REPORT

Construction Documentation Report
Interim Action

Kewaunee Marsh Arsenic Site
Kewaunee, Wisconsin

STS Consultants Ltd.
Consulting Engineers

June 11, 1996

Mr. James R. Reyburn
Wisconsin Department of Natural Resources
1125 North Military Avenue
P.O. Box 10448
Green Bay, Wisconsin 54307-0448

Re: Construction Documentation Report for Interim Action at the Kewaunee Marsh Arsenic Site, Kewaunee, Wisconsin -- STS Project No. 20716XA

Dear Mr. Reyburn:

STS Consultants, Ltd., (STS) is pleased to submit this report which describes construction of the Interim Action at the Kewaunee Marsh Arsenic Site. The Interim Action was completed in substantial accordance with the Work Plan dated July 26, 1995, and the Work Plan Addendum dated December 29, 1995. Also included are plans for cover revegetation and site monitoring as described in the signed Consent Order.

If you have any questions, please contact Mike Berger or Mark Bergeon at (414) 468-1978.

Sincerely,

STS CONSULTANTS LTD.

William R. Racine
Assistant Project Engineer

Michael T. Berger
Microbiologist

Mark A. Bergeon, P.G.
Associate

MTB/vmv.wd

(C416A001)

"I, Michael D. O'Shea, hereby certify that I am a registered professional engineer in the State of Wisconsin, registered in accordance with the requirements of ch. A-E4, Wis. Adm. Code; that this document has been prepared in accordance with the Rules of Professional Conduct in ch. A-E8, Wis. Adm. Code; and that, to the best of my knowledge, all information contained in this document is correct and the document was prepared in compliance with all applicable requirements in chs. NR 700 to 726, Wis. Adm. Code."

Professional Engineer 28510
Signature, title and P.E. Number — P.E. stamp

"I, Michael T. Berger, hereby certify that I am a scientist as that term is defined in s. NR 712.03(3), Wis. Adm. Code, and that, to the best of my knowledge, all of the information contained in this report is correct and the document was prepared in compliance with all applicable requirements in chs. NR 700 to 726, Wis. Adm. Code."

Microbiologist 6/11/96
Signature and Title — Date

STS Consultants Ltd.
Consulting Engineers

1035 Kepler Drive
Green Bay, Wisconsin 54311
414.468.1978/Fax 414.468.3312

Copy to:

Mr. Thomas P. McElligott
Quarles & Brady
411 East Wisconsin Avenue
Milwaukee, Wisconsin 53202-4497

Mr. Robert E. Dowdy
14533 South 85th Avenue
Orland Park, Illinois 60462

Report

PROJECT

CONSTRUCTION DOCUMENTATION REPORT
INTERIM ACTION
KEWAUNEE MARSH ARSENIC SITE
KEWAUNEE, WISCONSIN

Project No.

20716XA

Date

JUNE 1996

STS Consultants Ltd.
Consulting Engineers
1035 Kepler Drive
Green Bay, Wisconsin 54311-8320
414.468.1978/Fax 414.468.3312

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KEWAUNEE, WISCONSIN
STS PROJECT NO. 20716XA -- JUNE 1996

1.0 INTRODUCTION

1.1 Location

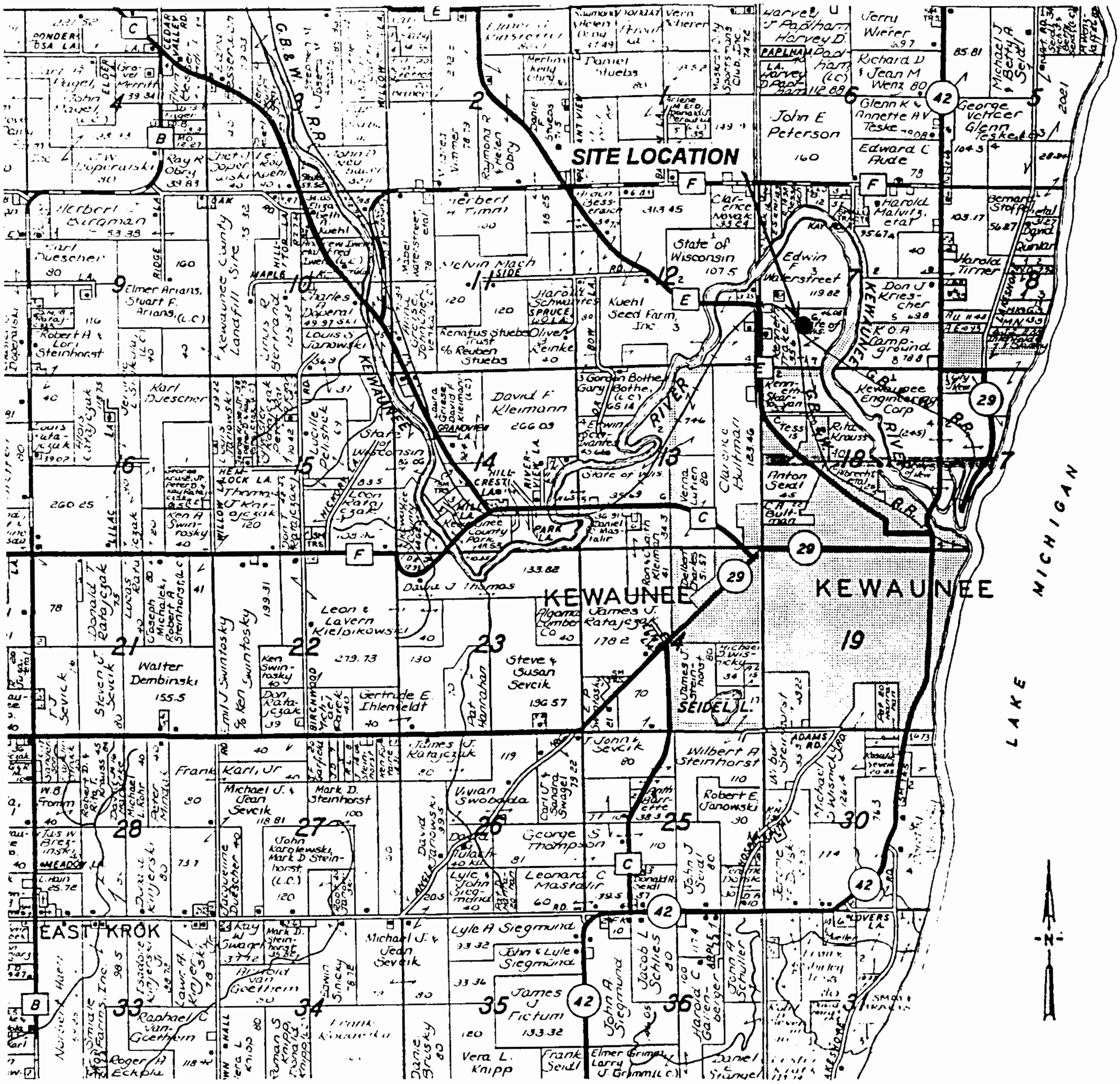
The project site is located in the C. D. Besadny Fish and Wildlife Area, which is located in the SW 1/4, Section 7, T23N, R25E, Township of Pierce, Kewaunee County, Wisconsin. The site is approximately one mile northwest of State Hwy. 42 along trackage previously known as the "ferry yard lead." The approximate location is indicated on Figure 1. Aerial photographs illustrating the site are provided in Appendix B.

1.2 Interim Action Conceptual Design

Based upon review of remedial alternatives and site assessment results, an Interim Action was developed. The Interim Action included placement of a temporary geotextile/wood chip cover over the visibly impacted areas of the marsh and installation of an additional 2,500 feet of chain-link fence. The Interim Action was designed to restrict site access and to limit direct contact exposure from the most heavily impacted areas of the marsh.

The Interim Action was also designed to address overland flow transport of arsenic. Construction of the proposed permeable cover would prevent direct runoff from the area of highest arsenic impact and reduce the potential for elevated arsenic concentrations reaching the river. With the cover in place, a portion of the precipitation which falls on the temporary cover will run off without contacting the arsenic impacted area. The remainder of the precipitation will evaporate or percolate through the temporary cover and will not contribute to overland flow.

BRUNING 542200



MAP SOURCE: KEWAUNEE COUNTY WISCONSIN PLAT BOOK DATED 1989

STS Consultants Ltd.
Consulting Engineers

PROJECT/CLIENT

KEWAUNEE MARSH ARESNIC SITE
C.D. BESADNY WILDLIFE AREA
KEWAUNEE, WISCONSIN
SITE LOCATION DIAGRAM

DRAWN BY	MTB	5/01/96
CHECKED BY	MAB	5/6/96
APPROVED BY		
SCALE 1 1/4" = 1 MILE	FIGURE NO. Fig. 1	
STS DRAWING NO. 20716XA		

1.3 Cooperative Action

Impact delineation suggested that the majority of arsenic was present on State lands. As arsenic impact exists on both railroad and State lands, the FVW (current owner of the railroad right-of-way) entered into a cooperative agreement with the State of Wisconsin to implement the Interim Action. This agreement was formalized in Consent Order No. 96-LMEE-006, signed by FVW on February 7, 1996, and the State of Wisconsin on February 23, 1996. Under this Consent Order, FVW agreed to implement the proposed Interim Action consisting of a geotextile/wood chip cover and security fence placement. The State agreed to provide partial funding for the Interim Action and provide in-kind services for toxicological assessment and biological monitoring. A copy of this Consent Order has been included in Appendix A.

2.0 INTERIM ACTION CONSTRUCTION

The Interim Action was implemented in substantial accordance with the Consent Order. The Interim Action included placement of a geotextile/wood chip cover and security fence to limit direct contact exposure and restrict site access.

Approval to implement the Interim Action was granted by the WDNR Environmental Repair and Response Program on July 27, 1995. Approval to install the temporary cover and security fence in the wetland was granted by the United States Army Corps of Engineers on October 26, 1995, and by the WDNR Department of Water Regulation and Zoning on January 9, 1996. Approval was issued by the Department of Water Regulation and Zoning pursuant to Manual Code 3565.1 in lieu of a Chapter 30 permit. Copies of these approvals and an interoffice memo describing conditions of the Department of Water Regulation and Zoning approval are included in Appendix A.

2.1 Cover Design and Construction

The Interim Action included placement of a geotextile/wood chip cover over the visibly impacted areas of the marsh. Included in the cover design were application of agricultural lime and placement of polystyrene sheets prior to installation of the geotextile fabric. After fabric placement, an anchoring berm was installed followed by placement of the wood chip cap. Details of cover construction are provided below. Photographic documentation of cover construction is included as Appendix B.

2.1.1 Lime

Approximately 30 cubic yards of granular lime was placed on the area to be covered by the geotextile fabric. Lime was loaded into a side-dumping railcar and transported to the site on January 16, 1996. Lime was placed using track-mounted, low-ground pressure bulldozers. A photograph illustrating lime placement is included in Appendix B.

The purpose of the lime was to precipitate soluble arsenic, inhibiting both horizontal and vertical movement. Calculations for the lime are in Appendix C. A granular form of lime was chosen so as to minimize the loss of the material during placement.

2.1.2 Polystyrene

Approximately 212 sheets of 18-foot x 4-foot x 5-inch polystyrene were placed on areas of the marsh devoid of vegetation. The polystyrene was transported to the site and placed by Superior Special Services, Inc., on February 15, 1996.

The purpose of the polystyrene was to provide a supportive surface for the cover. The polystyrene was placed to provide additional buoyancy in the low solids areas, allowing the cover to settle evenly. The polystyrene buoyancy calculations are included in Appendix C. The approximate location of the polystyrene blocks is illustrated on Sheet 20716XA-AB1. Photographs illustrating polystyrene block placement are included in Appendix B.

2.1.3 Geotextile

Approximately 155,000 square feet of geotextile fabric was used to cover the visibly impacted areas. The geotextile used was a woven material with a minimum width strength of 300 pounds per inch in both the machine and cross direction at 5% elongation. All of the geotextile fabric tests met or exceeded the minimum requirements. Results of geotextile testing are presented in Appendix D.

The purpose of the geotextile fabric was to provide a high-strength, permeable barrier between the marsh and the wood chip cover. The purpose of the geotextile is to separate the wood chip material from the marsh surface and provide support. In addition, the permeable fabric will allow precipitation to infiltrate through the cover, minimizing ponding and subsequent cover settling.

2.1.3.1 Geotextile Seaming

The geotextile was sewn into three large panels, requiring approximately 13,000 feet of seams. The three panels were sewn by Superior Special Services, Inc., in Nekoosa, Wisconsin. The seams were sewn at approximately 4.5 stitches per inch with a minimum required ultimate seam strength of 300 pounds per inch. After sewing, the three panels of fabric were loaded onto a trailer and transported to Kewaunee. The final two seams were sewn on site. All of the seams passed the minimum requirements. Results of geotextile seam testing are presented in Appendix D. Photographs of geotextile seaming and transport are included in Appendix B.

2.1.3.2 Geotextile Placement

The geotextile fabric was placed on February 15, 1996. The fabric was pulled into place over the lime and polystyrene blocks by low-ground pressure bulldozers and Superior Special Services, Inc.'s, personnel. The location of the geotextile cover is illustrated on Sheet 20716XA-AB1. Photographs illustrating geotextile placement are illustrated in Appendix B.

2.1.4 Anchor Berm Fill Material

Approximately 220 cubic yards of fill material was placed near the eastern end of the geotextile cover to create an anchor berm. The fill material has a unit weight between 125 and 145 pounds per cubic foot. The fill material was delivered by side-dumping railcars and placed with a tracked loader.

The purpose of the fill material was to provide anchoring support for the geotextile fabric. Buoyancy calculations for the fill material are illustrated in Appendix C. The location of the fill material is illustrated on Sheets 20716XA-AB1 and 20716XA-AB2.

2.1.5 Wood Chip Cover Material

Wood chip material was provided by the City of Green Bay. This material consisted of a mixture of yard mulch and wood chips. This material was transported to the Itel Corporation Lease Site in the FVW Prairie Avenue yard. Stockpiling began during August 1995 and continued through December 1995. Approximately 28,000 cubic yards

of loose material was stockpiled during this time. Approximately 20,000 cubic yards of compacted material was loaded from the final stockpile onto side-dumping railcars and delivered to the site. Differences in stockpiled volumes, to volumes delivered to the site, were due to compaction and consolidation.

2.1.5.1 Wood Chip Placement

Wood chips were stockpiled on the south end of the fabric and then pushed over the geotextile by low-ground pressure bulldozers so as not to damage the fabric. Wood chips were placed to a compacted depth of 2.0 to 2.5 feet over the entire fabric.

The final cover thickness differs from the estimated 4-foot depth described in the Work Plan. This difference is due to compaction of the heterogeneous mulch material. Although the mass of wood chips is roughly the same, the density of the cover material has increased. The denser cover should perform adequately for limiting direct contact exposure. In addition, the compacted cover should be less susceptible to erosion and more efficient in shedding precipitation. Cover dimensions are illustrated on Sheets 20716XA-AB1 and 20716XA-AB2.

2.1.5.2 Wood Chip Placement in Depressions

Results of WDNR site assessment conducted during May and June 1995, suggested that water-filled depressions near the area to be covered contained high concentrations of arsenic, and thus constituted a threat to wildlife. Two depressions were identified within the fenced area near the area to receive the geotextile and wood chip cover. Approximately 164 cubic yards of wood chips

were placed in the depression just north of the cover. Approximately 60 cubic yards of wood chips were placed in the second depression located just south of the cover. Locations of filled depressions are illustrated on Sheet 20716XA-AB1.

Wood chips were placed in the depressions to minimize ponded arsenic-impacted water. The filled depressions would no longer be available for waterfowl, which further reduces the risk of wildlife arsenic exposure.

2.2 Chain-Link Fence

Approximately 2,430 feet of 6-foot-high chain-link fence was installed. A permit to install fence within 300 feet of the river was obtained from the Kewaunee County Zoning Administration on December 12, 1995. A copy of this permit is included in Appendix A. An additional 900 feet of 6-foot-high chain-link fence were reinstalled along the railroad grade. The posts for the chain-link fence installed in the marsh were 18 feet long, driven 12 feet into the ground. Poles were spaced on 10-foot centers. Specifications for the fence are provided in Appendix E.

An additional 30 hazard identification signs were installed on the 2,430 feet of fence in the marsh area. This is in addition to the 10 existing signs on the 900 feet of fence reinstalled along the railroad right-of-way. The hazard identification signs read:

Danger
Inorganic Arsenic
Authorized Personnel Only
No Smoking or Eating
Respirator Required

Signs were installed in general conformance to OSHA Standard 29 CFR 1910.1018.

The purpose of the chain-link fence was to limit site access. Maintenance of the fence will be the responsibility of the WDNR as specified in the Consent Order. The location of the fence is illustrated on Sheet 20716XA-AB1.

2.3 Snow Fence

Approximately 1,850 feet of 4-foot-high wood lath snow fence was placed along the outer edge of the wood chip cover. The snow fence was held in place by 6-foot-long steel posts driven on 10-foot centers approximately 2 feet into the marsh surface. The purpose of the snow fence was to minimize the risk of cover erosion during high water periods. The location of the snow fence is illustrated on Sheet 20716XA-AB1.

3.0 SITE RESTORATION

3.1 Prairie Avenue Yard

The Itel Corporation Lease Site at the FVW Prairie Avenue yard will be restored in 1996 in accordance with a verbal request made by Jerry Smith with the U.S. Corps of Engineers. Existing base coarse material will be removed and residual wood chip material will be spread evenly across the site.

3.2 Site Vegetation

Approval for construction of the Interim Action was granted by the WDNR pursuant to Manual Code 3565.1 on January 8, 1996. A copy of this approval is included in Appendix A. One of the conditions of this approval was that the temporary wood chip cover be seeded and/or protected with a vegetative cover by May 15, 1996.

Approximately four acres comprising the temporary cover were fertilized and seeded on May 7, 1996. Approximately 300 pounds of nitrogen fertilizer and 500 pounds of seed were spread. The fertilizer composition and application rates were determined from wood chip material analysis performed by the WDHIC Soil and Forage Laboratory in Bonduel, Wisconsin (Appendix F). The seed mixture was determined by the WDNR and will contain 75% annual rye, 19% bluegrass, 4% timothy, and 2% redtop. The application rate was determined by STS.

The seed mix was developed to establish a vegetated mat to protect the temporary cover, while at the same time limiting its attractiveness to wildlife. Seeding will be documented under separate cover. The fertilizer and seed application rates are included in Appendix F.

4.0 SITE MONITORING

4.1 Temporary Monitoring Points

Six temporary groundwater monitoring points were installed in the wetlands surrounding the cover in substantial accordance with the WDNR correspondence dated March 14, 1996, and the Consent Order. Locations of the temporary monitoring points are illustrated on Sheet 20716XA-AB1. Temporary monitoring points were constructed using a 3-foot riser pipe attached to a 5-foot length of factory slotted Schedule 40 PVC fitted with a pointed PVC bottom cap. A slot width of .006 inch was used to minimize fouling. Temporary monitoring points were installed by pushing them to depths of 6 to 7 feet below grade. No filter pack or surface seal was used during installation. STS also installed a staff gauge in the Kewaunee River to measure stream level fluctuations.

4.2 Groundwater Monitoring

All site monitoring and analyses will be conducted in substantial accordance with the Consent Order. Groundwater table elevations and river level staff gauge readings will be taken monthly during April through October of 1996. During the period of November 1996 through March 1997, groundwater table elevations and river level readings will be taken on a quarterly basis. Sampling of temporary monitoring points to assess groundwater quality will occur on a quarterly basis for the first year. Sampling frequency thereafter will depend on the first year's data. Field measurements of groundwater will include temperature and conductivity. Color, odor, and turbidity of the sample will also be noted in the field. Laboratory analyses will be performed for total arsenic in an unfiltered sample and the filtrate from a filtered sample.

4.3 Surface Water Quality Monitoring

Surface water samples will be collected at a near-shore location along the right, downstream bank of the Kewaunee River in a line directly east of the area covered. Samples will be collected

on a quarterly basis for the first year. Sampling frequency thereafter will depend on the results of the first year's data. Field measurements will include temperature and conductivity. Laboratory analysis will be performed for total arsenic in an unfiltered sample.

4.4 Biological Studies

As described in the Consent Order, the WDNR has committed to conducting a biological studies component in order to assess the short- and long-term effectiveness and potential impact of the Interim Action. Biological studies may include laboratory toxicity testing of soils and water, in-field studies of biota to assess arsenic exposure levels, and chemical analyses of soils, water, plant and animal tissues. The WDNR will keep the railroad informed of the progress and results of the biological studies, including, but not limited to, sending the railroad copies of reports or memorandums regarding the studies.

4.5 Modeling

As described in the Consent Order, monitoring data will be analyzed to determine rate and transport of arsenic impact within the wetland system. Modeling will be conducted to estimate the transport of arsenic by groundwater from the site to the Kewaunee River. Depending on modeling results, the Interim Action implemented may be proposed as the final Remedial Action. A description of models used and results of modeling will be detailed under separate cover.

5.0 GENERAL QUALIFICATIONS

STS was retained to monitor construction of the Interim Action at the Kewaunee Marsh Arsenic Site. Superior Special Services, Inc., was the general contractor in charge of geotextile seaming and cover placement.

Based on observations at the site, the Interim Action was completed in substantial conformance with design plans and specifications. Test results indicate the geotextile fabric exceeded design specification requirements.

Based on observations at the site, the final thickness of the temporary cover is less than the original design plans, which is documented in this report. In our opinion, the temporary cover at the Kewaunee Marsh Arsenic Site has been constructed in general conformance with the intent of the design plans and WDNR requirements.

APPENDIX A

Consent Order

WDNR Approvals

U.S. Corps of Engineers Approval

Kewaunee Zoning Administration Permit

WISCONSIN
DEPT. OF NATURAL RESOURCES

State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES

George E. Meyer
Secretary

Lake Michigan District Headquarters
1125 N. Military Avenue
P.O. Box 10448
Green Bay, WI 54307-0448
TELEPHONE # (414)492-5864
TELEFAX # (414)492-5913

July 27, 1995

Ms. Janet Gilbert
Fox Valley and Western Ltd.
P.O. Box 5062
Rosemont, IL. 60017-5062

Re: Kewaunee Marsh Arsenic Site

Dear Ms. Gilbert;

The following is in response to our meeting on July 25, 1995 in Green Bay regarding proposed interim remedial action at the Kewaunee Marsh arsenic site. The Department has determined that the proposed interim action (fence, cap and monitoring) would be an approvable action. The Department's flood plain and zoning rules would still be applicable and a water regulation and zoning permit may be required. STS Consultants should proceed with the development of a detailed interim action workplan for submittal to the Department.

The Department is interested in a cost sharing cooperative agreement but due to budgetary constraints the extent of that cost share cannot be determined at this time. This is something we will have to investigate and agree to in the future cooperative agreement. If you would like to discuss this matter further or schedule another meeting please contact me at (414) 492-5864.

Sincerely,

James Reyburn
Project Manager

cc: Bruce Urben - LMD
Dave Hildreth - LMD
Jim Raber - LMD
Ron Fassbender - LMD
Tim Doelger - LMD
Robert Strous - SW/3
Lee Liebenstein - WM/2
Robert Dowdy
Mike Berger - STS
Mark Bergeon -STS
Thomas McElliot - Quarles & Brady
Joe Renville - LG/5

State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES

Tommy G. Thompson, Governor
George E. Meyer, Secretary

Box 7921
101 South Webster Street
Madison, Wisconsin 53707-7921
TELEPHONE 608-268-2621
FAX 608-267-3579
TDD 608-267-6897

February 23, 1996

Thomas P. McElligott, Esq.
Quarles & Brady
411 East Wisconsin Avenue
Milwaukee, WI 53202

Casetrack ID 96-LMEE-006
FID# 431052270

SUBJECT: Revised Consent Order for Kewaunee Marsh Arsenic Site

Dear Mr. McElligott:

Enclosed is your client's copy of the signed Consent Order.

Failure to abide by the conditions of this Consent Order to which you have agreed may cause the Department to pursue further enforcement action.

If you have any questions on this matter, please contact Attorney Joseph Renville, Bureau of Legal Services, at (608) 266-9454.

Sincerely,

Brenda B. Hagman

Brenda B. Hagman, Director
Office of Environmental Enforcement
Bureau of Law Enforcement

c: ERR/SW/3
J. Renville - LC/5
L. Liebenstein - WR/2
J. Reyburn - LMD
D. Helf - LMD

BEFORE THE
STATE OF WISCONSIN
DEPARTMENT OF NATURAL RESOURCES

In the Matter of Hazardous Substance Contamination at the Kewaunee Marsh Site in the Town of Pierce, Kewaunee County, Wisconsin	))))	**Casetrack ID# 96-LMEE-006 CONSENT ORDER No. 96-LMEE-006 FID No. 431052270**

FINDINGS OF FACT, CONCLUSIONS OF LAW AND ORDER

The following constitutes a summary of the Findings of Fact and Conclusions of Law upon which the Wisconsin Department of Natural Resources ("the Department") bases Consent Order No. 96-LMEE-006.

FINDINGS OF FACT

The Department asserts the following finding of facts:

1. Arsenic contamination exists in the Kewaunee Marsh and adjacent wetlands located in the Southwest One-Quarter (1/4) of Section Seven (7), Township Twenty Three (23) North, Range Twenty Five (25) East, near the Town of Pierce, Kewaunee County, (hereinafter referred to as "the Site"). The Site has an area of approximately 8 acres.

2. The Department became concerned that arsenic contaminants, posing a risk to human health and the environment, existed at the Site. Fox Valley & Western Ltd. ("as a successor in interest to the Green Bay and Western Railroad (hereinafter collectively referred to as "the Railroad"), has conducted an environmental assessment of the Site and has initially identified areas of higher concentration of arsenic contamination. The Railroad has also installed a security fence and warning signs around a portion of the perimeter of the Site.

3. The Department has conducted an environmental assessment at the Site and has collected soil and groundwater samples, and conducted toxicity testing.

4. Interim actions to be completed at the Site include the installation of groundwater monitoring wells, periodic sampling of the Kewaunee River water, a biological study and a program of long term monitoring of the groundwater and biota of the Site. An Interim Action proposed by the Railroad and

approved by the Department includes geotextile membrane and cap of woodchips, grass and leaves (hereinafter collectively referred to as "woodchips") to isolate the direct exposure pathway to the arsenic contaminated areas.

CONCLUSIONS OF LAW

It is the Department's position that:

1. Arsenic present at the Site is a "hazardous substances" as that term is defined in s.144.01(4m), Stats.

2. Under s. 144.76(7)(a), Stats., the Department has the authority to take actions to "identify, locate, monitor, contain, remove, or dispose" of hazardous substances that are discharging, or threaten to discharge, to the environment. Under s. 144.442, Wis. Stats., the Department has the authority to take environmental repair action to protect public health, safety or welfare, or the environment.

3. Under s. 144.76(7)(c), Stats., the Department has the authority to issue an administrative order to persons possessing, controlling, or responsible for the discharge of hazardous substances to in order to protect public health, safety or welfare. This includes the authority to enter into a consent order with owners of contaminated property.

4. This Consent Order is reasonable and necessary to accomplish the purposes of s. 144.76, Stats., and is enforceable under ss. 144.98 and 144.99, Stats.

CONSENT ORDER

Without admitting any finding of fact or conclusion of law alleged by the Department, the Railroad agrees to fully comply with the requirements of the following Department Consent Order:

1. The Department and the Railroad agree to cooperate in the implementation of the Interim Actions. Implementation of the interim action plan shall be in compliance with the terms and conditions of the Department's approvals and the requirements of chs. NR 103, 105, 140, 141 and 724, Wis. Adm. Code. Local permits and approvals must be obtained before conducting the interim actions.

2. The interim action plan includes the following activities:

a. the stockpiling and delivery of woodchips to be used in the interim action;

b. the installation of the geotextile and woodchip cover; and the installation of the security fence;

c. Monitoring of the site will be conducted as a partnership to include:

(1). Groundwater

A. The Railroad will install a minimum of five groundwater monitoring points in the wetland. At least one point will be located south of the tracks where elevated arsenic levels were found in the groundwater. The design and location of the monitoring wells shall be selected by the Department Project Manager. The monitoring points shall be installed within thirty (30) days following selection of the design and location.

B. The monitoring points will be constructed, located, operated to determine groundwater elevations, flow directions, and quality. The locations of the wells and all groundwater elevations will be referenced to state plane coordinates and the national vertical geodetic datum of 1929.

C. A staff gauge will be installed to obtain water level readings in the river.

D. Given the wetland soil conditions, installation of driven point monitoring wells under s. NR 141.27, Wis. Adm. Code, will be done in lieu of standard well construction procedures under ch. NR 141, Wis. Adm. Code. Periodic resurveying to check the driven point well elevations will be performed to ensure the accuracy of groundwater elevation readings and to correct for potential datum changes as a result of winter freeze-thaw cycles.

E. Groundwater table elevations and river level staff gauge readings will be taken monthly during April through October of 1996. During the period of November of 1996 through March of 1997, groundwater table elevations and river level readings will be taken on a quarterly basis.

F. Sampling of monitoring points to assess groundwater quality will occur on a quarterly basis for the first year. Sampling frequency thereafter will depend on the first year's data.

G. The data available after each monitoring event will be reviewed by the Department and the Railroad for changes and/or trends.

H. In-field measurements of groundwater will include temperature and specific conductance. Color, odor, and turbidity of the sample should be noted in the field. Laboratory analysis will be performed for total arsenic in an unfiltered sample and in the filtrate from a filtered sample. Other measurements and sampling detail will be established by the Department Project Manager.

I. The Railroad will retain consultants or in-house expertise to perform an analysis of the monitoring data, including data collected by other parties (e.g., the USGS river gauge near Kewaunee, Site 04085200) to calculate the transport of arsenic by groundwater from the site to the Kewaunee River. This analysis will determine the transport and fate of arsenic from this site.

(2). Kewaunee River Water

A. Surface water samples shall be collected by the Railroad at a near-shore location along the right downstream bank of the Kewaunee River in a line directly east of the area to be covered in the wetland. The sample location may be anywhere along the 300-foot segment of river bank south of the above line where it intersects the river.

B. River water samples shall be collected by the Railroad on a quarterly basis for the first year. Sampling frequency thereafter will depend on the results of the first year's data.

C. Field measurements will be made for temperature and conductivity. Total arsenic will be analyzed for in unfiltered river water samples. Other measurements and sampling detail will be established by the Department Project Manager.

(3). Biological Studies

A. In order to assess the short and long term effectiveness and impact of the interim action, the Department is committed to conducting a biological studies component. In committing to the biological studies component, the Department will provide, at a minimum, in-kind services of approximately $35,000 for pre-and-post interim action implementation monitoring with a post implementation monitoring period covering one year. Biological studies may

include laboratory toxicity testing of soils and water, in-field studies of biota to arsenic exposure levels, and chemical analysis of soils, water, plant and animal tissues.

B. Commitment, continuation, and design of biological field studies after one year of interim action implementation by the Department will depend on the first year of monitoring results.

C. The results of the Department's June 1995 biological studies demonstrated that the existing dug wildlife ponds to the North and East of the impacted wetland present an unacceptable risk of exposure to humans, wildlife, or aquatic life. Therefore, the Railroad shall fill the ponds with wood chips as part of the interim actions.

D. The Department will keep the Railroad informed of the progress and results of the biological studies, including but not limited to sending the Railroad copies of reports or memorandums regarding the studies.

3. In order to assure the implementation of the interim action, the Department shall contribute monetary and in-kind services of $105,000 to the costs of interim actions. This amount will be used to cover the following costs.

a. $50,000 from the Environmental Fund. This amount will be contributed as cost share to cover expenses related to the covering and fencing of the most highly contaminated arsenic area. The Department shall reimburse the Railroad $50,000, within 45 days after the Railroad or its consultant submits to the Department a report which documents that the Railroad has covered the arsenic contaminated areas, and has successfully fenced the area.

b. In addition to $30,000 already expended by Water Resource Management (WRM), to conduct toxicity testing at six locations at the site, $35,000 of WRM funds will be used by the Department for conducting a study of the impact and threats of the arsenic on the biological components of the site.

c. The Department will contribute $20,000 of Water Resource Management funds as cost share for the installation and monitoring of the groundwater monitoring points. The Department will provide the $20,000 to the Railroad or it's consultants upon the Department's review and approval of an installation and monitoring plan to be submitted no later than April 1, 1996.

4. The Department will be responsible for the upkeep, maintenance and repair of the security fence.

5. Following completion of the groundwater and Kewaunee River water sampling provided in paragraph 3c.(1) and (2) above, the Department and the Railroad will cooperatively discuss the need and responsibility for continued monitoring and, if necessary, modify this consent order.

6. The parties acknowledge and agree that although approved only as an interim action, the work to be undertaken pursuant to this order may, depending on the results of the long term monitoring and /or hydraulic modeling, be a reasonable and appropriate final remedy.

7. In the event that the Railroad receives any insurance proceeds which reimburse the Railroad for costs incurred to conduct the interim action at the Site, the Railroad agrees to repay the Department either the amount reimbursed or the $105,000, which ever is less, within 30 days of receiving said reimbursement. Nothing contained herein shall be construed to require the Railroad to commence an action against its insurers or any other party.

8. Nothing in this Consent Order shall be deemed to waive the right of the Department or the Railroad to seek cost recovery for the costs incurred in connection with the Site from any other parties. The Railroad and the Department will cooperate in any reasonable efforts by the Department to identify other potential responsible parties and to recover the state's cost share under this Consent Order.

9. The Railroad shall submit three copies of any report required by this Consent Order to the following address:

Department of Natural Resources
Lake Michigan District, Green Bay Office
1125 N. Military Avenue
Green Bay, Wisconsin 54307-0448
Attn: Jim Reyburn

10. The Railroad's consent to the issuance of this order and agreement to undertake the work herein shall not be construed as an admission or acknowledgement that it is liable or responsible in any manner for the contamination at the Site.

11. This Consent Order may be modified in writing upon mutual agreement of the parties.

12. Except as set forth below, the Department shall not initiate or cause to be initiated any administrative or judicial action (including issuance of subsequent administrative orders) against the Railroad in connection with or related to the interim actions for the Site or cost incurred in connection therewith. Provided, however, the Department may initiate such action: (1) to the extent necessary to enforce the terms of this order; or (2) if the interim actions are determined not to be a reasonable and appropriate final remedy to allow closure in accordance with s. 144.76 Stats. and ch. NR. 726, Wis. Adm. Code, or (3) if conditions at the site have materially changed and such changes necessitate the initiation of an action to protect human health or the environment.

13. Nothing contained in this order shall be deemed as a waiver or relinquishment of any right the Railroad may have to contest or defend any subsequent administrative or judicial action initiated by the Department, including not limited to any attempt to modify this order.

14. This Consent Order shall be effective on the date that it is signed by the second of the two parties.

The undersigned hereby certifies that he/she is legally authorized to sign this Consent Order on behalf of the respective parties.

FOX VALLEY & WESTERN LTD.

William J. Korbe Date FEB. 7, 1996

Title: V.P. - ENGINEERING

STATE OF WISCONSIN
DEPARTMENT OF NATURAL RESOURCES
For the Secretary
By:

Brenda B. Hagman Date Feb 23, 1996

Brenda B. Hagman, Director
Office of Environmental Enforcement
Bureau of Law Enforcement

STIPULATION AND WAIVER

Fox Valley & Western Ltd. hereby waives further notice, its statutory right to demand an administrative hearing before the Department of Natural Resources and to commence any judicial action regarding the foregoing Consent Order under ss. 144.76, 227.42, 227.52 and 227.53 Stats., or any other provision of law. Fox Valley & Western Ltd. further stipulates and agrees that the Consent Order is effective and enforceable upon being signed by both parties and may be enforced in accordance with ss. 144.76, 144.98, and 144.99, Stats., and chs. NR 700-736, Wis. Admin Code. The undersigned hereby certifies that he/she is legally authorized by Fox, Valley & Western Railroad to execute such Consent Order, Stipulation and Waiver.

FOX VALLEY & WESTERN LTD.

William J. Korbe Date FEB. 7, 1996

Title: V.P. - ENGINEERING

WISCONSIN
DEPT. OF NATURAL RESOURCES

George E. Meyer
Secretary

State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES

Lake Michigan District Headquarters
1125 N. Military Avenue
P.O. Box 10448
Green Bay, WI 54307-0448
TELEPHONE # (414)492-5865
TELEFAX # (414)492-5913

January 9, 1996

Mr. Geoffrey Nokes
Fox Valley & Western Ltd.
P.O.Box 5081
Rosemont, IL. 60017-5081

Re: C.D. Besadny Fish and Wildlife Area Arsenic Contamination, Kewaunee, WI.

Dear Mr. Nokes;

Attached is an approval from the Department Water Regulation and Zoning section for construction of a cover and fencing in the C.D. Besadny Wildlife Area. This approval is issued pursuant to Manual Code 3565.1 in lieu of a Chapter 30 permit. The proposed cover and fence is an interim remedial action designed to reduce direct contact and surface water migration exposure pathways. The installation of groundwater monitoring wells, surface water and biological monitoring will provide information to assess the degree and extent of contamination and the need for any future remedial action.

Therefore Fox Valley & Western Ltd. should proceed as soon as possible with the construction of the interim action remedy as outlined in the STS Consultant workplan dated August 15, 1995 and Addendum to the Work Plan dated December 29, 1995, subject to the Water Regulation approval special conditions. Please provide me an updated schedule of work.

The Department looks foreword to working in cooperation with the Railroad in addressing this problem. If you have any questions please contact me at (414) 492-5864.

Sincerely;

James Reyburn
Project Manager

cc: Mike Russo - Green Bay Area
Joe Renville-LG/5
Bruce Urben-LMD
Tom Bahti - GBA
→ Mike Berger - STS
Bob Dowdy
Janet Gilbert - Fox Valley & Western

CORRESPONDENCE/MEMORANDUM

State of Wisconsin

DATE : January 8, 1996

FILE : 3560
3LM-95-674

TO : James Reyburn LMD Solid Waste

FROM : Michael Russo GRB

SUBJECT : C. D. Besadny Fish and Wildlife Area Arsenic Contamination Interim Remedial Action

Approval in hereby granted pursuant to Manual Code 3565.1 to construct the Interim Containment Structure at the C. D. Besadny Fish and Wildlife Area.

The approval is granted based on the original Interim Action dated August 15, 1995 and the Addendum to Work Plan for Interim Action from STS Consultants, Ltd. dated December 29, 1995. The interim action consists of leveling the area and the placement of a geotextile/wood chip cover over an area approximately 900 feet by 240 feet starting at the Fox Valley and Western Ltd. tracks and running east. The area will be prepared by placing up to 30 tons of granular lime, the open areas will be covered with polystyrene sheet, The entire area will be covered with a geotextile material, road gravel will be placed on the eastern perimeter and the area will be covered with up to four feet of wood chips.

The project is approved subject to the following conditions and will expire on January 8, 1998.

Sp ial Conditions

1. The wood chips shall be placed at a minimum of a 4:1 side slope.

2. The wood chip perimeter shall be protected with snow fencing or a similar material.

3. The wood chips shall be seeded and/or protected with a vegetative cover by May 15, 1996.

4. The additional isolated ponds within the chain link fence shall be covered in a similar manner as the main contaminated area.

5. The site shall be monitored closely during the initial ice cover melting to assure that the cover does not migrate from the intended site. If movement does occur additional steps shall be taken to anchor the cover.

6. The site shall be closely monitored during the spring runoff to determine the potential and/or prevention of actual erosion to the side sloped of the wood chip cover. If erosion starts to occur immediate action shall be taken to prevent the movement of the wood chips from the covered site.

cc Ron Fassbender
Jim Raber
Tom Bahti

WISCONSIN
DEPT. OF NATURAL RESOURCES

George E. Meyer
Secretary

State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES

Lake Michigan District Headquarters
1125 N. Military Avenue
P.O. Box 10448
Green Bay, WI 54307-0448
TELEPHONE # (414)492-5864
TELEFAX # (414)492-5913

March 14, 1996

Mr. Michael Berger
STS Consultants Ltd.
1035 Kepler Dr.
Greem Bay, WI. 54311

Re: Kewaunee Marsh Arsenic Site

Dear Mr. Berger,

I looked at the March 6, 1996 transmittal letter and plan sheet for the groundwater monitoring point placement. As we discussed at our meeting at your office on March 13, I recommend that six monitoring wells be installed at the site at the locations identified on the plan sheet. If the monitoring points are to bend or tip over time they should be replaced. All groundwater monitoring should follow the STS workplan addendum dated December 29, 1995 and section 2(c) of the consent order. Sufficient water volume should be collected to run both filtered and unfiltered samples.

Mr. Russo and myself inspected the site on March 13. One item of concern we found was the amount of plastic refuse interspersed within the organic cap. It appeared that the plastic refuse bags from lawn clippings were included in the City of Green Bay chipping process. It appeared the problem was the worst on the west end of the site. An attempt should be made to remove the plastic from the surface prior to seeding the site.

Please contact me at 492- 5864 if you have any questions.

Sincerely;

James Reyburn

cc: Mike Russo - NED

DEPARTMENT OF THE ARMY
ST. PAUL DISTRICT, CORPS OF ENGINEERS
ARMY CORPS OF ENGINEERS CENTRE
190 FIFTH STREET EAST
ST. PAUL, MN 55101-1638

October 26, 1995

OCT 27 1995

REPLY TO
ATTENTION OF

Construction-Operations
Regulatory (96-00581-NW-DCG)

Mr. Michael T. Berger
STS Consultants, Ltd.
1035 Kepler Drive
Green Bay, Wisconsin 54311

Dear Mr. Berger:

We have reviewed information about a project to discharge into wetlands geotextile fabric and woodchips as interim remedial action to isolate surficial arsenic contamination from direct contact in approximately 3.9 acres of wetlands adjacent to the Kewaunee River. The project site is in the SW 1/4 Sec. 7, T. 23N., R. 25E., Kewaunee County, Wisconsin.

This work is authorized by the Department of the Army nationwide permit referenced below and described in the enclosures, provided the enclosed conditions are followed. Also, the Wisconsin Department of Natural Resources (WDNR) shall be allowed reasonable entry and access to inspect any discharge for compliance with applicable state laws. You should notify the WDNR within five days prior to, and again five days following the discharge.

This determination covers only your project as described above. If the design, location, or purpose of the project is changed, you should contact us to make sure the work would not result in a violation of Federal law.

It is your responsibility to ensure that the work complies with the terms of this letter and the enclosures, AND THAT YOU OBTAIN ALL REQUIRED STATE AND LOCAL PERMITS AND APPROVALS BEFORE YOU PROCEED WITH THE WORK.

If you have any questions, contact Mr. Dale C. Gross in our Green Bay office at (414) 448-2824.

Sincerely,

for Ben Wopat
Chief, Regulatory Branch

Enclosures
Nationwide permit conditions

Determination: 33 CFR 330-App. A, number (38)
Copy furnished to: WDNR (Reference No. 3-LM-95-674)

B. Nationwide Permit

38. Cleanup of Hazardous and Toxic Waste. Specific activities required to effect the containment, stabilization, or removal of hazardous or toxic waste materials that are performed, ordered, or sponsored by a government agency with established legal or regulatory authority provided the permittee notifies the District Engineer in accordance with the "Notification" general condition. For discharges in special aquatic sites, including wetlands, the notification must also include a delineation of affected special aquatic sites, including wetlands. Court-ordered remedial action plans or related settlements are also authorized by this nationwide permit. This nationwide permit does not authorize the establishment of new disposal sites or the expansion of existing sites used for the disposal of hazardous or toxic waste. (Sections 10 and 404)

CORRESPONDENCE/MEMORANDUM

State of Wisconsin

DATE : March 4, 1996

FILE : 3560
3LM-95-674

TO : James Reyburn LMD

FROM : Michael Russo GRB

SUBJECT : Kewaunee Marsh Remedial Action Site

Over the last week I have had several conversations regarding the revegetation of the Kewaunee Marsh site with wildlife, our Water Reg. staff in Madison and the Environmental Analysis and Review staff in the District Office.

While no one was directly opposed to the use of reed canary grass (*Phalaris arundinacea)* there was a agreement that there may be other species that would work better. The main problem is that the majority of the species are also exotics. However, the chance of them migrating of site would be far less.

Therefore, it is recommended that the following seed mix be used to revegetate the site:

Kentucky Bluegrass (*Poa pretensis*)
Timothy (*Phleum pratense*)
Annual Rye certified annual
Redtop

Please forward this recommendation to STS as a change to the conditions of the manual code approval.

Thanks.

C. Nationwide Permit Conditions

General Conditions: The following general conditions must be followed in order for any authorization by a nationwide permit to be valid:

1. Navigation. No activity may cause more than a minimal adverse effect on navigation.

2. Proper maintenance. Any structure or fill authorized shall be properly maintained, including maintenance to ensure public safety.

3. Erosion and siltation controls. Appropriate erosion and siltation controls must be used and maintained in effective operating condition during construction, and all exposed soil and other fills must be permanently stabilized at the earliest practicable date.

4. Aquatic life movements. No activity may substantially disrupt the movement of those species of aquatic life indigenous to the waterbody, including those species which normally migrate through the area, unless the activity's primary purpose is to impound water.

5. Equipment. Heavy equipment working in wetlands must be placed on mats or other measures must be taken to minimize soil disturbance.

6. Regional and case-by-case conditions. The activity must comply with any regional conditions which may have been added by the division engineer (see 33 CFR 330.4(e)) and any case specific conditions added by the Corps.

7. Wild and Scenic Rivers. No activity may occur in a component of the National Wild and Scenic River System; or in a river officially designated by Congress as a "study river" for possible inclusion in the system, while the river is in an official study status. Information on Wild and Scenic Rivers may be obtained from the National Park Service and the U.S. Forest Service.

8. Tribal rights. No activity or its operation may impair reserved tribal rights, including, but not limited to, reserved water rights and treaty fishing and hunting rights.

9. Water quality certification. In certain states, an individual state water quality certification must be obtained or waived (see 33 CFR 330.4(c)).

10. Coastal zone management. In certain states, an individual state coastal zone management consistency concurrence must be obtained or waived. (see 33 CFR 330.4(d)).

11. Endangered Species. No activity is authorized under any NWP which is likely to jeopardize the continued existence of a threatened or endangered species or a species proposed for such designation, as identified under the Federal Endangered Species Act, or which is likely to destroy or adversely modify the critical habitat of such species. Non-federal permittees shall notify the district engineer if any listed species or critical habitat might be affected or is in the vicinity of the project and shall not begin work on the activity until notified by the district engineer that the requirements of the Endangered Species Act have been satisfied and that the activity is authorized. Information on the location of threatened and endangered species and their critical habitat can be obtained from the U.S. Fish and Wildlife Service and National Marine Fisheries Service. (see 33 CFR 330.4(f))

12. Historic properties. No activity which may affect Historic properties listed, or eligible for listing, in the National Register of Historic Places is authorized, until the DE has complied with the provisions of 33 CFR 325, Appendix C. The prospective permittee must notify the district engineer if the authorized activity may affect any historic properties listed, determined to be eligible, or which the prospective permittee has reason to believe may be eligible for listing on the National Register of Historic Places, and shall not begin the activity until notified by the District Engineer that the requirements of the National Historic Preservation Act have been satisfied and that the activity is authorized. Information on the location and existence of historic resources can be obtained from the State Historic Preservation Office and the National Register of Historic Places (see 33 CFR 330.4(g)).

Section 404 Only Conditions: In addition to the General Conditions, the following conditions apply only to activities that involve the discharge of dredged or fill material and must be followed in order for authorization by the nationwide permits to be valid:

1. Water supply intakes. No discharge of dredged or fill material may occur in the proximity of a public water supply intake except where the discharge is for repair of the public water supply intake structures or adjacent bank stabilization.

2. Shellfish production. No discharge of dredged or fill material may occur in areas of concentrated shellfish production, unless the discharge is directly related to a shellfish harvesting activity authorized by nationwide permit 4.

3. Suitable material. No discharge of dredged or fill material may consist of unsuitable material (e.g., trash, debris, car bodies, etc.) and material discharged must be free from toxic pollutants in toxic amounts (see section 307 of the Clean Water Act).

4. Mitigation. Discharges of dredged or fill material into waters of the United States must be minimized or avoided to the maximum extent practicable at the project site (i.e. on-site), unless the DE has approved a compensation mitigation plan for the specific regulated activity.

5. Spawning areas. Discharges in spawning areas during spawning seasons must be avoided to the maximum extent practicable.

6. Obstruction of high flows. To the maximum extent practicable, discharges must not permanently restrict or impede the passage of normal or expected high flows or cause the relocation of the water (unless the primary purpose of the fill is to impound waters).

7. Adverse impacts from impoundments. If the discharge creates an impoundment of water, adverse impacts on the aquatic system caused by the accelerated passage of water and/or the restriction of its flow shall be minimized to the maximum extent practicable.

8. Waterfowl breeding areas. Discharges into breeding areas for migratory waterfowl must be avoided to the maximum extent practicable.

9. Removal of temporary fills. Any temporary fills must be removed in their entirety and the affected areas returned to their preexisting elevation.

APPL--ATION FOR LAND USE PERMIT

Kewaunee County Zoning Admin.
Courthouse
613 Dodge Street
Kewaunee, Wisconsin 54216

Phone (414) 388-4410

LAND USE — TOWN OF Pierce
Application No. LU-95-3 Date 12-12-95
Permit No. LU-95-3 Date 12-12-95
Appeal No. ____ Date ____
OWNER (PRINT OR TYPE) State of Wisconsin
Lot ____ Block ____ SE 1/4, SW 1/4, Sec. 7 T. 23N R 25E
Subdivision ____
NUMBER DATE

THE UNDERSIGNED HEREBY MAKES APPLICATION FOR LAND USE FOR THE PREMISES DESCRIBED HEREIN. THE UNDERSIGNED AGREES THAT ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE REQUIREMENTS OF THE KEWAUNEE COUNTY SHORELAND ORDINANCE AND WITH ALL OTHER APPLICABLE COUNTY ORDINANCES AND THE LAWS AND REGULATIONS OF THE STATE OF WISCONSIN

[signature] DATE 11/16/95 — OWNER OR AGENT SIGNATURE
Michael T. Byrne, STS Consultants Ltd. DATE 11/13/95 — BUILDER SIGNATURE

PBx 10448 Green Bay WI 54307-0441 — ADDRESS
1035 Kepler Drive, Green Bay WI 54311 — ADDRESS

TELEPHONE (414) 492 5826
TELEPHONE (414)-468-1978

NOTE: THIS PERMIT DOES NOT RELIEVE YOU FROM THE RESPONSIBILITY OF OBTAINING OTHER PERMITS THAT MAY BE REQUIRED!

PERMIT VALID FOR TWO YEARS FROM DATE OF ISSUE

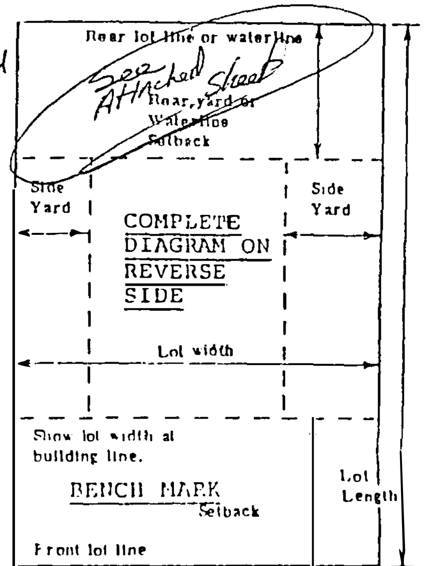
DESCRIPTION

1. Work (check one)
   - New Building ____
   - Addition Fence Installation
   - Repairs ____
   - Alteration ____
   - Moving ____
   - Wrecking ____
2. Purpose and Use of Premises: Also placement of Woodchips and geotextile Fabric to remove Arsenic
3. Other Required Permits (date of application) ____
   - Sanitary ____
   - Building ____ Well ____
   - Other ____
4. Building Details
   - Type of Construction Chain Link Fence
   - Size: - ft. wide x 2500 ft. long
   - Height 6 ft. No. Stories -
   - Floor Area - sq. ft. Cost $ -

Building Site Map (Indicate North): see Attached

NOTE: If property is located at a highway intersection, show the intersecting highway and its setbacks required along it and at the intersection, together with vision clearance lines.

Lot Size ____ ft. x ____ ft. Area ____ sq. ft.



(NOTE - IF NEEDED, USE AN ADDITIONAL SHEET OF PAPER FOR THIS)

5. EARTH WORK DETAILS
   - LENGTH ____
   - WIDTH ____ BED ____ BANKS ____
   - DEPTH ____
   - SIDE SLOPES ____
   - CUBIC YRS. TO BE REMOVED ____
   - SPOIL DISPOSAL SITE ____
6. FILL DETAILS
   - FILL AREA 180' x 900'
   - DEPTH 4'
   - TYPE OF FILL Woodchips
   - BENCH MARK ELEVATION ____
   - FINISHED GRADE ELEVATION 970

ACTION

Permit Issued (date) 12-12-95 Glenn Sether, Zoning Administrator

Work Started (date) ? Work Completed (date) ? Fee $ 10.00

Certification of Compliance Issued (date) ____ Fee Paid (date) 12-12-95

Permit Denied (date) ____ for the following reasons ____

INSPECTION Date 12-12-95 Inspector Glenn Sether Remarks Permit issued so the DNR can attempt to contain arsenic contamination site from about 50 years ago. Chain link fence to be placed within 75 foot setback requirement for buildings - OK.

RECORD

APPEALED TO BOARD OF ADJUSTMENT (DATE) NA NOTICE PUBLISHED (DATE) ____

COPY SENT TO D.N.R. AREA OFFICE (DATE) ____

____ APPEAL HEARD (DATE) ____

DECISION ____

COPY SENT TO D.N.R. AREA OFFICE (DATE) ____

RECEIVED

APPENDIX B

Photographic Documentation

TABLE OF CONTENTS

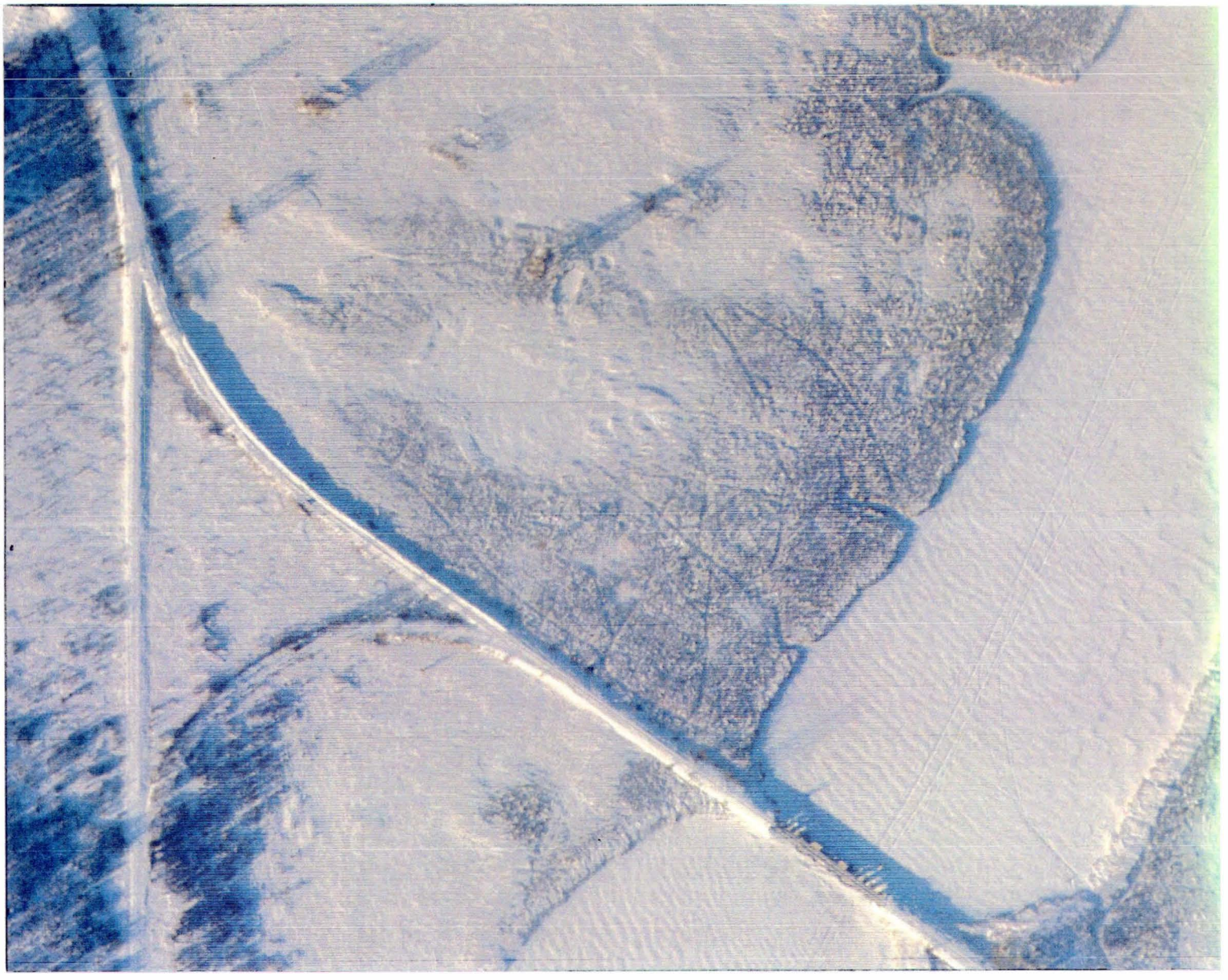


Photo 1: Aerial photo of arsenic site before construction.

Photo 2: Aerial photo of arsenic site.

Photo 3: Unloading of 30 cubic yards of lime.

Photo 4: Polystyrene placement.

Photo 5: Frost showing position of polystyrene under geotextile fabric.

Photo 6: Geotextile seaming in Nekoosa, Wisconsin.

Photo 7: Loading fabric onto trailer in Nekoosa, Wisconsin.

Photo 8: Unloading of fabric in Kewaunee, Wisconsin.

Photo 9: Transporting fabric to marsh site.

Photo 10: Pulling fabric over polystyrene blocks.

Photo 11: Fabric placement.

Photo 12: Fill material.

Photo 13: Placed fill material.

Photo 14: Woodchip unloading.

Photo 15: Woodchip placement.

Photo 16: Woodchip placement over fill material.

Photo 17: Snow fence placed along perimeter of cover.

Photo 18: Woodchip placement in depressions.

Photo 19: Chain-link fence installation.

Photo 20: Aerial photo of completed cover.

APPENDIX C

Calculations

STS CONSULTANTS LTD.

CALCULATION SHEET

PROJECT KEWAUNEE MARSH JOB NO 20716 XA PAGE 1 OF 1

SUBJECT SEED & FERTILIZER REQUIREMENTS DIVISION

ORIGINATOR WRR DATE 5/2/96 CHECKED BY DATE

APPROXIMATE AREA TO BE SEEDED & FERTILIZED IS 4 ACRES

SEED RATE ≈ 130 lbs/ac (WDNR COMPOSITION, STS RATE)

FERTILIZER RATE ≈ 80 lbs NITROGEN/ac (WDHIC SOIL & FORAGE LAB)

SEED:

130 lbs/ac x 4 ac = 520 lbs OF SEED REQ'D

FERTILIZER:

80 lbs N/ac x 4 ac = 320 lbs NITROGEN FERTILIZER REQ'D

8241

STS CONSULTANTS LTD.

CALCULATION SHEET

PROJECT KELVAUNEE MARSH JOB NO 20716 XA PAGE 1 OF 2

SUBJECT POLYSTYRENE BUOYANCY CALCULATIONS DIVISION

ORIGINATOR LJBB DATE 12/4/95 CHECKED BY DATE

ASSUMPTIONS

1) VEGETATED AREAS HAVE 25% SOLIDS

2) UNVEGETATED (STRESSED) AREAS HAVE 10% SOLIDS

3) SOLIDS UNIT WEIGHT AT 120 lbs/ft^3

F_B (VEGETATED) $= \left[.75(62.4 \text{ lbs/ft}^3) + .25(120 \text{ lbs/ft}^3)\right] = 76.8 \text{ lbs/ft}^3$

F_B (STRESSED) $= \left[.9(62.4 \text{ lbs/ft}^3) + .1(120 \text{ lbs/ft}^3)\right] = 68.16 \text{ lbs/ft}^3$

F_B (VEGETATED) $-$ F_B (STRESSED) $= 8.64 \text{ lbs/ft}^3$

NEED 8.64 lbs/ft^3 IN STRESSED AREAS,
POLYSTYRENE PROVIDES 59.6 lbs/ft^3

$$\frac{8.64 \text{ lbs/ft}^3 \text{ REQUIRED}}{59.6 \text{ lbs/ft}^3 \text{ PROVIDED}} = 0.145' \text{ POLYSTRENE ACROSS ENTIRE AREA}$$

OR APPROXIMATELY 1 3/4"

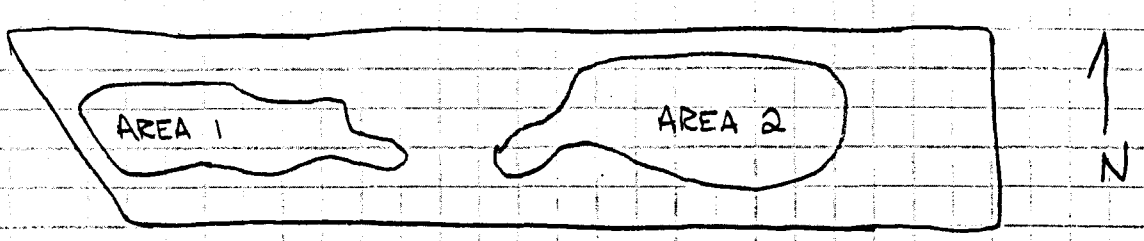
STS CONSULTANTS LTD.

CALCULATION SHEET

PROJECT KEWAUNEE MARSH JOB NO 20716 XA PAGE 2 OF 2

SUBJECT VOLUME OF POLYSTYRENE REQUIRED DIVISION

ORIGINATOR WRR DATE 12/4/95 CHECKED BY DATE



FROM PLANIMETER AREA 1 ≈ 13,950 ft²

AREA 2 ≈ 24,150 ft²

- NEED 1 3/4" THICK LAYER OF POLYSTYRENE OVER ENTIRE MARSH FROM BOUYANCY CALCS, ASSUME 2" RATHER THAN 1 3/4" SO .167' x 38,100 ft² = 6350 ft³ OF POLYSTYRENE REQUIRED

- SHEETS OF POLYSTYRENE ARE 5" x 18' x 4'

= 37% OF POLYSTYRENE GOES ON AREA 1 & 63% ON AREA 2

VOLUME OF 1 SHEET = .417' x 18' x 4' = 30.0 ft³

- NEED 212 TOTAL SHEETS

AREA 1 = 212 x .37 = 78 SHEETS AREA 2 = 212 x .63 = 134 SHEETS

8241

STS CONSULTANTS LTD.

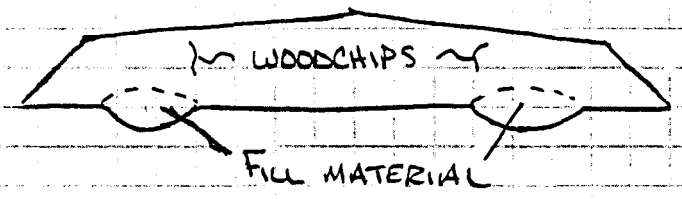
CALCULATION SHEET

PROJECT KEWAUNEE MARSH JOB NO 20716 xA PAGE ____ OF ____

SUBJECT FILL MATERIAL VOLUME CALCULATIONS DIVISION ____

ORIGINATOR WRR DATE 12/4/95 CHECKED BY ____ DATE ____

FILL MATERIAL ≈ 135 lbs/ft³



DIMENSIONS OF FILL MATERIAL:

1.5'-2.0'

1 — 5' — 1

5' WIDE x 2' HIGH x 780' LONG

* ASSUME AREA 1 + 2 = AREA 3

BUOYANCY CALCS:

$W = F_b$ $\quad W = 135\ lbs/ft^3 (780' \times 5' \times 1.5') = 789,750\ lb$

$789,750\ lbs = (76.8\ lbs/ft^3)(780' \times 5' \times D')$

$D = 2.64'$

VOLUME OF FILL MAT'L = $780' \times 5' \times 1.5' = 5850\ ft^3$

$= 217\ cyds$

STS CONSULTANTS LTD.

CALCULATION SHEET

PROJECT: Kewaunee Marsh Arsenic Site JOB NO.: 20716xA PAGE 1 OF 1

SUBJECT: Lime Application DIVISION

ORIGINATOR: MTB DATE: 12/27/96 CHECKED BY: WRR DATE: 12/28/95

In 1 Ft^3 = 0.70 Ft^3 pore space · Assume 30% solids in marsh materials

159,000 Ft^3 × 0.7 Ft^3 pore space = 111,300 Ft^3 pore space (water)

111,300 Ft^3 water × $\frac{1\ L}{0.0353\ Ft^3}$ = 3.2×10^6 L water

3.2×10^6 L water × $\frac{10\ g\ Lime}{Liter\ water}$ = 3.2×10^7 g Lime

= 3.2×10^4 Kg Lime

3.2×10^4 Kg Lime × $2.2\ lb/Kg$ = 7×10^4 lb Lime

7×10^4 lb Lime × $\frac{1\ Ft^3}{85\ lb}$ × $\frac{1\ yd^3}{27\ Ft^3}$ = 30.5 yd^3 Lime

- Lime added to ppt arsenic in pore water.
- Assume majority of arsenic in Top 1 Ft. of marsh

8241

APPENDIX D

Geotextile Cover Fabric Test Results

GEOSYNTEC CONSULTANTS
Materials Testing Laboratory

GEOTEXTILE SEAM TEST RESULTS

CLIENT:	*STS Consultants Ltd.*	***MATERIAL:***	*Polyester / Polypropylene*
CONTACT:	*Mr. Bill Racine*	***CLIENT ID:***	*Preconstruction Seam 1-6*
PROJECT:	*Kewaunee Marsh, WI / 20716XA*	***SEAM TYPE:***	*Butterfly / 4.5 S.P.I. / 2 Rows*
GEOSYNTEC JOB NO.:	*FLQ50059*	***DATE TESTED:***	*12/23/95*

INDIVIDUAL SPECIMENS

1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
352.6	371.1	314.9	367.2	373.9	348.9				
1	1	1	1	1	1				

SUMMARY RESULTS

PROPERTY (STANDARD)	*UNIT*	*MEAN*	*STD*	*SPEC.*	*PASS/FAIL*
WIDE-WIDTH SEAM STRENGTH (ASTM D4884)	lb/in.	355	22.0		
TYPE OF FAILURE					

COMMENTS:
1 = FILL YARN FAILURE

GEOSYNTEC CONSULTANTS
Materials Testing Laboratory

GEOTEXTILE TEST RESULTS

CLIENT:	*STS Consultants Ltd.*	***MATERIAL:***	*Polyester / Polypropylene*
CONTACT:	*Mr. Bill Racine*	***CLIENT ID:***	*Preconstruction Sample 1-6*
PROJECT:	*Kewaunee Marsh, WI / 20716XA*	***DATE TESTED:***	*12/27/95*
GEOSYNTEC JOB NO.:	*FLQ50059*		

INDIVIDUAL SPECIMENS

1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
600	642	633							
850	778	854							
327.5	330.9	326.3							
463.0	476.1	455.7							
10.3	10.2	10.8							
9.0	7.9	9.4							

SUMMARY RESULTS

PROPERTY (STANDARD)	*UNIT*	*MEAN*	*STD*	*SPEC.*	*PASS/FAIL*
WIDE-WIDTH STRIP TENSILE PROPERTIES:					
(ASTM D4595)					
ULTIMATE STRENGTH	lb/in.				
MD		625	22.1		
XD		827	42.8		
TENSION AT 5% STRAIN	lb/in.				
MD		328.2	2.39		
XD		464.9	10.34		
STRAIN AT ULTIMATE	%				
MD		10.4	0.32		
XD		8.7	0.77		

COMMENTS:
MD = MACHINE DIRECTION
XD = CROSS-MACHINE DIRECTION

GEOSYNTEC CONSULTANTS
Materials Testing Laboratory

GEOTEXTILE SEAM TEST RESULTS

CLIENT:	*STS Consultants Ltd.*
CONTACT:	*Mr. Bill Racine*
PROJECT:	*Kewaunee Marsh, WI / 20716XA*
GEOSYNTEC JOB NO.:	*FLQ50059*

MATERIAL:	*Polyester / Polypropylene*
CLIENT ID:	*Seam 1 / Panel 8 1996 12ply/9ply*
SEAM TYPE:	*Butterfly / 4.5 S.P.I. / 2 Rows*
GEOSYNTEC ID.:	*932-1251-FLQC-1*
DATE TESTED:	*2/9/96*

INDIVIDUAL SPECIMENS

1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
414.7	404.5	384.1	393.4	337.4	386.7				
1	1	1	1	1	1				

SUMMARY RESULTS

PROPERTY (STANDARD)	*UNIT*	*MEAN*	*STD*	*SPEC.*	*PASS/FAIL*
WIDE-WIDTH SEAM STRENGTH (ASTM D4884)	lb/in.	387	26.8		
TYPE OF FAILURE					

COMMENTS:
1 = FILL YARN FAILURE

GEOSYNTEC CONSULTANTS
Materials Testing Laboratory

GEOTEXTILE TEST RESULTS

CLIENT:	*STS Consultants Ltd.*	*MATERIAL:*	*Polyester / Polypropylene*
CONTACT:	*Mr. Bill Racine*	*CLIENT ID:*	*Sample-1 Panel-8 1996*
PROJECT:	*Kewaunee Marsh, WI / 20716XA*	*GEOSYNTEC ID:*	*932-1251-FLQC-1*
GEOSYNTEC JOB NO.:	*FLQ50059*	*DATE TESTED:*	*2/14/96*

INDIVIDUAL SPECIMENS

1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
586	571	588	613	573	594				
325	338	326	360	329	323				
10.1	9.4	10.0	9.5	9.9	10.0				

SUMMARY RESULTS

PROPERTY (STANDARD)	*UNIT*	*MEAN*	*STD*	*SPEC.*	*PASS/FAIL*
WIDE-WIDTH STRIP TENSILE PROPERTIES:					
(ASTM D4595)					
ULTIMATE STRENGTH	lb/in.				
MD		587	15.4		
TENSION AT 5% STRAIN	lb/in.				
MD		333	13.9		
STRAIN AT ULTIMATE	%				
MD		9.8	0.29		

COMMENTS:
MD = MACHINE DIRECTION
XD = CROSS-MACHINE DIRECTION

GEOSYNTEC CONSULTANTS
Materials Testing Laboratory

GEOTEXTILE SEAM TEST RESULTS

CLIENT:	*STS Consultants Ltd.*	***MATERIAL:***	*Polyester / Polypropylene*
CONTACT:	*Mr. Bill Racine*	***CLIENT ID:***	*Seam 2 / Panel 15 1996 12ply/9ply*
PROJECT:	*Kewaunee Marsh, WI / 20716XA*	***SEAM TYPE:***	*Butterfly / 4.5 S.P.I. / 2 Rows*
GEOSYNTEC JOB NO.:	*FLQ50059*	***GEOSYNTEC ID.:***	*933-1251-FLQC-I*
		DATE TESTED:	*2/10/96*

INDIVIDUAL SPECIMENS

1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
381.4	491.5	480.4	454.6	491.1	481.6				
1	1	1	1	1	1				

SUMMARY RESULTS

PROPERTY (STANDARD)	*UNIT*	*MEAN*	*STD*	*SPEC.*	*PASS/FAIL*
WIDE-WIDTH SEAM STRENGTH (ASTM D4884)	lb/in.	463	42.4		
TYPE OF FAILURE					

COMMENTS:
1 = FILL YARN FAILURE

GEOSYNTEC CONSULTANTS
Materials Testing Laboratory

GEOTEXTILE SEAM TEST RESULTS

CLIENT:	*STS Consultants Ltd.*
CONTACT:	*Mr. Bill Racine*
PROJECT:	*Kewaunee Marsh, WI / 20716XA*
GEOSYNTEC JOB NO.:	*FLQ50059*

MATERIAL:	*Polyester / Polypropylene*
CLIENT ID:	*Seam 3 / Panel 18 1996 12ply/9ply*
SEAM TYPE:	*Butterfly / 4.5 S.P.I. / 2 Rows*
GEOSYNTEC ID.:	*934-1251-FLQC-I*
DATE TESTED:	*2/9/96*

INDIVIDUAL SPECIMENS

1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
327.0	431.0	314.5	421.4	413.0	*				
1	1	1	1	1					

SUMMARY RESULTS

PROPERTY (STANDARD)	*UNIT*	*MEAN*	*STD*	*SPEC.*	*PASS/FAIL*
WIDE-WIDTH SEAM STRENGTH (ASTM D4884)	lb/in.	381	55.9		
TYPE OF FAILURE					

COMMENTS:
1 = FILL YARN FAILURE
* = INSUFFICIENT MATERIAL FOR 6 SPECIMENS

GEOSYNTEC CONSULTANTS
Materials Testing Laboratory

GEOTEXTILE SEAM TEST RESULTS

CLIENT:	*STS Consultants Ltd.*
CONTACT:	*Mr. Bill Racine*
PROJECT:	*Kewaunee Marsh, WI / 20716XA*
GEOSYNTEC JOB NO.:	*FLQ50059*

MATERIAL:	*Polyester / Polypropylene*
CLIENT ID:	*Seam 4 / Panel 24 1996 12ply/9ply*
SEAM TYPE:	*Butterfly / 5.0 S.P.I. / 2 Rows*
GEOSYNTEC ID.:	*975-1251-FLQC-I*
DATE TESTED:	*2/21/96*

INDIVIDUAL SPECIMENS

1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
331.1	331.8	327.0	337.5	377.9	381.1				
1	1	1	1	1	1				

SUMMARY RESULTS

PROPERTY (STANDARD)	*UNIT*	*MEAN*	*STD*	*SPEC.*	*PASS/FAIL*
WIDE-WIDTH SEAM STRENGTH (ASTM D4884)	lb/in.	348	24.9		
TYPE OF FAILURE					

COMMENTS:
1 = FILL YARN FAILURE

GEOSYNTEC CONSULTANTS
Materials Testing Laboratory

GEOTEXTILE SEAM TEST RESULTS

CLIENT:	*STS Consultants Ltd.*	***MATERIAL:***	*Polyester / Polypropylene*
CONTACT:	*Mr. Bill Racine*	***CLIENT ID:***	*Seam 5 / Panel 28 1996 12ply/9ply*
PROJECT:	*Kewaunee Marsh, WI / 20716XA*	***SEAM TYPE:***	*Butterfly / 4.5 S.P.I. / 2 Rows*
GEOSYNTEC JOB NO.:	*FLQ50059*	***GEOSYNTEC ID.:***	*976-1251-FLQC-1*
		DATE TESTED:	*2/17/96*

INDIVIDUAL SPECIMENS

1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
369.2	339.1	395.4	358.0	324.2	346.6				
1	1	1	1	1	1				

SUMMARY RESULTS

PROPERTY (STANDARD)	*UNIT*	*MEAN*	*STD*	*SPEC.*	*PASS/FAIL*
WIDE-WIDTH SEAM STRENGTH (ASTM D4884)	lb/in.	355	25.0		
TYPE OF FAILURE					

COMMENTS:
1 = FILL YARN FAILURE

GEOSYNTEC CONSULTANTS
Materials Testing Laboratory

GEOTEXTILE SEAM TEST RESULTS

CLIENT:	*STS Consultants Ltd.*
CONTACT:	*Mr. Bill Racine*
PROJECT:	*Kewaunee Marsh, WI / 20716XA*
GEOSYNTEC JOB NO.:	*FLQ50059*

MATERIAL:	*Polyester / Polypropylene*
CLIENT ID:	*Seam 6/ Panel 34 1996 12ply/9ply*
SEAM TYPE:	*Butterfly / 4.5 S.P.I. / 2 Rows*
GEOSYNTEC ID.:	*977-1251-FLQC-1*
DATE TESTED:	*2/21/96*

INDIVIDUAL SPECIMENS

1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
326.6	387.0	371.5	349.9	350.0	361.5				
1	1	1	1	1	1				

SUMMARY RESULTS

PROPERTY (STANDARD)	*UNIT*	*MEAN*	*STD*	*SPEC.*	*PASS/FAIL*
WIDE-WIDTH SEAM STRENGTH (ASTM D4884)	lb/in.	358	20.7		
TYPE OF FAILURE					

COMMENTS:
1 = FILL YARN FAILURE

GEOSYNTEC CONSULTANTS
Materials Testing Laboratory

GEOTEXTILE SEAM TEST RESULTS

CLIENT:	*STS Consultants Ltd.*	***MATERIAL:***	*Polyester / Polypropylene*
CONTACT:	*Mr. Bill Racine*	***CLIENT ID:***	*Seam 7 / Panel 38 1996 12ply/9ply*
PROJECT:	*Kewaunee Marsh, WI / 20716XA*	***SEAM TYPE:***	*Butterfly / 4.5 S.P.I. / 2 Rows*
GEOSYNTEC JOB NO.:	*FLQ50059*	***GEOSYNTEC ID.:***	*978-1251-FLQC-1*
		DATE TESTED:	*2/17/96*

INDIVIDUAL SPECIMENS

1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
384.1	317.7	422.0	433.9	330.0	325.0				
1	1	1	1	1	1				

SUMMARY RESULTS

PROPERTY (STANDARD)	*UNIT*	*MEAN*	*STD*	*SPEC.*	*PASS/FAIL*
WIDE-WIDTH SEAM STRENGTH (ASTM D4884)	lb/in.	369	51.6		
TYPE OF FAILURE					

COMMENTS:
1 = FILL YARN FAILURE

GEOSYNTEC CONSULTANTS
Materials Testing Laboratory

GEOTEXTILE SEAM TEST RESULTS

CLIENT:	*STS Consultants Ltd.*
CONTACT:	*Mr. Bill Racine*
PROJECT:	*Kewaunee Marsh, WI / 20716XA*
GEOSYNTEC JOB NO.:	*FLQ50059*

MATERIAL:	*Polyester / Polypropylene*
CLIENT ID:	*Seam 8 / Panel 40 1996 12ply/9ply*
SEAM TYPE:	*Butterfly / 5.0 S.P.I. / 2 Rows*
GEOSYNTEC ID.:	*979-1251-FLQC-1*
DATE TESTED:	*2/21/96*

INDIVIDUAL SPECIMENS

1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
340.6	369.1	368.0	372.5	371.6	347.5				
1	1	1	1	1	1				

SUMMARY RESULTS

PROPERTY (STANDARD)	*UNIT*	*MEAN*	*STD*	*SPEC.*	*PASS/FAIL*
WIDE-WIDTH SEAM STRENGTH (ASTM D4884)	lb/in.	362	13.8		
TYPE OF FAILURE					

COMMENTS:
1 = FILL YARN FAILURE

GEOSYNTEC CONSULTANTS
Materials Testing Laboratory

GEOTEXTILE SEAM TEST RESULTS

CLIENT:	*STS Consultants Ltd.*
CONTACT:	*Mr. Bill Racine*
PROJECT:	*Kewaunee Marsh, WI / 20716XA*
GEOSYNTEC JOB NO.:	*FLQ50059*

MATERIAL:	*Polyester / Polypropylene*
CLIENT ID:	*Seam 9 / Panel 47 1996 12ply/9ply*
SEAM TYPE:	*Butterfly / 5.0 S.P.I. / 2 Rows*
GEOSYNTEC ID.:	*980-1251-FLQC-1*
DATE TESTED:	*2/22/96*

INDIVIDUAL SPECIMENS

1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
365.1	350.6	380.3	366.4	393.6	397.0				
1	1	1	1	1	1				

SUMMARY RESULTS

PROPERTY (STANDARD)	*UNIT*	*MEAN*	*STD*	*SPEC.*	*PASS/FAIL*
WIDE-WIDTH SEAM STRENGTH					
(ASTM D4884)	lb/in.	376	18.0		
TYPE OF FAILURE					

COMMENTS:
1 = FILL YARN FAILURE

GEOSYNTEC CONSULTANTS
Materials Testing Laboratory

GEOTEXTILE SEAM TEST RESULTS

CLIENT:	*STS Consultants Ltd.*
CONTACT:	*Mr. Bill Racine*
PROJECT:	*Kewaunee Marsh, WI / 20716XA*
GEOSYNTEC JOB NO.:	*FLQ50059*

MATERIAL:	*Polyester / Polypropylene*
CLIENT ID:	*Seam 10 / Panel 51 1996 12ply/9ply*
SEAM TYPE:	*Butterfly / 5.0 S.P.I. / 2 Rows*
GEOSYNTEC ID.:	*981-1251-FLQC-I*
DATE TESTED:	*2/22/96*

INDIVIDUAL SPECIMENS

1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
329.5	365.0	332.3	393.8	429.4	418.6				
1	1	1	1	1	1				

SUMMARY RESULTS

PROPERTY (STANDARD)	*UNIT*	*MEAN*	*STD*	*SPEC.*	*PASS/FAIL*
WIDE-WIDTH SEAM STRENGTH					
(ASTM D4884)	lb/in.	378	42.8		
TYPE OF FAILURE					

COMMENTS:

1 = FILL YARN FAILURE

GEOSYNTEC CONSULTANTS
Materials Testing Laboratory

GEOTEXTILE TEST RESULTS

CLIENT:	*STS Consultants Ltd.*	***MATERIAL:***	*Polyester / Polypropylene*
CONTACT:	*Mr. Bill Racine*	***CLIENT ID:***	*Sample-10 Panel-51 1996*
PROJECT:	*Kewaunee Marsh, WI / 20716XA*	***GEOSYNTEC ID:***	*981-1251-FLQC-1*
GEOSYNTEC JOB NO.:	*FLQ50059*	***DATE TESTED:***	*2/27/96*

INDIVIDUAL SPECIMENS

1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
575	594	604							
315	336	341							
9.9	9.7	10.1							

SUMMARY RESULTS

PROPERTY (STANDARD)	*UNIT*	*MEAN*	*STD*	*SPEC.*	*PASS/FAIL*
WIDE-WIDTH STRIP TENSILE PROPERTIES:					
(ASTM D4595)					
ULTIMATE STRENGTH	lb/in.				
MD		591	14.4		
TENSION AT 5% STRAIN	lb/in.				
MD		331	13.9		
STRAIN AT ULTIMATE	%				
MD		9.9	0.20		

COMMENTS:
MD = MACHINE DIRECTION
XD = CROSS-MACHINE DIRECTION

[redacted] [redacted] [redacted]

GEOSYNTEC CONSULTANTS
Materials Testing Laboratory

GEOTEXTILE SEAM TEST RESULTS

CLIENT:	*STS Consultants Ltd.*	***MATERIAL:***	*Polyester / Polypropylene*
CONTACT:	*Mr. Bill Racine*	***CLIENT ID:***	*Seam 11 / Panel 55 1996 12ply/9ply*
PROJECT:	*Kewaunee Marsh, WI / 20716XA*	***SEAM TYPE:***	*Butterfly / 4.5 S.P.I. / 2 Rows*
GEOSYNTEC JOB NO.:	*FLQ50059*	***GEOSYNTEC ID.:***	*994-1251-FLQC-1*
		DATE TESTED:	*2/23/96*

INDIVIDUAL SPECIMENS

1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
404.5	378.6	374.4	336.8	344.3	338.8				
1	1	1	1	1	1				

SUMMARY RESULTS

PROPERTY (STANDARD)	*UNIT*	*MEAN*	*STD*	*SPEC.*	*PASS/FAIL*
WIDE-WIDTH SEAM STRENGTH (ASTM D4884)	lb/in.	363	27.3		
TYPE OF FAILURE					

COMMENTS:
1 = FILL YARN FAILURE

GEOSYNTEC CONSULTANTS
Materials Testing Laboratory

GEOTEXTILE SEAM TEST RESULTS

CLIENT:	*STS Consultants Ltd.*
CONTACT:	*Mr. Bill Racine*
PROJECT:	*Kewaunee Marsh, WI / 20716XA*
GEOSYNTEC JOB NO.:	*FLQ50059*

MATERIAL:	*Polyester / Polypropylene*
CLIENT ID:	*Seam 12 / Panel 60 1996 12ply/9ply*
SEAM TYPE:	*Butterfly / 5.0 S.P.I. / 2 Rows*
GEOSYNTEC ID.:	*995-1251-FLQC-I*
DATE TESTED:	*2/23/96*

INDIVIDUAL SPECIMENS

1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
375.6	368.6	332.0	425.4	350.4	336.6				
1	1	1	1	1	1				

SUMMARY RESULTS

PROPERTY (STANDARD)	*UNIT*	*MEAN*	*STD*	*SPEC.*	*PASS/FAIL*
WIDE-WIDTH SEAM STRENGTH (ASTM D4884)	lb/in.	365	34.3		
TYPE OF FAILURE					

COMMENTS:
1 = FILL YARN FAILURE

GEOSYNTEC CONSULTANTS
Materials Testing Laboratory

GEOTEXTILE SEAM TEST RESULTS

CLIENT:	*STS Consultants Ltd.*
CONTACT:	*Mr. Bill Racine*
PROJECT:	*Kewaunee Marsh, WI / 20716XA*
GEOSYNTEC JOB NO.:	*FLQ50059*

MATERIAL:	*Polyester / Polypropylene*
CLIENT ID:	*Seam 13 / Panel 66 1996 12ply/9ply*
SEAM TYPE:	*Butterfly / 5.0 S.P.I. / 2 Rows*
GEOSYNTEC ID.:	*996-1251-FLQC-1*
DATE TESTED:	*2/24/96*

INDIVIDUAL SPECIMENS

1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
370.9	388.4	354.4	446.4	387.6	*				
1	1	1	1	1					

SUMMARY RESULTS

PROPERTY (STANDARD)	*UNIT*	*MEAN*	*STD*	*SPEC.*	*PASS/FAIL*
WIDE-WIDTH SEAM STRENGTH (ASTM D4884)	lb/in.	390	34.7		
TYPE OF FAILURE					

COMMENTS:

1 = FILL YARN FAILURE
* = INSUFFICIENT MATERIAL FOR 6 SPECIMENS

APPENDIX F

Materials Analysis

Fertilizer and Seed Application Rates

SOIL TEST REPORT

Analyzed By:

Source Soil & Forage Laboratory
106 N. CECIL STREET
BONDUEL, WI 54107

LAB NO.	7-34212
State County	Account No.
KEWAUNEE	997
Date Rec'd	Date Processed
03/07/96	11-Mar-96

STS CONSULTANTS
1035 KEPLER DR
GREEN BAY WI 54311

This Report is for:

STS CONSULTANTS

IDENTIFICATION		LABORATORY ANALYSIS														LAB USE	
Field KM	Sam. No.	Text Cod	Est. CEC	Soil pH	O.M	P ppm	K ppm	Ca ppm	Mg ppm	B ppm	Mn ppm	Zn ppm	SO_4-S ppm	S Avail. Index	Other Tests	Sample Density g/cm³	Buffer Code
Acres 4.0	1	3		8.1	19.3	145	999									.59	N.R.
Soil Name (or sub-soil group) GROUP O																	
Plow Depth 6.5																	

OPTION 1:

Crop. year	Crop to be Grown	Crop Yield Goal	Soil Test 1/ Interpretation P	Soil Test 1/ Interpretation K	RECOMMENDATIONS Nutrient Needs N lbs/a	Nutrient Needs P_2O_5 lbs/a	Nutrient Needs K_2O	Fertilizer Replacement Credit 2/ N	Fertilizer Replacement Credit 2/ P_2O_5 lbs/a	Fertilizer Replacement Credit 2/ K_2O	Nutrients to Apply N	Nutrients to Apply P_2O_5 lbs/a	Nutrients to Apply K_2O
1	Pasture, tallgrass	3.1- 4.0	EH	EH	80	0	0	0	0	0	80	0	0
2	Pasture, tallgrass	3.1- 4.0	EH	EH	80	0	0	0	0	0	80	0	0
3	Pasture, tallgrass	3.1- 4.0	EH	EH	80	0	0	0	0	0	80	0	0

NO lime is required for this rotation to reach pH 5.6

OPTION 2:

Crop. year	Crop to be Grown	Crop Yield Goal	Soil Test 1/ Interpretation P	Soil Test 1/ Interpretation K	RECOMMENDATIONS Nutrient Needs N lbs/a	Nutrient Needs P_2O_5 lbs/a	Nutrient Needs K_2O	Fertilizer Replacement Credit 2/ N	Fertilizer Replacement Credit 2/ P_2O_5 lbs/a	Fertilizer Replacement Credit 2/ K_2O	Nutrients to Apply N	Nutrients to Apply P_2O_5 lbs/a	Nutrients to Apply K_2O
1	Corn, field	131- 150	EH	EH	80	0	0	0	0	0	80	0	0#
2	Oats	61.0-90.0	EH	EH	10	0	0	0	0	0	10	0	0
3													

NO lime is required for this rotation to reach pH 5.6

1/ Soil Test Interpretation Codes: VL (very low), L (low), Opt (optimum), H (high), VH (very high), EH (excessively high)
2/ These credits are determined from information provided relative to legume-sod plowdown and manure application.
Note: If spring nitrogen availability test has been run, subtract the nitrogen credit from crop nitrogen needs.

COMMENTS SECTION

THIS SOIL IS NOT SUITED FOR ALFALFA.

N.R. = NOT REQUIRED FOR CALCULATION OF LIME REQUIREMENT WHEN THE SOIL PH IS 6.6 OR HIGHER.

WHERE BARLEY OR OATS ARE UNDERSEEDED WITH A LEGUME FORAGE REDUCE NITROGEN BY 50%.

NITROGEN APPLICATIONS FOR PASTURE SHOULD BE SPLIT INTO 2 TO 3 APPLICATIONS PER YEAR.

BECAUSE OF THE LOW POTASSIUM BUFFERING CAPACITY OF THIS SOIL THIS FIELD SHOULD BE RETESTED EVERY TWO YEARS.

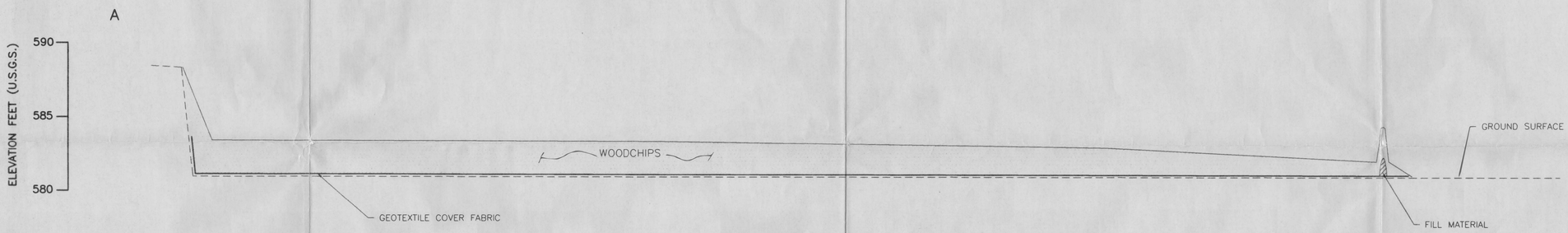
SOIL NAME FOR THIS FIELD WAS NOT SPECIFIED. MORE SPECIFIC RECOMMENDATIONS ARE POSSIBLE IF THE SOIL NAME IS PROVIDED.

- NO NUTRIENTS RECOMMENED FOR CORN, HOWEVER ON SLOW WARMING SOILS SOME STARTER FERTILIZER IS SUGGESTED.

Site Vegetation

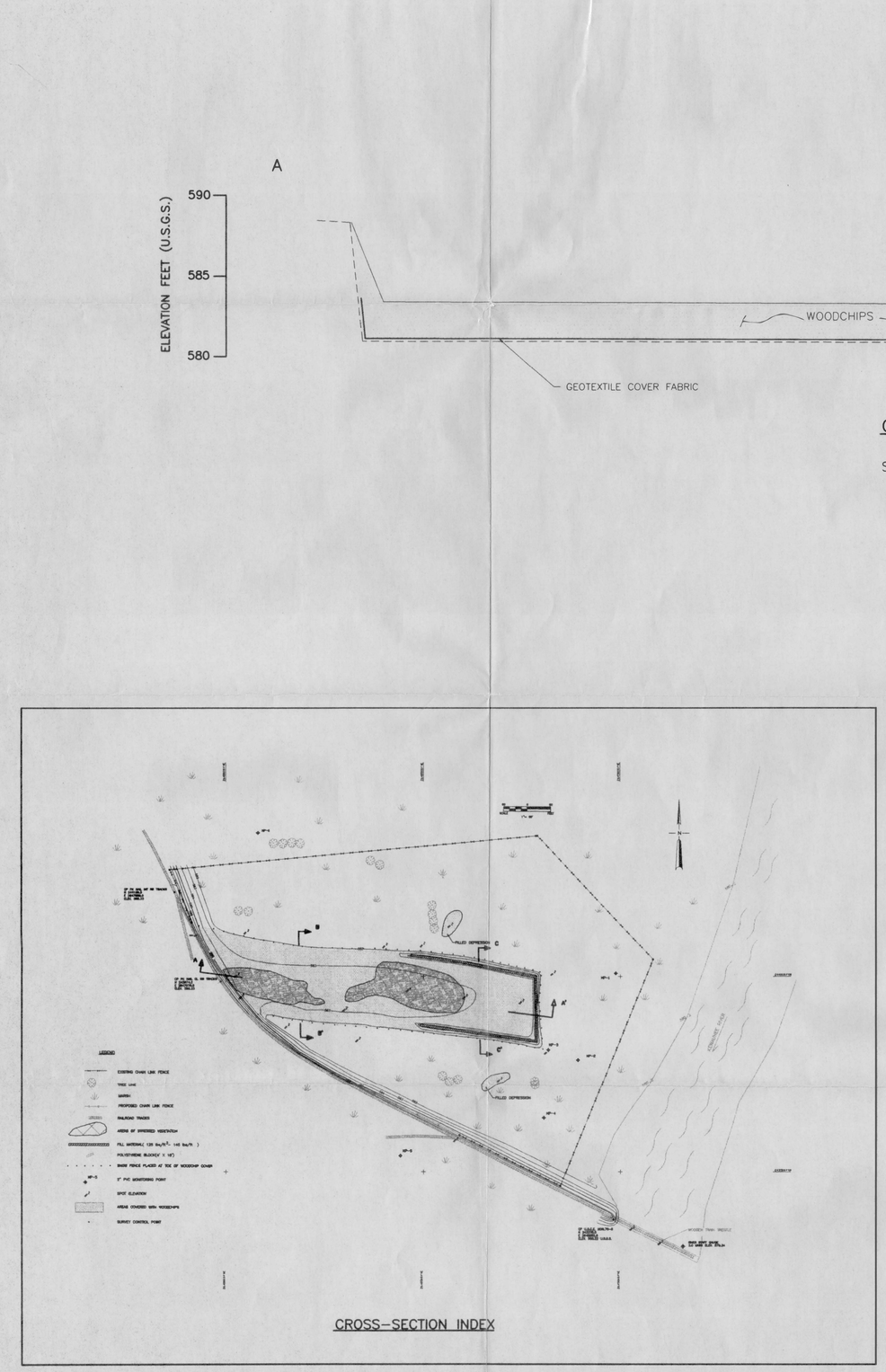
Seed Type	Application Rate (lbs/ac)
Kentucky Bluegrass	25
Redtop	2
Timothy	5
Annual Rye	100

Approximately four acres comprising the temporary cover will be seeded.

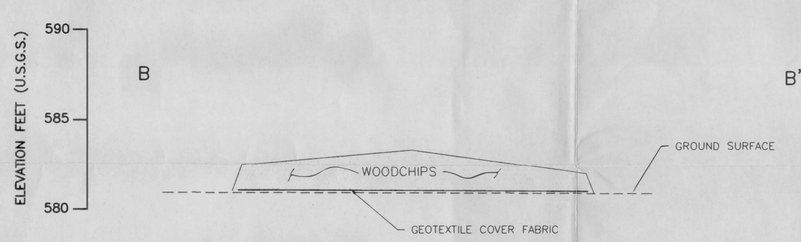


CROSS-SECTION A-A'

SCALE: 1"= 40' HORIZ.
1"= 4' VERT.

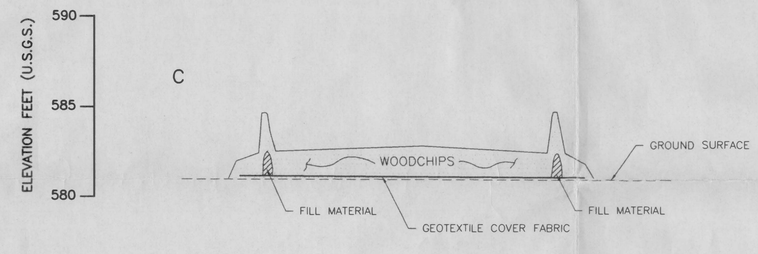


CROSS-SECTION INDEX



CROSS-SECTION B-B'

SCALE: 1"= 40' HORIZ.
1"= 4' VERT.



CROSS-SECTION C-C'

SCALE: 1"= 40' HORIZ.
1"= 4' VERT.

LEGEND
- WOODCHIPS
- FILL MATERIAL
- GROUND SURFACE
- GEOTEXTILE COVER FABRIC

BY	DESCRIPTION	DATE

DRAWN BY D.T.B. DATE 3-29-96
CHECKED BY M.D.O. DATE 5-1-96
APPROVED BY M.T.B. DATE 5-1-96
CADFILE W:\DWG96\20716XA\AB2.DWG

THOMSON INC.

FOX VALLEY AND WESTERN LTD.
KEWAUNEE MARSH ARSENIC SITE
KEWAUNEE, WISCONSIN
CROSS-SECTIONS

STS Consultants Ltd.
Consulting Engineers

STS PROJECT NUMBER 20716XA
STS PROJECT FILE
SCALE AS NOTED
SHEET NUMBER 20716XA-AB2

2648000 FtE | 2648500 FtE | 2649000 FtE

60 0 60
SCALE FEET
1"= 60'

N

MP-6

CP PK NAIL INT RR TRACKS
N 244199.5
E 2647859.0
ELEV. 588.33

CP PK NAIL CL RR TRACKS
N 243974.2
E 2647978.5
ELEV. 588.23

A | A' | B | B' | C | C'

FILLED DEPRESSION

MP-1 | MP-2 | MP-3 | MP-4 | MP-5

FILLED DEPRESSION

CP U.S.C.E. MON.76-8
N 243378.5
E 2648982.6
ELEV. 588.22 U.S.G.S.

WOODEN TRAIN TRESTLE

RIVER STAFF GAUGE
2.0 MARK ELEV. 579.34

KEWAUNEE RIVER

244000 FtN | 243500 FtN

LEGEND

- CHAIN LINK FENCE
- TREE LINE
- MARSH
- RAILROAD TRACKS
- AREAS OF STRESSED VEGETATION
- FILL MATERIAL(125 lbs/ft – 145 lbs/ft)
- POLYSTYRENE BLOCK(4' X 3' X 18')
- SNOW FENCE PLACED AT TOE OF WOODCHIP COVER
- MP-5 2" PVC MONITORING POINT
- SPOT ELEVATION
- AREAS COVERED WITH WOODCHIPS
- SURVEY CONTROL POINT

REVISION NO.	DESCRIPTION	DATE	BY

DRAWN BY D.T.B. DATE 3-29-96
CHECKED BY M.D.O. DATE 5-1-96
APPROVED BY M.T.B. DATE 5-1-96
CADFILE C:\DTB\20716XA\SITE96.DWG

FOX VALLEY & WESTERN LTD.
KEWAUNEE MARSH ARSENIC SITE
KEWAUNEE, WISCONSIN

EXISTING SITE CONDITIONS (MARCH 1996)

STS Consultants Ltd.
Consulting Engineers

STS PROJECT NUMBER
20716XA

STS PROJECT FILE

SCALE
1"= 60'

SHEET NUMBER
20716XA-AB1