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APPLICATION FOR SIGNIFICANT MODIFICATION TO PERMIT FOR AN EXISTING UNIT

WINNEBAGO RECLAMATION SERVICE, INC.
PAGEL LANDFILL FACILITY
ROCKFORD, WINNEBAGO COUNTY, ILLINOIS

IEPA SITE NO. 2018080001

VOLUME I OF II

Submitted To:

Illinois Environmental Protection Agency
Division of Land Pollution Control
Springfield, Illinois

May 1996

Prepared By:

ANDREWS ENVIRONMENTAL ENGINEERING INC.
3535 Mayflower Boulevard, Springfield, Illinois 62707/(217) 787-2334

ANDREWS ENVIRONMENTAL ENGINEERING INC. 3535 Mayflower Blvd., Springfield, Illinois 62707/(217) 787-2334

May 24, 1996

Mr. Edwin C. Bakowski, P.E.
Solid Waste Branch Manager
Permit Section, Bureau of Land
Division of Land Pollution Control
Illinois Environmental Protection Agency
2200 Churchill Road
Post Office Box 19276
Springfield, Illinois 62794-9276

re: Winnebago Reclamation Service, Inc.
Application for Signficant Modification
to Permit for an Existing Unit
IEPA Site No. 2018080001

Dear Mr. Bakowski:

On behalf of our client, Winnebago Reclamation Service, Inc., enclosed herewith is an original and three (3) copies of a document entitled *"Application for Significant Modification to Permit for an Existing Unit"*.

This document is intended to incorporate all addenda and supplemental information with regard to the engineering portions of the Application that has been submitted to the Illinois Environmental Protection Agency (IEPA) to date. It also incorporates several additional design changes that the Applicant would like to have incorporated into the Permit.

Information concerning the hydrogeological investigation and groundwater modeling aspects of the application were provided by GeoTrans, Inc. and are already on file at IEPA.

A summary of changes that have been made since the original application, dated July 1995, was filed is in the front of the document. This summary is intended to assist in the review of the updated application so that a timely decision on Permit Issuance can be achieved.

If you have any questions or comments, please do not hesitate to contact me.

Sincerely,

Edward M. Leigh
Environmental Engineer II
Division of Engineering Services

Enclosures

EML:pll

CC: Tom Hilbert, NRG Technologies, Inc.
Alex Vincent, GeoTrans, Inc.

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SUMMARY OF CHANGES

May, 1996

Summary of Design Modifications

The volumes contained herein are intended to incorporate all addenda and supplemental information with regard to the engineering portions of the application that has been submitted to the Illinois Environmental Protection Agency (IEPA) to date. The original application was submitted in July, 1995.

Although most of the information that was included in correspondence with IEPA has been incorporated directly into the application, three letters that addressed many of the major review comments are included at the end of this summary.

In addition to prior submittals, the revised volumes include several design changes that the Winnebago Reclamation Service, Inc. would like incorporated into the application. Most of the changes are in regard to issues involved with construction of the final cover system and have arisen as the closure date approaches and final cover system design is finalized. A brief description of the design changes that have been incorporated into the revised volumes is included below.

Final Cover System

- The final cover system has been redesigned so that the final grades match the slightly steeper side slopes (2.5H:1V) that exist on west site of the existing unit.
- The crown slope has been increased to 10% to aid in maintaining piping grades for the leachate and gas management systems after differential settlement occurs.
- The maximum elevation has been increased to 865 ft MSL to accommodate the increased gate receipts that the facility has been experiencing.
- References to VLDPE have been removed from the geomembrane specifications because the VLDPE resin specified in the original application is no longer commercially available.
- The granular drainage layer has been removed from the side slopes for ease of construction.

Surface Water Control

- Terrace and letdown locations have been revised to reflect the new final grades.
- Perimeter ditches on the west side of the landfill have been relocated to the outside of the haul road for space considerations.
- The sedimentation pond in the northwest corner of the facility has been eliminated.

Leachate and Gas Collection System

- The system has been redesigned so that leachate and gas may be transported through the same header system.

- The location of underground leachate/condensate storage tanks has been changed for ease of construction. The number of storage tanks has been changed from four to two.
- Minor changes to the locations of several wells, headers, and other components have been changed to reflect field conditions.

Specific changes to the permit narratives, attachments, and site developmental drawings that have been made in the revised volumes are detailed below.

Permit Narratives and Attachments

Permit Application Forms

- Permit Application Forms LPC-PA1 and LPC-PA16 have been modified such that the application is classified as a Landfill Expansion as well as a 1st Significant Modification. The application description has been modified accordingly.
- Permit Application Form LPC-PA8, along with the Resolution of the County Board of Winnebago County has been added. This form was originally submitted to IEPA in an addendum on November 17, 1995.

General Information Document

- The remaining airspace and anticipated annual waste receipts (p.4) have been modified in accordance with the calculations in Attachment 23.
- The anticipated operating life and design period (p.5) has been modified in accordance with the calculations in Attachment 23.

Construction Plan

- The anticipated operating life and design period (p.1) has been modified in accordance with the calculations in Attachment 23.
- The final slopes (p.3) have been modified in accordance with the revised final grades.
- Discussion pertaining to surface water drainage (pp.5-6) has been modified so that letdowns may be constructed with a Turf Reinforcement Mat (TRM) instead of riprap.
- The prescriptive requirements for gas/leachate extraction well perforations (p.7) have been removed. Additional discussion is presented under Attachment 14.
- The description of the leachate collection system (p.7) has been modified in accordance with the revised leachate collection system design.
- Hydraulic conductivity specifications have been removed from this section in favor of placement on the site developmental drawings and in Attachment 19.

Operating Plan

- The remaining airspace, refuse capacity, anticipated annual waste receipts, and placement rate (pp.2-3) have been modified in accordance with the calculations in Attachment 23.
- The anticipated operating life and design period (pp.4-5) have been modified in accordance with the calculations in Attachment 23.

Attachment 3 - Reduced Site Developmental Plan Drawings

- A new set of site developmental drawings has been included in Attachment 3.

Attachment 9 - Wetland Determination and Section 404 Compliance Documentation

- A document entitled *Wetland Mitigation Monitoring Report,* dated December 18, 1995, has been added at the end of Attachment 9. This is the first of several biannual reports that will be submitted to the U.S. Army Corps of Engineers over the next 5 years. Construction of the mitigation wetland was completed in 1995.

Attachment 12 - Report of Stability Analysis

- An addendum to the original Foundation and Mass Stability Analysis has been added at the end of Attachment 12. The addendum incorporates analyses investigating the stability of the 2.5H:1V side slopes depicted in the revised Site Developmental Drawings and demonstrates the facility's compliance with 35 IAC 811.305.

Attachment 13 - Leachate Management Plan

- All changes in the addendum dated November 17, 1995 have been incorporated into Attachment 13.
- Infiltration and leachate generation estimates (p.2) were revised in accordance with revised HELP model output.
- The description of the leachate collection system (pp.3-4) has been modified in accordance with the revised leachate collection system design.
- References to VLDPE geomembrane (p.4) has been changed to VFPE.
- The number of leachate monitoring points (p.6) has been changed from four to two. These points correspond to the two underground leachate storage tanks as depicted in the site developmental drawings.
- Two additional HELP model runs simulating infiltration through the final cover system have been added to Appendix 1. These runs represent scenarios for the crown area with a granular drainage layer and for the side slope area without a granular drainage layer. The two runs were combined using an area-weighted average to determine the total infiltration. In order to maintain the required final cover system performance, hydraulic conductivity of the low-permeability layer was changed to 1.0×10^{-6} cm/s in these runs. Additional discussion concerning the HELP modeling has been added in Appendix 1.
- The geomembrane leakage calculations have been removed from Appendix 2. The most recent version of the HELP model (v.3.02) performs this calculation automatically, so it is no longer needed.

Attachment 14 - Gas Management Plan

- Discussion pertaining to gas generation calculations (pp.1-2) has been revised. The gas generation calculations were revised due to the increase in volume associated with the revised final contours.
- Discussion pertaining to gas collection headers (p.3) has been modified in accordance with the revised gas collection system design. This includes placement of the headers in underground trenches to provide freeze protection.
- The prescriptive requirements for gas/leachate extraction well perforations (p.3) have been removed. These requirements were originally included because they appeared in the draft

New Source Performance Standards (NSPS) for municipal waste landfills. They were deleted in the final rule. Recent information indicates that slotting may be a more effective perforation method than drilling holes in the well casing.

- Additional corrective measures for maintaining negative gage pressures at the gas wellhead (pp. 3-4) have been added.
- The gas generation calculations in Appendix 1 have been revised. Modifications to the calculations include updated waste acceptance rates, in-place density of waste, and model parameters. The calculations yielded a slightly lower maximum gas generation rate than previous submittals.
- Additional discussion pertaining to the gas processing facility has been added in Appendix 2. This information was originally submitted to IEPA on August 7, 1995.
- A copy of the permit to construct and operate a flare station has been added in Appendix 3. This permit was issued on August 22, 1995.

Attachment 18 - Surface Water Control

- Revised drainage calculations for all terraces, ditches, letdowns, and pipe drop inlets have been added in Appendix 2.

Attachment 19 - Construction Quality Assurance Program

- All changes in the addendum dated November 17, 1995 have been incorporated into Attachment 13.
- Additional discussion pertaining to prequalification of materials used in the final cover system (p.2) has been added.
- The prescriptive requirements for gas/leachate extraction well perforations (p.3) have been removed. Additional discussion is presented under Attachment 14.
- References to VLDPE geomembrane (pp.8,11) has been changed to VFPE.
- Discussion pertaining to gas collection headers (p.9) has been modified in accordance with the revised gas collection system design. This includes placement of the headers in underground trenches to provide freeze protection.
- A statement has been added allowing the granular drainage layer to be omitted on the side slopes (pp.10,12).
- A section on construction quality assurance for the gas monitoring system has been added at the end of Attachment 19. The information was originally submitted to IEPA on August 7, 1995.
- A frequency of 1 per 10,000 c.y. for triaxial laboratory permeability tests on the low-permeability layer and the leachate storage lagoon was added in Table 1.
- The hydraulic conductivity specification for the low-permeability layer in Table 1 has been changed to 1.0×10^{-8} cm/s in accordance with the HELP model output in Attachment 13.
- A note has been added to Table 1 that allows the CQAO to perform laboratory testing to determining the minimum density and moisture content required to achieve the maximum hydraulic conductivity specification for the low-permeability layer.
- Table 2 has been modified to represent typical properties of a VFPE geomembrane. References to VLDPE have been removed.

Attachment 20 - Closure Plan, Post-closure Care Plan, and Cost Estimates

- All changes in the addendum dated November 17, 1995 have been incorporated into Attachment 20.
- The anticipated date of closure (pp.1,10) has been changed to the year 2001 in accordance with the calculations in Attachment 23.
- The average top elevations have (pp.3,11) have been changed in accordance with the revised final grades and existing conditions.
- The hydraulic conductivity of the low-permeability layer (p.5) has been changed to 1.0×10^{-6} cm/s in accordance with the HELP runs in Attachment 13.
- A statement has been added allowing the granular drainage layer to be omitted on the side slopes (p.6).
- The cost of the installation of two gas monitoring probes ($2,000) has been added to the Premature Closure Cost Estimate. Of the 17 gas monitoring probes depicted on the site developmental drawings, only two have not yet been installed.
- The number of leachate monitoring points in the Post-closure Care Cost Estimate has been decreased from four to two. These points correspond to the two underground leachate storage tanks as depicted in the site developmental drawings.
- The cost of leachate treatment in the Post-closure Care Cost Estimate has been increased to $1,060 per year. This cost was based on an increased leachate generation rate as predicted by the HELP runs in Attachment 13.
- The Post-closure Care Cost discounting calculations were revised to reflect a beginning of the year method rather than an end of the year method.
- The total Closure and Post-closure Care Cost Estimate was changed to $4,544,880 based on the changes discussed above. The discounted cost estimate was changed to $3,501,863.

Attachment 21 - Clay Soil Availability Calculations

- The calculations in Attachment 21 have been revised in accordance with the revised final grades. There were no changes in the conclusions concerning clay soil availability at the facility.

Attachment 23 - Site Capacity and Operating Life Calculations

- The calculations in Attachment 23 have been revised in accordance with the revised final grades. The expected annual gate receipts were also increased due to the increased gate receipts that have been accepted at the facility in the last few years. The anticipated date of closure of the facility was calculated to be in the year 2001.

Site Developmental Plan Drawings

Sheet B3-1 Existing Site Conditions

- Topography has been updated with respect to field surveys performed in November, 1995 and April, 1996.

Sheet B3-2 Site Plan Map

- Topography has been updated with respect to field surveys performed in November, 1995 and April, 1996.
- The phasing diagram has been revised to reflect more current conditions.

Sheet B3-3 Final Site Conditions

- Topography has been updated with respect to a field survey performed in April, 1996.
- The revised final contours with a maximum elevation of 865 ft MSL are depicted.
- Drainage structures, including, terraces, ditches, letdowns, and pipe drop inlets, have been modified in accordance with the revised surface water drainage design.
- The sedimentation basin in the northwest corner of the site has been removed in accordance with the revised surface water drainage design.

Sheet B3-4 Cross Section 1

- The engineering cross section has been modified in accordance with the revised final grades.

Sheet B3-5 Cross Section 2

- All changes in the addendum dated November 17, 1995 have been incorporated into Sheet B3-5.
- The engineering cross section has been modified in accordance with the revised final grades.
- The lagoon detail has been modified to incorporate the use of a VFPE liner and a hydraulic conductivity of 1.0×10^{-6} cm/s for the secondary recompacted earthen liner.
- The granular drainage layer has been deleted from the side slope on final cover / liner system convergence detail.

Sheet B3-6 Existing Gas/Leachate Collection System

- The location of the sanitary sewer line has been revised in accordance with as-built drawings.

Sheet B3-7 Proposed Gas/Leachate Collection System

- Topography has been updated with respect to a field survey performed in April, 1996 and the revised final contours.
- The location of several perimeter gas extraction wells on the west side of the landfill have been modified in accordance with as-built locations. To date, twelve of these wells have been installed.
- The locations of the gas collection headers has been modified slightly to ensure proper drainage of leachate and landfill gas condensate.
- The locations of underground storage tanks have been moved from the top of the landfill to outside the waste boundary. The number of tanks has been changed from four to two. The leachate monitoring points corresponding to these tanks are labeled.
- The location of sanitary sewer lines and a lift station have been added in accordance with plan drawings.

- Revised gas probe locations have been incorporated into Sheet B3-7. The locations of these probes were submitted to IEPA in an application for supplemental permit for the existing unit.

Sheet B3-8 Drainage Details 1

- Terrace and ditch dimensions have been revised in accordance with the drainage calculations in Attachment 18.
- The final cover system detail has been modified in accordance with the revised final cover design, including the low-permeability layer with a hydraulic conductivity of 1.0×10^{-6} and the omission of the granular drainage layer on the side slopes.
- The letdown details have been modified so that a TRM may be used in place of riprap.

Sheet B3-9 Drainage Details 2

- Pipe drop inlet dimensions have been revised in accordance with the drainage calculations in Attachment 18.
- The contoured furrow detail has been removed. Erosion protection will instead be achieved by using a hydraulically applied bonded fiber matrix.

Sheet B3-10 Gas/Leachate Collection Details

- A revised gas wellhead detail depicting the transport of leachate and gas through the same header piping has been added.
- A gas well installation detail depicting the well casing and sealing procedures has been added.
- The leachate management schematic detail has been modified in accordance with the revised leachate collection system design.

APPLICATION HISTORY

DOCUMENT	DATE OF DOCUMENT	DATE RECEIVED
Original Application for Log No. 1995-250	July 10, 1995	July 10, 1995
Additional Information regarding Groundwater Corrective Action	July 13, 1995	July 14, 1995
Additional Information regarding CQA for Installation of Gas Monitoring System	August 7, 1995	August 7, 1995
Additional Information explaining why the adjacent gas processing unit should not be part of this facility	August 7, 1995	August 8, 1995
Initial Response to the Agency letter of October 6, 1995	October 16, 1995	October 20, 1995
Initial Follow up on the October 24, 1995 Meeting	November 1, 1995	November 2, 1995
Four Modified Disks for Groundwater Impact Assessment	November 2, 1995	November 3, 1995
Additional Information responding to the Agency letter of October 6, 1995	November 17, 1995	November 17, 1995
Addendum to Additional Information received November 17, 1995	December 7, 1995	December 8, 1995

Thomas Hilbert
Environmental Engineer
Winnebago Reclamation
8403 Lindenwood Rd..
Rockford, IL 61109
(815) 874-4806
November 1, 1995

Chris Liebman
Illinois Environmental Protection Agency
Division of Land Pollution Control
Groundwater Assistance Unit
2200 Churchill Rd.
Springfield, IL 62706

Re: Summary of meeting to discuss corrections and clarification to the Pagel Landfill application for "Significant Modification" of the existing permit.
Log No. 1995-250

Dear Chris:

Winnebago Reclamation Service (WRS) appreciates the time that representatives of the Illinois Environmental Protection Agency (IEPA) spent with WRS to discuss the status of our current application for a Significant Modification of our Pagel Landfill facility. We felt that the meeting was productive and will help ensure that our formal response to those items in the application that require correction or additional information will satisfy any remaining IEPA concerns.

WRS has completed the following summary of the October 24, 1995 meeting to help clarify our response and IEPA concerns:

I. GROUNDWATER MODELING ITEMS

1. The draft response is acceptable but, the IEPA would still need to review the revised Tables in the Groundwater Impact Assessment (GIA) prior to a formal approval.

2. The draft response is acceptable but, the IEPA would still need to review the revised Tables in the GIA prior to a formal acceptance. Revisions to table 3.5 will affect the results of the sensitivity analysis for the organic surrogate group. Although the organic surrogate group exceeds the applicable groundwater quality standard (AGQS) in the low hydraulic conductivity sensitivity analysis, a new organic surrogate group is not necessary. The text will be revised in the GIA to add a discussion that explains the reasons for exceeding the organic surrogate group AGQS at the low hydraulic conductivity.

3. GeoTrans will attempt to recompile the model code such that it will be able to run on a machine with 16 megabytes of RAM. This may require altering the length of the time between solutions (time steps). However, if efforts to improve the efficiency of model are not successful without altering the resultant output, WRS will provide the IEPA with additional RAM. This would probably be done by establishing a line of credit with an IEPA selected computer services contractor.

4. This information will be submitted upon finding a solution to the problem identified in item number I (3).

II. NON-MODELING GROUNDWATER ITEMS

1a. The existing AGQS values developed from wells that are located in the upgradient bedrock aquifer are appropriate and a separate set of AGQS values developed in the sand and gravel aquifer are not necessary at this time. However, the text in the Groundwater Monitoring Plan (GMP) will be revised to clarify that an analysis of groundwater flow paths supports the use of bedrock wells for development of AGQS values that apply to downgradient wells in the sand and gravel aquifer. In addition, text will be added to address the possibility of future problems that may result from differences in the groundwater chemistry of the dolomite aquifer and the alluvial aquifer.

1b. The text in the GMP will be revised to clarify that previous investigative borings and monitoring wells have been abandoned in accordance with the appropriate procedures delineated in 77 IAC 920 and Table 1 of the IEPA "Groundwater Monitoring Network for Non hazardous Solid Waste Disposal Facilities", April 1990.

1c. Proposed revisions to text on page 15 in the GMP are acceptable.

2a. Proposed new cross sections that will be added to the Groundwater Management Zone Application (GMZ) were distributed and found to be acceptable.

2b. The text in the GMP will be revised to provide a clear understanding that the proposed Operations and Maintenance Monitoring Program is a continuation of assessment monitoring required under 35 IAC 811.319. Specific reference to the appropriate regulations will be added as part of the text revisions.

2c. The O & M Monitoring Program presented in the draft response will be updated to include the "typical" annual organic scan for all of the wells proposed in the O & M monitoring network. In addition, the monitoring program will be designed to satisfy the requirements of 35 IAC 811.319(b)(5)(A-G) and 811.326(a)(1)(A). The proposed program will take advantage of the flexibility allowed to decrease the number of wells and parameters during 3 quarters of the year. However, the assessment monitoring requirements for semi-annual monitoring for detectable leachate constituents will be

satisfied in the proposed program.

WRS will also propose two wells within the GMZ that are representative of the spatial and chemical characteristics of impacted groundwater to be sampled for the full list of parameters at 40 CFR 258 Appendix II. If any parameters are detected during this sampling event that are not listed in the proposed O & M Monitoring Program they will be added to the list to be sampled on a semi-annual basis.

2d. The Groundwater Remedial Alternative Analysis and Preliminary Design (Preliminary Design) will be reworked to provide references to the regulatory requirements listed at 35 IAC 811.324-326. In addition, a public meeting will be proposed to allow public participation in the remedial design review process.

3a. This item is addressed under II(2)(b-c). A quotation from the prime analytical contractor will be provided that verifies the cost estimate for groundwater monitoring.

3b. Proposed revisions to the text presented will be incorporated and cross checked with the Closure/Post-Closure cost estimate.

3c. The text in Attachment 20 of the engineering design document will be revised to include the discussion of the assumptions used in the proposed time frame for completion of remedial activities.

3d. No summary necessary

III. NON-GROUNDWATER ITEMS

1. Certification that provides proof that the proposed final elevations are consistent with the existing Siting for the facility will be provided.

2. IEPA will check with John Taylor and Robert Schershligt to ensure that the existing financial assurance mechanisms are in place.

3. The HELP model will be revised to find the minimum hydraulic conductivity specification that can be used without altering the current predicted infiltration rate for the final cover. A maximum hydraulic conductivity will be specified for the clay base layer and the results of the HELP model runs will be presented. IEPA has verbally agreed to the proposed design for carrying the final cover system into the landfill liner and will review actual details when they are presented.

4a. No summary necessary.

4b. Existing storage lagoon details will be revised to clarify details as requested by the IEPA.

4c. The proposed system will be described in revisions to the Leachate Management Plan (Attachment 13) that provide a description of how leachate will be handled during transition from the old system to the new system.

5a-b. The leachate monitoring program will be revised to contain typical monitoring required of other 35 IAC 814 subpart C facilities. This will be presented in a format that mimics the groundwater monitoring program (i.e. an annual organic scan and routine quarterly monitoring). Sampling points will be labeled and individual samples will be collected from each sampling point (no compositing). A cost estimate from the prime analytical laboratory will be provided to verify cost estimates for the Closure/ Post Closure care cost estimate.

5c. Revisions in the postclosure care cost estimate will be made that reflects a change in the annual leachate production rate from 3,000 gallons a year to 16,456 gallons a year for the entire closure period will be provided.

Once again WRS thanks the IEPA for the time to discuss these items. We plan on presenting the above referenced revisions to the IEPA on 11-10-95. If you have any questions, or find that your meeting notes conflict with the above summary please, feel free to call me to ensure that WRS satisfies any remaining concerns.

Sincerely,

Thomas Hilbert

cc: Chris Leibman, DLPC, Permit Section
Ken Liss, DLPC-Groundwater Asst. Unit
Bernie Schorle - USEPA Region V
Dan Feezor - Andrews Engineering, Inc.
Dan Burnell - GeoTrans, Inc.
John Holmstrom - Winnebago Reclamation Service, Inc.

ANDREWS ENVIRONMENTAL ENGINEERING INC. 3535 Mayflower Blvd., Springfield, Illinois 62707/(217) 787-2334

November 17, 1995

Mr. Tom Hilbert
Winnebago Reclamation Service, Inc.
Pagel's Landfill
8403 Lindenwood Road
Rockford, IL 61109

re: Existing Permit Log Number: 1995-250 -- Pagel Landfill
Corrections to the Application for Significant Modification

Dear Tom:

Enclosed please find the formal response to those items in the Application that require correction or additional information to satisfy the Illinois Environmental Protection Agency (IEPA) comments for the Engineering Portion of the previously referenced Significant Modification Application. The response addresses the comments specified in the IEPA letter dated October 6, 1995 and discussed during the meeting on October 24, 1995. This submittal contained herein addresses the engineering related comments and alters the Permit Application Forms in Volume I, the Leachate Management Plan in Attachment 13, the Construction Quality Assurance Program in Attachment 19, the Closure Plan, Post-Closure Care Plan and Cost Estimates in Attachment 20, and the full-size set of Site Developmental Drawings.

The following replacement pages should be inserted into each respective document to address the comments:

- Drawing Sheets B-5 and B-8 should be replaced with the new Drawing Sheets B-5 and B-8 in the full-size set of Site Developmental Drawings;
- The Certification of Siting Approval Form (LPC-PA8) should be inserted after the Permit Application Forms within Volume I;
- Reduced Drawing Sheets B-5 and B-8 should be replaced with the new Drawing Sheets B-5 and B-8 in the Reduced Site Developmental Plan Drawings (Attachment 3 of Volume I);
- Within the Leachate Management Plan (Attachment 13 of Volume II), replace the Main Narratives, replace the Appendix 1 Title Sheet, add the HELP Run, and a new Appendix 4;
- Replace the entire Construction Quality Assurance Program (Attachment 19 in Volume II); and
- Replace the Narratives and Appendix 1 within the Closure Plan, Post-Closure Care Plan and Cost Estimates (Attachment 20 in Volume II).

If you have any questions or comments, please contact me. Thank you.

Sincerely,

Daniel R. Feezor, P.E.
Project Engineer
Division of Solid Waste Management

CC: Bernie Schorle, USEPA Region V
Fred Nika, IEPA, Federal Section
Alex Vincent, GeoTrans, Inc.

Enclosures
DRF:jim

GeoTrans, inc.
GROUNDWATER SPECIALISTS

46050 Manekin Plaza ▪ Suite 100 ▪ Sterling, Virginia ▪ 20166

703 ▪ 444 ▪ 7000 FAX: 703 ▪ 444 ▪ 1685

November 16, 1995

VIA EXPRESS MAIL

Mr. Thomas Hilbert
Environmental Engineer
Winnebago Reclamation
8403 Lindenwood Rd.
Rockford, IL 61109

Subject: Corrections to the Pagel Landfill Application for "Significant Modification" of the existing Permit, Log No. 1995-250
GeoTrans Project No. 7740-007

Dear Tom,

Enclosed please find the formal response to those items in the application that require correction or additional information to satisfy IEPA comments. The response addresses the comments specified in the IEPA letter dated October 6, 1995 and discussed during the meeting on October 24, 1995. To this end, four reports have been modified: (1) Groundwater Management Zone Application; (2) Groundwater Impact Assessment; (3) Groundwater Monitoring Plan; and (4) Groundwater Remedial Alternative Analysis and Preliminary Design (Air Sparging). The latter has been revised to include an evaluation of remedial alternatives and is now entitled "Corrective Action Measures Assessment and Preliminary Design."

The following replacement pages should be inserted into each respective document to address the comments or reflect changes in pagination.

Groundwater Management Zone Application:

1. Replace Table of Contents pages ii and iv,
2. Replace pages 10 through 14 and 28, and
3. Insert Attachment 1 and associated Figures A1 through A6 at page 32.

Groundwater Impact Assessment:

1. Replace Table of Contents pages ii and v,
2. Replace text pages 24, 30, 31, 90, 91, 92, 93, 95, and 96, and
3. Insert Attachment 1 (pages 97-99).

Groundwater Monitoring Plan:

1. Replace Table of Contents pages ii and v and
2. Replace pages 1, 2, 13, 14 (Figure 3.1), 15, 16, 17 (Figure 3.2), 23, 24, 26, 33-36, and 40-59.

Groundwater Remedial Alternative Analysis and Preliminary Design (Air Sparging):

1. This document has been revised for IEPA and is entitled "Corrective Action Measures Assessment and Preliminary Design."

If you have any questions or need clarification, please do not hesitate to contact me at (703) 444-7000.

Sincerely,

Alex Vincent

Alex Vincent
Senior Hydrogeologist

av/AV

enclosures: as stated

cc: D. Feezor (Andrews) for C. Liebman, IEPA (w/encl. - 4 copies)
B. Schorle, USEPA Region 5 (w/encl. - 2 copies)
R. Rajaram, PRC Environmental (w/encl. - 1 copy)
D. Burnell, GeoTrans (w/encl. - 1 copy)
P. Rich, GeoTrans (w/encl. - 1 copy)

State of Illinois
ENVIRONMENTAL PROTECTION AGENCY

A. Gade, Director

2200 Churchill Road, Springfield, IL 62794-9276

General Application for Permit (LPC-PA1)

his form must be used for any application for permit from the Bureau of Land, except for waste stream applications nd applications for the composting of landscape waste only. One original and two (2) photocopies, or three (3) if pplicable, of all permit application forms must be submitted. Attach the original and appropriate number of copies f any necessary plans, specifications, reports, etc. to fully support and describe the activities or modifications eing proposed. If necessary, attach sufficient information to demonstrate compliance with all applicable RCRA equirements. Incomplete applications will be rejected. Please refer to the instructions for further guidance.

ote: Permit applications which are to be hand-delivered to the Bureau of Land, Permit Section must be delivered to the 1240 North Ninth Street location between the hours of 8:30 a.m. to 5:00 p.m., Monday through Friday (excluding State holidays).

lease type or print legibly.

. SITE IDENTIFICATION

ame: Pagel Landfill Facility Site # (IEPA): 2 0 1 8 0 8 0 0 0 1

hysical Site Location (street, road, etc.): 8403 Lindenwood Road

ity, Zip Code: Rockford, Illinois 61109 County: Winnebago

xisting OE/OP Permit Nos. (if applicable): 1972-24 (Existing Unit) 1991-138-LF (Expansion Unit)

I. OWNER/OPERATOR IDENTIFICATION

	OWNER	OPERATOR
lame	Winnebago Reclamation Service, Inc.	Winnebago Reclamation Service, Inc.
ddress:	4920 Forest Hills Road	4920 Forest Hills Road
	Loves Park, Illinois 61111	Loves Park, Illinois 61111
ontact Name:	Gary L. Marzorati	Gary L. Marzorati
hone #:	(815) 654-4779	(815) 654-4779

III. PERMIT APPLICATION IDENTIFICATION

TYPE SUBMISSION/REVIEW PERIOD:

- ___ New Landfill/180 days (35 IAC Part 813)
- X Landfill Expansion/180 days (35 IAC Part 813)
- X 1st Sign. Mod/90 days (35 IAC Part 814)
- ___ Sign. Mod to Operate/90 days (35 IAC Part 813)
- ___ Other Sign. Mod/90 days (35 IAC Part 813)
- ___ Renewal of Landfill/90 days (35 IAC Part 813)
- ___ Developmental/90 days (35 IAC Part 807)
- ___ Operating/45 days (35 IAC Part 807)
- ___ Supplemental/90 days (35 IAC Part 807)
- ___ Permit Transfer/90 days (35 IAC Part 807)
- ___ Generic/90 days

TYPE FACILITY:

- X Landfill
- ___ Land Treatment
- ___ Transfer Station
- ___ Treatment
- ___ Storage
- ___ Incinerator
- ___ Composting
- ___ Recycling/Reclamation
- ___ Other (Specify)

TYPE WASTE:

- X General Municipal Refuse
- X Hazardous
- ___ Special (Non-hazardous)
- ___ Chemical Only (exc. putrescible)
- ___ Inert Only (exc. chemical and putrescible)
- ___ Used Oil
- ___ Solvents
- ___ Landscape/Yard Waste
- ___ Other (Specify)

DESCRIPTION OF THIS PERMIT REQUEST: (Include a brief narrative description here.)

Significant Modification of Existing Permit and increase in final elevation.

This Agency is authorized to require this information under Illinois Revised Statutes, 1979, Chapter 111 1/2, Section 1039. Disclosure of this information is required under that Section. Failure to do so may prevent this form from being processed and could result in your application being denied. This form has been approved by the Forms Management Center.

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V. COMPLETENESS REQUIREMENTS

he following items must be checked Yes, No or N/A. Each item will be reviewed by the log clerk. Blank items will esult in rejection of the application. Please refer to the instructions for further guidance.

.	Have all public notice letters (LPC-PA16) been mailed and are copies and supporting documentation enclosed?	X Yes	___ No ___ N/A
. a.	Is the Siting Certification Form (LPC-PA8) completed and enclosed?	X Yes	___ No ___ N/A
b.	Is siting approval currently under litigation?	___ Yes	X No ___ N/A
. a.	Is a closure, and if necessary a post closure, plan covering these activities being submitted, or	X Yes	___ No ___ N/A
b.	has one already been approved? (Provide permit number 1990-454-SP.)	X Yes	___ No ___ N/A
. a.	For waste disposal sites only: Has any employee, owner, operator, officer or director of the owner or operator had a prior conduct certification denied, cancelled or revoked?	___ Yes	X No ___ N/A
b.	Have you included a demonstration of how you comply or intend to comply with 35 Ill. Adm. Code Part 745?	X Yes	___ No ___ N/A
. a.	Is land ownership held in beneficial trust?	___ Yes	X No ___ N/A
b.	If yes, is a beneficial trust certification form (LPC-PA9) completed and enclosed?	___ Yes	___ No X N/A
. a.	Does the application contain information or proposals regarding the hydrogeology; groundwater monitoring, modeling or classification; a groundwater impact assessment; or vadose zone monitoring for which you are requesting approval?	X Yes	___ No ___ N/A
b.	If yes, have you submitted a third (3rd) copy of the application (4 total) and supporting documents?		

/. **SIGNATURES** (Original signatures required. Signature stamps or applications transmitted electronically or by facsimile are not acceptable.)

ll lications shall be signed by the person designated below or by a duly authorized representative of that person:

Corporation - By a principal executive officer of at least the level of vice-president.
Partnership or Sole Proprietorship - By a general partner or the proprietor, respectively.
Government - By either a principal executive officer or a ranking elected official.

person is a duly authorized representative only if:

1. The authorization is made in writing by a person described above; and
2. is submitted with this application (a copy of a previously submitted authorization can be used).

hereby affirm that all information contained in this Application is true and accurate to the best of my knowledge and belief.

Owner Signature: [signature] Title: Gary L. Marzorati ~~Executive Vice-President~~ Date: 5-22-96

Owner FEIN or S.S. Number 338-36-5020

Operator Signature: [signature] Title: Gary L. Marzorati Executive Vice-President Date: 5-22-96

Operator FEIN or S.S. Number 338-36-5020

Engineer Signature: Daniel R. Feezor Name: Daniel R. Feezor, P.E. Date: 5/22/96

Engineer Address: Andrews Environmental Engineering, Inc.
3535 Mayflower Boulevard
Springfield, Illinois 62707

Engineer Seal: DANIEL R. FEEZOR 062-048889 REGISTERED PROFESSIONAL ENGINEER OF ILLINOIS Expires 11/30/97

Eng er Phone No.: (217) 787-2334

All information submitted as part of the Application is available to the public except when specifically designated by the Applicant to be treated confidentially as a trade secret or secret process in accordance with Section 7(a) of the Environmental Protection Act, applicable Rules and Regulations of the Illinois Pollution Control Board and applicable Agency rules and guidelines.

LWE/mls/sp00022/1-2

State of Illinois
ENVIRONMENTAL PROTECTION AGENCY

Mary A. Gade, Director
2200 Churchill Road, Springfield, IL 62794-9276

APPLICATION FOR A PERMIT TO DEVELOP A NONHAZARDOUS LANDFILL (LPC-PA2)

I. Site Name: Pagel Landfill County: Winnebago

Site Number: 2 0 1 8 0 8 0 0 0 1

II. Applicant Information:

1.

	Owner	Operator (if different)
Name:	Winnebago Reclamation Service, Inc.	Winnebago Reclamation Service, Inc.
Phone:	(815) 654-4779	(815) 654-4779

2. Ownership and Operator Status:

	Owner	Operator
Corporation	X	X
Partnership		
Sole Proprietor		
Governmental Body		
Other:		

3. Land is:

Owned by Applicant Operator	X
Leased by Applicant	
Beginning Date on Lease	
Expiration Date on Lease	
Held in Trust*	

*(Note: Lands held in trust must complete form LPC-PA9)

III. Site Location Map:

Attach a copy of the United States Geological Survey (U.S.G.S.) quadrangle map (7.5 minute quadrangle, if published) and/or a topographic map of the area which contains the site.

Quadrangle map provided: Rockford South (Name) 1976 (Date)

Other map provided: _____ (Title)

IV. Facility Background:

____ This is a new unit within a new facility.

____ This is a new unit within an existing facility.

____ This is a vertical, horizontal, vertical and horizontal (circle the appropriate one) expansion of an existing unit (or units) within an existing facility

If this is a modification of an existing facility, list the environmental permits which have been issued to the facility and their dates of issuance.

1972-24 (04/07/72)	1989-027 (05/01/89)
1979-923 (10/29/79)	1991-203-SP (08/28/91)
1985-96 (07/26/85)	1991-138-LF (04/05/93)
1987-060-SP (06/18/87)	1991-EN-2120 (01/16/91) - DWPC
	1991-HB-2118 (01/23/91) - DWPC

V. General Facility Information:

The following information must accompany the application as a General Information Document. Please indicate the location in the application for the documents being submitted with this application.

GEN = General Information Document
OPR = Operating Plan
CON - Construction Document
SDD - Site Developmental Drawings

Location in Application

GEN 1. A directory of maps, plan sheets, etc. included in the application.

SDD 2. A Site Plan Map(s).

3. Narrative descriptions of the facility. The permit application shall contain a written description of the facility with supporting documentation describing the procedures and plans that will be used at the facility to comply with the requirements of 35 IAC 811 and any other applicable Parts of 35 Ill. Adm. Code: Chapter I. Such descriptions shall include, but not be limited to the following information:

OPR a) The type of waste disposal units and the types of wastes expected in each unit;

OPR b) An estimate of the maximum capacity of each unit and the rate at which waste is to be placed;

OPR c) The manner in which waste will be placed and compacted to comply with 35 IAC 811.105;

OPR d) The estimated unit weight of the waste;

OPR e) The length of time each unit will receive waste;

OPR f) The design period to be used for each unit;

OPR g) Size of the open face area, including all information showing that slopes steeper than two to one will be stable and in compliance with 35 IAC 811.107(b);

OPR h) A description of how units will be developed to allow contemporaneous closure and stabilization pursuant to 35 IAC 811.110, 811.111, 811.204, 811.205 or 811.322;

OPR i) A description of all equipment to be used at the facility for complying with 35 IAC 807.304;

OPR j) A litter control plan for complying with 35 IAC 811.107(k);

OPR k) A salvaging plan including a description of all salvage facilities and a plan for complying with 35 IAC 811.108;

OPR l) A description of all utilities for operation in compliance with 35 IAC 811.107(d);

OPR m) A boundary control plan describing how the operator will comply the requirements of 35 IAC 811.109;

Att.25 n) A maintenance plan describing how the operator will comply with 35 IAC 811.107(c) and (e);

OPR o) An air quality plan describing the methods to be used to comply with the open burning requirements of 35 IAC 811.107(f) and for controlling dust in compliance with 35 IAC 811.107(g);

OPR p) A noise control plan describing how the operator will control noise in compliance with 35 IAC 811.107(h);

OPR q) An odor control plan;

OPR r) A vector control plan to comply with 35 IAC 811.107(i);

Att.24 s) A firefighting and fire safety plan;

Att.22 t) A transportation plan that includes all existing and planned roads in the facility that will be used during the operation of the landfill facility; the size and type of such roads and the frequency with which they will be used; and

OPR u) A plan to prevent the tracking of mud by hauling vehicles onto public roadways.

____ v) Other special features or relevant items.

4. The location documentation listed below should be included in the General Information Document.

Att.4 A. Documentation that the facility will operate in compliance with 35 IAC 811.102(a).

Att.5 B. A floodplain determination containing:

____ (1) Documentation that the facility is not located within the floodplain of the 100-year flood event; or

____ (2) Documentation that the facility meets the requirements of 35 IAC 811.102(b).

Att.6 C. Documentation from the State Historic Preservation Officer that the facility will be in compliance with 35 IAC 811.102(c).

Att.7 D. Documentation from the Illinois Nature Preserves Commission that the facility will be in compliance with 35 IAC 811.102(c) as it relates to any Dedicated Illinois Nature Preserve.

Att.8 E. Documentation that the facility will be in compliance with 35 IAC 811.102(d).

Att.9 F. Documentation that the facility located within a wetland will not cause a violation of Section 404 of the Clean Water Act (35 U.S.C. 1344).

Att.10 G. Documentation that the facility is in compliance with 35 IAC 811.102(f).

5. The surface water control plan which demonstrates compliance with 35 IAC 811.103 shall include at least the following:

Att.18 A. A copy of the approved National Pollutant Discharge Elimination System (NPDES) permit issued pursuant to 35 IAC 309 or, if a permit is pending, a copy of the NPDES permit application to discharge runoff from all disturbed areas;

SDD B. A map showing the location of all structures affected by the surface water from disturbed areas on the facility;

CON C. Discussions of all structures to be constructed during development of the facility and during the first five year operating period with reference to their detailed designs; and

CON D. Estimated construction dates of all structures to be constructed beyond the first five year operating period.

6. The General Information Document shall contain a description of the material to be used as daily cover:

OPR A. A description of the soil to be used, including its classification and approximate hydraulic conductivity; or

OPR B. Documentation that any proposed alternative materials or procedures to substitute for daily cover meet the minimum requirements of 35 IAC 811.106(b).

Att.27. Legal Description(s).

Att.28. Proof of Property Ownership Certification.

VI. The following documents are required to be included as part of this application. List any *additional information.*

1. General Information Document (Refer to LPC-PA2 instructions)

2. Inert Waste Landfill Documents (Refer to Appendix A)

   A. Determination

   B. Design Report

   C. Closure Plan

3. Chemical and Putrescible Waste Landfill Documents

   A. Location Requirements (Appendix B)

   B. Groundwater Protection Evaluation (Appendix C)

   C. Design Description (Appendix D)

   D. Construction Report (Appendix E)

   E. Closure Plan and Post-Closure Care Plan (Appendix F)

   F. Operating and Reporting Plan (Appendix G)

   Others

4. _____

5. _____

Consult the Instructions for Appendices A, B, C, D, E, F, and G for the type of information needed to be included in each document or report.

CL:rmi/1641q/sp, 70-73

Illinois Environmental Protection Agency · P.O. Box 19276, Springfield, IL 62794-9276

CERTIFICATION OF SITING APPROVAL (LPC-PA8)

Name of Applicant: Winnebago Reclamation Service, Inc.

Address of Applicant: 4920 Forest Hills Road, Loves Park, Illinois 61111

Name of Site: Winnebago Reclamation Landfill (Pagel's Landfill)

Site Information: Nearest City New Milford

County: Winnebago

1. On October 11, 19 90, the County board (governing body of county or municipality) of Winnebago (county or municipality) County approved the site location suitability of Winnebago Reclamation Landfill (name of site) as described in item 3 below as a new regional pollution control facility in accordance with Section 39.2 of the Illinois Environmental Protection Act, Ill. Rev. Stat., ch. 111 1/2, Secion 1039.2.

2. The facility was approved for the following activities:

waste storage (___), landfill (X), waste disposal (___), waste transfer station (X),

waste treatment (___), waste incinerator (___).

3. Attached to this certification is a true and correct statement of the legal description of the site as it was approved by the aforementioned local governing body.

4. Attached to this certification is a true and accurate statement of conditions, if any, under which the approval was provided. (Note: These conditions are provided for information only to the IEPA. The IEPA is not obligated to monitor or enforce local conditions.)

5. The undersigned has been authorized by the County Board (governing body of county or municipality) of Winnebago County (county or municipality) to execute this certification on behalf of Winnebago County (county or municipality)

NAME: [signature]

TITLE: County Board Chairman

SUBSCRIBED AND SWORN TO BEFORE ME
this 3 day of December, 19 90

[signature]
Notary Public

"OFFICIAL SEAL"
TERRI L. KNIGHT
Notary Public, State of Illinois
My Commission Expires 5/26/93

IL 532 1429
LPC 218 01/90

Printed on Recycled Paper

This Agency is authorized to require this information under Illinois Revised Statutes, 1979, Chapter 111 1/2, Section 1039. Disclosure of this information is required under that Section. Failure to do so may prevent this form from being processed and could result in your application being denied. This form has been approved by the Forms Management Center.

STATE OF ILLINOIS)
) SS
COUNTY OF WINNEBAGO)

GLORIA M. LIND, COUNTY CLERK WITHIN AND FOR SAID COUNTY, AND HAVING A SEAL DO HEREBY CERTIFY THAT I HAVE COMPARED THE FOREGOING COPY OF THE RECORD OF

RESOLUTION ADOPTING THE PROPOSED FINDINGS AND ORDER ON THE REGIONAL POLLUTION CONTROL FACILITY LOCATION APPROVAL APPLICATION FILED BY WINNEBAGO RECLAMATION SERVICE, INC.

WITH THE ORIGINAL RECORD THEREOF NOW REMAINING IN MY OFFICE, AND HAVE FOUND THE SAME TO BE A CORRECT TRANSCRIPT THEREFROM AND OF THE WHOLE OF SUCH ORIGINAL RECORD.

IN TESTIMONY WHEREOF I HAVE HEREWITH SET MY HAND AND AFFIXED THE SEAL OF SAID COUNTY, AT THE CITY OF ROCKFORD, IN SAID COUNTY, THIS 12TH DAY OF OCTOBER A.D. 1990

Gloria Lind WINNEBAGO COUNTY CLER

BY: Tami Hoal DEPUTY COUNTY CLERK

R E S O L U T I O N
of the
COUNTY BOARD OF THE COUNTY OF WINNEBAGO, ILLINOIS

SUBMITTED BY: ZONING COMMITTEE

90-CR-

RESOLUTION ADOPTING THE PROPOSED FINDINGS AND ORDER ON THE REGIONAL POLLUTION CONTROL FACILITY LOCATION APPROVAL APPLICATION FILED BY WINNEBAGO RECLAMATION SERVICE, INC.

WHEREAS, the Illinois Environmental Protection Act, Paragraph 1001 et seq. of Chapter 111-1/2 of the Illinois Revised Statutes (hereinafter referred to as the "Act"), requires that local governments approve the site location suitability for new regional pollution control facilities; and

WHEREAS, on April 20, 1990, Winnebago Reclamation Service, Inc. filed a Regional Pollution Control Facility Location Approval Application, requesting site location approval for a resource recovery facility, the expansion of an existing sanitary landfill, and a sanitary landfill to be located in unincorporated Winnebago County, Illinois, on the west side of Lindenwood Road on the property commonly known as the Pagel Landfill site; and

WHEREAS, pursuant to subparagraph (d) of Paragraph 1039.2 of the Act, a public hearing on the Application was held by the Zoning Committee on behalf of the County Board on July 19 and July 24, 1990; and

WHEREAS, pursuant to subparagraph (c) of Paragraph 1039.2 of the Act, all written comments received or postmarked not later than thirty days after the close of the public hearing have been considered; and

WHEREAS, after reviewing the testimony and evidence presented at the public hearing, the Zoning Committee has prepared a document entitled Findings And Order, a copy of which is attached hereto and made a part hereof; and

WHEREAS, after considering the record of said proceedings, the Winnebago County Board finds that the Zoning Committee's recommendations as proposed in the attached document are accurate, proper, and should be adopted.

NOW, THEREFORE, BE IT RESOLVED, by the County Board of the County of Winnebago, Illinois, that the Findings And Order which is attached hereto and made a part hereof is adopted as the written decision of the County Board on the Regional Pollution Control Facility Location Approval Application filed by Winnebago Reclamation Service, Inc. on April 20, 1990 as required by Section 39.2 of the Illinois Environmental Protection Act, Paragraph 1039.2 of Chapter 111-1/2 of the Illinois Revised Statutes.

BE IT FURTHER RESOLVED, that the attached Findings And Order be executed by the Chairman of the County Board and thereafter entered into the record of proceedings on the Application filed by Winnebago Reclamation Service, Inc.

BE IT FURTHER RESOLVED, that this Resolution shall be in full force and effect immediately upon its adoption.

BE IT FURTHER RESOLVED, that the Clerk of the County Board is hereby directed to prepare and deliver a certified copy of this Resolution to Gary L. Marzorati, Executive Vice President, Winnebago Reclamation Service, Inc., 4920 Forest Hills Road, Loves Park, Illinois 61111.

Respectfully submitted,

ZONING COMMITTEE

Chairman

David Winters

James E. Hagman

Earl L. Nell

The above and foregoing Resolution was adopted by the County Board of the County of Winnebago, Illinois, this 11TH day of OCTOBER, 1990.

Thomas Currier, Chairman of the County Board of the County of Winnebago, Illinois

ATTEST:

Gloria M. Lind, Clerk of the County Board of the County of Winnebago, Illinois

BEFORE THE WINNEBAGO COUNTY BOARD
WINNEBAGO COUNTY, ILLINOIS

IN THE MATTER OF:	)
	)
THE REGIONAL POLLUTION CONTROL FACILITY LOCATION APPROVAL APPLICATTION FILED ON APRIL 20, 1990 BY WINNEBAGO RECLAMATION SERVICE, INC.	)

FINDINGS AND ORDER

THIS MATTER coming on to be heard upon the Regional Pollution Control Facility Location Approval Application filed on April 20, 1990 by Winnebago Reclamation Service, Inc. (hereinafter referred to as "Applicant"), said Application requesting the site location approval for a resource recovery facility, the expansion of an existing sanitary landfill, and a sanitary landfill to be located in unincorporated Winnebago County, Illinois, on the west side of Lindenwood Road on the property commonly known as the Pagel Landfill site, the County Board having considered the entire Record in this cause which consists of the Application, testimony presented at the public hearing conducted on that Application, exhibits entered into evidence during the public hearing, and all written comments properly filed, the County Board for the County of Winnebago, Illinois finds and orders as follows:

I.

FINDINGS

A. The County Board recognizes that the process set forth in the Illinois Environmental Protection Act, Paragraph 1001 et seq. of Chapter 111-1/2 of the Illinois Revised Statutes, requiring local governments to approve the location suitability for new regional pollution control facilities, is quasi-judicial in nature. The County Board recognizes that it can only consider the Record consisting of the Application, testimony and exhibits from the public hearing, and written comments properly received. The County Board further recognizes that it must apply the preponderance of the evidence standard to that Record and base its decision in this matter only on the following nine criteria:

1. the facility is necessary to accommodate the waste needs of the area it is intended to serve;

2. the facility is so designed, located and proposed to be operated that the public health, safety and welfare will be protected;

3. the facility is located so as to minimize incompatibility with the character of the surrounding area and to minimize the effect on the value of the surrounding property;

4. the facility is located outside the boundary of the 100 year flood plain or the site is flood-proofed;

5. the plan of operations for the facility is designed to minimize the danger to the surrounding area from fire, spills, or other operational accidents;

6. the traffic patterns to or from the facility are so designed as to minimize the impact on existing traffic flows;

7. if the facility will be treating, storing or disposing of hazardous waste, an emergency response plan exists for the facility which includes notification, containment and evacuation procedures to be used in case of an accidental release;

8. if the facility is to be located in a county where the county board has adopted a solid waste management plan, the facility is consistent with that plan; and

9. if the facility will be located within a regulated recharge area, any applicable requirements specified by the Pollution Control Board for such areas have been met.

B. Utilizing the preponderance of the evidence standard, upon consideration of the Record in this matter as it relates to the nine criteria set forth above, the County Board FINDS:

1. The Applicant has met its burden of proof as to Criteria Nos. 1, 2, 3, 4, 5, and 6.

2. Criteria Nos. 7, 8, and 9 are not applicable to the facility as proposed by the Applicant.

II.

ORDER

Because the Applicant has met its burden of proof on, or otherwise demonstrated compliance with, all of the nine criteria as required by Section 39.2 of the Illinois Environmental Protection Act, the Regional Pollution Control Facility Location Approval Application filed by Winnebago Reclamation Service, Inc. on April 20, 1990, is hereby granted, and the site location for the facility proposed in that Application is approved.

Dated this 11TH day of OCTOBER, 1990.

Thomas E. Currier, Chairman
of the County Board of the
County of Winnebago, Illinois

ATTEST:

Gloria M. Lind, Clerk of the
County Board of the County of
Winnebago, Illinois

ROLL CALL - WINNEBAGO COUNTY BOARD MEETING

ROLL CALL - WINNEBAGO COUNTY FOREST PRESERVE DISTRICT

RE: _____

DATE: _____

	PRESENT	ABSENT	AYES	NAYES
AIELLO-MARY ANN			✓	
BARNARD, JUDY			✓	
BRUSCH, TOM			✓	
BUTITTA, APRIL			✓	
CLEARY, BETTY			✓	
CORDONNIER, RICHARD			✓	
CORNELIUS, DORIS			✓	
CURRIER, TOM			✓	
DANIELSON, JOHN			✓	
DE HART, DALE			✓	
DOTSON-WILLIAMS, HENRIETTA			✓	
FOLZ, STAN			✓	
GIORGI, AMEDEO			✓	
GORAL, MICKEY			✓	
HALLSTEN, DAWN			✓	
HEUER, ERNIE			✓	
HUGHES, JIM			—	—
KERESTES, DON			—	—
MAC KAY, PETE				✓
MC GAW, MARGARET (PEGGY)			✓	
MILLARD, ROBERT			✓	
✓ NULL, EARL			✓	
OWENS, TOM			✓	
SCHOU, JOHN			✓	
SIMON, AFRIC (SI)			✓	
TUNEBERG, JAMES			✓	
WALKER, OUSLEY			✓	
WINTERS, DAVID			—	—
			24	1

State of Illinois
ENVIRONMENTAL PROTECTION AGENCY

Mar . Gade, Director
2200 Churchill Road, Springfield, IL 62794-9276

NOTICE OF APPLICATION FOR PERMIT TO MANAGE WASTE (LPC-PA16)

Eugene R. Quinn, County Board Chairman
Winnebago County Administrative Building
404 Elm Street
Rockford, Illinois 61101

Date: May 24, 1996

To Elected Officials and Concerned Citizens:

The purpose of this notice is to inform you that a permit application has been submitted to the IEPA, Bureau of Land, for a solid waste project described below. You are not obligated to respond to this notice, however, if you have any comments, please submit them in writing to the address below, or call the Permit Section at 217/524-3300, within twenty-one (21) days.

Illinois Environmental Protection AGency
Bureau of Land, Permit Section (#33)
2200 Churchill Road, Post Office Box 19276
Springfield, Illinois 62794-9276

The permit application, which is identified below, is for a project described at the bottom of this page.

SITE IDENTIFICATION

Site Name: Winnebago Reclamation Service, Inc. - Pagel's Landfill

Site # (IEPA): 2018080001

Address: 8403 Lindenwood Road

City: Rockford, Illinois 61109

County: Winnebago

TYPE PERMIT SUBMISSION:		TYPE FACILITY:		TYPE WASTE:	
New Landfill		Landfill	X	General Municipal Refuse	X
Landfill Expansion	X	Land Treatment		Hazardous	
First Significant Modification	X	Transfer Station		Special (Non-Hazardous)	X
Significant Modification to Operate		Treatment Facility		Chemical Only (exc. putrescible)	
Other Significant Modification		Storage		Inert Only (exc. chem. & putrescible)	
Renewal of Landfill		Incinerator		Used Oil	
Development		Composting		Solvents	
Operating		Recycling/Reclamation		Landscape/Yard Waste	
Supplemental		Other		Other (Specify)	
Transfer					
Name Change					
Waste Stream					
Generic					

DESCRIPTION OF PROJECT: (For multiple waste stream applications, see reverse side).

Significant Modification of Existing Permit and increase in final elevation.

Printed on Recycled Paper

State of Illinois
ENVIRONMENTAL PROTECTION AGENCY

ar Gade, Director

2200 Churchill Road, Springfield, IL 62794-9276

NOTICE OF APPLICATION FOR PERMIT TO MANAGE WASTE (LPC-PA16)

Honorable Ron Wait
411 South State Street
Belvidere, Illinois 61008

Date: May 24, 1996

To Elected Officials and Concerned Citizens:

The purpose of this notice is to inform you that a permit application has been submitted to the IEPA, Bureau of Land, for a solid waste project described below. You are not obligated to respond to this notice, however, if you have any comments, please submit them in writing to the address below, or call the Permit Section at 217/524-3300, within twenty-one (21) days.

Illinois Environmental Protection AGency
Bureau of Land, Permit Section (#33)
2200 Churchill Road, Post Office Box 19276
Springfield, Illinois 62794-9276

The permit application, which is identified below, is for a project described at the bottom of this age.

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Address: 8403 Lindenwood Road

City: Rockford, Illinois 61109

County: Winnebago

TYPE PERMIT SUBMISSION:		TYPE FACILITY:		TYPE WASTE:	
New Landfill	✓	Landfill	X	General Municipal Refuse	X
Landfill Expansion	X	Land Treatment		Hazardous	
First Significant Modification	X	Transfer Station		Special (Non-Hazardous)	X
Significant Modification to Operate		Treatment Facility		Chemical Only (exc. putrescible)	
Other Significant Modification		Storage		Inert Only (exc. chem. & putrescible)	
Renewal of Landfill		Incinerator		Used Oil	
Development		Composting		Solvents	
Operating		Recycling/Reclamation		Landscape/Yard Waste	
Supplemental		Other		Other (Specify)	
Transfer					
Name Change					
Waste Stream					
Generic					

DESCRIPTION OF PROJECT: (For multiple waste stream applications, see reverse side).

Significant Modification of Existing Permit and increase in final elevation.

Printed on Recycled Paper

State of Illinois
ENVIRONMENTAL PROTECTION AGENCY

Ma \. Gade, Director

2200 Churchill Road, Springfield, IL 62794-9276

NOTICE OF APPLICATION FOR PERMIT TO MANAGE WASTE (LPC-PA16)

Honorable Dave Syverson
State of Illinois Building
200 South Wyman, Suite 302
Rockford, Illinois 61101

Date: May 24, 1996

To Elected Officials and Concerned Citizens:

The purpose of this notice is to inform you that a permit application has been submitted to the IEPA, Bureau of Land, for a solid waste project described below. You are not obligated to respond to this notice, however, if you have any comments, please submit them in writing to the address below, or call the Permit Section at 217/524-3300, within twenty-one (21) days.

Illinois Environmental Protection AGency
Bureau of Land, Permit Section (#33)
2200 Churchill Road, Post Office Box 19276
Springfield, Illinois 62794-9276

The permit application, which is identified below, is for a project described at the bottom of this page.

SITE IDENTIFICATION

Site Name: Winnebago Reclamation Service, Inc. - Pagel's Landfill

Site # (IEPA): 2018080001

Address: 8403 Lindenwood Road

City: Rockford, Illinois 61109

County: Winnebago

TYPE PERMIT SUBMISSION:		TYPE FACILITY:		TYPE WASTE:	
New Landfill		Landfill	X	General Municipal Refuse	X
Landfill Expansion	X	Land Treatment		Hazardous	
First Significant Modification	X	Transfer Station		Special (Non-Hazardous)	X
Significant Modification to Operate		Treatment Facility		Chemical Only (exc. putrescible)	
Other Significant Modification		Storage		Inert Only (exc. chem. & putrescible)	
Renewal of Landfill		Incinerator		Used Oil	
Development		Composting		Solvents	
Operating		Recycling/Reclamation		Landscape/Yard Waste	
Supplemental		Other		Other (Specify)	
Transfer					
Name Change					
Waste Stream					
Generic					

DESCRIPTION OF PROJECT: (For multiple waste stream applications, see reverse side).

Significant Modification of Existing Permit and increase in final elevation.

IL 532 0334
LPC 040 Rev. Aug-93

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State of Illinois
ENVIRONMENTAL PROTECTION AGENCY

la . Gade, Director
2200 Churchill Road, Springfield, IL 62794-9276

NOTICE OF APPLICATION FOR PERMIT TO MANAGE WASTE (LPC-PA16)

Sharon K. Baumgartner
Village Clerk of New Milford
6771 11th Street
Rockford, Illinois 61109

Date: May 24, 1996

To Elected Officials and Concerned Citizens:

The purpose of this notice is to inform you that a permit application has been submitted to the IEPA, Bureau of Land, for a solid waste project described below. You are not obligated to respond to this notice, however, if you have any comments, please submit them in writing to the address below, or call the Permit Section at 217/524-3300, within twenty-one (21) days.

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First Significant Modification	X	Transfer Station		Special (Non-Hazardous)	X
Significant Modification to Operate		Treatment Facility		Chemical Only (exc. putrescible)	
Other Significant Modification		Storage		Inert Only (exc. chem. & putrescible)	
Renewal of Landfill		Incinerator		Used Oil	
Development		Composting		Solvents	
Operating		Recycling/Reclamation		Landscape/Yard Waste	
Supplemental		Other		Other (Specify)	
Transfer					
Name Change					
Waste Stream					
Generic					

DESCRIPTION OF PROJECT: (For multiple waste stream applications, see reverse side).

Significant Modification of Existing Permit and increase in final elevation.

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State of Illinois
ENVIRONMENTAL PROTECTION AGENCY

Ma .. Gade, Director
2200 Churchill Road, Springfield, IL 62794-9276

NOTICE OF APPLICATION FOR PERMIT TO MANAGE WASTE (LPC-PA16)

Paul A. Logli, States Attorney
Winnebago County Administrative Building
404 Elm Street
Rockford, Illinois 61101

Date: May 24, 1996

To Elected Officials and Concerned Citizens:

The purpose of this notice is to inform you that a permit application has been submitted to the IEPA, Bureau of Land, for a solid waste project described below. You are not obligated to respond to this notice, however, if you have any comments, please submit them in writing to the address below, or call the Permit Section at 217/524-3300, within twenty-one (21) days.

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Renewal of Landfill		Incinerator		Used Oil	
Development		Composting		Solvents	
Operating		Recycling/Reclamation		Landscape/Yard Waste	
Supplemental		Other		Other (Specify)	
Transfer					
Name Change					
Waste Stream					
Generic					

DESCRIPTION OF PROJECT: (For multiple waste stream applications, see reverse side).

Significant Modification of Existing Permit and increase in final elevation.

Printed on Recycled Paper

APPLICATION FOR SIGNIFICANT MODIFICATION TO PERMIT FOR AN EXISTING UNIT

WINNEBAGO RECLAMATION SERVICE, INC.
PAGEL LANDFILL FACILITY
ROCKFORD, WINNEBAGO COUNTY, ILLINOIS

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GENERAL INFORMATION DOCUMENT

GENERAL INFORMATION DOCUMENT

INTRODUCTION

The Winnebago Reclamation Service, Inc. (WRS) Pagel Landfill is an existing municipal solid waste disposal facility located approximately four miles south of Rockford, Illinois. The facility is comprised of a single waste disposal unit and a permitted expansion unit which has not yet been fully developed. The existing unit began operation in 1972 under Permit Number 1972-24 issued by the Illinois Environmental Protection Agency (IEPA) on April 7, 1972 and operation continues today. An expansion unit, henceforth referred to as the "permitted expansion area", was granted Developmental Permit Number 1991-LF-138-DE by the IEPA on April 5, 1993 for a 27.5 acre area south of the existing unit. The expansion permit application, entitled Application for Significant Modification to Permit for a New Expansion Unit, Winnebago Reclamation Service, Inc., Pagel Landfill Facility, was submitted to the IEPA on April 5, 1991. Excerpts from the expansion permit application have been provided in the materials contained herein where applicable.

A Resource Recovery Facility will be owned by the Applicant and jointly operated by the Applicant and Joseph Behr and Sons, Inc., their representative signees, or a corporation formed by them for that purpose, on the adjacent site. This facility was permitted under Illinois Environmental Protection Agency Permit Number 1991-021-DE/OP on December 10, 1991.

The existing landfill has a unique asphalt liner and is equipped with a leachate collection system and an active gas collection system. Landfill gas is processed by Winnebago Gas Company and used for the thermal dewatering of sewage sludge by NRG Technologies, Inc.. Winnebago Gas Company, and NRG Technologies, Inc. are both companies affiliated with the applicant.

Approximately 1/4 mile east and hydrogeologically upgradient from Pagel Landfill is the Acme Solvents Facility Site. The Acme Solvents Site was placed on the CERCLA National Priority List in 1981. A Remedial Investigation and Feasibility Study and other technical investigations have been completed and the site is currently undergoing remedial activities.

In 1986, Pagel Landfill was also placed on the CERCLA National Priority List. On behalf of the Pagel Landfill Steering Committee, Warzyn Engineering, Inc. performed a remedial investigation and an associated feasibility study to access the practicality of various remedial alternatives at the facility. On June 28, 1991 the USEPA Region V issued a Declaration for the Record of Decision documenting the preferred remedy selected by the USEPA for the Pagel Landfill Facility. The Record of Decision was incorporated in a Consent Decree entered in the case entitled United States vs. Winnebago Reclamation Service, Inc., et al, in the U.S. District Court for the Northern District of Illinois on February 10, 1993.

In July 1993, Winnebago Reclamation Service, Inc. and Warzyn, Inc. submitted a Remedial Design/Remedial Action (RD/RA) Work Plan for the Pagel Landfill Facility that was approved by the USEPA. This RD/RA Work Plan describes the overall approach to the completion of the remedy selected in the Record of Decision. In accordance with the RD/RA Work Plan, separate Remedial Design (RD) Work Plans will be prepared to address individual components of the RD/RA. These specific component RD Work Plans will address the following:

a. Groundwater Extraction and Treatment System

b. Final Cover System

c. Leachate and Landfill Gas Management System

Because the Record of Decision requires that the major components of the remedy be performed in accordance with applicable Illinois regulations, the applicant is also submitting this Application for Significant Modification to Permit for an Existing Unit to the USEPA as the Preliminary Design (30% complete) for both the Final Cover System Work Plan and the Landfill Leachate and Gas Management System Work Plan.

The Application made herein is for an existing unit that has an area of approximately 42.65 acres. In accordance with 35 Illinois Administrative Code (IAC) 810.103, the unit is considered an existing unit and is therefore subject to 35 IAC 814 regulations. Since this unit has an expected life in excess of six years, 35 IAC 814 Subpart C applies. The following Narrative and

corresponding Sections address specific requirements of 35 IAC Part 812 which identifies information to be submitted in a Permit Application. It should be noted that this Narrative, and corresponding Attachments address all the changes identified in the Illinois Pollution Control Board's Ruling R93-10, which incorporates all RCRA Subtitle D Requirements.

CERTIFICATION BY PROFESSIONAL ENGINEER (Section 812.102)

All designs presented in this application have been prepared by, or under the supervision of, a professional engineer. See the accompanying permit application form (LPC-PA1) for the name of the engineer, date of preparation, registration number, a statement attesting to the accuracy of the information and design, and the professional engineer's seal.

APPLICATION FEES (Section 812.103)

At the present time, no application fee is required for the type of permit requested herein.

REQUIRED SIGNATURES (Section 812.104)

The duly authorized agent of the operator and the property owner to whom all inquiries and correspondence will be addressed is:

Name:	Gary L. Marzorati
Title:	Executive Vice President
Company:	Winnebago Reclamation Service, Inc.
Address:	4920 Forest Hills Road
	Loves Park, IL 61111
Telephone:	(815) 654-4779

Mr. Marzorati has signed the accompanying Permit Application form (LPC-PA1) as the duly authorized agent of the operator and property owner. Mr. Marzorati is also the facility's Certified Chief Operator (OC #88079).

At the existing WRS Pagel Landfill Unit, John Lichty is the certified operator pursuant to Section 22.5 of the Environmental Protection Act (Act).

APPROVAL BY UNIT OF LOCAL GOVERNMENT (Section 812.105)

This existing unit is not a new Regional Pollution Control Facility as defined in Section 3.32 of the Act. Therefore, local siting approval is not needed.

SITE LOCATION MAP (Section 812.106)

A Site Location Map is provided in Attachment 1.

SITE PLAN MAP (Section 812.107)

Sheet B-2 of the accompanying site developmental drawings addresses all the requirements of 35 IAC 812.107. However, the complete set of site developmental drawings (B-1 through B-11) can be considered the Site Plan Map.

NARRATIVE DESCRIPTION OF THE FACILITY (Section 812.108)

A narrative description of the facility addressing each of the items (a. - v.) listed under Part (V)(3) of permit application form LPC-PA2 follows:

a. The existing Pagel Landfill disposal unit was designed to utilize a cut and fill method of operation. The existing unit will primarily dispose of general municipal refuse, non-hazardous special waste, and demolition debris. See Page 1 in the accompanying Operating Plan.

b. The existing unit has a remaining estimated compacted refuse capacity of 1,818,700 cubic yards (as of November, 1995) and over the life of the site, it is assumed that annual waste receipts will be about 548,200 cubic yards, or about

274,100 cubic yards in-place. Site Capacity and Operating Life Calculations are detailed in Attachment 23.

c. Waste will generally be deposited at the lowest part of the active face or as otherwise permitted by the Illinois EPA and compacted to the highest achievable density necessary to minimize void space and settlement unless precluded by conditions that would make it impractical. See Pages 3-4 in the accompanying Operating Plan.

d. The gate unit weight of the waste is estimated to average between about 500-600 pounds per cubic yard. See Page 4 in the accompanying Operating Plan.

e. The existing unit is estimated to receive waste for approximately 5.0 years after the date of Permit. See Attachment 23.

f. The design period of the existing unit is 35 years. See Page 5 in the accompanying Operating Plan.

g. The size of the open face is estimated to be typically about 10,000 ft^2 and the slope of the working face will be maintained at or less than 3H:1V. See Page 4 in the accompanying Operating Plan.

h. Adjoining cells will be developed and landfilled consecutively to facilitate attainment of final grades as landfilling continues across the facility thus allowing contemporaneous closure and stabilization. See Page 6 in the accompanying Operating Plan.

i. A description of the equipment to be used at the facility for compliance with 35 IAC 807.304 is provided on Pages 7-8 of the accompanying Operating Plan.

j. A litter control plan for compliance with 35 IAC 811.107(k) is provided on Page 9 of the accompanying Operating Plan.

k. A salvaging plan is provided on Page 9 of the accompanying Operating Plan.

l. A description of the utilities for operation in compliance with 35 IAC 811.107(d) is provided on Page 9 of the accompanying Operating Plan.

m. A boundary control plan describing how the operator will comply with the requirements of 35 IAC 811.109 is addressed on Page 14 of the Construction Plan and Page 9 of the Operating Plan.

n. A maintenance plan describing how the operator will comply with 35 IAC 811.107(c) and (e) is addressed on Page 10 of the Operating Plan. The plan itself is provided herewith in Attachment 25.

o. An air quality plan describing the methods to be used to comply with the open burning requirements of 35 IAC 811.107(f) and for controlling dust in compliance with 35 IAC 811.107(g) is provided on Page 10 of the accompanying Operating Plan.

p. A noise control plan describing how the operator will control noise in compliance with 35 IAC 811.107(h) is provided on Pages 10-11 of the Operating Plan.

q. An odor control plan is provided on Page 11 of the accompanying Operating Plan.

r. A vector control plan for compliance with 35 IAC 811.107(i) is provided on Page 11 of the Operating Plan.

s. A firefighting and fire safety plan is addressed on Page 12 of the Operating Plan. The fire safety plan and firefighting plan are components of the Fire Control and Safety Plan provided herewith as Attachment 24.

t. A Site Transportation Plan that includes all existing and planned roads in the facility that will be used during operation, and the size and type of these roads and

their frequency of use is addressed on Page 12 of the Operating Plan and is provided in Attachment 22. Typical details are also provided on Sheet B-11 of the accompanying site developmental drawings.

u. In addition to travel on the on-site all-weather roads which will tend to shed mud from the tires of hauling vehicles, rumble strips will be provided to prevent mud tracking onto public roadways. See Page 12 of the Operating Plan and the accompanying site developmental drawings (B-1 through B-11).

v. Other relevant items concerning the operation of the facility are addressed in the accompanying Operating Plan and on the pages summarized below:

Topic	Page
Survey Controls	12
Landfill Gas Monitoring	13
Groundwater Monitoring Program	15
Load Checking Program	15
Special Waste Management	16
Site Closure	21

Items relevant to the facility's construction and development are addressed in the accompanying Construction Plan.

LOCATION STANDARDS (Section 812.109)

The facility will not invade or diminish the scenic, recreational, fish and wildlife values for any river designated for protection under the Wild and Scenic Rivers Act, 16 USC 1271 (See Attachment 4).

The facility will not restrict the flow of a 100-year flood, result in the washout of solid waste from the 100-year flood, or reduce the temporary water storage capacity of the 100-year floodplain (See Attachment 5).

The facility will not be located in an area where it poses a threat of harm or destruction to the features for which an irreplaceable historic or archeological site was listed pursuant to the National Historic Preservation Act or the Illinois Historic Preservation Act, or for which a natural landmark was designated by the National Park Service or the Illinois State Historic Preservation Officer (See Attachment 6).

The facility will not be located in an area designated as a Dedicated Illinois Nature Preserve pursuant to the Illinois Nature Areas Preservation Act (Ill. Rev. Stat. 1989, ch. 105 par. 701 et seq.) (See Attachment 7).

The facility is not located in an area where it may jeopardize the continued existence of any designated endangered species, result in the destruction or adverse modification of any of the critical habitat listed for such species, or cause or contribute to the taking of any endangered or threatened species of plant, fish, or wildlife listed pursuant to the Endangered Species Act 16 USC 1531 et seq., or the Illinois Endangered Species Protection Act (Ill. Rev. Stat. 1989, ch. 8, par. 331 et seq.) (See Attachment 8).

It has been determined that a 3.73 acre low quality scrub-shrub wetland lies southwest of the existing landfill. About two acres of this wetland will be displaced as a result of the construction of a drainage outlet ditch. However, a high quality wetland will be constructed nearby at a minimum compensation ratio of 1.5 to 1. A Permit Application pursuant to Section 404 of The Clean Water Act (33 USC 1344) has been approved by the U.S. Army Corps of Engineers - Rock Island District Office. (See Attachment 9.) A copy of any final action received from the U.S. Corps of Engineers will be forwarded to the Illinois Environmental Protection Agency, Division of Land Pollution Control, Permit Section.

The facility will not cause a violation of any requirements implementing an area-wide or statewide water quality management plan for non-point source pollution that has been approved under Section 208 of the Clean Water Act (33 USC 1288). The requirements of the Illinois Water Quality Management Plan (IWQMP) are either not applicable or of a nature that compliance with 35 IAC 811 should assure compliance with the Plan. Furthermore, Winnebago County does not lie within a Designated WQM Planning Area. See Attachment 10 for a partial copy of the IWQMP.

SURFACE WATER CONTROL (Section 812.110)

The site developmental drawings provided with this Application and the accompanying Narrative, Construction Plan, and Operating Plan, present the measures to be employed for surface water control. An NPDES Permit Application for the existing landfill was submitted to the IEPA-DWPC in April 1993. The Issuance of the Permit is pending.

As fill activities progress, two new outfall locations will replace the outfall locations detailed in the pending NPDES Permit Application. A new NPDES Permit Application will be submitted upon the implementation of the new outfalls. The Application will also incorporate the addition of a stormwater holding basin and all permanent surface water control structures to be constructed in conjunction with the closure of the existing unit.

Information pertaining to temporary drainage structures to be implemented during development of the facility and during the operating period, permanent drainage structures that will be utilized upon closure of the landfill, and design calculations are provided in Attachment 18. Additional information detailing the schedule of construction is provided in the Construction Plan. The proposed locations of all permanent drainage structures affected by the runoff from disturbed areas of the existing unit are detailed on Sheet B-3 of the site developmental drawings.

DAILY COVER (Section 812.111)

In accordance with 35 IAC 811.106, a uniform layer of at least 6 inches of earthen material will be placed over all exposed waste at the end of each operating day. Additional detail pertaining to daily cover is provided in the Operating Plan.

LEGAL DESCRIPTION (Section 812.112)

Legal descriptions of the facility boundary and existing unit's fill boundary are provided in Attachment 2.

PROOF OF PROPERTY OWNERSHIP AND CERTIFICATION (Section 812.113)

Proof of property ownership is provided in Attachment 2. A copy of Prior Conduct Certification, issued to Mr. Gary L. Marzorati, is also provided in Attachment 2.

MAP/PLAN SHEET DIRECTORY

A complete full-size set of site developmental drawings for the existing unit accompanies this Application. Although not bound into any of the Permit Application Volumes, they are intended to be reviewed as part of the Application. The following drawing sheets are included:

B-0	Title Sheet
B-1	Existing Site Conditions
B-2	Site Plan Map
B-3	Final Site Conditions
B-4	Cross Section 1
B-5	Cross Section 2
B-6	Existing Gas/Leachate Collection System
B-7	Proposed Gas/Leachate Collection System
B-8	Drainage Details 1
B-9	Drainage Details 2
B-10	Gas/Leachate Collection System Details
B-11	Roadway Details

For convenience, a reduced set of these drawings are also provided in Attachment 3.

CHEMICAL AND PUTRESCIBLE WASTE LANDFILL DOCUMENTS

CHEMICAL AND PUTRESCIBLE WASTE LANDFILL DOCUMENTS

INTRODUCTION

This document is provided to supplement the accompanying Permit Application form LPC-PA2. It addresses additional information required for Chemical and Putrescible Waste Landfills as detailed in Appendices B through G of LPC-PA2 and indicates the location of this information within the Application. In addition to specific cross-references made, please refer to the Table of Contents for related items.

APPENDIX B - SITE LOCATION REQUIREMENTS (Section 812.302)

In accordance with 35 IAC 814.302, the subject facility is exempt from the location requirements of 811.302 (a), (d), (e), and (f). The facility will not violate any of the remaining location standards of 35 IAC 811.302, as demonstrated in this Section and by the Facility Location Map in Attachment 1. Additional location standard documentation is provided in Attachment 11.

The unit is not located within 1,000 ft of a public well as established pursuant to Section 14.2 or 14.3 of the Act.

There are no sole-source aquifers as described by 35 IAC 811-302(b) within 1200 ft of the unit.

There are no schools or hospitals within 500 ft of the unit. The closest school is approximately 1 mile from the unit as depicted in Attachment 1. The only occupied dwellings within 500 ft of the existing unit are owned by Winnebago Reclamation Service, Inc. and were not occupied prior to the date when the operator first applied for a Permit to Develop the facility. However, no additional requirements apply since the facility is not a new unit.

Lindenwood road is the only public road within 500 ft of the subject facility. Wherever the facility is within 500 ft of the right-of-way of Lindenwood road, it will have its operations screened from view by a barrier no less than 8 ft in height.

There are no runways used by piston type or turbojet airplanes within 5,000 ft of the facility. The Rockford Municipal Airport is approximately 4 miles from the site. However, no additional requirements apply since the facility is not a new unit.

APPENDIX C - GROUNDWATER PROTECTION EVALUATION

Description of the Hydrogeology (Section 812.314)

In accordance with 35 IAC 814.302(a)(5), this facility is exempt from the hydrogeological site investigation requirements of 35 IAC 811.315. However, sufficient information is necessary to implement a groundwater monitoring program and establish background concentrations to establish water quality standards pursuant to 35 IAC 811.320. This information has been provided by GeoTrans, Inc. in a separate document.

Plugging and Sealing of Drill Holes (Section 812.315)

Plugging and sealing of drill holes is addressed in the Groundwater Impact Assessment provided by GeoTrans, Inc. in the Groundwater Monitoring Plan.

Results of the Groundwater Impact Assessment (Section 812.316)

The Groundwater Impact Assessment illustrates that the existing unit will not result in a statistically significant increase above the site's groundwater quality standards. This information has been provided by GeoTrans, Inc. in a separate document.

Groundwater Monitoring Program (Section 812.317)

A Groundwater Monitoring Plan in accordance with 35 IAC 811.319 has been provided by GeoTrans, Inc. in a separate document.

APPENDIX D - CHEMICAL AND PUTRESCIBLE WASTE LANDFILL DESIGN FEATURES

Foundation Analysis and Design (Section 812.305)

A foundation and mass stability analysis has been conducted for the existing Pagel Landfill Facility to demonstrate compliance with 35 IAC 814.302 (b)(2) The results are provided in the Report of Stability Analysis (Attachment 12).

Design of Liner System (Section 812.306)

In accordance with 35 IAC 814.302(a)(4), this facility is exempt from the liner requirements of 35 IAC 811.306.

Leachate Drainage and Collection Systems (Section 812.307)

In accordance with 35 IAC 814.302(a)(4), this facility is exempt from the leachate drainage and collection requirements of 35 IAC 811.307 and 811.308. However, in accordance with 35 IAC 814.302(b)(1), the unit must be equipped with a system that will effectively drain and collect leachate and transport it to a leachate management system. Compliance with this Section is demonstrated in the Leachate Management Plan (Attachment 13).

Leachate Management System (Section 812.308)

The facility will have a leachate treatment and disposal system in accordance with 35 IAC 811.309. Leachate will be disposed of by discharge to a POTW or other permitted treatment facility. At no time will leachate be discharged to waters of the State. Details pertaining to the leachate treatment and disposal system are provided in the Leachate Management Plan (Attachment 13).

Landfill Gas Monitoring Systems (Section 812.309)

A landfill gas monitoring program has been established in accordance with 35 IAC 811.310. Details pertaining to the landfill gas monitoring system are provided in the Gas Management Plan (Attachment 14) and on the site developmental drawings.

Gas Collection Systems (Section 812.310)

An active gas collection system will be installed at this facility. Details pertaining to the active gas collection system are provided in the Gas Management Plan (Attachment 14).

Landfill Gas Disposal (Section 812.311)

Landfill gas will be processed either off-site by a sewage sludge thermal dewatering plant operated by NRG Technologies, Inc. or on-site using a flare. Additional details pertaining to the landfill gas disposal system are provided the Gas Management Plan (Attachment 14).

Intermediate Cover (Section 812.312)

In accordance with 35 IAC 811.313, any areas that will not receive additional waste within 60 days of filling will be covered with at least 12 inches of compacted soil material at the end of the day. Additional details pertaining to intermediate cover are provided in the Operating Plan.

Design of Final Cover System (Section 812.313)

In accordance with 35 IAC 811.314, the unit will be equipped with a final cover system consisting of a low-permeability layer and a protective layer. Details pertaining to the final cover system are provided in the Construction Plan and in the Construction Quality Assurance Program (Attachment 19).

APPENDIX E - CONSTRUCTION REPORT

The Construction Quality Assurance Program provided in Attachment 19 address the requirements of 35 IAC 811.500-509 and Appendix E of LPC-PA2. Additional information is available in the Construction Plan and in the site developmental drawings.

APPENDIX F - CLOSURE PLAN AND POST-CLOSURE CARE PLAN

Closure Plans (Section 812.114)

The unit's closure plan is provided in Attachment 20.

Post-Closure Care Plans (Section 812.115)

The unit's post-closure care plan is provided in Attachment 20.

Closure and Post-Closure Cost Estimates (Section 812.116)

The unit's closure and post-closure cost estimates are provided in Attachment 20.

APPENDIX G - OPERATING AND REPORTING PLAN

Operating Plans (Section 812.318)

The accompanying Operating Plan addresses waste placement and other operational activities.

Waste Analysis (Section 812.302)

The existing unit will accept general refuse, construction/demolition debris and non-hazardous special wastes. Prior to acceptance of any special waste, chemical analysis

of the waste will be performed to secure individual and/or generic special waste stream permits as necessary. No hazardous wastes will be accepted.

Waste Shredding (Section 812.304)

At this time, the disposal of shredded waste in the existing unit is not practiced. Therefore, no reduction of the design period pursuant to 35 IAC 811.303(b) is requested.

For additional operational and reporting details, see the accompanying Operating Plan.

CONSTRUCTION PLAN

CONSTRUCTION PLAN

INTRODUCTION

This Plan is provided to supplement the permit application form LPC-PA2 and the accompanying site developmental drawings for the Winnebago Reclamation Service, Inc. - Pagel Landfill Facility.

The majority of construction activities at the subject facility will be in conjunction with continuing operational procedures as described in the Operating Plan and with the installation of final cover as described herewith. Other ongoing construction activities, including the construction of surface drainage structures, leachate collection facilities, gas monitoring and collection facilities, and others are detailed in this plan as well.

DESIGN PERIOD

The design period for this unit is the anticipated operating life of 5 years plus an anticipated post closure care period of 30 years. Accordingly, the design period is 35 years. For additional discussion, see the Site Capacity and Operating Life Calculations (Attachment 23).

FINAL COVER SYSTEM

The existing unit will be covered by a final cover system consisting of a low permeability layer overlain by a final protective layer.

The low permeability layer will consist of a 12 inch compacted earthen material layer overlain by a geomembrane. It will be constructed as soon as practical, but not later than 60 days after the placement of the final lift of waste.

Soils used for compacted earthen material will be Unified Soils Classification System types ML, ML-CL, CL or CH. It should be noted that this includes all soils within the ML-CL-CH classification range. The source of this material will be from the designated borrow areas.

The compacted earthen material layer is to be placed in lifts not to exceed 8 inches before compaction. These materials should be placed at a moisture content between 0 and 6 percent above optimum (ASTM:D698) moisture content. Earthen materials will be compacted with a soil compactor or other appropriate vehicle and each layer will be worked sufficiently to break down oversized clods, obtain a uniform moisture content, and ensure uniform density. Roots, cobbles, debris, and other deleterious material will be removed from the clay soil prior to compaction.

A geomembrane will be installed immediately above the compacted earthen material layer on a smooth surface free from rocks, stones, roots, sharp objects, and other undesirable debris that could puncture the liner. The geomembrane will be installed incrementally as final grades are reached by individuals experienced in geomembrane liner installation. The geomembrane will be installed and seamed in accordance with all manufacturer's recommendations.

The final protective layer will consist of a minimum 8 inch granular drainage layer overlain by protective soils to a total depth of at least 36 inches. The final protective layer will be placed as soon as possible after placement of the low permeability layer to prevent damage to the low permeability layer. The final protective layer will also protect the low permeability layer against root penetration.

The granular drainage layer will be equipped with drain piping that will intercept water from the granular drainage layer and transport it to the surface water control system. These pipes will be 6 inch nominal diameter corrugated, perforated HDPE drainage tile, and will be placed at a grade of no less than 0.5 percent. The piping will be wrapped with an appropriate geotextile filter fabric prior to installation. Drain piping will be located just below the break in slope between the crown and sideslopes and also at the base of the sideslopes around the perimeter of the unit.

Unified Soils Classification System types GM, GC, SM, SC, ML, ML-CL, and CL are all considered suitable protective soils. The protective soil layer may include soils from on-site and/or off-site sources and compost.

It is estimated that up to 30 percent settlement may occur from the time waste is first placed into a daily cell until completely stabilized. The majority of this, however, should occur prior to the placement of the final cover system. Some settling, approximately one percent per year, may occur after the final cover system is placed until stabilization is complete.

A Construction Quality Assurance Plan for the final cover system installation is provided in the Construction Quality Assurance Program (Attachment 19). Also, additional information regarding final cover is provided in the Closure Plan (Attachment 20).

CLAY SOIL AVAILABILITY

From the Application for Significant Modification to Permit for a New Expansion Unit, Winnebago Reclamation Service, Inc. - Pagel Landfill Facility, it has been determined that suitable soils are available on-site for the construction of final cover for the existing unit. These soils are present both in the permitted expansion area south of the existing landfill and west of Killbuck Creek in the southwest corner of the site. Soil borings and testing conducted in the permitted expansion area and four borings conducted west of Killbuck Creek indicate that sufficient quantities of clayey soils are available on-site. Calculations are provided in Attachment 21. The designated borrow areas are depicted on Sheet B-2 of the site developmental drawings.

FINAL SLOPE AND STABILIZATION

The final slopes are designed and will be constructed to a grade capable of supporting vegetation and that minimizes erosion. The final landfill slopes will be no flatter than 5 percent and no steeper than 40 percent (2.5H:IV). These slopes will drain runoff from the cover and prevent ponding. Vegetation will be established on all reconstructed surfaces to minimize wind and water erosion of the final protective cover.

Seed will typically be incorporated into the upper surface of the protective soil layer using a disk, harrow, or hydroseeding techniques. The mixture selected must be amenable to the soil quality, slopes, and climatological conditions that exist, without the need for continued maintenance and with minimal potential for root penetration into the compacted final cover. It will include a diverse

mix of native and introduced species that are tolerant of the landfill gas expected to be generated and compatible with the "open space" post closure land use. Such a mixture may include, among others, Redtop, Perennial Ryegrass, Tall Fescue, Crested Wheat Grass, Hard Fescue and Reed Canary Grass. Fertilizer, lime and mulch will be used at appropriate rates.

Landscaping or seeding professionals knowledgeable of local climatological conditions will be consulted in determining the specific seed mixtures to be sown, and the necessary soil amendments and application rates. As a guide, the design procedures and specifications presented in the handbook "Procedures and Standards for Urban Soil Erosion and Sediment Control in Illinois" may be utilized. Application rates for lime, fertilizer, and any other necessary soil amendments will be determined from composite soil tests from the area to be seeded. Mulch consisting of straw, jute, wood excelsior, etc. will be used as necessary to hold the seed in place and conserve moisture. All finalized areas of the landfill will be seeded as soon as practicable, with seeding usually conducted in the spring and fall.

In addition to the foregoing, erosion control techniques will be used to minimize the generation of sediment in the runoff from disturbed areas. These may include straw bale dikes, silt fences, vegetative filters, contoured parallel furrows, and other means as necessary.

For additional information regarding vegetation establishment and erosion control techniques, see the Closure Plan (Attachment 20) and copy of the existing NPDES Permit Application (Attachment 18).

No structures are anticipated to be constructed over the unit except those to be installed for leachate and/or landfill gas monitoring or control. All such structures will be vented (as appropriate), compatible with land use, and will in no way interfere with the operation of the cover system, gas collection system, or any monitoring system.

SURFACE WATER DRAINAGE

In conjunction with the Application, a surface water control system will be provided that will consist of a means for off- and on- site runoff diversion, and on-site runoff collection. Each component of the surface water control system is described in greater detail below:

Off-Site Runon Diversion

The existing Pagel Landfill is currently an above-grade landfill. Therefore, all potential runon to the facility will be directed to the runoff ditching network and conveyed off-site through Outfalls 003 and 004.

On-Site Temporary Drainage Diversion Berms

Diversion of on-site surface drainage around the active fill areas and areas with daily cover will be accomplished with temporary drainage diversion berms. Temporary berms will also isolate runoff from active fill areas and areas with daily cover. Likewise, to the extent practical, this type of berm will also be used to direct runoff from undisturbed areas around those which are disturbed. In addition, temporary swales or ditches may be utilized in conjunction with berms as necessary to facilitate positive drainage. All berms/swales/ditches will be constructed as necessary to prevent runoff from the 25-year, 24-hour, storm from entering active landfilling and disturbed areas.

All berms/swales/ditches and associated structures that will be provided for runoff diversion around disturbed areas will be designed to have flow velocities that will not cause erosion and scouring of the natural or constructed diversion and downstream channels. Diversion facilities will be operated until the final cover is placed and erosional stability is provided by vegetation or other approved means. Runoff from undisturbed areas that becomes commingled with runoff from disturbed areas will be handled as runoff from disturbed areas, including compliance with any NPDES Permit requirements.

On-Site Runoff Collection

Currently, the majority of surface water runoff from the site drains to an unnamed tributary of Killbuck Creek, or to Killbuck Creek itself.

As filling in the existing site is completed, final slopes will be vegetated to the extent possible, thereby reducing the impact on runoff water quality. Stormwater runoff will be collected in perimeter ditches and erosion control terraces located along the perimeter of the unit. The flow in these terraces will be conveyed to perimeter ditches via open letdowns lined with reinforcement matting. The perimeter ditches flowing to the north of the landfill will be tributary outlet ditches through pipe-drop inlets that allow the water to safely pass beneath the perimeter roadways. Outlet ditches will convey the stormwater runoff to a temporary stormwater holding basin that discharges to an unnamed tributary of Killbuck Creek through Outfall 003. The runoff which flows to the south of the site via perimeter ditches will be conveyed to an outlet ditch through a pipe-drop inlet. This outlet ditch discharges to Killbuck Creek through Outfall 004.

All ditches, terraces, letdowns, and any associated culverts and pipe-drop inlets were designed to carry the runoff from the 25-year, 24-hour storm when the site is active (disturbed areas present) or pass the 100-year, 24-hour storm with the site closed (completely vegetated). The sizing is based upon runoff generation estimates using the USDA-Soil Conservation Services TR-55 Method assuming that final grades are achieved (which tends to maximize tributary drainage and average watershed slope). Furthermore, for active site conditions, it is assumed the first five acres of any tributary area is freshly graded bare ground, the next five acres is poorly vegetated, and the remaining acreage has good vegetation.

All ditches and terraces are to be vegetated channels except the terrace outlet which will be lined with riprap. As necessary, where ditches or culverts discharge into existing waterways, riprap, clean broken concrete, or other suitable erosion control measures will be employed. Based upon these lining materials and protective measures, all ditches and receiving channels should be adequately protected from erosion and scouring.

For additional information concerning surface water drainage control see the Schedule of Construction provided in this Plan, and the Construction Quality Assurance Program (Attachment 19) and the copy of the existing NPDES Permit (Attachments 18).

LEACHATE COLLECTION SYSTEM

The leachate collection system is designed and will be constructed to operate for the entire design period.

Upon issuance of a permit, permanent dual leachate/gas vertical extraction wells will be installed around the perimeter of the facility where the depth is currently close to final elevation. Perimeter wells will be spaced approximately 200 ft apart on center. Interior wells will be installed in a rectangular grid pattern with a similar spacing after final cover has been installed, no later than the year 2001. The locations of the proposed wells are detailed on Sheet B-7 of the site developmental drawings.

Permanent dual leachate/gas vertical extraction wells will be constructed of 8 in. (min) diameter PVC or HDPE pipe, perforated or slotted on at least on the bottom two-thirds of the pipe. The boreholes for these wells will be 36 inches in diameter and will extend to a depth corresponding the top of the sand drainage layer above the existing asphalt liner. The borehole will be backfilled with gravel to a level at least 1 ft above the perforated section. The remainder of the borehole will be filled with at least 4 ft of backfill material, followed by a 3 ft bentonite seal, and finally a low permeability material equivalent to that used for the low permeability layer. Each well will be equipped with a well head assembly that will allow the collection of leachate samples and a dedicated submersible, explosion-proof, corrosion-resistant pump.

Leachate from the pumps will expel into an appropriate collection assembly and allowed to drain via gravity into underground leachate storage tanks. Underground storage tanks will consist of 10,000 gallon double-walled fiberglass or steel tanks. Two underground storage tanks will be installed at the facility, one at the east end and one at the west end. Each underground storage tank will be equipped with a load out pump. Leachate will be trucked from the underground storage tanks to the leachate storage lagoon or directly to other treatment facilities. Each underground storage tank will also be equipped with a sensor that will automatically alert the landfill operator in the case that the tank becomes full.

The leachate storage lagoon will provide on-site storage capacity for at least five days worth of accumulated leachate, in accordance with 35 IAC 811.309(d). Based upon the anticipated removal rate specified above, a minimum of 16,500 ft^3 (123,000 gallons) of storage capacity will be necessary. If a significant reduction of leachate generation occurs after closure, the capacity of the 5-day storage facility may be reduced accordingly. However, a storage capacity of at least 1350 ft^3 (10,000 gallons) will be available at all times. The storage lagoon may be equipped with an aeration device to promote biodegradation of organic constituents in the leachate.

The leachate storage lagoon will be equipped with a slotted pipe riser which will discharge to the sanitary sewer system. The leachate storage lagoon will be constructed utilizing a double composite compacted earthen liner/flexible membrane liner system. A "Witness Zone" consisting of a dual-sided geotextile/geonet composite drainage layer will be installed between the liner systems. The leachate storage lagoon will be bounded on all sides with a 6 ft chain link fence to prevent unauthorized access.

The materials used in the leachate collection system will be chemically resistant to the leachate expected to be produced. The collection piping is to be manufactured/constructed of High Density Polyethylene (HDPE) materials that meet this requirement. As can be seen from the copy of Page 4-161 of the USEPA document Lining of Waste Containment and Other Impoundment Facilities provided in Attachment 15, PVC and HDPE are the preferred materials of construction for leachate collection systems. Chemical resistance tables for both PVC and HDPE piping are also provided in Attachment 15.

A Construction Quality Assurance Plan for the leachate collection system installation is provided in the Construction Quality Assurance Program (Attachment 19). For additional details and information, see the accompanying site developmental drawings and the Leachate Management Plan (Attachment 13).

LANDFILL GAS MONITORING SYSTEMS

To facilitate landfill gas monitoring, gas probes and detection devices will be installed in conjunction with the development and operation of this unit. The location of the proposed gas monitoring probes is detailed on Sheet B-7 of the site developmental drawings. However, where dictated by field conditions, gas probes may be located closer to the waste boundary than described above. Installation of individual probes be installed within the first year of issuance of Significant Modification Permit. The monitoring zone for these probes will extend from its seal, near the ground surface, to the lowest elevation of the liner system or to the top elevation of the groundwater (seasonal low), whichever is higher. A minimum of three of the downwind locations of the perimeter probes will also typically serve as ambient air methane monitoring locations as described in the Landfill Gas Monitoring section of the accompanying Operating Plan.

The gas monitoring probes will be constructed of PVC or HDPE or other materials that will not react with or be corroded by the landfill gas. PVC will not react or be corroded by landfill gas and is the most common material used in conjunction with landfill gas. This is documented on Page 173 of the book Landfill Methane Recovery, a copy of which is provided in Attachment 15. Also they will be equipped with valve/hose pressure fitting(s) etc. as necessary to measure pressure and allow collection of a representative sample of gas. All pipe joints and fittings will be maintained in tight condition and the probe constructed with a bentonite seal to minimize gas leakage. As described herein, the design and construction of the gas monitoring system will not interfere with the operations of the liner, or leachate collection system, or delay the construction of the final cover system.

Boreholes that are not converted into gas monitoring probes, gas collectors, etc. and are no longer necessary for the operation of the site will be plugged and sealed in general accordance with the procedures detailed in the Groundwater Monitoring Plan provided by GeoTrans, Inc.. However, boreholes within the waste boundary will be backfilled with the drill cuttings and any excess refuse or contaminated soils etc. will be promptly disposed at the landfill's active working face or another permitted waste disposal facility, as appropriate. Any low permeability cover layer soils penetrated will be replaced with clean low permeability soils mixed with bentonite. Any protective cover layer soils penetrated will similarly be replaced with clean protective soils and

graded, vegetated, etc. as necessary to restore the area around the drill hole to its original condition.

All buildings on-site will be equipped with continuous methane detection devices which will sound an alarm if methane is detected at a concentration greater than 25 percent of the lower explosive limit. These devices will be located at the most likely entrance points. Usually, this will be at openings in below- and on-grade floors, walls, foundations, etc. which are in contact with the soil.

Additional information regarding the construction of gas monitoring devices is provided on Sheet B-10 of the site developmental drawings. Additional details are provided in the Gas Management Plan (Attachment 14) and the accompanying Operating Plan.

LANDFILL GAS COLLECTION SYSTEMS

The facility will use an active gas collection system to recover landfill gas for beneficial use. The system will utilize dual leachate/gas vertical extraction wells installed at an appropriate spacing throughout the landfill which will be connected to a network of collection piping as described in the Leachate Collection System section of this Plan. Each well will be equipped with a well head assembly that will allow the monitoring and adjustment of gas flow and the collection of gas samples.

Landfill gas will be conveyed through PVC or HDPE collection piping to a central point using compressors or mechanical vacuum blowers. The collection piping system will be buried in several areas to allow vehicular access were necessary. Gas condensate control devices, which will allow condensate to drain to intermediate transfer stations as described in the Leachate Management Plan (Attachment 13), will be installed at regular intervals throughout the gas collection system.

Mechanical blowers will be used to induce a pressure gradient on the collection piping network to convey the gas to an end user. Three 800 cfm compressors will be located in the landfill gas processing plant owned by Winnebago Gas Company. From this point, gas will be transferred to an off-site sewage sludge drying facility operated by NRG Technologies, Inc.

GROUNDWATER MONITORING SYSTEM

The implementation of a groundwater monitoring program is addressed in the Groundwater Monitoring Systems provided by GeoTrans, Inc..

PLUGGING AND SEALING OF BOREHOLES

All boreholes, including exploration borings that are not converted into groundwater monitoring wells, gas monitoring probes, gas collection wells, that are no longer necessary to the operation of the site, and other holes that may cause or facilitate contamination of groundwater will be sealed. Sealing procedures are provided in the Groundwater Monitoring Plan provided by GeoTrans, Inc.

ROADWAYS

Roadway details are addressed in the Site Transportation Plan provided herewith as Attachment 22 and on Sheet B-11 of the site developmental drawings.

BOUNDARY CONTROL

Where natural barriers are not present, 4' high (minimum) woven wire or chain link fencing and lockable gates will be provided to restrict access to the facility and open working face area of the unit, and prevent unauthorized entry at all times. An 8' (min.) high sight barrier will be provided where the waste boundary is within 500 ft of the right-of-way of any public roadways. This will be accomplished by providing vegetative barrier (treeline), earthen berm, or by using 8' high chain link fabric privacy (sight restrictive) fencing where visual screening is necessary.

In addition to the above described barriers, a permanent sign will be posted at the entrance to the facility stating that disposal of hazardous waste is prohibited and that special wastes must be permitted by the Agency and accompanied by a manifest and an identification record, along with the following facility information:

1. Permit number;

2. Hours of operation;

3. The penalty for unauthorized trespassing and dumping;

4. The name and telephone number of the appropriate emergency response agencies who will be available to deal with emergencies and other problems, if different than the operator, and

5. The name, address and telephone number of the company operating the facility.

OPERATIONAL FACILITIES

Since this is an existing facility, the existing gatehouse, scale, office facilities, etc. will continue to be utilized during operations.

CONSTRUCTION QUALITY ASSURANCE

A Construction Quality Assurance Program for the major components of this unit's construction is provided in Attachment 19.

SCHEDULE OF CONSTRUCTION

Construction and development activities will be conducted during the landfill's normal operating hours (i.e., 6:00 AM - 7:00 PM, Monday through Friday and 7:00 AM - 5:00 PM Saturday). However, these activities may be conducted at other times as necessary to meet construction deadlines or to facilitate use of equipment otherwise dedicated to landfill operation. When construction occurs during operating hours additional equipment will be purchased, rented, or leased and personnel or contractors employed as necessary to assure operations are not adversely affected.

Initial Construction

Initial development is anticipated to begin as soon as the necessary regulatory approvals are secured for the landfill Significant Modification Permit. At a minimum, the following developments will be completed during the first year:

1. Installation of any additional monitor wells as necessary.

2. Installation of any necessary erosion control devices.

3. Construction of temporary drainage diversion berms, ditches, culverts etc. as necessary to divert storm runoff from undisturbed areas around disturbed areas.

4. Where natural barriers are not present, 4' (minimum) woven wire or chain link fencing and lockable gates will be provided to restrict access to the facility and prevent unauthorized entry at all times. The location of fencing at the time of initial development may vary from that shown on the site developmental drawings, but will enclose, at a minimum, the actual area(s) used for landfilling and ancillary facilities such as the drainage ditches.

5. Installation of gas monitoring probes.

Ongoing Construction

The following activities will take place as soon as practical after sufficient completion of fill activities will allow:

1. Construction of all terraces and letdowns.

2. Installation/maintenance of erosion control devices as necessary to comply with the unit's NPDES Permit.

3. Installation of dual leachate/gas extraction wells, leachate collection and disposal systems, gas collection and disposal systems.

OPERATING PLAN

OPERATING PLAN

INTRODUCTION

This plan is provided to supplement Permit Application Form LPC-PA2 and the accompanying site developmental drawings for the existing Pagel Landfill Facility.

WASTE DISPOSAL UNIT TYPE

The existing area is approximately 42.65 acres of total waste boundary. Landfilling will continue to be above-grade landfilling by the area-fill method.

WASTE TYPE

The existing waste disposal unit will dispose of general municipal refuse, non-hazardous special waste and demolition debris. However, no special wastes will be accepted without prior receipt of individual special waste stream permits or other equivalent IEPA authorization as appropriate and required.

Lead-acid batteries as defined in Section 22.23(h) of the Act will not be accepted for disposal in this unit. Nor will landscape wastes be accepted for final disposal except as may be authorized by Section 22.22(c) of the Act and/or by future permitting. No hazardous wastes as defined in Section 3.15 of the Act requiring Resource Conservation and Recovery Act (RCRA) Subpart C permitting will be accepted at this facility.

UNIT CAPACITY

Based upon the lines, grades and details depicted on the accompanying site developmental drawings, it is estimated the remaining airspace volume of the existing unit is about 1,818,700 cubic yards (in-place).

Over the life of the facility, cover alternatives to soil may be permitted and employed which may dramatically reduce airspace loss due to cover soil. These cover alternatives are discussed in more detail in the Daily Cover section of this document. The maximum remaining waste capacity of the existing unit is estimated to be about 1,442,200 cubic yards (in-place).

OPERATING HOURS

The facility will typically be open for operation on the following schedule:

Monday through Friday	6:00 AM to 7:00 PM
Saturday	7:00 AM to 5:00 PM
Sunday and Major Holidays	C L O S E D
Emergency Conditions	6:00 AM to 10:00 PM

Daily covering will typically begin shortly before the scheduled closing time and should be completed within one hour of closing. However, covering operations and incidental construction activities will continue as long as necessary to complete.

WASTE PLACEMENT RATE

Based upon current waste receipts and considering future trends, it is estimated that the average annual gate receipts to be disposed in the existing unit will be about 548,200 cubic yards. Considering this annual estimate of receipts and the facility's operating hours, the estimated average rate at which waste will be placed in the existing unit is about 75 cubic yards per hour.

The waste disposal quantities and rates presented herein represent average estimates of future conditions. Actual values may vary from those presented dependent upon actual future waste generation rates, degree of recycling activity and the availability of alternative disposal facilities. Furthermore, hourly disposal rates may vary widely dependent upon the time of day, day of the week, weather conditions, and season of the year.

WASTE PLACEMENT AND COMPACTION

Waste disposal operations will move from the lowest portions of the unit to the highest portions. As warranted, the described phasing of operations may be altered under one of the following conditions:

1. Climatic conditions, such as wind and precipitation, are such that the placement of waste in the bottom of the unit would cause water pollution, or litter; or

2. The topography of the land surrounding the unit makes the procedure environmentally unsound, for example, because steep slopes surround the unit.

Typically, the wastes delivered to the facility will be deposited in daily cells constructed to a thickness of approximately 10-15 ft. A single cell will contain the amount of waste disposal during a day of operation. The cell will be confined to the smallest feasible volume by spreading the waste in approximately 2 ft thick layers and compacting it with a minimum of two passes of the operating equipment. Additional compaction may be applied to particularly loose or less dense waste as necessary. A landfill compactor, bulldozer, or endloader will be used for this operation. Additional layers will be placed and compacted to produce the final cell dimensions.

The width of a cell will be determined by the number of vehicles unloading at a given time. The width will be regulated to provide a safe space for each unloading vehicle without causing undue delays. At times short delays may occur in unloading to avoid any excessive width of the working face. The slope of the working face will be maintained at or less than 2H:1V. In general, refuse placement, spreading, or compacting will be conducted for maintenance of an active, working, fill face to as small an area as practical. The actual dimensions of the daily waste cells will vary dependent upon the actual daily waste receipts and the conditions at the time of placement, as well as the type of daily cover used.

Deposition of waste loads within the active fill area will be in a location as designated by the site personnel. Typically, refuse will be deposited at the toe of the fill and worked up the active face. However, waste may be placed at the top of the fill and worked downward or horizontally over the active face when conditions render it impractical or unsafe to do otherwise.

OPEN FACE SIZE AND SLOPE

As addressed in the Waste Placement and Compaction section of this Plan, the size of each daily waste cell will be confined to as small a volume as feasible and typically will be about 100' x 100' x 15' in cubic dimension. Likewise, the open fill face will be maintained as small as feasible while avoiding undue delays for the delivery vehicles or traffic congestion that could yield unsafe conditions. The slope of the working face will be maintained at or less than 3H:1V. If at a future date it is desirable to maintain steeper slopes, the IEPA-DLPC will be so notified and information regarding stability provided in accordance with 35 IAC 812.108(g). Considering the estimated daily waste volume, the typical wedge shape of a daily cell, and slopes typically flatter than 3H:1V, the surface area of the daily open face is expected to average about 10,000 square ft. However, dependant upon the actual daily receipts and site conditions at the time, the open face surface area will vary.

WASTE WEIGHT

The gate unit weight of the waste is estimated to average about 500-600 pounds per cubic yard. Actual gate receipt unit weights may vary up to about 1,000 to 1,200 pounds per cubic yard for municipal general refuse, dependent upon if received loose or highly compacted/baled. Also, special wastes and demolition wastes could weigh in excess of 3,000 pounds per cubic yard.

Due to compaction and consolidation at the working fill face, it is estimated that recently deposited waste will have an average unit weight of about 1,400 to 1,800 pounds per cubic yard. After degradation and settling, it is estimated this unit weight will increase to about 1,700-1,900 pounds per cubic yard.

OPERATING LIFE

Based upon the previously presented estimates for in-place waste capacities, annual waste receipts and compaction/consolidation at the working face, the estimated length of time remaining in the existing unit is approximately 5.0 years. A copy of the Site Capacity and Operating Life Calculations is provided in Attachment 23.

DESIGN PERIOD

At this time, putrescible waste disposal will not be restricted to only that in shredded form, nor is leachate recycling currently proposed. Therefore, in accordance with 35 IAC 811.303 and 814.302(b)(3), the design period for the existing unit will be its estimated remaining operating life of 5 years plus 30 years of post-closure care. Accordingly, the design period is 35.0 years.

DAILY COVER

In accordance with 35 IAC 811.106, a uniform layer of at least 6 inches of earthen material will be placed over all exposed waste at the end of each operating day. More than 6 inches of soil may be necessary in some areas if irregularly shaped objects are to be covered. Alternative daily cover such as a polyethylene tarps, fabrics, or foams may be used, upon approval by IEPA, providing that they achieve equivalent or superior performance to earthen materials in the following areas:

1. Prevention of blowing debris;

2. Minimization of access to the waste by vectors;

3. Minimization of the threat of fires at the open face; and

4. Minimization of odors.

These materials would be placed over the waste and anchored, and removed prior to further filling. Materials would be replaced periodically to maintain their integrity in terms of water penetration.

Soil used for daily cover will typically be those on-site excavated materials that tend to be unsuitable for the low permeability layer. These materials will usually consist of Unified Soil Classification System GM or finer-grained materials. Other materials, including foundry sand, auto fluff, and soils from Leaking Underground Storage Tank (LUST) clean-ups may also be used if approved by the IEPA. Soil cover materials may be taken directly from active on-site borrow areas, excavations, or stockpiles.

INTERMEDIATE COVER

In accordance with 35 IAC 811.313, any areas that will not receive additional waste within 60 days of filling will be covered with at least 12 inches of compacted soil material at the end of the day. All areas of intermediate cover will be graded so as to facilitate drainage and minimize infiltration.

The grade and thickness of intermediate cover will be maintained until the placement of additional wastes or final cover. All cracks, rills, gullies, and depressions will be repaired to prevent access to the solid waste by vectors, to minimize infiltration, and to prevent standing water.

Soil used for daily cover will typically be those on-site excavated materials that tend to be unsuitable for the low permeability layer. These materials will usually consist of Unified Soil Classification System GM or finer-grained materials. Soil cover materials may be taken directly from active on-site borrow areas, excavations, or stockpiles. Where intermediate cover will be maintained for long periods of time, it may be vegetated to minimize the potential for erosion.

CONTEMPORANEOUS CLOSURE AND STABILIZATION

As addressed in the Waste Placement and Compaction section of this Plan, continued filling will progress from the west side of the facility to the east side of the facility. Landfilling will continue

in each incremental fill area to the extent practical for safe and efficient operations until the final slopes and grades are achieved, prior to moving into the next area. Those areas where the final waste lift has been placed will receive final cover and be vegetated. This development and sequencing plan will provide a continuum of development, operation and closure, and will allow contemporaneous closure and stabilization of the unit.

For additional information, see the Waste Placement and Compaction section of this Plan, the Final Slope and Stabilization section of the accompanying Construction Plan, the accompanying site developmental drawings, and the Closure Plan and Post-Closure Plan in Attachment 20.

LANDFILL OPERATIONAL EQUIPMENT

The following list of equipment is currently available:

Caterpillar	D8 Bulldozer
Caterpillar	973 Track-Type Loader
John Deere	844 Endloader
Rex	3-90 Compactor
Case	1845 Skid Loader

Except for breakdown or maintenance, all the above equipment will be available on a full-time basis. Equipment may be periodically substituted or replaced as needed. Additional equipment will be acquired as needed to maintain future operations. In addition, the following list of support equipment will be readily available from a sister company:

Gardner-Denver 6" Trash Pump
J.D. 772 or Equivalent Road Grader
Semi Tractor-Trailer Water Truck
50-70 H.P. Tractor and 6' Mower
J.D. 510 or Equivalent Backhoe
Caterpillar D8 Tractor with Caterpillar 435 Scraper
Dump Trucks to Deliver Cover and Aggregate

LANDFILL PERSONNEL

Personnel for supervision and operation of this unit will include the following:

Chief Operator

The certified chief operator will be responsible for overall management and supervision of all site activities.

Site Manager

The site manager will be responsible for all site activities in absence of chief operator. Also, the site manager may act as an equipment operator.

Equipment Operators

At least one operator will be dedicated for operation of landfill equipment, landfilling and placement of daily cover. As need dictates, additional operators will be utilized. Also, additional operators and equipment from an outside contractor may be used for cell construction and final cover.

Laborers

Three (3) laborers will be employed full-time to provide labor for miscellaneous tasks in construction and operation, including but not limited to, maintenance of leachate collection system, fence installation, litter pick up, and construction activities. Others may be employed on a part-time basis.

Gate Attendant

The gate attendant will be responsible for waste screening, load and manifest acceptance, daily waste logs, and traffic routing.

Secretary/Bookkeeper

The secretary/bookkeeper will be responsible for bookkeeping, maintaining records on waste volumes, IEPA reports, and manifest records.

Personnel levels will be adjusted as necessary to ensure safe and proper operation of the facility. All will receive training in safety and emergency procedures. In addition, key personnel will be trained in CPR and First Aid.

LITTER CONTROL PLAN

Blowing liter will be minimized by the placement of daily cover and use of portable fences downwind of the working face. Also, the use of landfill equipment to compress the working face will reduce blowing litter. To provide further litter control, the following practices will also be employed in conjunction with the operations of this unit:

1. The operator will patrol the facility daily to check for litter accumulation. All litter will be collected and placed in the fill or in a secure, covered container for later disposal.

2. The facility will not accept solid waste from vehicles that do not utilize devices such as covers or tarpaulins to control litter, unless the nature of the solid waste load is such that it cannot cause any litter during its transportation to the facility.

SALVAGING PLAN

Operation of the landfill will not include salvaging operations unless it is in compliance with 35 IAC 811.108 and future authorization is received from the IEPA-DLPC as necessary.

UTILITIES

Since this is an existing facility, the existing gatehouse and office facilities will continue to be utilized during on-going operations. These facilities are equipped with electricity heat, and communication equipment (telephones). These and/or any other utilities will be maintained, extended, expanded, or added so as to be available at the site at all times as necessary for safe operation.

BOUNDARY CONTROL PLAN

A boundary control plan will be implemented which, at a minimum, will include natural and man-made barriers to restrict access to the facility and its open face, plus, the placement of a permanent sign at the facility's entrance. For additional information, see the Boundary Control section of the accompanying Construction Plan.

MAINTENANCE PLAN

Maintenance will be provided on the equipment and various systems to be used in conjunction with the existing unit at the site. This plan is provided herewith as Attachment 25.

AIR QUALITY PLAN

Air quality will be maintained at the site by employing the following practices:

1. Open burning will not be conducted on site. If in the future it becomes desirable to do so, it will be conducted only in strict accordance with 35 IAC 200 through 245 and any applicable local ordinances, as appropriate.

2. Dust from roadways will be controlled by paving or the application of water. As necessary, a water truck equipped with a spray bar will be maintained on-site for this use. The establishment of vegetation on disturbed surfaces at an early date after completion will also help to minimize blowing dust.

NOISE CONTROL PLAN

Noise generated from the site as a result of the existing unit will primarily occur from equipment operation during construction and operational activities.

In accordance with 35 IAC 901.107(d), the previous 35 IAC 901.102 through 901.106 do not apply to sound emitted from equipment used for construction.

Noise generation during operational activities will be controlled by the following mitigating measures:

1. Site buffers will be provided between the waste boundary of this unit (where operational activities will occur) and the nearby residences.

2. An 8-ft high (minimum) privacy fence, earthen berm, or vegetative barrier will be provided where the waste boundary is within 500 ft of any public road. Although this barrier is primarily intended for aesthetics, it will also dampen noise emanating from the landfill site.

3. Operation will be confined to the daytime hours of 6:00 AM to 10:00 PM, local time, as defined by 35 IAC 900.101.

4. All equipment will be equipped with mufflers or other sound dissipative devices as necessary for compliance with 35 IAC 901.102, 901.103, 902.101, and 902.121 as appropriate.

Based upon the above factors, this facility is not expected to cause or contribute to a violation of 35 IAC 900 through 905, or of Section 24 of the Illinois Environmental Protection Act.

ODOR CONTROL PLAN

Placement of daily cover is usually an adequate measure for controlling odors during landfilling operations. However, if an unusually odorous material or load is received it will be refused or immediately covered. Should an odor problem develop at the site, an evaluation will be made to determine the cause and remedial action will be taken as appropriate.

VECTOR CONTROL PLAN

Potential disease-carrying vectors, including rodents, flies, and birds, are normally not a problem at a well-operated sanitary landfill. Placement of daily cover prevents access to vectors seeking nesting and breeding places. Also, the operation of heavy equipment and truck traffic will discourage infestation of rodents and birds. However, if a problem is identified, the services of a pest control company will be employed.

FIREFIGHTING AND FIRE SAFETY PLAN

A fire safety plan and firefighting plan are provided as components of the Fire Control and Safety Plan provided herewith as Attachment 24.

TRANSPORTATION PLAN

A Site Transportation Plan is provided herewith as Attachment 22.

MUD TRACKING CONTROL

Mud tracking will be controlled by travel on the on-site paved all-weather roadway between the active working face and Lindenwood Road which will facilitate the shedding of mud from wheels of the waste delivery vehicles prior to leaving the site. In addition, rumble strips will be installed on the on-site roadway to further dislodge any mud from the exiting vehicles. A detail of the rumble strips is provided on Sheet B-11 of the site developmental drawings.

SURVEY CONTROLS

The following survey controls will be utilized:

1. The boundaries of all waste disposal units, property boundaries, disturbed areas, and the permitted/authorized operating area will be surveyed and marked by a professional land surveyor.

2. All stakes and monuments will be clearly marked for identification.

3. All stakes and monuments will be inspected annually and surveyed no less frequently than once every five years by a professional land surveyor, who will also replace and resurvey any missing or damaged stakes and monuments discovered during an inspection.

4. Control monuments will be established to check vertical elevation. The control monuments will be established and maintained by a professional land surveyor.

LANDFILL GAS MONITORING

The landfill gas monitoring program will consist of the sampling of landfill gas within and around the facility, and ambient air monitoring. In accordance with 35 IAC 811.310, all gas monitoring devices, including ambient air monitors, will be sampled on a monthly basis, for a minimum of 30 years after closure and at least as long as the gas collection system is in operation. After this period, monitoring will be discontinued if the concentration of methane is less than 5 percent of the lower explosive limit in air for four consecutive monitoring periods at all monitoring points outside the facility or if monitoring points within the facility indicate that methane is no longer being produced in quantities that would result in migration from the facility.

Monitoring of gas within the landfill will be accomplished by taking a sample from the main gas collection line, prior to entering the compressors. This sample will provide a flow-weighted composite, representative of the gas being produced over the entire facility. In addition, a pressure reading will be taken at the head of each gas extraction well for each sampling period.

Subsurface gas monitoring probes will be placed around the perimeter of the facility at locations and elevations capable of detecting migrating gas. These elevations will range from the ground surface to the lowest elevation of the liner system, or to the top elevation of the groundwater, whichever is higher.

Ambient air samples will be taken from at least three ambient air monitoring locations no more than 100 ft downwind from the edge of the facility or at the property boundary, whichever is closer. Samples will be taken no higher than 1 inch above the ground and only when the average wind velocity is less than 5 miles per hour.

All subsurface monitoring devices and the main gas collection line will be monitored for the following parameters at each sampling interval:

1. Methane
2. Pressure
3. Nitrogen
4. Oxygen
5. Carbon Dioxide

Ambient air monitors will be sampled for methane only.

Sampling will be performed by an employee of Winnebago Reclamation Service, Inc. or by private independent consultants. Analytical results will be submitted to the IEPA as required.

Below-grade gas monitoring will typically be conducted using portable gas monitoring equipment. A Landtec GEM-500 or equivalent instrument will be used to measure the methane, carbon dioxide, and oxygen content of landfill gas. Nitrogen will be calculated as 100 percent minus the aggregate percentage of methane, carbon dioxide, and oxygen. The GEM-500 may also be used to measure flow rate, BTU content, pressure, and temperature. Ambient air monitoring for methane will be conducted using GEM-500 as well. A copy of manufacturer's literature for this device is provided in Attachment 17.

GROUNDWATER MONITORING PROGRAM

Groundwater Monitoring at the site will be in accordance with the Groundwater Monitoring Systems report provided by GeoTrans, Inc.. The applicant will provide such alternative or additional monitoring as the Illinois EPA may require.

Groundwater sampling and analysis will be performed by an independent consultant/laboratory. The results will be submitted to the IEPA as required.

LOAD CHECKING PROGRAM

A designated inspector will inspect at least three random loads of solid waste delivered to the facility on a random day each week. The inspector may be the chief operator, site manager, supervisor, or an equipment operator. The load inspector, gate attendant, and the refuse handling equipment operator(s) will complete awareness training on special waste, hazardous waste, and potentially harmful waste on a regular basis. The training will also include information on package labels as prescribed by DOT and RCRA.

To prevent fire, all incoming trucks will be observed at the gatehouse for smoke and/or any other indicators of potential fires. Since most packer trucks are tightly compacted, they normally smother fire. However, if one is suspected to be on fire, the load will be dumped and the fire will be extinguished in accordance with the Fire Control and Safety Plan contained in Attachment 24.

The randomly selected loads will be deposited on the proposed Material Recovery Facility building tipping floor or adjacent to the active landfill face as appropriate and allowed by regulation. The contents will be unloaded in this separate location to enable a thorough inspection for the presence of hazardous waste, unauthorized non-hazardous special waste, or other unacceptable wastes.

Information and observations derived from each random inspection will be recorded and retained at the facility for at least three years. The recorded information will include, at a minimum, the date and time of the inspection; the names of the hauling firm and the driver of the vehicle; the vehicle license plate number; the source of the waste as stated by the driver; and observations made by the inspector during the detailed inspection. The written record will be signed by both the inspector and the driver.

If any regulated hazardous wastes or other unacceptable wastes are identified by random load checking, or are otherwise discovered to be improperly deposited at the facility, the facility will promptly notify the Emergency Response Unit of the Agency, the person responsible for shipping the wastes to the landfill, and the generator of the wastes, if known. Waste loads identical to the regulated hazardous or unacceptable waste identified through the random load checking that have not yet been deposited in the landfill will not be accepted.

If the suspected waste can be safely moved from the Material Recovery Facility building it will be moved to a secure location, away from traffic flow, equipment, and the public. If the suspect waste cannot be safely moved from the recycling building then that part of the tipping floor will be cordoned off at an appropriate distance to prevent public access or disturbance as necessary for safety. Waste checked in an area adjacent to the active working area will be isolated from public access where deposited.

The landfill operator will assure the cleanup, transportation and disposal of the waste at an approved hazardous waste management facility or other appropriate facility in cooperation with the Emergency Response Unit.

Subsequent shipments from the same generator and/or hauler will be closely scrutinized. The operator will question the driver regarding load contents and the waste loads will be inspected in accordance with the load checking program until the operator is confident that only acceptable waste is being transported to the facility.

SPECIAL WASTE MANAGEMENT

Non-hazardous special wastes that have been authorized for disposal at the facility by individual and/or generic permits or other appropriate authorization obtained from the Illinois EPA (IEPA) will be accepted for disposal in this unit. This authorization will be secured by following all applicable requirements of the IEPA, including appropriate waste sample analyses. The results of these analyses will typically be reviewed by both the operator and an independent consultant for appropriateness of acceptance prior to even submitting a request for authorization.

The gate attendant will require the driver of a delivery vehicle to identify the source and contents of each load. If the gate attendant believes that the load may be special waste, he will ask for a special waste manifest. If the special waste does not appear on the gate attendant's list of permitted special waste or if the driver does not have a required manifest, the gate attendant will require the driver to return the waste to the generator.

As a facility which accepts special wastes, the subject facility will meet the requirements of 35 IAC 811 Subpart D concerning the management of special wastes at landfills. This will include, but not necessarily be limited to, the following:

1. As discussed in the Boundary Control section of the accompanying Construction Plan, a prominent sign will be provided at the facility's entrance which summarizes the conditions of non-hazardous special waste acceptance and the prohibition of hazardous waste acceptance, and the prohibition of liquid waste acceptance.

2. Each special waste accepted for disposal at a permitted solid waste management facility will be accompanied by a manifest containing the following information, unless such special waste is disposed at an on-site facility and exempted, in accordance with 35 IAC 809.211, from the manifest requirement:

   a) The name of the generator of the special wastes;

   b) When and where the special waste was generated;

   c) The name of the special waste hauler;

   d) The name of the solid waste management facility to which it is shipped as final destination point;

   e) The date of delivery;

   f) The name, waste stream permit number (if applicable) and quantity of special waste delivered to the hauler;

   g) The signature of the person who delivered the special waste to the special waste hauler, acknowledging such delivery;

   h) The signature of the special waste hauler, acknowledging receipt of the special wastes; and

   i) The signature of the person who accepted the special waste at its final destination, acknowledging acceptance of the special waste.

3. A permitted facility that accepts special waste must be designated on the manifest as the final destination point. Any subsequent delivery of the special waste or any portion or product thereof to a special waste hauler will be conducted under a transportation record initiated by the permitted solid waste management facility.

4. Special waste will be accepted only if the manifests are distributed in the following manner:

   a) The receiving solid waste management facility, will accept special waste only if accompanied by three copies of the manifest from the hauler. The hauler will retain one copy.

   b) The receiving solid waste management facility will:

      i. Send one copy of the completed transportation record to the person who delivered the special waste to the special waste hauler (usually the generator, or another special waste management facility);

      ii. Send one copy of each manifest to the Agency in accordance with the requirements of 35 IAC 809 unless otherwise directed by the Agency; and

      iii. Send information on rejected loads to the Agency in a quarterly report.

      iv. Pursuant to Section 22.01 of the Act, an Annual Report will be submitted to the Agency specifying the quantities and disposition of non-hazardous special wastes accepted for treatment, storage, or disposal during the previous calendar year.

5. Every person who delivers special waste to a special waste hauler, every person who accepts special waste from a special waste hauler, and every special waste hauler will retain a copy of the special waste transportation record as a record of each special waste transaction. These copies will be retained for three years, and will be made available at reasonable times for inspection and photocopying by the Agency pursuant to Section 4(d) of the Act.

6. Each special waste disposed of at a facility (including special wastes generated at the facility) will be accompanied by a special waste profile identification sheet, from the waste generator, that certifies the following:

   a) The generator's name and address:

   b) The transporter's name and telephone number;

   c) The name of waste;

   d) The process generating the waste;

   e) Physical characteristics of waste (e.g., color, odor, solid or liquid, flash point);

   f) The chemical composition of the waste;

   g) The metals content of the waste;

   h) Hazardous characteristics (including identification of wastes deemed hazardous by the United States Environmental Protection Agency or the state);

   i) Presence of polychlorinated byphenyls (PCB)s or 2,3,7,8-tetrachlorodibensodioxin (2,3,7,8,-TCDD); and

j) Any other information, such as the result of any test carried out in accordance with Section 811.22 that can be used to determine:

i. Whether the special waste is regulated as a hazardous waste, as defined at 35 IAC 721;

ii. Whether the special waste is of a type that is permitted for or has been classified, in accordance with 35 IAC 809, for storage, treatment, or disposal at the facility, and

iii. Whether the method of storage, treatment, or disposal, using the methods available at the facility, is appropriate for the waste.

7. Each subsequent shipment of a special waste from the same generator must be accompanied by a transportation record in accordance with 35 IAC 811.403(b), a copy of the original special waste profile identification sheet, and either:

a) A special waste recertification by the generator describing whether there have been changes in the following:

i. Laboratory analysis (copies to be attached)

ii. Raw material in the waste-generating process;

iii. The waste-generating process itself;

iv. The physical or hazardous characteristics of the waste, and

v. New information on the human health effects of exposure to the waste; or

b) Certification that any change in the physical or hazardous characteristic of the waste is not sufficient to require a new special waste profile.

8. The landfill operator will retain copies of any special waste profile identification sheets, special waste recertification, certifications of representative sample, special waste laboratory analyses, special waste analysis plans, and any waivers of requirements (prohibitions, special waste management authorization, and operating requirements) at the facility until the end of the post closure care period.

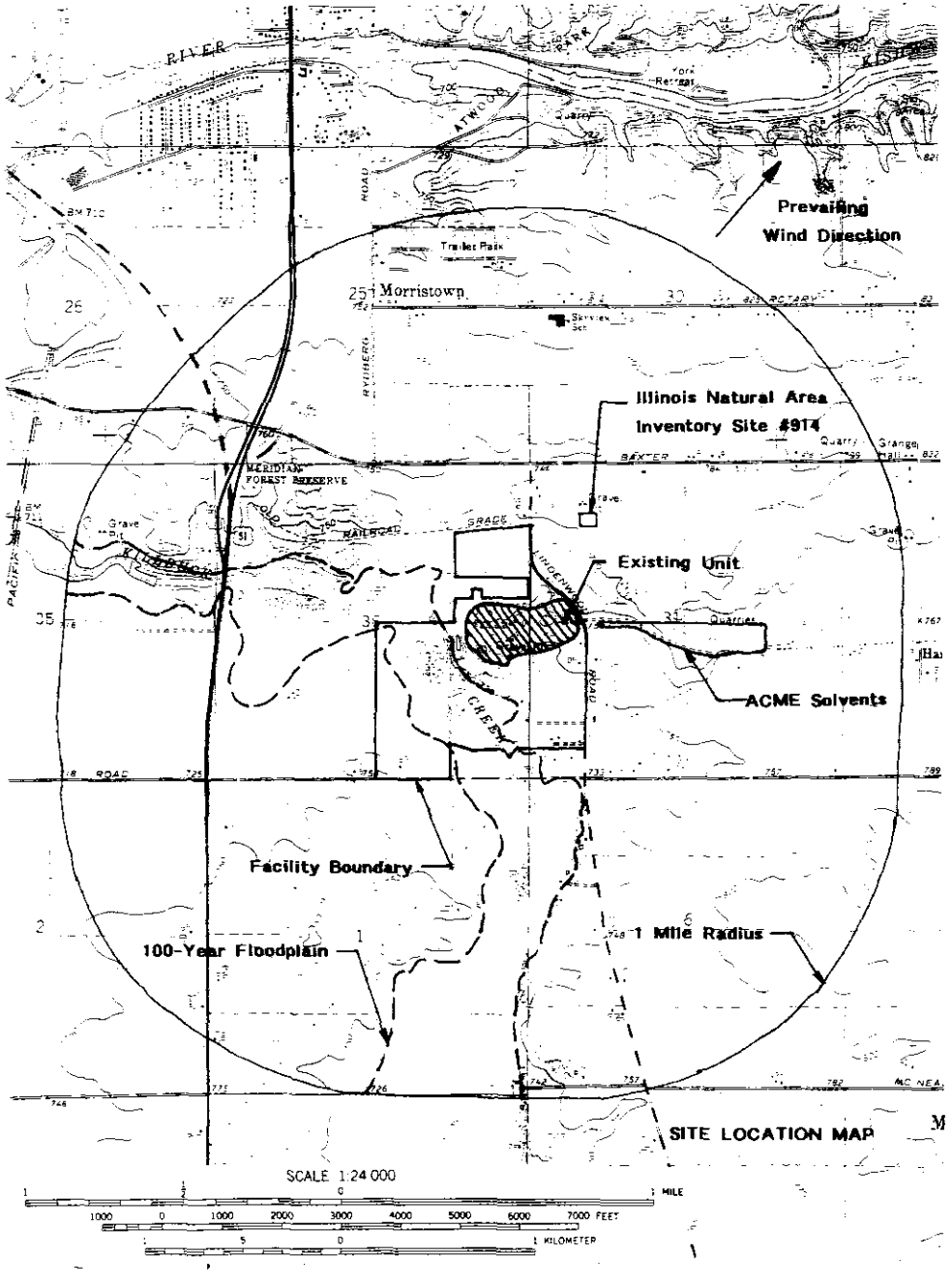
9. A local checking program as addressed in the previous section will be implemented.

SITE CLOSURE

The Closure Plan, Post-Closure Care Plan and Cost Estimates is provided as Attachment 20. Financial assurance in an amount equal to the estimated closure and post-closure care costs will be provided to the Illinois Environmental Protection Agency on or prior to the date initial operational authorization is requested in the existing unit.

ATTACHMENT 1

Site Location and Facility Location Maps

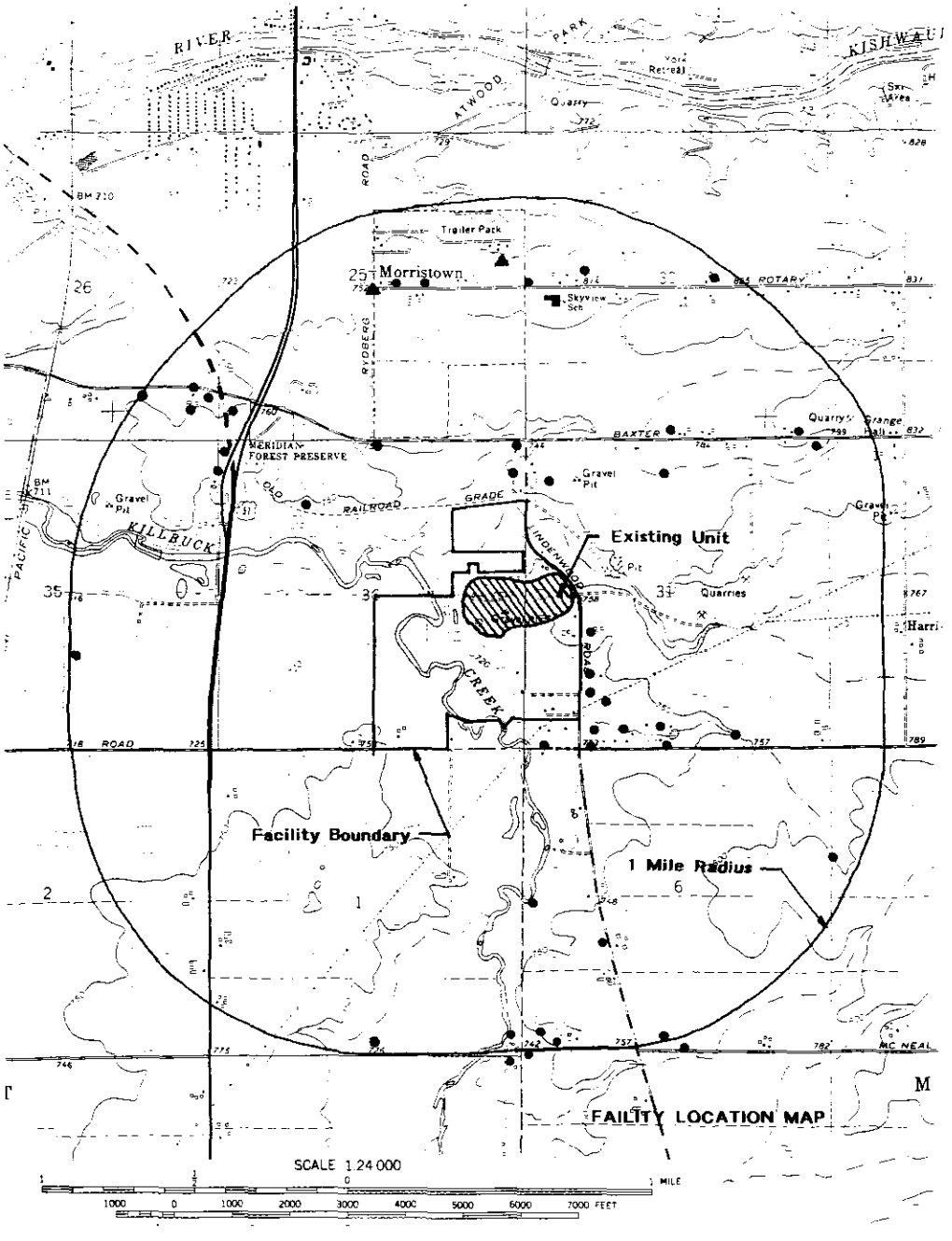


SITE LOCATION MAP

NOTES:

1. The Site Location Map is taken from portions of the most recent United States Geological Survey (USGS) maps of the Rockford South Quadrangle in the 7 1/2 minute series (topographic).
2. All surface waters are in blue.
3. The prevailing wind direction shown was obtained from the Illinois State Water Survey.
4. There are no rivers within the area which are designated for protection under Wild and Scenic Rivers Act (16 U.S.C. 1271 et. seq.).
5. The 100 year floodplain limits shown are based upon information obtained from the Illinois State Water Survey and the Illinois Department of Transportation.
6. The area denoted as the Illinois Natural Area Inventory Site #914 is a Grade B Dry Mesic Prairie and the only designated dedicated Illinois Natural Preserve in the vicinity.
7. A Phase 1 Archaeological Reconnaissance Survey indicated that there are no historic or archaeological sites designated by the National Historic Preservation Act (16 U.S.C. 470 et. seq.) and the Illinois Historic Preservation Act (Ill. Rev. Stat. 1989 Ch. 127, Par 133 dl et seq).
8. There are no areas on-site which are identified as critical habitats pursuant to the *Endangered Species Act (16 U.S.C. 1531 et seq.) and the Illinois Endangered Species* Protection Act (Ill. Rev. Stat. 1989, Ch. 8, Par 311 et seq.).
9. The main service corridors, transportation routes, and access roads to the facility are: IL 251, US 51, Mulford Road, Baxter Road and Lindenwood Road which are addressed in the Site Transportation Plan.

SITE LOCATION MAP
WINNEBAGO RECLAMATION SERVICE, INC.
PAGEL LANDFILL
MAY 1996



FACILITY LOCATION MAP

NOTES:

1. The Facility Location Map is taken from portions of the most recent United States *Geological Survey (USGS) maps of the Rockford South Quadrangle in the 7 1/2 minute* series (topographic).

2. Information regarding water wells within one mile of the facility was requested independently from the Illinois State Geological Survey and the Illinois State Water Survey. The approximate location of all wells identified by one or both of these state agencies is indicated with a dot. In addition, it is assumed each resident location not served by a Public Water Supply, has a water well for supplying drinking water. In addition, there has been correspondence with the IEPA-DPWS and the Illinois Department of Public Health. The location of the nearest community wells is shown with a triangle.

3. Any water well that exists on-site within 200 feet of the waste boundary of the unit shall be removed/plugged in accordance with the requirements and regulation of the Illinois *EPA and/or the Illinois Department of Public Health as appropriate. No off-site water wells* are located within 200 feet of the waste boundary nor are their any community water supply wells within 1000 feet of the waste boundary.

4. There are no sole source aquifers in this area.

5. The Meridan Forest Preserve is the only State of Federal Park, or recreational area within one mile of the site.

6. Where the waste boundary of the unit is within 500 feet of the right-of-way of Lindenwood Road, a barrier of fencing or vegetation no less than 8 feet high will be provided to screen operations from view. Lindenwood Road is the only public road within 500' of the waste boundary.

7. There are no hospitals and only one school within one mile of the site. There are, however, numerous occupied dwellings as shown. All dwellings within 500 feet of the waste boundary are owned by Winnebago Reclamation Service, Inc., and were occupied *after the date the first permit application for the facility was filed.*

8. The closest airport is the Greater Rockford Airport whose runways are located approximately 4 miles northwest of the site.

FACILITY LOCATION MAP
WINNEBAGO RECLAMATION SERVICE, INC.
PAGEL LANDFILL
MAY, 1996

ATTACHMENT 2

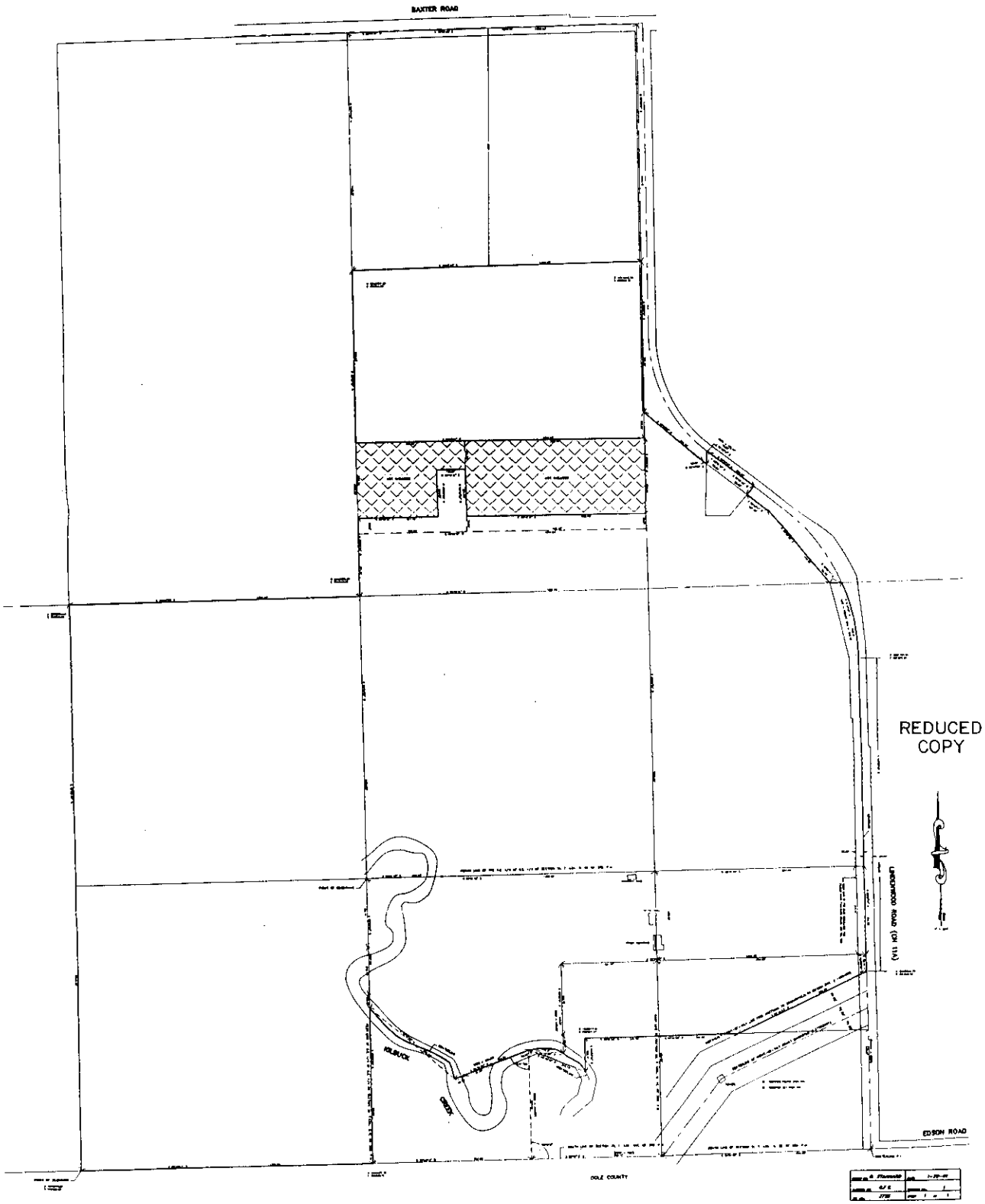
Legal Descriptions

LEGAL DESCRIPTION

Part of the East Half (1/2) of Section Thirty-Six (36), Township Forty-Three (43) North, Range One (1) East of the Third (3rd) Principal Meridian and part of the West Half (1/2) of Section Thirty-One (31), Township Forty-Three (43) North, Range Two (2) East of the Third (3rd) Principal Meridian bounded and described as follows, to wit: Beginning at the Southwest corner of the Southeast Quarter (1/4) of Section 36, Township 43 North, Range One (1) East of the Third (3rd) Principal Meridian; thence North 01°-00'-37" West, along the West line of said Southeast Quarter (1/4), a distance of 2646.66 feet to the Northwest corner of said Southeast Quarter (1/4); thence North 88°-40'-20" East, along the North line of said Southeast Quarter (1/4), a distance of 1321.49 feet to the Southwest Corner of the East Half (1/2) of the Northeast Quarter (1/4) of Section 36, Township 43 North, Range One (1) East of the Third (3rd) Principal Meridian; thence North 00°-58'-29" West, along the West line of the East Half (1/2) of said Northeast Quarter (1/4), a distance of 371.36 feet; thence North 89°-12'-41" East 367.15 feet; thence North 00°-58'-29" West 224.00 feet; thence North 89°-12'-41" East 132.00 feet; thence South 00°-58'-29" East 224.00 feet; thence North 89°-12'-41" East 822.54 feet to the East line of the Northeast Quarter of Section 36, Township 43 North, Range 1 East of the 3rd Principal Meridian; thence North 00°-56'-21" West, along said line, 360.34 feet to the Northeast corner of premises conveyed by Wayne and Geraldine Allen to John Holmstrom, III, as trustee for the Great Trust by Warranty Deed date July 12, 1983 and recorded as microfilm no. 83150251; thence South 89°-12'-41" West, along the North line of said premises, 1321.92 feet to the West line of the East Half of said Northeast Quarter; thence North 00°-58'-29" West, along said line, 800.68 feet to a point which is 1100.00 feet perpendicularly distant South from the North line of said Northeast Quarter (1/4); thence North 88°-12'-42" East, parallel with the North line of said Northeast Quarter (1/4), a distance of 1322.55 feet to the East line of said Northeast Quarter (1/4); thence South 00°-56'-21" East, along the East line of said Northeast Quarter (1/4), 701.26 feet to the Southwesterly right-of-way line for County Highway 11A (commonly known as Lindenwood Road); thence South 49°-03'-37" East, along said right-of-way line, 356.72 feet; thence South 52°-18'-16" East, along said right-of-way line, 23.01 feet; thence North 00°-31'-44" East, 62.94 feet to the centerline of County Highway 11A (Lindenwood Road); thence Southeasterly along a circular curve to the left, having a center which lies 716.14 feet to the Northeast, an arc distance of 15.02 feet (the chord across the previously described circular curve course bears South 51°-42'-16" East, 15.02 feet); thence South 52°-18'-16" East, along said centerline, 259.97 feet; thence South 37°-41'-44" West, 50.00 feet to the Southwesterly right-of-way line for County Highway 11A (Lindenwood Road); thence South 52°-18'-16" East, along said right-of-way line, 123.30 feet; thence South 38°-05'-50" East, along said right-of-way line, 444.23 feet to the South line of the Northwest Quarter (1/4), of Section 31, Township 43 North, Range Two (2) East of the Third (3rd) Principal Meridian; thence North 88°-21'-

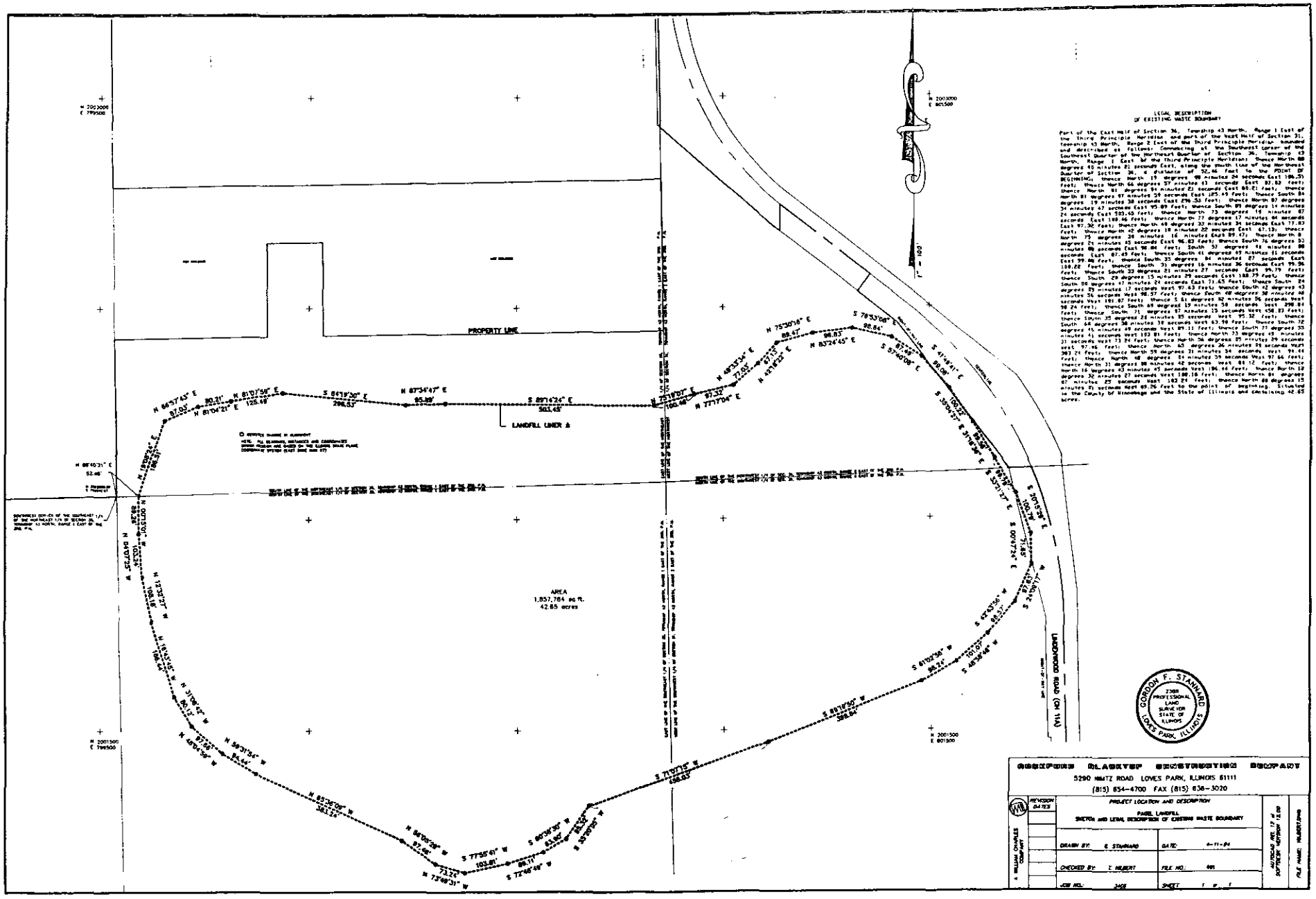
11" East, along said line, 53.79 feet to the centerline of County Highway 11A (Lindenwood Road); thence Southeasterly, along a circular curve to the right having a center which lies 955.00 feet to the Southwest, an arc distance of 362.48 feet (the chord across the previously described circular curve course bears South 11°-47'-41" East, 360.31 feet); thence South 00°-55'-16" East, along said centerline, 1472.95 feet to the Northwesterly line for a Commonwealth Edison right-of-way; thence South 63°-48'-23" West, along said right-of-way line, 652.00 feet; thence South 88°-21'-59" West, 364.83 feet to the East line of Section 36, Township 43 North, Range One (1) East of the Third (3rd) Principal Meridian; thence South 88°-21'-59" West, 341.76 feet; thence South 00°-56'-21" East, 155.11 feet to the centerline of the Kilbuck Creek; thence Northwesterly, along the centerline of said creek, 301.00 feet (the chord across the previously described irregular creek course bears North 68°-40'-19" West, 278.12 feet); thence South 68°-39'-36" West, 363.84 feet to the centerline of the Kilbuck Creek; thence Northwesterly, along the centerline of said creek; 530.00 feet to the West line of the Southeast Quarter (1/4) of the Southeast Quarter (1/4) of Section 36, Township 43 North, Range One (1) East of the Third (3rd) Principal Meridian (the chord across the previously described irregular creek course bears North 49°-15'-28" West, 508.97 feet); thence South 00°-58'-29" East, along said line, 716.05 feet to the South line of Section 36, Township 43 North, Range One (1) East of the Third (3rd) Principal Meridian; thence South 88°-43'-13" West, along said line, 1319.84 feet to the point of beginning. Subject to the rights of the public and the State of Illinois in and to those portions thereof taken, used, dedicated, or reserved for public road purposes. Situated in the County of Winnebago and the State of Illinois and containing 234.637 acres.

A


BAXTER ROAD
REDUCED COPY
LINCOLNWOOD ROAD (CH 11A)
EDSON ROAD
COLE COUNTY

LEGAL DESCRIPTION
OF EXISTING WASTE BOUNDARY

Part of the East Half of Section 36, Township 43 North, Range 1 East of the Third Principle Meridian and part of the West Half of Section 31, Township 43 North, Range 2 East of the Third Principle Meridian bounded and described as follows: Commencing at the Southwest corner of the Southeast Quarter of the Northeast Quarter of Section 36, Township 43 North, Range 1 East of the Third Principle Meridian; thence North 88 degrees 40 minutes 21 seconds East, along the south line of the Northeast Quarter of Section 36, a distance of 52.46 feet to the POINT OF BEGINNING; thence North 19 degrees 08 minutes 24 seconds East 186.51 feet; thence North 66 degrees 57 minutes 43 seconds East 87.03 feet; thence North 81 degrees 04 minutes 21 seconds East 80.21 feet; thence North 81 degrees 07 minutes 59 seconds East 125.49 feet; thence South 84 degrees 19 minutes 30 seconds East 296.53 feet; thence North 87 degrees 34 minutes 47 seconds East 95.89 feet; thence South 89 degrees 14 minutes 24 seconds East 503.45 feet; thence North 75 degrees 19 minutes 07 seconds East 100.46 feet; thence North 77 degrees 17 minutes 04 seconds East 97.32 feet; thence North 49 degrees 33 minutes 34 seconds East 77.03 feet; thence North 42 degrees 18 minutes 22 seconds East 67.13; thence North 75 degrees 30 minutes 16 minutes East 89.47; thence North 83 degrees 24 minutes 45 seconds East 96.83 feet; thence South 76 degrees 53 minutes 08 seconds East 98.84 feet; South 57 degrees 40 minutes 08 seconds East 87.49 feet; thence South 41 degrees 49 minutes 41 seconds East 99.08 feet; thence South 35 degrees 04 minutes 27 seconds East 100.22 feet; thence South 31 degrees 16 minutes 36 seconds East 99.56 feet; thence South 33 degrees 21 minutes 27 seconds East 99.79 feet; thence South 20 degrees 15 minutes 29 seconds East 100.79 feet; thence South 00 degrees 47 minutes 24 seconds East 71.65 feet; thence South 24 degrees 09 minutes 17 seconds West 97.63 feet; thence South 42 degrees 43 minutes 56 seconds West 98.57 feet; thence South 48 degrees 58 minutes 46 seconds West 101.07 feet; thence S 61 degrees 02 minutes 56 seconds West 98.24 feet; thence South 69 degrees 19 minutes 50 seconds West 398.84 feet; thence South 71 degrees 07 minutes 15 seconds West 458.03 feet; thence South 35 degrees 20 minutes 05 seconds West 95.32 feet; thence South 60 degrees 38 minutes 30 seconds West 63.90 feet; thence South 72 degrees 46 minutes 49 seconds West 89.11 feet; thence South 77 degrees 55 minutes 41 seconds West 103.81 feet; thence North 73 degrees 49 minutes 31 seconds West 73.24 feet; thence North 56 degrees 05 minutes 29 seconds West 97.46 feet; thence North 65 degrees 36 minutes 09 seconds West 383.24 feet; thence North 59 degrees 31 minutes 54 seconds West 94.44 feet; thence North 48 degrees 04 minutes 59 seconds West 97.66 feet; thence North 31 degrees 08 minutes 42 seconds West 80.12 feet; thence North 16 degrees 43 minutes 45 seconds West 186.44 feet; thence North 12 degrees 32 minutes 27 seconds West 108.18 feet; thence North 04 degrees 07 minutes 25 seconds West 103.24 feet; thence North 00 degrees 15 minutes 01 seconds West 89.26 feet to the point of beginning. Situated in the County of Winnebago and the State of Illinois and containing 42.65 acres.



LEGAL DESCRIPTION
OF EXISTING WASTE BOUNDARY

Part of the East Half of Section 36, Township 43 North, Range 1 East of the Third Principle Meridian and part of the West Half of Section 31, Township 43 North, Range 2 East of the Third Principle Meridian bounded and described as follows: Commencing at the Southeast corner of the Southeast Quarter of the Northeast Quarter of Section 36, Township 43 North, Range 1 East of the Third Principle Meridian; thence North 88 degrees 40 minutes 21 seconds East, along the south line of the Northeast Quarter of Section 36, a distance of 52.46 feet to the POINT OF BEGINNING; thence North 19 degrees 48 minutes 24 seconds East 196.51 feet; thence North 44 degrees 57 minutes 43 seconds East 87.03 feet; thence North 81 degrees 04 minutes 21 seconds East 65.61 feet; thence North 81 degrees 07 minutes 59 seconds East 125.49 feet; thence South 84 degrees 19 minutes 30 seconds East 296.53 feet; thence North 87 degrees 34 minutes 47 seconds East 95.89 feet; thence South 89 degrees 14 minutes 24 seconds East 503.45 feet; thence North 73 degrees 16 minutes 07 seconds East 100.46 feet; thence North 77 degrees 17 minutes 04 seconds East 97.32 feet; thence North 48 degrees 33 minutes 34 seconds East 77.03 feet; thence North 42 degrees 18 minutes 22 seconds East 67.13; thence North 75 degrees 28 minutes 16 minutes East 89.47; thence North 8 degrees 21 minutes 35 seconds East 96.83 feet; thence South 76 degrees 32 minutes 00 seconds East 98.84 feet; South 52 degrees 18 minutes 00 seconds East 87.45 feet; thence South 41 degrees 47 minutes 11 seconds East 99.00 feet; thence South 33 degrees 84 minutes 27 seconds East 188.22 feet; thence South 31 degrees 16 minutes 36 seconds East 99.96 feet; thence South 33 degrees 21 minutes 27 seconds East 94.79 feet; thence South 29 degrees 15 minutes 29 seconds East 188.79 feet; thence South 00 degrees 47 minutes 24 seconds East 71.65 feet; thence South 24 degrees 35 minutes 17 seconds West 97.63 feet; thence South 42 degrees 43 minutes 56 seconds West 98.57 feet; thence South 48 degrees 30 minutes 46 seconds West 101.87 feet; thence S 61 degrees 52 minutes 56 seconds West 98.24 feet; thence South 69 degrees 19 minutes 58 seconds West 298.84 feet; thence South 71 degrees 57 minutes 15 seconds West 458.83 feet; thence South 35 degrees 28 minutes 55 seconds West 95.32 feet; thence South 64 degrees 36 minutes 18 seconds West 63.98 feet; thence South 72 degrees 15 minutes 49 seconds West 89.13 feet; thence South 73 degrees 55 minutes 41 seconds West 103.81 feet; thence North 73 degrees 45 minutes 31 seconds West 73.24 feet; thence North 36 degrees 05 minutes 39 seconds West 97.46 feet; thence North 63 degrees 36 minutes 59 seconds West 363.24 feet; thence North 59 degrees 21 minutes 34 seconds West 94.44 feet; thence North 48 degrees 54 minutes 39 seconds West 97.44 feet; thence North 31 degrees 08 minutes 42 seconds West 84.12 feet; thence North 16 degrees 43 minutes 45 seconds West 186.44 feet; thence North 18 degrees 32 minutes 27 seconds West 198.18 feet; thence North 84 degrees 07 minutes 27 seconds West 103.24 feet; thence North 88 degrees 15 minutes 21 seconds West 69.26 feet to the point of beginning. Situated in the County of Winnebago and the State of Illinois and containing 42.85 acres.

Lawyers Title Insurance Corporation

NATIONAL HEADQUARTERS
RICHMOND, VIRGINIA

OWNERSHIP, MORTGAGE AND JUDGMENT REPORT

Issued By:

ROCKFORD TITLE COMPANY

315 N. Church Street Rockford, Illinois 61101 Phone: (815) 987-4900

CASE NO. 127247 March 1, 1991

TO: William Charles, Ltd.
4920 Forest Hills Road
Loves Park, Illinois 61111

Attention: Colleen

RE: Name: Winnebago Reclamation Service, Inc.
Address Given:

LEGAL DESCRIPTION(S):

PARCEL I

Part of the East Half (1/2) of Section Thirty-six (36), Township Forty-three (43) North, Range One (1) East of the Third (3rd) Principal Meridian and part of the West Half (1/2) of Section Thirty-one (31), Township Forty-three (43) North, Range Two (2) East of the Third (3rd) Principal Meridian, bounded and described as follows, to-wit: Beginning at the Southwest corner of the Southeast Quarter (1/4) of Section 36, Township 43 North, Range One (1) East of the Third (3rd) Principal Meridian; thence North 01° 00' 37" West, along the West line of said Southeast Quarter (1/4), a distance of 2646.66 feet to the Northwest
(Continued)

We have searched the records insofar as they relate to the above captioned premises and find the following of record:

LAST DEED(S) OF RECORD:

TITLE VESTED IN: Winnebago Reclamation Service, Inc.

jb

(continued)

Lawyers Title
Insurance Corporation

NATIONAL HEADQUARTERS
RICHMOND, VIRGINIA

LEGAL DESCRIPTION(S)
(Continued)
Case No. 127247

corner of said Southeast Quarter (1/4); thence North 88° 40' 20" East, along the North line of said Southeast Quarter (1/4), a distance of 1321.49 feet to the Southwest corner of the East Half (1/2) of the Northeast Quarter (1/4) of Section 36, Township 43 North, Range One (1) East of the Third (3rd) Principal Meridian; thence North 00° 58' 29" West, along the West line of the East Half (1/2) of said Northeast Quarter (1/4), a distance of 1532.38 feet to a point which is 1100.00 feet perpendicularly South from the North line of said Northeast Quarter (1/4); thence North 88° 12' 42" East, parallel with the North line of said Northeast Quarter (1/4), a distance of 1322.55 feet to the East line of said Northeast Quarter (1/4); thence South 00° 56' 21" East, along the East line of said Northeast Quarter (1/4), 701.26 feet to the Southwesterly right-of-way for County Highway 11A (commonly known as Lindenwood Road); thence South 49° 03' 37" East, along said right-of-way line, 356.72 feet; thence South 52° 18' 16" East, along said right-of-way line, 23.01 feet; thence North 00° 31' 44" East, 62.94 feet to the center line of County Highway 11A (Lindenwood Road); thence Southeasterly along a circular curve to the left, having a center which lies 716.14 feet to the Northeast, an arc distance of 15.02 feet (the chord across the previously described circular curve course bears South 51° 42' 16" East, 15.02 feet); thence South 52° 18' 16" East, along said center line, 259.97 feet; thence South 37° 41' 44" West, 50.00 feet to the Southwesterly right-of-way line of County Highway 11A (Lindenwood Road); thence South 52° 18' 16" East, along said right-of-way line, 123.30 feet; thence South 38° 05' 50" East, along said right-of-way line, 444.23 feet to the South line of the Northwest Quarter (1/4), of Section 31, Township 43 North, Range Two (2) East of the Third (3rd) Principal Meridian; thence North 88° 21' 11" East, along said line, 53.79 feet to the center line of County Highway 11A (Lindenwood Road); thence Southeasterly, along a circular curve to the right having a center which lies 955.00 feet to the Southwest, an arc distance of 362.48 feet (the chord across the previously described circular curve course bears South 11° 47' 41" East, 360.31 feet); thence South 00° 55' 16" East, along said center line, 1472.95 feet to the Northwesterly line of a Commonwealth Edison right-of-way; thence South 63° 48' 23" West, along said right-of-way line, 652.00 feet; thence South 88° 21' 59" West, 364.83 feet to the East line of Section 36, Township 43 North, Range One (1) East of the Third (3rd) Principal Meridian; thence South 88° 21' 59" West, 341.76 feet; thence South 00° 56' 21" East, 155.11

(Continued)

LEGAL DESCRIPTION(S)
(Continued)
Case No. 127247

feet to the center line of the Kilbuck Creek; thence Northwesterly, along the center line of said creek, 301.00 feet (the chord across the previously described irregular creek course bears North 68° 40' 19" West, 278.12 feet); thence South 68° 39' 36" West, 363.84 feet to the center line of the Kilbuck Creek; thence Northwesterly, along the center line of said creek, 530.00 feet to the West line of the Southeast Quarter (1/4) of the Southeast Quarter (1/4) of Section 36, Township 43 North, Range One (1) East of the Third (3rd) Principal Meridian (the chord across the previously described irregular creek course bears North 49° 15' 28" West, 508.97 feet); thence South 00° 58' 29" East, along said line, 716.05 feet to the South line of Section 36, Township 43 North, Range One (1) East of the Third (3rd) Principal Meridian; thence South 88° 43' 13" West, along said line, 1319.84 feet to the point of beginning. Subject to the rights of the public and the State of Illinois in and to those portions thereof taken, used, dedicated or reserved for public road purposes; **EXCEPTING** That part of the Southwest Quarter (1/4) of Section 31, Township 43 North, Range 2 East of the Third Principal Meridian, and part of the Southeast Quarter (1/4) of the Southeast Quarter (1/4) of Section 36, Township 43 North, Range 1 East of the Third Principal Meridian, bounded and described as follows: Beginning at a point on the East line of said Section 36, which point is 900.0 feet (as measured along said line) North of the Southeast corner of said Section 36; thence West along a line parallel with the South line of said Section 36, a distance of 466.0 feet; thence South along a line parallel with the East line of said Section 36, a distance of 425 feet to the center line of Kilbuck Creek; thence Southeasterly (upstream) along the center line of said creek to its intersection with a line drawn 366.0 feet perpendicularly distant West of and parallel with the East line of said Section 36; thence North along the last described parallel line a distance of 152.0 feet (Deed = 218.0 feet more or less) to the intersection with a line drawn 550 feet (as measured along a line parallel with the East line of said Section 36), North of and parallel with the South line of said Section 36; thence East along the last described parallel line, a distance of 366.0 feet to the East line of said Section 36 also being the West line of said Section 31; thence East along a line parallel with the South line of said Section 31, a distance of 341.79 feet; thence North 63 degrees 48' 38" East along a line, a distance of 652.30 feet to a point on the center line of Kilbuck Road (formerly known as Lindenwood Road (County Highway No.

(Continued)

LEGAL DESCRIPTION(S)
(Continued)
Case No. 127247

11A)), which point is 820.76 feet (Deed = 820.71 feet) North of the South line of said Section 31; thence North along the center line of Kilbuck Road aforesaid, a distance of 79.30 feet to a point 900.05 feet (Deed = 900.0 feet) (as measured along said center line) North of the South line of said Section 31; thence West along a line drawn parallel with the South line of said Section 31, a distance 933.71 feet (Deed = 931.33 feet more or less) to the point of beginning; **EXCEPTING THEREFROM** Part of the Southeast Quarter (1/4) of the Southeast Quarter (1/4) Section Thirty-six (36) in Township Forty-three (43) North, Range One (1) East of the Third (3rd) Principal Meridian and part of the Southwest Quarter (1/4) of Section Thirty-one (31) in Township Forty-three (43) North, Range Two (2) East of the Third (3rd) Principal Meridian, bounded and described as follows, to-wit: Beginning at the Northwest corner of said Southeast Quarter (1/4) of the Southeast Quarter (1/4) of said Section Thirty-six (36); thence East along the North line of the Southeast Quarter (1/4) of the Southeast Quarter (1/4) of said Section Thirty-six (36) and said line extended Easterly, to a point on the center line for a Public Highway designated Lindenwood Road (County Highway No. 11A); thence South along the centerline for said Lindenwood Road, to a point 900 feet (measured along said centerline) North of the South line of said Section Thirty-one (31); thence West, parallel with the South line of said Section Thirty-one (31), a distance of 1397.33 feet; thence South parallel with the East line of said Section Thirty-six (36) a distance of Four Hundred Twenty-five (425) feet to the center of Kilbuck Creek; thence Northwesterly (downstream) along the center of said creek to a point Six Hundred Twenty-three (623) feet (measured parallel with the South line of said Section Thirty-six (36)) West of the East line of said Section Thirty-six (36) and Four Hundred Ninety-nine and Sixty-five Hundredths (499.65) feet North and perpendicularly distant from the South line of said Section Thirty-six (36); thence Southwesterly at an angle of 69° 58' measured clockwise from a line perpendicular to the South line of said Section Thirty-six (36) passing through a point Six Hundred Twenty-three (623) feet West of the Southeast corner of said Section Thirty-six (36), a distance of Three Hundred Thirty-nine and Five Hundredths (339.05) feet to the center of Kilbuck Creek; thence Northerly, Westerly, Southerly and Northwesterly (downstream) along the center of said Kilbuck Creek to its intersection with the West line of the Southeast Quarter (1/4) of the Southeast Quarter (1/4) of

(Continued)

LEGAL DESCRIPTION(S)
(Continued)
Case No. 127247

said Section Thirty-six (36); thence North along said West line to the point of beginning; situated in the County of Winnebago and the State of Illinois.

PARCEL II

That part of the Southwest Quarter (1/4) of Section 31, Township 43 North, Range 2 East of the Third Principal Meridian, and part of the Southeast Quarter (1/4) of the Southeast Quarter (1/4) of Section 36, Township 43 North, Range 1 East of the Third Principal Meridian, bounded and described as follows: Beginning at a point on the East line of said Section 36, which point is 900.0 feet (as measured along said line) North of the Southeast corner of said Section 36; thence West along a line parallel with the South line of said Section 36, a distance of 466.0 feet; thence South along a line parallel with the East line of said Section 36, a distance of 425 feet to the center line of Kilbuck Creek; thence Southeasterly (upstream) along the center line of said creek to its intersection with a line drawn 366.0 feet perpendicularly distant West of and parallel with the East line of said Section 36; thence North along the last described parallel line a distance of 152.0 feet (Deed = 218.0 feet more or less) to the intersection with a line drawn 550 feet (as measured along a line parallel with the East line of said Section 36), North of and parallel with the South line of said Section 36; thence East along the last described parallel line, a distance of 366.0 feet to the East line of said Section 36 also being the West line of said Section 31; thence East along a line parallel with the South line of said Section 31, a distance of 341.79 feet; thence North 63 degrees 48' 38" East along a line, a distance of 652.30 feet to a point on the center line of Kilbuck Road (formerly known as Lindenwood Road (County Highway No. 11A)), which point is 820.76 feet (Deed = 820.71 feet) North of the South line of said Section 31; thence North along the center line of Kilbuck Road aforesaid, a distance of 79.30 feet to a point 900.05 feet (Deed = 900.0 feet) (as measured along said center line) North of the South line of said Section 31; thence West along a line drawn parallel with the South line of said Section 31, a distance 933.71 feet (Deed = 931.33 feet more or less) to the point of beginning; situated in the County of Winnebago and the State of Illinois.

(Continued)

Lawyers Title Insurance Corporation

NATIONAL HEADQUARTERS
RICHMOND, VIRGINIA

LEGAL DESCRIPTION(S)
(Continued)
Case No. 127247

PARCEL III

Part of the Southeast Quarter (1/4) of the Southeast Quarter (1/4) Section Thirty-six (36) in Township Forty-three (43) North, Range One (1) East of the Third (3rd) Principal Meridian and part of the Southwest Quarter (1/4) of Section Thirty-one (31) in Township Forty-three (43) North, Range Two (2) East of the Third (3rd) Principal Meridian, bounded and described as follows, to-wit: Beginning at the Northwest corner of said Southeast Quarter (1/4) of the Southeast Quarter (1/4) of said Section Thirty-six (36); thence East along the North line of the Southeast Quarter (1/4) of the Southeast Quarter (1/4) of said Section Thirty-six (36) and said line extended Easterly, to a point on the center line for a Public Highway designated Lindenwood Road (County Highway No. 11A); thence South along the centerline for said Lindenwood Road, to a point 900 feet (measured along said centerline) North of the South line of said Section Thirty-one (31); thence West, parallel with the South line of said Section Thirty-one (31), a distance of 1397.33 feet; thence South parallel with the East line of said Section Thirty-six (36) a distance of Four Hundred Twenty-five (425) feet to the center of Kilbuck Creek; thence Northwesterly (downstream) along the center of said creek to a point Six Hundred Twenty-three (623) feet (measured parallel with the South line of said Section Thirty-six (36)) West of the East line of said Section Thirty-six (36) and Four Hundred Ninety-nine and Sixty-five Hundredths (499.65) feet North and perpendicularly distant from the South line of said Section Thirty-six (36); thence Southwesterly at an angle of 69° 58' measured clockwise from a line perpendicular to the South line of said Section Thirty-six (36) passing through a point Six Hundred Twenty-three (623) feet West of the Southeast corner of said Section Thirty-six (36), a distance of Three Hundred Thirty-nine and Five Hundredths (339.05) feet to the center of Kilbuck Creek; thence Northerly, Westerly, Southerly and Northwesterly (downstream) along the center of said Kilbuck Creek to its intersection with the West line of the Southeast Quarter (1/4) of the Southeast Quarter (1/4) of said Section Thirty-six (36); thence North along said West line to the point of beginning; situated in the County of Winnebago and the State of Illinois.

Lawyers Title
Insurance Corporation

NATIONAL HEADQUARTERS
RICHMOND, VIRGINIA

REAL ESTATE TAXES
(Continued)
Case No. 127247

(1989-$7,350.72), 252-001C (1989-$8,668.32) and Part of 252-004A (1989-$688.32). PARCEL II - 283-507B (1989-$1,592.80 Ex. 9). PARCEL III - 283-506A (1989-$1,804.94 Ex. 9).

Lawyers Title Insurance Corporation

Case No. 127247

NATIONAL HEADQUARTERS
RICHMOND, VIRGINIA

OWNERSHIP, MORTGAGE AND JUDGMENT REPORT
CONTINUED

UNRELEASED MORTGAGE(S) AND/OR TRUST DEED(S):

UNIFORM COMMERCIAL CODE FILING; NRG Technologies, Inc., Debtor; Marine Bank, Nat'l Association, Secured Party; filed May 11, 1987 as No. F-240378.

JUDGMENTS, DIVORCE PROCEEDINGS, MECHANIC'S LIENS, TAX LIENS:

NONE

REAL ESTATE TAXES:

We have checked the taxes for the year 1989 and find they are all paid. Property Code(s) PARCEL I - 252-753 (1989-$737.86), 283-256 (1989-$1,124.66), 283-505 (1989-$1,044.50), 252-751 (1989-$1,382.58), 252-003 (1989-$476.76), 283-255 (1989-Ex. 4), 283-254 (1989-$803.92), 283-253A (1989-$121.34), 283-505A (1989-$1,259.06), 252-001B
(Continued)

This search has been made as of 02/13/91 at 8:00 a.m., and has been made as an accomodation to you and we assume no responsibility as abstractors or insurers of real estate titles. Note: Our liability on this report shall not exceed the amount of the invoice. This is not a commitment for title insurance.

Yours Truly,

ROCKFORD TITLE COMPANY

BY: Michael J. Kohn

jb

Illinois Environmental Protection Agency · P. O. Box 19276, Springfield, IL 62794-9276

217/782-6761

Refer to: 2018080001 -- Winnebago County
Pagel Pit
Log No. OC-88079
Permit File

March 4, 1991

Mr. Gary L. Marzorati
5133 Bent Tree Ct.
Rockford, Illinois 61111

Dear Mr. Marzorati:

The Agency is in receipt of your Prior Conduct Certification Annual Update report. The report is being kept on file. The next Annual Supplemental information report will be due March 4, 1992.

Should you have any questions, please contact the Permit Section at 217/782-6761.

Very truly yours,

Lawrence W. Eastep, P.E., Manager
Permit Section
Division of Land Pollution Control

LWE:NGK:rd0610q/6

cc: Division File
Rockford Region

Illinois Environmental Protection Agency · P.O. Box 19276, Springfield, IL 62794-9276

APPLICATION FOR PRIOR CONDUCT CERTIFICATION (35 IAC 745)

Applicant Name: Gary Marzorati Social Security No. 338-36-5020

Address: 3616 Stubai Trail , Rockford, Illinois 61111

Site Name: Winnebago Reclamation Service-Pagels Site Code 2018080001

Is this application: New _____, Supplemental _____, Annual Update X

I. Other waste disposal sites owned or operated (anywhere) at anytime at which you were the chief operator: (If more than one, attach the name, address and nature of each site.)

Site Name: _____ Site Code _____

Site Address: _____

Nature of Site: Hazardous ☐ Special ☐ General Municipal Refuse ☒ Other ☐ (Attach Explanation)

II. All of the following questions need to be answered. If the answer to any of the following is affirmative attach a copy of any final administrative or judicial determination. Part II does not need to be filled out if there has been no change since the last report.

1) Have you ever violated any federal, state, or local laws, regulations or ordinances governing the operation of any waste disposal site? YES ☐ NO ☒

2) Have you ever been convicted in Illinois or any other state of any crime which is a felony under Illinois law or been convicted of a felony in a federal court? YES ☐ NO ☒

3) Have you ever been proven to have shown gross carelessness in the handling storing, processing, transporting or disposing of any hazardous waste in any state? YES ☐ NO ☒

4) Have you ever had a prior conduct certification denied, cancelled or revoked? YES ☐ NO ☒

III. Is there any administrative or judicial proceeding, which is still pending, which:

1) Could result in a determination of the type described in section II above; or YES ☐ NO ☒

2) Could result in the reversal of any administrative or judicial determination provided in response to section II above. YES ☐ NO ☒

If the answer to any of the above is yes provide a description including the name of the Agency or Court, title, docket No. and status.

IV. For Annual Update Applications- YES ☐ NO ☒
Is there a change in any of the information required by sections II or III above:
(If yes please note in section II or III above and attach proper supplemental information).

V. For Supplemental Applications - complete sections I, II, and III, attach all required information, and specifically identify the reason for submitting this application.

CERTIFICATION STATEMENT

I certify under penalty of law that the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

G L Marzorati
Signature of Applicant

Vice-President
Title

November 28, 1990
Date

This Agency is authorized to require this information under Illinois Revised Statutes, 1979, Chapter 111 1/2, Section 1039. Disclosure of this information is required under that Section. Failure to do so may prevent this form from being processed and could result in your application being denied. This form has been approved by the Forms Management Center.

LWE:jd/4522g/sp

IL 532 1686
LPC 277 (REV. 10/90)

PRINTED ON RECYCLED PAPER

Printed on Recycled Paper

INSTRUCTIONS FOR COMPLETING THE APPLICATION FOR PRIOR CONDUCT CERTIFICATION

Illinois regulations require that all waste disposal sites have a chief operator who has a prior conduct certification (See 35 Ill. Adm. Code Subtitle G, Part 745). A chief operator means the person in responsible charge of a waste disposal site. A site may have more than one certified chief operator, however, an operator may not serve in that capacity at more than one site.

A site may have more than one permitted unit (even with different site numbers), but as long as the site meets the definition under Part 702, or Part 807 and is one contiguous piece of property only one chief operator with prior conduct certification is required.

Applications are required from the chief operator at all waste disposal sites initially by April 1, 1988 (such that operators may be certified by July 1, 1988). Operators are also required to provide supplemental information to pending applications within 30 days after any change in circumstances which renders the original applications incomplete or inaccurate. For certified operators, an annual update of information is due 90 days prior to expiration of their existing certification. Finally, an operator must provide supplemental information upon Agency request pursuant to 35 Ill. Adm. Code 745.124.

If an operator ceases to become chief operator at one site and becomes chief operator at another site, a new application must be submitted.

COMPLETING THE APPLICATION

General: Provide the operator's name, Social Security number, and address as well as the site name and site code. The site name should be the same as the name on the most recent operating permit.

Part I: Information on ownership and/or operation of other waste disposal sites, even if located in other states, must be provided. If more than one additional site is owned/operated, attach this information.

Part II: This part of the application deals with the operator's prior conduct, in other states as well as in Illinois. If there is any confusion on completing this part, the operator should attach a complete explanation as well as any supporting documentation. If an administrative citation final order (Sec. 21(P) of the Act) has been issued against the facility, relevant information should be discussed in an attachment. If the operator submitting this application was a named respondent in an administrative citation final order the response to question II-1 should be affirmative. The fact that an operator has allowed his certification to lapse would not be reason to answer affirmatively to question II-4. In this case a completely new application would be required. Part II does not need to be filled out for annual update if there has been no change since the last report.

Part III: This part deals with pending actions which could impact the application. If final decisions are reached during the application review it is the operator's responsibility to provide supplemental information within 30 days.

Part IV: For annual updates if there is no change in the information provided previously in parts II and III, please indicate "no" in this part. If an operator has previously marked "yes" to one of the questions in Part II, and supporting information has previously been provided, and no additional convictions or violations have occurred, there is no need to submit copies of administrative or judicial determinations.

Part V: If supplemental information is to be submitted it is imperative that a thorough discussion explaining that information be presented.

An original and two copies of all applications shall be submitted by registered or certified mail to:

Illinois Environmental Protection Agency
Division of Land Pollution Control - #24
Prior Conduct Certification Review
2200 Churchill Road
Post Office Box 19276
Springfield, Illinois 62794-9276

LE/4522g/3

Illinois Environmental Protection Agency 2200 Churchill Road, Springfield, IL 62706

217/782-6761

Refer to: 2018080001 -- Winnebago County
Pagel Landfill
Log No. OC-88079
Permit File

June 22, 1988

Garry L. Marzorati
5133 Bent Tree Court
Rockford, Illinois 61111

Dear Mr. Marzorati:

Prior conduct certification for waste disposal site operation pursuant to 35 Ill. Adm. Code Part 745 is hereby granted to the person identified above, at the site identified above. This approval is granted subject to the following conditions:

1. Except as provided in 745.124 this prior conduct certification shall remain valid unless you request termination, you leave the employment of the designated site or until certification is revoked pursuant to 745.162.

2. Unless otherwise specified by the site permittee or owner, you are deemed to be the chief operator as defined in 745.102(b), and are expected to be in responsible charge of the above named site on a 24 hour basis.

3. You are prohibited as serving as chief operator for units located at two or more sites.

4. An annual supplemental information report is due nine months from the date of this approval, and annually thereafter, for as long as this Certification remains valid. This report should be on Agency forms. Reports should be submitted to:

   Illinois Environmental Protection Agency
   Division of Land Pollution Control -- PCC
   2200 Churchill Road
   P.O. Box 19276
   Springfield, Illinois 62794-9276

Very truly yours,

Lawrence W Eastep by CAZ

Lawrence W. Eastep, P.E., Manager
Permit Section
Division of Land Pollution Control

LWE:DH:rmi/1694j/102

cc: Division File
Rockford Region
Compliance Section

ATTACHMENT 3

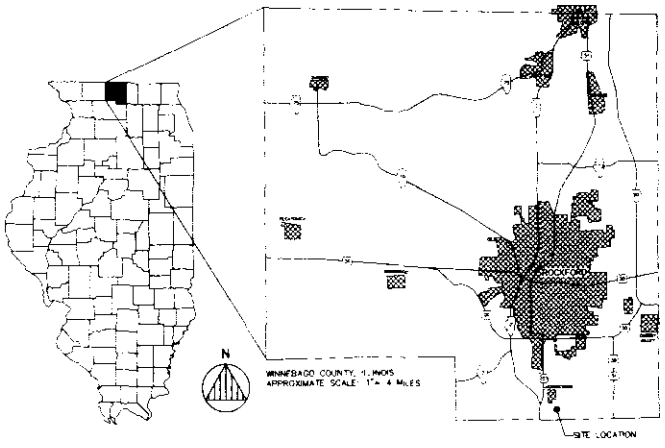
Reduced Site Developmental Plan Drawings

APPLICATION FOR SIGNIFICANT MODIFICATION TO PERMIT FOR
WINNEBAGO RECLAMATION SERVICE, INC.
PAGEL LANDFILL FACILITY
ROCKFORD, WINNEBAGO COUNTY, ILLINOIS

PREPARED BY:

ANDREWS ENVIRONMENTAL ENGINEERING INC.

SITE LOCATION

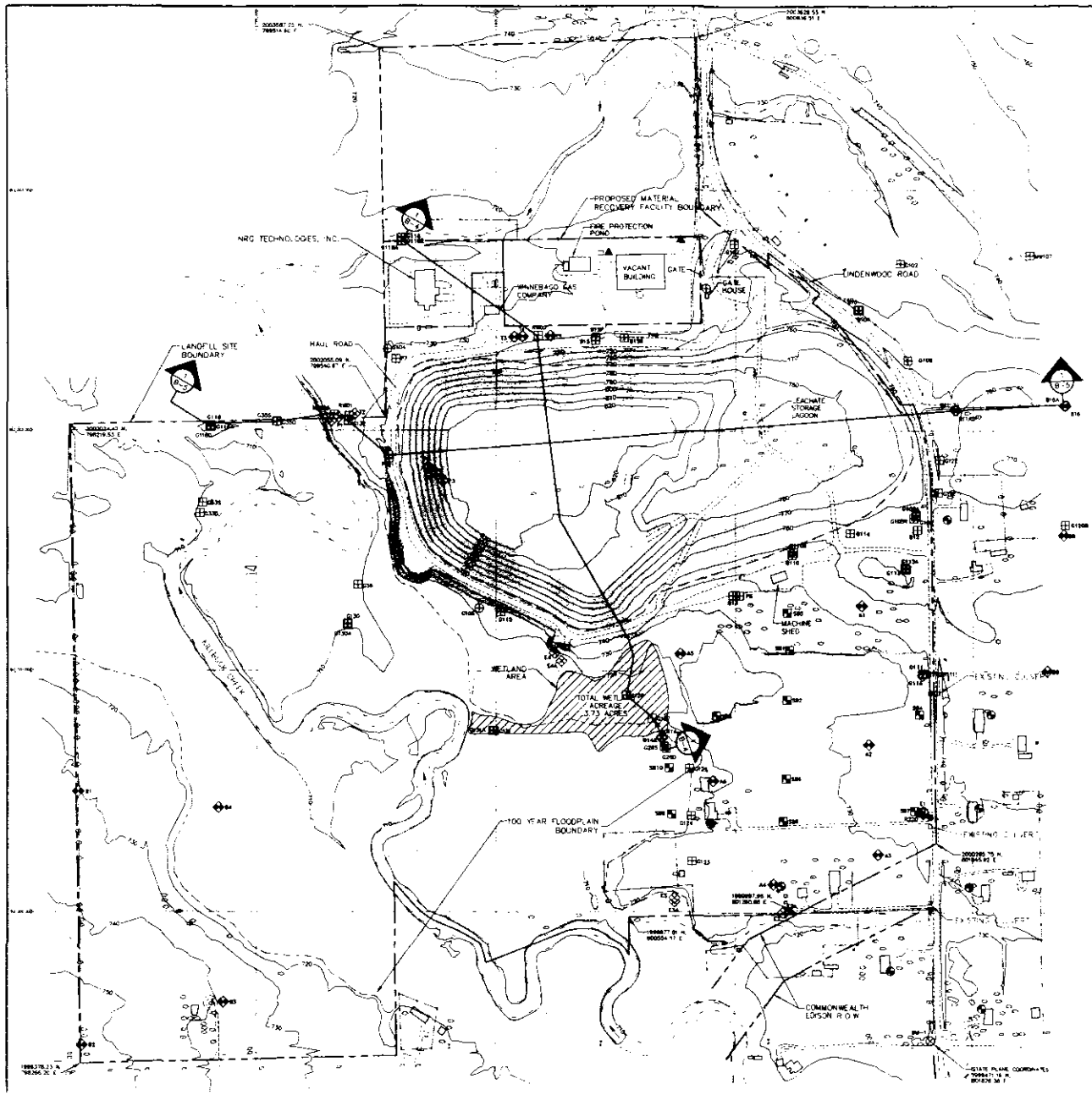


REFERENCE SYMBOLS KEY

	REVISION SYMBOL
	STATE PLANER COORDINATE
DRAWING NUMBER / SHEET NUMBER	DETAIL REFERENCE
DRAWING NUMBER / SHEET NUMBER	DETAIL REFERENCE
DRAWING NUMBER / SHEET NUMBER	CROSS SECTION REFERENCE
DRAWING NUMBER / DRAWING TITLE / SCALE / SHEET NUMBER	DRAWING REFERENCE

INDEX OF DRAWINGS

B3-0	TITLE SHEET
B3-1	EXISTING SITE CONDITIONS
B3-2	SITE PLAN MAP
B3-3	FINAL SITE CONDITIONS
B3-4	CROSS SECTION 1
B3-5	CROSS SECTION 2
B3-6	EXISTING GAS/LEACHATE COLLECTION SYSTEM
B3-7	PROPOSED GAS/LEACHATE COLLECTION SYSTEM
B3-8	DRAINAGE DETAILS 1
B3-9	DRAINAGE DETAILS 2
B3-10	GAS/LEACHATE COLLECTION DETAILS
B3-11	ROADWAY DETAILS



NOTES:

1. BASE MAP WAS DEVELOPED FROM [illegible] CHICAGO AERIAL SURVEY OF [illegible] PLANES [illegible] DATE OF PHOTOGRAPHY APRIL 2, 1990 SUPPLEMENTED BY NOVEMBER 1996 [illegible] AND [illegible] 1998 (PERIMETER) FIELD SURVEYS.
2. CONTOUR INTERVAL [illegible] FEET.
3. FOR CLARITY, NOT ALL EXISTING [illegible] FEATURES ARE SHOWN.
4. NOT ALL BORINGS FROM PREVIOUS STUDIES ARE SHOWN.
5. THE APPROXIMATE 100 YEAR FLOODPLAIN BOUNDARY SHOWN IS BASED UPON INFORMATION PROVIDED BY THE ILLINOIS STATE WATER SURVEY.
6. THE APPROXIMATE WETLAND AREA SHOWN IS AS DETERMINED BY ENSAR, INC. IN THEIR DECEMBER 13, 1996 REPORT FOR THE SITE.
8. BENCHMARKS (VERTICAL CONTROL MONUMENTS) SHALL BE ESTABLISHED AND MAINTAINED BY A PROFESSIONAL LAND SURVEYOR.
9. THE INDIVIDUAL NORTHING-EASTING POINTS ALONG THE SITE BOUNDARY ARE STATE PLANE COORDINATES.

BENCHMARK DESCRIPTIONS:

BM 1: [illegible] DISK MOUNTED ON ROD IN [illegible] GPS DATA ELEVATION [illegible]

LEGEND

- EXISTING LANDFILL MONITOR WELL/POINT
- EXISTING WATER WELLS
- MONITOR WELLS INSTALLED DURING PREVIOUS STUDIES
- PIEZOMETERS INSTALLED DURING PREVIOUS STUDIES
- BORINGS INSTALLED DURING PREVIOUS STUDIES
- FIRE HYDRANT
- FENCE
- CURRENT PERMITTED WASTE BOUNDARY
- 100 YEAR FLOODPLAIN BOUNDARY
- TREE
- UTILITY [illegible]
- BENCHMARK

GRAPHIC SCALE

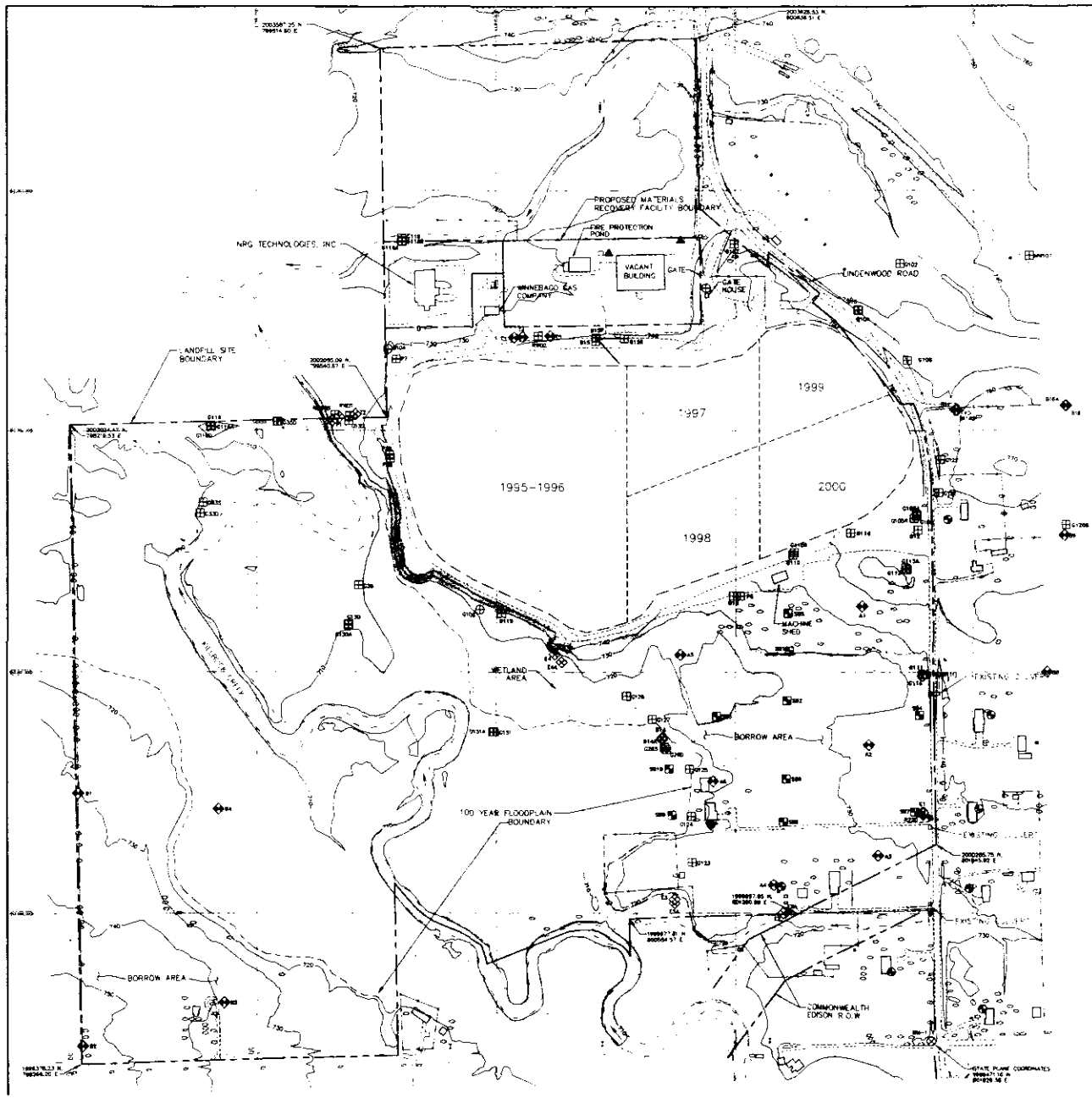
200 0 100 200 400 800

(IN FEET)
1 inch = 200 ft

ANDREWS ENVIRONMENTAL ENGINEERING, INC.
3535 Mayfield Road
Cleveland, Ohio 44121
(216) 291-2334

EXISTING SITE CONDITIONS
[illegible] COMPANY [illegible] TO HELPER [illegible]
WINNEBAGO RECLAMATION SERVICE, INC.
PAGELL LANDFILL FACILITY
WINNEBAGO, WINNEBAGO COUNTY, ILLINOIS

B3-1



NOTES

1. THIS DRAWING IS INTENDED TO ADDRESS THE REQUIREMENTS OF 35 IAC B17.107. HOWEVER, TO THE EXTENT NECESSARY FOR COMPLIANCE, THIS COMPLETE SET OF DRAWINGS (B-0 THROUGH B-13) CAN BE CONSIDERED THE SITE PLAN MAP.
2. THE FILL BOUNDARY SHOWN DEPICTS THE MAXIMUM LATERAL EXTENT TO WHICH WASTES HAVE BEEN PLACED. THE BELOW GROUND WASTE BOUNDARY IS DEPICTED BY THE CROSS SECTIONS ON SHEETS B-4 AND B-5.
3. EARTHEN MATERIALS WILL BE OBTAINED FROM TWO ON-SITE BORROW AREAS, ONE WITHIN THE PERMITTED EXPANSION AREA IMMEDIATELY SOUTH OF THE EXISTING UNIT, AND THE OTHER IN THE SOUTHWEST CORNER OF THE SITE ACROSS KILLBUCK CREEK.
4. THOSE AREAS ANTICIPATED TO BE DISTURBED INCLUDE THE EXISTING FILL AREA, BORROW AREAS, AND AREAS IMMEDIATELY ADJACENT TO THE EXISTING FILL AREA. MINOR LANDFORMING AND GRADING ACTIVITIES THAT MAY BE REQUIRED ARE NOT DEPICTED ON THE CONTOURS.
5. THIS MAP AND OTHER DRAWINGS PROVIDED SHOW THE ROADS IN AND ADJACENT TO THE FACILITY. THIS INCLUDES THE ROADS OF THE EXISTING FILL AREA AS MAY BE PERMITTED BY THE ILLINOIS DEPARTMENT OF TRANSPORTATION (IDOT). AN ON-SITE ROADWAY MAY BE CONSTRUCTED ACROSS KILLBUCK CREEK AND ITS FLOODPLAIN TO CONNECT THE BORROW AREA AND THE LANDFILL AREA. THE DETAILS OF SUCH A ROADWAY WOULD BE PROVIDED WITH THE PERMIT APPLICATION TO IDOT AND A COPY WOULD BE PROVIDED TO THE IEPA DLPC.
6. THESE DRAWINGS SHOW THE NATURAL FEATURES AND PERIMETER FENCING WHICH SHALL CONTROL ACCESS TO THE FACILITY. WHERE ON-SITE ROADS INTERSECT PUBLIC ROADS, LOCKABLE GATES SHALL BE PROVIDED TO LIMIT ACCESS DURING NON-OPERATIONAL HOURS.
7. THE DEVICES TO CONTROL LITTER WILL INCLUDE, BUT NOT BE LIMITED TO, USE OF LITTER FENCES AND MANUAL LITTER PICKERS.
8. IN ADDITION TO USE OF FIRE EXTINGUISHERS AND EARTHMOVING EQUIPMENT, THE FIRE PROTECTION FACILITIES AT THE ADJACENT MATERIAL RECOVERY FACILITY SHALL BE AVAILABLE FOR FIRE PROTECTION AT THE LANDFILL AS SHOWN. THERE ARE TWO EXISTING FIRE HYDRANTS, ONE CONNECTED TO A 300,000 GALLON FIRE PROTECTION POND AND THE OTHER TO A 220 GALLON PER MINUTE INDUSTRIAL WELL.
9. UTILITY POLES AROUND THE AREAS TO BE LANDFILLED ARE SHOWN. THOSE ON THE EXISTING FILL AND THE SURROUNDING AREA ARE NECESSARY TO PROVIDE POWER TO THE EXISTING ACTIVE GAS COLLECTION SYSTEM AND LEACHATE PUMPING STATIONS. THESE WILL BE EXTENDED AS NECESSARY FOR NEW PUMPS AND GAS COLLECTION FACILITIES AS APPROPRIATE. THE FACILITY IS NOT SERVED BY A PUBLIC WATER SUPPLY OR NATURAL GAS PIPELINE.

BENCHMARK DESCRIPTIONS:

BM-1 GPS DISK MOUNTED ON ROD IN GROUND. GPS DISK ELEVATION 731.61

LEGEND

- EXISTING LANDFILL MONITOR WELL/POINT
- EXISTING WATER WELLS
- MONITOR WELLS INSTALLED DURING PREVIOUS STUDIES
- PIEZOMETERS INSTALLED DURING PREVIOUS STUDIES
- BORINGS INSTALLED DURING PREVIOUS STUDIES
- FIRE HYDRANT
- FENCE
- CURRENTLY PERMITTED WASTE BOUNDARY
- 100 YEAR FLOODPLAIN BOUNDARY
- TREE
- UTILITY POLE
- BENCHMARK

GRAPHIC SCALE

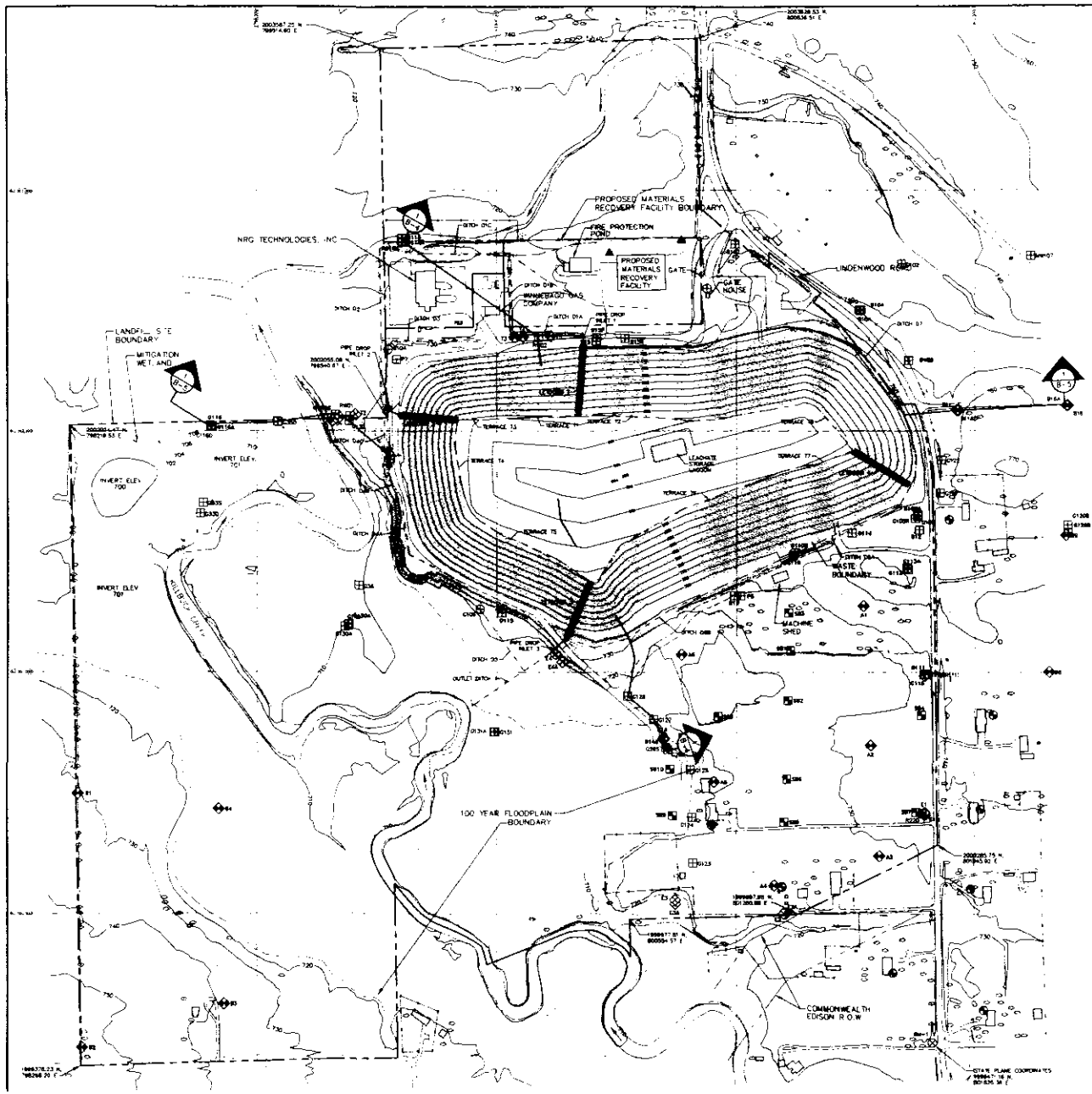
200 0 100 200 400 800

(IN FEET)
1 inch = 200 ft

ANDREWS ENVIRONMENTAL ENGINEERING, INC.
3535 Mayflower Drive
Lansing, Illinois 60438
(708) 895-7755

SITE PLAN MAP
APPLICATION FOR SUPPLEMENTAL INSTALLATION TO PERMIT 1-138
WINNEBAGO RECLAMATION SERVICE, INC.
PAGEL LANDFILL FACILITY
ROCKFORD, WINNEBAGO COUNTY, ILLINOIS

SHEET NUMBER
B3-2



NOTES:

1. THIS DRAWING IS INTENDED TO DEPICT THE FINAL SITE CONDITIONS UPON CLOSURE OF THE EXISTING UNIT IN THE YEAR 2007. SOME MINOR LANDFORMING AND GRADING ACTIVITIES THAT MAY BE REQUIRED ARE NOT DEPICTED IN THE CONTOURS.
2. ALL PERMANENT DRAINAGE STRUCTURES REQUIRED FOR CONTROL OF THE RUNOFF FROM THE UNCAPPED AREAS OF THE EXISTING UNIT ARE SHOWN IN ACCORDANCE WITH 35 IAC 812.113. ALL DITCHES AND TERRACES ARE DESIGNED TO BE VEGETATED CHANNELS. TERRACE DOWNDRAINS WILL BE LINED WITH RIPRAP. ADDITIONAL DETAILS ON DRAINAGE STRUCTURES ARE PROVIDED ON SHEET B-9.
3. PROPOSED MONITORING WELL LOCATIONS ARE DETAILED IN THE GROUNDWATER MONITORING PLAN PROVIDED BY GEOTRANS, INC. IN A SEPARATE DOCUMENT.
4. THE MITIGATION WETLAND DEPICTED CONFORMS TO THE WETLAND MITIGATION PLAN PREPARED BY ENCAP, INC. WITHIN THEIR DECEMBER 29, 1990 JOINT APPLICATION TO THE U.S. ARMY CORPS OF ENGINEERS IN COMPLIANCE WITH SECTION 404 OF THE CLEAN WATER ACT.
5. THE APPROXIMATE 100 YEAR FLOODPLAIN BOUNDARY SHOWN IS BASED UPON INFORMATION PROVIDED BY THE ILLINOIS STATE WATER SURVEY.
6. BENCHMARKS (VERTICAL CONTROL MONUMENTS) SHALL BE ESTABLISHED AND MAINTAINED BY A PROFESSIONAL LAND SURVEYOR.
7. THE INDIVIDUAL NORTHING EASTING POINTS ALONG THE SITE BOUNDARY ARE STATE PLANE COORDINATES.

BENCHMARK DESCRIPTIONS:

BM-1 CPS DISK MOUNTED ON ROD IN GROUND. CPS DISK ELEVATION 711.61

LEGEND

- EXISTING LANDFILL MONITOR WELL/POINT
- EXISTING WATER WELLS
- MONITOR WELLS INSTALLED DURING PREVIOUS STUDIES
- PIEZOMETERS INSTALLED DURING PREVIOUS STUDIES
- BORINGS INSTALLED DURING PREVIOUS STUDIES
- FIRE HYDRANT
- FENCE
- CURRENT PERMITTED FILL BOUNDARY
- 100 YEAR FLOODPLAIN BOUNDARY
- TREE
- UTILITY POLE
- BENCHMARK

GRAPHIC SCALE

200 0 100 200 400 600

IN FEET
1" = 200 ft

BY ANDREWS

ANDREWS ENVIRONMENTAL ENGINEERING, INC.
3535 Mayflower Blvd
Springfield, Illinois
(217) 378-7334

APPROVED BY: DRAWN BY: DESIGNED BY: LMJ DATE: 1-24-95

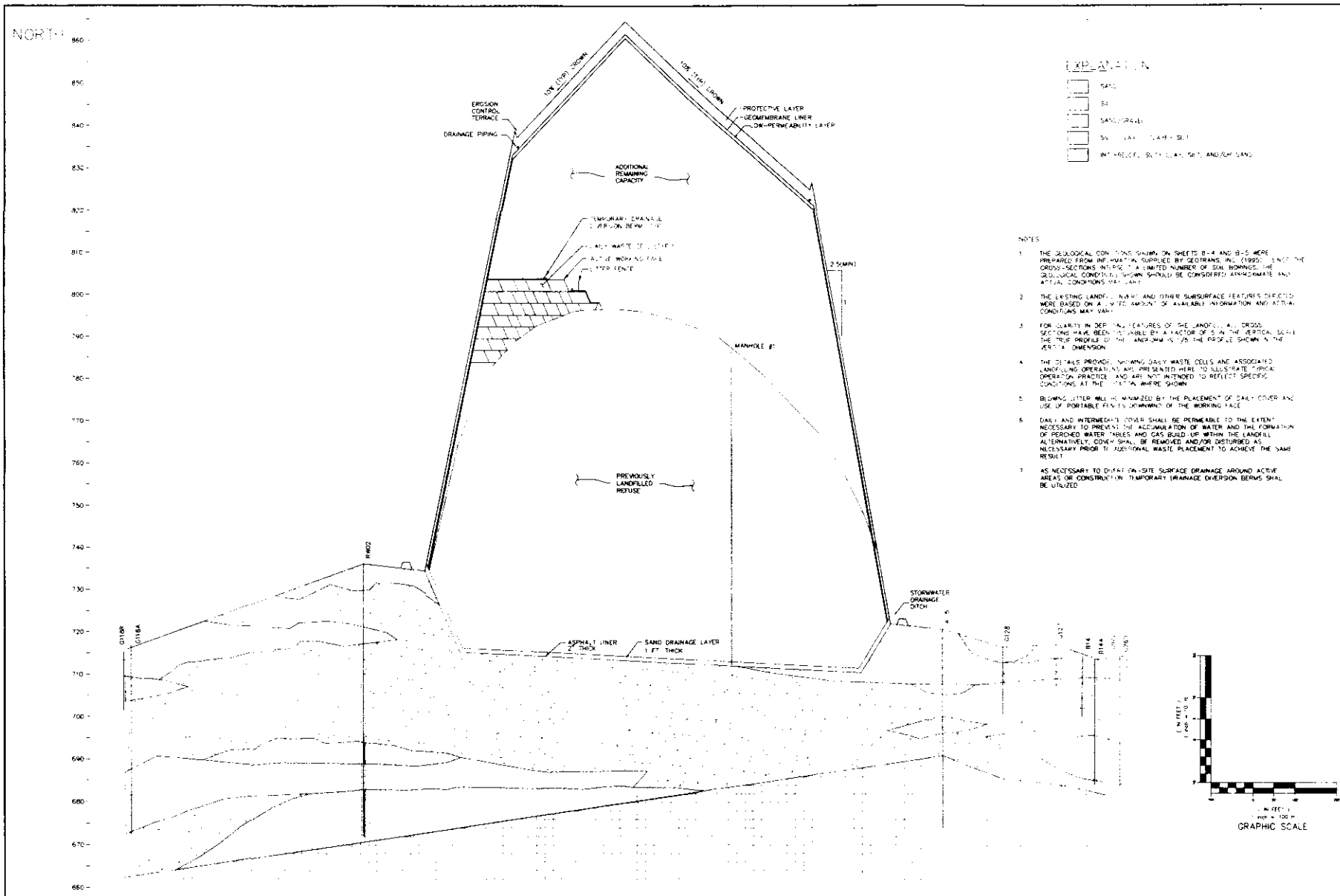
FINAL SITE CONDITIONS

APPLICATION FOR SIGNIFICANT MODIFICATION TO PERMIT FOR
WINNEBAGO RECLAMATION SERVICE, INC.
PAGELL LANDFILL FACILITY
HUTCHINSON, WINNEBAGO COUNTY, ILLINOIS

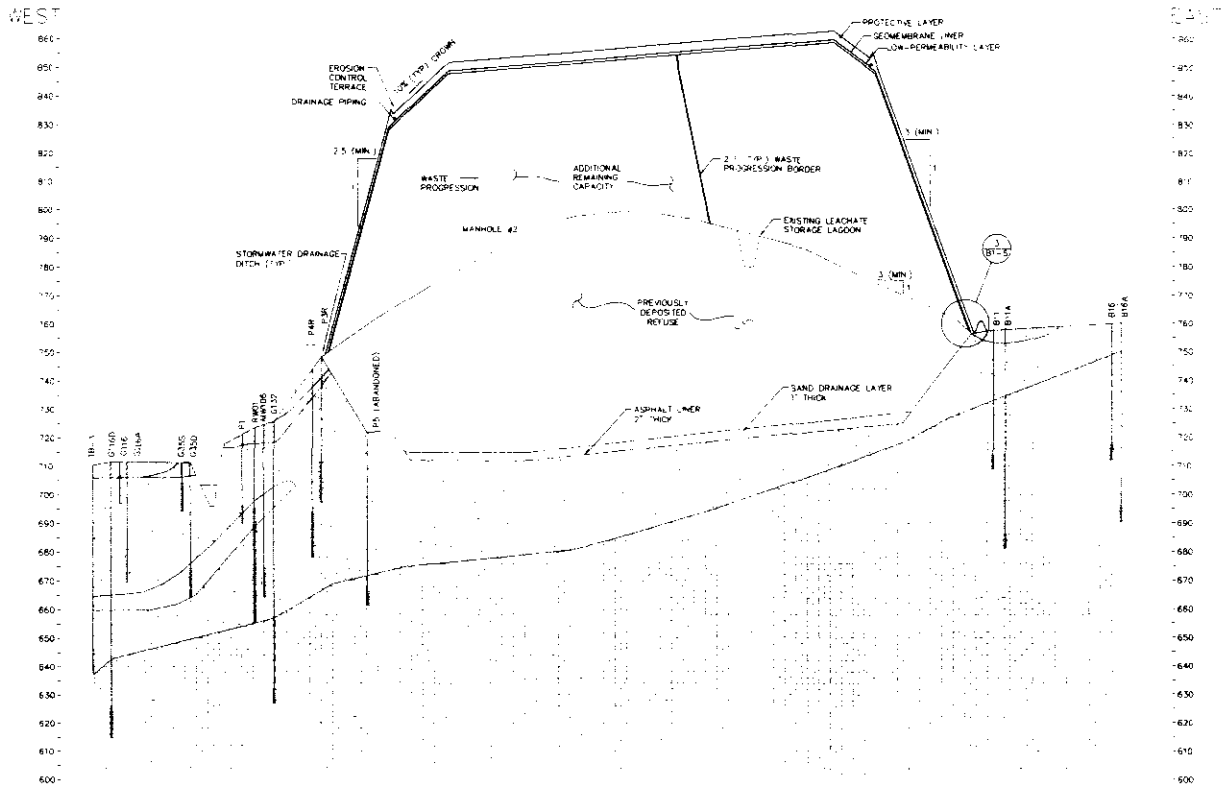
MAY 1994

SHEET NUMBER

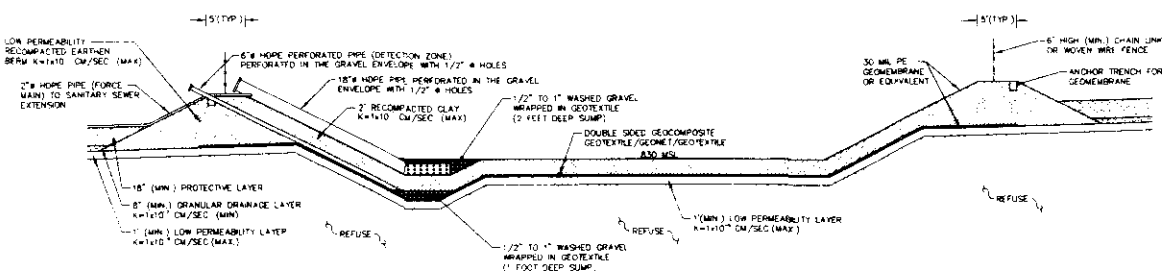
B3-3



1 EAST-WEST CROSS SECTION
B-4 SCALE AS SHOWN



1 EAST–WEST CROSS SECTION
B-5 SCALE: AS SHOWN



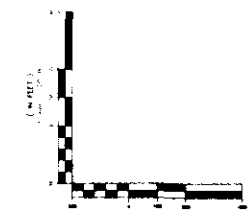
2 LEACHATE STORAGE LAGOON CROSS SECTION
B-5 NOT TO SCALE

EXPLANATION

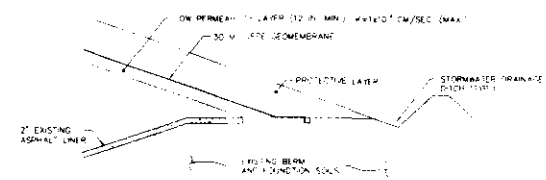
- SAND
- SILT
- SAND/GRAVEL
- CLAY (CLAYEY SILT)
- WEATHERED SILT, CLAY, SILT AND/OR SAND

NOTES:

1. THE GEOLOGIC CONDITIONS SHOWN ON SHEETS B-4 AND B-5 WERE PREPARED FROM INFORMATION SUPPLIED BY GEOTRANS, INC. (1995). SINCE THE CROSS SECTIONS INTERSECT A LIMITED NUMBER OF SOIL BORINGS, THE GEOLOGICAL CONDITIONS SHOWN SHOULD BE CONSIDERED APPROXIMATE AND ACTUAL CONDITIONS MAY VARY.
2. THE EXISTING LANDFILL INVERT AND OTHER SUBSURFACE FEATURES DEPICTED WERE BASED ON A LIMITED AMOUNT OF AVAILABLE INFORMATION AND ACTUAL CONDITIONS MAY VARY.
3. FOR CLARITY IN DEPICTING FEATURES OF THE LANDFILL, ALL CROSS SECTIONS HAVE BEEN COMPRESSED BY A FACTOR OF 5 IN THE VERTICAL SCALE. THE TRUE PROFILE OF THE LANDFORM IS 1/5 THE PROFILE SHOWN IN THE VERTICAL DIMENSION.



GRAPHIC SCALE



NOTES:
THIS FINAL COVER SYSTEM/LINER SYSTEM CONVERGENCE DETAIL IS PRESENTED TO ILLUSTRATE HOW THE FINAL COVER SYSTEM WILL TYPICALLY COVER/OVERLAY THE ENTIRE EXISTING LINER SYSTEM. THE FINAL COVER SYSTEM SHALL BE INSTALLED IN SUCH A MANNER TO PRESERVE THE INTEGRITY OF THE EXISTING ASPHALT LINER AND CORRESPONDING FOUNDATION SOILS. ADJUSTMENTS MAY BE MADE IN THE FIELD BY THE CONSTRUCTION QUALITY ASSURANCE OFFICER (CQAO) FOR CONDITIONS ENCOUNTERED THAT VARY FROM THE DETAIL. ANY ADJUSTMENTS SHALL BE REFLECTED IN THE "AS BUILT" DRAWINGS AND/OR CONSTRUCTION VERIFICATION DOCUMENTATION TO BE SUBMITTED TO THE IDNR, EPA AND/OR ANY OTHER GOVERNMENT AGENCY WITH AUTHORITY OVER THE FACILITY AND ITS CONSTRUCTION.

3 FINAL COVER SYSTEM/LINER CONVERGENCE DETAIL
B-5 SCALE: NONE

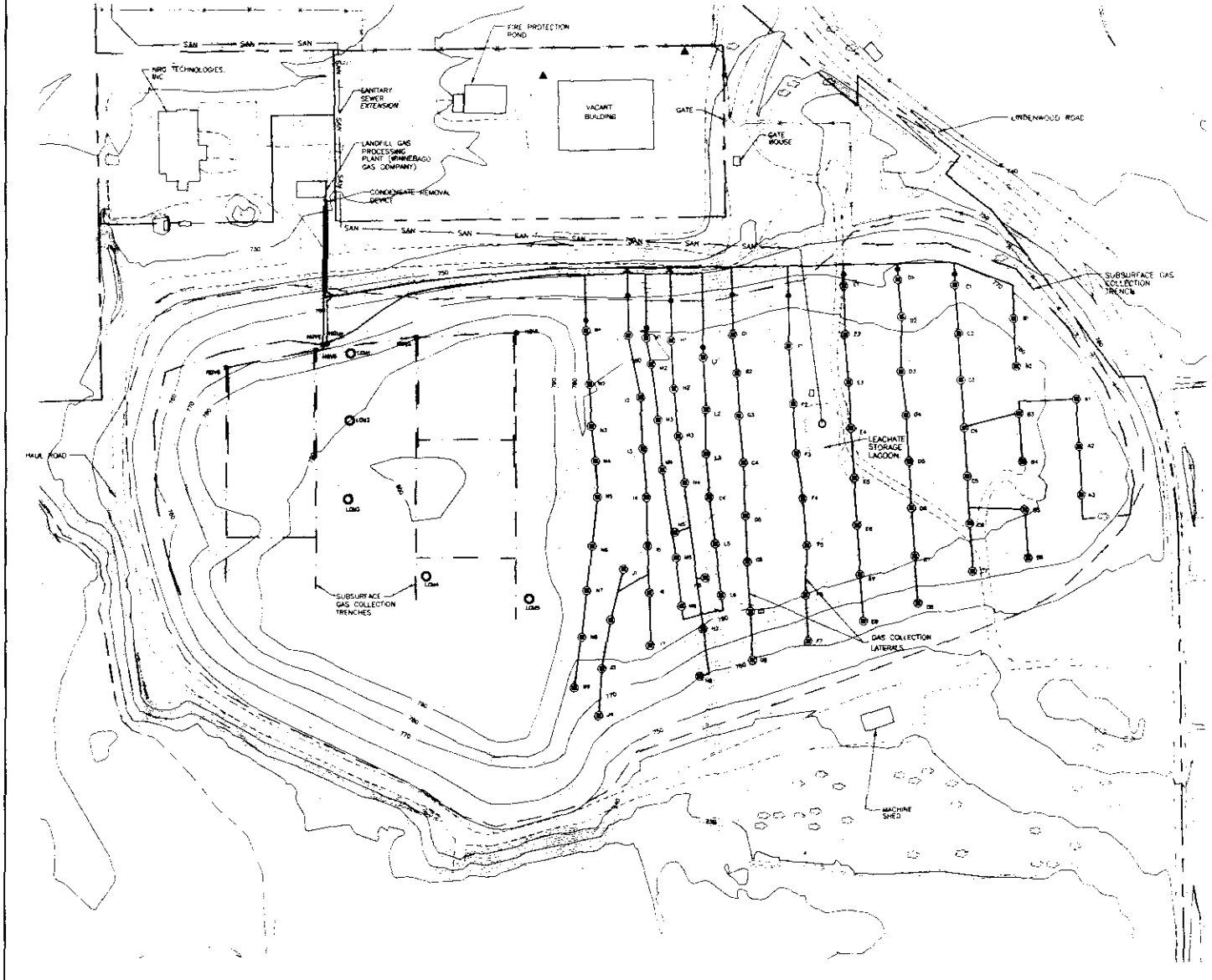
ANDREWS ENVIRONMENTAL ENGINEERING, INC.
3555 Mayflower Drive
Lincoln, Nebraska 68516
(402) 475-2449

PREPARED BY: DBR | DESIGNED BY: | DATE: | CHECKED BY: | APPROVED BY:

CROSS SECTION 2

RECONSTRUCTION FOR COMPLIANCE WITH SUBTITLE D OF RCRA FOR
WINNEBAGO RECLAMATION SERVICE, INC.
PAGEL LANDFILL FACILITY
ROCKFORD, WINNEBAGO COUNTY, ILLINOIS

B3-5



NOTES

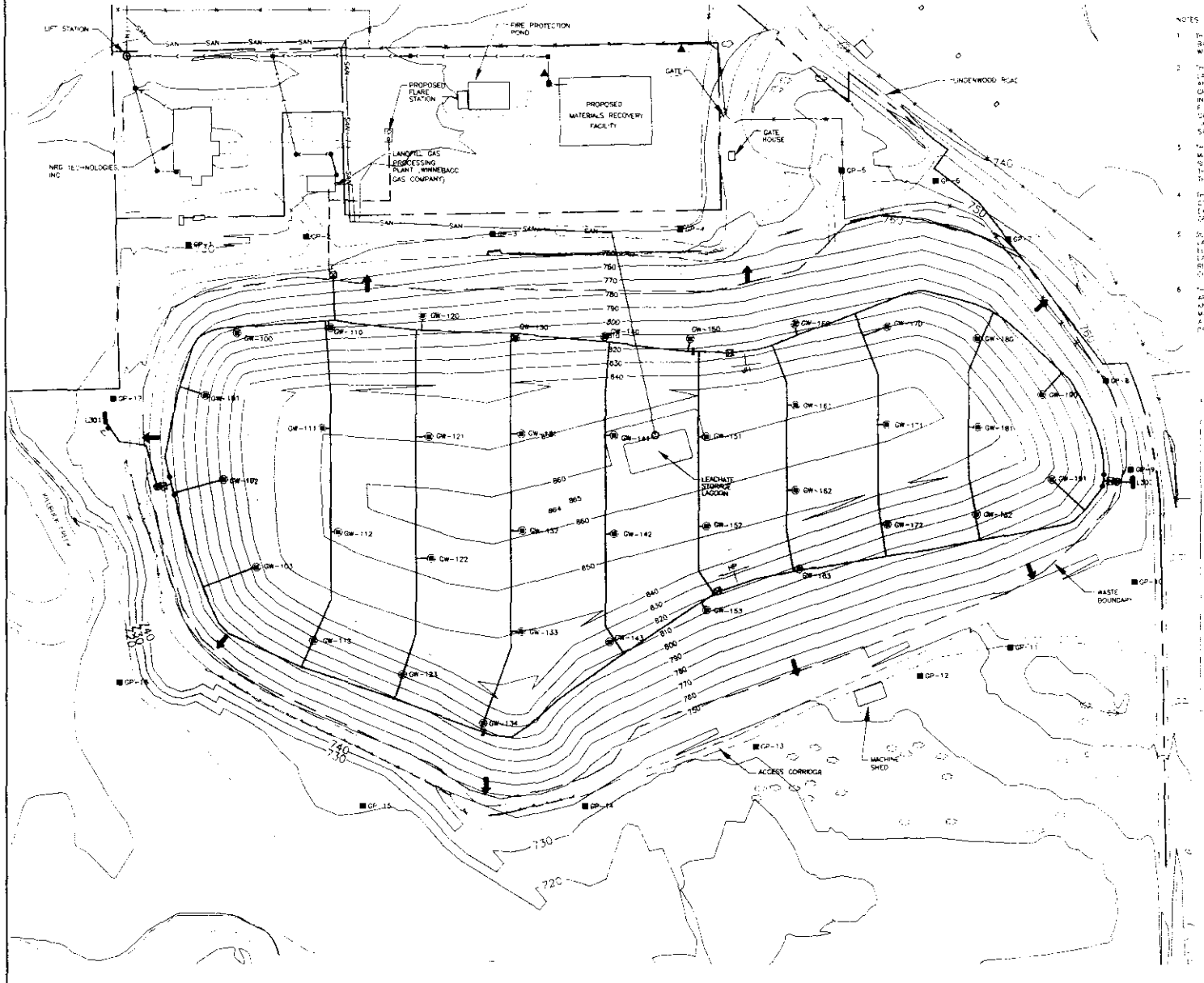
1. THIS DRAWING IS INTENDED TO DEPICT THE LAYOUT OF THE EXISTING GAS/LEACHATE COLLECTION SYSTEM AS OF JULY 1994. THE LOCATIONS OF ALL GAS COLLECTION LATERALS, MAINS, AND LEACHATE COLLECTION MANHOLES ARE APPROXIMATE.
2. BASE MAP WAS DEVELOPED FROM GEOMER-CHICAGO AERIAL SURVEY OF DES PLAINES, ILLINOIS, DATE OF PHOTOGRAPHY APRIL 26, 1990 SUPPLEMENTED JANUARY 1993 FIELD SURVEY.
3. SUBSURFACE GAS COLLECTION TRENCHES ARE CONSTRUCTED OF 8" N.P.V. PIPING INSTALLED IN A GRAVEL ENVELOPE WITHIN THE WASTE. FOR CLARITY, TRENCHES THAT ARE DIRECTLY ABOVE ANOTHER TRENCH HAVE BEEN SLIGHTLY OFFSET.
4. VERTICAL GAS/LEACHATE EXTRACTION WELLS ARE CONSTRUCTED OF 12" DIA. SDR-11 PIPE INSTALLED IN BOREHOLES BACKFILLED WITH GRAVEL. TWO 800 CFM COMPRESSORS ARE LOCATED IN THE LANDFILL GAS PROCESSING PLANT.
5. A 12" DRAINAGE LAYER EXISTS BENEATH THE ENTIRE UNIT IMMEDIATELY ABOVE THE ASPHALT LINER. A NETWORK OF COLLECTION PIPING WAS INSTALLED IN THE SAND DRAINAGE LAYER IN THE NORTHWEST PORTION OF THE UNIT. LEACHATE COLLECTION MANHOLES CONNECT TO THE PIPING NETWORK.
6. LEACHATE IS MANUALLY PUMPED FROM VERTICAL EXTRACTION WELLS AND LEACHATE COLLECTION MANHOLES ON A ROTATING BASIS. LEACHATE IS THEN TRANSFERRED TO THE LEACHATE STORAGE LAGOON OR DIRECTLY TO THE ROCK RIVER WATER RECLAMATION DISTRICT SEWER LINE.
7. ALL VERTICAL LEACHATE/GAS EXTRACTION WELLS WILL BE ABANDONED OR REMOVED UPON INSTALLATION OF THE PROPOSED GAS COLLECTION SYSTEM AS DETAILED ON SHEET B-7. THE SUBSURFACE GAS COLLECTION TRENCHES MAY BE OPERATED IN CONJUNCTION WITH THE PROPOSED SYSTEM.

REVISIONS
NO. DATE DESCRIPTION

ANDREWS ENVIRONMENTAL ENGINEERING, INC.
3533 MAGNUSON HILL DRIVE, SUITE 1
PERRYSBURG, OHIO 43551
(419) 874-7978
APPROVED BY: DRAWN BY: DATE: MAY 1994

EXISTING GAS/LEACHATE COLLECTION SYSTEM
WINNEBAGO RECLAMATION SERVICE, INC.
PAGEL LANDFILL FACILITY
WINNEBAGO COUNTY, ILLINOIS

B3-6



NOTES

1. THIS DRAWING IS INTENDED TO DEPICT GAS MIGRATION PATHWAYS ON THE BASIS OF DESIGN ELEMENTS, GEOLOGY AND HYDROLOGY IN ACCORDANCE WITH 35 IAC 812.309.
2. THE MOST PROBABLE PATHWAYS FOR GAS MIGRATION AWAY FROM THE LANDFILL ARE CONSIDERED TO BE VERTICALLY THROUGH THE LANDFILL COVER AND LATERALLY THROUGH THE SIDEWALLS DUE TO THE EXTENSIVE SAND AND GRAVEL LAYER BENEATH THE FACILITY, AND THE ABSENCE OF GROUNDWATER IN THE VICINITY OF THE ASPHALT LINER. THIS ASSUMES THAT THE POTENTIAL FOR LATERAL MIGRATION IS EQUAL IN ALL DIRECTIONS. THE MIGRATION IS DEPENDENT ON SEVERAL SOIL PROPERTIES INCLUDING BUT NOT LIMITED TO HYDRAULIC CONDUCTIVITY, GRAIN SIZE, DEGREE OF FRACTURING, SATURATION, AND TEMPERATURE.
3. THE FACILITY HAS BEEN DESIGNED TO REDUCE THE POTENTIAL FOR GAS MIGRATION. INSTALLATION OF THE LOW PERMEABILITY LINER WILL SIGNIFICANTLY REDUCE THE POTENTIAL FOR VERTICAL MIGRATION, AND THE PROPOSED ACTIVE GAS COLLECTION SYSTEM WILL SIGNIFICANTLY REDUCE THE POTENTIAL FOR LATERAL MIGRATION.
4. THIS DRAWING IS ALSO INTENDED TO DEPICT THE LAYOUT OF THE ACTIVE GAS COLLECTION SYSTEM, AND THE LOCATION OF FUTURE LEACHATE/GAS EXTRACTION WELLS. ADDITIONAL DETAILS ON INDIVIDUAL COMPONENTS OF EACH SYSTEM ARE DEPICTED ON SHEET B-7.
5. FUTURE LEACHATE/GAS EXTRACTION WELLS AROUND THE PERIMETER OF THE LANDFILL WILL BE INSTALLED WHEN THE LANDFILL DEPTH IS CLOSE TO FINAL ELEVATION. INTERIOR WELLS WILL BE INSTALLED UPON CLOSURE OF THE LANDFILL. AN EXISTING GAS COLLECTION SYSTEM (NOT SHOWN) WILL BE REMOVED OR ABANDONED UPON INSTALLATION OF THE PROPOSED COLLECTION SYSTEM.
6. THE LOCATIONS OF ALL GAS COLLECTION SYSTEM COMPONENTS AND APPROPRIATE MINOR COMPONENTS, INCLUDING VALVES, CONDENSATE KNOCKOUTS, ETC. ARE NOT SHOWN. CHANGES IN THE ACTUAL LAYOUT MAY BE MADE AS NECESSARY DURING INSTALLATION & APPROVED BY A REGISTERED PROFESSIONAL ENGINEER AND RECORDED IN THE AS-BUILT DRAWINGS.

LEGEND

- FUTURE LEACHATE/GAS EXTRACTION WELL
- LANDFILL GAS CONDENSATE KNOCKOUT
- BUTTERFLY VALVE
- SAMPLING RISER
- LEACHATE/CONDENSATE STORAGE TANK
- GAS COLLECTION SYSTEM PIPING
- SAN — SANITARY SEWER LINE
- GRAVITY DRAIN SEWER LINE
- HP — HIGH POINT
- GAS MONITORING PROBE
- GAS MIGRATION PATHWAY
- FIRE HYDRANT
- FENCE
- CURRENTLY PERMITTED WASTE BOUNDARY
- SITE BOUNDARY
- 100 YEAR FLOODPLAIN BOUNDARY
- GUARD RAIL
- TREE

GRAPHIC SCALE

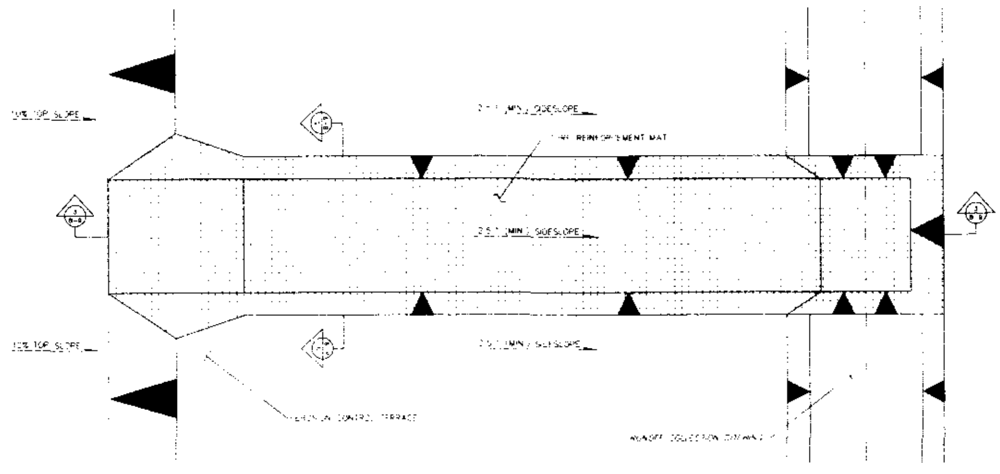
100 0 50 100 200 400

(IN FEET)
1 inch = 100 ft

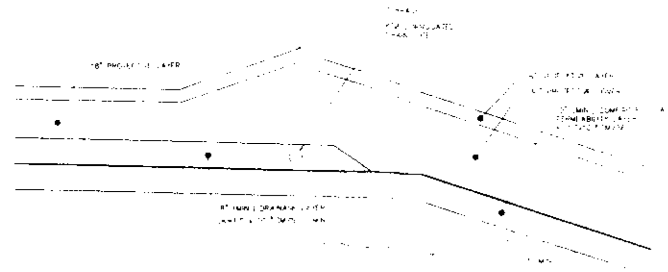
ANDREWS ENVIRONMENTAL ENGINEERING, INC.
2535 Mechanic Road, Springfield, Illinois
Tel (217) 544-7464 Fax (217) 544-7465

PROPOSED GAS/LEACHATE COLLECTION SYSTEM
SIGNIFICANT MODIFICATION TO PERMIT 1-108
WINNEBAGO RECLAMATION SERVICE, INC.
PAGE LANDFILL FACILITY
BOONE AND WINNEBAGO COUNTIES, ILLINOIS

B3-7



1 TERRACE OUTLET PLAN
B-9 NOT TO SCALE



2 FINAL COVER SYSTEM DETAIL
B-9 NOT TO SCALE

NOTES

4 STORMWATER DRAINAGE STRUCTURES
B-9 NOT TO SCALE

STRUCTURE						
DITCH	159.[illegible]	1.5[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
DITCH	[illegible]	1.70	[illegible]	[illegible]	[illegible]	[illegible]
DITCH	134.0	1.95	[illegible]	[illegible]	[illegible]	[illegible]
DITCH	72.8	2.5[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
DITCH	75.[illegible]	0.80	[illegible]	[illegible]	[illegible]	[illegible]
DITCH	[illegible]	1.30	[illegible]	[illegible]	[illegible]	[illegible]
DITCH	17.5	1.20	[illegible]	[illegible]	[illegible]	[illegible]
DITCH	29.3	1.10	[illegible]	[illegible]	[illegible]	[illegible]
DITCH	34.4	1.05	[illegible]	[illegible]	[illegible]	[illegible]
DITCH	64.5	1.05	[illegible]	[illegible]	[illegible]	[illegible]
DITCH	86.0	1.35	[illegible]	[illegible]	[illegible]	[illegible]
DITCH	3.8	1.10	[illegible]	[illegible]	[illegible]	[illegible]
DITCH	[illegible]	2.20	[illegible]	[illegible]	[illegible]	[illegible]
DITCH	98.[illegible]	1.25	[illegible]	[illegible]	[illegible]	[illegible]
TERRACE	15.0	1.30	[illegible]	[illegible]	[illegible]	[illegible]
TERRACE	27.6	1.85	[illegible]	[illegible]	[illegible]	[illegible]
TERRACE	3.6	0.60	[illegible]	[illegible]	[illegible]	[illegible]
TERRACE	9.9	1.20	[illegible]	[illegible]	[illegible]	[illegible]
TERRACE	20.8	1.60	[illegible]	[illegible]	[illegible]	[illegible]
TERRACE	12.5	1.6[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
TERRACE	5.8	1.10	[illegible]	[illegible]	[illegible]	[illegible]
TERRACE	2.6	1.6[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

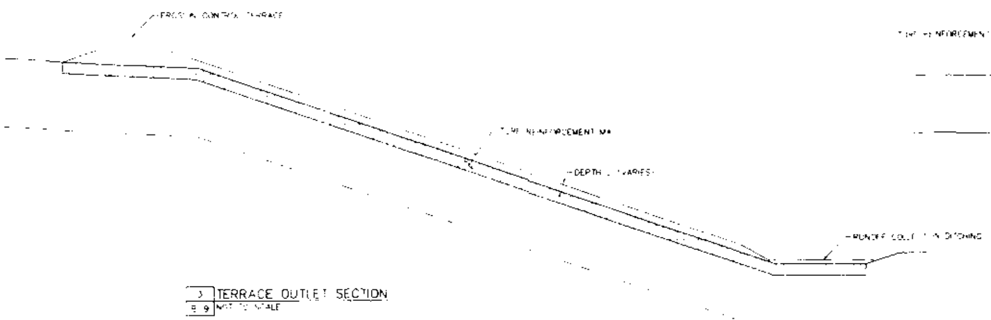
NOTES

1) AS DETERMINED BY AN ILLINOIS REGISTERED PROFESSIONAL ENGINEER, ANY DIMENSIONS AND GRADES MAY BE VARIED FROM THAT SHOWN IF THE DESIGN CAPACITY IS MAINTAINED AND EROSION WILL NOT RESULT.

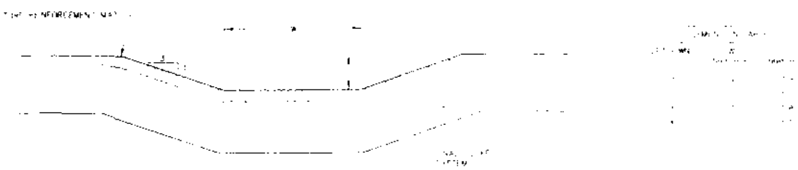
2) TERRACE OUTLETS MAY BE CONSTRUCTED BY PLACING ABOVE-GRADE BERMS ON THE FINAL COVER SYSTEM, PROVIDED THAT THE APPROPRIATE CHANNEL DIMENSIONS ARE MAINTAINED.

3) THE DESIGN CAPACITIES FOR ALL PERMANENT DRAINAGE STRUCTURES ARE BASED UPON THE 25-YEAR, 24-HOUR, STORM WITH THE SITE ACTIVE (DISTURBED AREAS PRESENT) OR THE 100-YEAR, 24-HOUR, STORM WITH THE SITE CLOSED (COMPLETELY VEGETATED) WHICHEVER YIELDED THE GREATER FLOW. TEMPORARY DITCHES WILL BE DESIGNED TO PASS THE 25-YEAR, 24-HOUR STORM RUNOFF.

4) ALL DITCHES AND TERRACES ARE DESIGNED TO BE VEGETATED CHANNELS. THE DITCHES AND TERRACES SHALL BE SEEDED AND/OR STABILIZED AS SOON AS PRACTICABLE AFTER CONSTRUCTION. TERRACE OUTLETS WILL BE LINED WITH A TURF REINFORCEMENT MAT.



3 TERRACE OUTLET SECTION
B-9 NOT TO SCALE

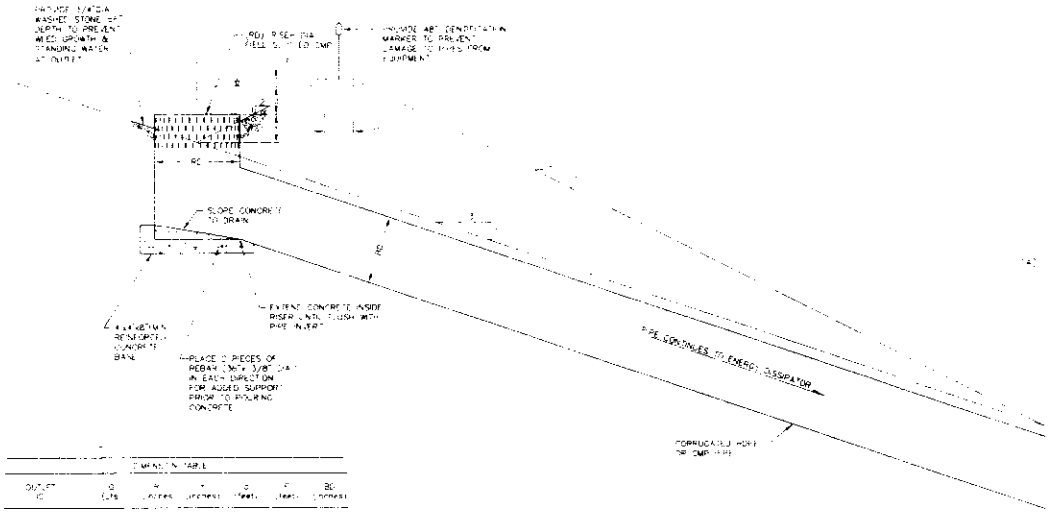


5 TERRACE OUTLET SECTION
B-9 NOT TO SCALE

ANDREWS ENVIRONMENTAL ENGINEERING

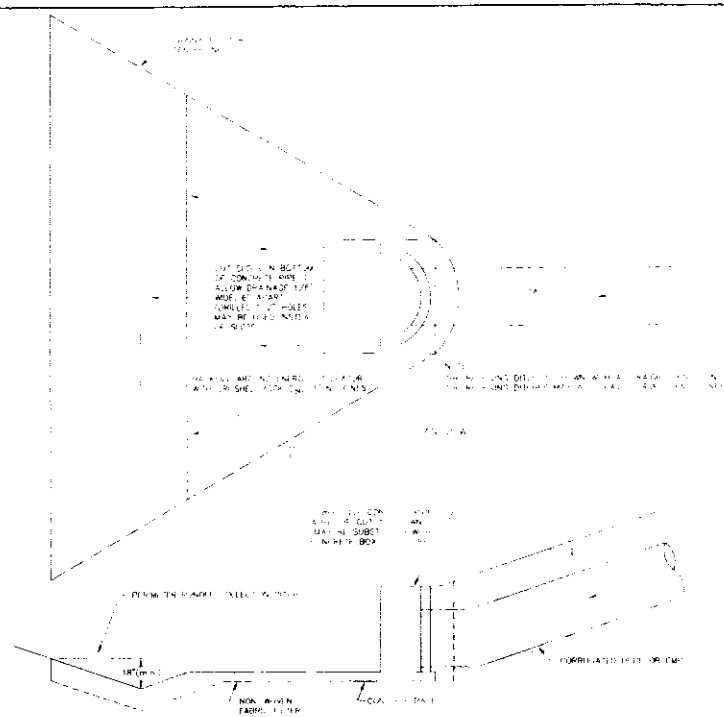
DRAINAGE DETAILS

B3-8

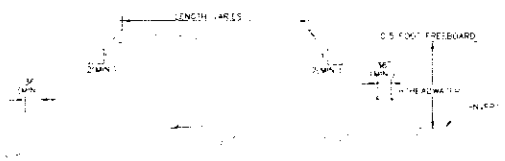


DIMENSION TABLE						
OUTLET ID	Q (cfs)	A (inches)	Y (inches)	S (feet)	F (feet)	BC (inches)
PD-1	116	60	12	1.8	0.25	48
PD-2	70	48	12	1.5	0.25	36
PD-3	70	48	12	1.5	0.25	36

PIPE DROP INLET LEIDOWN
B-10 NOT TO SCALE



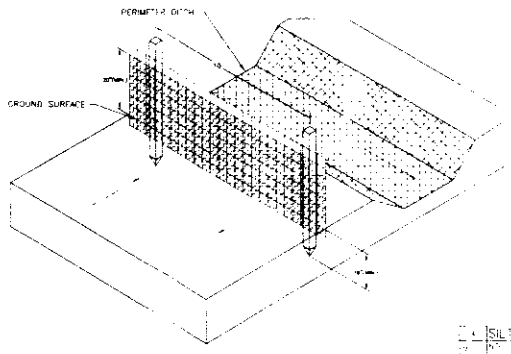
ENERGY DISSIPATOR
NOT TO SCALE



NOTES

1. CULVERTS WILL BE INSTALLED AS NECESSARY TO PROVIDE VEHICULAR ACCESS TO THE FACILITY.
2. MINIMUM SLOPE OF CULVERTS SHALL BE THE SAME AS THE DITCHES ON WHICH THEY ARE PLACED.
3. RIPRAP OR OTHER SUITABLE EROSION CONTROL MEASURES SHALL BE UTILIZED AROUND THE CULVERT'S INLET AND OUTLET AS NECESSARY TO PREVENT SCOURING.

CULVERT DETAIL
B-10 NOT TO SCALE



NOTES

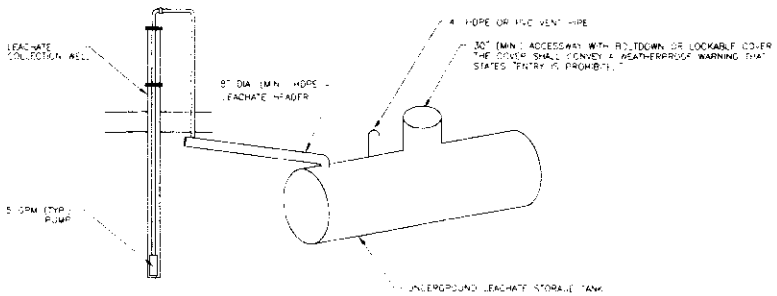
1. [illegible] FENCES WILL BE [illegible] AS REQUIRED [illegible] THE LANDFILL [illegible] OPERATION.
2. [illegible] WIRE [illegible] A MAXIMUM [illegible] MINIMUM 67 WIRE [illegible] AT WIRE TIES.
3. THE FABRIC CLOTH [illegible] BE PERMANENTLY SECURED TO THE WOVEN WIRE [illegible] WITH TIES [illegible] INCHES AT THE TOP AND MIDDLE.
4. WHEN THE SECTION [illegible] WOVEN WIRE WILL BE [illegible] DEPTH OF [illegible] INCHES.
5. MAINTENANCE WILL BE PERFORMED AS NEEDED AND MATERIAL [illegible] WHEN REQUIRED [illegible] OPERATOR.

SILT FENCE DETAIL
NOT TO SCALE

ANDREAS ENVIRONMENTAL ENGINEERING, INC.

DRAINAGE DETAILS
WINNEBAGO RECLAMATION SERVICE
FAGEL LANDFILL FACILITY

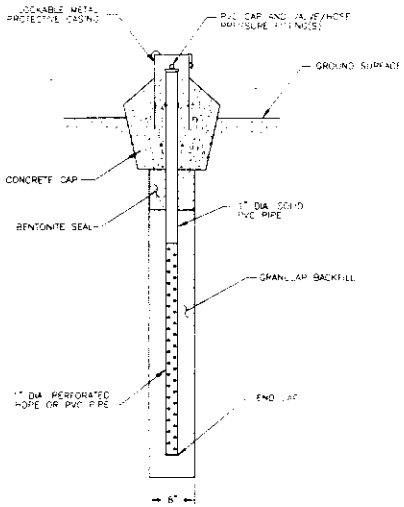
B3-9



1 LEACHATE TRANSFER/STORAGE SCHEMATIC
B3-10 NOT TO SCALE

NOTES:

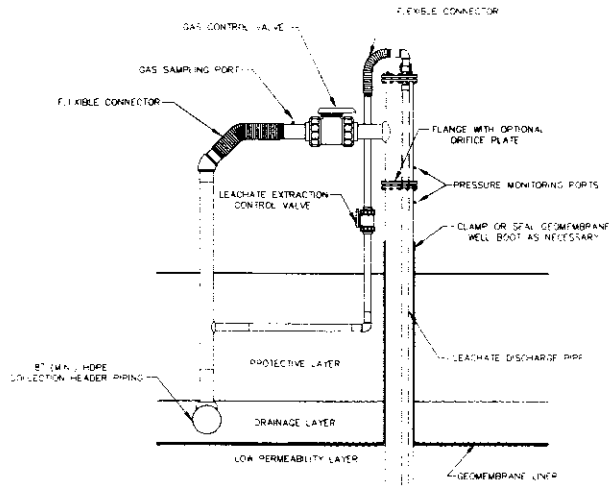
1. A SUBMERSIBLE PUMP OR EJECTOR WILL BE UTILIZED TO TRANSFER LEACHATE ACCUMULATIONS FROM THE LEACHATE COLLECTION WELL TO GRAVITY DRAINED LEACHATE HEADER PIPING. THE PUMP WILL BE LEVEL ACTUATED AND WILL HAVE A CAPACITY OF 5 GPM. THE PUMP DISCHARGE LINE WITHIN THE WELL MAY BE HOSING, TUBING, OR PVC PIPING AS NECESSARY TO FACILITATE EASY PUMP RETRIEVAL AND MAINTENANCE.
2. LEACHATE LATERALS WILL BE CONSTRUCTED OF 8" DIAMETER (MIN.) HDPE PIPING, PLACED BELOW GRADE WITH A SLOPE OF 1/4" (EQUAL TO 2%) TO FACILITATE GRAVITY DRAINAGE.
3. UNDERGROUND LEACHATE STORAGE TANKS WILL CONSIST OF 10,000 GALLON DOUBLE-WALLED FIBERGLASS OR STEEL TANKS, PLACED BENEATH THE LOW-PERMEABILITY LAYER. THE TANKS WILL BE EQUIPPED WITH A SENSOR OR OTHER DEVICE THAT WILL ALERT THE LANDFILL OPERATOR IF A LEAK BETWEEN THE INNER AND OUTER WALLS IS DETECTED.
4. EACH UNDERGROUND LEACHATE STORAGE TANK WILL BE EQUIPPED WITH A LOCAL PUMP. LEACHATE WILL BE TRUCKED AND/OR PUMPED FROM THE UNDERGROUND STORAGE TANKS TO A LEACHATE STORAGE LAGOON THE LAGOON TO OTHER TREATMENT FACILITIES.
5. ADDITIONAL LEACHATE STORAGE CAPACITY WILL BE PROVIDED ON SITE BY A LEACHATE STORAGE LAGOON. DETAILS CONCERNING THE LAGOON ARE PROVIDED ON SHEET B-4.
7. THE CONTENTS OF THE LEACHATE STORAGE LAGOON WILL BE TRANSFERRED BY TANK TRUCK OR DIRECT PUMPAGE TO THE SANITARY SEWER LINE OF THE ROCK RIVER WATER RECLAMATION DISTRICT.
8. A DETAILED MAP DEPICTING THE LOCATION OF ALL LEACHATE/GAS COLLECTION WELLS, TRANSFER PIPING, AND STORAGE FACILITIES IS INCLUDED ON SHEET B-[illegible]



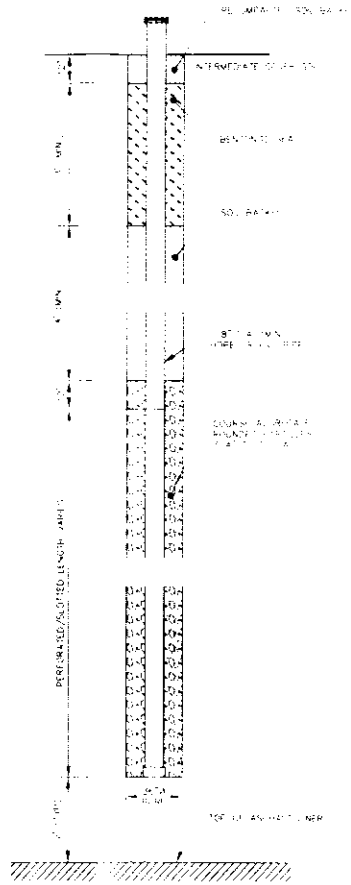
NOTES:

1. GAS MONITORING PROBES LOCATED OUTSIDE THE WASTE BOUNDARY WILL HAVE A BENTONITE SEAL DIRECTLY BELOW THE CONCRETE CAP. THE MONITORING ZONE WILL EXTEND FROM THE BASE OF THE SEAL TO THE LOWEST ELEVATION OF THE LINER SYSTEM OR TO THE TOP ELEVATION OF THE GROUNDWATER, WHICHEVER IS HIGHER.
2. THE GRANULAR BACKFILL WILL BE A COARSE AGGREGATE WITH D10 > 3/4 IN. AND D80 < 1.0 IN. TO A LEVEL AT LEAST 1 FT. ABOVE THE PERFORATED SECTION.
3. PERFORATIONS SHALL BE EVERY 90° WITH 1/2 IN. HOLES, SPACED ON CENTER AT 6 IN. VERTICAL INTERVALS.

2 GAS MONITORING PROBE
B3-10 NOT TO SCALE



3 LEACHATE/GAS EXTRACTION WELLHEAD
B3-10 NOT TO SCALE



4 LEACHATE/GAS EXTRACTION WELL
B3-10 NOT TO SCALE

NOTES:

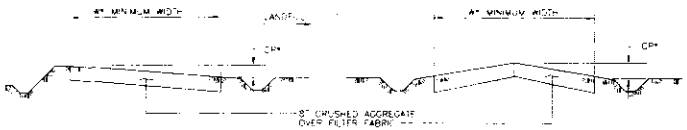
1. LEACHATE/GAS COLLECTION WELLS WILL BE CONSTRUCTED [illegible] PVC OR HDPE PIPE. PERFORATIONS WILL BE FACING 90° [illegible] SPACED ON CENTER AT 6 IN. VERTICAL INTERVALS. SLOTS WILL BE 1/4 IN. WIDE, 6 IN. TO 8 IN. LONG, 12 IN. TO 24 IN. FROM CENTER TO CENTER, AND WILL BE STAGGERED AND ALTERNATED AT 6 IN.
2. LEACHATE/GAS COLLECTION HEADERS WILL BE CONTROL [illegible] (MIN.) PVC OR HDPE PIPE AND WILL BE BURIED TO PREVENT FREEZING AND TO ALLOW VEHICULAR ACCESS TO THE LANDFILL.

ANDREWS ENVIRONMENTAL ENGINEERING, INC.

GAS/LEACHATE COLLECTION DETAILS

WINNEBAGO RECLAMATION SERVICE
DAGET LANDFILL FACILITY

SHEET NUMBER
B3-10



* REGULARLY TRAVELED ROADS WITH 2-WAY TRAFFIC: W=20' CP=6" CH=3"

* INFREQUENTLY TRAVELED ROADS WHERE 2-WAY TRAFFIC WILL NOT OCCUR: W=12' CP=4" CH=2"

PERIMETER LOCATION **INTERIOR LOCATION**

NOTES:

1. ROADWAYS SHALL NOT BE CONSTRUCTED AT GRADES STEEPER THAN 8% UNLESS THE LENGTH IS SHORT (<200 FT) OR OTHERWISE APPROVED BY AN ILKNAS REGISTERED PROFESSIONAL ENGINEER.
2. WHERE SIDE WALLS ARE ON EMBANKMENTS AND/OR ADJACENT TO SIDESLOPES STEEPER THAN 3:1 AND EXCEEDING 5 FEET IN DEPTH GUARDRAIL OR OTHER SUITABLE SAFETY BARRIERS SHALL BE PROVIDED AS APPROPRIATE.

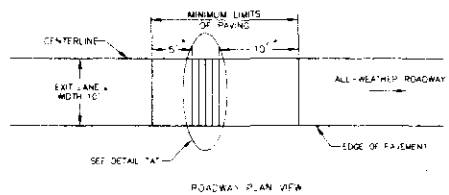
1 ALL WEATHER ROADWAY DETAIL

B3-11 NOT TO SCALE

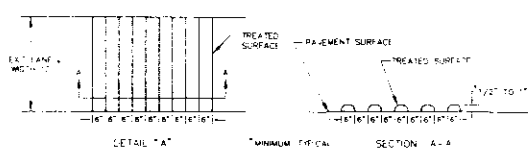
NOTES:

1. THE SURFACE TO BE TREATED SHALL BE THOROUGHLY CLEANED WITH BROOMS AND AN INDUSTRIAL TYPE DETERGENT MIXED WITH WATER.
2. AFTER THE SURFACE HAS BEEN CLEANED AND DRIED, A TWO COMPONENT EPOXY SHALL BE PLACED ON THE SURFACE TO BE TREATED AND BUILT-UP.
3. AGGREGATE SHALL BE PLACED ON TOP OF THE EPOXY BEDS AND SUFFICIENT AGGREGATE/EPOXY USED TO BUILD UP THE TREATED SURFACE TO THE HEIGHT SHOWN.
4. THE EPOXY SHALL MEET THE REQUIREMENTS OF ASTM C 881 TYPE IV, GRADE 2, CLASS B TEMPERATURE RANGE AND SHALL NOT BE APPLIED UNLESS AIR TEMPERATURE IS AT LEAST 50 F.
5. THE AGGREGATE USED SHALL BE A 1/4" - 1/2" DIAMETER ROCK AND SHALL BE SURFACE DRY (NO FREE MOISTURE). IT SHALL BE GRADED AS FOLLOWS:

% PASSING	SIEVE SIZE
95 - 100	1/2"
25 - 80	3/8"
0 - 5	#8



ROADWAY PLAN VIEW



DETAIL "A" *MINIMUM TYPICAL SECTION A-A

2 RUMBLE STRIP DETAIL

B3-11 NOT TO SCALE

ROADWAY DETAILS

WAKEFIELD REGIONAL DISPOSAL
PARCEL LANDFILL FACILITY

ANDREWS ENVIRONMENTAL ENGINEERING, INC.

B3-11

ATTACHMENT 4

Wild and Scenic Rivers Act Determination

In accordance with 35 IAC 811.102(a), a Wild and Scenic Rivers Act Determination was made in conjunction with the expansion permit application, submitted on April 5, 1991. Since the existing unit was considered part of the facility in that Application, the Wild and Scenic Rivers Act Determination is applicable to the existing unit as detailed in the Application submitted herewith. Documentation of the Wild and Scenic Rivers Act Determination follows.

ANDREWS ENVIRONMENTAL ENGINEERING INC. 3535 Mayflower Blvd., Springfield, Illinois 62707/(217) 787-2334

October 29, 1990

Jim Hart
Department of Conservation
524 South Second Street, Room 310
Springfield, Illinois 62701-1787

re: Wild and Scenic Rivers Act Determination

Dear Mr. Hart:

Enclosed is a portion of the U.S.G.S Rockford South Quadrangle Map showing a proposed sanitary landfill expansion and soils borrow area. The site is located in part of the East 1/2 of Section 36, T. 43 N., R. 1 E. and the West 1/2 of Section 31, T. 43 N., R. 2 E., 3 p.m., all in Winnebago County, Illinois.

Please comment on the proposed use of this site as it pertains to compliance with the requirements under the Wild and Scenic Rivers Act, (16 U.S.C. 1271 et seq.)

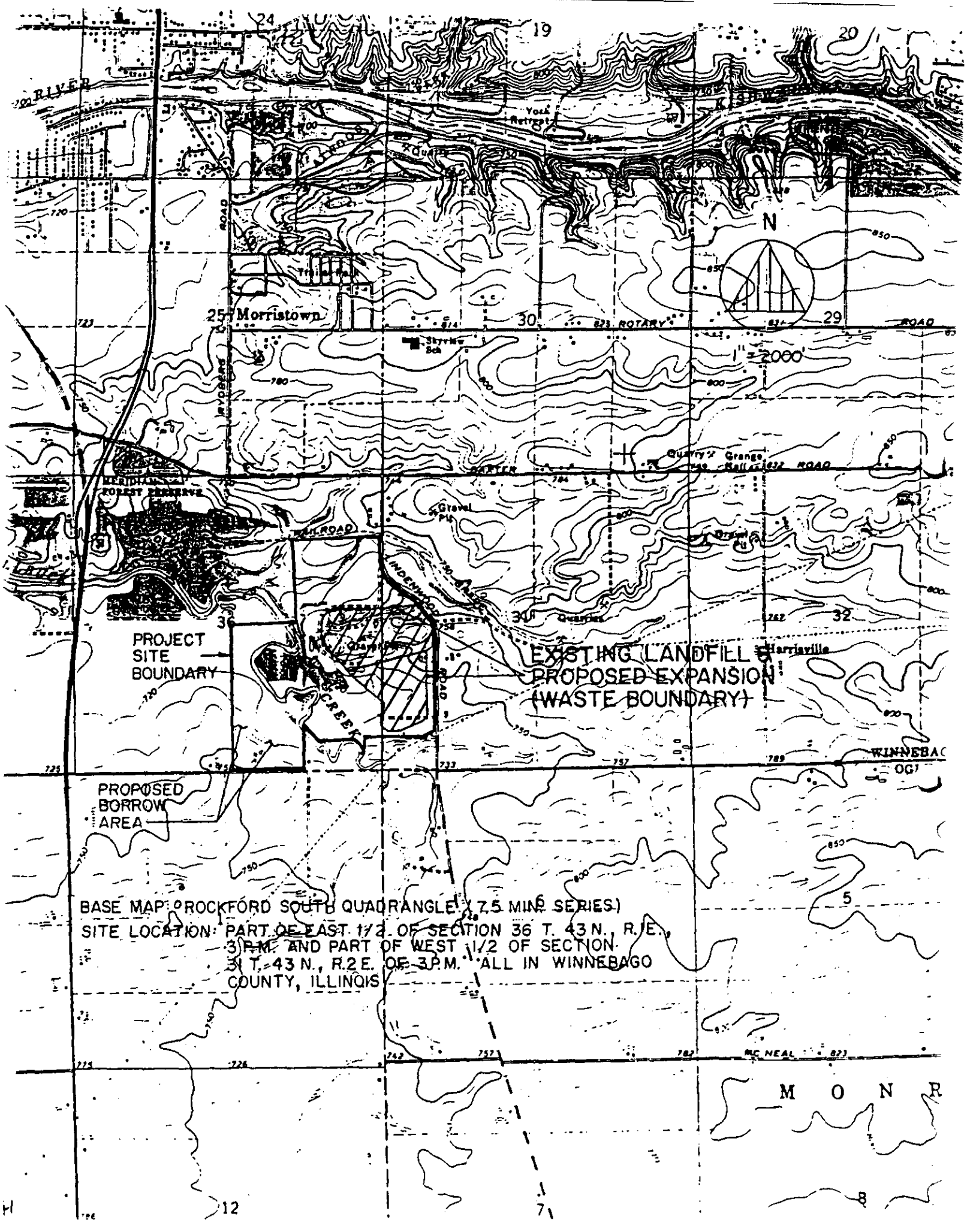
If you have any questions or require further information, please contact me. Thank you.

Sincerely,

Daniel R Feezor

Daniel R. Feezor,
Environmental Scientist I

DRF:jln
enclosure
cc: Winnebago Reclamation Service, Inc.


PROJECT SITE BOUNDARY
EXISTING LANDFILL & PROPOSED EXPANSION (WASTE BOUNDARY)
PROPOSED BORROW AREA
Morristown
Harrisville
MERIDIAN FOREST PRESERVE
ROTARY ROAD
RIVER ROAD
RAILROAD
LINDENWOOD ROAD
CREEK
MC NEAL
1" = 2000'
N
BASE MAP: ROCKFORD SOUTH QUADRANGLE (7.5 MIN. SERIES)
SITE LOCATION: PART OF EAST 1/2 OF SECTION 36 T. 43 N., R. 1 E., 3 P.M. AND PART OF WEST 1/2 OF SECTION 31 T. 43 N., R. 2 E. OF 3 P.M. ALL IN WINNEBAGO COUNTY, ILLINOIS

Illinois Department of Conservation
life and land together

LINCOLN TOWER PLAZA • 524 SOUTH SECOND STREET • SPRINGFIELD 62701-1787
CHICAGO OFFICE • ROOM 4-300 • 100 WEST RANDOLPH 60601
MARK FRECH, DIRECTOR - KATHY SELCKE, ASSISTANT DIRECTOR

April 3, 1991

Daniel R. Feezor
Andrews Environmental Engineering, Inc.
3535 Mayflower Bldg.
Springfield, Illinois 62707

Dear Mr. Feezor:

At your request this office has reviewed the proposed sanitary landfill expansion and soil borrow areas at the site located in part of the east ½ of Section 36, T43N, R1E and the west ½ of Section 31, T43N, R2E, 3PM, in Winnebago County as to compliance with the Wild and Scenic Rivers Act.

Kilbuck Creek, in Winnebago County, was not listed among the Streams denoted for immediate or of study quality for Wild and Scenic Status, however, it was listed in the nationwide Rivers Inventory as a Phase II Inventory River of Recreation Importance. The attribute highlighted was the fishing opportunities present. Because it is listed as a potential candidate for inclusion in the National Wild and Scenic River System it is required by law to be given special consideration by federal agencies as part of their planning and environmental review process.

Immediate action by any federal agency to mitigate any potential impacts, to the listed section of stream, by projects which they may be associated with is required.

Sincerely,

James G. Hart
Water Resource Planner
Division of Planning

JGH:mip

ATTACHMENT 5

Floodway Determination

In accordance with 35 IAC 811.102(b), a 100-Year Floodplain Determination was made in conjunction with the expansion permit application, submitted on April 5, 1991. Since the existing unit was considered part of the facility in that Application, the 100-Year Floodplain Determination is applicable to the existing unit as detailed in the Application submitted herewith. Documentation of the 100-Year Floodplain Determination follows.

Illinois Department of Transportation
Division of Water Resources
2300 South Dirksen Parkway/Springfield, Illinois/62764

December 6, 1990

SUBJECT: Winnebago Reclamation Service, Inc.
Pagel's Landfill
Proposed Expansion
Kilbuck Creek
Winnebago County

Mr. Daniel R. Feezor
Andrews Environmental Engineering, Inc.
3535 Mayflower Boulevard
Springfield, Illinois 62707

Dear Mr. Feezor:

Thank you for your November 29, 1990 letter regarding the proposed construction of the subject project.

The Illinois Department of Transportation, Division of Water Resources exercises jurisdiction over construction activities in the floodway of Kilbuck Creek. From the location map you enclosed, it appears that your fill site while in the floodplain, and therefore subject to flood risk, is outside of the floodway. We have enclosed a copy of the flood boundary and floodway map for your proposed site. As long as your construction is entirely in the flood fringe (shaded area) and outside the floodway (white area bounded by dashed lines), no permit will be required by this office.

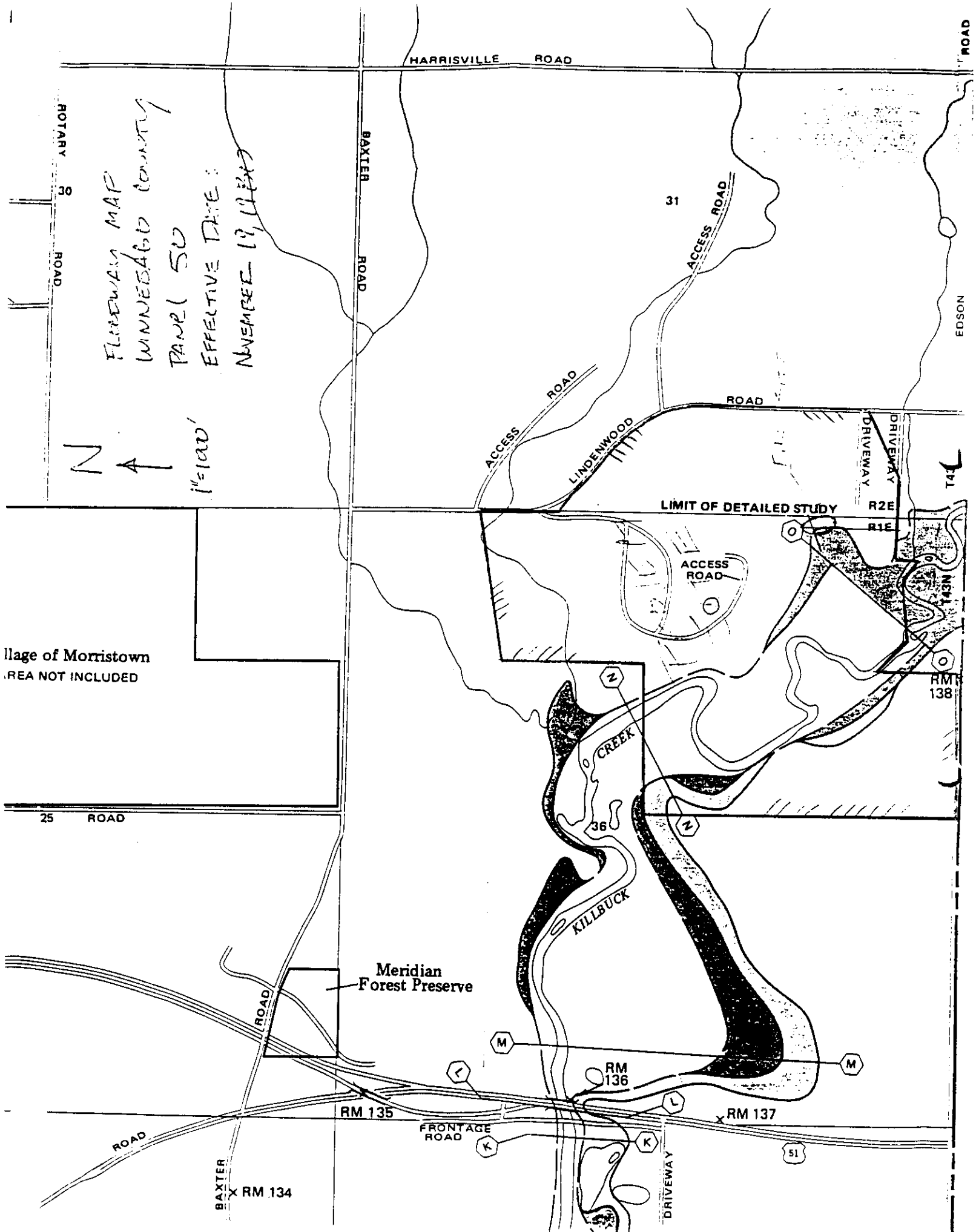
This is not to be construed as a release from any other federal, state or local laws or regulations. We recommend that you contact the Winnebago County Zoning Department to ascertain local floodplain construction reguirements.

If you have any questions, please contact Dennis Luebbe of my staff at 217/782-3862.

Sincerely,

Dennis L. Kennedy, P.E., Head
Technical Analysis and Permit Unit

DLK:DML:lmt
cc: Winnebago County Zoning Department (Richard Mohaupt)
Rock Island District Corps of Engineers
Illinois Environmental Protection Agency


HARRISVILLE ROAD
ROTARY ROAD
30
BAXTER ROAD
31
ACCESS ROAD
EDSON
ACCESS ROAD
LINDENWOOD
ROAD
DRIVEWAY
DRIVEWAY
T41
LIMIT OF DETAILED STUDY
R2E
R1E
ACCESS ROAD
T43N
llage of Morristown
REA NOT INCLUDED
RM 138
CREEK
25 ROAD
36
KILLBUCK
Meridian Forest Preserve
ROAD
RM 136
RM 135
RM 137
FRONTAGE ROAD
ROAD
51
BAXTER
RM 134
DRIVEWAY

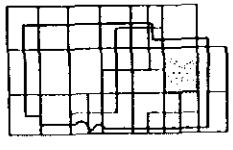
NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

OGLE COUNTY, ILLINOIS
(UNINCORPORATED AREAS)

PANEL 300 OF 500
(SEE MAP INDEX FOR PANELS NOT PRINTED)

PANEL LOCATION

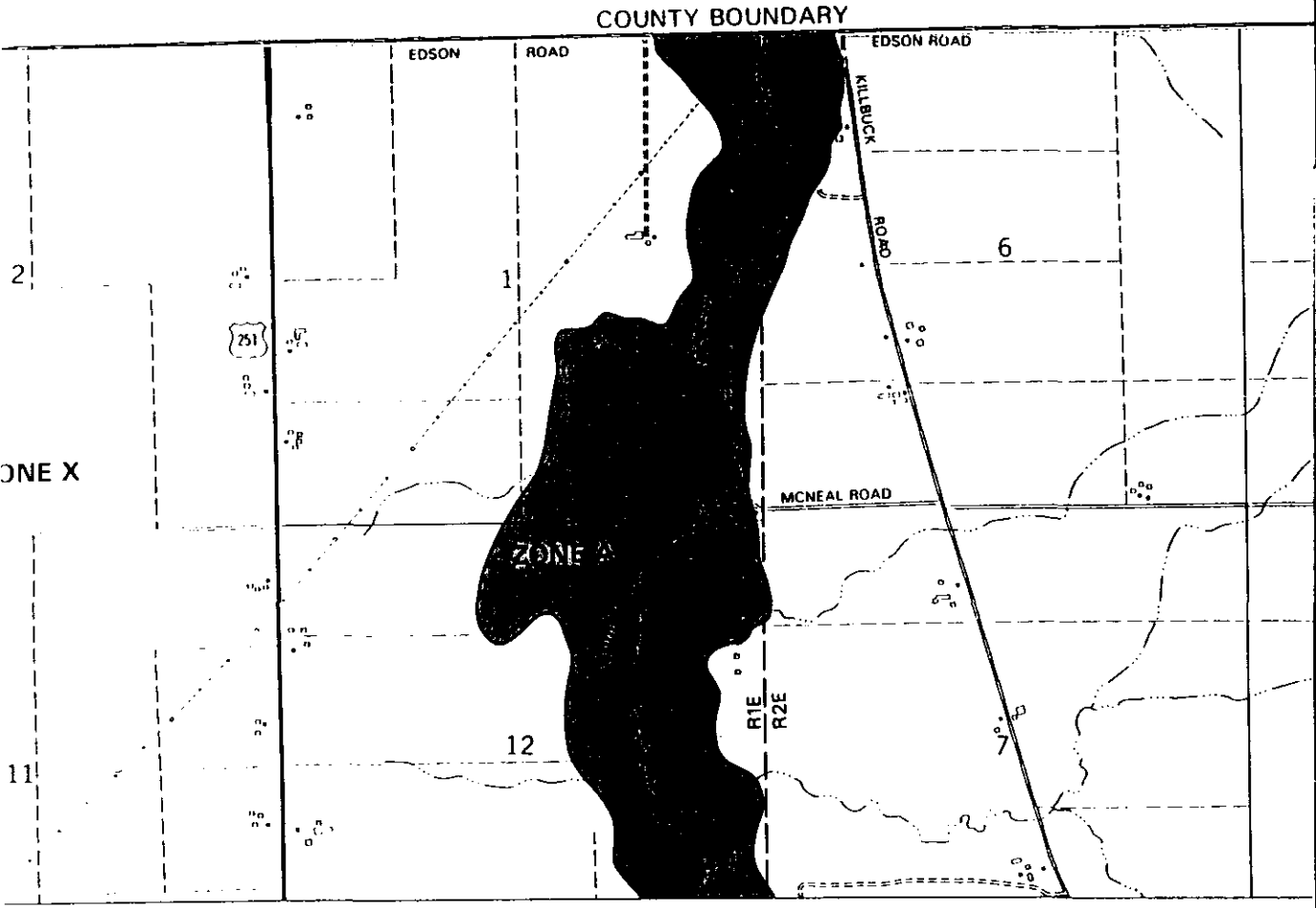


COMMUNITY-PANEL NUMBER
170525 0300 A

EFFECTIVE DATE:
APRIL 5, 1988

Federal Emergency Management Agency

Trim Post 2/12/90



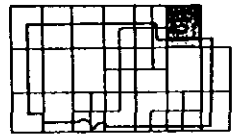
NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

OGLE COUNTY, ILLINOIS
(UNINCORPORATED AREAS)

PANEL 150 OF 500
(SEE MAP INDEX FOR PANELS NOT PRINTED)

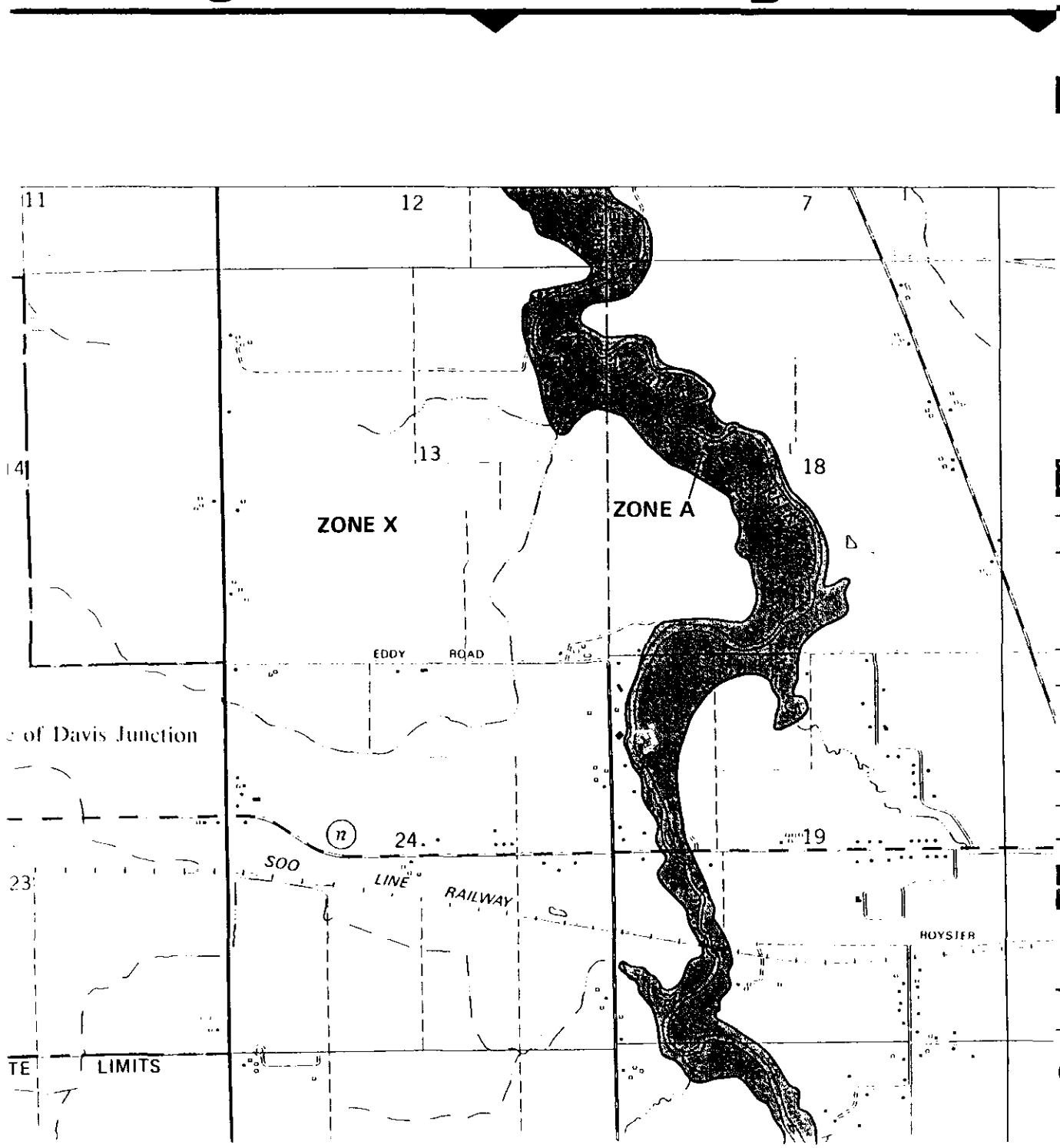
PANEL LOCATION



COMMUNITY-PANEL NUMBER
170525 0150 A

EFFECTIVE DATE:
APRIL 5, 1988

Federal Emergency Management Agency



LEGEND

SPECIAL FLOOD HAZARD AREAS INUNDATED BY 100-YEAR FLOOD

ZONE A	No base flood elevations determined.
ZONE AE	Base flood elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); base flood elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE A99	To be protected from 100-year flood by Federal flood protection system under construction; no base elevations determined.
ZONE V	Coastal flood with velocity hazard (wave action); no base flood elevations determined.
ZONE VE	Coastal flood with velocity hazard (wave action); base flood elevations determined.

FLOODWAY AREAS IN ZONE AE

OTHER FLOOD AREAS

ZONE X	Areas of 500-year flood; areas of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 100-year flood.

OTHER AREAS

ZONE X	Areas determined to be outside 500-year flood plain.
ZONE D	Areas in which flood hazards are undetermined.

Flood Boundary

Floodway Boundary

Zone D Boundary

Boundary Dividing Special Flood Hazard Zones, and Boundary Dividing Areas of Different Coastal Base Flood Elevations Within Special Flood Hazard Zones.

~513~ Base Flood Elevation Line; Elevation in Feet*

(D) Cross Section Line

(EL 987) Base Flood Elevation in Feet Where Uniform Within Zone*

RM7X Elevation Reference Mark

Illinois State Water Survey

Telephone (217) 333-9545
Surface Water Section
2204 Griffith Drive
Champaign, Illinois 61820-7495

June 8, 1990

Mr. Andy Rathsack
Andrews Environmental Engineering Inc.
3535 Mayflower Blvd
Springfield, Illinois 62707

Dear Mr. Rathsack:

I have received and examined the topographic site map you supplied subsequent to your request of May 29 for floodplain delineation on a proposed landfill site near Killbuck Creek in unincorporated Winnebago County, Illinois. As you originally requested, I herewith furnish base (100-year) flood elevations or approximations for points A-E as shown on your site map:

Point	BFE
A	712.6 ft NGVD
B	715.4 ft NGVD
C	716.5 ft NGVD
D	717.2 ft NGVD
E	717.8 ft NGVD

It thus appears from your topographic mapping of the area that your site is clear of the 100-year floodplain throughout. Please call me if you have any questions about this determination.

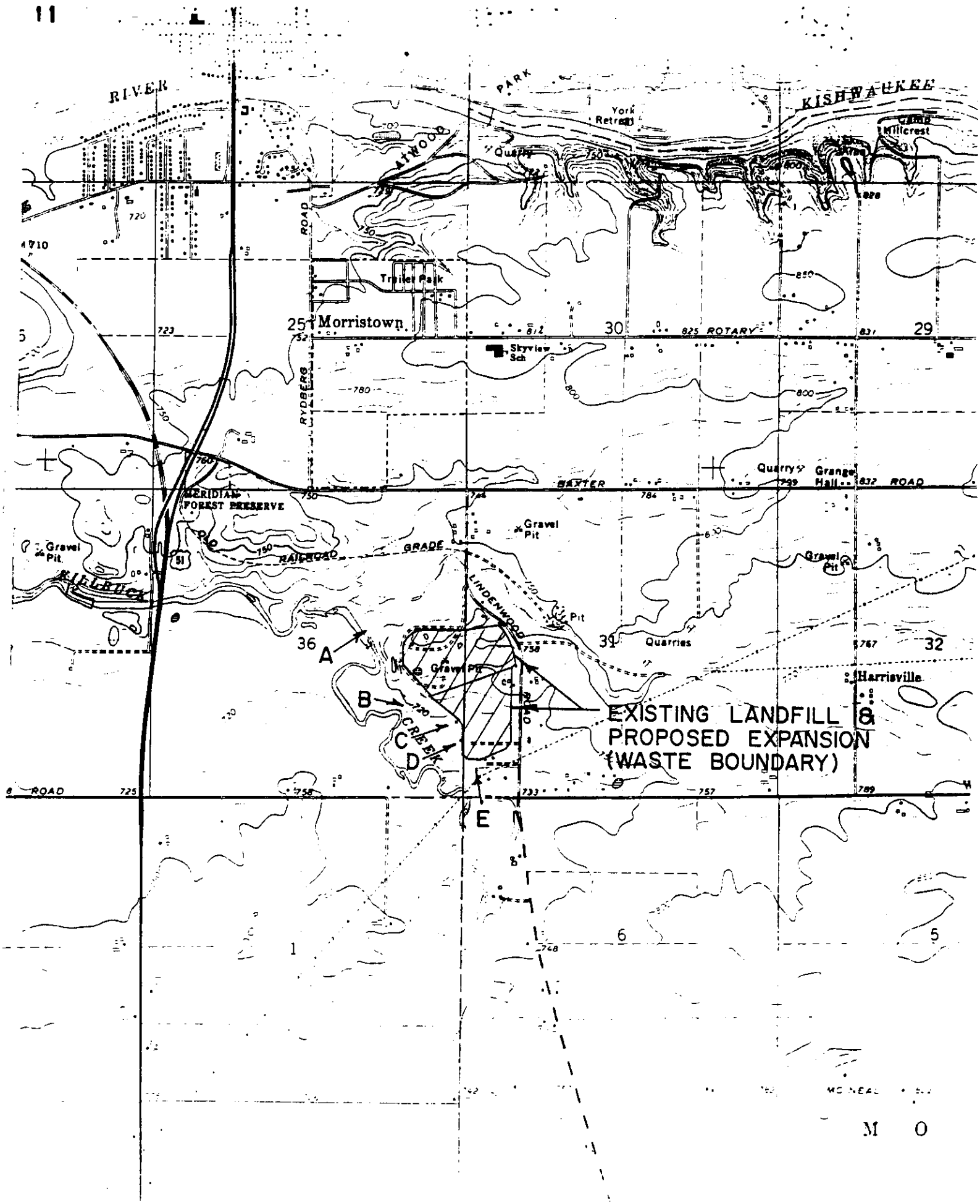
Sincerely,

G. Michael Bender

G. Michael Bender, P.E.
Associate Engineer
Phone: (217) 333-0447

Enclosures

kjb


RIVER
PARK
KISHWAUKEE
York Retreat
Camp Millcrest
ATWOOD
Quarry
ROAD
Trailer Park
25
Morristown
30
ROTARY
29
Skyview Sch
RYDBERG
BAXTER
ROAD
Quarry
Grange Hall
MERIDIAN FOREST PRESERVE
Gravel Pit
RAILROAD
GRADE
KILLBUCK
LINDENWOOD
Pit
36
A
31
Quarries
32
Harrisville
B
C
D
CREEK
EXISTING LANDFILL &
PROPOSED EXPANSION
(WASTE BOUNDARY)
ROAD
E
1
6
5
M O

APPROXIMATE SCALE

1000 0 1000 FEET

NATIONAL FLOOD INSURANCE PROGRAM

FLOODWAY

FLOOD BOUNDARY AND FLOODWAY MAP

WINNEBAGO COUNTY, ILLINOIS

(UNINCORPORATED AREAS)

PANEL 50 OF 115

(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER
170720 0050 B

EFFECTIVE DATE:
NOVEMBER 19, 1980

federal emergency management agency
federal insurance administration

KEY TO MAP

500-Year Flood Boundary
100-Year Flood Boundary
FLOODWAY FRINGE
FLOODWAY
100-Year Flood Boundary
500-Year Flood Boundary
Approximate 100-Year Flood Boundary
Cross Section Line — A — A
Elevation Reference Mark — RM7 ×
River Mile — • M1.5

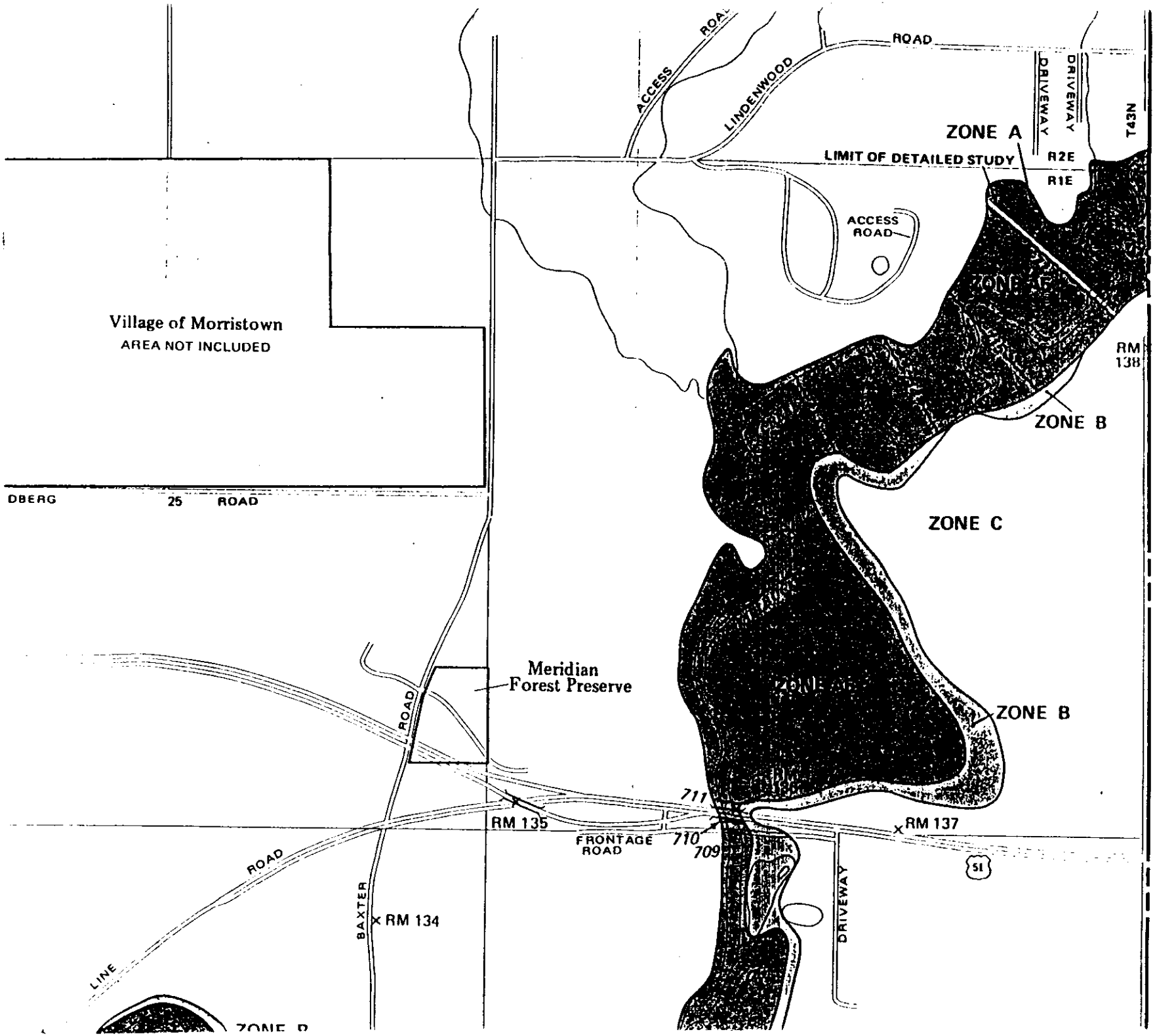
NOTES TO USER

Boundaries of the floodways were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the Federal Insurance Administration.

This map was prepared to facilitate flood plain management activities only; it may not show all special flood hazard areas in the community or all planimetric features outside of the flood plain. Refer to the latest official Flood Insurance Rate Map for any additional areas of special flood hazard.

For adjoining map panels, see separately printed Index To Map Panels.

For description of Elevation Reference Marks, see Panel 170054 0015 B.


ACCESS ROAD
LINDENWOOD
ROAD
DRIVEWAY
DRIVEWAY
T43N
ZONE A
LIMIT OF DETAILED STUDY
R2E
R1E
ACCESS ROAD
Village of Morristown
AREA NOT INCLUDED
RM 138
ZONE B
DBERG
25 ROAD
ZONE C
Meridian Forest Preserve
ROAD
ZONE B
711
RM 135
FRONTAGE ROAD
710
709
RM 137
ROAD
51
BAXTER
RM 134
DRIVEWAY
LINE

APPROXIMATE SCALE

1000 0 1000 FEET

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

WINNEBAGO COUNTY, ILLINOIS
(UNINCORPORATED AREAS)

PANEL 50 OF 115
(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER
170720 0050 B

EFFECTIVE DATE:
NOVEMBER 19, 1980

federal emergency management agency
federal insurance administration

KEY TO MAP

500-Year Flood Boundary
100-Year Flood Boundary
Zone Designations* With Date of Identification e.g., 12/2/74
100-Year Flood Boundary
500-Year Flood Boundary

ZONE B
ZONE B

Base Flood Elevation Line With Elevation In Feet** — 513

Base Flood Elevation In Feet Where Uniform Within Zone** — (EL 987)

Elevation Reference Mark — RM7 ×

River Mile — • M1.5

**Referenced to the National Geodetic Vertical Datum of 1929

*EXPLANATION OF ZONE DESIGNATIONS

ZONE	EXPLANATION
A	Areas of 100-year flood; base flood elevations and flood hazard factors not determined.
A0	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; average depths of inundation are shown, but no flood hazard factors are determined.
AH	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; base flood elevations are shown, but no flood hazard factors are determined.
A1-A30	Areas of 100-year flood; base flood elevations and flood hazard factors determined.
A99	Areas of 100-year flood to be protected by flood protection system under construction; base flood elevations and flood hazard factors not determined.
B	Areas between limits of the 100-year flood and 500-year flood; or certain areas subject to 100-year flooding with average depths less than one (1) foot or where the contributing drainage area is less than one square mile; or areas protected by levees from the base flood. (Medium shading)
C	Areas of minimal flooding. (No shading)
D	Areas of undetermined, but possible, flood hazards.
V	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors not determined.
V1-V30	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors determined.

NOTES TO USER

Certain areas not in the special flood hazard areas (zones A and V) may be protected by flood control structures.

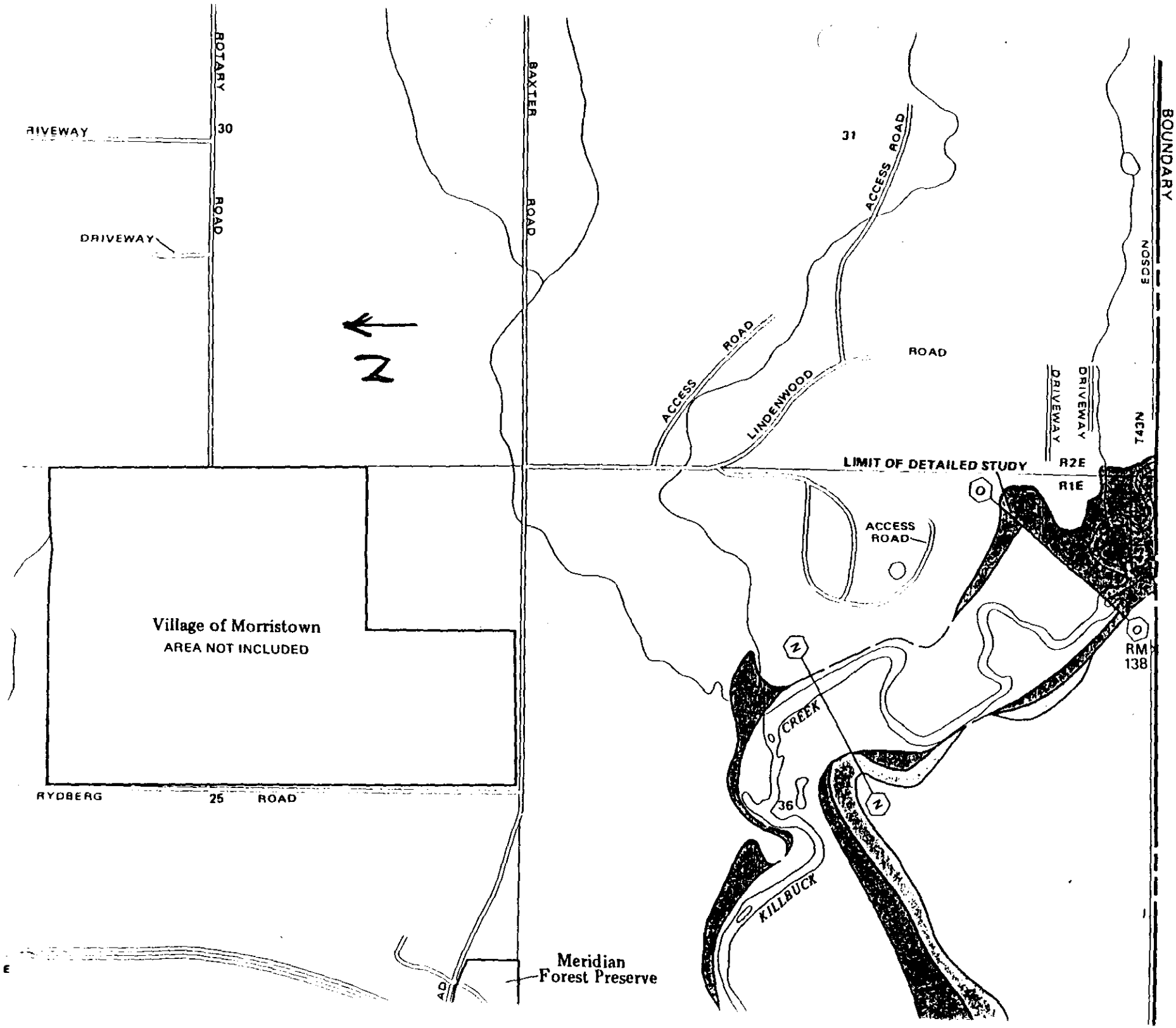
This map is for flood insurance purposes only; it does not necessarily show all areas subject to flooding in the community or all planimetric features outside special flood hazard areas.

For adjoining map panels, see separately printed Index To Map Panels.

Description of Elevation Reference Marks on Panel 170720 0045 B

INITIAL IDENTIFICATION:
JANUARY 10, 1975

FLOOD HAZARD BOUNDARY MAP REVISIONS:


ROTARY
ROAD
BAXTER
ROAD
RIVEWAY
30
DRIVEWAY
31
ACCESS ROAD
ACCESS ROAD
LINDENWOOD
ROAD
DRIVEWAY
DRIVEWAY
BOUNDARY
EDSON
T42N
LIMIT OF DETAILED STUDY
R2E
R1E
ACCESS ROAD
Village of Morristown
AREA NOT INCLUDED
RM 138
CREEK
36
KILLBUCK
RYDBERG
25
ROAD
Meridian Forest Preserve

Combined Killbuck Creek/Kishwaukee River Flo

TABLE

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

WINNEBAGO COUNTY, IL

FLOODWAY DATA

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	REGULATORY (NGVD)	WITHOUT FLOODWAY (NGVD)	WITH FLOODWAY (NGVD)	INCREASE (FEET)
Killbuck Creek (continued)								
H	17,600[1]	1,072	6,563	1.6	701.7	701.7	701.8	0.1
I	19,200[1]	420	2,459	4.2	701.8	701.8	701.9	0.1
J	19,500[1]	153	1,117	9.2	702.8	702.8	702.9	0.1
K	23,600[1]	215	1,625	6.3	709.4	709.4	709.5	0.1
L	23,800[1]	172	1,657	6.2	710.3	710.3	710.4	0.1
M	24,300[1]	1,521	8,863	1.2	711.4	711.4	711.5	0.1
N	28,400[1]	733	3,050	3.4	712.6	712.6	712.7	0.1
O	32,500[1]	1,070	4,056	2.5	716.5	716.5	716.6	0.1
Kishwaukee River								
A	900[2]	485[3]	7,054	4.6	694.6	694.6	694.7	0.1
B	3,250[2]	2,203[3]	22,192	1.4	695.5	695.5	695.6	0.1
C	9,800[2]	5,289[3]	38,611	0.8	696.3	696.3	696.4	0.1
D	15,350[2]	5,119[3]	18,592	1.7	697.5	697.5	697.6	0.1
E	20,600[2]	400	4,029	7.7	700.5	700.5	700.6	0.1
F	22,200[2]	450	4,933	6.3	702.7	702.7	702.8	0.1
G	26,300[2]	340	4,258	7.3	704.5	704.5	704.6	0.1

[1]Feet above confluence with Kishwaukee River
[2]Feet above confluence with Rock River
[3]Combined Kishwaukee River/Killbuck Creek floodway

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

WINNEBAGO COUNTY, IL
(UNINCORPORATED AREAS)

FLOODWAY DATA

KILLBUCK CREEK AND KISHWAUKEE RIVER

ATTACHMENT 6

Historic and Archaeological Evaluation

In accordance with 35 IAC 811.102(c), documentation is included herewith which demonstrates that this facility is not located in areas where it may pose a threat of harm or destruction to the features for which an irreplaceable historic, or archaeological site was listed pursuant to the National Historic Preservation Act (16 U.S.C. 470 et seq.) or the Illinois Historic Preservation Act (Ill. Rev. Stat. 1989, ch. 127, par. 133d1 et seq.) for which a Natural Landmark was designated by the National Park Service or the Illinois State Historic Preservation Officer. The documentation included herewith is summarized in chronological order.

- October 29, 1990 - - Correspondence to the Illinois Historic Preservation Agency was authored requesting a determination of compliance with 35 Ill. Admin. Code 811.102(c).

- November 29, 1990 - - Response from the Illinois Historic Preservation Agency was received which stated that a Phase I archeological reconnaissance survey of the proposed disturbed area was needed.

- December 6, 1990 - - A Phase I Archeological Reconnaissance Survey on 31 Acres of Land was authored by Midwest Archeological Research Services, Inc.

- January 30, 1991 - - Response from the Illinois Historic Preservation Agency was received which stated that the Phase I Archeological Reconnaissance Survey on 31 Acres of Land was acceptable, and compliance with the Illinois Historic Preservation Act (Ill. Rev. Stat. 1989, ch. 127, par. 133d1 et seq.) was demonstrated.

- July 27, 1994 - - Response from the Illinois Historic Preservation Agency was received which stated that a Phase I archeological reconnaissance survey for the additional proposed disturbed areas was needed (specifically, the borrow areas).

- September 16, 1994 - - A Phase I Archeological Reconnaissance Survey of a Bridge Crossing and Proposed Borrow Area for the Winnebago Reclamation District in New Milford Township was authored by Midwest Archeological Research Services, Inc.

- September 28, 1994 - - The Phase I Archeological Reconnaissance Survey of a Bridge Crossing and Proposed Borrow Area for the Winnebago Reclamation District in New Milford Township was submitted to the Illinois Historic Preservation Agency by Winnebago Reclamation Service, Inc.

- November 7, 1994 - - Response from the Illinois Historic Preservation Agency was received which stated that the Phase I Archeological Reconnaissance Survey of a Bridge Crossing and Proposed Borrow Area for the Winnebago Reclamation District in New Milford Township was acceptable, and compliance with the Illinois Historic Preservation Act (Ill. Rev. Stat. 1989, ch. 127, par. 133d1 et seq.) was demonstrated (for all potentially disturbed areas).

ANDREWS ENVIRONMENTAL ENGINEERING INC. 3535 Mayflower Blvd., Springfield, Illinois 62707/(217) 787-233-

October 29, 1990

Theodore W. Hild
Deputy State Historic Preservation Office
Illinois Historic Preservation Agency
Old State Capitol
Springfield, Illinois 62701

re: Historic Significance Site Evaluation

Dear Mr. Hild:

Enclosed is a portion of the U.S.G.S. Rockford South Quadrangle Map showing a proposed sanitary landfill expansion and soils borrow area. The site is located in part of the East 1/2 of Section 36, T.43N., R.1E. and the West 1/2 of Section 31, T.43N., R.2E., 3 P.M., all in Winnebago County, Illinois.

Please indicate if the proposed project is located in an area where it may pose a threat of harm or destruction to the features for which an irreplaceable historic, or archaeological site was listed pursuant to the National Historic Preservation Act (16 U.S.C. 470 et seq.) or the Illinois Historic Preservation Act (Ill. Rev. Stat. 1989, ch. 127, par. 133dl et seq.) for which a Natural Landmark was designated by the National Park Service or the Illinois State Historic Preservation Officer.

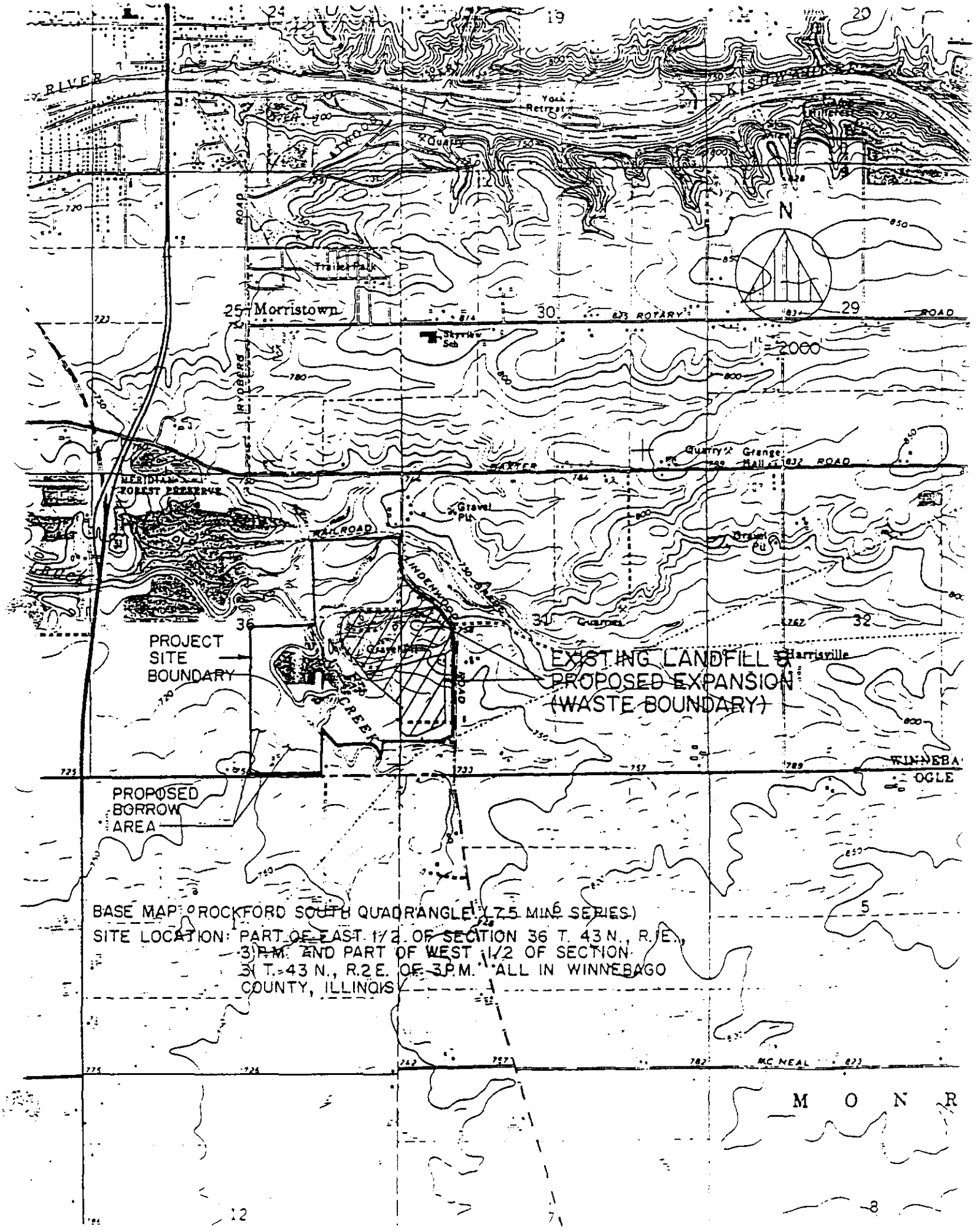
If you have any questions or need additional information, please contact me. Thank you.

Sincerely,

Daniel R Feezor

Daniel R. Feezor,
Environmental Scientist I

DRF:pll
enclosure
cc: Winnebago Reclamation Service, Inc.


PROJECT SITE BOUNDARY
EXISTING LANDFILL & PROPOSED EXPANSION (WASTE BOUNDARY)
PROPOSED BORROW AREA
Morristown
Harrisville
MERIDIAN FOREST PRESERVE
ROTARY ROAD
BAXTER ROAD
RAILROAD
LINDENWOOD ROAD
HYDBERG ROAD
MCNEAL
WINNEBAGO
OGLE
MONR
N
BASE MAP: ROCKFORD SOUTH QUADRANGLE (7.5 MIN. SERIES)
SITE LOCATION: PART OF EAST 1/2 OF SECTION 36 T. 43 N., R.1 E., 3 P.M. AND PART OF WEST 1/2 OF SECTION 3 T. 43 N., R.2 E. OF 3 P.M. ALL IN WINNEBAGO COUNTY, ILLINOIS

Illinois Historic Preservation Agency

Old State Capitol • Springfield, Illinois 62701 • (217) 782-4836

217/785-4997

WINNEBAGO COUNTY IHPA LOG #901031007JAW
Sanitary landfill expansion and soils borrow area
Winnebago Reclamation Services, Inc.

November 29, 1990

Mr. Daniel R. Feezor
Environmental Scientist I
Andrews Environmental Engineering, Inc.
3535 Mayflower Boulevard
Springfield, Illinois 62707

Dear Sir:

Thank you for requesting comments from our office concerning the possible effects of the project referenced above on cultural resources. Our comments are required by Section 106 of the National Historic Preservation Act of 1966, as amended, and its implementing regulations, 36 CFR 800: "Protection of Historic Properties".

The project area has a probability of containing significant prehistoric/historic archaeological resources. The project area is located in an environmental locale favorable for prehistoric occupation. Accordingly, a Phase I archaeological reconnaissance survey to locate, identify, and record all archaeological resources within the project area will be required. This decision is based upon our understanding that there has not been any large scale disturbance of the ground surface (excluding agricultural activities) or major construction activity within the project area which would have destroyed existing cultural resources. If the area has been disturbed, please contact our office with appropriate documentation.

Enclosed you will find an attachment briefly describing Phase I surveys and listing archaeological contracting services. A copy of our letter should be provided to the selected professional archaeological contractor for their information.

If you have any further questions, please contact Joyce A. Williams, Staff Archaeologist, Illinois Historic Preservation Agency, Old State Capitol, Springfield, Illinois 62701, 217/785-1279.

Sincerely,

Theodore W. Hild
Deputy State Historic
Preservation Officer

TWH:JAW:bb0982A/93

Enclosure: Additional Information Sheet on
Archaeological Surveys and Contracting Services

cc: Larry Eastep, IEPA WO/A

An Introduction to Archaeological Surveys

Prepared by
ILLINOIS STATE HISTORIC PRESERVATION OFFICE

When you read the accompanying letter, you were notified that your Federal or State permitted, funded, or licensed project will require an archaeological survey. The purpose of this survey will be to determine if prehistoric or historic resources are present within the project area. If you are the average applicant you have had little or no experience with such surveys - this short introduction is designed to help you fulfill the Federal/State requirements and complete the process.

WHY PROTECT HISTORIC RESOURCES? Historic preservation legislation grew out of the public concern for the rapid loss of our prehistoric and historic heritage in the wake of increasingly large-scale Federal/State and private development. The legislation is an attempt to protect our heritage while at the same time allowing economic development to go forward.

WHAT IS THE LEGAL BASIS? The basis for all subsequent historic preservation legislation lies within the National Historic Preservation Act of 1966 (NHPA). Section 106 of NHPA requires all Federal Agencies' "undertakings" to "take into account" their effect on historic properties. As of January 1, 1990, the State Agency Historic Resources Preservation Act (Public Act 86-707) requires the same for all State Agency undertakings. A Federal or State "undertaking" is defined to cover a wide range of permitting, funding, and licensing activities. It is the responsibility of Federal/State Agencies to ensure the protection of historic resources and this effort is regulated by the State Historic Preservation Office (SHPO). In Illinois the SHPO is part of the Illinois Historic Preservation Agency (IHPA).

WHAT IS AN ARCHAEOLOGICAL SURVEY? An archaeological survey includes both (1) an examination of the written records, such as county plat books, published and unpublished archaeological reports, state site files, and (2) a field investigation of the project area to determine if prehistoric or historic resources are present. This process of resource identification is called a Phase I survey.

WHAT DOES A PHASE I SURVEY REQUIRE? Archaeological evidence is normally buried beneath the surface of the ground. To determine if an archaeological site is present it is necessary to get below this surface. The most efficient way is by plowing. If the project area is or can be plowed then the artifactual evidence will be brought to the surface and systematic pedestrian surveys (walkovers) will determine if a site is present. These walkovers are best done when the vegetation is low in the fall or spring. If the project area is covered with vegetation then small shovel probes (1' sq.) are excavated on a systematic grid pattern (usually 50' intervals) to sample the subsurface deposits. Where deeply buried sites may be present, such as in floodplains, deep coring or machine trenching may be required.

WHO DOES ARCHAEOLOGICAL SURVEYS? Professional archaeologists who meet the Federal standards set forth in 36 CFR Part 66, Appendix C may conduct Federal surveys, while those meeting the State standards set forth in the Archaeological and Paleontological Resources Protection Act (Ch. 127, par. 133c9) may conduct State surveys (see the other side of this sheet for information on obtaining the services of a contract archaeologist). The applicant is responsible for obtaining and paying for such services.

AFTER THE SURVEY - WHAT NEXT? When the field investigations are completed the archaeologist will submit a report of their findings and recommendations to the applicant. It is the responsibility of the applicant to forward a copy to the SHPO for evaluation and findings. If no sites were found or the sites found are not eligible for the National Register the project may proceed. Occasionally, an significant archaeological site may be encountered. In such a case the SHPO and the Federal or State Agency will work with the applicant to protect both the cultural resources and to facilitate the completion of your project.

NEED FURTHER ASSISTANCE? The IHPA is here to assist you and the Federal/State agencies in complying with the mandates of the historic preservation legislation. If you have questions or need assistance with archaeological resources protection or Federal/State compliance, please contact Ms. Paula G. Cross, Review and Compliance Senior Staff Archaeologist, Archaeology Section, Preservation Services Division, Illinois Historic Preservation Agency, Old State Capital Building, Springfield, Illinois 62701 (217/785-4997).

OVER

ILLINOIS-BASED ARCHAEOLOGICAL CONTRACTING SERVICES (1989)

- order to assist agencies, engineering firms, and others who require professional archaeological services the 'llinois Historic Preservation Agency (IHPA) has listed below Illinois-based organizations on the Illinois -chaeological Survey, Inc.'s (IAS) "Registry of Qualified Institutions". The IAS is a not-for-profit organization f professional archaeologists who do research and business in Illinois. This list is provided for your nformation, you may use any archaeologist who meets the minimum qualifications as set forth in Title 36 Code of deral Regulations, Part 66, Appendix c. Essentially, these regulations require a graduate degree in thropology/archaeology and 16 months of professional experience. If you have any questions concerning an rchaeologist's qualifications please contact the IHPA at 217/785-4997. The inclusion of organizations on this list oes not constitute any recommendation or endorsement of their qualifications, professional expertise, or erformance record by the IHPA or the IAS.

merican Resources Group, Limited
27 North Washington Street
arbondale, Illinois 62901
CONTACT PERSON: Mr. Michael J. McNerney
618/529-2741

enter for American Archaeology
(Kampsville Archaeological Center)
ost Office Box 22
ampsville, Illinois 62053
CONTACT PERSON: Mr. Kenneth B. Farnsworth
618/653-4316

ontract Archaeology Program
outhern Illinois University
dwardsville, Illinois 62026
CONTACT PERSON: Dr. William I. Woods
618/692-2059

epartment of Anthropology
orthern Illinois University
eKalb, Illinois 60115
CONTACT PERSON: Dr. Mark Mehrer
815/753-0246 / 0293

epartment of Sociology
oyola University
525 North Sheridan Road
hicago, Illinois 60626
CONTACT PERSON: Mr. David Keene
312/508-3734

idwestern Archaeological Research Center
04 Edwards Hall
llinois State University
ormal, Illinois 61761
CONTACT PERSON: Dr. Charles Orser
309/438-2271

ever River Research
ost Office Box 5234
pringfield, Illinois 62705
CONTACT PERSON: Mr. Floyd Mansberger
217/787-2864

rchaeological Consultants
20 Robert Drive
ormal, Illinois 61761
CONTACT PERSON: Dr. Charles L. Rohrbaugh
309/454-6590

Archaeology Laboratory
Western Illinois University
201 Tillman Hall
Macomb, Illinois 61455
CONTACT PERSON: Mr. Lawrence A. Conrad
309/298-1188

Center for Archaeological Investigations
Southern Illinois University
Carbondale, Illinois 62901
CONTACT PERSON: Dr. Brian M. Butler
618/453-5031

Department of Anthropology
University of Illinois
109 Davenport Hall
607 South Matthews Avenue
Urbana, Illinois 61801
CONTACT PERSON: Mr. Charles Bareis
217/333-1708

Department of Anthropology
Northwestern University
Evanston, Illinois 60201
CONTACT PERSON: Dr. James Brown
708/491-5402

Illinois State Museum
(Illinois State Museum Society)
Spring and Edwards Streets
Springfield, Illinois 62706
CONTACT PERSON: Dr. Michael Wiant
217/785-0134

Patrick Engineering, Inc.
346 Taft Avenue
Glen Ellyn, Illinois 60137
CONTACT: Archaeology Division
708/858-7050

Midwestern Archaeological Research
Services, Inc.
18906 Hebron Road
Harvard, Illinois 60033
CONTACT PERSON: Dr. Rochelle Lurie
815/943-3399

91A-03/26/90

Results of an Archaeological Reconnaissance Survey on 31 Acres of Land in Winnebago County, Illinois

Prepared by:

Dr. Rochelle Lurie
Midwest Archaeological Research Services, Inc.
18906 Hebron Road
Harvard, Illinois 60033

Submitted to:

EnCAP, Inc.
400 E. Hillcrest
Suite 240
DeKalb, Illinois 60115

December 6, 1990

Cultural Resource Management Report No. 101

ARCHAEOLOGICAL SURVEY SHORT REPORT
Illinois Historic Preservation Agency
Old State Capital Bldg., Springfield, IL 62701
(217) 785-4997

Reviewer: _____
date: _____
_____ accepted ____ rejected
mars#: 101

LOCATIONAL INFORMATION AND SURVEY CONDITIONS

County: Wnnebago Quadrangle Rockford South 7.5 min.

Project type/title:

Winnebago Reclamation Landfill Site.

Responsible federal/state agencies: IEPA

Legal Location: N. SE. SE and S. S. NE and N. S. SE. SE SW. SW. SW and W. SE.SW. SW - see attached description

Sec.	T.	R.
36	43N	1E
31	43N	2E

U. T. M. At the center of the cultivated fields surveyed- 4668650 N. 330040 E

Project Description:

Pedestrian survey and limited shovel probing were used to survey approximatley 30 acres of land for an extension of the Winnebago Landfill.

Topography: Relatively flat land adjacent to Killbuck Creek

Soils: See attached wetlands report.

Drainage: Killbuck Creek to the Kishwaukee River to the Rock River

Land use/ground cover (include % visibility):

Soybean stubble; 50-75% visibility. Small grass covered area of (all disturbed ground) and wooded wetlands.

Survey limitations: None.

ARCHAEOLOGICAL AND HISTORICAL INFORMATION

Historic plats/atlases/sources:

USGS topographic maps; IAS site files at University of Wisconsin, Milwaukee.

Previously reported sites:

11-Wo-71 and 11-Wo-72 in Section 34, and sections 26/35 T43N, R1E, respectively along Killbuck Creek to the west.

Previous surveys:

None in the immediate area.

Regional archaeologist contacted: M. C. Bird

Investigation techniques:

Pedestrian survey was used in all of the agricultural fields; 1 line of shovel probes was placed between the fields and the wetlands. Wetlands were flooded and could not be probed.

Time Expended 2 man/days

Sites/find spots located: None

Cultural Material:

None (curated at) NA

Collection techinques:

Pedestrian survey transects and shovel probes were mapped (Figure 2). All possibly cultural material was collected. After washing, none appeared cultural. Probe fill was trowelled and soil profiles noted on probe forms.

Area Surveyed (acres and square meters): Approximately 30 acres; 12,120 sq. meters.

MARS #: 101

RESULTS OF INVESTIGATION AND RECOMMENDATIONS:

[X] Phase I archaeological reconnaissance has located no archaeological material; project clearance is recommended.

[ ] Phase I archaeological reconnaissance has located archaeological materials; site(s) does(do) not meet requirements for National Register eligibility; project clearance is recommended.

[ ] Phase I archaeological reconnaissance has located archaeological materials; site(s) may meet requirements for National Register eligibility; further testing is recommended.

[ ] Phase II archaeological investigation has indicated that site(s) does(do) not meet requirements for National Register eligibility; project clearance is recommended.

[ ] Phase II archaeological investigation has indicated that site(s) meet requirements for National Register eligibility; formal report is pending and a determination of eligibility is recommended.

Comments:

Mr. John Lichty, site supervisor of the Winnebago Landfill, identified the boundaries of the survey area in the field. He indicated that the wetlands to the north of the soybean fields were created by previous stripping and filling around the landfill. Our shovel probes bear out this information. Wetlands were flooded and could not be probed.

CONTRACTOR INFORMATION:

Arch. Contractor: Midwest Archaeological Research Services, Inc.

Address/phone: 18906 Hebron Rd., Harvard, Illinois 60033. (815) 943-3399 or 943-3199.

Surveyor(s): R. Gary Stollenwerk and Brant Vollman Survey date(s): 11/28/90

Report completed by: Rochelle Lurie date: 12/6/90

Submitted by (signature and title): Rochelle Lurie, President

ATTACHMENT CHECK LIST: #1 Through #4 are manditory:

[X] 1) Relevant portion of USGS 7.5" topographic quadrangle map(s) showing project location and any recorded sites;

[X] 2) Project map(s) depicting survey limits and, when applicable, approximate site limits and concentrations of cultural material;

[NA] 3) site form(s): two copies of each form);

[X] 4) all relevant project correspondence;

[ ] 5) additional information sheets as necessary.

Address of contracting agency to whom SHPO comment should be mailed:

William E. Southern
EnCAP, Inc.
400 E. Hillcrest
Suite 240
DeKalb, Illinois 60115

Reviewers comments:

On November 28, 1990 Mr. R. Gary Stollenwerk and Mr. Brant Vollman, staff archaeologists for Midwest Archaeological Research Services, Inc. (MARS), conducted a Phase I archaeological reconnaissance survey of approximately 31 acres of land to be used as an extension of the Winnebago Landfill. This parcel of land is located south of the existing landfill, west of Lindenwood Road and east of Killbuck Creek, in Section 36 of Township 43 North and Range 1 East and in Section 31 of Township 43 North and Range 2 East (3rd PM) Winnebago County, Illinois (Figure 1). The property's proximity to the creek makes it a likely area for prehistoric and/or historic archaeological resources. Two prehistoric archaeological sites have been found along Killbuck Creek within three miles west of the project area near the Killbuck Bluffs Forest Preserve. Many sites have been found to the north of the project area along the Kishwaukee River. A reconnaissance survey places the developers of this land in compliance with the National Historic Preservation Act of 1966, as amended and its implementing regulations, 36 CFR 800: "Protection of Historic Properties" and Illinois State laws protecting archaeological resources.

The proposed extension area (as defined by Mr. John Lichty, site supervisor for the Winnebago Landfill) includes four agricultural fields, an abandoned modern house, the remains of a farmstead complex and a former nursery (Figure 2). Of these areas approximately 20 acres were surveyable. The agricultural fields were covered with soybean stubble, but ground surface visibility was generally 75%. Pedestrian survey of these fields was conducted at 10 meter intervals. No artifacts were recovered. A single line of shovel probes was placed along the boarder of the nursery area to confirm Mr. Lichty's statement that this area had previously been graded and filled. The transect was placed at the western edge of the nursery, the area that appeared least disturbed. No artifacts were recovered from six probes dug along this transect. Soils in the probes indicate that the area had been considerably disturbed. No further work was done in the nursery area. The seventh probe in the transect was at the edge of the wetlands. Water filled the probe immediately. The wetlands were too wet to be probed. The area between Fields B and C contains a farm pond and outhouse. A concrete foundation is all that is left of the farm house in Field B.

Since no archaeological material (prehistoric or historic) was recovered during the survey, no further work is recommended.

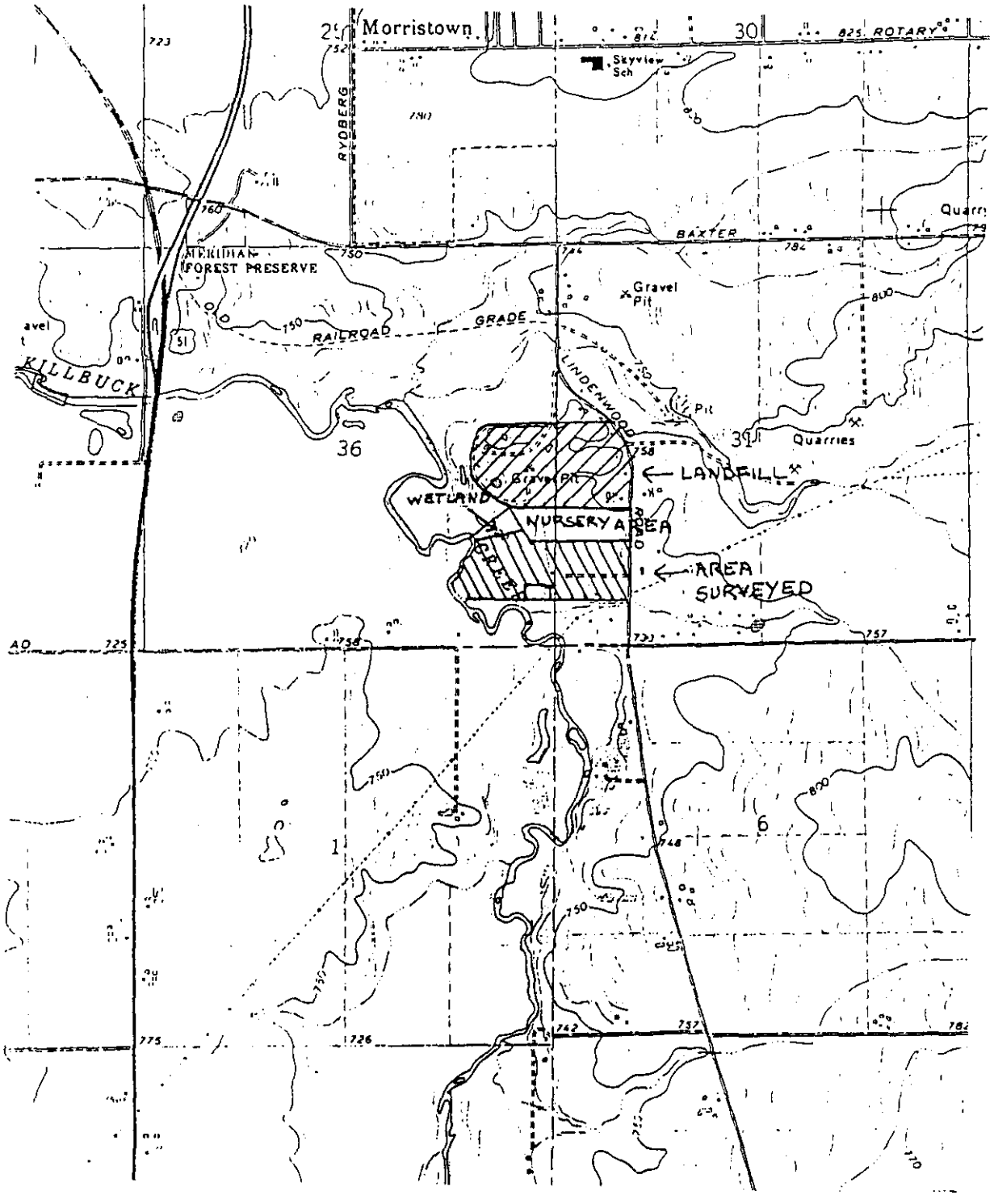


Figure 1. Portion of the USGS Rockford South Quadrangle map showing the location of the survey area.

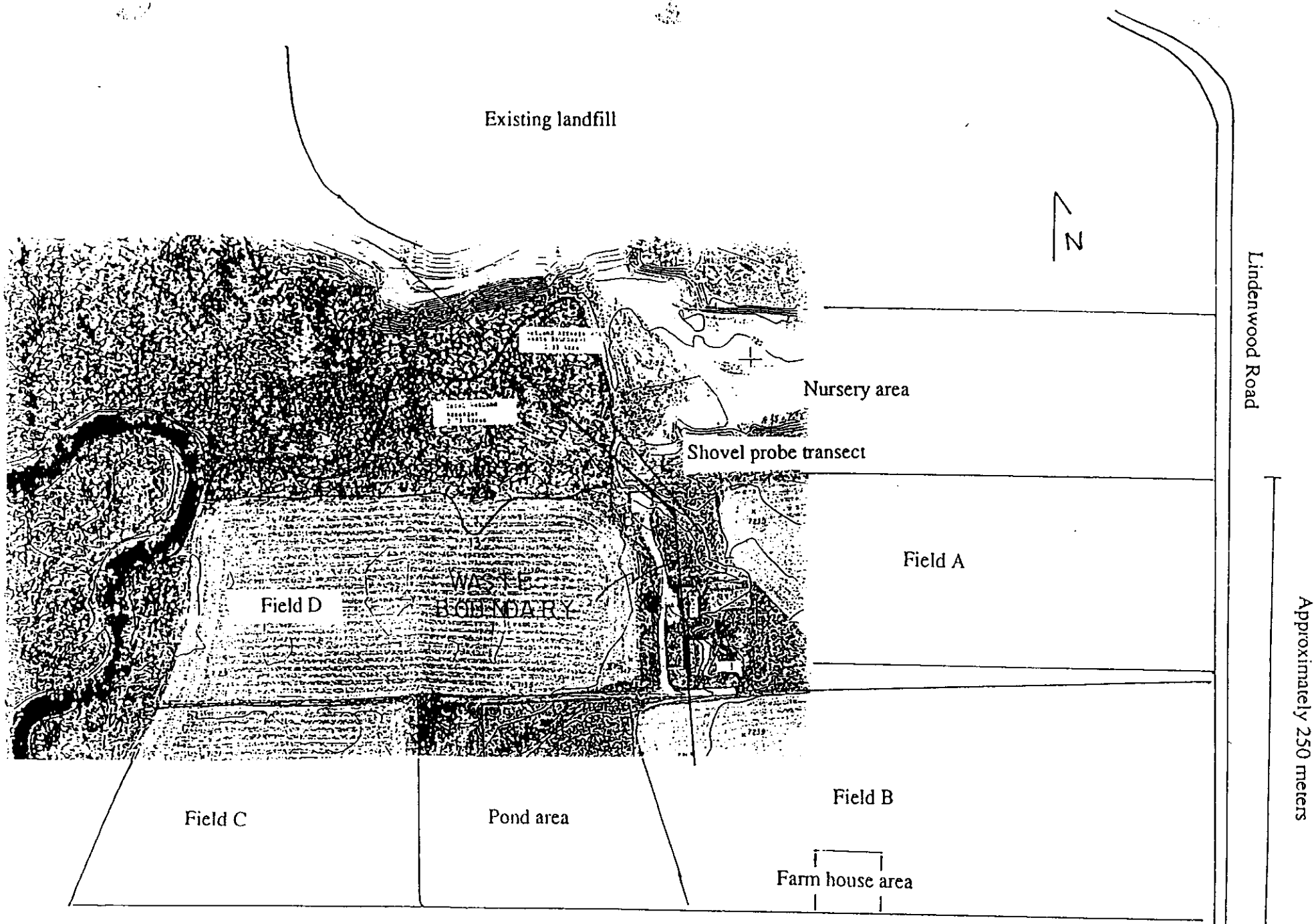


Figure 2. Sketch map of the surveyed area (Aerial photograph supplied by EnCAP).

Maps and other documentation supplied to MARS, Inc. by EnCAP

EXHIBIT A

LEGAL DESCRIPTION

Part of the East Half (1/2) of Section Thirty-Six (36), Township Forty-Three (43) North, Range One (1) East of the Third (3rd) Principal Meridian and part of the West Half (1/2) of Section Thirty-One (31), Township Forty-Three (43) North, Range Two (2) East of the Third (3rd) Principal Meridian bounded and described as follows to wit: Beginning at the Southwest corner of the Southeast Quarter (1/4) of Section 36, Township 43 North, Range One (1) East of the Third (3rd) Principal Meridian; thence North 01 00' 37" West, along the West line of said Southeast Quarter (1/4), a distance of 2646.66 feet, to the Northwest corner of said Southeast Quarter (1/4); thence North 88 40' 20" East, along the North line of said Southeast Quarter (1/4), a distance of 1321.49 feet to the Southwest Corner of the East Half (1/2) of the Northeast Quarter (1/4) of Section 36, Township 43 North, Range One (1) East of the Third (3rd) Principal Meridian; thence North 00 58' 29" West, along the West line of the East Half (1/2) of said Northeast Quarter (1/4), a distance of 1532.38 feet to a point which is 1100.00 feet perpendicularly distant South from the North line of said Northeast Quarter (1/4); thence North 88 12' 42" East, parallel with the North line of said Northeast Quarter (1/4), a distance of 1322.55 feet to the East line of said Northeast Quarter (1/4); thence South 00 56' 21" East, along the East line of said Northeast Quarter (1/4), 701.26 feet to the Southwesterly right-of-way line for County Highway 11A (commonly known as Lindenwood Road); thence South 49 03' 37" East, along said right-of-way line, 356.72 feet; thence South 52 18' 16" East, along said right-of-way line, 23.01 feet; thence North 00 31' 44" East, 62.94 feet to the center line of County Highway 11A (Lindenwood Road); thence Southeasterly along a circular curve to the left, having a center which lies 716.14 feet to the Northeast, an arc distance of 15.02 feet (the chord across the previously described circular curve course bears south 51 42' 16" East, 15.02 feet); thence South 52 18' 16" East, along said center line, 259.97 feet; thence South 37 41' 44" West, 50.00 feet to the Southwesterly right- of-way line for County Highway 11A (Lindenwood Road); thence South 52 18' 16" East, along said right-of-way line, 123.30 feet; thence South 38 05' 50" East, along said right-of-way line, 444.23 feet to the South line of the Northwest Quarter (1/4), of Section 31, Township 43 North, Range Two (2) East of the Third (3rd) Principal Meridian; thence North 88 21' 11" East, along said line, 53.79 feet to the center line of County Highway 11A (Lindenwood Road); thence Southeasterly, along a circular curve to the right having a center which lies 955.00 feet to the Southwest, an arc distance of 362.48 feet (the chord across the previously described circular curve course bears South 11 47' 41" East, 360.31 feet); thence South 00 55' 16" East, along said center line, 1472.95 feet to the Northwesterly line of a Commonwealth Edison right-of-way; thence South 63 48' 23" West, along said right of way line, 652.00 feet; thence South 88 21'

59" West, 364.83 feet to the East line of Section 36, Township 43 North, Range One (1) East of the Third (3rd) Principal Meridian; thence South 88 21' 59" West, 341.76 feet; thence South 00 56' 21" East, 155.11 feet to the center line of the Kilbuck Creek; thence Northwesterly, along the center line of said creek, 301.00 feet (the chord across the previously described irregular creek course bears North 68 40' 19" West, 278.12 feet); thence South 68 39' 36" West, 363.84 feet to the center line of the Kilbuck Creek; thence Northwesterly, along the center line of said creek, 530.00 feet to the West, line of the Southeast Quarter (1/4) of the Southeast Quarter (1/4) of Section 36, Township 43 North, Range One (1) East of the Third (3rd) Principal Meridian (the chord across the previously described irregular creek course bears North 49 15' 28" West, 508.97 feet); thence South 00 58' 29" East, along said line, 716.05 feet to the South line of Section 36, Township 43 North, Range One (1) East of the Third (3rd) Principal Meridian; thence South 88 43' 13" West, along said line, 1319.84 feet to the point of beginning. Subject to the rights of the public and the State of Illinois in and to those portions thereof taken, used, dedicated, or reserved for public road purposes. Situated in the County of Winnebago and the State of Illinois and containing 244.901 acres.

Illinois Historic
Preservation Agency
Old State Capitol Springfield, Illinois 62701 (217) 782-4836
Suite 4-900 State of Illinois Center 100 W. Randolph Chicago, IL 60601 (312) 814-1409

217/785-4997

WINNEBAGO COUNTY
Sanitary landfill expansion
and soils borrow area
Winnebago Reclamation Services, Inc.

IHPA LOG #901031007JAW
Midwest Archeological Research Services, Inc.
Acres: 30.0 Sites: 0

January 30, 1991

Mr. Daniel R. Feezor
Environmental Scientist I
Andrews Environmental Engineering, inc.
3535 Mayflower Boulevard
Springfield, Illinois 62707

Dear Sir:

Thank you for submitting the results of the archaeological reconnaissance. The Illinois Historic Preservation Agency is required by Paragraph 133c24, Section 4 of the Illinois State Agency Historic Resources Preservation Act (Ill. Rev. Stat. 1989, ch. 127, par. 133c21, et seq.) to review all state undertakings for their effect on cultural resources. Pursuant to this, we have received information regarding the referenced project for our comment.

Our staff has reviewed the archaeological Phase I reconnaissance report performed for the project referenced above.

The Phase I survey and assessment of the archaeological resources appear to be adequate. Accordingly, we have determined, based upon this report, that no significant historic, architectural, and archaeological resources are located in the project area.

Please retain this letter in your files as evidence of compliance with Paragraph 133c 24, Section 4 of the Illinois State Agency Historic Resources Preservation Act (Ill. Rev. Stat. 1989, ch. 127).

Sincerely,

Theodore W. Hild
Deputy State Historic
Preservation Officer

TWH:JAW:bb1011A/26

cc: Larry Eastep, IEPA
Rochelle Lurie, MARS

Illinois Historic
Preservation Agency

Old State Capitol • Springfield, Illinois 62701 • (217) 782-4836

217/785-4997

WINNEBAGO COUNTY
Rockford
Haul Road Over Kilbuck Creek

PLEASE REFER TO:
IHPA LOG #940617019PWO

July 27, 1994

Winnebago Reclamation Service
8403 Lindenwood Road
Rockford, Illinois 61109

Gentlemen:

The Illinois Historic Preservation Agency is required by the Illinois State Agency Historic Resources Preservation Act (20 ILCS 3420, 1992) to review all state funded, permitted or licensed undertakings for their effect on cultural resources. Pursuant to this, we have received information regarding the referenced project for our comment.

The project area has a high probability of containing significant prehistoric/historic archaeological resources. Accordingly, a Phase I archaeological reconnaissance survey to locate, identify, and record all archaeological resources within the project area will be required. This decision is based upon our understanding that there has not been any large scale disturbance of the ground surface (excluding agricultural activities) or major construction activity within the project area which would have destroyed existing cultural resources prior to your project. If the area has been disturbed, please contact our office with the appropriate written and/or photographic documentation.

Enclosed you will find an attachment briefly describing Phase I surveys and listing archaeological contracting services. A COPY OF OUR LETTER OR THE IHPA LOG NUMBER SHOULD BE PROVIDED TO THE SELECTED PROFESSIONAL ARCHAEOLOGICAL CONTRACTOR FOR THEIR INFORMATION, AND TO ASSURE THAT THE SURVEY RESULTS ARE CONNECTED TO YOUR PROJECT PAPERWORK.

If you have any further questions, please contact Joseph S. Phillippe, Staff Archaeologist, Illinois Historic Preservation Agency, Old State Capitol, Springfield, Illinois 62701, 217/785-1279.

Sincerely,

Anne E. Haaker
Deputy State Historic
Preservation Officer

AEH:JSP

Enclosure: Contractor List

cc: Mr. Dennis L. Kennedy, P.E., Head

Printed on Recycled Paper

Phase I Archaeological Reconnaissance Survey of a Bridge Crossing and Proposed Borrow Area for the Winnebago Reclamation District in New Milford Township

Prepared by:
M. Catherine Bird
Midwest Archaeological Research Services, Inc.
18906 Hebron Road
Harvard, Illinois 60033

Submitted to:
Mr. Tom Hilbert
Winnebago Reclamation District
8403 Lindenwood Road
Rockford, Illinois 61109

September 16, 1994

Cultural Resource Management Report No. 387

Midwest Archaeological Research Services, Inc. (MARS, Inc.) staff archaeologists, M. Catherine Bird and R. Gary Stollenwerk, conducted an archaeological reconnaissance survey August 30, 1994 of approximately 35 acres of land located primarily in the W 1/2 of the SE 1/4 of Section 36 of Township 43 North, Range 2 East (New Milford Township) of the Third Principal Meridian, Winnebago County, Illinois (Figure 1). Killbuck Creek flows along the eastern boundary of the parcel which includes agricultural fields within floodplain and stream terraces formed on glacial outwash and till deposits.

The Illinois Historic Preservation Agency may request a Phase I archaeological survey of this property (IHPA LOG # not available). Reconnaissance surveys are conducted to identify possible prehistoric or early historic remains on landscapes scheduled for modification. Identification of any such non-renewable cultural resources allows land managers to plan adequate preservation or mitigation measures.

Although a nineteenth century farmstead once stood within the project parcel, only the foundation of a relatively recent twentieth century house was noted during the Phase I archaeological reconnaissance. The site does not meet the requirements of National Register of Historic Places (NRHP) eligibility. Project clearance is recommended.

Methodology

Field methods employed during the survey will be in accordance with the Illinois Historic Preservation Agency's *Protecting Illinois Cultural Resources - An Introduction to Archaeological Surveys* Cultural Resources guidelines. Field methods will include the following:

Background Research

November 28, 1990 MARS, Inc. conducted a Phase I archaeological reconnaissance survey of 31 acres on the east side of Killbuck Creek for the Winnebago Reclamation District. Dr. Lurie's report, *Results of an Archaeological Reconnaissance Survey on 31 Acres of Land in Winnebago County, Illinois*, (IHPA Log #901031007JAW) reported no significant historic, architectural, or archaeological resources. Before the reconnaissance survey on the west side of Killbuck Creek was conducted, MARS, Inc. consulted the Illinois Archaeological Survey for information on the location of sites that have been found previously near the project area. Two prehistoric archaeological sites have been found along Killbuck Creek within three miles west of the project area near the Killbuck Bluffs Forest Preserve.

Historical plats and atlases of the area (1871, 1892, 1905) were reviewed also to assess the potential for early pioneer sites (Figures 2 through 4). The study parcel was formerly

part of the W. Wortman Farmstead in 1871, the R. M. Barras Farmstead in 1892, and the D. Flanders Farmstead in 1905. Photographs were taken of the structural remnants of the foundations and debris encountered.

Field Methods

The proposed bridge crossing and borrow area for the Winnebago Reclamation District included approximately 35 acres of agricultural land, therefore, the most effective way to conduct the reconnaissance was with pedestrian survey. This method of survey can be used wherever ground surface visibility is 50% or greater. The study parcel was planted in soybeans (two feet high) previous to the survey and surface visibility was less than 500%. The Client strip-plowed the agricultural field (five meter wide strips with unplowed intermediate strips each five meters wide). The plowed strips had a surface visibility of 90 to 95%. Pedestrian survey of the strips began in the southeast corner of the parcel, with two archaeologists within each five meter wide strip. North-south transects were walked until the 35 acres were covered. All archaeological material was flagged, a sketch was be drawn of any potential site, and then materials were collected for standard processing in the laboratory.

Results and Recommendations

No prehistoric or historical artifacts were recovered during the course of the Phase I archaeological reconnaissance survey. A concrete foundation and a debris pile was located and photographed (Plates 1 and 2). An open, water-filled pit discovered on the outside of the probable house was reported to the Reclamation District as a safety hazard.

Although a structure first appears on the parcel in 1871, the extant foundation does not represent a nineteenth century structure but rather a much more recent construction with a poured concrete foundation. No historical materials were recovered from the surrounding agricultural buildings. The site does not meet requirements for NRHP eligibility. Project clearance is recommended.

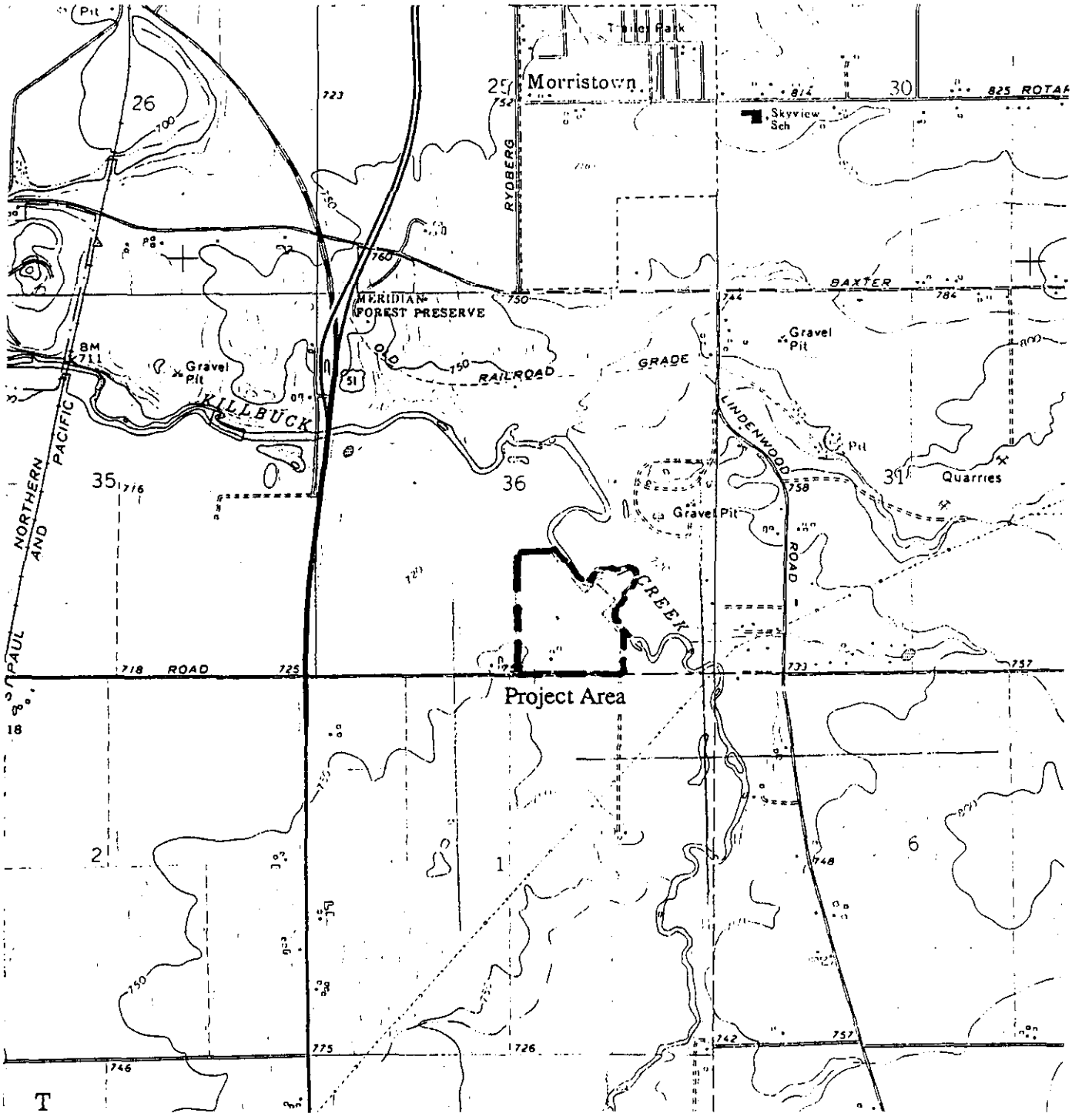


Figure 1. Rockford South 7.5' quadrangle showing the project area.

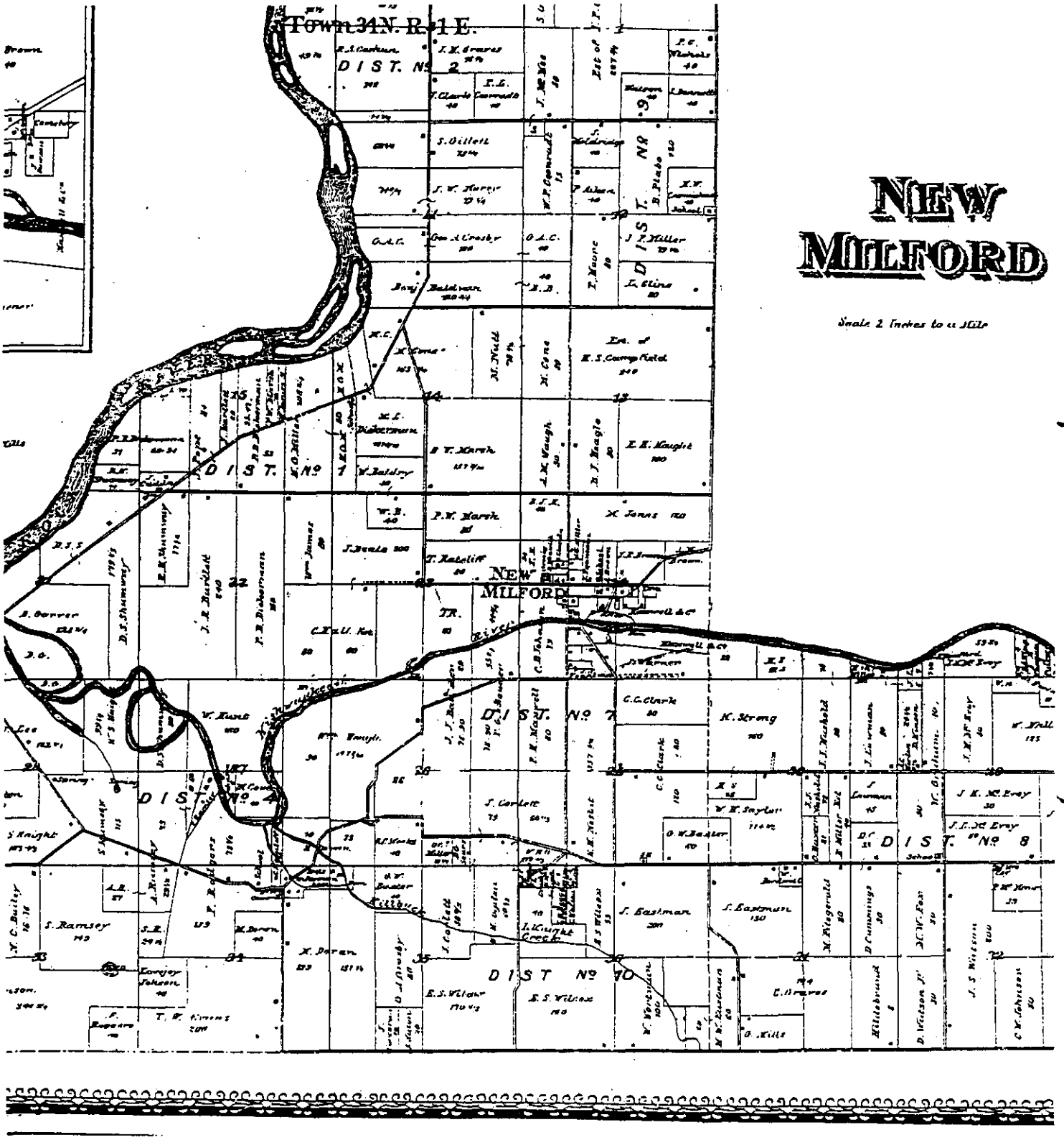


Figure 2. New Milford Township 1871 plat showing the project area.

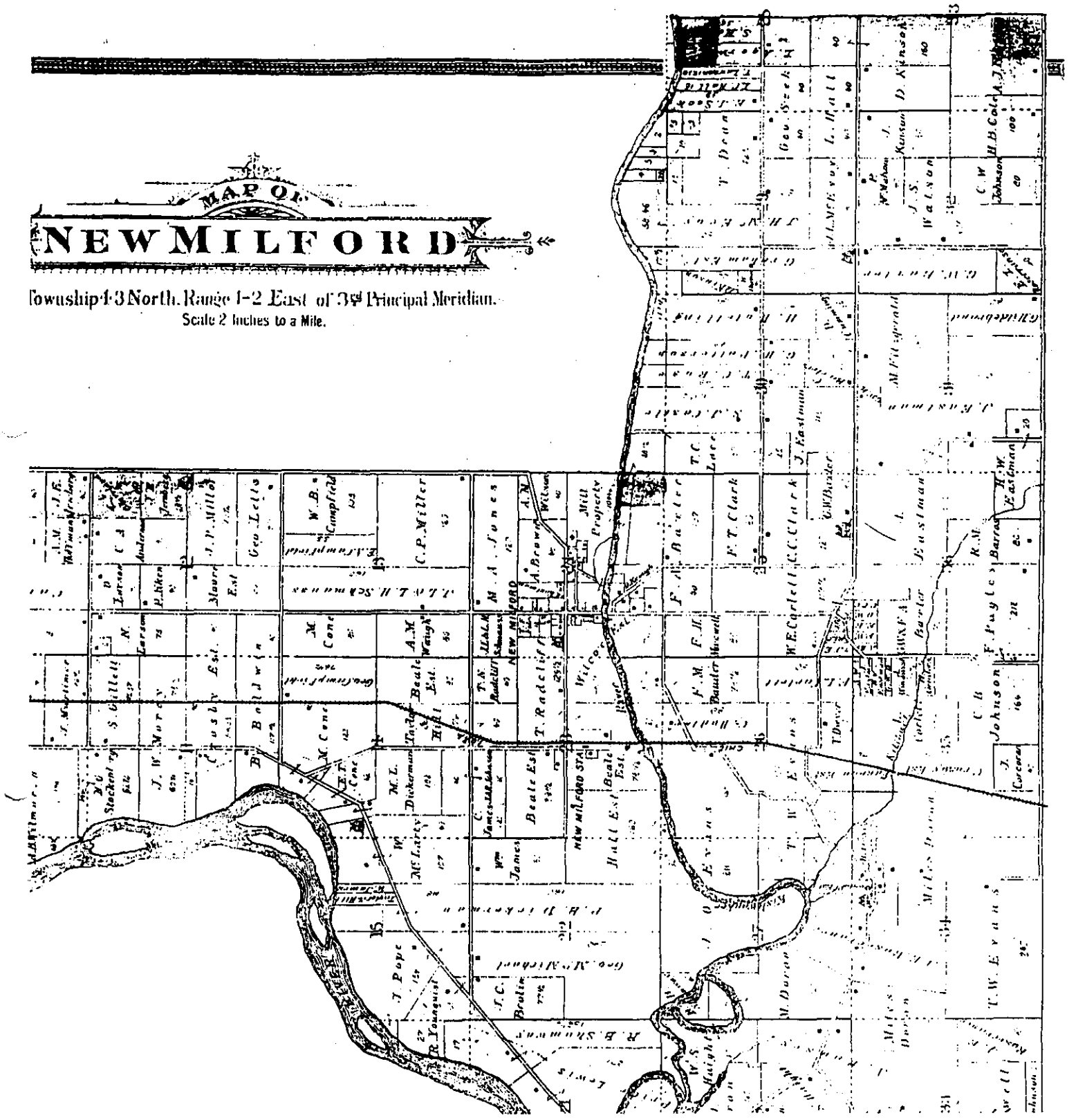


Figure 3. New Milford Township 1892 plat showing the project area.

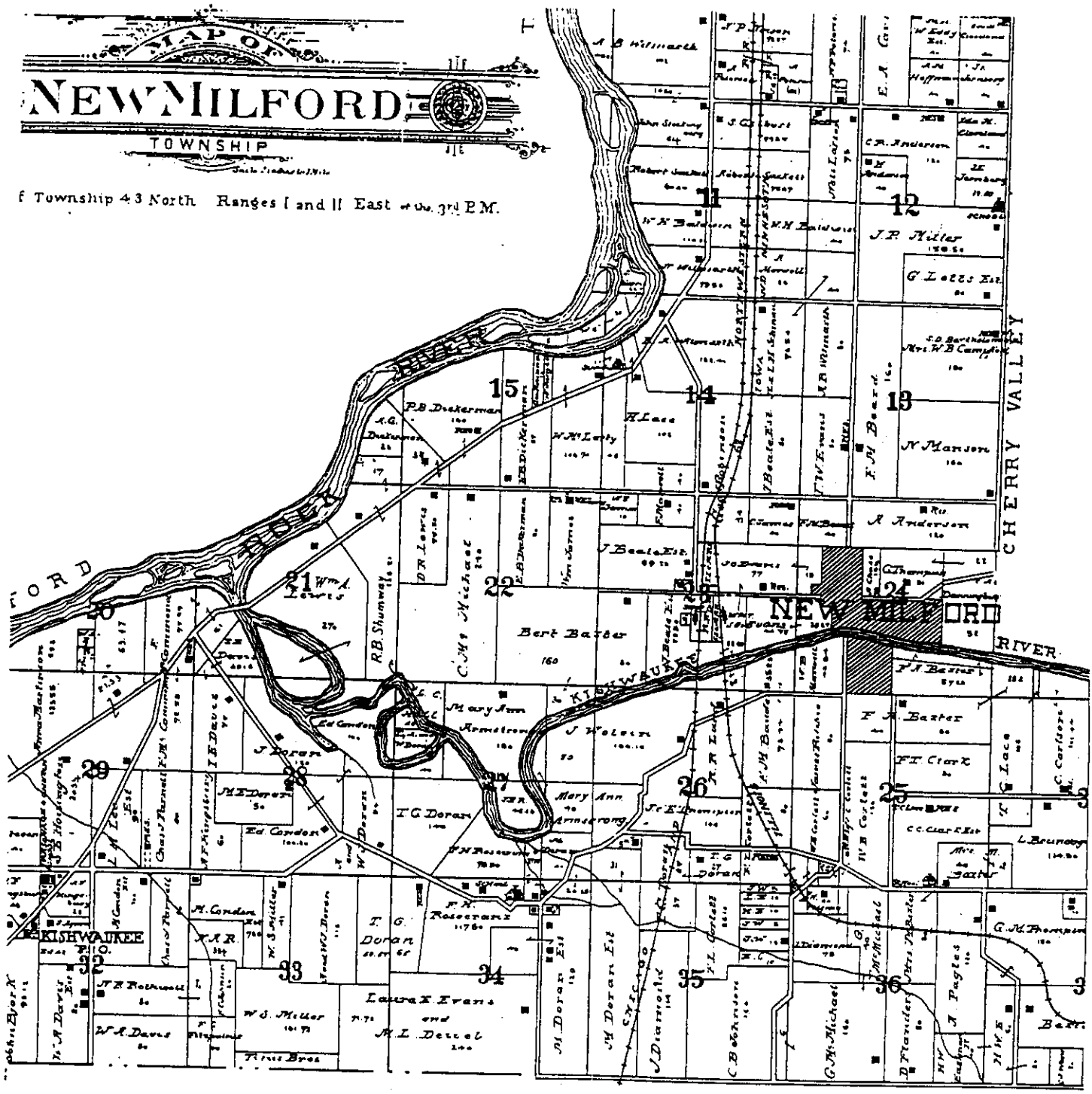


Figure 4. New Milford Township 1905 plat showing the project area.

Plate 1. Remains of a twentieth century house within the project area.

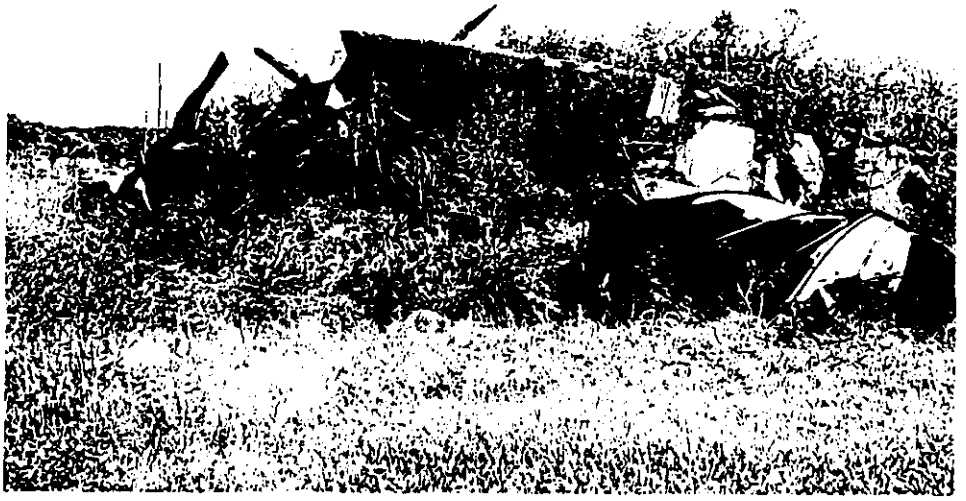


Plate 2. Debris pile north of the twentieth century house within the project area.

ARCHAEOLOGICAL SURVEY SHORT REPORT
Illinois Historic Preservation Agency
Old State Capital Building
Springfield, Illinois 62701 (217) 785-4997
IHPA Log # ~~NA~~ 9406170 19PWO

IHPA Use Only (Form ASSR0886)
Reviewer: _____
date: _____
_____ accepted _____ rejected
mars#: 387

LOCATIONAL INFORMATION AND SURVEY CONDITIONS

County: Winnebago Quadrangle Rockford South 7.5'

ProjectType/Title:

Bridge crossing of Killbuck Creek and borrow area for Winnebago Reclamation District

Funding and/or Permitting Federal/State Agencies: IDOT ?

Sec. W 1/2 of the SE 1/4 of Section 36 T. 43N R. 2E Natural Division (No.) 3d

U. T. M. Center of project: 4668630N, 329420E

Project Description:

Phase I pedestrian survey of an agricultural field located along Killbuck Creek

Topography: Floodplain and terraces

Soils: Millington, Elliott, Kane, and Varna silt loams; and Flager sandy loam

Drainage: Downslope to Killbuck Creek and then to the Kishwaukee River

Land Use/Ground Cover (include % visibility):

Planted in two foot high soybeans which was strip-plowed for survey (visibility 90 to 95% within the strips)

Survey Limitations: None

ARCHAEOLOGICAL AND HISTORICAL INFORMATION

Historic Plats/Atlases/Sources:

1871, 1892, and 1905 plat maps of New Milford Township, Winnebago County, Illinois

Previously Reported Sites:

11-Wo-71 in Section 34 and 11-Wo-72 in Section 26 (west of the project area)

PreviousSurveys:

MARS 101 (Lurie 1990) and RIP airport expansion survey (Berres 1993)

Regional ArchaeologistContacted: M. Catherine Bird

Investigation Techniques:

Pedestrian survey with two archaeologists within each 5 meter wide plowed strip, intervening 5 meter wide unplowed strips of soybeans. Walked in north-south transects beginning in the southeast corner of the parcel.

Time Expended 2 person/days

Sites/Find SpotsLocated: None

Cultural Material:

None (curated at) NA

Collection Techinques:

NA

Area Surveyed (Acres and Square Meters): Approximately 35 acres or 141,645 square meters

RESULTS OF INVESTIGATION AND RECOMMENDATIONS:

[ ] Phase I archaeological reconnaissance has located no archaeological material; project clearance is recommended.

[XXX] Phase I archaeological reconnaissance has located archaeological materials; site(s) does(do) not meet requirements for National Register eligibility; project clearance is recommended.

[ ] Phase I archaeological reconnaissance has located archaeological materials; site(s) may meet requirements for National Register eligibility; further testing is recommended.

[ ] Phase II archaeological investigation has indicated that site(s) does(do) not meet requirements for National Register eligibility; project clearance is recommended.

[ ] Phase II archaeological investigation has indicated that site(s) meet requirements for National Register eligibility; formal report is pending and a determination of eligibility is recommended.

Comments:

Although a structure first appears on the parcel in 1871, the extant foundation does not represent a nineteenth century structure but rather a much more recent construction with a poured concrete foundation. No historical materials were recovered from the surrounding agricultural fields.

CONTRACTOR INFORMATION:

Arch. Contractor: Midwest Archaeological Research Services, Inc.

Address/phone: 18906 Hebron Rd. Harvard, Illinois 60033 (815) 943-3399

Surveyor(s): M. Catherin Bird and R. Gary Stollenwerk Survey date(s): 8/30/94

Report completed by: M. Catherine Bird and Linda Naunapper date: 9/12/94

Submitted by (signature and title): M. Catherine Bird, Conservation Archaeologist

ATTACHMENT CHECK LIST: #1 Through #4 are mandatory:

[XXX] 1) Relevant portion of USGS 7.5" topographic quadrangle map(s) showing project location and any recorded sites;

[XXX] 2) Project map(s) depicting survey limits and, when applicable, approximate site limits and concentrations of cultural material;

[NA] 3) site form(s): two copies of each form);

[XXX] 4) all relevant project correspondence;

[XXX] 5) additional information sheets as necessary.

Address of contracting agency to whom SHPO comment should be mailed:

Winnebago Reclamation District
8403 Lindenwood Road
Rockford, Illinois 61109

Contact Person: Tom Hilbert Phone # 815/874-4806

Reviewers comments:

Thomas Hilbert
Environmental Engineer
Winnebago Reclamation
8403 Lindenwood Rd.
Rockford, IL 61109
(815) 874-4806
September 28, 1994

Ms. Anne E. Haaker
Deputy State Historic Preservation Officer
Illinois Historic Preservation Agency
Old State Capital
Springfield, IL 62701
Re: IHPA Log No. 940617019PWO

Dear Anne:

Winnebago Reclamation Service, Inc. (WRS) has already completed a Phase I archeological reconnaissance survey on a portion of the project area. Results of a survey completed by Dr. Rochelle Lurie of Midwest Archeological Research Services (MARS) in December 1990 are enclosed. This survey encompassed all of the project area on the east side of Kilbuck creek. The survey indicated that there is no evidence of archeological material on the east side of Kilbuck creek within the project area.

The western portion of the project area was surveyed by MARS in august of this year and the results of that survey indicated that there are no significant archeological resources on the west side of Kilbuck creek within the project area.

Since both surveys resulted in no discovery of archeological material Winnebago Reclamation Service, Inc. requests approval of the above referenced project from the Illinois Historic Preservation Agency.

Sincerely,

Thomas Hilbert

Enclosure: 2 copies of Phase I Survey completed by MARS, Sept 16, 1994
1 copy of Phase I Survey completed by MARS, Oct. 29, 1990

Illinois Historic
Preservation Agency

Old State Capitol • Springfield, Illinois 62701 • (217) 782-4836

217/785-4997

WINNEBAGO COUNTY
Rockford
Haul Road Over Kilbuck Creek

PLEASE REFER TO:
IHPA LOG #940617019PWO
MARS 35 acres 0 sites

November 7, 1994

Winnebago Reclamation Service
8403 Lindenwood Road
Rockford, Illinois 61109

Gentlemen:

Thank you for submitting the results of the archaeological reconnaissance. Our comments are required by Section 106 of the National Historic Preservation Act of 1966, as amended, and its implementing regulations, 36 CFR 800: "Protection of Historic Properties".

Our staff has reviewed the archaeological Phase I reconnaissance report performed for the project referenced above.

The Phase I survey and assessment of the archaeological resources appear to be adequate. Accordingly, we have determined, based upon this report, that no significant historic, architectural, and archaeological resources are located in the project area.

Please retain this letter in your files as evidence of compliance with Section 106 of the National Historic Preservation Act of 1966, as amended.

Sincerely,

Anne E. Haaker
Deputy State Historic
Preservation Officer

AEH:JSP

Printed on Recycled Paper

ATTACHMENT 7

Natural Preserve Determination

In accordance with 35 IAC 811.102(d), a Natural Preserve Determination was made in conjunction with the expansion permit application, submitted on April 5, 1991. Since the existing unit was considered part of the facility in that Application, the Natural Preserve Determination is applicable to the existing unit as detailed in the Application submitted herewith. Documentation of the Natural Preserve Determination follows.

ANDREWS ENVIRONMENTAL ENGINEERING INC. 3535 Mayflower Blvd., Springfield, Illinois 62707/(217) 787-2334

October 29, 1990

Gretchen Bonfert
Illinois Department of Conservation
Division of Nature Preserves
600 North Grand Avenue West
Springfield, Illinois 62706

re: Dedicated Illinois Nature Preserve Determination

Dear Ms. Bonfert:

Enclosed is a portion of the U.S.G.S Rockford South Quadrangle Map showing a proposed sanitary landfill expansion and soils borrow area. The site is located in part of the East 1/2 of Section 36, T. 43 N., R. 1 E. and the West 1/2 of Section 31, T. 43 N., R. 2 E., 3 p.m., all in Winnebago County, Illinois.

Please indicate if the proposed project is located in a natural area which was designated as a Dedicated Illinois Nature Preserve pursuant to the Illinois Natural Areas Preservation Act (Ill. Rev. Stat. 1989, ch. 105 par. 701 et seq.)

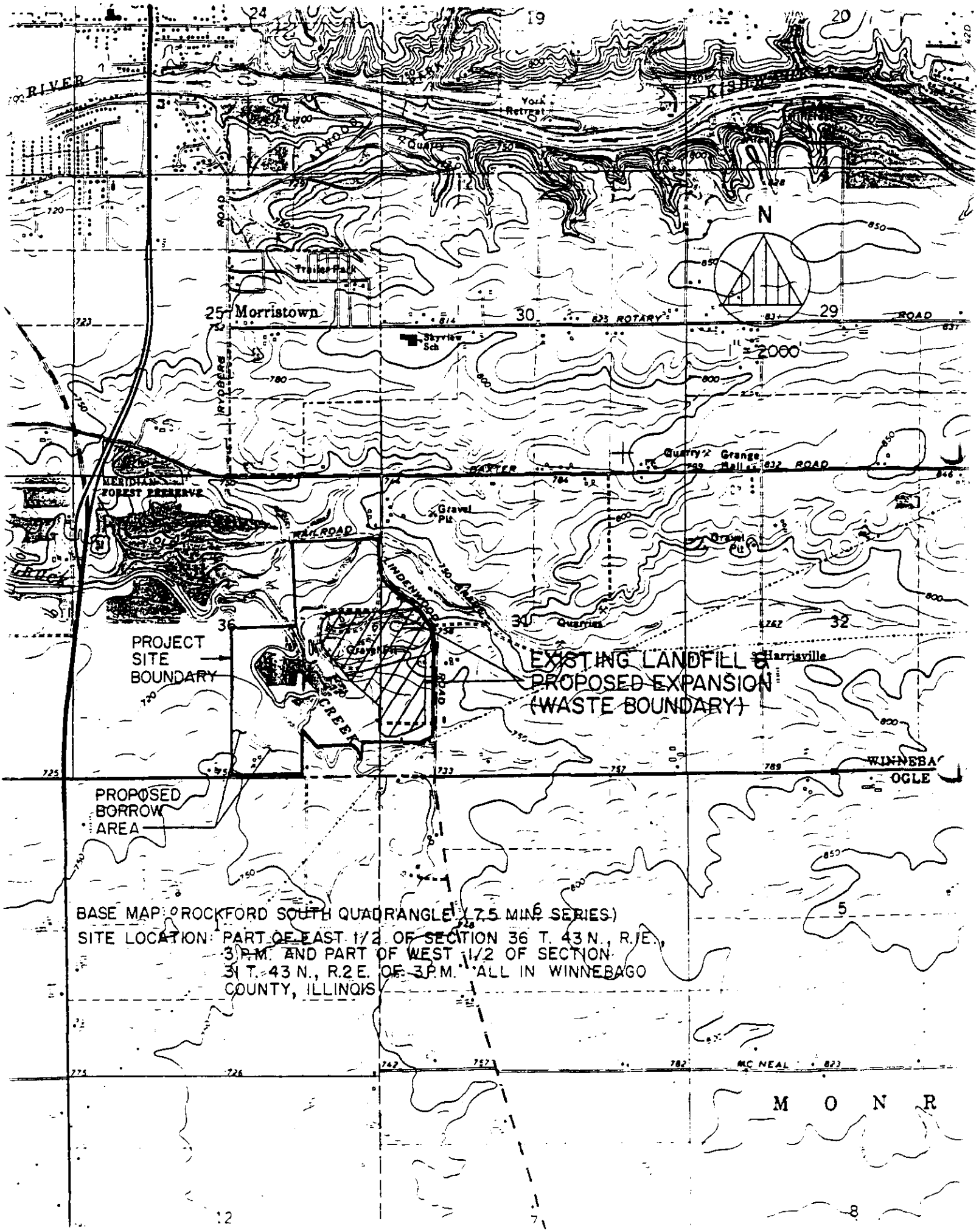
If you have any questions or need any additional information, please contact me. Thank you.

Sincerely,

Daniel R Feezor

Daniel R. Feezor
Environmental Scientist I

DFF:jln
enclosure
cc: Winnebago Reclamation Service, Inc.



BASE MAP: ROCKFORD SOUTH QUADRANGLE (7.5 MIN. SERIES)
SITE LOCATION: PART OF EAST 1/2 OF SECTION 36 T. 43 N., R. 1 E., 3 P.M. AND PART OF WEST 1/2 OF SECTION 31 T. 43 N., R. 2 E. OF 3 P.M. ALL IN WINNEBAGO COUNTY, ILLINOIS

Illinois Nature Preserves Commission

524 SOUTH SECOND STREET
LINCOLN TOWER PLAZA
SPRINGFIELD, ILLINOIS 62706
217/785-8686

320 S Third St
Rockford, IL 61104
4 December 1990

Daniel R Feezor
Environmental Scientist I
Andrews Environmental Engineering Inc
3535 Mayflower Blvd
Springfield, IL 62707

Dear Mr. Feezor:

I have reviewed your map of the proposed sanitary landfill expansion and soils borrow area project located in the south-central part of Winnebago County, Illinois - as per your letter of 29 October 1990 to Gretchen Bonfert, Deputy Director, Illinois Nature Preserves Commission (INPC) - pursuant to the Illinois Pollution Control Board's General Standards for all landfills, Section 811.102(c).

The landfill expansion/soils borrow area project does not appear to pose any direct threat to a Dedicated Illinois Nature Preserve - pursuant to the Illinois Natural Areas Preservation Act (Ill. Rev. Stat. Ch. 105, par. 701 et seq.).

You should be aware, however, that less than one-quarter mile northeast of the NE corner of the defined "project site boundary" there is an Illinois Natural Areas Inventory site (INAI # 914; Winnebago County Reference Number: 63) identified as Winquist Prairie. This Category I (INAI) Grade B dry-mesic prairie is designated as an Illinois Natural Heritage Landmark by the INPC, the Illinois Department of Conservation, and the owner.

You should also be aware that Kilbuck Creek, a section of which is included in the project site, and the lower Kishwaukee River, into which Kilbuck Creek drains, are both designated as Class B Streams - Highly Valued Aquatic Resources by the Illinois Environmental Protection Agency (IEPA) - as per the Biological Stream Characterization (BSC): A Biological Assessment of Illinois Stream Quality. 1989. IEPA/Water Pollution Control.

If you require any further information from INPC, please don't hesitate to contact me.

Sincerely,

John Alesandrini
Natural Areas Pres. Specialist

cc: Gretchen Bonfert, Deputy Director, INPC
Harris Chien, Water Pollution Control, IEPA-Rockford

Illinois Nature Preserves Commission

524 SOUTH SECOND STREET
LINCOLN TOWER PLAZA
SPRINGFIELD, ILLINOIS 62706
217/785-8686

320 S Third St
Rockford, IL 61104
30 January 1991

Daniel R Feezor
Environmental Scientist I
Andrews Environmental Engineering Inc
3535 Mayflower Blvd
Springfield, IL 62707

re: review of proposed sanitary landfill expansion in Winnebago County, IL (as per previous correspondence 12-04-90...)

Dear Mr. Feezor:

Sorry that this got shuffled off into a "miscellaneous" pile for a few days...as per our phone conversation of last week, I have enclosed for your reference and files a copy of the IL Natural Areas Inventory summary and attached location map for Winquist Prairie (INAI Site 914: Winnebago Co Ref No 63) showing precise location of the inventory prairie site in relation to Baxter and Lindenwood Roads.

Thanks for inquiring further about this small but important prairie remnant. Please contact me if I can be of any further assistance.

Sincerely,

John Alesandrini
Natural Areas Preservation Specialist

cc: Gretchen Bonfert, Deputy Director, INPC

ILLINOIS NATURAL AREAS INVENTORY

AREA # 914

COUNTY: Winnebago

REFERENCE NUMBER: 63

AREA NAME: Winquist Prairie

NATURAL AREA CATEGORIES & SIGNIFICANT FEATURES:

CAT.	DESCRIPTION
I	Grade B Dry-mesic prairie

EXCEPTIONAL FEATURES:

CAT.	DESCRIPTION
None	None

LEGAL LOCATION:
NW SEC 31, T43N R2E 3PM

TOPOGRAPHIC QUADRANGLE: Rockford South 7.5

TOTAL ACREAGE: 2.0

OWNERSHIP TYPE: Private

NUMBER OF OWNERSHIPS: 1

PRESERVATION STATUS:
Private land, not protected by owner or lessee

THREATS:
Threat of destruction known, but not immediate: Mining

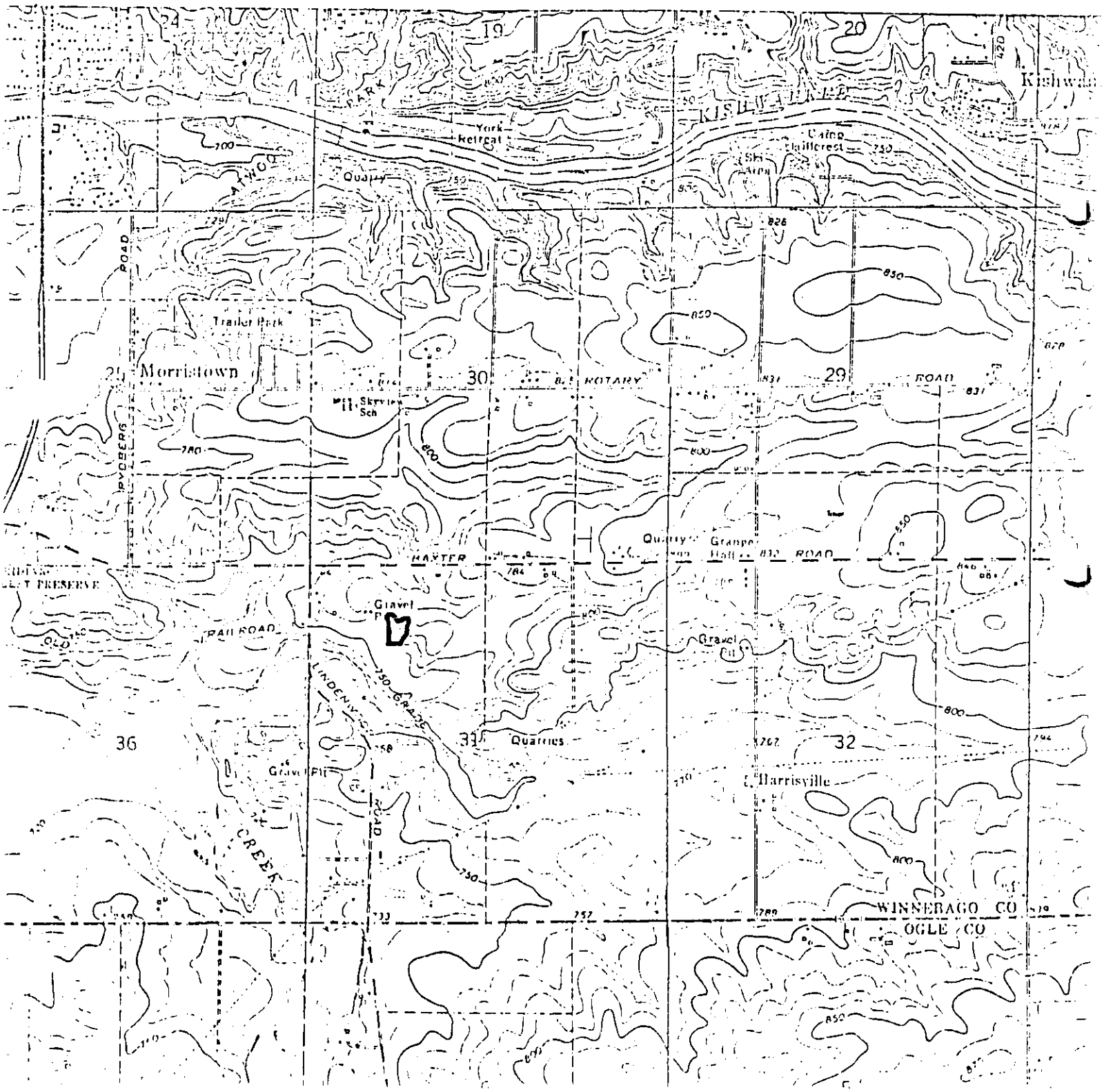
County WINNEBAGO No. 63

Name of Area WINQUIST PRAIRIE

Quadrangle ROCKFORD SOUTH 7.5

Location SEC. 31, T43N, R2E

ILLINOIS NATURAL AREAS INVENTORY



ATTACHMENT 8

Critical Habitat Evaluation

In accordance with 35 IAC 811.102(e), a Critical Habitat of Endangered Species Determination was made in conjunction with the expansion permit application, submitted on April 5, 1991. Since the existing unit was considered part of the facility in that Application, the Critical Habitat of Endangered Species Determination is applicable to the existing unit as detailed in the Application submitted herewith. Documentation of the Critical Habitat of Endangered Species Determination follows.

ANDREWS ENVIRONMENTAL ENGINEERING INC. 3535 Mayflower Blvd., Springfield, Illinois 62707/(217) 787-2334

October 29, 1990

Deanna Glasser, Ph.D.
Endangered and Threatened Species Program Manager
Illinois Department of Conservation
524 South Second Street
Springfield, Illinois 62701-1757

re: Endangered Species Evaluation

Dear Dr. Glasser:

Enclosed is a portion of the U.S.G.S. Rockford South Quadrangle Map showing a proposed sanitary landfill expansion and soils borrow area. The site is located in part of the East 1/2 of Section 36, T.43N., R.1E. and the West 1/2 of Section 31, T.43N., R.2E., 3 P.M., all in Winnebago County, Illinois.

Please indicate if the proposed project is located in an area where it may jeopardize the continued existence of any designated endangered species, result in the destruction or adverse modification of the critical habitat listed for such species, or cause or contribute to the taking of any endangered or threatened species of plant, fish or wildlife listed pursuant to the Endangered Species Act 16 U.S.C. 1531 et seq., or the Illinois Endangered Species Act (Ill. Rev. Stat. 1989, ch. 8, par. 331 et seq.).

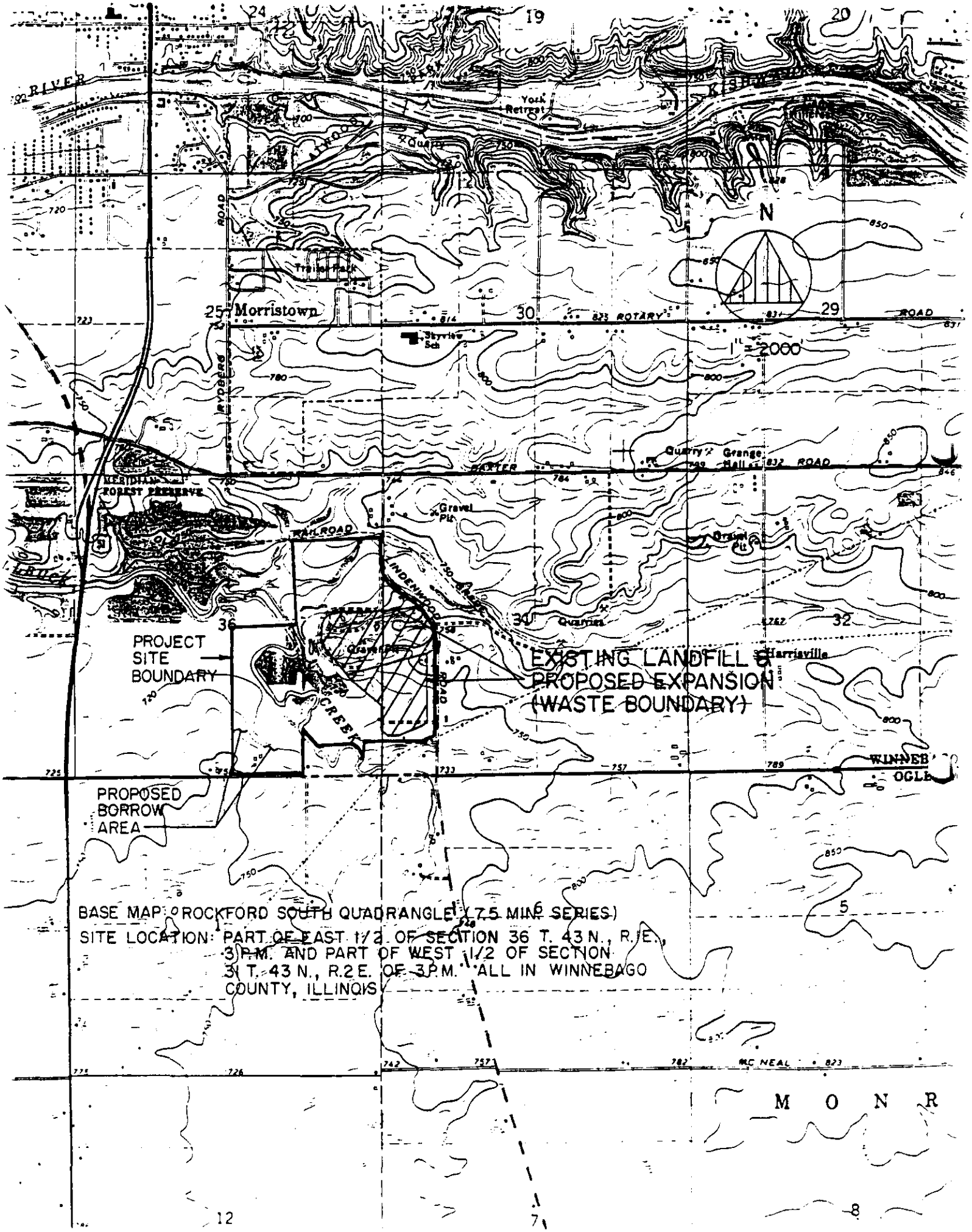
If you have any questions or need additional information, please contact me. Thank you.

Sincerely,

Daniel R Feezor

Daniel R. Feezor,
Environmental Scientist I

DRF:pll
enclosure
cc: Winnebago Reclamation Service, Inc.


PROJECT SITE BOUNDARY
EXISTING LANDFILL & PROPOSED EXPANSION (WASTE BOUNDARY)
PROPOSED BORROW AREA
Morristown
Harrisville
N
1" = 2000'
BASE MAP: ROCKFORD SOUTH QUADRANGLE (7.5 MIN. SERIES)
SITE LOCATION: PART OF EAST 1/2 OF SECTION 36 T. 43 N., R. 1 E., 3 P.M. AND PART OF WEST 1/2 OF SECTION 31 T. 43 N., R. 2 E. OF 3 P.M. ALL IN WINNEBAGO COUNTY, ILLINOIS

Illinois Department of Conservation
life and land together

LINCOLN TOWER PLAZA • 524 SOUTH SECOND STREET • SPRINGFIELD 62701-1787
CHICAGO OFFICE • ROOM 4-300 • 100 WEST RANDOLPH 60601
MARK FRECH, DIRECTOR - KATHY SELCKE, ASSISTANT DIRECTOR

November 1, 1990

Daniel Feezor
Environmental Scientist
Andrews Environmental Engineering, Inc.
3535 Mayflower Blvd.
Springfield, IL 62707

Dear Daniel Feezor:

This replies to your October 29 request to Dr. Deanna Glosser for endangered species evaluation of a landfill site in Winnebago County, Illinois.

We have no records of the occurrence of endangered or threatened species at the site under review. Therefore, we would not expect the proposed landfill expansion to have adverse effects on any state-listed species. Our lack of records should not be interpreted as an absolute assurance that no endangered or threatened species are present on the site. It is always possible that rare species of which we are not aware occur in the area. To our knowledge, detailed surveys of the area have not been done.

Your letter requests review pursuant to both the U.S. and Illinois Endangered Species Acts. Although we do maintain records of federal-listed species which occur in Illinois, our review cannot be considered the official position of the U.S. Fish and Wildlife Service. I encourage you to contact the Fish and Wildlife Service at 1830 Second Ave., Rock Island, IL 61201, or by phone at (309)793-5800 to request their review of the project.

We cannot charge you for our search of the Illinois Natural Heritage Database, but we encourage you to support its continued operation through a tax-deductible contribution to the Illinois Nongame Wildlife Conservation Fund. A sheet summarizing costs to the Database is enclosed.

If you have additional questions, please contact us.

Sincerely,

Glen Kruse

Glen Kruse
Project Manager

SUMMARY OF COSTS TO ILLINOIS NATURAL HERITAGE DATABASE

Staff Time	$40.00
Total	$40.00

Contributions may be sent to:

Illinois Nongame Wildlife Conservation Fund
Division of Natural Heritage
Illinois Department of Conservation
Lincoln Tower Plaza, 524 S. Second
Springfield, IL 62701-1787

ENCAP, Inc.
Environmental Consultants and Planners

400 E. HILLCREST
SUITE 240
FAX: 815-758-6821

P.O. BOX 721
DEKALB, IL 60115
TELEPHONE: 815/758-1621

January 24, 1991

Mr. Andy Rathsack
Andrews Environmental Engineering, Inc.
3535 Mayflower Boulevard
Springfield, Illinois 62707

Re: Winnebago Reclamation Services Project

Dear Mr. Rathsack:

This letter stands as a supplement to our Wetland Determination Report dated 12 November 1990. In our report, we state that the subject property does not provide the types of habitats required by any of the state or federally-listed threatened or endangered species found in Illinois. Furthermore, the Illinois Natural Heritage Database (Glen Kruse, IDOC letter dated 1 November 1990) does not show records for any listed species at the subject property. It is the opinion of IDOC and this office that the proposed landfill expansion will not have adverse effects on any state-listed species.

This finding indicates the Winnebago Reclamation Services project near Rockford, Illinois is in compliance with Section 811.102 (Location Standards) of the recently adopted Illinois landfill regulations.

Sincerely,

William E. Southern
President

WES:sas

cc: John Lichty

ATTACHMENT 9

Wetland Determination and Section 404 Compliance Documentation

In accordance with 35 IAC 811.102(e), a Wetland Determination was made in conjunction with the expansion permit application, submitted on April 5, 1991. Since the existing unit was considered part of the facility in that Application, the Wetland Determination is applicable to the existing unit as detailed in the Application submitted herewith. Documentation of the Wetland Determination follows.

WETLands USE PERMIT.

DEPARTMENT OF THE ARMY
ROCK ISLAND DISTRICT, CORPS OF ENGINEERS
CLOCK TOWER BUILDING — P.O. BOX 2004
ROCK ISLAND, ILLINOIS 61204-2004

REPLY TO
ATTENTION OF:

September 1, 1993

Operations Division

SUBJECT: CENCR-OD-S-275290

Mr. Thomas Hilbert
Winnebago Reclamation Services, Inc.
8403 Lindenwood Road
Rockford, Illinois 61109

Dear Mr. Hilbert:

Our office reviewed your application dated July 19, 1993, concerning the proposed placement of fill material into an isolated wetland associated with the expansion of the Winnebago Reclamation Landfill in Section 31, Township 43 North, Range 1 East, Winnebago County, Illinois.

The State of Illinois denied state water quality certification under Section 401 of the Clean Water Act for the nationwide permit as described under Item 26 of the enclosed Fact Sheet No. 3(IL). This is the nationwide permit under which your activity will be covered after you obtain either water quality certification or waiver from the Illinois Environmental Protection Agency for your project.

You are advised that this verification of the nationwide permit authorization for your project is valid for two years from the date of this letter. If the project is not completed within this two-year period or your project plans change, you should contact our office for another determination.

You are reminded that no work can be started until you receive all required Federal, state, and local approvals.

Should you have any questions, please contact our Regulatory Functions Branch by letter, or telephone Mr. Jeff Sniadach, 309/794-5369.

Sincerely,

Raymond J. Horton P.E.

James H. Blanchar, P.E.
Chief, Operations Division

Enclosure

State of Illinois
ENVIRONMENTAL PROTECTION AGENCY

Mary A. Gade, Director

2200 Churchill Road, Springfield, IL 62794-9276

217/782-0610

October 15, 1993

Mr. James H. Blanchar, P.E.
Chief, Operations Division
Rock Island District
Corps of Engineers
Clock Tower Building
Rock Island, Illinois 61201

Re: Winnebago Reclamation Services, Inc. (Winnebago County)
Landfill Expansion - Wetland
Log #C-894-93 [CoE Appl. 275290]

Dear Mr. Blanchar:

This Agency received a request on August 4, 1993, from Winnebago Reclamation Services, Inc. requesting necessary comments for environmental consideration concerning the expansion of a landfill into a wetland adjacent to Kilbuck Creek, with development of a wetland mitigation area, near Rockford. We offer the following comments.

Based on the information included in this submittal, it is our engineering judgment that the proposed project may be completed without causing water pollution as defined in the Illinois Environmental Protection Act, provided the project is carefully planned and supervised.

These comments are directed at the effect on water quality of the construction procedures involved in the above described project and is not an approval of any discharge resulting from the completed facility, nor an approval of the design of the facility. These comments do not supplant any permit responsibilities of the applicant towards this Agency.

This Agency hereby issues certification under Section 401 of the Clean Water Act (Pl 95-217), subject to the applicant's compliance with the following conditions:

1. The applicant shall not cause:

   a. violation of applicable water quality standards of the Illinois Pollution Control Board, Title 35, Subtitle C: Water Pollution Rules and Regulations;

   b. water pollution as defined and prohibited by the Illinois Environmental Protection Act; and

   c. interference with water use practices near public recreation areas or water supply intakes.

2. The applicant shall provide adequate planning and supervision during the project construction period for implementing construction methods, processes and cleanup procedures necessary to prevent water pollution and control erosion

3. Any spoil material excavated, dredged or otherwise produced must not be returned to the waterway but must be deposited in a self-contained area in compliance with all State statutes, regulations and permit requirements with no discharge to the waters of the State unless a permit has been issued by this Agency. Any back filling must be done with clean material and placed in a manner to prevent violation of applicable water quality standards.

4. All areas affected by construction shall be mulched and seeded as soon after construction as possible. The applicant shall undertake necessary measures and procedures to reduce erosion during construction. Interim measures to prevent erosion during construction shall be taken and may include the installation of staked straw bales, sedimentation basins and temporary mulching. All construction within the waterway shall be conducted during zero or low flow conditions.

   The applicant shall be responsible for obtaining an NPDES Storm Water Permit prior to initiating construction if the construction activity associated with the project will result in the disturbance of 5 (five) or more acres, total land area. An NPDES Storm Water Permit may be obtained by submitting a properly completed Notice of Intent (NOI) form by certified mail to the Agency's Division of Water Pollution Control, Permit Section.

5. The applicant shall implement erosion control measures consistent with the "Standards and Specifications for Soil Erosion and Sediment Control" (IEPA/WPC/87-012).

6. The applicant shall comply with the Subtitle G permit issued for this landfill by this Agency.

7. This certification becomes effective when the Department of the Army, Corps of Engineers, includes the above conditions #1 through 6 as conditions of the requested permit issued pursuant to Section 404 of PL. 95-217.

This certification does not grant immunity from any enforcement action found necessary by this Agency to meet its responsibilities in prevention, abatement, and control of water pollution.

Very truly yours,

Thomas G. McSwiggin, P.E.
Manager, Permit Section
Division of Water Pollution Control

TGM:BY:sad/1983v,19-20

cc: IDOT, Division of Water Resources, Springfield
USEPA, Region V
DWPC, Records Unit
DWPC, Field Operations Section, Rockford
Winnebago Reclamation Services, Inc.

JOINT APPLICATION FORM

1. Application Number (To be assigned by Agency)

2. Date: 29 (Day) Dec (Month) 1990 (Year)

3. For Agency use only (Date Received)

4. Name and address of applicant

Winnebago Reclamation Services
4920 Forest Hills Road
Loves Park, Illinois 61111

Telephone no. during business hours
A/C (815) 874-4806
A/C ( )

5. Name, address, and title of authorized agent

ENCAP, Inc.
400 East Hillcrest, Suite 240
DeKalb, Illinois 60115

Telephone no. during business hours
A/C (815) 758-1621
A/C ( )

6. Describe in detail the proposed activity, its purpose, and intended use. If additional space is needed, attach additional support information to each agency application.

Winnebago Reclamation - see attached sheet

7. Names, addresses, and telephone numbers of all adjoining and potentially affected property owners, including the owner of subject property if different from applicant.

Available upon request

8. Location of activity
Address:

Killbuck Road (west); Rt. 51 (east)
Street, road, or other descriptive location

Rockford and Cherry Valley Townships
In or near city or town

Winnebago County — Illinois
County — State — Zip Code

Legal Description:

See attached legal description
¼ — Sec. — Twp. — Rge. — P.M.

Tax Assessor's Description (if known):

Map No. — Subdiv. No. — Lot No.

Name of waterway at location of the activity

Killbuck Creek

9. Date activity is proposed to commence July 1991 Date activity is expected to be completed 6 mos. approx.

10. Is any portion of the activity for which authorization is sought now complete? ___ Yes XX No If answer is "Yes" give reasons in the remark section. Month and Year the activity was completed _____ Indicate the existing work on drawings.

11. List all approvals or certifications required by other federal, interstate, state, or local agencies for any structures, construction, discharges, deposits, or other activities described in this application. If this form is being used for concurrent application to the Corps of Engineers, Illinois Department of Transportation, and Illinois Environmental Protection Agency, these agencies need not be listed.

Issuing Agency	Type Approval	Identification No.	Date of Application	Date of Approval
Winnebago County Board	Zoning/Siting approval			

12. Has any agency denied approval for the activity described herein or for any activity directly related to the activity described herein.
___ Yes XX No (If "Yes", explain in remarks.)

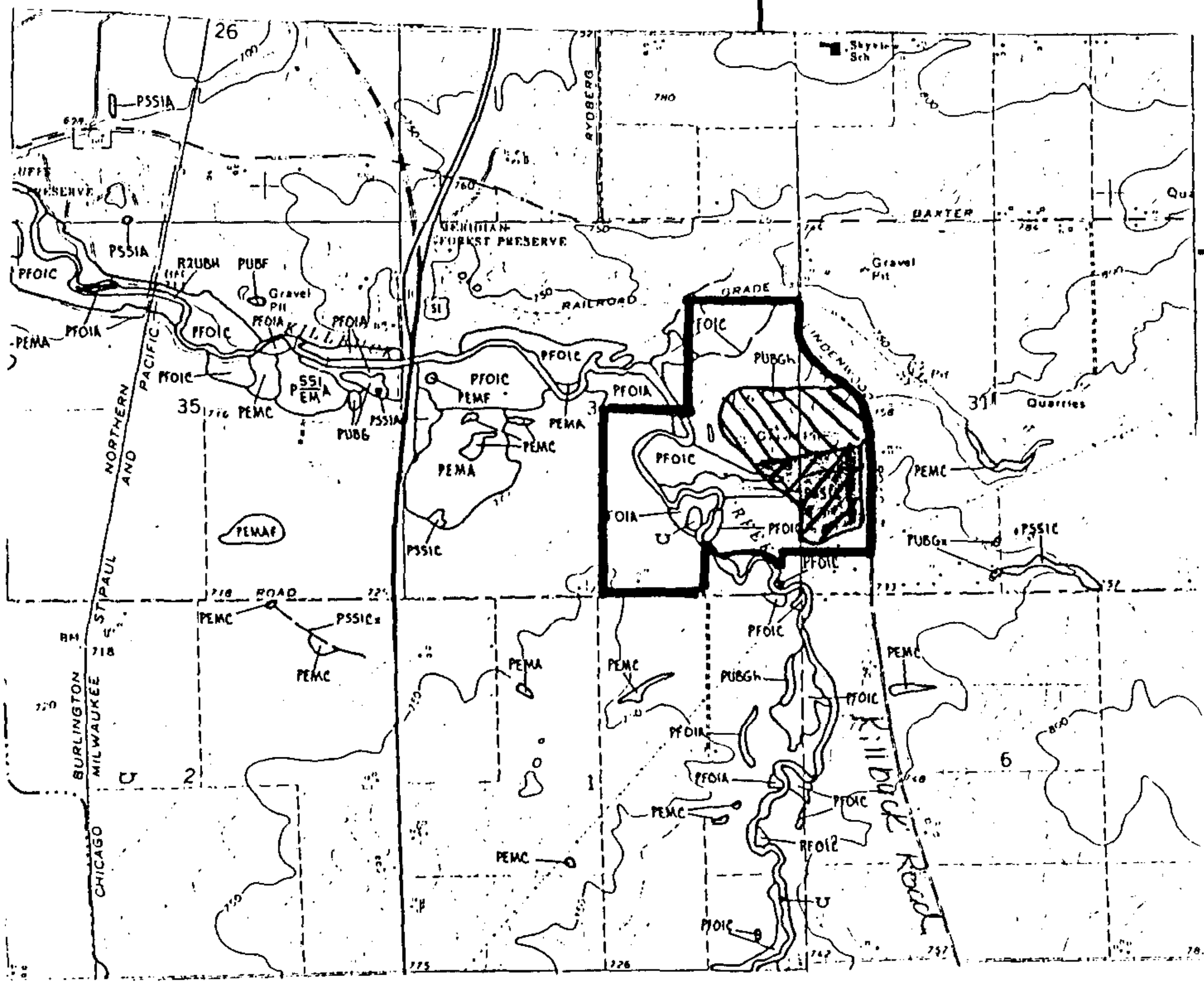
13. Remarks

14. Application is hereby made for authorizations of the activities described herein. I certify that I am familiar with the information contained in the application, and that to the best of my knowledge and belief, such information is true, complete, and accurate. I further certify that I possess the authority to undertake the proposed activities.

Signature of Applicant or Authorized Agent

NCR FORM 426
01 JUNE 81

CORPS OF ENGINEERS COPY - SEE JURISDICTIONAL MAP FOR ADDRESS



LIST OF ADJACENT PROPERTY OWNERS

NO.	NAME	ADDRESS
1.	Available Upon Request	
2.		
3.		
4.		

PROJECT DESCRIPTION:

Winnebago Reclamation

LOCATION: T43N R2E ; T43N R1E

Winnebago County, Rockford Township and Cherry Valley Township

SHEET OF

NCR FORM 427
01 JUNE 81

CORPS OF ENGINEERS COPY

See Enclosed Plans

PROJECT DESCRIPTION:

Winnebago Reclamation

LOCATION: T43N R2E; T43N R1E

Winnebago County; Rockford and Cherryvalley Townships

6. A planned expansion of the Winnebago Reclamation Landfill. A wetland determination conducted on 5 November 1990, indicated a portion of scrub-shrub/forested wetland extended onto the proposed expansion site. Site plans indicate that approximately 2 acres of the 3.73 acre wetland will be filled (0.83 acre) or directly impacted (1.17 acres). The wetland acreage to be filled lies outside the floodplain and is artificial in nature and the result of pre-1970 land use which altered hydrology at the site. The wetland exists on a compacted pad of non-hydric soil (Orthents, Loamy; 802) and is qualified as a jurisdictional wetland because of wetland hydrology and the presence of a predominance of hydrophytic vegetation. A spoil pile keeps water from entering a drainway leading to Killbuck Creek. This is an isolated wetland and has no hydrologic connection with any other wetland.

The entire wetland will be mitigated for at a ratio of 1.5:1. A 5.6 acre emergent wetland will be created within the Killbuck Creek floodplain. All spoil resulting from construction of the mitigation wetland will be removed from the floodplain. The resulting action will increase storage capacity within the floodplain. The mitigation wetland will be completed at least a year prior to disturbance of the existing wetland. The wetland mitigation plan (Design Plan, Cross-sections and Narrative) accompanies the site plan included with this application. This project will result in a net gain of 3.6 acres of wetland at the project site.

Run-off and sedimentation from the expansion area will be controlled in accordance with the issuance of a National Pollutant Discharge Elimination System (NPDES) Permit. A sedimentation basin will be constructed if required.

EXHIBIT A

LEGAL DESCRIPTION

Part of the East Half (1/2) of Section Thirty-Six (36), Township Forty-Three (43) North, Range One (1) East of the Third (3rd) Principal Meridian and part of the West Half (1/2) of Section Thirty-One (31), Township Forty-Three (43) North, Range Two (2) East of the Third (3rd) Principal Meridian bounded and described as follows to wit: Beginning at the Southwest corner of the Southeast Quarter (1/4) of Section 36, Township 43 North, Range One (1) East of the Third (3rd) Principal Meridian; thence North 01 00' 37" West, along the West line of said Southeast Quarter (1/4), a distance of 2646.66 feet, to the Northwest corner of said Southeast Quarter (1/4); thence North 88 40' 20" East, along the North line of said Southeast Quarter (1/4), a distance of 1321.49 feet to the Southwest Corner of the East Half (1/2) of the Northeast Quarter (1/4) of Section 36, Township 43 North, Range One (1) East of the Third (3rd) Principal Meridian; thence North 00 58' 29" West, along the West line of the East Half (1/2) of said Northeast Quarter (1/4), a distance of 1532.38 feet to a point which is 1100.00 feet perpendicularly distant South from the North line of said Northeast Quarter (1/4); thence North 88 12' 42" East, parallel with the North line of said Northeast Quarter (1/4), a distance of 1322.55 feet to the East line of said Northeast Quarter (1/4); thence South 00 56' 21" East, along the East line of said Northeast Quarter (1/4), 701.26 feet to the Southwesterly right-of-way line for County Highway 11A (commonly known as Lindenwood Road); thence South 49 03' 37" East, along said right-of-way line, 356.72 feet; thence South 52 18' 16" East, along said right-of-way line, 23.01 feet; thence North 00 31' 44" East, 62.94 feet to the center line of County Highway 11A (Lindenwood Road); thence Southeasterly along a circular curve to the left, having a center which lies 716.14 feet to the Northeast, an arc distance of 15.02 feet (the chord across the previously described circular curve course bears south 51 42' 16" East, 15.02 feet); thence South 52 18' 16" East, along said center line, 259.97 feet; thence South 37 41' 44" West, 50.00 feet to the Southwesterly right- of-way line for County Highway 11A (Lindenwood Road); thence South 52 18' 16" East, along said right-of-way line, 123.30 feet; thence South 38 05' 50" East, along said right-of-way line, 444.23 feet to the South line of the Northwest Quarter (1/4), of Section 31, Township 43 North, Range Two (2) East of the Third (3rd) Principal Meridian; thence North 88 21' 11" East, along said line, 53.79 feet to the center line of County Highway 11A (Lindenwood Road); thence Southeasterly, along a circular curve to the right having a center which lies 955.00 feet to the Southwest, an arc distance of 362.48 feet (the chord across the previously described circular curve course bears South 11 47' 41" East, 1[illegible].11 feet); thence South 00 55' 16" East, along said center line, 1472.95 feet to the Northwesterly line of a Commonwealth Edison right-of-way; thence South 63 48' 23" West, along said right of way line, 652.00 feet; thence South 88 21'

59" West, 364.83 feet to the East line of Section 36, Township 43 North, Range One (1) East of the Third (3rd) Principal Meridian; thence South 88 21' 59" West, 341.76 feet; thence South 00 56' 21" East, 155.11 feet to the center line of the Kilbuck Creek; thence Northwesterly, along the center line of said creek, 301.00 feet (the chord across the previously described irregular creek course bears North 68 40' 19" West, 278.12 feet); thence South 68 39' 36" West, 363.84 feet to the center line of the Kilbuck Creek; thence Northwesterly, along the center line of said creek, 530.00 feet to the West, line of the Southeast Quarter (1/4) of the Southeast Quarter (1/4) of Section 36, Township 43 North, Range One (1) East of the Third (3rd) Principal Meridian (the chord across the previously described irregular creek course bears North 49 15' 28" West, 508.97 feet); thence South 00 58' 29" East, along said line, 716.05 feet to the South line of Section 36, Township 43 North, Range One (1) East of the Third (3rd) Principal Meridian; thence South 88 43' 13" West, along said line, 1319.84 feet to the point of beginning. Subject to the rights of the public and the State of Illinois in and to those portions thereof taken, used, dedicated, or reserved for public road purposes. Situated in the County of Winnebago and the State of Illinois and containing 244.901 acres.

APPROXIMATE SCALE

0 1000 FEET

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

WINNEBAGO COUNTY, ILLINOIS

(UNINCORPORATED AREAS)

PANEL 50 OF 115

(MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER
170720 0050 B

EFFECTIVE DATE:
NOVEMBER 19, 1980

federal emergency management agency
federal insurance administration

KEY TO MAP

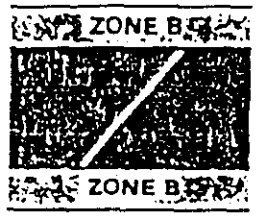
500-Year Flood Boundary

100-Year Flood Boundary

Zone Designations* With Date of Identification e.g., 12/2/74

100-Year Flood Boundary

500-Year Flood Boundary



Base Flood Elevation Line With Elevation In Feet** — 513 —

Base Flood Elevation in Feet Where Uniform Within Zone** (EL 987)

Elevation Reference Mark RM7 ×

River Mile • M1.5

**Referenced to the National Geodetic Vertical Datum of 1929

*EXPLANATION OF ZONE DESIGNATIONS

ZONE	EXPLANATION
A	Areas of 100-year flood; base flood elevations and flood hazard factors not determined.
AO	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; average depths of inundation are shown, but no flood hazard factors are determined.
AH	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; base flood elevations are shown, but no flood hazard factors are determined.
A1-A30	Areas of 100-year flood; base flood elevations and flood hazard factors determined.
A99	Areas of 100-year flood to be protected by flood protection system under construction; base flood elevations and flood hazard factors not determined.
B	Areas between limits of the 100-year flood and 500-year flood; or certain areas subject to 100-year flooding with average depths less than one (1) foot or where the contributing drainage area is less than one square mile; or areas protected by levees from the base flood. (Medium shading)
C	Areas of minimal flooding. (No shading)
D	Areas of undetermined, but possible, flood hazards.
V	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors not determined.
V1-V30	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors determined.

NOTES TO USER

Certain areas not in the special flood hazard areas (zones A and V) may be protected by flood control structures.

This map is for flood insurance purposes only; it does not necessarily show all areas subject to flooding in the community or all planimetric features outside special flood hazard areas.

For adjoining map panels, see separately printed Index To Map Panels.

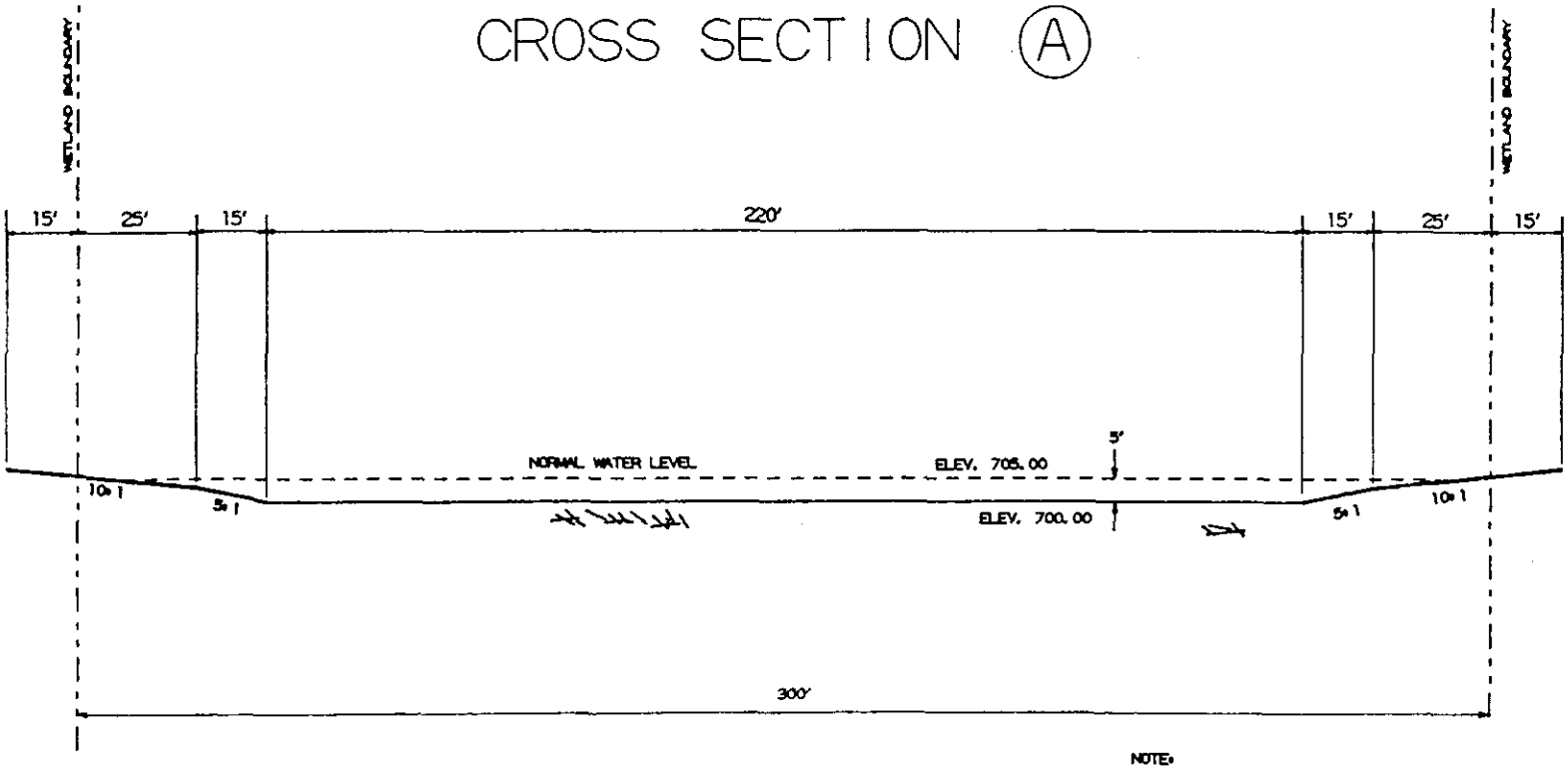
Description of Elevation Reference Marks on Panel 170720 0050 B

INITIAL IDENTIFICATION
JANUARY 10, 1975

FLOOD HAZARD BOUNDARY MAP REVISIONS

E. J. Inc.
109 E. Hillcrest St. 240
P.O. Box 721
DeKalb, IL 60115

CROSS SECTION (A)

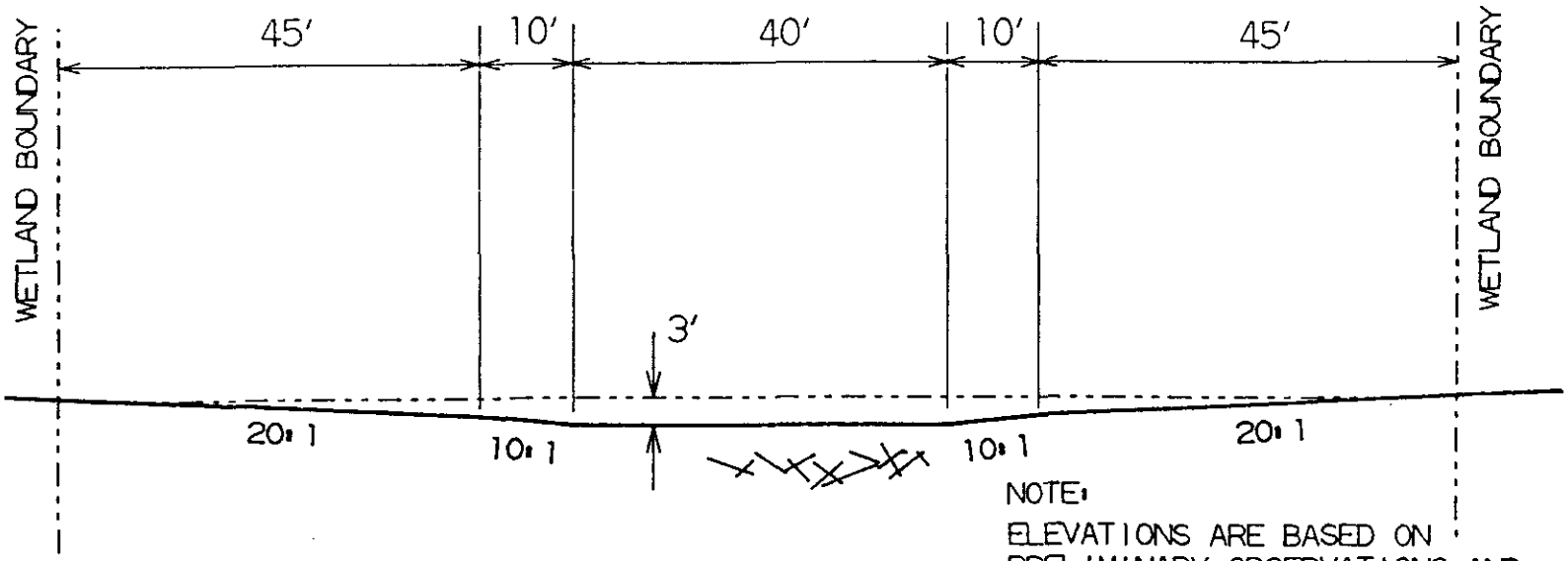


SCALE: 1" = 40'

NOTE:
GIVEN ELEVATIONS ARE BASED ON PRELIMINARY OBSERVATIONS AND ARE SUBJECT TO REVISION.

ap, Inc.
400 E. Hillcrest, Ste. 240
P.O. Box 721
DeKalb, IL 60115

CROSS SECTION (B)

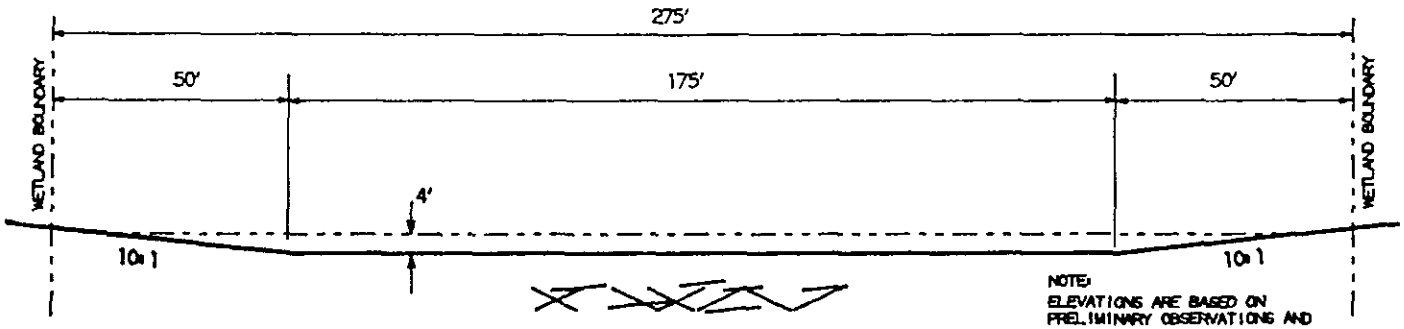


NOTE:
ELEVATIONS ARE BASED ON PRELIMINARY OBSERVATIONS AND SUBJECT TO CHANGE TO ACHIEVE FIVE FOOT (5') WATER DEPTH

SCALE: 1" = 20'

p, inc.
400 E. Hillcrest St. 240
P.O. Box 721
DeKalb, IL 60115

CROSS SECTION Ⓒ



NOTE:
ELEVATIONS ARE BASED ON PRELIMINARY OBSERVATIONS AND SUBJECT TO CHANGE TO ACHIEVE FIVE FOOT (5') WATER DEPTH

SCALE: 1" = 40'

Routine Wetland Delineation

Winnebago Reclamation Landfill

Submitted to: Winnebago Reclamation Services
4920 Forest Hill Road
Loves Park, Illinois
Attn: Gary Marzorati

Date submitted: 13 December 1990

Routine Wetland Delineation

Project: Winnebago Reclamation Landfill Site

Site location: Illinois, Winnebago County, Rockford Township, T43N R1E, Section 36 and Cherry Valley Township, T43N R2E, Section 31

National Wetlands Inventory (NWI): Rockford South Quad

Date of site visit: 5 November 1990

Investigators: D. Koehring, T. Krumwiede and W.E. Southern

Narrative to Accompany Aerial Photograph

The subject property is located along Killbuck Creek in southern Winnebago County south of Rockford. The property adjoins an operational landfill owned by Winnebago Reclamation. The purpose of the site visit was to determine if any jurisdictional wetlands existed on a 31 acre site proposed for landfill expansion. In addition to the 31 acre tract, we examined a zone of adjacent property approximately 500 feet in width for wetlands and other sensitive habitats.

Prior to its current use as a landfill, the project area was mined for gravel. This land-use history accounts for an altered landscape at the project area. The Winnebago County Soil Survey shows hydric floodplain soils running along Killbuck Creek. This hydric soil is interrupted by a unit mapped as Loamy Orthents (802) immediately south of the existing landfill. This mapping unit describes moderately fine to moderately coarse soils that have been mixed by filling and leveling operations.

The National Wetland Inventory (NWI) shows an expanse of scrub-shrub and forested wetland extending eastward from Killbuck Creek onto the western edge of the proposed expansion site. The eastern one-half of the NWI-wetland occurs on soils mapped as Loamy Orthents (D; see COE data sheets). This "pad" of mixed soils is outside of the floodplain and elevated approximately 3 feet above the adjacent cropland. It was determined by ENCAP that the forested/scrub-shrub wetland associated with Killbuck Creek terminated at the western extent of this pad of non-wetland soils. The southeastern portion of the pad, however, causes run-off from the east to pool and this portion of the area was determined to be a jurisdictional scrub-shrub wetland. This wetland is isolated from the wooded wetland along the creek but water may leave the area through a break in an old spoil bank. The water then enters a ditched drainway which empties into Killbuck Creek. This spoil bank was created many years ago. It separates the scrub-shrub area from the drainway and is the

reason this "artificial" wetland remains inundated. This shallow drainway and a small amount of adjacent cropland also were determined to be jurisdictional wetland. These 3 portions of contiguous wetland total 3.73 acres, of which only 0.83 acres occur within the proposed landfill expansion boundary. The wetland was delineated in the field with 4-foot lath stakes marked with blue and white flagging. We began staking at Killbuck Creek and moved clockwise around the wetland numbering stakes sequentially. All acreage values were determined by digitizing the aerial photograph (scale 1" = 100') which accompanies this report.

The cropland portion of the wetland (Part B) is the terminal end of a natural drainway and totals 0.09 acres. Soybeans were not harvested from this portion of the field presumably because of the wet conditions. Pennsylvania Smartweed (Polygonum pensylvanicum, Cocklebur (Xanthium strumarium), Giant Foxtail (Seteria faberii), and Chufa (Cyperus esculentus) were the dominant plant species within the wetland. Standing water was present in several pockets of the cropfield and reached maximum depths of 2-4 inches within the wetland. The mottled condition of the Comfrey Loam soil indicates that extended periods of soil saturation exist at this site. The amount of water present at the time of the site visit is attributed to a significant (1.8 inches) rainfall that occurred the day before.

The largest portion of this wetland (3.18 acres) is a scrub-shrub/forested wetland (Part A) which actually occurs upon fill material and is perched 2-4 feet above the crop field and ditch. Because of their disturbed nature, soils were not used for delineating this portion as wetland. Although disturbed, this area does function as a wetland and does satisfy the wetland hydrology and hydrophytic vegetation criteria. Former and current land-use has funneled runoff from the east to this artificially perched area. This has been the case for many years as is evidenced by the presence of tree species which are adapted to seasonally saturated conditions. Trees present include Black Willow (Salix nigra), Cottonwood (Populus deltoides), Box Elder (Acer negundo) and White Willow (Salix alba). Reed Canary Grass (Phalaris arundincea) dominates the sparsely vegetated understory in places where the canopy has remained somewhat open. The water on this perched site backs up until it reaches a depth that allows overflow into the ditched basin and eventually to Killbuck Creek. A subsurface hydrological connection with Killbuck Creek does not exist. This shallow, intermittent ditch was cut to facilitate drainage of the altered upland. The streambed lies slightly lower than the crop field and, therefore, moves water to the creek. This drainway (Part C) occurs at the northern extent of the Comfrey Loam mapping unit and is bordered on the north by the Orthents, made-land complex. Waterflow was rapid at the time of our visit because of the recent rainfall. Reed Canary Grass is the dominant plant species both in and along the edge of the streambed. This artificial wetland is perched above Killbuck Creek and does not have a natural connection with the creek. It is, therefore, an isolated wetland that happens to be near the creek.

Endangered Species

The wetland does not provide the types of habitat required by any of the wetland plant or animal species listed as threatened or endangered in Illinois. Similarly, the immediately adjacent upland habitats are not likely to support any sensitive species which would be displaced as a consequence of primary or secondary impacts from an operational landfill. It is our position, therefore, that the possibility of endangered species occurrence on the subject property should not be an issue.

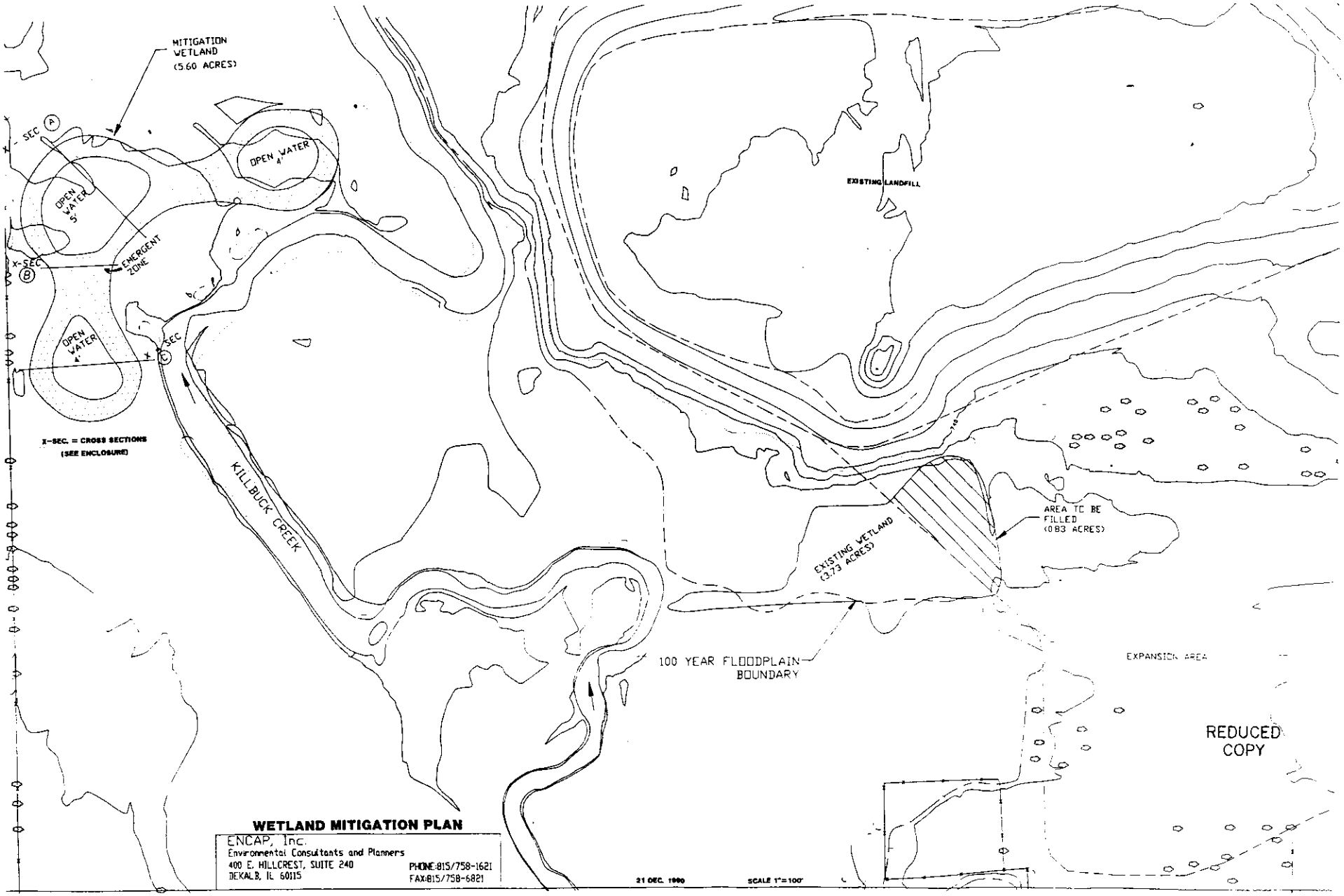
Recommendations

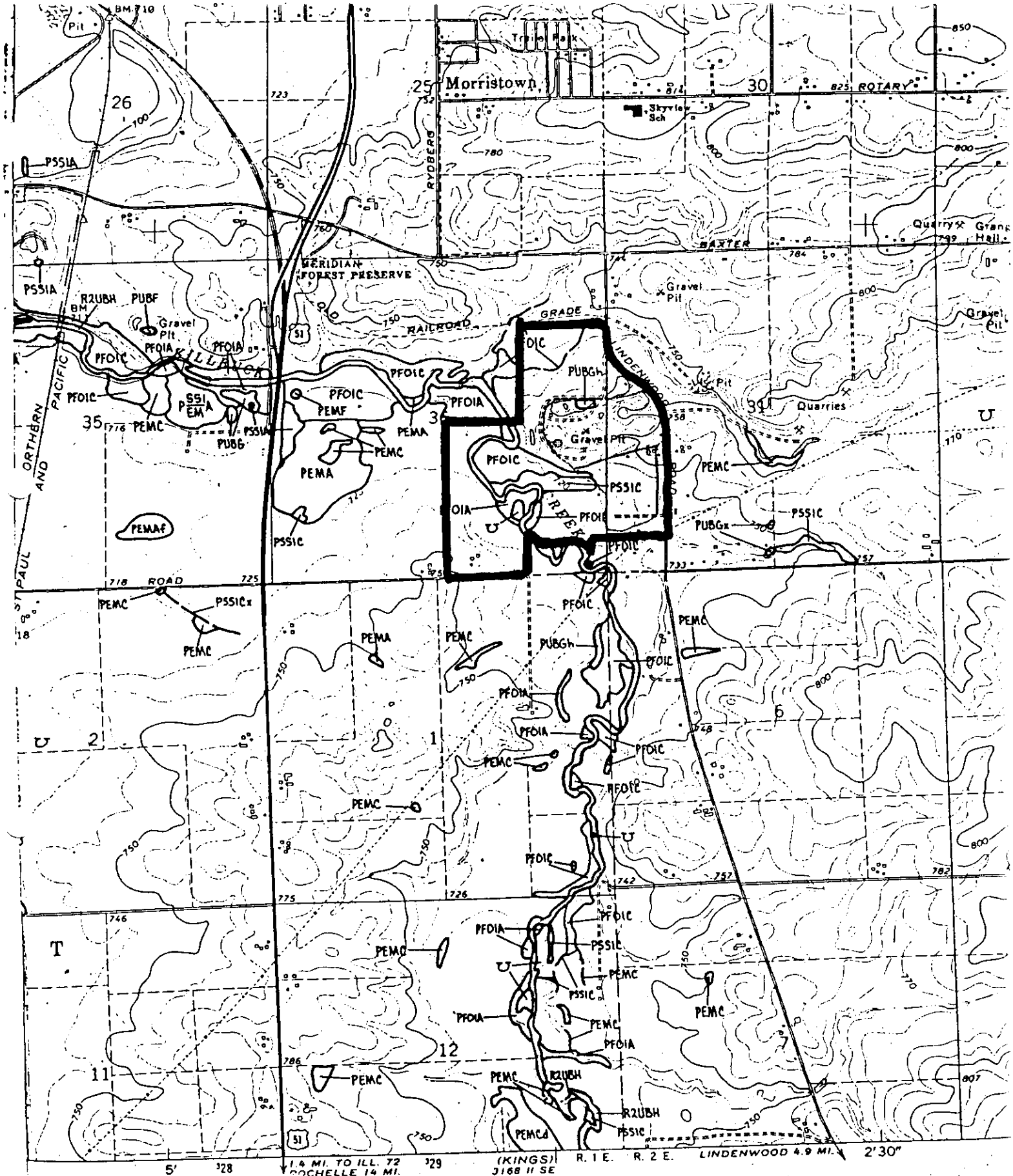
A total of 3.73 acres of jurisdictional wetland was delineated at the project site. Only 0.83 acre of this wetland occurs within the boundaries of the area proposed for development as a landfill. The quality of this wetland is low because of its artificial nature (i.e. formed on disturbed soils) and low plant species diversity. The water source, which primarily comes from the east, is presently of low quality. Runoff washes across a borrow area devoid of vegetation and carries an unusually large amount of sediment into the wetland. Any action that would divert this source of water probably would alter the hydrology which currently qualifies this area as a scrub-shrub/forested wetland.

Any action that will result in the filling of any portion of this wetland will require a permit under Section 404 of the Clean Water Act. If less than 1 acre of wetland is to be filled, a Nationwide Authorization without Mitigation may be possible. If between 1 and 10 acres are to be filled a Nationwide Authorization with mitigation may be required by the Corps of Engineers. Once a site plan has been developed showing the amount and location of wetland impact, a preapplication meeting should be scheduled with the Corps of Engineers in Rock Island. After this meeting, the permit application will be filed. ENCAP is prepared to assist with the permit application, mitigation plan, and discussions with the Corps. The joint permit application also will be submitted to the Illinois Department of Transportation. We will need detailed floodplain information for submittal to them. If any floodplain is being filled, IDOT may require at least compensatory storage. Control of sediment also will be an issue with them. Your design plans should include sediment traps for all surface runoff that will enter Killbuck Creek or the floodplain. IEPA also will receive a copy of the permit. Their main concern will be water quality. The application for a wetland permit should include reference to your landfill permit by title and number.

The loss of this low quality wetland could be compensated for on-site. Mitigation could accomplished within the floodplain in an area where disturbance from the operational landfill will be minimal. We suggest a location across Killbuck Creek in the northwestern corner of the property. This is a farmed area within the floodplain that provides seclusion and optimal adjoin-

ing habitats. Creation of a high quality emergent wetland at this location within the floodplain would be an improvement upon the existing "artificial" wetland. Such a site would serve as enhanced habitat for many wetland species.


MITIGATION WETLAND (5.60 ACRES)
X-SEC (A)
OPEN WATER
OPEN WATER
EMERGENT ZONE
X-SEC (B)
OPEN WATER
X-SEC (C)
X-SEC. = CROSS SECTIONS (SEE ENCLOSURE)
KILLBUCK CREEK
EXISTING LANDFILL
EXISTING WETLAND (3.73 ACRES)
AREA TO BE FILLED (0.83 ACRES)
100 YEAR FLOODPLAIN BOUNDARY
EXPANSION AREA
REDUCED COPY
WETLAND MITIGATION PLAN
ENCAP, Inc.
Environmental Consultants and Planners
400 E. HILLCREST, SUITE 240
DEKALB, IL 60115
PHONE:815/758-1621
FAX:815/758-6821
21 DEC. 1990
SCALE 1"=100'



National Wetland Inventory Map

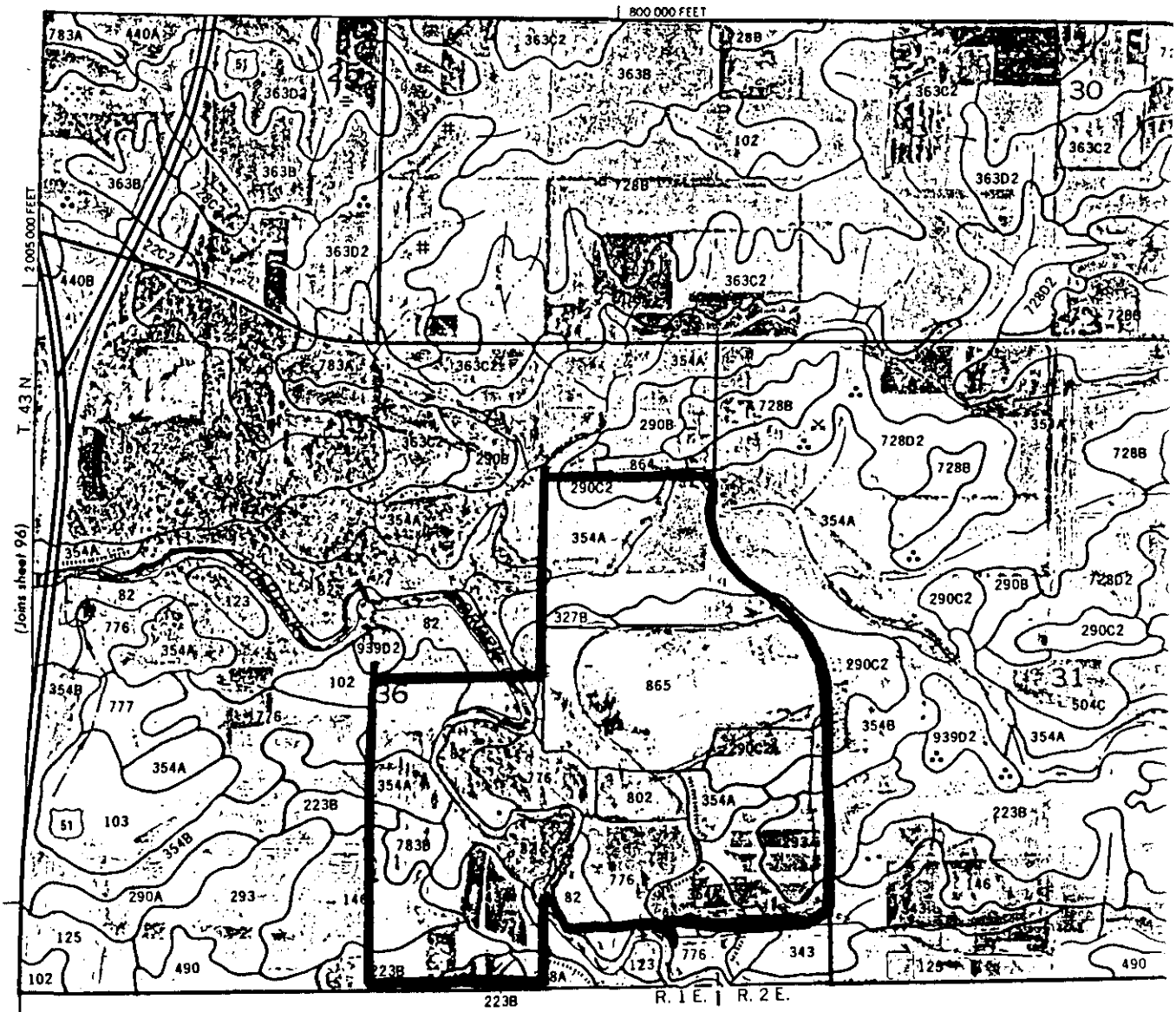
SPECIAL NOTE

This document was prepared primarily by stereoscopic

SYMBOLOGY EXAMPLE

NOTES TO TH

• Wetlands wh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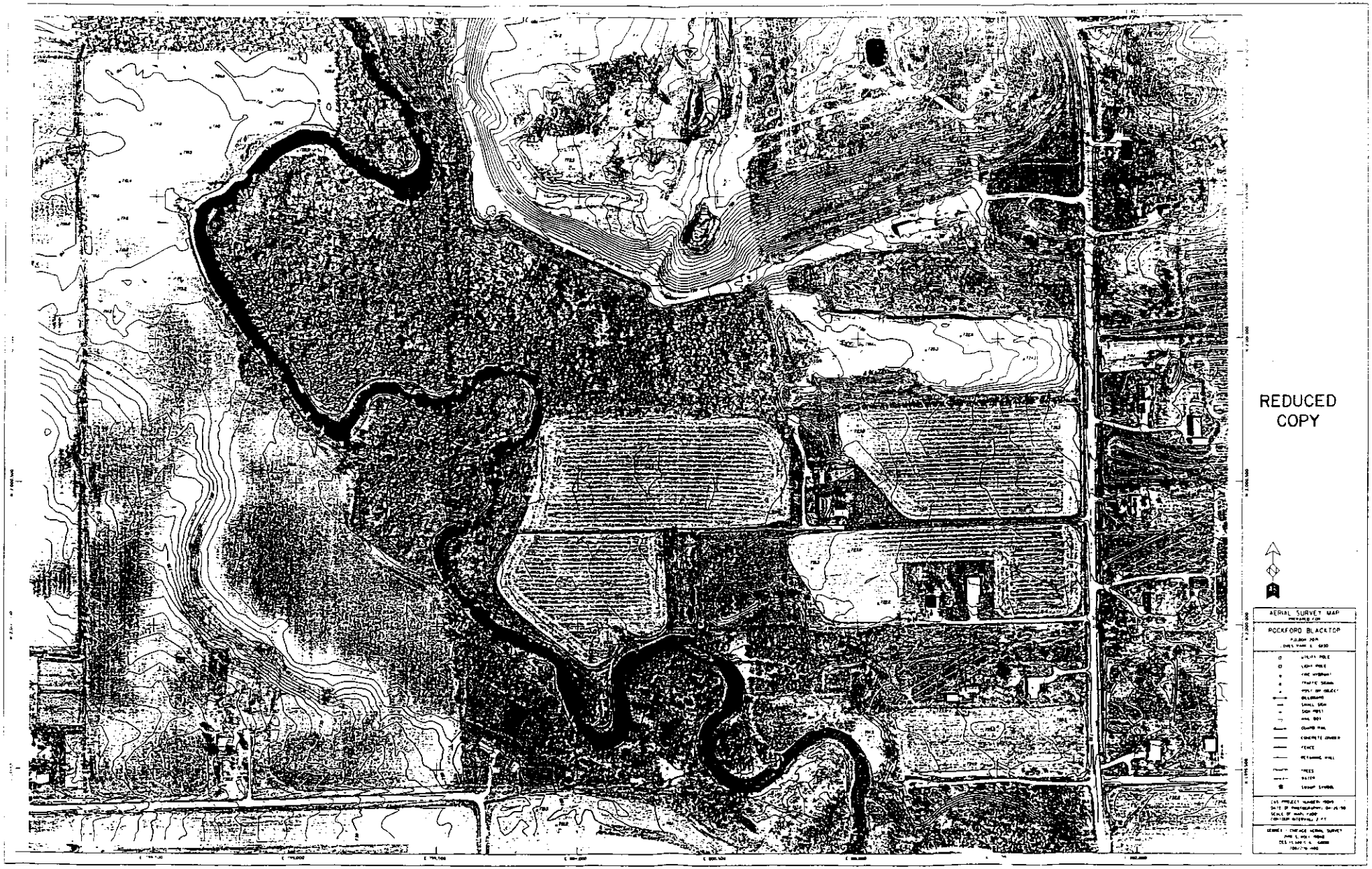
Soils Map



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ROUTINE ON-SITE WETLAND DETERMINATION DATA FORM

Field Investigator(s): D. Koehring and T. Krumwiede

Date: 5 November 1990

Project Name: Winnebago Reclamation

State: Illinois **County:** Winnebago

Applicant/Owner: Winnebago Reclamation Landfill

Plant Community #/Name: Scrub-Shrub Wetland (A)

Do normal environmental conditions exist at this plant community? Yes xx No

Has the vegetation, soils, and/or hydrology been significantly disturbed? Yes xx No
The soil is mapped as Orthents, Loamy. This mapping unit describes moderately fine textured to moderately coarse textured soils that have been mixed by filling and leveling operations. At this site the unit is a nearly level pad of a sandy clay mixture. This mixed soil was deposited into the floodplain and is from 3 to 5 feet in depth. Based on tree size this activity occurred 15 to 25 years ago. Natural hydrology has been altered, and the artificial soil favors opportunistic plant species.

VEGETATION

Dominant Plant Species	Indicator Status	Stratum
1. Phalaris arundinacea	FACW	H
2. Acer negundo	FAC	T
3. Salix alba	FACW	T
4. Populus deltoides	FAC	T
5. Salix nigra	OBL	T
6.		
7.		
8.		
9.		

Percent of dominant species that are OBL, FACW, and/or FAC: 100%

Is the hydrohpytic vegetation criterion met? Yes xx No

Rationale: Minimum criterion met.

Scrub-Shrub Wetland

SOILS

Series/Phase: Orthents, Loamy Subgroup:

Is the soil on the hydric soils list? Yes No xx Undetermined

Is the soil a histosol? Yes No xx Histic epipedon present? Yes No xx

Is the soil Mottled: Yes No xx Gleyed: Yes No xx

Matrix Color: 10YR 6/6 Mottle Colors:

Other hydric soil indicators:

Is the hydric soil criterion met? Yes No xx

Rationale:

Hydrology

Is the ground surface inundated? Yes xx No Surface water depth: 4-6 inches

Is the soil saturated? Yes No Depth to saturated water:

Other field evidence observed: Dead trees (4-6" DBH) in standing water.

Is the wetland hydrology criterion met? Yes xx No

Rationale: Minimum criterion met

JURISDICTIONAL DETERMINATION AND RATIONALE

Is the plant community a wetland? Yes xx No

Rationale: Soils, vegetation and hydrology have been altered at the sight, but nevertheless existing conditions qualify the area as a jurisdictional wetland.

ROUTINE ON-SITE WETLAND DETERMINATION DATA FORM

Field Investigator(s): D. Koehring and T. Krumwiede

Date: 5 November 1990

Project Name: Winnebago Reclamation

State: Illinois **County:** Winnebago

Applicant/Owner: Winnebago Reclamation Landfill

Plant Community #/Name: Crop Field (B)

Do normal environmental conditions exist at this plant community? Yes No xx
This portion of the wetland occurs within an agricultural field which was planted to soybeans in 1990.

Has the vegetation, soils, and/or hydrology been significantly disturbed? Yes No xx

VEGETATION

Dominant Plant Species	Indicator Status	Stratum
1. Cyperus esculentus	FACW	H
2. Polygonum pensyvanicum	FACW	H
3. Seteria faberii	FACU	H
4. Xanthium strumarium	FAC	H
5.		
6.		
7.		
8.		
9.		

Percent of dominant species that are OBL, FACW, and/or FAC: 75%

Is the hydrohpytic vegetation criterion met? Yes xx No

Rationale: Minimum criterion met.

Crop Field

SOILS

Series/Phase: Comfrey Loam Subgroup: Cumulic Haplaquolls

Is the soil on the hydric soils list? Yes xx No Undetermined

Is the soil a histosol? Yes No xx Histic epipedon present? Yes No xx

Is the soil Mottled: Yes No xx Gleyed: Yes No xx

Matrix Color: 7.5YR 2/0 Mottle Colors: 7.5YR 5/8

Other hydric soil indicators:

Is the hydric soil criterion met? Yes xx No

Rationale: Minimum criterion met.

HYDROLOGY

Is the ground surface inundated? Yes xx No Surface water depth: 2-3 inches

Is the soil saturated? Yes No Depth to saturated water:

Other field evidence observed: Soybeans were not harvested due to wet conditions.

Is the wetland hydrology criterion met? Yes xx No

Rationale: Vegetation and field indicators identify this site as a farmed wetland.

JURISDICTIONAL DETERMINATION AND RATIONALE

Is the plant community a wetland? Yes xx No

Rationale: All three wetland qualifiers are met.

ROUTINE ON-SITE WETLAND DETERMINATION DATA FORM

Field Investigator(s): D. Koehring and T. Krumwiede

Date: 5 November 1990

Project Name: Winnebago Reclamation

State: Illinois **County:** Winnebago

Applicant/Owner: Winnebago Reclamation Landfill

Plant Community #/Name: Ditched Drainway (C)

Do normal environmental conditions exist at this plant community? Yes xx No

Has the vegetation, soils, and/or hydrology been significantly disturbed?
Yes xx No
The north bank of this shallowly ditched drainway is fill material (Orthents Loamy 802). The placement of this fill has altered natural water courses and the ditch expedites drainage to Killbuck Creek.

VEGETATION

Dominant Plant Species	Indicator Status	Stratum
1. Phalaris arundinacea	FACW	H
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		

Percent of dominant species that are OBL, FACW, and/or FAC 100%

Is the hydrohpytic vegetation criterion met? Yes xx No

Rationale: Minimum criterion met.

Ditched Drainway

SOILS

Series/Phase: Comfrey Loam Subgroup: Cumulic Haplaquolls

Is the soil on the hydric soil list? Yes xx No Undetermined

Is the soil a histosol? Yes No xx Histic epipedon present? Yes No xx

Is the soil Mottled: Yes No Gleyed: Yes No

Matrix Color: 7.5YR 2/0 Mottle Colors: 7.5YR 5/8

Other hydric soil indicators:

Is the hydric soil criterion met? Yes xx No

Rationale: Minimum criterion met.

HYDROLOGY

Is the ground surface inundated? Yes xx No Surface water depth: 4-6 inches

Is the soil saturated? Yes No Depth to saturated water:

Other field evidence observed:

Is the wetland hydrology criterion met? Yes xx No

Rationale: This shallowly ditched drainway occurs on hydric soil. This soil holds sufficient amounts of water to support hydrophytic vegetation along the intermittent streambed.

JURISDICTIONAL DETERMINATION AND RATIONALE

Is the plant community a wetland? Yes xx No

Rationale: The presence of wetland soils, hydrology and vegetation.

ROUTINE ON-SITE WETLAND DETERMINATION DATA FORM

Field Investigator(s): D. Koehring and T. Krumwiede

Date: 5 November 1990

Project Name: Winnebago Reclamation

State: Illinois **County:** Winnebago

Applicant/Owner: Winnebago Reclamation Landfill

Plant Community #/Name: NWI Scrub-Shrub/Forested Wetland (D)

Do normal environmental conditions exist at this plant community? Yes xx No

Has the vegetation, soils, and/or hydrology been significantly disturbed? Yes xx No

The soil is mapped as Orthents, Loamy. This mapping unit describes moderately fine textured to moderately coarse textured soils that have been mixed by filling and leveling operations. At this site the unit is a nearly level "pad" of a sandy clay mixture. This mixed soil was deposited into the floodplain and is from 3 to 5 feet in depth. Based on tree size this activity occurred 15 to 25 years ago. Natural hydrology has been altered, and the artificial soil favors opportunistic plant species.

VEGETATION

Dominant Plant Species	Indicator Status	Stratum
1. Rhamnus cathartica	FACU	S
2. Populus deltoides	FAC	T
3. Acer negundo	FAC	T
4.		
5.		
6.		
7.		
8.		

Percent of dominant species that are OBL, FACW, and/or FAC: 67%

Is the hydrohpytic vegetation criterion met? Yes xx No

Rationale: Minimum criterion met

Wetland Scrub-shrub/forested wetland

SOILS

Series/Phase: Orthents, Loamy Subgroup:

Is the soil on the hydric soils list? Yes No xx Undetermined

Is the soil a histosol? Yes No xx Histic epipedon present? Yes No xx

Is the soil Mottled: Yes No xx Gleyed: Yes No xx

Matrix Color: 10YR 6/6 Mottle Colors:

Other hydric soil indicators:

Is the hydric soil criterion met? Yes No xx

Rationale:

HYDROLOGY

Is the ground surface inundated? Yes No xx Surface water depth:

Is the soil saturated? Yes No xx Depth to saturated soil: No water at 24 inches

Other field evidence observed:

Is the wetland hydrology criterion met? Yes No xx

Rationale: No surface or subsurface water despite receiving 1.8 inches of rain the previous day.

JURISDICTIONAL DETERMINATION AND RATIONALE

Is the plant community a wetland? Yes No xx

Rationale: No hydric soil or wetland Hydrology is present.

Winnebago Reclamation Wetland Mitigation Plan

Submitted to: Winnebago Reclamation Services
4920 Forest Hill Road
Loves Park, Illinois 61111
Attn: Mr. Gary Marzorati

Date submitted: 19 December 1990

ENCAP, Inc.

Environmental Consultants and Planners

400 E. HILLCREST
SUITE 240
FAX: 815-758-6821

P.O. BOX 721
DEKALB, IL 60115
TELEPHONE: 815/758-1621

WINNEBAGO RECLAMATION WETLAND MITIGATION PLAN

A wetland determination conducted on 5 November 1990, determined that a portion of scrub-shrub/forested wetland extended onto the proposed expansion area for the Winnebago Reclamation Landfill. The delineated wetland area totaled 3.73 acres and consisted of three distinct portions. Site plans indicate 0.83 acre will be filled. This activity may impact up to 2 acres of the wetland. Since about half of the wetland may be impacted, we propose to mitigate for the entire wetland at a ratio of 1.5 acres to 1. The proposed mitigation wetland will be 5.6 acres in size. This overall increase in wetland acreage will enhance the quality of wetland habitat at the site.

No further landfill expansions are expected at this location. The present and proposed sites will operate for 30 or more years.

Description of the Existing Wetland

The 3.73-acre wetland is composed of the 3 units with the following characteristics:

Scrub-shrub/Forested Wetland - This is the largest portion of the wetland (3.18 acres). It exists on soil mapped as Orthents, Loamy. This mapping unit lies outside the floodplain of Killbuck Creek, and is described as moderately fine textured to moderately course textured soils that have been mixed, and heavily compacted, by filling and leveling operations. This "artificial" wetland owes its origin and existing condition to past and current land use practices. Prior to its use as a landfill, the site was operated as a limestone quarry. These activities have altered the natural hydrology and diverted run-off to the compacted soils of the artificial pad. The frequency and duration of inundation has resulted in hydrophytic vegetation becoming established (see ENCAP delineation report).

Shallow Drainway - This shallow intermittent ditch was dug in the past to facilitate drainage of the altered upland and to prevent run-off from entering the adjacent crop field. All three wetland criteria are present, but this linear portion of the wetland (0.46 acre) also is artificial. Dredge spoil from the drainway was deposited along the ditch bank at the time of construction. The bank is now tree and brush covered. This part of the area was included in our wetland acreage figure thereby inflating it slightly.

Farmed Wetland - This portion of the wetland (0.09 acre) exists at the terminal end of a natural drainway. This "saturated" cropland has been impacted by intensive agriculture and also by the ditched drainway to which it is connected.

This wetland is rated low in quality because of the artificial nature of its 3 parts.

Description of Mitigation Wetland

A mitigation wetland of 5.6 acres will be constructed. This is almost three times the amount of wetland acreage that will be filled or otherwise directly impacted (2.0 acres) by landfill expansion. The mitigation wetland will be completed at least a year prior to disturbance of the existing wetland. This time frame will ensure establishment of emergent habitat before any of the existing wetland will be disturbed. Almost all of the existing wetland that lies within the floodplain will remain in its present condition. The quality of the riparian habitat, therefore, will not be seriously impacted. In fact, the mitigation wetland will enhance the quality of the riparian and upland habitats by providing a source of standing water, emergent habitats, and zones of interspersion typical of hemimarshes.

Location - The mitigation wetland will be located in an agricultural field west of Killbuck Creek (see Site Mitigation Plan). The site was chosen because of its seclusion from the landfill and the associated disturbance. The area lies within the floodplain and occurs on La Hogne Silt Loam, a nearly-level, somewhat poorly drained soil. No farmed wetlands exist in this field; therefore no wetlands will be impacted by the earthmoving process. The cropfield is bordered on the east by Killbuck Creek and to the north by a mature stand of bottomland timber. Currently, agricultural land lies to the west and south. The adjacent habitats along Killbuck Creek will remain intact.

Characteristics - We propose to construct a 5.6 acre elbow-shaped wetland that is designed to create a mosaic of interspersed emergent and open water habitats. Three separate pockets of open water will total approximately 2.48 acres, or 45% of the wetland. A maximum depth of 5 feet will be reached in the central deep water zone. The wetland was designed with variable depths in order to achieve a layering effect of emergent vegetation. This plant zonation and interspersion will create a variety of biotic niches and, therefore, will enhance wetland wildlife habitat at the site. The accompanying wetland mitigation plan and cross-sections (see accompanying prints) provide details about water depths and vegetative zones. A 50-foot-wide buffer zone will surround the wetland. It will be seeded to Perennial Rye Grass. The primary function of the buffer zone is to control sediment that may move toward the wetland from farm fields which are off-site.

Construction and Revegetation - All earth excavated from the basin of the mitigation wetland will be removed from the floodplain and used by the landfill operation for other purposes. The wetland basin will be over-excavated by 12 inches (1 foot deeper than depths shown on plan). The excavated grade will then be top dressed with a minimum of 12 inches of hydric soil.

This procedure will achieve the bottom contours shown on the mitigation plan. The hydric soils used for this purpose will come from the construction area covered by this permit and from farmed areas not designated as wetlands. Use of these soils will increase our ability to establish hydric vegetation at the mitigation site. The soils used will be either Comfrey Loam (#776) or Millington Silt Loam (#82). These areas where these soils occur were not chosen as mitigation sites because of their inadequate size and their proximity to disturbance from the operational landfill.

Extensive seeding and/or planting of wetland vegetation will be necessary to prevent colonization by undesirable weedy species and to assure introduction of desirable wetland species. We anticipate the wetland soils will lack a seed bank of hydric species. The emergent wetland (portions 3 feet and shallower) will be revegetated to erect emergent plants and other species which grade into sedge meadow. Species of submerged aquatics will be introduced to the deeper zones. Plant species will be taken from the attached list on the basis of availability. The seeding effort will be conducted as early as possible in the growing season and while the wetland is at a low water mark. Wetland planting will be done by ENCAP. The client will seed the buffer area.

Monitoring Program - A five-year plan will be set up for ENCAP to monitor the condition of the mitigation wetland. Biannual visits during the growing season will be used to document the effectiveness of the plantings and ensure that abnormal loads of sedimentation are not reaching the wetland. This plan also will allow for remedial actions should they be necessary. ENCAP will monitor construction activities to assure proper slopes and depths are realized.

In the year of planting, ENCAP will visit the wetland monthly following construction and planting to monitor water depths and germination. In years 2 through 5, ENCAP will visit the site twice during each growing season. Transects will be established to sample species composition and relative abundance/coverage in 20% of the emergent zone (0-3 foot depths). If vegetative coverage is less than 50% by the second growing season, supplemental seeding or planting will be planned for the following growing season.

ENCAP will submit an annual report to the Corps of Engineers regarding the results of the monitoring program.

Plant list for Winnebago Reclamation Mitigation Wetland

Emergents

Sweet Flag
Water Knotweed
Great Bulrush
Broad-Leaved Cattail
Common Bur-reed
Water Plantain
Common Arrowhead
Pickerel Weed
Hard-Stemed Bulrush

Shoreline Plants

Swamp Milkweed
Blue Joint
Three-Square
Stool-forming Sedge
Dark Green Rush
Cord Grass
Sedge Mix
Willow Aster
Fowl Manna Grass
Barnyard Grass

Submergents

Coontail
Eel Grass
Sago Pondweed
Long-leaved Pondweed

Wetland Mitigation Monitoring Report

Kilbuck Creek

Submitted to: Winnebago Reclamation
4920 Forest Hills Road
Loves Park, Illinois 61111
Attn: Mr. Tom Hilbert

Date submitted: 18 December 1995

ENCAP, Inc.

Environmental Consultants and Planners

400 E. HILLCREST, SUITE 240
FAX: 815-758-6821

DEKALB, IL 60115-2470
TELEPHONE: 815-758-1621

PLANT COMMUNITY MONITORING REPORT FOR THE WINNEBAGO RECLAMATION MITIGATION SITE

Project Name and Client: Kilbuck Creek/Winnebago Reclamation

Phase of Monitoring: Wetland Monitoring Report Number 1 (Year 1 - Fall 1995)

Date of Site Visit: 10 October 1995

Investigators: M. Southern and A. Ray

INTRODUCTION

The Kilbuck Creek Mitigation Wetland is located in unincorporated Winnebago County south of the City of Rockford. It was constructed as compensation for wetland acreage filled on the site of a landfill operated by Winnebago Reclamation. The mitigation wetland was planted in the spring of 1995 to increase both the habitat value and the plant species diversity of the wetland.

Per Army Corps of Engineers (COE) requirements, monitoring of the plant community is conducted twice annually; once in early summer and again during the fall. A copy of this report is submitted to the Corps of Engineers, as required by a Section 404 permit condition, and to the property owner.

The purpose of the monitoring program, conducted over a 5-year period, is to document the success of the wetland plantings, evaluate the progress of the overall development of the wetland mitigation site, and to make recommendations on changes or improvements in wetland management.

OBJECTIVES

The primary objective of the monitoring program is to document changes in plant community composition over the 5-year period of regularly scheduled monitoring and reveal the need for changes in management to improve overall wetland quality. The results from the monitoring effort will be used during an evaluation by the Corps of Engineers to determine if the mitigation effort is successful. Specific goals of the monitoring are to estimate the proportional cover by hydrophytic vegetation, determine plant species diversity (with special attention to the planted species) and evaluate overall development of the wetland. Vegetative cover within the wetland emergent zone should remain stable or increase to levels prescribed by the COE for later monitoring sessions. If this is not achieved, supplemental planting or other measures may be required. A general goal of the monitoring effort is to reveal the potential for problems which may affect the growth of the plantings and to provide recommendations for resolving or reducing these problems.

GENERAL DESCRIPTION OF THE WETLAND

The mitigation wetland was constructed during the period from late October 1994 to early 1995. Construction monitoring was conducted by ENCAP, Inc. during the same period. The wetland is comprised of three deep water zones placed approximately equal distances apart, surrounded by a shallower emergent vegetation zone in an L-shaped basin (Figure 1). The wetland is situated on former agricultural land between several meanders of Kilbuck Creek, approaching the stream as close as 20 feet at the wetland's southeastern corner.

Hydrology in the wetland is supplied primarily by groundwater from the surrounding upland areas and Kilbuck Creek. During periods of extreme high water in Kilbuck Creek, surface water enters the wetland near a bend in the southeastern portion of the central basin.

The soil substrate existing at the mitigation site prior to wetland construction was a sandy loam mixed with small gravel. During wetland excavation the final grades were overexcavated by at least 12 inches to accommodate a mulch of hydric soil imported from elsewhere on the property.

Following final grading of the wetland and associated upland areas, the non-inundated portions of the site were seeded with a mix of prairie plant species (Lafayette Home Nursery, Inc.; Wet-mesic Prairie 3B), including a fast-growing temporary matrix to provide erosion control and act as a nurse crop for the slower-developing perennial species. This upland planting was intended to provide erosion control, surface flow filtration, a visual buffer and wildlife habitat for the wetland.

The upland buffer is not part of the wetland mitigation under the COE permit, and it is not directly monitored for success; however, when the conditions within the upland buffer may affect the success of the mitigation effort, comments will be included in these monitoring reports.

GENERAL HISTORY OF THE WETLAND PLANTING

The initial planting of the wetland was performed by ENCAP, Inc. during the spring of 1995. Approximately 1.03 acres of emergent zone were planted between the elevations of 705 and 707 feet. Nine wetland species were planted as rootstock in the spring of 1995 (Table 1). Prior to the planting, protective planting enclosures, each approximately 10 X 30 feet and constructed with steel posts and chicken wire, were erected in the wetland near the existing shoreline. The enclosures were positioned to protect the planted species from wild herbivores during the first full growing season. Subsequently, the water level within the wetland basin was lowered by excavation of a trench which drained the wetland to Kilbuck Creek. This action left some of the planting enclosures above the new NWL and outside of the soil saturation zone. Lowering of the water level became necessary because the water elevation in the wetland was greater than was anticipated based on groundwater monitoring well data from the month of August for the 7 years preceding wetland construction (Figure 2).

MONITORING METHODS

Specific monitoring requirements were not specified by the COE in the Section 404 permit, so a basic monitoring method was employed. Sampling was conducted by meander search along a single transect that paralleled the perimeter of the existing shoreline. All vascular plant species encountered within the emergent zone were included in this census. Species present in more than 50% of the wetland emergent plant zone were designated as dominant species.

All plant identification was to the species level whenever possible. In some cases, identification to species level was impossible because of specimen age or condition (e.g., Spike Rush species - all scientific plant names are presented in Table 1), when identification was to the genus level only.

An estimate of the vegetative cover (expressed as a percentage) by live emergent vegetation in the emergent zone also was made based on a visual estimate of the relative cover provided by plants.

The plant community composition of the wetland was tabulated according to the National List of Plants that Occur in Wetlands: North Central (Region 3) (1988) issued by the U.S. Fish and Wildlife Service. This classification system separates plant species into five categories based on their frequency of occurrence in wetlands. The five wetness categories are as follows: (1) Obligate Wetland (frequency greater than 99%); (2) Facultative Wetland (frequency 67 to 99%); (3) Facultative (frequency 33 to 67%); (4) Facultative Upland (frequency 1 to 33%); and 5) Obligate Upland (frequency less than 1%). For discussion purposes, upland species are composed of the facultative upland and obligate upland classes, and wetland species are composed of the obligate wetland and

facultative wetland classes. Facultative species have an approximately equal chance of occurring in wetland or upland habitats, and are considered a transitional class.

Presence data (Table 1) was used to calculate the Floristic Quality Index (Swink and Wilhelm, 1994). Under this method two objective indices (the Coefficient of Conservatism ($\bar{C}$) and Floristic Quality Index (I)) are used in combination to evaluate the relative floristic quality of a given plant community, based on the plant species present. The essence of the method is the determination of the extent to which a region supports conservative native plant species. This index is useful in evaluating habitat restoration or creation by targeting low-ranking or non-native species for removal.

The Floristic Quality Index provides information about the quality of the plant community, but it is not a determination of overall wetland quality or function. The method was developed for use in the counties immediately surrounding the Chicago metropolitan area; however, plant species and plant communities in Winnebago County share similar ecological relationships to those in the collar counties. Therefore, application of the Swink and Wilhelm method in Winnebago County should be acceptable for monitoring purposes.

The Floristic Quality Index, based on the mean Coefficient of Conservatism ($\bar{C}$) and the number of native plant species present, is used to evaluate the overall floristic quality of a given plant community, relative to undisturbed native plant communities. Mean Coefficient of Conservatism values of 3.5 or above are considered to indicate environmentally significant plant communities. Floristic Quality Index values of 20 or above are generally considered indicative of plant communities exhibiting significant potential of supporting representative natural native plant communities. Plant community composition is influenced by the level of past disturbance to the area. Plant community quality generally will be greater when conditions are relatively undisturbed, than for plant communities which have been disturbed. Disturbed areas support a greater variety of weedy, aggressive or non-native plant species. Introduced or non-native species encountered during each monitoring session are listed in Table 1 as a measure of the level of disturbance the wetland plant community has experienced. It is anticipated that as wetland conditions stabilize, future monitoring sessions will reflect a reduction in the proportions of non-native species and high quality native species will increase in quantity.

Physical data measurements were not collected during this first monitoring session. In future monitoring sessions, groundwater monitoring well data may be presented. Additional data will be collected utilizing a soil moisture probe to satisfy COE requirements.

RESULTS FROM YEAR 1, FALL MONITORING SESSION (1995)

A total of 15 vegetative species were encountered; a summary of plant classes present and their relative proportions follows:

Plant Class	No. Species	% Total
Obligate Wetland:	9	60.0
Facultative Wetland:	1	6.7
Facultative:	2	13.3
Facultative Upland:	3	20.0
Obligate Upland:	0	0.0

Mean percent vegetative cover in the emergent zone during this monitoring session was conservatively estimated to be 5%. A high proportion of the wetland is currently unvegetated, in part because water level changes have been frequent during the growing season, resulting in poor growing conditions for most plant

species. In addition, the available natural seed bank at the wetland site does not include a wide variety of native plant species because of previous agricultural usage.

The planting enclosures performed as expected and contained planted vegetation. These enclosures should be expanded to cover areas closer to the normal water level (NWL).

SURVIVORSHIP OF PLANTED SPECIES

Eight of the planted species (88.9%) were encountered during this monitoring session. The survivorship of the planted species, documented in future monitoring sessions, will permit evaluation of the long-term survivorship and overall success of the planting. The existing planted species appeared to be small and stressed, apparently as a result of the water level changes within the emergent zone. Replanting of these species should be considered to establish a permanent presence within the appropriate soil saturation zone for each species.

Planted species not detected during this monitoring session may be present, but did not leave persistent parts, or may have initiated their development below the ground surface (e.g., Common Cattail). Future monitoring sessions will provide an indication of the survival of these species.

PREDATION BY HERBIVORES

Waterfowl activity within the vicinity of the wetland has been extensive, including the long-term residence within the wetland by a flock of domestic geese. The domestic geese as well as migrating Canada Geese decimated many of the plants outside the planting enclosures.

Muskrat activity in the wetland also has been extensive; bank burrows and muddy trails between the wetland and Kilbuck Creek were common during the monitoring session.

COMPARISON WITH OTHER MONITORING SESSIONS

Future monitoring sessions will provide comparative data to track the development of the emergent zone at the mitigation site. At the time of this monitoring the emergent zone was poorly developed because of the change in water levels and the short time elapsed since planting was performed at the wetland.

FLORISTIC QUALITY ASSESSMENT

The mean Coefficient of Conservatism for this monitoring session was 4.00 (Table 1), indicating a high quality wetland plant community. This high rating generally resulted from the presence of the planted species. If the planted species were excluded, the Coefficient of Conservatism would have been 2.00, indicating a low quality plant community. The overall floristic quality also was low (I value = 14.42; Table 1). This condition is primarily the result of the young age of the mitigation site and its lack of an existing seedbank to provide additional plant species diversity. As the wetland site becomes stabilized over time, additional wetland plant species will most likely be represented, while other, primarily the non-hydrophytic species, will become less abundant. It is anticipated that future monitoring sessions will result in improved floristic quality.

The proportion of native to non-native plant species (86.7%) was relatively high, despite the presence of an aggressive agricultural weed (Giant Foxtail) that often prevents native annuals from growing.

Since the presence of plant species changes throughout the growing season, annual measures more accurately describe the wetland plant community than a single monitoring session. Future monitoring sessions will include an annual

calculation of the floristic indices. Despite reservations concerning the lack of stable hydrological conditions and minimal plant species diversity, the floristic quality of the wetland is considered to be within an acceptable range for a first year mitigation wetland.

CONCLUSIONS AND MANAGEMENT RECOMMENDATIONS

The results for this monitoring session show that the emergent zone is developing slowly. Supplemental planting will be required in the spring of 1996 to meet minimum Corps of Engineers mitigation requirements for vegetative cover in the emergent plant zone. The wetland ecosystem will have become more stable and seed and rootstock planting should be successful. Species diversity at this wetland is not stable and may experience dramatic changes in future monitoring sessions. Plant species richness and abundance is low throughout the wetland site and time is required for mature individuals to spread to empty spaces. Despite these factors, the wetland plant community is relatively high in overall quality, because of the species planted in the spring of 1995.

Table 1. Cumulative Census of Plant Species Encountered During Mitigation Monitoring at the Winnebago Reclamation Mitigation Wetland.

Common Name	Scientific Name	Fall 1995	Rank (C-value)
OBLIGATE WETLAND			
* Common Arrowhead	*Sagittaria latifolia*	X	4
* Common Bur Reed	*Sparganium eurycarpum*	X	6
* Common Cattail	*Typha latifolia*	X	1
* Common Rush	*Juncus effusus*		7
* Common Water Plantain	*Alisma subcordatum*	X	4
* Hard-stemmed Bulrush	*Scirpus acutus*	X	5
~ Monkey Flower	*Mimulus rigens*	X	6
* Pickerel Weed	*Pontederia cordata*	X	10
* Sweet Flag	*Acorus calamus*	X	7
FACULTATIVE WETLAND			
Barnyard Grass	*Echinochloa crusgalli*	X	0
FACULTATIVE			
# ~ Golden Coreopsis	*Coreopsis tinctoria*	X	--
~ Illinois Sensitive Plant	*Desmanthus illinoensis*	X	3
FACULTATIVE UPLAND			
~ Black-eyed Susan	*Rudbeckia hirta*	X	1
D# Giant Foxtail	*Setaria faberii*	X	--
Giant Ragweed	*Ambrosia trifida*	X	0
UPLAND			
None Encountered			

Number of Plant Species	15
Number of Native Plant Species	13
Coefficient of Conservatism	4
Annual Coefficient of Conservatism	NA
Floristic Quality Index	14.42
Annual Floristic Quality Index	NA
Number of Planted Species Encountered	8
Planted Species Survivorship (%)	88.9

* Rootstock planted in 1995 (9)
\# Non-native or introduced plant species
D Dominant species within emergent zone
~ Seed Planted in 1995

FI 1. lan w o tig n s

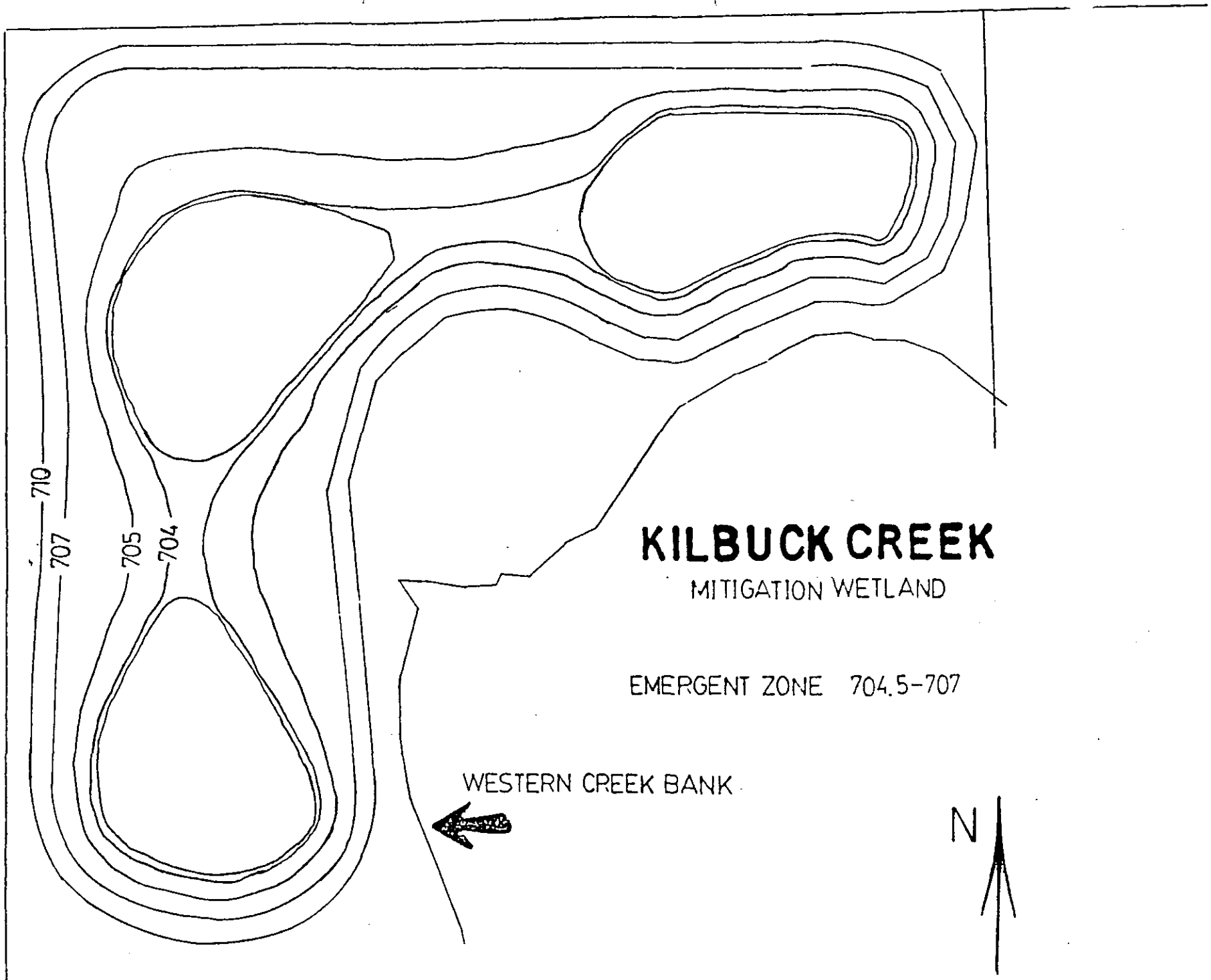
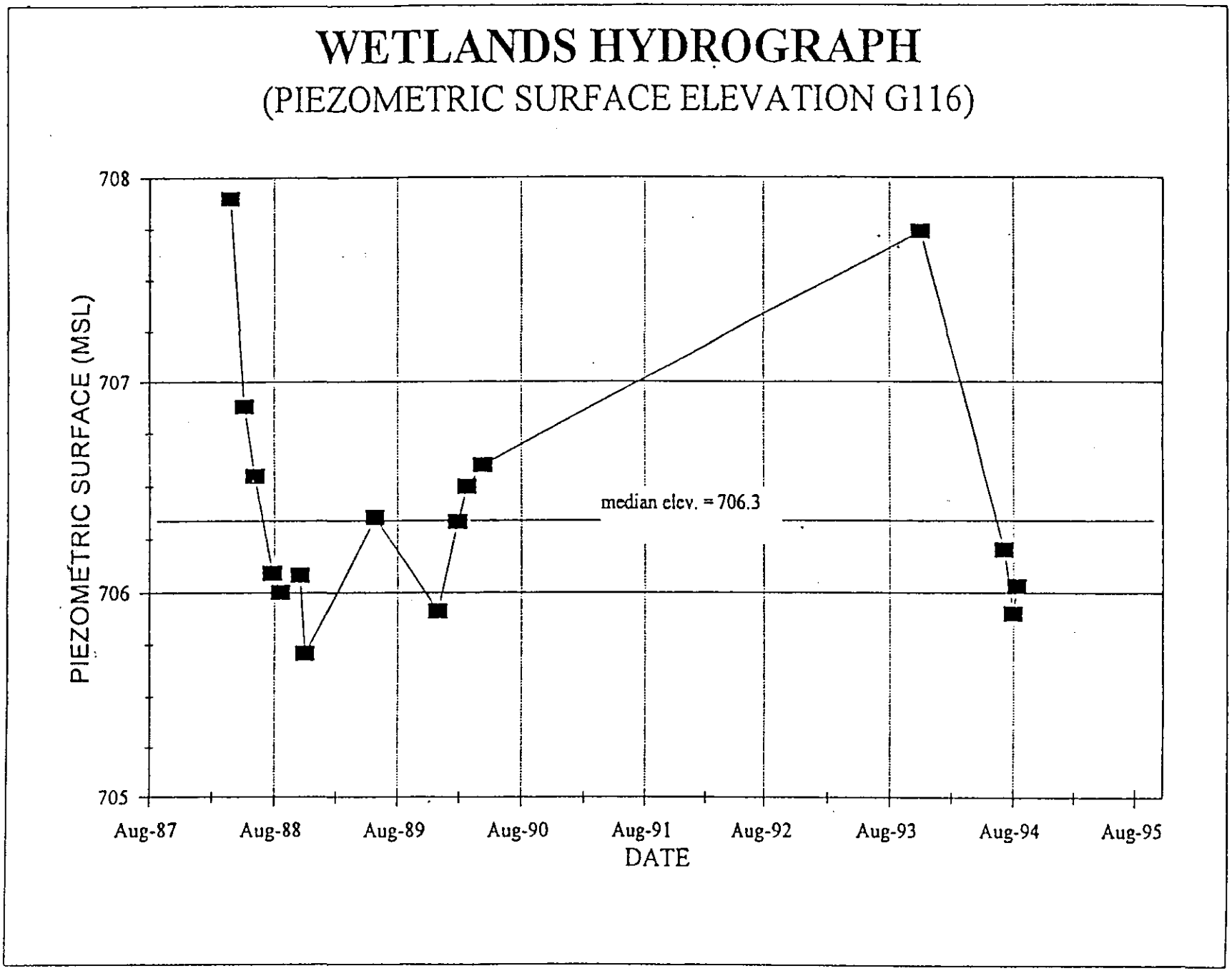


FIGURE 1. Plan view of mitigation site.

FIGURE 2. Groundwater monitoring well data near the mitigation wetland.



ATTACHMENT 10

Illinois Water Quality Management Plan (Partial)

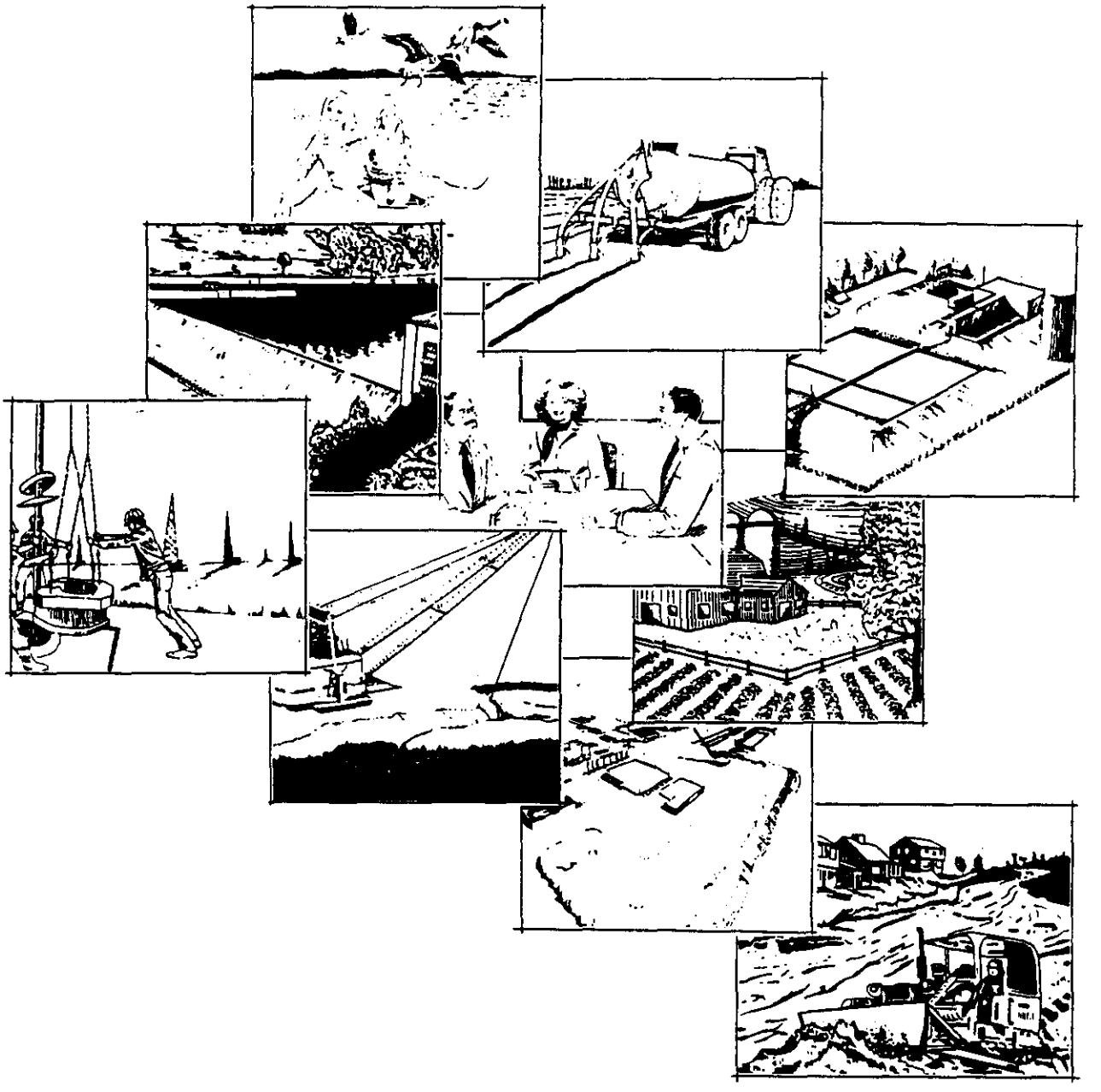
Illinois
Environmental
Protection Agency

Bureau of Water
2200 Churchill Road
Springfield, Illinois 62794-9276

December 1992

IEPA/WPC/92-220

Illinois Water Quality Management Plan



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THE ILLINOIS WATER QUALITY MANAGEMENT PLAN

Prepared by:

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
BUREAU OF WATER
DIVISION OF WATER POLLUTION CONTROL

In Cooperation With:

GREATER EGYPT REGIONAL PLANNING AND DEVELOPMENT COMMISSION

NORTHEASTERN ILLINOIS PLANNING COMMISSION

SOUTHWESTERN ILLINOIS METROPOLITAN AND
REGIONAL PLANNING COMMISSION

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EXECUTIVE SUMMARY

The purpose of the Illinois Water Quality Management Plan is to consolidate and streamline portions of approved State and Areawide WQM plans in order to facilitate their usage in the operations of all designated WQM agencies. The WQM Plan represents a joint effort by the four agencies with WQM planning responsibilities. The four agencies involved are: Illinois Environmental Protection Agency, Greater Egypt Regional Planning and Development Commission, Northeastern Illinois Planning Commission and the Southwestern Illinois Metropolitan and Regional Planning Commission. There are several reasons which promoted the unifying of existing state and areawide plans. The first is the need to compile existing WQM plans in a convenient administrative format. At the state level, there is a need to improve the process of WQM Plan consistency review for NPDES permit or Title II Construction Grant determinations. For local officials there is a need to clearly define designated management agency responsibility and highlight recommendations for future action. This is a necessary step in the continuing process of WQM plan implementation. A second reason for WQM Plan consolidation is to provide an orderly transition from plan development to implementation of programs. There has been a considerable public investment to establish credibility in the process Section 208 created, both from a planning and implementation standpoint. The cessation of funding for Section 208 WQM planning has resulted in the need to incorporate this planning process into the ongoing Agency water pollution control program.

Following public review and any subsequent revision, this document will become the certified State and Areawide WQM Plan document. Prior Areawide WQM planning documents represent a supplemental information base and an expression of local consensus. Their status with designated areawide agencies will be determined by each such agency after consultation with Illinois EPA. Following the completion and review of the Illinois WQM Plan, annual updates and amendments to the plan will be published in the Agency's Division of Water Pollution Control Program Plan. The Program Plan will serve as a vehicle to circulate and document plan changes. The amendment process for point sources will be conducted in accordance with the adopted "Procedures and Requirements for Conflict Resolution in Revising Water Quality Management Plans". The following pages contain a brief synopsis of the continuing policies and recommendations found in the Illinois Water Quality Management Plan. The more detailed policies and recommendations can be found in the appropriate chapter in the plan.

Chapter Two -- Point Source Control: Control of point sources in Illinois is provided through the regulatory structure established by the Illinois Environmental Protection Act (Act) and subsequently through the Illinois Pollution Control Board (Board) Rules and Regulations. The emphasis of the Illinois WQM Plan for point sources is directed specifically towards NPDES and construction grant determinations and

their conformance with the Illinois WQM Plan. From a statewide perspective, the control of point source discharge is a necessary component in a comprehensive strategy for water quality management. The primary responsibility for control of point sources is shared between the State and local designated management agencies.

* The emphasis of the WQM Plan is to ensure that those State and local programs involved with point source control are carried out in an efficient and effective manner.

* It is the primary responsibility of the State to ensure that the process of construction grant award, NPDES permit issuance and compliance monitoring are undertaken in accordance with all applicable state and federal requirements. The issuance of new NPDES permits constitutes an amendment to the approved WQM Plan.

* Designated local management agencies are primarily responsible to ensure the quality of its effluent, the efficient provision of service within its facility plan area, the effective enforcement of applicable sewer use and pretreatment ordinances as well as the encouragement of water or energy conservation strategies (as appropriate). Facility plans should be implemented by local designated management agencies as approved by Illinois EPA. Amendments to these plans should be conducted in accordance with established Agency procedure.

* Continued regulation of combined sewer overflows is a beneficial and essential element of an effective statewide WQM plan. Local treatment authority plans for controlling combined sewer overflows must comply with applicable Pollution Control Board rules.

Chapter Three -- Agriculture: The control of water quality impacts from agricultural activities is the foundation of a comprehensive strategy for the abatement of nonpoint source pollution. The responsibility for control of agricultural nonpoint source pollution is shared among federal, State and local agencies and the individual farm operator and is based on a program of voluntary compliance. The policies and recommendations contained in the plan reflect the institutional and program changes which were first suggested in the initial plan in 1979.

* The WQM Plan recommends expanded development of a program of education and research efforts directed towards agricutural nonpoint source pollution in five primary areas of concentration: erosion and sedimentation, livestock waste management, silviculture, pesticide use and fertilizer application.

* The Illinois Department of Agriculture and the 98 soil and water conservation districts have continued responsiblity for technical services, cost-sharing and direction of the soil erosion control program.

* The Illinois Environmental Protection Agency (IEPA) and the Illinois Pollution Control Board (IPCB) have continued responsibility for water quality monitoring, progress accountability and enforcement of the provisions of the water quality related elements of the agricultural nonpoint source control program.

* The State has the primary responsibility for assuring the efficient and effective use of fiscal, technical and personnel resources related to soil erosion and water quality nonpoint management objectives. Local, State and federal agencies should cooperate to assure adequate compliance monitoring and assessments are made. Local voluntary support is encouraged.

* The State, through the Department of Agriculture, should continue to provide funding to accelerate the rate of soil survey completion in order to provide full coverage of the State with modern surveys.

* The Illinois EPA should continue to upgrade and refine its program for administering the Illinois Pollution Control Board's Livestock Waste Regulations (Agriculture Related Pollution, Ill. Adm. Code, Title 35, Subtitle E, Chapter I, Part 501). Problem feedlots will continue to be prioritized on a "worst case first" basis for follow-up action. Compliance with existing regulations should be pursued on a voluntary basis whenever possible. To defray compliance costs, livestock operators should be informed of sources of financial relief and lower cost alternatives for waste management.

* The Illinois Department of Conservation, Division of Forest Resources and Natural Heritage (IDOC-FRNH) is the primary agency responsible for directing technical assistance and educational programs for forestry operations. The recommendations contained in the State Forest and Related Resources Plan, developed by IDOC-FRNH, should be implemented.

* Reduction in fertilizer contributions to high nitrate concentrations and elevated nutrient levels should be controlled through sound fertilizer management practices.

* Continued emphasis should be placed on the development and implementation of an effective program of pesticide waste management.

* Cooperative agreements should be undertaken by the Agency with other State and Federal agencies to evaluate pesticide problems resulting from their use in agricultural production. Pesticide use surveys and water quality monitoring programs should be coordinated and effectively employed in the evaluation process.

* Integrated pest management programs are encouraged.

Chapter Four -- Construction: The emphasis of the WQM Plan, with regard to construction nonpoint source control, is preventative in nature. Construction nonpoint source pollution is not as widespread as other types of nonpoint source pollution in the State, but when it occurs it is usually significant. Effective programs for mitigating the impacts of construction nonpoint source control can be established using existing techniques and authorities. This is especially true at the local level. Additional coverage of this problem can be through improvement in administrative procedures and site practices by the developer of a site, whether they be either a private or public entity. From a statewide perspective, the control of construction non-point source pollution is a necessary support to the agricultural erosion and sedimentation control program.

* The WQM Plan emphasizes the development of technical and administrative guidance tools to assist responsible units of government and agencies in the selection of best management practices (BMPs) and administrative mechanisms for the needed nonpoint source control.

* Designated Management Agencies (DMAs) responsible for the control of construction nonpoint sources include municipal and county governments, soil and water conservation districts throughout the state as well as various state agencies (IEPA, IDOT, IDOC, and the ICDB).

* It is the primary responsibility of the state to control construction nonpoint source pollution arising from state sponsored or directed activities. State Agencies responsible for regulating and reviewing construction related activities, such as IEPA, IDOT, DWR and IDOC, should consider necessary conditions in permits for water resource related projects to prevent pollution from these activities.

* All counties and municipalities should carry out some or all of the following preferred control practices for local nonpoint source pollution: Adopt and enforce standards and specifications for erosion and sedimentation control in developing areas; Adopt and enforce model ordinances which contain minimum standards for control in those areas currently under development; and where possible, better use of both local and state personnel, through training and education programs.

Chapter Five -- Urban Runoff: From a statewide perspective, the control of urban runoff is a necessary component to prevent impairment of water uses in an urban setting. Local units of government have primary responsibility for the control of urban runoff. Urban runoff studies in eight standard metropolitan statistical areas across Illinois indicated that lead, copper and iron exceed the existing general use water quality standards 25 to 30 times per year as a result of urban runoff at various points within each study area, and that the once a year maximum may be 15 to 20 times the standard. The Plan stresses three ways to reduce urban

runoff pollution: 1) by controlling the design, construct, and maintenance of the drainage network; 2) by preventing polutants from entering the drainage network; and 3) by treating stormwater to remove pollutants before polluted runoff reaches a waterway.

* Research which will give technical and administrtive guidance to the responsible units of government should continue. This includes continued analysis of National Urban Runoff Program (NURP) results to maximize its transferability throughout the State, analysis of the impact of urban stormwater on beneficial water uses, the relationship between air and water quality, and the standardization of technical and administrative urban stormwater runoff control practices.

* In northeastern Illinois, all appropriate municipal and county governments should implement measures to work toward a reduction in BOD in urban stormwater runoff from separately sewered areas.

* Municipalities and counties should adopt and enforce appropriate and adequate stormwater detention ordinances. Such ordinances should be consistent with the minimal standards set forth in the model ordinances developed by either the Northeastern Illinois Planning Commission (Suggested On-Site Stormwater Detention Basin Ordinance, January 1980) or Southwestern Illinois Metropolitan Planning Commission (Model Stormwater Detention Ordinance for Developing Areas, January 1982).

* It is the primary responsibility of the local, state or federal agency to control urban runoff contributions arising from their individually directed activities and facilities. Preferred control practices are administrative procedures for personnel training, improved equipment utilization and scheduling as well as controlled application programs for de-icing or other related right-of-way clearance programs.

* A program of education/information transfer should be initiated. The program would: 1) acquaint developers and local officials with the need for use of proper stormwater management techniques, 2) establish and promote anti-litter activities, and 3) inform homeowners of the proper use and application of fertilizers and pesticides.

Chapter Six -- Mineral Extraction Oil Brine Disposal: The Illinois Water Quality Management Plan identified seepage from brine holding pits, injection operations and abandoned wells as the major sources of brine pollution in Illinois. Oil brine pollution is particularly significant in Central and Southern Illinois. The major impact of brine damage in this area is the contamination and resultant decrease in productivity of the soil. The WQM Plan stresses that strict enforcement of existing regulatory guidelines for the disposal of oil field brines is essential for the protection of currently utilized and potential groundwater sources as well as surface water quality. From a statewide perspective,

the control of oil field brine is a necessary component for the compliance management of groundwater and surface water quality as well as the soil erosion control program.

* The State has primary responsibility through the Gas and Oil Division of the Department of Mines and Minerals (DMMR) for the control of water quality impacts from oil field brine. The control of erosion and reclamation of soil and water resources is a local responsibility.

* Technical guidance is necessary to aid in the selection of Best Management Practices to prevent water quality degradation and restore degrade soil and water resources.

* Designated local management agencies should continue to inventory and categorize areas of oil field brine damage and should work for brine damage reclamation.

Chapter Seven -- Mineral Extraction/Mining: The Plan summarizes work of various agencies on methodologies to assess water quality problems and on assessment of mine reclamation techniques. Studies of GERFDC, SIMAPC and other agencies showed that abandoned coal mining operations, closed before recent reclamation laws, constitute a majority of potentially polluting mine sites.

* Control of pollution from mining activities is necessary to protect waters of the State. Reclamation of abandoned mines and mine waste sites can improve water quality for legitimate uses. Water quality priorities for reclamation should be as follows: (1) public water supply watershed and (2) general use water.

* The maintenance of water quality affected by mining and quarry operations should be assured through interagency cooperation during permit review and the hearing process.

Chapter Eight -- Hydrographic Modification: The Plan defines hydrographic modifications as activities which alter stream channels in such a way that flow patterns are changed. Estimates indicate that one-third or 12,000 miles of the total streams mileage in Illinois has been altered. In Illinois, primary decision-making on hydrographic modification projects rests with the U.S. Army Corps of Engineers and the Illinois Department of Transportation, Division of Water Resources. From a statewide perspective, the control of pollution resulting from hydrographic modification procedures is a necessary component for the maintenance of legitimate water uses in both urban and rural settings. The primary responsibility for the control of hydrographic modification impacts on water quality rests with the State.

* Illinois EPA, under Section 401 of the Clean Water Act of 1977, will review all applications for hydrographic modifications associated with dredging under Section 404 of the Act. In addition, IDOT, Division of Water Resources and Illinois EPA will jointly review all applications for permits for hydrograhic modification under Section 10 of the federal "Rivers and Harbors Act of 1899" and Sections 65 and 70 of "An Act in Relation to the Regulation of the Rivers, Lakes and Streams of the State of Illinois."

* Districts organized under the Illinois Drainage Code are considered designated management agencies for the control of hydrographic modification impacts. Local public and private interests, including drainage districts, should consider hydrographic modification alternatives that are less likely to cause water quality degradation in lieu of channel deepening and widening projects.

* The modification of permits and operation plans for existing impoundments for the improvement of water quality should be encouraged. Procedures for assuring adequate consideration of water quality impacts for proposed impoundments should be guaranteed.

* The Army Corps of Engineers should cooperate with the State and local jurisdictions in the siting of suitable dredge disposal areas, consistent with the provisions of Section 404(t) of the Clean Water Act of 1977 to maintain federal interest in navigation.

Chapter Nine -- Groundwater: The Illinois WQM Plan summarizes the nature of groundwater problems in Illinois. A large number of Illinois communities depend on groundwater as a water supply. However, numerous sources of contamination threaten this inadequately protected resource. Groundwater protection in Illinois is accomplished predominantly through remedial action. Although this approach provides a reasonable degree of protection, better management of groundwater is needed. Protection of groundwater quality is a necessary component of an overall water quality management strategy and implementation responsibility is shared between state and local governments.

* The emphasis of the WQM Plan is to ensure the conjunctive management of ground and surface water.

* Areas which have a high potential for groundwater contamination should be identified and protected from pollution. The Illinois State Water Survey, Illinois Geological Survey, Illinois EPA and the U. S. Geological Survey should monitor groundwater in areas of high usage.

* Additional state and/or local control of contamination sources, based on existing authorities, should be actively pursued.

* A groundwater education program needs to be undertaken in order to underscore the importance of protecting underground water resources.

Chapter Ten -- Groundwater/Residual Waste: Residual waste is material (sludge) which is separated from point discharges of industrial, municipal or private waste treatment plants. This waste may contain pathogens, heavy metals, toxic or hazardous material which can cause water pollution. The WQM Plan emphasizes the need for the conservation and reuse of wastes. Needs include the better use of existing sludge management systems and education programs.

* The State, through Illinois Pollution Control Board Rules contained in Chapter 7 (Solid Waste) and Chapter 9 (Special Waste Hauling Regulations) is responsible for the regulations of solid waste disposal practices. In addition, the State is responsible for sludge disposal resulting from the operation of publicly owned treatment works through IPCB rules in Title 35, Subtitle C, Chapter I, Water Pollution.

* The Plan recommends consideration of disposal alternatives through Section 201, landfill compliance with IPCB regulations, proper practices in soil application, continued enforcement of hazardous or toxic standards and permits and education for those who work with sludge.

* The preferred method for disposal of domestic septage, land application, should be encouraged. Specific wastewater treatment plants should be permitted by the IEPA to receive domestic septage. Special consideration is given to conditions during winter when land application is not possible for septage that contains hazardous or toxic wastes.

* The disposal of water treatment plant residues or sludges should be evaluated on a case-by-case basis.

* Responsible local agencies should implement the most cost-effective sludge disposal/utilization schemes consistent with applicable regional and subregional residuals disposal plans.

* The Septage Disposal Plan adopted by NIPC is made a part of the Illinois WQM plan for application in its area. Specific recommendations are developed for sludge management in NIPC area communities.

Chapter Eleven -- Groundwater/On-Site Disposal: The Illinois Water Quality Management Plan emphasizes that properly installed on-site systems are of sufficient structural and mechanical integrity to be received as reliable wastewater treatment options. A key area for improving performance of on-site systems is in the procedures for improving quality assurance in terms of design, installation and management of systems. From a statewide perspective, the control of adverse water quality impacts from on-site disposal systems is a necessary component in the conjunctive management of ground and surface water. The responsibility for the proper use and placement of on-site systems is shared between the State and local units of government.

* The State has primary responsibility, through the Illinois Department of Public Health (IDPH) and those counties acting as designated agents of the State, to ensure the effective enforcement of the Private Sewage Disposal Code. In those instances where urban or county health departments act as local independent authorities, they are primarily responsible for enforcement of the appropriate private sewage disposal ordinances or codes.

* It is the primary responsibility of the State to ensure that the administration and application of the IDPH Private Sewage Disposal Code and the IEPA Construction Grant Program be closely coordinated.

* The education/information function should be stressed. This includes both the public and private sectors. All state and local agencies involved with on-site disposal should be kept informed of current developments in on-site disposal technology, and should provide on-going training for their staff. The development of a regular schedule and program of training seminars on septic tank installation and maintenance for licensed contractors and new applicants is encouraged.

Chapter Twelve -- Stream Use/Water Quality Standards: The present Illinois Water Quality Standards have been in effect since 1972. The uses that a given water will support should be directly reflected by the water quality standards assigned to it. The identification of attainable stream uses and supporting water quality criteria are the cornerstornes of the water quality management planning proces. The primary responsibility for the establishment of water quality standards and their revision rests with the Illinois Pollution Control Board.

* The emphasis of the Illinois WQM Plan is to ensure that water quality standards are established and maintained in a manner consistent with the 1970 Environmental Protection Act. This includes the review of existing water quality standards, establishing a process to tailor water quality standards to existing and potential uses of a stream segment and ensuring that public water supplies are protected from degradation.

* The Illinois EPA will work with adjoining states to assure that waters flowing into Illinois meet applicable Illinois water quality standards at those points of entry.

* The designated areawide WQM agencies will assist the Illinois EPA in the process of developing attainable water quality standards for water bodies in those areas.

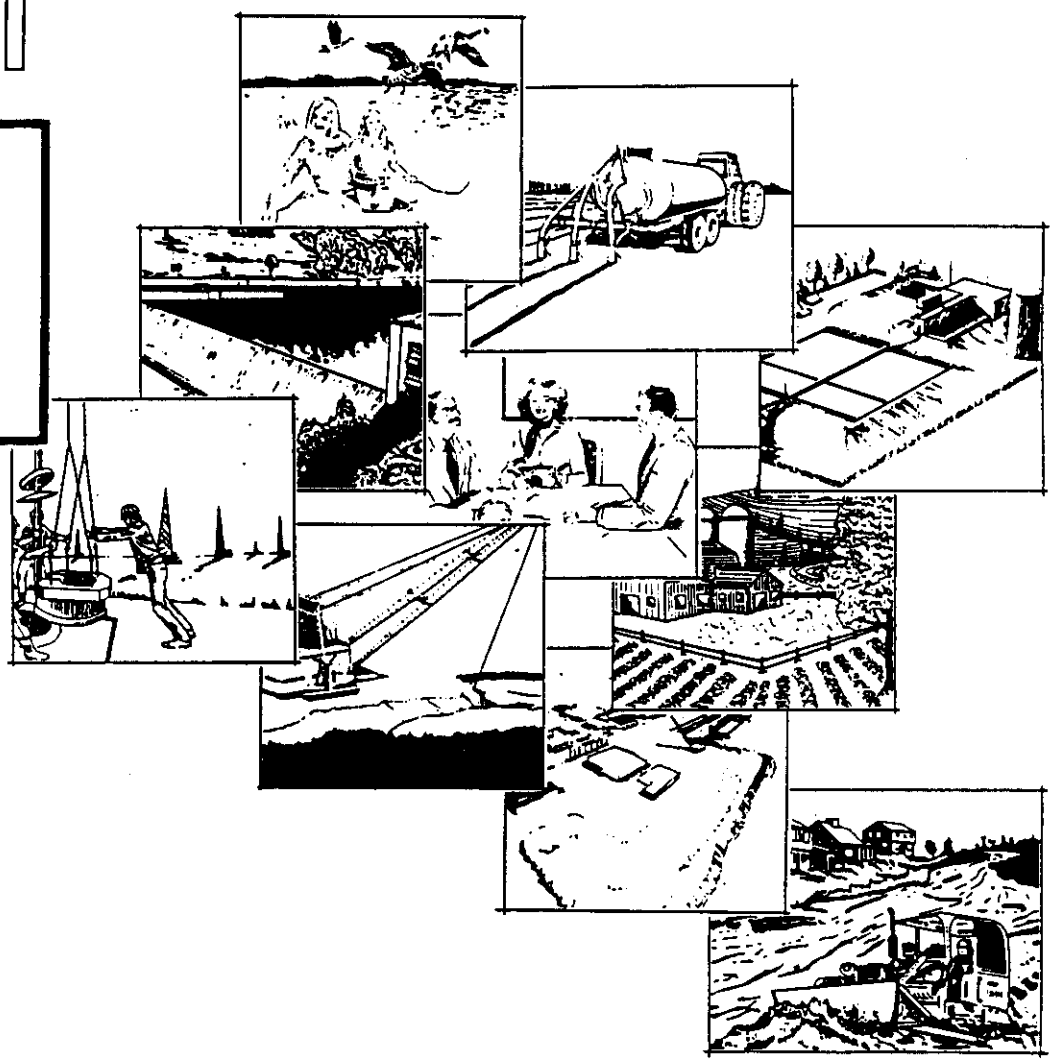
Chapter Thirteen -- Management: Effective treatment and control of existing sources of pollution and the prevention of future water quality problems are dependent on an effective management system being established to implement the WQM plan. From a statewide perspective, an effective management system is the key factor in maintaining and implementing the WQM Program.

* The Water Quality Management Plan emphasizes the development of an acceptable and workable Statewide WQM management structure based on the existing state and areawide management systems established in the four Illinois certified and approved WQM Plans.

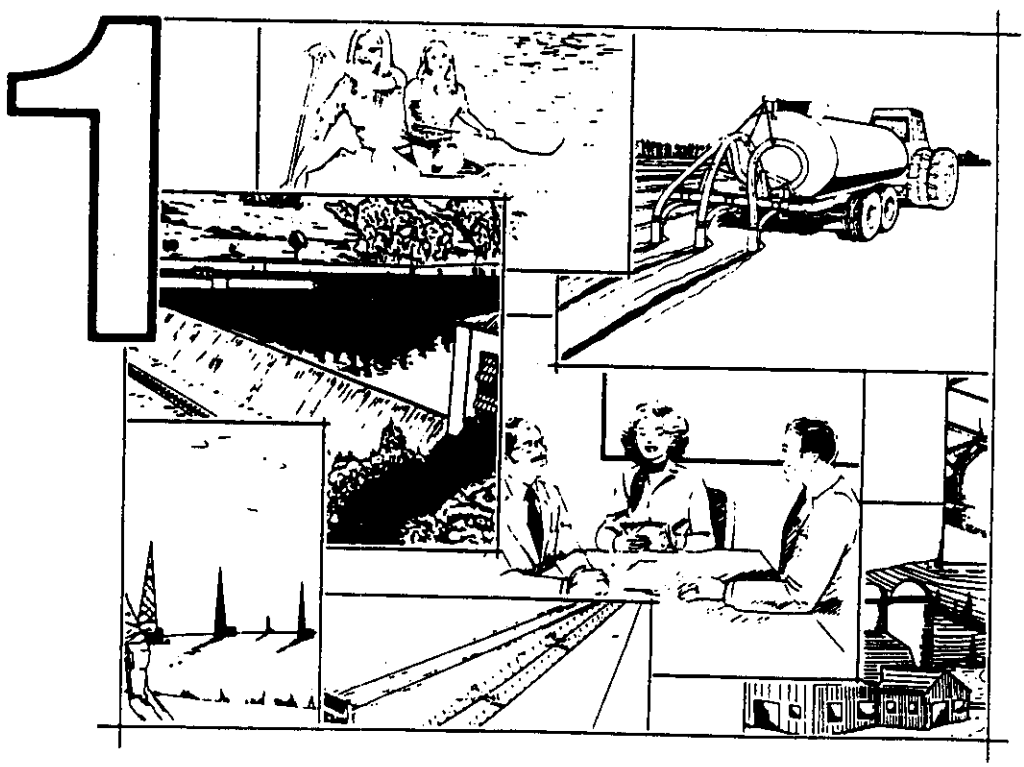
* This WQM Plan identifies and designates as WQM agencies all entities necessary for the implementation of an effective Statewide WQM program.

OVERVIEW

PART 1



INTRODUCTION
CHAPTER 1



November 15, 1982

CHAPTER ONE: INTRODUCTION

I. PURPOSE

Section 303(e) of the Clean Water Act requires that the State develop a continuing planning process (CPP) which integrates operating policies, procedures and practices that comprise the functional and planning elements of the Agency's water quality management (WQM) program. The purpose of the Illinois Water Quality Management Plan, presented in this document, is to consolidate and streamline portions of approved state and areawide WQM plans in order to facilitate their usage in the routine operations of all designated WQM agencies.

Four Water Quality Management (WQM) plans have been approved within the State of Illinois: three areawide plans covering 19 counties; and the State WQM Plan covering the remaining 83 counties. The areawide plans have been developed by three designated regional WQM plan agencies: Northeastern Illinois Planning Commission (NIPC), Southwestern Illinois Metropolitan and Regional Planning Commission (SIMAPC) and Greater Egypt Regional Planning and Development Commission (GERPDC). The State plan has been developed and maintained by the Illinois Environmental Protection Agency (IEPA). All three areawide WQM plans have been broadly integrated with the State WQM plan but operational procedures need to be refined to effectively use WQM plans in an administrative framework. The WQM consolidation effort has been directed toward identifying desired base information, establishing an appropriate format for all four WQM plans, and promoting efficient procedural mechanisms to expedite WQM plan consistency determinations.

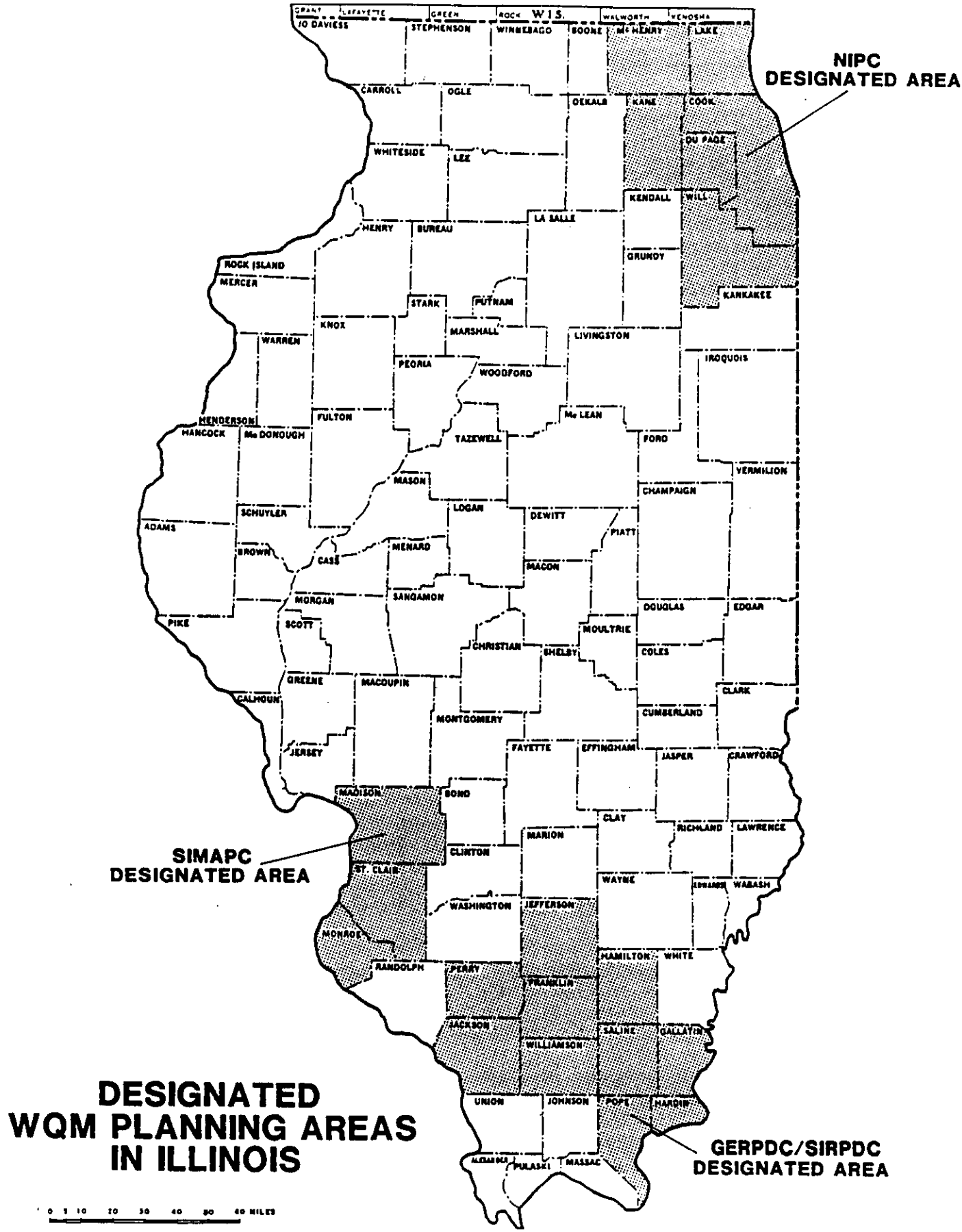
II. DEVELOPMENT OF STATE AND AREAWIDE WQM PLANNING PROGRAMS

WQM planning authority and responsibility for 19 counties has been delegated to areawide planning agencies designated under the provisions of Section 208. These agencies (NIPC, SIMAPC and GERPDC) were specifically designated by the Governor as being best qualified to undertake WQM planning in their respective areas. WQM planning for the remaining 83 counties in the State was conducted in accordance with Sections 208 and 303(e). Under these authorities, WQM plans were developed by the three designated areawide agencies and Illinois EPA.

Water quality management planning, on a statewide basis, has been accomplished in three phases: Phase I WQM plans completed by IEPA under Section 303(e) authority; Phase II and III plans and programs developed by state and areawide agencies under Section 208 funding.

The Phase I Basin Plans for 14 basins identified as planning areas were completed by IEPA prior to July 1, 1976. These plans developed a complete and accurate inventory of wastewater dischargers which were originally included in the NPDES permit program (excluded were such point source categories as storm sewers, small livestock

November 15, 1982



feedlots, and agricultural field drainage tiles). Phase I plans documented ambient water quality conditions and problems which would not be solved by implementation of the point source regulatory controls alone. This resulted in a segment-by-segment listing of water quality standards violations which were expected to continue in the absence of additional controls on point or nonpoint sources.

Phase II planning (Section 208 Planning) started in 1975 with the designation of the NIPC, SIMAPC and GERPDC WQM planning areas. The areawide Phase II planning strategies emphasized the development of comprehensive WQM plans which produced locally acceptable and politically feasible recommendations for point and nonpoint source control and institutional arrangements for plan implementation. In 1976, IEPA was delegated the WQM planning responsibility for the nondesignated portion of the State. The Phase II strategy of Illinois EPA emphasized nonpoint source assessment and problem solving approaches. Institutional arrangements for plan implementation were the main focus in those problems areas where it appeared likely implementable solutions could be developed, within the initial WQM planning period. The agricultural nonpoint source element and lake programs were developed during Phase II. Phase II planning also served as the problem assessment stage for groundwater, construction erosion and urban runoff. Development of program expertise for agricultural nonpoint source control was assigned high priority. Phase III provided for the transfer of this experience to other nonpoint source problems. Additionally at the end of Phase II planning, the Governor designated the Illinois EPA and the three areawide agencies as continuing planning agencies required under the Clean Water Act Amendments of 1977.

Phase III elements included all those planning and program activities that were undertaken since May of 1979. The State and areawide programs during Phase II plan development tended to look at the general relationships between water quality conditions and the applicability of technical or institutional control options. These initial studies revealed those areas in which the information base and/or causative relationships were not sufficiently developed for decision-making purposes. Since the completion of the initial plan development phase in the 208 program, attention has been directed towards attainment of an adequate data base, the transfer of information and control approaches, and the implementation of control strategies for problem resolution. The development of the Illinois Water Quality Management Plan serves as the transition from Section 208 planning to a continuing water quality management program.

III. THE CONCEPT AND ORGANIZATION OF THE ILLINOIS WQM PLAN

The WQM Plan represents a joint effort by the four agencies with WQM planning responsibilities. The four agencies involved are: Illinois Environmental Protection Agency, Greater Egypt Regional Planning and Development Commission, Northeastern Illinois Planning Commission and the Southwestern Illinois Metropolitan and Regional Planning Commission. In addition to WQM planning responsibilities,

Illinois EPA also retains certain implementation responsibilities. Other implementation responsibilities are assigned or recommended to the appropriate local governmental units and other state agencies for both point and nonpoint source control.

There are several reasons which promoted the unifying of existing state and areawide plans. The first is the need to compile existing WQM plans in a convenient and expedient administrative format. The need for convenience and workability is applicable for both local and state level decision-makers. At the state level, there is a need to improve the process of WQM Plan consistency review for NPDES permit or Title II Construction Grant determinations. For local officials there is a need to clearly define designated management agency responsibility. This is a necessary step in the continuing process of WQM plan implementation.

A second reason for WQM Plan consolidation is to provide an orderly transition from plan development to implementation of programs. There has been a considerable public investment to establish credibility in the process Section 208 created, both from a planning and implementation standpoint. The cessation of funding for Section 208 WQM planning has resulted in the need to incorporate this planning process into the ongoing Agency water pollution control program. Program choices need to be made in light of this fiscal reality. This includes identifying ways in which the current WQM planning process can be merged into base Agency program activities.

The consolidating of State and areawide WQM plans provides the following benefits from both a State and local perspective:

1. Records statewide and areawide policies which make up the general management strategy for both point and nonpoint source;

2. Provides a concise compilation of pertinent data needed in consistency determination for grant and permit issuance;

3. Formats existing WQM plans into a standard style to simplify their use;

4. Denotes roles and responsibilities of designated management agencies;

5. Establishes a simple routine process to update and amend the WQM plan through the use of Agency's Annual Program Plan;

6. Incorporates water quality management planning considerations into base program (Sections 106 and 205(j)) activities and;

7. Defines the minimum water quality management planning requirements for plan continuity.

The merging of State and areawide WQM Plans has been undertaken in two distinct parts. Part of this effort entailed the development of a document entitled 208 Planning in Illinois. This report contains abstracts for all FFY 1977 through 1981 projects completed with WQM planning funds by the respective State or areawide planning agency. This provides a convenient compilation of 208 work activities and facilitates information transfer among interested parties. The second part of this effort is the Illinois WQM Plan itself.

The Agency has worked with the three areawide agencies to develop a document which will fulfill these objectives. All four currently certified and approved WQM plans have been subject to the same level of scrutiny and revision. Revision in the context of the consolidation process is the reformatting of plans based on the administrative use of these documents over the past several years. Under contract, the areawide WQM agencies provided the following assistance during the consolidation effort:

1. Detailed facility planning area (FPA) boundary mapping in areas with complex boundary issues;

2. Identification of currently inconsistent FPA boundary alignments;

3. Tabular accounts of specified point source data jointly agreed to as necessary for decision-making and;

4. Summary narratives of point and nonpoint source recommendations contained in the initial approved WQM plans as modified by subsequent amendments.

Based on this information, a joint work effort merged this information together into one unified document. Following public review and any subsequent revision, this document will become the certified State and Areawide WQM Plan document for the purposes of consistency review. It will be the singular reference document for such reviews. Prior WQM planning documents represent a supplemental information base and an expression of local consensus. Prior WQM planning documents and those currently under development by designated areawide agencies represent a major source of guidance for management agencies in establishing their programs. While not a basis for consistency reviews, they should be routinely considered by management agencies working in the respective areas of the state. Their status with designated areawide agencies will be determined by each such agency after consultation with Illinois EPA.

Following the completion and review of the initial plan consolidation effort, annual updates and amendments to the plan will be prepared by the Agency in cooperation with the Areawide WQM agencies and published in the Agency's Division of Water Pollution Control Program Plan. Public involvement process on plan amendments being considered may be conducted by the designated areawide WQM agencies. The Program Plan will serve as a vehicle to circulate and document WQM Plan changes. The amendment process for point sources will be conducted in accordance with the adopted "Procedures and Requirements for Conflict Resolution in Revising Water Quality Management Plans."

The WQM Plan is comprised of four distinct parts. Part One provides the basic conceptual framework and objectives of the plan. Part Two outlines the process for point source decision-making consistency within the WQM Plan. It also highlights the basis for regulatory action, how certain regulatory decisions form amendments to the WQM Plan and what other types of decisions result in amendments (changes) to the WQM Plan. There is also a discussion of the concept of conflict resolution and a definition of the term in the context of the WQM Plan.

Part Three of the WQM Plan is divided into ten major areas which were identified in the initial 208 water quality management plans. These sections are: agriculture; construction; urban runoff; mineral extraction-oil field brine disposal; mineral extraction-mining; hydrographic modification; groundwater; groundwater-residual wastes; groundwater-on-site disposal; and stream use/water quality standards. Each major section contains two headings: plan findings, and continuing policies and recommendations.

The plan findings section summarizes the common pollution problems identified in all four Water Quality Management Plans. Specific problems identified in respective State and WQM agency plans are highlighted. A brief generic definition of the problem and its impact on the waters of the state is provided in those instances where site specific identification does not exist.

The second section contains policies and recommendations for the ten major chapters. These statements are derived from the initial plan findings, specific problem solving recommendations and applicable results from projects which were undertaken utilizing Section 208 WQM planning funds.

Part Four of this document discusses Management. As part of the on-going process of WQM planning and implementation, locally comprised advisory boards were created in the three designated areas. These groups serve in a facilitator role, particularly with regard to exercise of implementation responsibilities by local designated management agencies and maintenance of the certified WQM Plan. A general discussion of these groups, their activities and their relationships to areawide planning agencies are covered. This section also includes a description and discussion of designated management agencies for various point and nonpoint source areas.

ATTACHMENT 11

Other Location Standard Documentation

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

REPLY TO THE ATTENTION OF:

MAR 15 1994

WG-16J

Mr. Edward M. Leigh
Environmental Engineer I
Andrews Environmental Engineering
3535 Mayflower Boulevard
Springfield, Illinois 62707

Dear Mr. Leigh:

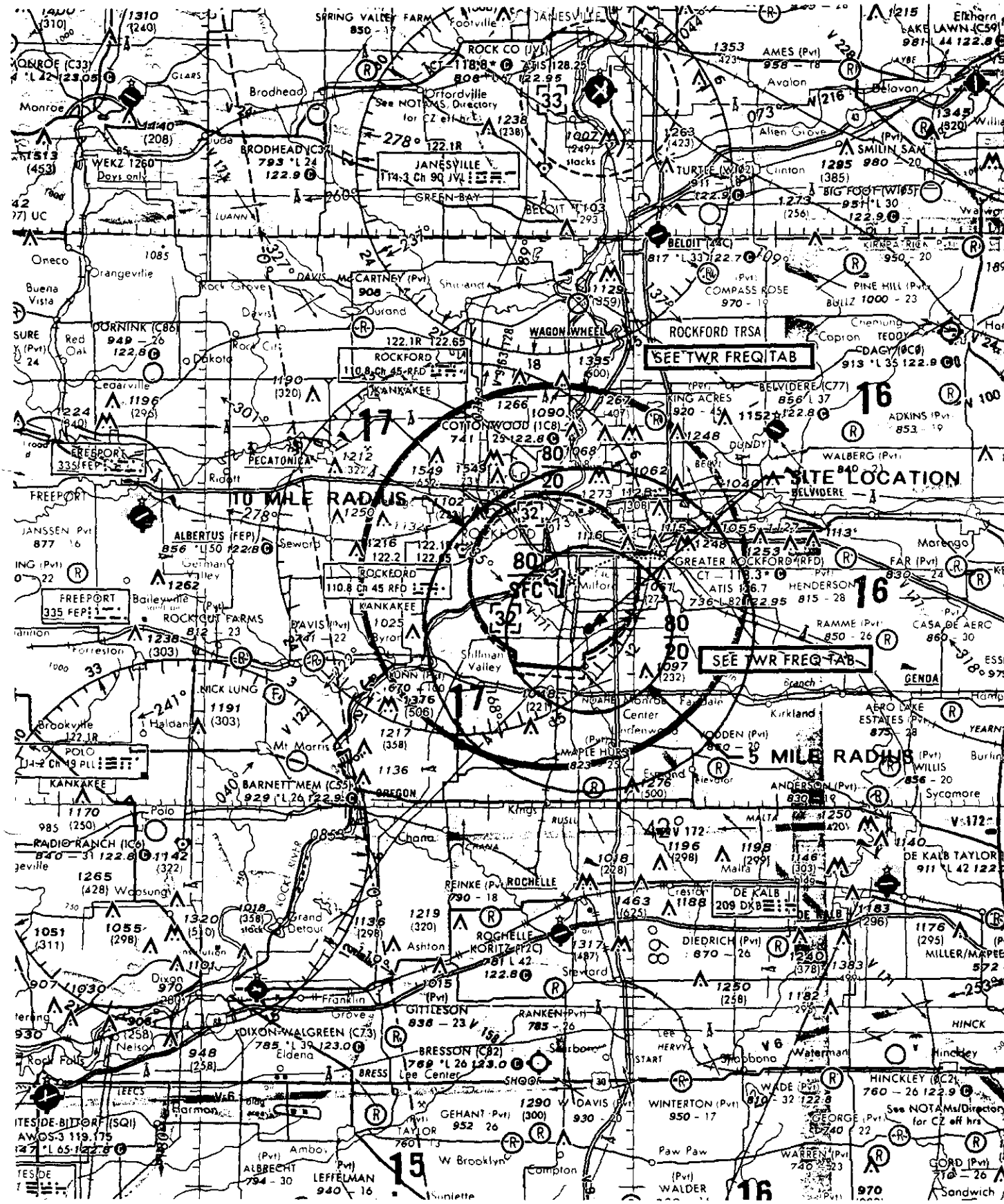
Thank you for your request of March 7, 1994, concerning federally designated Sole Source Aquifers (SSAs) in the State of Illinois. Presently, no Sole Source Aquifers have been designated in the State of Illinois, nor are any petitions pending in the State.

If you have any questions with the letter, or regarding the Federal Sole Source Aquifer program in general, feel free to contact me at (312) 353-1435.

Sincerely,

Paul A. Johnson
Acting Sole Source Aquifer Coordinator

Printed on Recycled Paper



ANDREWS ENVIRONMENTAL ENGINEERING, INC.
3535 MAYFLOWER BOULEVARD
SPRINGFIELD, ILLINOIS 62707 (217) 787-2334

PAGEL LANDFILL
ROCKFORD, ILLINOIS

DRAWN BY: VJM	SCALE: 1"=7.89 mi.	AIRPORT LOCATIONS MAP	DRAWING NUMBER
DESIGNED BY: VJM	DATE: 5/94		

ATTACHMENT 12

Report of Stability Analysis

SUMMARY OF FINDINGS

The Pagel Landfill - Significant Modification in Winnebago County, Illinois is the subject of the Foundation and Mass Stability Analysis reported herein. The study complies with the requirements of "Standards for New Solid Waste Landfills, 35 Ill. Adm. Code, Sections 811.205(a), 811.304, and 811.305(a), as adopted by the Illinois Pollution Control Board on August 17, 1990 and amended September 15, 1993. The following summary of the findings of the study is presented subject to any and all qualifications and discussion contained in the formal text which follows.

1. Foundation Support - The Existing Pagel Landfill is founded on dense to very dense sand and gravel underlain at shallow depth by dolomite bedrock. The requirements of 811.304 a), b), and c) are satisfied by the foundation.

2. Mass Stability - Analyses indicate that the design meets requirements 811.304 d), e), and f), with respect to the stability of the slopes of the Unit.

3. Liquefaction Potential - Deposits susceptible to liquefaction are absent beneath, and adjacent to, the site. The requirements of 811.304 f) are therefore met, there being no materials subject to liquefaction present.

PAGEL LANDFILL - SIGNIFICANT MODIFICATION

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2. SOIL PARAMETERS FOR BEARING CAPACITY AND MASS STABILITY ANALYSES	8
3. RESULTS OF SLOPE STABILITY ANALYSES	10

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1. RESULTS OF STABILITY ANALYSES	In Pocket

INTRODUCTION

This report presents analyses of the foundation and slope stability of a proposed Significant Modification to the existing Pagel Landfill in Winnebago County, Illinois. The site is about 5 miles south of Rockford. It has been receiving waste since 1972 under IEPA Permit No. 1972 - 24. Drawings prepared by AEEI indicate that the Significant Modification will be an increase in the height of the completed facility.

A lateral expansion of the facility, located to the south of the existing Pagel Landfill was the subject of a 1991 foundation and slope stability study by Testing Service Corporation (TSC). Information from that study has been augmented by additional boring data obtained from Andrews Environmental Engineers, Inc. (AEEI) and from Winnebago Reclamation Service (WRS). Regional seismic data has been taken from Nuttli and Hermann (1978), Stover, et. al. (1979), McGinnis and Ervin (1974), Algermissen et. al. (1982) and Johnson and Kantner (1990).

PURPOSE

The purpose of this study is to establish the foundation and slope stability of the proposed facility and to formulate appropriate remedial treatments where needed to increase the stability and raise Safety Factors to or above the minimums required by 35 Ill. Adm. Code. Briefly, those minimums are:

1. Foundation Support

    a. The material beneath the unit shall have sufficient strength to support the weight of the unit during all phases of construction and operation. - 811.304 a)

    b. The loads and loading rate shall not cause, or contribute to, failure of the liner-leachate collection systems. -811.304 a)

    c. The total settlement or swell of the foundation shall not cause, or contribute to, failure of the liner leachate collection system. -811.304 b)

    d. The waste disposal unit shall be designed to achieve a safety factor against bearing capacity failure of at least 2.0 under static conditions and 1.5 under seismic conditions. -811.304 c)

2. Mass Stability

    a. The waste disposal unit shall be designed to achieve a factor of safety against slope failure of at least 1.5 for static conditions and 1.3 under seismic conditions. -811.304 d)

b. The potential for off-site landsliding shall be considered where such an occurrence could effect the unit. -811.304 f)

c. The liner and leachate collection system shall be stable during all phases of construction operation. The side slopes shall achieve a minimum static factor of safety of 1.3 and a minimum seismic factor of safety of 1.0 at all times. -811.306 b)

d. In calculating factors of safety, both long term (in tens or hundreds of years) and short term (over the design period of the facility) conditions expected at the facility shall be considered. -811.304 e)

3. Liquefaction -

a. The potential for earthquake or blast induced liquefaction, and its effect on the stability and integrity of the unit shall be considered and taken into account in the design. -811.304 f)

b. The potential for earthquake induced liquefaction outside the unit shall be taken into account if such events could affect the unit. -811.304 f)

SCOPE

The elements of this study included the following:

1. Evaluation of available subsurface data to establish the stratigraphy, groundwater conditions and material properties applicable to this study.

3. Assessment of subsurface data, and the geometries of the existing and final landfill configurations, to determine the critical section for foundation and mass stability analyses.

3. Review of seismic literature to establish ground motion parameters appropriate to the required seismic analyses.

4. Engineering analyses using the above described data, using generally accepted methods in the fields of engineering geology and geotechnical engineering to satisfy the stated purposes of this study.

5. Preparation of this report, presenting the results of those analyses and recommendations as to potential remedial measures.

The available subsurface data is considered adequate to the specific requirements of this study.

GENERAL SITE AND SUBSURFACE CONDITIONS

Site Conditions -The site lies in the Sections 36, T43N, R1E and 31, T43N, R2E about one mile south of New Milford, Illinois. It is bounded on the east by Lindenwood Road, on the south by a lateral expansion which has been permitted for development and operation under 35 IAC 811, on the west by Killbuck Creek and on the north by other properties.

The site occupies gently rolling terrain through which Killbuck Creek has incised and constructed a flood plain. Elevations in the vicinity of the site range from about 800 feet (NGVD) to about 710 (NGVD) adjacent to Killbuck Creek. Another solid waste disposal facility is located about a mile southwest of the Pagel Landfill.

Geologic Setting -Assessments of the geology in the vicinity of the site have been made by Andrews (1990). Borings performed as part of Hydrogeologic studies by AEEI and others, together with groundwater levels recorded periodically, were used in the analyses described in subsequent sections of this report. A summary of the geologic setting follows.

The column of materials underlaying the site comprises a surficial layer of Pleistocene glacial drift which lies unconformably on Paleozoic rocks which are underlain unconformably, in turn, by Precambrian igneous rocks. The Paleozoic rocks are of Ordovician age. The unconformities mark periods during which erosion, rather than deposition, was the dominant process. As such, the structural and lithologic characteristics of each major component of the column are largely unique to that component.

The Precambrian rocks, believed to be granite, are part of the ancestral North American continent (craton). Only sparse data are available regarding the structure of the Precambrian. Using extensive gravity survey data, McGinnis and Ervin (1974) postulate the presence of essentially coherent, undeformed blocks of Precambrian lithosphere separated by normal or reverse faults beneath the Paleozoic rocks. Their studies further lead them to believe that the Paleozoic rocks are draped over the offsets in the Precambrian basement, being folded rather than faulted.

Although much of the Paleozoic sequence is buried beneath the younger glacial drift, some evidence of faulting can be seen in the limited exposures. The best known structural feature in Northern Illinois is the Sandwich Fault Zone which extends from the southern part of the Chicago area northwestward to around Oregon in Ogle County. Displacement is up to the south and ranges from 900 feet near Joliet to 0 at the extremities of the trace (Kolata, et. al, 1978). The fault appears to be nearly vertical. At the northwest end, the fault is about 100 feet wide and is characterised by intensely sheared rocks. Adjacent rocks have been broken by many faults which exhibit small displacement. A second, less prominent, east - west trending feature, the Plum River Fault Zone has been mapped from the Mississippi River eastward through Carrol County to a point about three miles west of the Rock River in Ogle County. There is no evidence of movement on either of these faults since before the earliest Pleistocene deposits in the area were laid down.

The glacial drift in the vicinity of the site includes both till and outwash and is on the order of 50 to 100 feet thick. The till is generally clayey or silty in composition, while the outwash is generally sand and gravel. Reportedly, the sandy, gravelly Argyle Till is present in the area although Geologic Sections for the site do not indicate its presence.

The till is generally quite competent, having been compressed under the weight of the ice sheet at the time of its deposition. The outwash materials are also considered competent and may be lightly cemented as evidenced by near vertical banks exposed by sand and gravel mining operations.

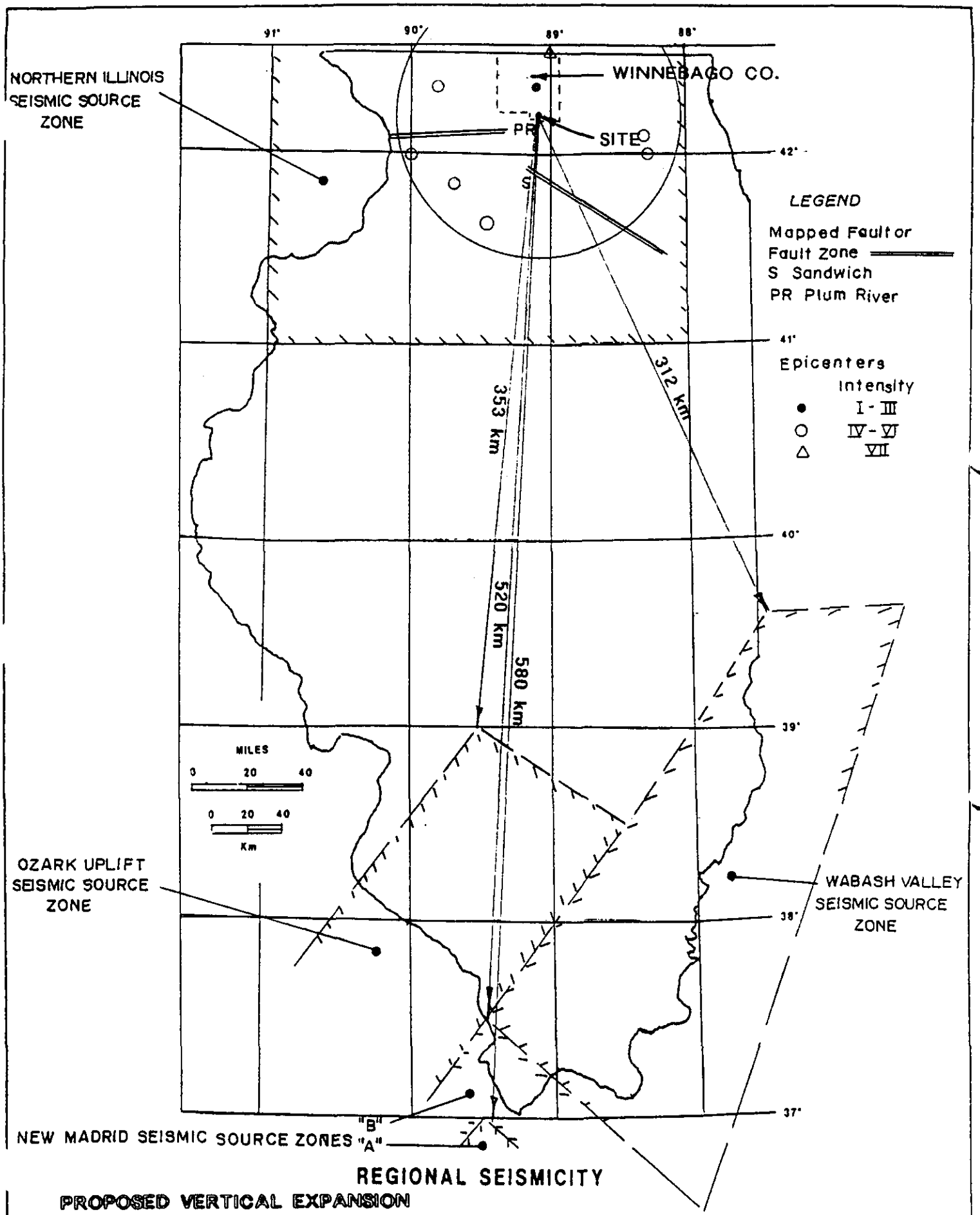
Seismic Setting -The area is subject to occasional seismic activity. Nuttli and Hermann (1978) delimit specific seismic source zones based on the historic occurrence of seismic activity. Illinois includes portions of the Northern Illinois, Ozark Uplift, Wabash Valley, and the New Madrid "B" Seismic Source Zones. In addition, the New Madrid "A" Seismic Source Zone lie immediately adjacent to the southern tip of Illinois. The boundaries of these zones are shown on Figure No. 1 which also shows some of the structural features, the approximate locations of Illinois epicenters within 50 miles of the site (as of 1979) and the site location.

As may be seen on Figure 1, the site lies within the Northern Illinois Seismic Zone. The distance from the site to the nearest point of the other four source zones is also shown.

The Northern Illinois Seismic Source Zone extends through three degrees of longitude between 88 West and 91 West and two degrees of latitude between 41 North and 43 North. As of the 1978 publication date, the catalogue of earthquakes for the Northern Illinois Seismic Source Zone records some 21 events ranging in modified Mercalli intensity from 0 (detected only by instruments) to VII (all frightened-general alarm..). This latter event, which occurred in 1909, was centered about 30 miles due north of the site. Both the Sandwich and Plum River Fault lie within the Northern Illinois Seismic Source Zone. Figure No. 1 of McGinnis and Ervin (1974) indicates that the zone is characterized by high gravity gradients which, in the vicinity of the site, are oriented north -south, suggesting reverse faulting.

The zonation of Nuttli and Hermann is statistical and independent of known structural features. The statistical basis of the zonation means that the predicted event for a chosen recurrence interval may occur at any point in the zone with equal probability. Therefore a central location within the zone is, in theory, no more prone to the predicted event than a location near a zone boundary. The statistical nature of most of the seismic zonation in the Central and Eastern United States has led some seismologists to coin the term "wild card" earthquakes in reference to their seemingly random occurrence in an area.

Nuttli and Hermann present both magnitude-recurrence interval and magnitude-peak acceleration-attenuation relationships for the Central United States. These data are applicable with equal probability to any point in the seismic source zone in question. The magnitude - recurrence relationship predicts the maximum event which can be reasonably expected to occur during a given recurrence interval. For a specific area of the

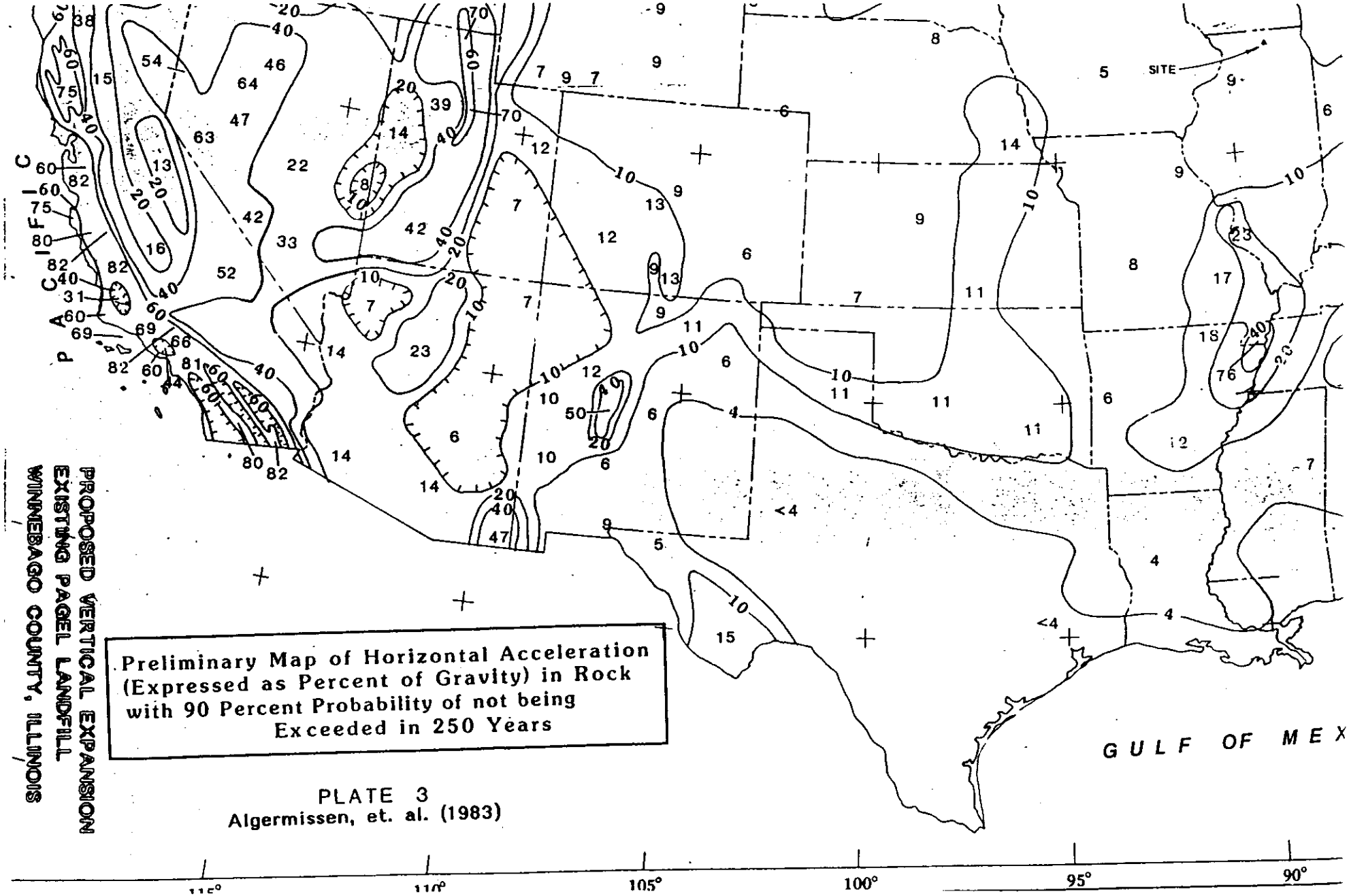


REGIONAL SEISMICITY

PROPOSED VERTICAL EXPANSION
PAGEL LANDFILL
WINNEBAGO COUNTY, ILLINOIS

FIGURE NO. 1

TESTING SERVICE CORPORATION - 457 EAST GUNDERSEN DRIVE - CAROL STREAM, ILLINOIS 60188



Preliminary Map of Horizontal Acceleration (Expressed as Percent of Gravity) in Rock with 90 Percent Probability of not being Exceeded in 250 Years

PLATE 3
Algermissen, et. al. (1983)

PROPOSED VERTICAL EXPANSION
EXISTING PAGEL LANDFILL
WINNEBAGO COUNTY, ILLINOIS

FIGURE NO. 2

source zone, the probability of a larger event during an exposure period equal in length to the recurrence interval can be evaluated as the probability of the recurrent event being exceeded during that period in the entire source zone (approximately equal to 0.63) multiplied by the ratio of the area in question to the source zone area.

Ground motion from earthquakes in other source zones is also possible. Three other seismic source zones, the Ozark Uplift, Wabash Valley, and New Madrid "B", extend into Illinois, while the New Madrid "A" zone lies near the southern tip of the state. The maximum event for each of these zones exceeds that for the Northern Illinois Seismic Zone. Nuttli and Hermann indicate that the maximum event in the New Madrid "A" source zone produces a body wave magnitude (m_b) equal to the greatest produced by any earthquake anywhere in the world.

Working with the Nuttli and Hermann (1978) and other data, Algermissen, et. al. (1982) developed estimates of seismic acceleration and velocity for a 10 percent probability of exceedance and exposure times of 10, 50, and 250 years for the United States as a whole. Their results are presented on maps indicating the probable values of maximum acceleration and maximum velocity for 10, 50 and 250 year exposure periods. A portion of their map showing the site is included as Figure No. 2. The data on Figure No. 2 are the rock acceleration values which may be exceeded at a probability level of 10% in 250 years. The work of Algermissen et. al. is incoporated by specific reference in 40 CFR 258, EPA Subtitle D.

Site History -Rarely do foundation or mass stability problems develop absent evidence from the performance of previous excavations and slopes. As similar excavations, lining and fill slopes have been constructed at the existing Pagel Landfill, the writer prepared a series of questions for personnel involved in the construction of that facility. Those questions were contained in a letter dated September 29, 1990, a copy of which is included in Appendix A. In response, Mr. John D. Lichty of Winnebago Reclamation Service interviewed WRS personnel involved since the construction of the Pagel Landfill in 1972 and added his observations over the past four years. A copy of his letter of response, dated October 9, 1990, is also included in Appendix A. Briefly, he indicates that no phenomena considered symptomatic of latent foundation or mass stability problems have been observed at the existing facility.

EVALUATIONS AND ANALYSES

Seismic Ground Motion - Recurrence - Magnitude data for the Northern Illinois Seismic Source Zone obtained from Nuttli and Hermann were used to determine the maximum body wave magnitude (mb) earthquake for exposure periods of 10 years and 250 years applicable to the short and long term analyses required. The predicted magnitudes were in turn used to determine the maximum acceleration applicable to each case. These values are presented in Table No. 1 below. The calculations are included in Appendix B.

TABLE NO. 1

SEISMIC PARAMETERS FOR SOURCE ZONE

Exposure		10 Year				250 Year			
Source Zone	R (km)	m_b	ah_{max} (g)	I	Duration (sec)	m_b	ah_{max} (g)	I	Duration (sec)
Northern Illinois	≤15	4.0	0.014	<III	< 1	5.5	0.087	VII	3 - 5
Wabash Valley	312	4.5	0.004	III	< 1	6.0	0.023	V-VI	1 - 2
Ozark Uplift	353	4.6	0.004	V	1±	6.1	0.026	VI-VII	2 - 4
New Madrid "B"	190	4.3	0.002	<III	< 1	5.8	0.012	V-VI	1 - 2
New Madrid "A"	245	5.3	0.006	V	1 - 3	6.7	0.037	VII	3 - 5
Residual Events*	≤15	3.1	0.004	IV	1±	4.6	0.022	VI	1 - 2

*For comparison purposes only.

Where: R is the distance in kilometers from the site to the nearest point of the zone in question, m_b is the predicted body wave magnitude for the recurrence interval, ah_{max} is the maximum horizontal (shear wave) ground acceleration, I is the predicted modified Mercalli intensity at the site, and Duration is the estimated length of discernable ground motion.

The probability that the tabulated ground motion will be exceeded at the site during the stated intervals is equal to 10 %. The acceleration spectra for these events is expected to have a significant component in the 1 hz to 10 hz range. Based on the analysis above, motion consistent with the design event occurring in the Northern Illinois Seismic Source Zone has been chosen as appropriate to this site.

Subsurface Conditions -Available data indicates that the soil overburden along the north edge of the proposed expansion includes a sequence of silt fill, sand, silty clay, sandy silt and sand and gravel. This overburden is superimposed on the dolomitic bedrock which lies at Elevations ranging from about 730 on the east end to 670 on the west.

Material Properties - The previous study established the values of Moist and Saturated Unit Weight, Angle of Internal Friction, O and Cohesion appropriate to the calculation of Foundation Bearing Capacity, Mass Stability and Liquefaction Potential for the lateral expansion site to the south. The typical subsurface profile for that site did not include the silt fill and sandy silt horizons which are observed at the section under consideration. Accordingly, values of soil parameters for these units have been estimated on the basis of Standard Penetration Tests and other data obtained from borings at the site.

The required analyses include calculation of the stability for the conditions that occur immediately after a change in stress (short term), and for the conditions that result when the transitory effects of that change have dissipated (long term). In general, granular materials adjust to loadings simultaneously with the loading, and the same properties are appropriate to both analyses. A time lag occurs in the behavior of cohesive soils, however, and the analysis must use either two different sets of properties or employ factors that link the two behaviors.

For the proposed Pagel Landfill Significant Modification, the transitory effects are expected to be limited to changes in pore pressure. These changes have been studied during the performance of the Isotropically Consolidated, Undrained Triaxial Shear Tests for other studies (TSC 1991, 1992, 1993, 1994). The test allows the strength of the soil to be described in terms of the stress difference, the angle of internal friction (0), the true cohesion (c), a pore pressure constant, and a pore pressure parameter. Values of the latter two factors are chosen to reflect the time under consideration. Typically the pore pressure constant and parameter obtained from the test are used for analysis immediately after loading, while the factors are set equal to zero for the analysis after the effects have dissipated.

Effective strength parameters for various soils are distributed over a much smaller range than the total strength parameters. Seismic loading is considered to mobilize short term strength parameters because of its transitory nature. The long term and short term seismic analysis differ only because larger accelerations accompany the longer exposure period.

For purposes of the required analyses, the material properties described above were evaluated for the following structural units:

1. Silt Fill
2. Stiff to Hard Pleistocene Clays
3. Dense to very dense Pleistocene Sand and Gravel outwash
4. Dense Sandy Silt
5. Compacted Clay Liner Material
6. Vegetative Cover Layer
7. Waste.
8. Ordovician Bedrock

Effective strength parameters for the vegetative layer were taken as those for a topsoil characterized by an effective angle of internal friction (0) of 23 and an effective cohesion of 200 pounds per square foot. Probably the most difficult material to characterize is the waste. Landva and Clark (1990) report angles of internal friction (0) ranging from 24 to 41 and cohesion intercepts between 300 and 500 pounds per square foot based on numerous test of waste. The writer has developed a conservative estimate

of these parameters based on observations of stability in the field. Those values, which lie at the lower bound of values reported by Landva and Clark, will be used herein.

TABLE 2

SOIL PARAMETERS FOR BEARING CAPACITY AND MASS STABILITY ANALYSES

EFFECTIVE STRESS VALUES

SUBSURFACE UNIT	UNIT WEIGHT Moist pcf	Sat. pcf	COHESION psf	FRICTION ANGLE Degrees	PORE PRESSURE VALUES Constant psf	Parameter
Pleistocene Clays	133	133	150	30.0	-4940	-0.5
Pleistocene Sand	125	130	200	36.0	0	0
Silt Fill	125	125	150	28.0	-3480	-0.2
Compacted Liner	125	125	260	26.5	-1040	-0.4
Sandy Silt	130	130	200	32.0	-2080	-0.1
Vegetative Layer	110	110	200	23.0	0	0
Waste	70	70	200	25.0	-2790	0
Ordivician Rock	160	160	20000	50.0	0	0

These are considered reasonable estimates of the respective values. After initial calculations with tabulated values, the results were reviewed, and the effects of variation in the assigned properties on the outcome was evaluated. Generally, the assigned parameters led to outcomes consistent with the writer's experience.

Groundwater - As the effect of groundwater on the stability and performance of excavations and embankments is pronounced, care was taken to include it as appropriate in the analyses reported herein. The water table used is essentially that depicted by Andrews (1991) based on water levels in piezometers and observation wells.

FINDINGS AND CONCLUSIONS

Foundation Support - The existing Pagel Landfill is founded on competent Pleistocene Drift underlain at shallow depth by rock. Engineering analyses of the foundation support have been performed. These are included in Appendix C of this report. The results are summarized below:

1. 811.304 a) The Pleistocene Drift is sufficiently strong as to support the weight of the unit during all phases of construction and operation.

2. 811.304 a) Neither the loads, nor their rate of application will cause failure of the liner - leachate collection system.

3. 811.304 b) The maximum total settlement of the foundation under the proposed Significant Modification will be on the

order of 6 ± inches. The maximum calculated differential settlement is 3 ± inches in about 400 feet. The bedrock is considered devoid of economic resources (except possibly water) and the risk of undermining caused by extraction from adjacent properties is considered nil.

4. 811.304 c) The minimum long and short term Factors of Safety against bearing capacity failure are as follows:

	Short Term	Long Term	Criteria
Static	7.68	24.9	≥ 2.0
Seismic	7.65	24.4	≥ 1.5

5. The proposed expansion will utilize the existing foundation and it is expected that no new foundation will be required. Miscellaneous stabilization may be required. Suitable soils for foundation construction and repair shall be any USCS classification except OL, OH, and PT. The liquid limit shall not be greater than 60 nor shall the maximum laboratory dry density be less than 100 pounds per cubic foot when determined in accordance with ASTM D 698. Suitable soils shall be essentially free of particles larger than eight inches in greatest dimension.

Mass Stability Analyses - Bearing capacity considerations apply to the foundation as a whole; mass stability analyses consider local portions of the landfill to respond independently to gravity, seismic, and other forces. Mass stability thus constitutes an assessment of local stability of the foundation.

The most common model used for slope stability evaluation is the circular arc method which considers a slope failure occurring along a path which, when viewed in section, is a circular arc. Computations involved with this method are extensive and tedious when done by hand. Fortunately, numerous computer programs have been developed to eliminate hand calculations. The analyses reported herein were made using STABL3 developed at Purdue University by Siegel (1983).

The usual method of accounting for seismic forces in slope stability analyses is termed the pseudo-static approach. It involves superimposing a force, equal to the mass of material above the arc in question multiplied by an "acceleration" (in gravity units), on the system of forces normally considered in the static analysis. Based on observation of slopes which have been subject to actual major earthquake motions, it has been observed that the pseudo-static method underestimates the competence of the slope if the actual ground acceleration is used in the analysis. To account for this difference, it is customary to use between 20 and 40 percent of the expected maximum acceleration in the analysis. For example, the County of Los Angeles Code once mandated the use of an "acceleration" of 0.2 g for slopes adjacent to the San Andreas and other active faults where credible ground accelerations may range from 0.5 to 1 g.

The section chosen for analysis is shown on Plate No. 1. It was analyzed with for stability of the completed unit at the point of maximum height above existing contours. The results of the computer generated analyses are depicted on Plate No. 1; the output from the program is included in Appendix C. The stability of the vegetative layer and compacted clay components of the final cover was verified independent of the gross slopes. Those analyses are included in Appendix D.

Our analyses indicate safety factors greater than the minimums required by 35 Ill. Adm. Code. The following values were obtained:

TABLE 3

RESULTS OF STABILITY ANALYSES

	Short Term		Long Term		Criteria	
	Static	Seismic	Static	Seismic	Static	Seismic
Section 1 Final Configuration:	4.60	1.95	1.97	1.55	1.5	1.3
Compacted Clay	3.3±	3.1±	3.2±	2.6±	1.5	1.3
Vegetative Layer:	3.2±	3.1±	3.2±	3.1±	1.5	1.3

Factors of safety above the minimums for all cases at Section 1 and Section 2 confirm that the slopes meet the criteria of 35 Ill. Adm. Code 811.305.c).

Accordingly:

1. 811.304 d) The factors of safety against slope failure for the unit exceed 1.5 and 1.3 for static and seismic conditions, respectively.

2. 811.304 f) No evidence of off-site landsliding has been found in the near vicinity of the subject site.

Liquefaction -Liquefaction occurs when repeated stressing of a saturated granular material rearranges the grains into a more compact structure. The process is accompanied by a temporary loss of strength, during which the material behaves essentially as a liquid with no load supporting capacity. Three factors must be present for liquefaction to be possible:

1. The material must be a fairly fine grained sand or silty sand in a loose condition.

2. The material must be below the water table.

3. The material must undergo a minimum periodic shear stress for a sufficient number of repetitions. The minimum number of repetitions required to liquify the soil varies inversely with the magnitude of the repeated shear stress. There is apparently a threshold shear stress below which

liquefaction will not occur regardless of the number of repetitions. That threshold appears to occur only if the magnitude exceeds 5.5.

Liquefaction is possible only when all three conditions are met. Standard Penetration Test results from site borings exceed the values above which liquefaction will not occur. Therefore, liquefaction of on-site materials is not expected (811.304 f)).

Other Seismic Risks -This study also considers potential damage to the liner/leachate collection system from ground rupture as a result of new faulting through the site, or renewed movement along a pre-existing fault beneath the site. Although not required by 35 Ill. Adm. Code, elements of these issues are part of Subtitle D. They have been incorporated herein to be consistent with the standard of practice for seismic risk evaluations in more seismically active parts of the United States and Subtitle D.

Johnston and Kantner (1990) note that ground rupture is rare in mid-continent locations (except for Australia). No evidence has been disclosed, by any geologist or geotechnical engineer associated with Pagel Landfill, of any displacement of Pleistocene materials by faulting in the vicinity of the site. Accordingly, risk of liner and/or cover rupture as a result of either new or pre-existing faulting is considered nil.

Risks associated with tsunami and seismic seiche are not considered applicable to the project area, although such factors would be assessed elsewhere.

CLOSURE

In formulating the conclusions presented herein, we have used methodology normally employed by practitioners of geotechnical engineering working in Northern Illinois where such standards exist. In the assessment of seismic factors, which local practice has tended to ignore and for which there is, as a result, no local standard, we have employed methods and practices customarily employed by geotechnical engineers and engineering geologists working on general civil engineering projects in seismically active areas of California and have addressed issues normally addressed by those practitioners, except as noted herein as being of no application to this site.

Respectfully submitted,

TESTING SERVICE CORPORATION April 30, 1994

MICHAEL S. ROBINSON
62-37150
REGISTERED
PROFESSIONAL
ENGINEER
STATE OF ILLINOIS

Michael S. Robinson, P.E.
Chief Design Services

[C:35158RPT]

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APPENDIX A

INQUIRIES & RESPONSES SLOPE HISTORY AND GEOLOGIC STRUCTURE

Robinson, TSC 29 September 1990

Lichty, WRS 9 October 1990

Robinson, TSC 1 October 1990

Staurowski, 9 October 1990

Winnebago Reclamation Service, Inc.

October 9, 1990

Michael Robinson
TSC
467 East Gunderson Drive
Carol Stream, Illinois
60188

Recycling and
waste disposal

Dear Mike:

I am writing in response to your letter of September 29, 1990 which contained four questions about our experience with slope stability in the excavation of the existing landfill.

I passed your questions on to Chuck Howard . Chuck has been involved with the development of every cell since the landfill was constructed in 1972. To the best of his knowledge none of the four scenarios in question ever occured.

I have been involved on a daily basis with the new cell development and placement of final cover for the past four years and I can say that none of these have occured.

I hope this answers your questions adequately. If you have any further questions please feel free to contact me at 815-874-4806.

Sincerely,
Winnebago Reclamation Service,Inc.

John D. Licty
Manager

JDL:lm
cc : 2

'20 Forest
.ills Road
Loves Park
Illinois 61111

P.O. Box 2071
Loves Park
Illinois 61130

.654.5952
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TSC
TESTING SERVICE CORPORATION

Subsurface Exploration
Geotechnical Engineering
Construction Materials Engineering & Testing
Environmental Engineering
Geosciences & Hydrogeologic Studies
Monitoring Wells

October 1, 1990

ANDREWS ENVIRONMENTAL ENGINEERING, INC.
3535 Mayflower Boulevard
Springfield, Illinois 62707

Attention: Andy Rathsack, P.E.

RE: L-29170
PROPOSED EXPANSION WINNEBAGO RECLAMATION SERVICE LANDFILL
Winnebago County, Illinois

Dear Andy:

We are presently nearing completion of our geotechnical analysis of slope stability, bearing capacity and liquifaction potential for the subject project. Before we commit our findings and recommendations to a formal report, we need some additional information regarding observations by geologists during the field work. The information requested is in regard to the presence or absence of faulting at the site, and the nature of any faults, if observed. Would you please pose the following questions to field personnel who have had occasion to view outcrops both on and adjacent to the site.

1. During the field work for the subject project, did you have occasion to observe outcrops of the subsurface materials (in excavations, creek banks, etc.)?

2. If yes, was evidence of faulting apparent in those exposures?

3. If faulting was evident, which unit or units were displaced (Paleozoic, Pleistocene, Holocene).?

4. Is there any indication, in either the published literature or in the available aerial photographs, of faulting on or near the site which has displaced either late Pleistocene or Holocene sediments ? If yes, give the location of such faulting with respect to the site.

Our objective in asking these questions is, to the extent possible, to assess the risk of activation of pre-existing faults which could crack the liner. Although criteria for such evaluation is not included explicitly in R88-7, we believe that these seismic issues should be addressed along with the seismic slope stability analyses and liquifaction assessment required by the Rule. We are fully confident that there is essentially no risk associated with existing faults.

457 EAST GUNDERSEN DR. • CAROL STREAM, ILLINOIS 60188-2492 • FAX: (708) 653-2726 • TEL: (708) 653-3920

We will appreciate any help you can give us with respect to the information requested. Please call if you have further questions regarding these or other matters.

Respectfully submitted,

Michael S. Robinson, P.E.
Chief, Design Services

MSR/mr

ROBERTA L. JENNINGS
CONSULTING HYDROGEOLOGIST

2926 N. SHOREWOOD DRIVE
MCHENRY, ILLINOIS 60050
815/344-0017

A.I.P.G. CPGS 6440
IND. CPG 257

October 9, 1990

Mike Robinson, Chief of Design Services
Testing Service Corporation
457 East Gundersen Drive
Carol Stream, IL 60188-2492

re: field observations at Winnebago Reclamation Landfill

Dear Mike,

In regards to your letter of October 1, 1990, the following are responses to your four points of query:

1) During field work for the WRL project, I had occasion to make two visits to the existing quarry east of WRL in order to provide a larger scale picture of the geology. The quarry provided excellent exposures of rock strata, although the overburden materials had been disturbed. Outside of the quarry, there were no other excavations or similar outcrops I observed.

2) In my visits to the quarry, there was no readily apparent displacement of rock strata indicative of a fault, or other suspect features.

3) Refer to response #2.

4) Published literature, specifically "The Sandwich Fault Zone of Northern Illinois, 1978, Dennis R. Kolata, T. C. Buschbach, and Janis D. Treworgy, Illinois State Geological Survey Circular 505, 26 p." shows the Sandwich Fault and Plum River Fault zones to be located at substantial distances (approximately 15 miles) from the site area. Additionally, this publication concludes that faulting is post-Niagaran, pre-Illinoian (Pleistocene) in age and that there is no evidence suggesting re-activating in the future. I have not reviewed aerial photos, but at this time I am looking into their availability. Should I find evidence in the photos contrary to that stated above, I will contact you immediately.

Mike, I have answered your questions to the best of my ability. Should you require anything further, please do not hesitate to contact me.

Sincerely,

Belinda Staurowsky, Research Hydrogeologist

APPENDIX B

SEISMIC ANALYSES

I. MathCad Output ..... Five Pages

Project No.: 55150-0100
File No.: WRVXSEI1

457 East Gundersen Drive
Carol Stream, Illinois 60188
Tel (708) 653-3920
Fax (708) 653-2988

By: M.S.R.
Date: 04-27-94
Chckd:

ANALYSIS OF GROUND MOTIONS FOR PAGEL LANDFILL VERTICAL EXPANSION

Units: $cm \equiv 1$ $m \equiv cm \cdot 100$ $km \equiv m \cdot 1000$ $sec \equiv 1$ $g \equiv 9.8 \cdot \frac{m}{sec^2}$

Northern Illinois Seismic Zone

Area of Seismic Zone - sq. km. $A_z := 55128 \cdot km^2$

Recurrence Values. Analysis will consider Recurrence intervals of 1 to 400 years

$n := 1 .. 400$ $f_n := n^{-1}$ Probability Level: $P := 10 \cdot \%$

Regional Coeff $a := 2.64$

Area of Exceedence. The probability of the calculated value being equalled or exceeded by an event within this area is less than the stated probability level, for an exposure interval equal to the stated recurrence interval.

$$A_{ex} := \left[\frac{P}{0.63}\right] \cdot A_z$$

Radius of Exceedence. This is the radius of the circle comprising the Area o Exceedence. The probability of the calculated value being equalled or exceeded by an event occuring closer than this is less than the stated probability level for an exposure interval equal to the stated recurrence interval.

$$R_{site} := \sqrt{\frac{A_{ex}}{\pi}} \qquad R_{site} = 52.8 \cdot km$$

Predicted Body Wave Magnitude for Recurrence of 1 yr < T < 401 yr

$$mb_n := \frac{\log\left[f_n\right] - a}{-0.92}$$

Exposure Interval	
"Short Term"	Long Term
Short := 10	Long := 250

Predicted Magnitude	
"Short Term"	Long Term
$mb_{Short} = 3.96$	$mb_{Long} = 5.48$

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ANALYSIS OF GROUND MOTIONS FOR PAGEL LANDFILL VERTICAL EXPANSION

Motion resulting from the predicted event will attenuate over a distance equa to the Radius of Exceedence.

For Exposure interval: Short = 10

$$aH_{site} := 10^{0.84+0.52\cdot mb_{Short}-1.02\cdot \log\left[\frac{R_{site}}{km}\right]}$$

$$aH_{site} = 0.014\cdot g$$

For Exposure interval: Long = 250

$$aH_{site} := 10^{0.84+0.52\cdot mb_{Long}-1.02\cdot \log\left[\frac{R_{site}}{km}\right]}$$

$$aH_{site} = 0.087\cdot g$$

$$P := (1 - 0.37)\cdot\left[\frac{\pi\cdot R_{site}^{2}}{A_z}\right] \qquad P = 10\cdot \%$$

For Distant Source Areas, The exceedence area will be considered to be a square whose nearest side is centered on a line drawn from the site to the nearest point of the source zone and perpendicular to the connecting line.

Wabash Valley Seismic Zone

$a := 3.1$

$A_z := 39780\cdot km^2 \qquad Dist := 312\cdot km$

$$A_{ex} := \left[\frac{P}{0.63}\right]\cdot A_z \qquad d := \sqrt{A_{ex}}$$

$$R_{site} := Dist + \frac{d}{2} \qquad R_{site} = 351.7\cdot km$$

File No.: WRVXSEI1

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Carol Stream, Illinois 60188
Tel (708) 653-3920
Fax (708) 653-2988

By: M.S.R.
Date: 04-27-94
Chckd:

ANALYSIS OF GROUND MOTIONS FOR PAGEL LANDFILL VERTICAL EXPANSION

$$mb_n := \frac{\log\left[\frac{f}{n}\right] - a}{-0.92}$$

Predicted Magnitude

"Short Term" $mb_{Short} = 4.5$

Long Term $mb_{Long} = 6$

$$aH_{Short} := 10^{0.84+0.52 \cdot mb_{Short} - 1.02 \cdot \log\left[\frac{R_{site}}{km}\right]}$$

$$aH_{Long} := 10^{0.84+0.52 \cdot mb_{Long} - 1.02 \cdot \log\left[\frac{R_{site}}{km}\right]}$$

$aH_{Short} = 0.004 \cdot g$

Predicted Acceleration

"Short Term" $aH_{Short} = 0.004 \cdot g$

Long Term $aH_{Long} = 0.023 \cdot g$

Probability that aH not exceeded:

$$P := (1 - 0.37)^{\left[\frac{d^2}{A_z}\right]} \qquad P = 10 \cdot \%$$

Ozark Uplift Seismic Zone

$a := 3.19$

$A_z := 36557 \cdot km^2$ $\quad Dist := 353 \cdot km$

$$A_{ex} := \left[\frac{P}{0.63}\right] \cdot A_z \qquad d := \sqrt{A_{ex}}$$

$$mb_n := \frac{\log\left[\frac{f}{n}\right] - a}{-0.92}$$

Predicted Magnitude

"Short Term" $mb_{Short} = 4.6$

Long Term $mb_{Long} = 6.1$

$$aH_{Short} := 10^{0.84+0.52 \cdot mb_{Short} - 1.02 \cdot \log\left[\frac{R_{site}}{km}\right]}$$

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ANALYSIS OF GROUND MOTIONS FOR PAGEL LANDFILL VERTICAL EXPANSION

Ozark Uplift Seismic Zone

$$aH_{Long} := 10^{0.84+0.52\cdot mb_{Long}-1.02\cdot \log\left[\frac{R_{site}}{km}\right]}$$

Predicted Acceleration

"Short Term" $aH_{Short} = 0.004\cdot g$

Long Term $aH_{Long} = 0.026\cdot g$

Probability that aH not exceeded: $P := (1 - 0.37)^{\left[\frac{d^2}{A_z}\right]}$

$P = 10\cdot \%$

New Madrid "B" Seismic Zone

$A_z := 27506\cdot km^2$ $Dist := 520\cdot km$

$a := 2.99$

$$A_{ex} := \left[\frac{P}{0.63}\right]\cdot A_z \qquad d := \sqrt{A_{ex}}$$

$$mb_n := \frac{\log\left[f_n\right] - a}{-0.92}$$

$$R_{site} := Dist + \frac{d}{2}$$

Predicted Magnitude

"Short Term" $mb_{Short} = 4.3$

Long Term $mb_{Long} = 5.9$

$$aH_{Short} := 10^{0.84+0.52\cdot mb_{Short}-1.02\cdot \log\left[\frac{R_{site}}{km}\right]}$$

$$aH_{Long} := 10^{0.84+0.52\cdot mb_{Long}-1.02\cdot \log\left[\frac{R_{site}}{km}\right]}$$

Predicted Acceleration

"Short Term" $aH_{Short} = 0.002\cdot g$

Long Term $aH_{Long} = 0.012\cdot g$

Probability that aH not exceeded:

$P := (1 - 0.37)^{\left[\frac{d^2}{A_z}\right]}$ $P = 10\cdot \%$

TESTING SERVICE CORPORATION
457 East Gundersen Drive
Carol Stream, Illinois 60188
Tel (708) 653-3920
Fax (708) 653-2988

By: M.S.R.
Date: 04-27-94
Chckd:

ANALYSIS OF GROUND MOTIONS FOR WRL VERTICAL EXPANSION

Units

$cm \equiv 1 \quad m := 100 \cdot cm \quad km := 1000 \cdot m \quad sec := 1$

$$g := 980 \cdot \frac{cm}{sec^2}$$

New Madrid "A" Seismic Zone:

$A_z := 22506 \cdot km^2 \qquad Dist := 580 \cdot km$

$a := 3.90 \qquad Short := 10$

$n := 1 .. 400 \qquad Long := 250$

$$A_{exc} := \frac{10 \cdot \%}{0.63} \cdot A_z \qquad d := \sqrt{A_{exc}}$$

$$f_n := n^{-1}$$

$$mb_n := \frac{\log\left[f_n\right] - a}{-0.92}$$

Predicted Magnitude

Short Term $mb_{Short} = 5.3$ Long Term $mb_{Long} = 6.8$

$$R_{site} := Dist + \frac{d}{2}$$

$$aH_{Short} := 10^{0.84+0.52 \cdot mb_{Short} - 1.02 \cdot \log\left[\frac{R_{site}}{km}\right]}$$

$$aH_{Long} := 10^{0.84+0.52 \cdot mb_{Long} - 1.02 \cdot \log\left[\frac{R_{site}}{km}\right]}$$

Predicted Acceleration

Short Term $aH_{Short} = 0.006 \cdot g$ Long Term $aH_{Long} = 0.037 \cdot g$

Probability that motion not exceeded

$$P := (1 - .37) \cdot \frac{A_{exc}}{A_z} \qquad P = 10 \cdot \%$$

TESTING SERVICE CORPORATION
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Carol Stream, Illinois 60188
Tel (708) 653-3920
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ANALYSIS OF GROUND MOTIONS FOR WRL VERTICAL EXPANSION

Residual Events:

$a := 1.83$

$$mb_n := \frac{\log\left[f_n\right] - a}{-0.92}$$

$A_z := 100000 \cdot km^2$

$$A_{exc} := \frac{10 \cdot \%}{0.63} \cdot A_z$$

$$R_{site} := \sqrt{\frac{A_{exc}}{\pi}}$$

Predicted Magnitude

Short Term	Long Term
$mb_{Short} = 3.1$	$mb_{Long} = 4.6$

$$aH_{Short} := 10^{0.84+0.52 \cdot mb_{Short} - 1.02 \cdot \log\left[\frac{R_{site}}{km}\right]}$$

$$aH_{Long} := 10^{0.84+0.52 \cdot mb_{Long} - 1.02 \cdot \log\left[\frac{R_{site}}{km}\right]}$$

For event within 15 km of site.
Report these values even if site is in assigned Source Zone.

Predicted Acceleration

Short Term	Long Term
$aH_{Short} = 0.004 \cdot g$	$aH_{Long} = 0.022 \cdot g$

Probability that aH not exceeded:

$$P := (1 - 0.37)^{\left[\frac{\pi \cdot R_{site}^2}{A_z}\right]} \qquad P = 10 \cdot \%$$

APPENDIX C

OUTPUT FROM STABL3 - MASS STABILITY ANALYSIS

Section A

Final Configuration, North Slope, Short Term, Static,

Final Configuration, North Slope, Short Term, Seismic,

Final Configuration, North Slope, Long Term, Static,

Final Configuration, North Slope, Long Term, Seismic,

35158-0105 Disk: A File VX1ST.OU1
M.S.R. 26 April 1994

--SLOPE STABILITY ANALYSIS--
SIMPLIFIED JANBU METHOD OF SLICES
IRREGULAR FAILURE SURFACES

PROBLEM DESCRIPTION: WINNEBAGO REC. SERV. PROP VERT. EXP.
SHORT TERM STATIC

BOUNDARY COORDINATES

11 TOP BOUNDARIES
31 TOTAL BOUNDARIES

BOUNDARY NO.	X-LEFT (FT)	Y-LEFT (FT)	X-RIGHT (FT)	Y-RIGHT (FT)	SOIL TYPE BELOW BND
1	.00	51.00	35.00	59.00	1
2	35.00	59.00	130.00	59.00	1
3	130.00	59.00	250.00	58.00	1
4	250.00	58.00	310.00	59.00	1
5	310.00	59.00	350.00	61.00	1
6	350.00	61.00	400.00	63.00	1
7	400.00	63.00	410.00	65.00	1
8	410.00	65.00	431.00	71.00	1
9	431.00	71.00	629.00	137.00	2
10	629.00	137.00	830.00	145.00	2
11	830.00	145.00	1030.00	155.00	2
12	431.00	71.00	439.00	71.00	1
13	439.00	71.00	440.50	71.00	3
14	440.50	71.00	629.40	134.00	3
15	629.40	134.00	830.00	142.00	3
16	830.00	142.00	1030.00	152.00	3
17	440.50	71.00	450.00	71.00	3
18	450.00	71.00	629.80	131.00	4
19	629.80	131.00	830.00	139.00	4
20	830.00	139.00	1030.00	149.00	4
21	450.00	71.00	495.00	48.50	3
22	495.00	48.50	1030.00	48.50	3
23	439.00	71.00	471.00	55.00	1
24	471.00	55.00	477.00	52.00	5
25	477.00	52.00	482.00	49.50	6
26	482.00	49.50	494.00	43.50	7
27	494.00	43.50	1030.00	43.50	7
28	.00	55.00	471.00	55.00	5
29	.00	52.00	477.00	52.00	6
30	.00	49.50	482.00	49.50	7
31	.00	40.00	1030.00	40.00	8

ISOTROPIC SOIL PARAMETERS
8 TYPE(S) OF SOIL

SOIL TYPE NO.	TOTAL UNIT WT. (PCF)	SATURATED UNIT WT. (PCF)	COHESION INTERCEPT (PSF)	FRICTION ANGLE (DEG)	PORE PRESSURE PARAMETER	PRESSURE CONSTANT (PSF)	PIEZOMETRIC SURFACE NO.
1	125.0	125.0	150.0	28.0	-.20	-3480.0	1
2	110.0	110.0	200.0	23.0	.00	.0	1
3	125.0	125.0	260.0	26.5	-.40	-1040.0	1
4	70.0	70.0	200.0	25.0	-.10	-2790.0	1
5	125.0	130.0	200.0	36.0	.00	.0	1
6	133.0	133.0	150.0	30.0	-.50	-4940.0	1
7	130.0	130.0	200.0	32.0	-.10	-2080.0	1
8	125.0	130.0	200.0	36.0	.00	.0	1

35158-0105 Disk: A File VX1ST.OU1
M.S.R. 26 April 1994
TWO PIEZOMETRIC SURFACES HAVE BEEN SPECIFIED

UNITWEIGHT OF WATER = 62.40

PIEZOMETRIC SURFACE NO. 1 SPECIFIED BY 5 COORDINATE POINTS

POINT NO.	X-WATER (FT)	Y-WATER (FT)
1	.00	52.00
2	400.00	58.00
3	461.00	60.00
4	495.00	48.50
5	1030.00	48.50

PIEZOMETRIC SURFACE NO. 2 SPECIFIED BY 4 COORDINATE POINTS

POINT NO.	X-WATER (FT)	Y-WATER (FT)
1	.00	52.00
2	400.00	58.00
3	450.00	71.00
4	1030.00	71.00

A CRITICAL FAILURE SURFACE SEARCHING METHOD, USING A RANDOM TECHNIQUE FOR GENERATING CIRCULAR SURFACES, HAS BEEN SPECIFIED.

100 TRIAL SURFACES HAVE BEEN GENERATED.

10 SURFACES INITIATE FROM EACH OF 10 POINTS EQUALLY SPACED
ALONG THE GROUND SURFACE BETWEEN X = 350.00 FT.
AND X = 431.00 FT.
EACH SURFACE TERMINATES BETWEEN X = 630.00 FT.
AND X = 830.00 FT.

UNLESS FURTHER LIMITATIONS WERE IMPOSED, THE MINIMUM ELEVATION AT WHICH A SURFACE EXTENDS IS Y = .00 FT.

50.00 FT. LINE SEGMENTS DEFINE EACH TRIAL FAILURE SURFACE.

FOLLOWING ARE DISPLAYED THE TEN MOST CRITICAL OF THE TRIAL FAILURE SURFACES EXAMINED. THEY ARE ORDERED - MOST CRITICAL FIRST.

SAFETY FACTORS ARE CALCULATED BY THE MODIFIED BISHOP METHOD.

FAILURE SURFACE SPECIFIED BY 9 COORDINATE POINTS

POINT NO.	X-SURF (FT)	Y-SURF (FT)
1	359.00	61.36
2	405.05	41.89
3	454.05	31.91
4	504.05	31.81
5	553.08	41.60
6	599.21	60.89
7	640.62	88.91
8	675.67	124.57
9	685.24	139.24

*** 4.599 ***

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M.S.R. 26 April 1994

FAILURE SURFACE SPECIFIED BY 8 COORDINATE POINTS

POINT NO.	X-SURF (FT)	Y-SURF (FT)
1	404.00	63.80
2	452.80	52.90
3	502.76	50.85
4	552.28	57.70
5	599.81	73.25
6	643.81	96.99
7	682.89	128.17
8	692.84	139.54

*** 4.646 ***

FAILURE SURFACE SPECIFIED BY 10 COORDINATE POINTS

POINT NO.	X-SURF (FT)	Y-SURF (FT)
1	350.00	61.00
2	395.30	39.83
3	443.55	26.73
4	493.33	22.10
5	543.18	26.07
6	591.60	38.52
7	637.18	59.08
8	678.55	87.16
9	714.50	121.90
10	728.40	140.96

*** 4.706 ***

FAILURE SURFACE SPECIFIED BY 8 COORDINATE POINTS

POINT NO.	X-SURF (FT)	Y-SURF (FT)
1	359.00	61.36
2	403.10	37.79
3	451.65	25.85
4	501.65	26.27
5	549.99	39.04
6	593.67	63.37
7	629.99	97.73
8	655.46	138.05

*** 4.720 ***

FAILURE SURFACE SPECIFIED BY 8 COORDINATE POINTS

POINT NO.	X-SURF (FT)	Y-SURF (FT)
1	350.00	61.00
2	395.13	39.49
3	444.10	29.36
4	494.06	31.21
5	542.15	44.93
6	585.57	69.72
7	621.82	104.16
8	643.24	137.57

*** 4.731 ***

35158-0105 Disk: A File VX1ST.OU1
M.S.R. 26 April 1994

FAILURE SURFACE SPECIFIED BY 8 COORDINATE POINTS

POINT NO.	X-SURF (FT)	Y-SURF (FT)
1	368.00	61.72
2	411.95	37.87
3	460.43	25.66
4	510.43	25.85
5	558.82	38.43
6	602.59	62.61
7	638.99	96.89
8	665.33	138.45

*** 4.740 ***

FAILURE SURFACE SPECIFIED BY 8 COORDINATE POINTS

POINT NO.	X-SURF (FT)	Y-SURF (FT)
1	350.00	61.00
2	399.47	53.71
3	449.46	53.25
4	499.05	59.64
5	547.30	72.75
6	593.30	92.34
7	636.19	118.05
8	661.37	138.29

*** 4.782 ***

FAILURE SURFACE SPECIFIED BY 9 COORDINATE POINTS

POINT NO.	X-SURF (FT)	Y-SURF (FT)
1	386.00	62.44
2	431.34	41.37
3	480.21	30.77
4	530.21	31.16
5	578.90	42.53
6	623.90	64.31
7	663.02	95.45
8	694.35	134.42
9	696.94	139.70

*** 4.784 ***

FAILURE SURFACE SPECIFIED BY 7 COORDINATE POINTS

POINT NO.	X-SURF (FT)	Y-SURF (FT)
1	395.00	62.80
2	444.32	54.58
3	494.30	55.80
4	543.16	66.42
5	589.14	86.07
6	630.59	114.03
7	654.70	138.02

*** 4.802 ***

35158-0105 Disk: A File VX1ST.OU1
M.S.R. 26 April 1994

FAILURE SURFACE SPECIFIED BY 8 COORDINATE POINTS

POINT NO.	X-SURF (FT)	Y-SURF (FT)
1	377.00	62.08
2	420.41	37.27
3	468.73	24.41
4	518.73	24.39
5	567.06	37.19
6	610.50	61.95
7	646.13	97.03
8	670.73	138.66

*** 4.843 ***

35158-0105 Disk: A File VX1ST.OU1
M.S.R. 26 April 1994

```
                 Y            A     X     I     S            F     T

                 .00    128.75    257.50    386.25    515.00    643.75

X          .00 +--**-----+---------+---------+---------+---------+
               -
               -    *
               -
               -
               -
       128.75 +    *
               -
               -
               -
               -
               -
A      257.50 +    *
               -
               -    *
               -
               -    *
               -    1
X      386.25 + .3 8
               - .17*
               -..8..*
               ..1.2W*
               ..8.*..
               ..1**7
I      515.00 ..6... .
               ..35.9.
               ...12.7
               ...8.5.9
               ...3.127.
               -....8..49**
S      643.75 +....3.127.5
               -......8..14
               -  ....3..21
               -  ......3..
               -    ......3
               -    . .....
       772.50 +      .....
               -        . .
               -         ..
               -          *
               -
               -
F      901.25 +
               -
               -
               -
               -
               -
T     1030.00 +  ** W     *
```

35158-0105 Disk A File: VS1SI.out
M.S.R. 26 April 1994

--SLOPE STABILITY ANALYSIS--
SIMPLIFIED JANBU METHOD OF SLICES
IRREGULAR FAILURE SURFACES

PROBLEM DESCRIPTION: WINNEBAGO REC. SERV. PROP VERT. EXP.
SHORT TERM SEISMIC

BOUNDARY COORDINATES
11 TOP BOUNDARIES
31 TOTAL BOUNDARIES

BOUNDARY NO.	X-LEFT (FT)	Y-LEFT (FT)	X-RIGHT (FT)	Y-RIGHT (FT)	SOIL TYPE BELOW BND
1	.00	51.00	35.00	59.00	1
2	35.00	59.00	130.00	59.00	1
3	130.00	59.00	250.00	58.00	1
4	250.00	58.00	310.00	59.00	1
5	310.00	59.00	350.00	61.00	1
6	350.00	61.00	400.00	63.00	1
7	400.00	63.00	410.00	65.00	1
8	410.00	65.00	431.00	71.00	1
9	431.00	71.00	629.00	137.00	2
10	629.00	137.00	830.00	145.00	2
11	830.00	145.00	1030.00	155.00	2
12	431.00	71.00	439.00	71.00	1
13	439.00	71.00	440.50	71.00	3
14	440.50	71.00	629.40	134.00	3
15	629.40	134.00	830.00	142.00	3
16	830.00	142.00	1030.00	152.00	3
17	440.50	71.00	450.00	71.00	3
18	450.00	71.00	629.80	131.00	4
19	629.80	131.00	830.00	139.00	4
20	830.00	139.00	1030.00	149.00	4
21	450.00	71.00	495.00	48.50	3
22	495.00	48.50	1030.00	48.50	3
23	439.00	71.00	471.00	55.00	1
24	471.00	55.00	477.00	52.00	5
25	477.00	52.00	482.00	49.50	6
26	482.00	49.50	494.00	43.50	7
27	494.00	43.50	1030.00	43.50	7
28	.00	55.00	471.00	55.00	5
29	.00	52.00	477.00	52.00	6
30	.00	49.50	482.00	49.50	7
31	.00	40.00	1030.00	40.00	8

ISOTROPIC SOIL PARAMETERS

8 TYPES OF SOIL

SOIL TYPE NO.	TOTAL UNIT WT. (PCF)	SATURATED UNIT WT. (PCF)	COHESION INTERCEPT (PSF)	FRICTION ANGLE (DEG)	PORE PRESSURE PARAMETER	PRESSURE CONSTANT (PSF)	PIEZOMETRIC SURFACE NO.
1	125.0	125.0	150.0	28.0	-.20	-3480.0	1
2	110.0	110.0	200.0	23.0	.00	.0	1
3	125.0	125.0	260.0	26.5	-.40	-1040.0	1
4	70.0	70.0	200.0	25.0	-.10	-2790.0	1
5	125.0	130.0	200.0	36.0	.00	.0	1
6	133.0	133.0	150.0	30.0	-.50	-4940.0	1
7	130.0	130.0	200.0	32.0	-.10	-2080.0	1
8	125.0	130.0	200.0	36.0	.00	.0	1

35158-0105 Disk A File: VS1SI.out
M.S.R. 26 April 1994
2 PIEZOMETRIC SURFACES HAVE BEEN SPECIFIED

PIEZOMETRIC SURFACE NO. 1 SPECIFIED BY 5 COORDINATE POINTS

POINT NO.	X-WATER (FT)	Y-WATER (FT)
1	.00	52.00
2	400.00	58.00
3	461.00	60.00
4	495.00	48.50
5	1030.00	48.50

PIEZOMETRIC SURFACE NO. 2 SPECIFIED BY 4 COORDINATE POINTS

POINT NO.	X-WATER (FT)	Y-WATER (FT)
1	.00	52.00
2	400.00	58.00
3	450.00	71.00
4	1030.00	71.00

A HORIZONTAL EARTHQUAKE LOADING COEFFICIENT
OF .020 HAS BEEN ASSIGNED

A VERTICAL EARTHQUAKE LOADING COEFFICIENT
OF .000 HAS BEEN ASSIGNED

CAVITATION PRESSURE = .0 PSF

A CRITICAL FAILURE SURFACE SEARCHING METHOD, USING A RANDOM TECHNIQUE FOR GENERATING CIRCULAR SURFACES, HAS BEEN SPECIFIED.

100 TRIAL SURFACES HAVE BEEN GENERATED.

10 SURFACES INITIATE FROM EACH OF 10 POINTS EQUALLY SPACED
ALONG THE GROUND SURFACE BETWEEN X = 350.00 FT.
AND X = 431.00 FT.
EACH SURFACE TERMINATES BETWEEN X = 630.00 FT.
AND X = 830.00 FT.

UNLESS FURTHER LIMITATIONS WERE IMPOSED, THE MINIMUM ELEVATION AT WHICH A SURFACE EXTENDS IS Y = .00 FT.

35.00 FT. LINE SEGMENTS DEFINE EACH TRIAL FAILURE SURFACE.

FOLLOWING ARE DISPLAYED THE TEN MOST CRITICAL OF THE TRIAL FAILURE SURFACES EXAMINED. THEY ARE ORDERED - MOST CRITICAL FIRST.

SAFETY FACTORS ARE CALCULATED BY THE MODIFIED BISHOP METHOD.

35158-0105 Disk A File: VS1SI.out
M.S.R. 26 April 1994

FAILURE SURFACE SPECIFIED BY 8 COORDINATE POINTS

POINT NO.	X-SURF (FT)	Y-SURF (FT)
1	422.00	68.43
2	456.98	69.65
3	491.72	73.88
4	525.97	81.08
5	559.48	91.19
6	592.00	104.14
7	623.28	119.84
8	652.72	137.94

*** 1.952 ***

FAILURE SURFACE SPECIFIED BY 9 COORDINATE POINTS

POINT NO.	X-SURF (FT)	Y-SURF (FT)
1	404.00	63.80
2	438.98	64.86
3	473.78	68.61
4	508.19	75.03
5	542.00	84.07
6	575.02	95.69
7	607.04	109.81
8	637.88	126.36
9	656.20	138.08

*** 1.956 ***

FAILURE SURFACE SPECIFIED BY 9 COORDINATE POINTS

POINT NO.	X-SURF (FT)	Y-SURF (FT)
1	431.00	71.00
2	465.91	68.49
3	500.90	69.45
4	535.62	73.87
5	569.72	81.72
6	602.89	92.91
7	634.78	107.34
8	665.08	124.85
9	685.07	139.23

*** 2.036 ***

FAILURE SURFACE SPECIFIED BY 10 COORDINATE POINTS

POINT NO.	X-SURF (FT)	Y-SURF (FT)
1	404.00	63.80
2	438.39	57.30
3	473.31	54.96
4	508.26	56.81
5	542.74	62.84
6	576.25	72.94
7	608.31	86.98
8	638.46	104.76
9	666.27	126.01
10	679.61	139.01

*** 2.117 ***

35158-0105 Disk A File: VS1SI.out
M.S.R. 26 April 1994

FAILURE SURFACE SPECIFIED BY 12 COORDINATE POINTS

POINT NO.	X-SURF (FT)	Y-SURF (FT)
1	350.00	61.00
2	384.91	58.45
3	419.91	58.18
4	454.85	60.19
5	489.59	64.46
6	523.97	70.99
7	557.86	79.73
8	591.11	90.67
9	623.58	103.74
10	655.13	118.89
11	685.62	136.07
12	690.83	139.46

*** 2.135 ***

FAILURE SURFACE SPECIFIED BY 10 COORDINATE POINTS

POINT NO.	X-SURF (FT)	Y-SURF (FT)
1	404.00	63.80
2	438.46	57.66
3	473.38	55.28
4	508.35	56.68
5	542.96	61.84
6	576.82	70.72
7	609.52	83.19
8	640.69	99.12
9	669.95	118.33
10	695.85	139.66

*** 2.154 ***

FAILURE SURFACE SPECIFIED BY 11 COORDINATE POINTS

POINT NO.	X-SURF (FT)	Y-SURF (FT)
1	395.00	62.80
2	429.63	57.75
3	464.59	55.91
4	499.56	57.30
5	534.26	61.89
6	568.38	69.66
7	601.65	80.54
8	633.78	94.43
9	664.49	111.21
10	693.53	130.75
11	704.88	140.02

*** 2.161 ***

35158-0105 Disk A File: VS1SI.out
M.S.R. 26 April 1994

```
                 Y            A     X     I     S            F     T

                 .00    128.75    257.50    386.25    515.00    643.75

X          .00 +--**-----+---------+---------+---------+---------+
               -
               -    *
               -
               -
               -
       128.75 +    *
               -
               -
               -
               -
               -
A      257.50 +    *
               -
               -    *
               -
               -    *
               -  . .
X      386.25 +  ..5
               -....*
               ....41*
               ....8W*
               ....*2
               ...**31
I      515.00 ....4.2.
               .....412
               .....751
               .....632
               ......6312
               .......851**
S      643.75 +......73821
               - .......532
               - ........73
               -   .......7
               -    ......9
               -    .......
       772.50 +      .....
               -        ...
               -         ..
               -          *
               -
               -
F      901.25 +
               -
               -
               -
               -
               -
T     1030.00 +  ** W     *
```

35158-0105 Disk A File VX2ST.OU1
M.S.R. April 26, 1994

--SLOPE STABILITY ANALYSIS--
SIMPLIFIED JANBU METHOD OF SLICES
IRREGULAR FAILURE SURFACES

PROBLEM DESCRIPTION WINNEBAGO REC. SERV. PROP VERT. EXP.
LONG TERM STATIC

BOUNDARY COORDINATES
11 TOP BOUNDARIES
31 TOTAL BOUNDARIES

BOUNDARY NO.	X-LEFT (FT)	Y-LEFT (FT)	X-RIGHT (FT)	Y-RIGHT (FT)	SOIL TYPE BELOW BND
1	.00	51.00	35.00	59.00	1
2	35.00	59.00	130.00	59.00	1
3	130.00	59.00	250.00	58.00	1
4	250.00	58.00	310.00	59.00	1
5	310.00	59.00	350.00	61.00	1
6	350.00	61.00	400.00	63.00	1
7	400.00	63.00	410.00	65.00	1
8	410.00	65.00	431.00	71.00	1
9	431.00	71.00	629.00	137.00	2
10	629.00	137.00	830.00	145.00	2
11	830.00	145.00	1030.00	155.00	2
12	431.00	71.00	439.00	71.00	1
13	439.00	71.00	440.50	71.00	3
14	440.50	71.00	629.40	134.00	3
15	629.40	134.00	830.00	142.00	3
16	830.00	142.00	1030.00	152.00	3
17	440.50	71.00	450.00	71.00	3
18	450.00	71.00	629.80	131.00	4
19	629.80	131.00	830.00	139.00	4
20	830.00	139.00	1030.00	149.00	4
21	450.00	71.00	495.00	48.50	3
22	495.00	48.50	1030.00	48.50	3
23	439.00	71.00	471.00	55.00	1
24	471.00	55.00	477.00	52.00	5
25	477.00	52.00	482.00	49.50	6
26	482.00	49.50	494.00	43.50	7
27	494.00	43.50	1030.00	43.50	7
28	.00	55.00	471.00	55.00	5
29	.00	52.00	477.00	52.00	6
30	.00	49.50	482.00	49.50	7
31	.00	40.00	1030.00	40.00	8

ISOTROPIC SOIL PARAMETERS
8 TYPES OF SOIL

SOIL TYPE NO.	TOTAL UNIT WT. (PCF)	SATURATED UNIT WT. (PCF)	COHESION INTERCEPT (PSF)	FRICTION ANGLE (DEG)	PORE PRESSURE PARAMETER	PRESSURE CONSTANT (PSF)	PIEZOMETRIC SURFACE NO.
1	125.0	125.0	150.0	28.0	.00	.0	2
2	110.0	110.0	200.0	23.0	.00	.0	2
3	125.0	125.0	260.0	26.5	.00	.0	2
4	70.0	70.0	200.0	25.0	.00	.0	2
5	125.0	130.0	200.0	36.0	.00	.0	2
6	133.0	133.0	150.0	30.0	.00	.0	2
7	130.0	130.0	200.0	32.0	.00	.0	2
8	125.0	130.0	200.0	36.0	.00	.0	2

35158-0105 Disk A File VX2ST.OU1
M.S.R. April 26, 1994
2 PIEZOMETRIC SURFACES HAVE BEEN SPECIFIED

PIEZOMETRIC SURFACE NO. 1 SPECIFIED BY 5 COORDINATE POINTS

POINT NO.	X-WATER (FT)	Y-WATER (FT)
1	.00	52.00
2	400.00	58.00
3	461.00	60.00
4	495.00	48.50
5	1030.00	48.50

PIEZOMETRIC SURFACE NO. 2 SPECIFIED BY 4 COORDINATE POINTS

POINT NO.	X-WATER (FT)	Y-WATER (FT)
1	.00	52.00
2	400.00	58.00
3	450.00	71.00
4	1030.00	71.00

A CRITICAL FAILURE SURFACE SEARCHING METHOD, USING A RANDOM TECHNIQUE FOR GENERATING CIRCULAR SURFACES, HAS BEEN SPECIFIED.

100 TRIAL SURFACES HAVE BEEN GENERATED.

10 SURFACES INITIATE FROM EACH OF 10 POINTS EQUALLY SPACED
ALONG THE GROUND SURFACE BETWEEN X = 350.00 FT.
AND X = 431.00 FT.
EACH SURFACE TERMINATES BETWEEN X = 630.00 FT.
AND X = 830.00 FT.

UNLESS FURTHER LIMITATIONS WERE IMPOSED, THE MINIMUM ELEVATION AT WHICH A SURFACE EXTENDS IS Y = .00 FT.

35.00 FT. LINE SEGMENTS DEFINE EACH TRIAL FAILURE SURFACE.

FOLLOWING ARE DISPLAYED THE TEN MOST CRITICAL OF THE TRIAL FAILURE SURFACES EXAMINED. THEY ARE ORDERED - MOST CRITICAL FIRST.

SAFETY FACTORS ARE CALCULATED BY THE MODIFIED BISHOP METHOD.

FAILURE SURFACE SPECIFIED BY 10 COORDINATE POINTS

POINT NO.	X-SURF (FT)	Y-SURF (FT)
1	404.00	63.80
2	438.39	57.30
3	473.31	54.96
4	508.26	56.81
5	542.74	62.84
6	576.25	72.94
7	608.31	86.98
8	638.46	104.76
9	666.27	126.01
10	679.61	139.01

*** 1.966 ***

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M.S.R. April 26, 1994

FAILURE SURFACE SPECIFIED BY 9 COORDINATE POINTS

POINT NO.	X-SURF (FT)	Y-SURF (FT)
1	413.00	65.86
2	446.77	56.68
3	481.60	53.16
4	516.53	55.39
5	550.61	63.32
6	582.94	76.74
7	612.63	95.27
8	638.89	118.42
9	654.86	138.03

*** 1.968 ***

FAILURE SURFACE SPECIFIED BY 10 COORDINATE POINTS

POINT NO.	X-SURF (FT)	Y-SURF (FT)
1	404.00	63.80
2	438.46	57.66
3	473.38	55.28
4	508.35	56.68
5	542.96	61.84
6	576.82	70.72
7	609.52	83.19
8	640.69	99.12
9	669.95	118.33
10	695.85	139.66

*** 2.022 ***

FAILURE SURFACE SPECIFIED BY 10 COORDINATE POINTS

POINT NO.	X-SURF (FT)	Y-SURF (FT)
1	413.00	65.86
2	446.59	56.01
3	481.29	51.49
4	516.28	52.43
5	550.70	58.80
6	583.70	70.44
7	614.50	87.07
8	642.34	108.29
9	666.54	133.57
10	670.06	138.63

*** 2.035 ***

FAILURE SURFACE SPECIFIED BY 9 COORDINATE POINTS

POINT NO.	X-SURF (FT)	Y-SURF (FT)
1	404.00	63.80
2	438.98	64.86
3	473.78	68.61
4	508.19	75.03
5	542.00	84.07
6	575.02	95.69
7	607.04	109.81
8	637.88	126.36
9	656.20	138.08

*** 2.037 ***

35158-0105 Disk A File VX2ST.OU1
M.S.R. April 26, 1994

FAILURE SURFACE SPECIFIED BY 11 COORDINATE POINTS

POINT NO.	X-SURF (FT)	Y-SURF (FT)
1	395.00	62.80
2	429.63	57.75
3	464.59	55.91
4	499.56	57.30
5	534.26	61.89
6	568.38	69.66
7	601.65	80.54
8	633.78	94.43
9	664.49	111.21
10	693.53	130.75
11	704.88	140.02

*** 2.057 ***

FAILURE SURFACE SPECIFIED BY 10 COORDINATE POINTS

POINT NO.	X-SURF (FT)	Y-SURF (FT)
1	413.00	65.86
2	446.46	55.58
3	481.07	50.36
4	516.07	50.30
5	550.69	55.41
6	584.18	65.57
7	615.81	80.57
8	644.87	100.07
9	670.74	123.64
10	683.38	139.16

*** 2.073 ***

FAILURE SURFACE SPECIFIED BY 8 COORDINATE POINTS

POINT NO.	X-SURF (FT)	Y-SURF (FT)
1	422.00	68.43
2	456.98	69.65
3	491.72	73.88
4	525.97	81.08
5	559.48	91.19
6	592.00	104.14
7	623.28	119.84
8	652.72	137.94

*** 2.075 ***

FAILURE SURFACE SPECIFIED BY 9 COORDINATE POINTS

POINT NO.	X-SURF (FT)	Y-SURF (FT)
1	404.00	63.80
2	436.95	52.00
3	471.59	46.99
4	506.54	48.96
5	540.39	57.85
6	571.80	73.28
7	599.52	94.65
8	622.44	121.11
9	631.46	137.10

*** 2.115 ***

35158-0105 Disk A File VX2ST.OU1
M.S.R. April 26, 1994

FAILURE SURFACE SPECIFIED BY 12 COORDINATE POINTS

POINT NO.	X-SURF (FT)	Y-SURF (FT)
1	350.00	61.00
2	384.91	58.45
3	419.91	58.18
4	454.85	60.19
5	489.59	64.46
6	523.97	70.99
7	557.86	79.73
8	591.11	90.67
9	623.58	103.74
10	655.13	118.89
11	685.62	136.07
12	690.83	139.46

*** 2.138 ***

35158-0105 Disk A File VX2ST.OU1
M.S.R. April 26, 1994

```
                    Y            A     X     I     S            F     T

                   .00    128.75    257.50    386.25    515.00    643.75

        X       .00 +--**-----+---------+---------+---------+---------+
                    -
                    -    *
                    -
                    -
                    -
             128.75 +    *
                    -
                    -
                    -
                    -
                    -
        A    257.50 +    *
                    -
                    -    *
                    -
                    -    *
                    -  . .
        X    386.25 +  ..6
                    -....*
                    ....15*
                    ....2W*
                    ....*5
                    ...**08
        I    515.00 ....1.5.
                    ....9185
                    ....7208
                    .....315
                    ......3185
                    ......7208**
        S    643.75 +......61258
                    - .......312
                    - ........61
                    -   .......6
                    -    .......
                    -    .......
             772.50 +      .....
                    -        ...
                    -         ..
                    -          *
                    -
                    -
        F    901.25 +
                    -
                    -
                    -
                    -
                    -
        T   1030.00 +  ** W     *
```

35158-0105 Disk A File VX2SI.OU1
M.S.R. April 26, 1994

--SLOPE STABILITY ANALYSIS--
SIMPLIFIED JANBU METHOD OF SLICES
IRREGULAR FAILURE SURFACES

PROBLEM DESCRIPTION WINNEBAGO REC. SERV. PROP VERT. EXP.
LONG TERM SEISMIC

BOUNDARY COORDINATES
11 TOP BOUNDARIES
31 TOTAL BOUNDARIES

BOUNDARY NO.	X-LEFT (FT)	Y-LEFT (FT)	X-RIGHT (FT)	Y-RIGHT (FT)	SOIL TYPE BELOW BND
1	.00	51.00	35.00	59.00	1
2	35.00	59.00	130.00	59.00	1
3	130.00	59.00	250.00	58.00	1
4	250.00	58.00	310.00	59.00	1
5	310.00	59.00	350.00	61.00	1
6	350.00	61.00	400.00	63.00	1
7	400.00	63.00	410.00	65.00	1
8	410.00	65.00	431.00	71.00	1
9	431.00	71.00	629.00	137.00	2
10	629.00	137.00	830.00	145.00	2
11	830.00	145.00	1030.00	155.00	2
12	431.00	71.00	439.00	71.00	1
13	439.00	71.00	440.50	71.00	3
14	440.50	71.00	629.40	134.00	3
15	629.40	134.00	830.00	142.00	3
16	830.00	142.00	1030.00	152.00	3
17	440.50	71.00	450.00	71.00	3
18	450.00	71.00	629.80	131.00	4
19	629.80	131.00	830.00	139.00	4
20	830.00	139.00	1030.00	149.00	4
21	450.00	71.00	495.00	48.50	3
22	495.00	48.50	1030.00	48.50	3
23	439.00	71.00	471.00	55.00	1
24	471.00	55.00	477.00	52.00	5
25	477.00	52.00	482.00	49.50	6
26	482.00	49.50	494.00	43.50	7
27	494.00	43.50	1030.00	43.50	7
28	.00	55.00	471.00	55.00	5
29	.00	52.00	477.00	52.00	6
30	.00	49.50	482.00	49.50	7
31	.00	40.00	1030.00	40.00	8

ISOTROPIC SOIL PARAMETERS
8 TYPES OF SOIL

SOIL TYPE NO.	TOTAL UNIT WT. (PCF)	SATURATED UNIT WT. (PCF)	COHESION INTERCEPT (PSF)	FRICTION ANGLE (DEG)	PORE PRESSURE PARAMETER	PRESSURE CONSTANT (PSF)	PIEZOMETRIC SURFACE NO.
1	125.0	125.0	150.0	28.0	-.20	-3480.0	2
2	110.0	110.0	200.0	23.0	.00	.0	2
3	125.0	125.0	260.0	26.5	-.40	-1040.0	2
4	70.0	70.0	200.0	25.0	-.10	-2790.0	2
5	125.0	130.0	200.0	36.0	.00	.0	2
6	133.0	133.0	150.0	30.0	-.50	-4940.0	2
7	130.0	130.0	200.0	32.0	-.10	-2080.0	2
8	125.0	130.0	200.0	36.0	.00	.0	2

35158-0105 Disk A File VX2SI.OU1
M.S.R. April 26, 1994
2 PIEZOMETRIC SURFACES HAVE BEEN SPECIFIED

PIEZOMETRIC SURFACE NO. 1 SPECIFIED BY 5 COORDINATE POINTS

POINT NO.	X-WATER (FT)	Y-WATER (FT)
1	.00	52.00
2	400.00	58.00
3	461.00	60.00
4	495.00	48.50
5	1030.00	48.50

PIEZOMETRIC SURFACE NO. 2 SPECIFIED BY 4 COORDINATE POINTS

POINT NO.	X-WATER (FT)	Y-WATER (FT)
1	.00	52.00
2	400.00	58.00
3	450.00	71.00
4	1030.00	71.00

A HORIZONTAL EARTHQUAKE LOADING COEFFICIENT
OF .100 HAS BEEN ASSIGNED

A VERTICAL EARTHQUAKE LOADING COEFFICIENT
OF .000 HAS BEEN ASSIGNED

CAVITATION PRESSURE = .0 PSF

A CRITICAL FAILURE SURFACE SEARCHING METHOD, USING A RANDOM TECHNIQUE FOR GENERATING CIRCULAR SURFACES, HAS BEEN SPECIFIED.

100 TRIAL SURFACES HAVE BEEN GENERATED.

10 SURFACES INITIATE FROM EACH OF 10 POINTS EQUALLY SPACED
ALONG THE GROUND SURFACE BETWEEN X = 350.00 FT.
AND X = 431.00 FT.
EACH SURFACE TERMINATES BETWEEN X = 630.00 FT.
AND X = 830.00 FT.

35.00 FT. LINE SEGMENTS DEFINE EACH TRIAL FAILURE SURFACE.

FOLLOWING ARE DISPLAYED THE TEN MOST CRITICAL OF THE TRIAL FAILURE SURFACES EXAMINED. THEY ARE ORDERED - MOST CRITICAL FIRST.

SAFETY FACTORS ARE CALCULATED BY THE MODIFIED BISHOP METHOD.

FAILURE SURFACE SPECIFIED BY 9 COORDINATE POINTS

POINT NO.	X-SURF (FT)	Y-SURF (FT)
1	404.00	63.80
2	438.98	64.86
3	473.78	68.61
4	508.19	75.03
5	542.00	84.07
6	575.02	95.69
7	607.04	109.81
8	637.88	126.36
9	656.20	138.08

*** 1.548 ***

35158-0105 Disk A File VX2SI.OU1
M.S.R. April 26, 1994

FAILURE SURFACE SPECIFIED BY 8 COORDINATE POINTS

POINT NO.	X-SURF (FT)	Y-SURF (FT)
1	422.00	68.43
2	456.98	69.65
3	491.72	73.88
4	525.97	81.08
5	559.48	91.19
6	592.00	104.14
7	623.28	119.84
8	652.72	137.94

*** 1.550 ***

FAILURE SURFACE SPECIFIED BY 9 COORDINATE POINTS

POINT NO.	X-SURF (FT)	Y-SURF (FT)
1	431.00	71.00
2	465.91	68.49
3	500.90	69.45
4	535.62	73.87
5	569.72	81.72
6	602.89	92.91
7	634.78	107.34
8	665.08	124.85
9	685.07	139.23

*** 1.589 ***

FAILURE SURFACE SPECIFIED BY 10 COORDINATE POINTS

POINT NO.	X-SURF (FT)	Y-SURF (FT)
1	404.00	63.80
2	438.39	57.30
3	473.31	54.96
4	508.26	56.81
5	542.74	62.84
6	576.25	72.94
7	608.31	86.98
8	638.46	104.76
9	666.27	126.01
10	679.61	139.01

*** 1.648 ***

35158-0105 Disk A File VX2SI.OU1
M.S.R. April 26, 1994

FAILURE SURFACE SPECIFIED BY 12 COORDINATE POINTS

POINT NO.	X-SURF (FT)	Y-SURF (FT)
1	350.00	61.00
2	384.91	58.45
3	419.91	58.18
4	454.85	60.19
5	489.59	64.46
6	523.97	70.99
7	557.86	79.73
8	591.11	90.67
9	623.58	103.74
10	655.13	118.89
11	685.62	136.07
12	690.83	139.46

*** 1.649 ***

FAILURE SURFACE SPECIFIED BY 11 COORDINATE POINTS

POINT NO.	X-SURF (FT)	Y-SURF (FT)
1	395.00	62.80
2	429.63	57.75
3	464.59	55.91
4	499.56	57.30
5	534.26	61.89
6	568.38	69.66
7	601.65	80.54
8	633.78	94.43
9	664.49	111.21
10	693.53	130.75
11	704.88	140.02

*** 1.662 ***

FAILURE SURFACE SPECIFIED BY 10 COORDINATE POINTS

POINT NO.	X-SURF (FT)	Y-SURF (FT)
1	404.00	63.80
2	438.46	57.66
3	473.38	55.28
4	508.35	56.68
5	542.96	61.84
6	576.82	70.72
7	609.52	83.19
8	640.69	99.12
9	669.95	118.33
10	695.85	139.66

*** 1.665 ***

35158-0105 Disk A File VX2SI.OU1
M.S.R. April 26, 1994

FAILURE SURFACE SPECIFIED BY 11 COORDINATE POINTS

POINT NO.	X-SURF (FT)	Y-SURF (FT)
1	422.00	68.43
2	457.00	68.01
3	491.95	69.75
4	526.74	73.62
5	561.22	79.63
6	595.26	87.75
7	628.75	97.95
8	661.54	110.18
9	693.52	124.41
10	724.56	140.57
11	724.97	140.82

*** 1.677 ***

FAILURE SURFACE SPECIFIED BY 9 COORDINATE POINTS

POINT NO.	X-SURF (FT)	Y-SURF (FT)
1	413.00	65.86
2	446.77	56.68
3	481.60	53.16
4	516.53	55.39
5	550.61	63.32
6	582.94	76.74
7	612.63	95.27
8	638.89	118.42
9	654.86	138.03

*** 1.691 ***

FAILURE SURFACE SPECIFIED BY 10 COORDINATE POINTS

POINT NO.	X-SURF (FT)	Y-SURF (FT)
1	413.00	65.86
2	446.59	56.01
3	481.29	51.49
4	516.28	52.43
5	550.70	58.80
6	583.70	70.44
7	614.50	87.07
8	642.34	108.29
9	666.54	133.57
10	670.06	138.63

*** 1.714 ***

35158-0105 Disk A File VX2SI.OU1
M.S.R. April 26, 1994

```
                 Y            A     X     I     S            F     T

                 .00    128.75    257.50    386.25    515.00    643.75

X        .00 +--**-----+---------+---------+---------+---------+
             -
             -    *
             -
             -
             -
     128.75 +    *
             -
             -
             -
             -
             -
A    257.50 +    *
             -
             -    *
             -
             -    *
             -  . .
X    386.25 +  ..5
             -....*
             ....41*
             ....9W*
             ....*1
             ...**32
I    515.00 ....4.1.
             .....421
             .....652
             .....731
             ......6321
             .......952**
S    643.75 +......63912
             - .......531
             - ........63
             -   .......6
             -    ......8
             -    .......
     772.50 +      .....
             -        ...
             -         ..
             -          *
             -
             -
F    901.25 +
             -
             -
             -
             -
             -
T   1030.00 +  ** W     *
```

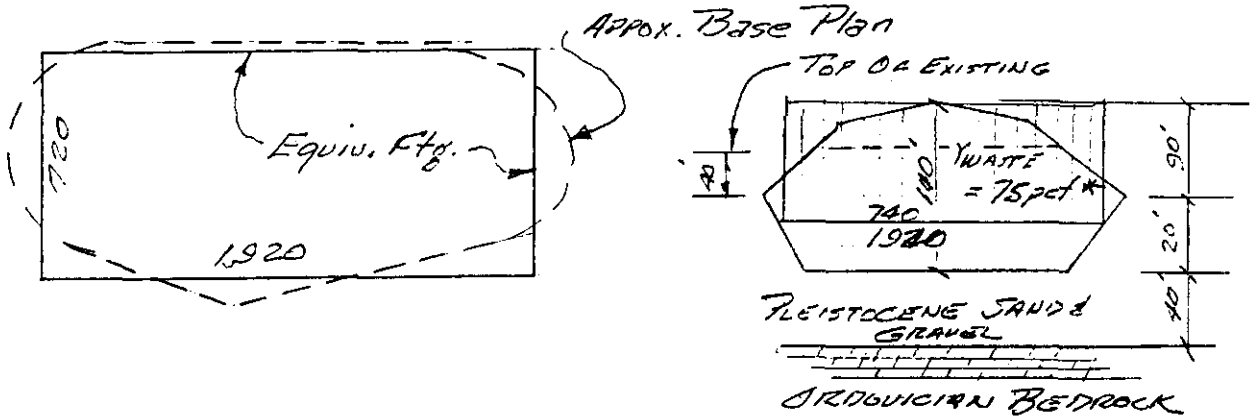
APPENDIX D

MISCELLANEOUS CALCULATIONS

Six Pages

1. Bearing Capacity
2. Settlement
3. Stability of Final Cover
    a. Compacted Clay
    b. Vegetative Cover

I BEARING CAPACITY



$B = 740$, $L = 1940$ $D = 20'$

$D/B = \frac{20}{740} = 0.027$

$B/L = \frac{740}{1940} = 0.38$

* INCL PROVISION FOR LINER & FINAL COVER

PRESSURE = 110 (75)

= 8250 psf

= 8.25 Ksf

BEARING CAPACITY FACTORS

PLEISTOCENE SAND & GRAVEL

$\gamma = 130$ $c = 200$ $\phi = 36°$ $N_q = 40$ $N_\gamma = 50$ $N_c = 58$ (NAVFAC 7.2-131)

WITH WATER TABLE @ BEARING LEVEL USE $N_\gamma = \frac{50}{2} = 25$

" " " ABOVE " " USE $\gamma_q = (130 - 62.4)$

$q_{ult} = 200(58)(1 + 0.3 \times 0.38) + (130 - 62.4)(20)(40) + 0.4(130 - 62.4)(25)740$

$= 12{,}922 + 54080 + 500{,}240 = 567{,}200$ psf $= \underline{567.2 \text{ Ksf}}$

FOUNDATION SOIL IS CLEAN GRANULAR $\therefore q_{ult_{short}} = q_{ult_{long}}$

SEISMIC CONSIDERATIONS:

For Short Term $\alpha = 0.014$ For Long Term $\alpha = 0.087$

CG TRASH IS 55' ABOVE FDN

$e = 55$ $M = 75(110)(740)(55)(0.014) = 4.7 \times 10^6$ Ft-Lb. Short

FOR 1' STRIP OF FOUNDATION $S = \frac{1(740)^2}{6} = \underline{91267 \text{ Ft}^3}$

TSC
TESTING SERVICE CORPORATION
457 EAST GUNDERSEN DRIVE • CAROL STREAM, ILLINOIS 60188-2492
FAX: (708) 653-2726 • Telephone (708) 653-3920

Subject MISCELLANEOUS ANALYSES
Computed MSR Date 4-30-94 Checked JL

I. BEARING CAPACITY

SEISMIC CONSIDERATIONS:

INCREASE IN BRG PRESSURE $\Delta f = \frac{4.7 \times 10^6}{9.13 \times 10^4} = \underline{51.5 \text{ psf}}$ Short

$51 \times \frac{(0.087)}{(0.014)} = \underline{320 \text{ psf}}$ Long

SAFETY FACTORS

	SHORT TERM	LONG TERM
STATIC	$\frac{567.2}{8.25} = 68.8$	$\frac{567.2}{8.25} = 68.8$
SEISMIC	$\frac{567.2}{(8.25 + \frac{51.5}{1000})} = 68.3$	$\frac{567.2}{(8.25 + \frac{320}{1000})} = 66.2$

II. SETTLEMENT

For Dense ~ Very Dense Granular Soils $K_{v1} = 290 \text{ T/ft}^3$ NAVFAC 7.1-219

$D = 20'$ $\Delta H = \frac{4(8.25)(740)^2}{\frac{(290 \text{ T/ft}^2 \times 2 \text{ T/ton})(741)^2}{2}} = 0.11'$ LAW...

RE-EVALUATE

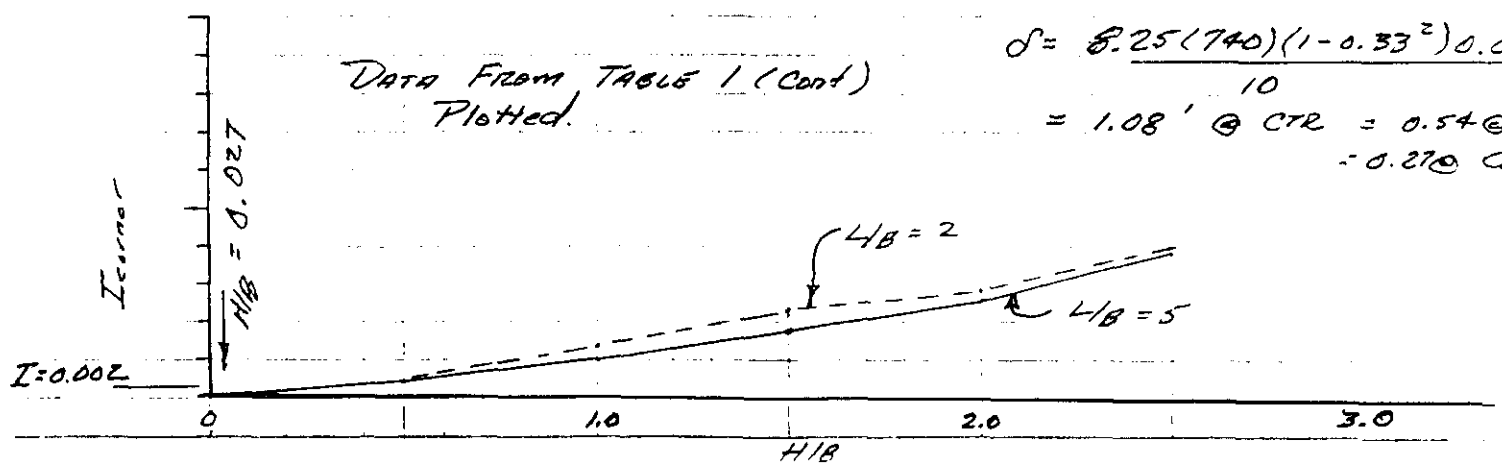
SEE ALSO NAVFAC 7.1-212, 213 $H/B = 0.027$ $L/B = 0.38^{-1} = 2.6$

$\nu = 0.33$

For $E_v = 10$ ksf (say)

$\delta = \frac{8.25(740)(1-0.33^2)0.002}{10}$

$= 1.08'$ @ CTR $= 0.54$ @ Ed. $= 0.27$ @ Corn.



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II SETTLEMENT

OF THE TOTAL 8.25 KSF FINAL LOAD, 60' x 0.075 = 4.5 KSF IS IN PLACE. THE SETTLEMENT CAUSED BY THAT LOAD HAS ALREADY OCCURED

Correction for Load in Place

$$\delta_{ctr}' = \frac{(8.25-4.50)}{8.25}(1.08) = 0.49' = 6''\ \text{say}$$

3" @ Mid. Pt. of Side
1½" @ Corner

Differential $\frac{0.25}{\frac{740}{2}} = 0.0007$

$= 1/1480$

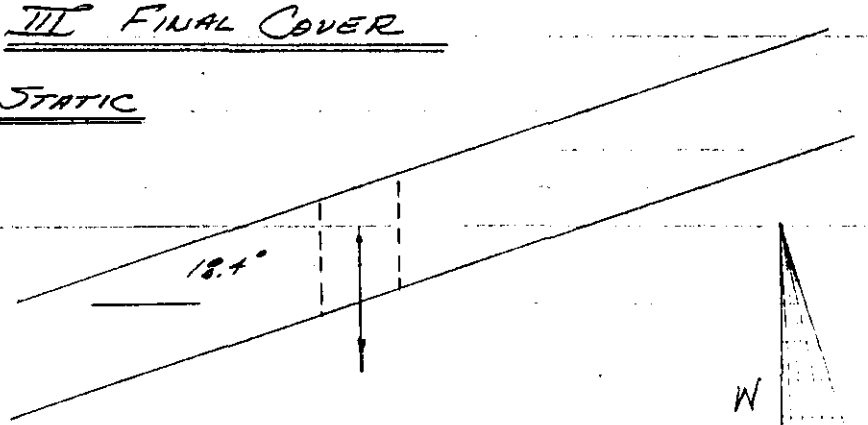
EASILY TOLERABE

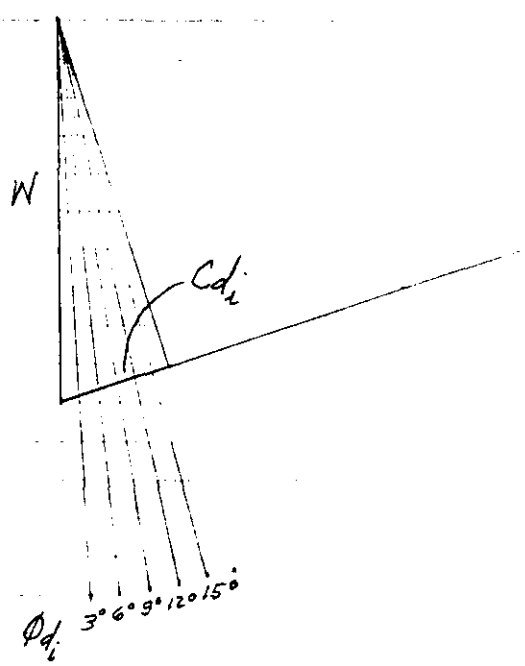
III FINAL COVER

STATIC

$$\tan \phi_d = \frac{\tan \phi}{FS}$$

LET $\phi_d = 0°, 3°, 6°, 9°, 12°, 15°$





ϕ_d	Cd/W
0	0.31
3	0.26
6	0.20
9	0.145
12	0.095
15	0.050

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III FINAL COVER

STATIC

Short Term $\phi_u = 0$ $C_u = C - P_b \text{Const} \tan\phi$

Comp Clay $C_u = 260 - (-1040) \tan 26.5$

$= 779$ psf

Veg. Layer 200 psf

$W = \Sigma \gamma h$

Comp. Clay $= 3(130) + 3(110)$

$= 720$ #/ft

Veg. Layer $3(110) = 330$ #/ft.

For Comp Clay

$C_d = 720(0.31) = 223.2$

$C = \frac{223.2}{\cos 18.4} = 235$ psf

$FS = \frac{779}{235} = 3.31$

For Veg. Layer

See Long Term Value.

LONG TERM Compacted Clay

$W = 720$
$C = 200$
$\phi = 26.5$

ϕ_d	FS_ϕ	C_d/W	C_d	C	FS_c *
3	9.51	0.26	187.2	260	1.32
6	4.74	0.20	144.0		1.71
9	3.15	0.145	104.4		2.36
12	2.34	0.095	68.4		3.61
15	1.86	0.05	36.0	260	6.85

$* \frac{C(\cos 18.4)}{C_d}$

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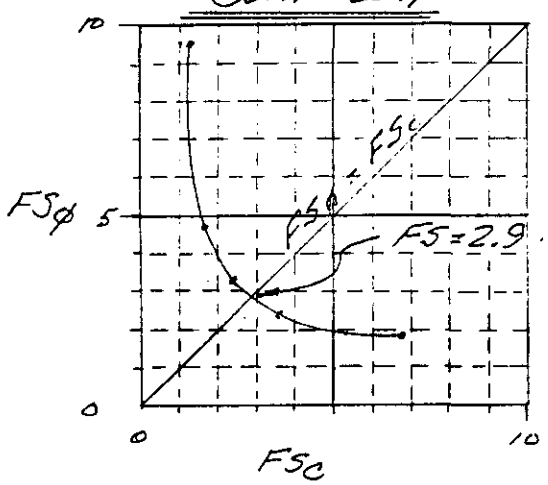
III FINAL COVER

STATIC - LONG TERM

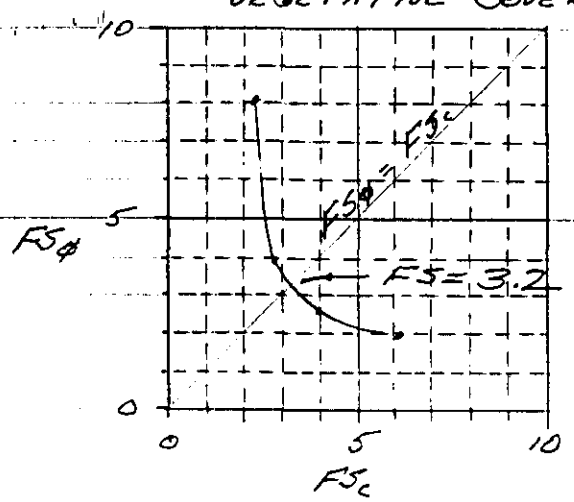
COMP CLAY



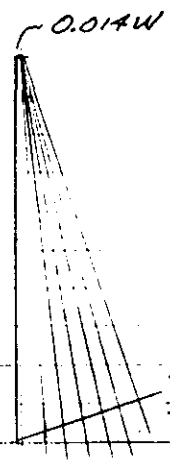
VEGETATIVE COVER W = 330# C = 200 φ = 23°

ϕ_d	FS_ϕ	Cd/W	Cd	C	FS_c
3	8.1	0.26	85.8	200	2.21
6	4.0	0.20	66.0		2.88
9	2.68	0.145	47.9		3.96
12	2.00	0.095	31.3		6.04
15	1.58	0.050	16.5	200	11.50

VEGETATIVE COVER



SEISMIC ~ SHORT TERM



ϕ_d	Cd/W
3	0.27
6	0.21
9	0.16
12	0.10
15	0.06
0	0.33

~ LONG TERM

ϕ_d	Cd/W
3	0.335
6	0.290
9	0.245
12	0.195
15	0.145
0	0.40

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III. FINAL COVER

SEISMIC

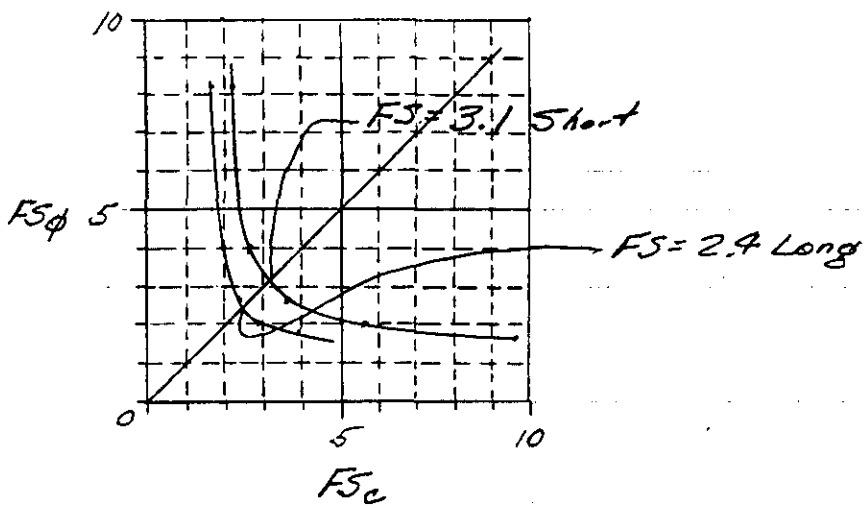
COMP. CLAY $W = 720$, $\phi = 26.5$, $C = 260$ psf $C_u = 778$

Short Term $F.S. = \dfrac{778 \cos 18.4}{0.33(720)} = 3.11$

Long Term $F.S. = \dfrac{778 \cos 18.4}{0.40(720)} = 2.56$

VEG COVER

ϕ_d	FS_ϕ	Cd/W Short	Cd/W Long	Cd Short	Cd Long	C	FS_c Short	FS_c Long
3	8.1	89.1	110.6	0.27	0.335	200	2.13	1.72
6	4.0	69.3	95.7	0.21	0.290		2.74	1.98
9	2.7	52.8	80.9	0.16	0.245		3.59	2.35
12	2.0	33.0	64.3	0.10	0.195		5.75	2.95
15	1.6	19.8	47.9	0.06	0.145	200	9.58	3.97



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Subsurface Exploration
Geotechnical Engineering
Construction Materials Engineering & Testing
Environmental Engineering
Geosciences & Hydrogeologic Studies
Monitoring Wells

Carol Stream, Illinois

June 9, 1994

Winnebago Reclamation Service
Thomas Hilbert
8403 Lindenwood Road
Rockford, Illinois 61109

Re: TSC Job 35158
Winnebago Reclamation Service
Pagel Landfill Significant Modification
Rockford, Illinois

Dear Tom:

We have completed our analysis of the stability of the FML component of the final cover for the subject project. This letter presents our findings.

The attached calculations estimate the short and long term, static and seismic Safety Factors for the following cases:

1. Sliding of the proposed VLDPE membrane on the compacted clay foundation above the 3 (horizontal) to 1 (vertical) slopes.

2. Sliding of the drainage sand layer on the VLDPE membrane above the 3 (horizontal) to 1 (vertical) slopes.

Larger Safety Factors will exist for the portion of the final cover on a 3 % slope.

Our analysis of static loadings yields Safety Factors at the VLDPE - Compacted Clay interface of 4.08 and 1.85 for short and long term conditions, respectively. To realize these values, the VLDPE - Compacted Clay interface must produce interface efficiencies of 0.8 for friction and 0.3 for adhesion. If these values cannot be obtained with a smooth FML surface, a textured surface (with efficiencies of 99 % $\pm$) should be used.

Analysis of the Drainage Sand - VLDPE interface indicate that an efficiency in excess of 80 % will be required to produce a Safety Factor > 1.5 as required by the IEPA. It seems unlikely that this value can be obtained with a smooth VLDPE FML. Accordingly we recommend that the top face of the FML be textured.

Analysis of the seismic condition indicates that the Safety Factors for the FML - Compacted Clay interface will be 3.48 and 2.61, respectively. Safety Factors for the Drainage Sand - FML interface are found to be greater than 1.3 based on seismic displacement and the long term loading. These results were obtained using an allowable post seismic deformation of 1/2 inch and an interface efficiency of 80 %. If a textured surface is used to satisfy the static criteria, the seismic Safety Factors will become infinitely large.

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To achieve the soil strengths anticipated by this analysis, the clay foundation of the FML and Drainage Sand should be compacted. In our opinion, the clay should be compacted to at least 88 percent of the maximum laboratory dry density determined in accordance with ASTM D 1557 (commonly known as the modified Proctor test) and the sand should be subjected to at least two full coverages of a heavy vibratory plate compactor.

We trust that the foregoing is satisfactory to your needs. Please call if you have further questions regarding these or other matters.

Respectfully submitted,

TESTING SERVICE CORPORATION

MICHAEL S. ROBINSON
62-37150
REGISTERED
PROFESSIONAL
ENGINEER
STATE OF ILLINOIS

Michael S. Robinson, P.E.
Manager, Design Services

MSR/mr

Attachments: 4 Sheets

cc: Dan Feezor, AEEI (Via UPS Overnight)

[35158FML]
Disk: "C"

TSC
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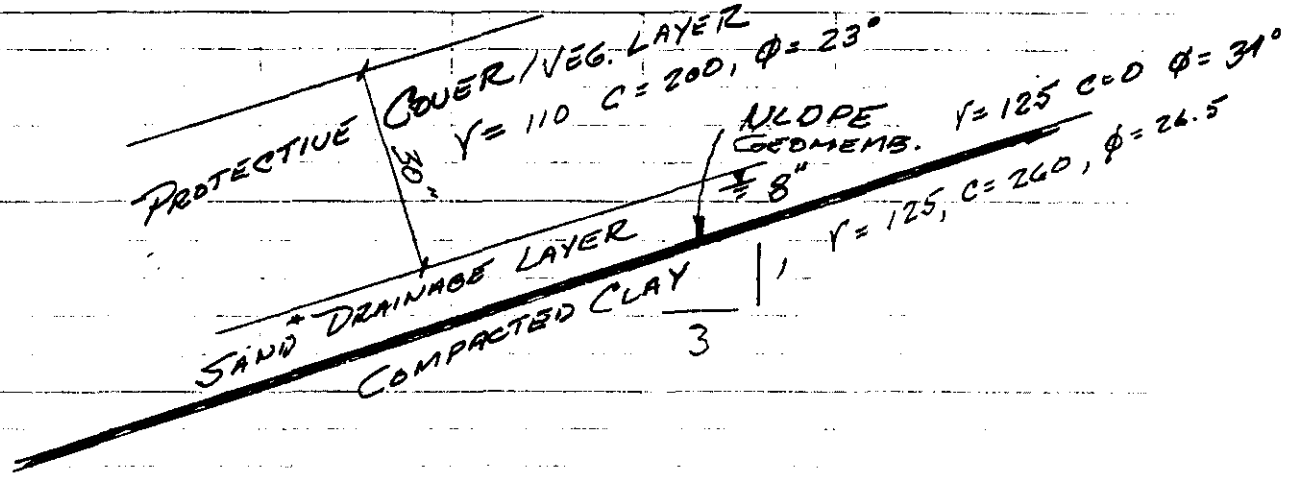
Project No. 35158 Sheet 1 of 4
Project PAGEL SIGNIFICANT MODIFICATION
Subject STABILITY FINAL COVER Computed MSR Date 6-6-94 Checked



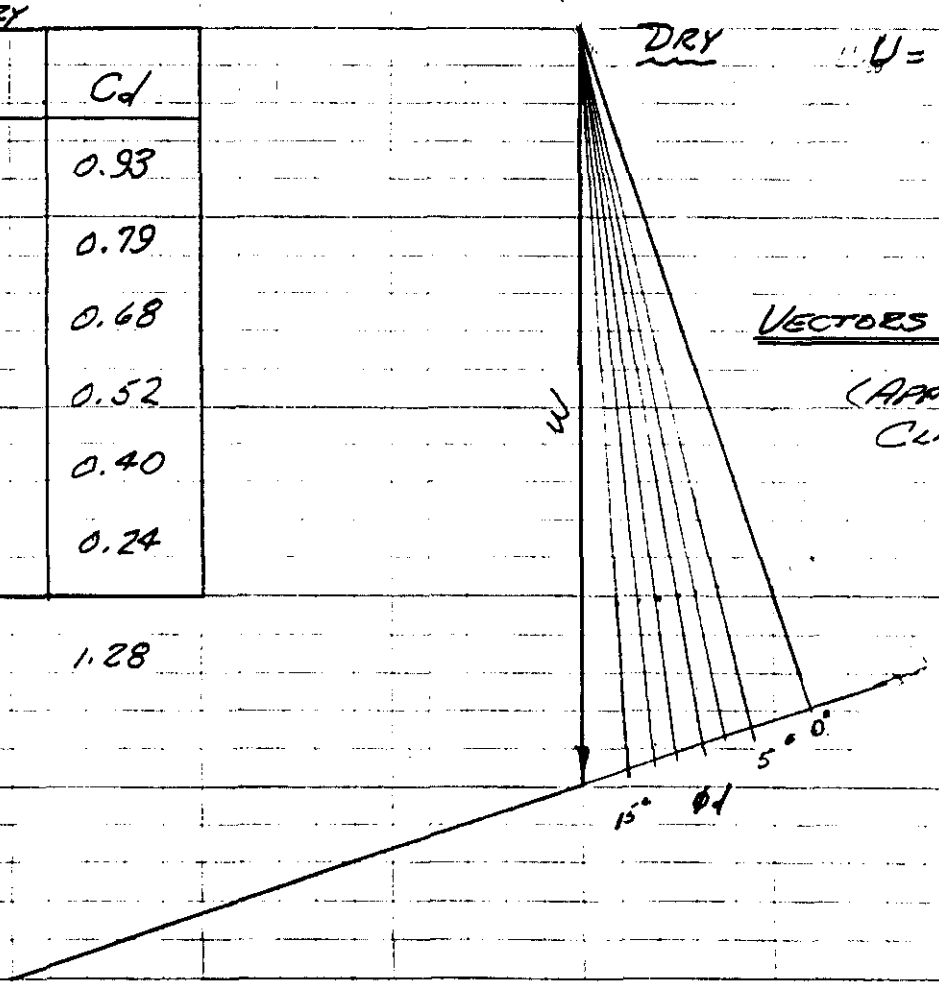
$$EQ\ \gamma = \frac{110(30)+125(8)}{38} = 113\ PCF$$

SLIPPAGE SAND ON FML
" " FML ON CLAY

$$\gamma H = 113\left(\frac{30+8}{12}\right) = \underline{358^{\#}} \qquad W_T = \frac{358}{\cos 18.4^\circ} = \underline{377^{\#}} = 4.00''$$

STATIC DRY

Φ_d	C_d
5	0.93
7	0.79
9	0.68
11	0.52
13	0.40
15	0.24
0°	1.28



DRY

$$U = \frac{8}{12}(62.4)\cos 18.4^\circ = 43.8^{\#}$$

$$U = \frac{4.00(43.8)}{377^{\#}}$$

$$U = 0.46''$$

VECTORS ~ DRY SLOPE

(APPLICABLE TO CLAY/SLOPE INTERFACE

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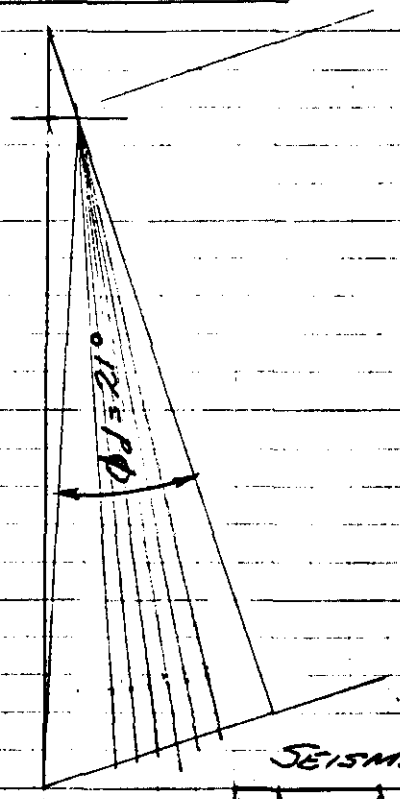
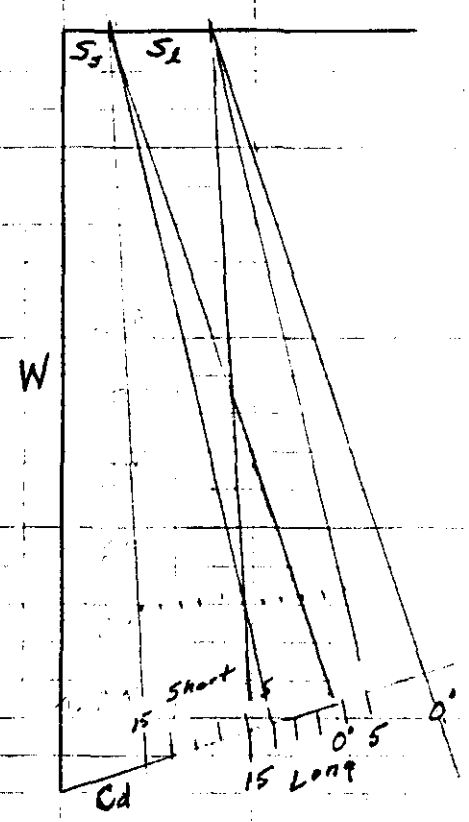
Project No. 35158 Sheet 2 of 4
Project PAGEL SIGNIFICANT MODIFICATION
Subject STABILITY ~ FINAL COVER Computed MSR Date 6-8-94 Checked

VECTORS ~ SLOPE W/ WATER

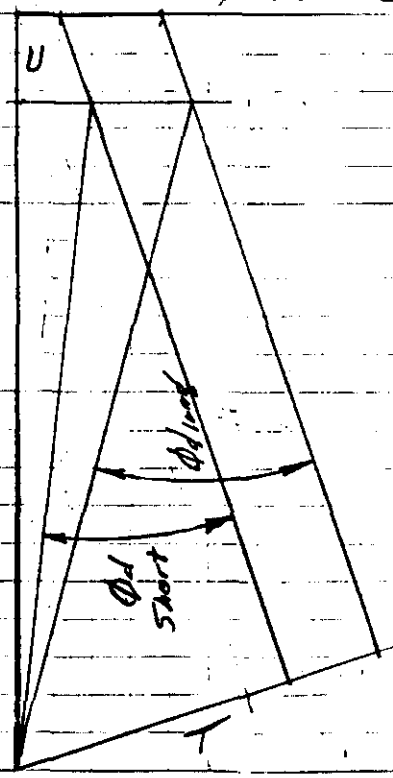
(APPLICABLE TO SAND ~ SLOPE INTERFACE)



SEISMIC DRY



SEISMIC, W/ WATER



SEISMIC ANAL.

a_{grnd} = 0.014 Short
0.087 LONG

Soft Site Amplit.

$\frac{a_{site}}{a_{rock}}$ = Short 4, Long 2.2

$S_s = 4(0.014)(4.00) = 0.224$

$S_L = 2.2(0.087)4.00 = 0.77$

	Short	Long
ϕ_d	25°	33°

ϕ_d	Cd Short	Cd Long
5°	1.47	1.69
7°	1.04	1.55
9°	0.89	1.40
11°	0.75	1.29
13°	0.61	1.17
15°	0.47	1.03
0°	1.50	2.00

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Project No. 35158 Sheet 3 of 4
Project PAGEL SIGNIFICANT MODIFICATION
Subject STABILITY FINAL COVER Computed MSR Date 6-9-94 Checked

STRENGTH PARAMETERS

For VLDPE/CLAY $E_\phi = 75\%$ $E_c = 30\%$

$\phi_i = \tan^{-1}(0.75 \tan 26.5^\circ) = 20.5^\circ$

$C_i = 0.30(260) = 78$ psf (Long Term)

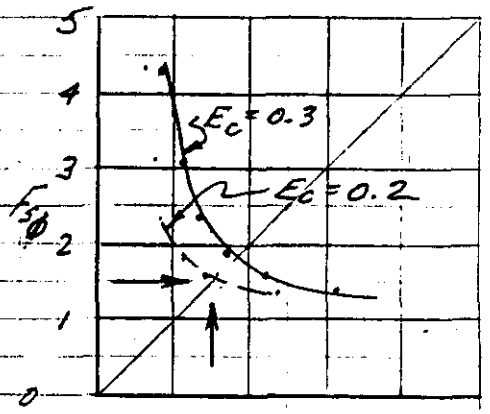
$C_i = 0.30(260) + 1040(0.75)\tan 26.5^\circ = 467$ psf

$W = 377\#$ $C = Cd\left(\frac{377}{4}\right)\cos 18.4^\circ = 89.4\,Cd$

LONG TERM

ϕ_d	$F_{S\phi}$	Cd	C	F_{S_c}
5°	4.27	0.93	83.1	0.94 (0.63)
7°	3.04	0.79	70.6	1.10 (0.74)
9°	2.36	0.68	60.8	1.28 (0.86
11°	1.92	0.52	46.5	1.68 (1.12)
13°	1.62	0.40	35.8	2.18 (1.45)
15°	1.40	0.24	21.5	3.63 (2.42)

STATIC



SHORT TERM

ϕ_d	$F_{S\phi}$	Cd	C	F_{S_c}
0°	—	1.28	114.4	4.08

ϕ_d	$F_{S\phi}$	SHORT TERM			LONG TERM		
		Cd	C	F_{S_c}	Cd	C	F_{S_c}
0	—	1.50	134.1	3.48	2.00	178.8	2.61

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Project No. 35158 Sheet 4 of 4
Project PAGEL SIGNIFICANT MODIFICATION
Subject STABILITY – FINAL COVER Computed MSR Date 6-9-94 Checked

STRENGTH PARAMETERS

FOR DRAINAGE SAND $\phi = 34°$ $E_\phi = 0.8$ $\phi_L = \tan^{-1}(0.8 \tan 34)$

STATIC SHORT & LONG TERM $\phi_L = 28.4°$

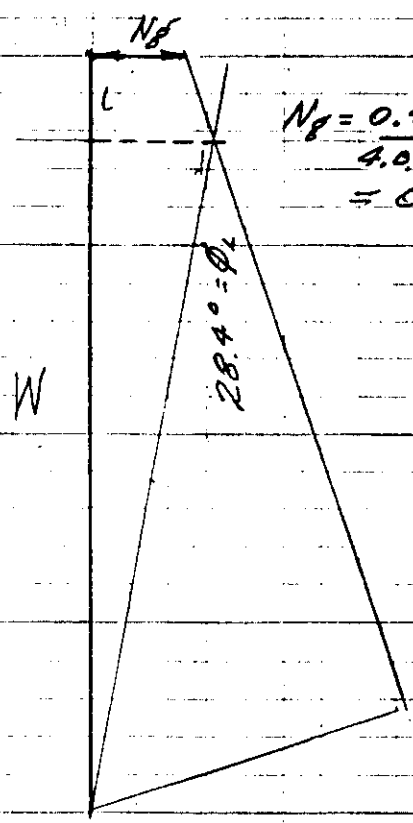
$FS = \frac{\tan 28.4}{\tan 20.5} = 1.44 > 1.3$

SEISMIC MOVEMENT WILL OCCUR IF SR ≤ 1

SHORT $SR = \frac{\tan 28.4}{\tan 25°} = 1.16$

LONG TERM $SR = \frac{\tan 28.4°}{\tan 33°} = 0.83$ ∴ POST SEISMIC DEFORMATION CAN OCCUR

DETERMINE N USE METHOD OF MAKOISI & SEED TO EVALUATE POST SEISMIC DEFORMATION



FOR NEWMARK ANALYSIS

$N_\gamma = \frac{0.49}{4.00} = 0.12$

$\frac{N}{A} = \frac{0.12}{2(0.087)} = 0.63 = K_y/K_{max}$

From Fig 2 it can be seen that for M = 5.5, $\delta \leq 1$ cm

For $\delta_{allow} = 1/2''$

$FS_\delta = \frac{\delta_{allow}}{\delta} > 1.3$

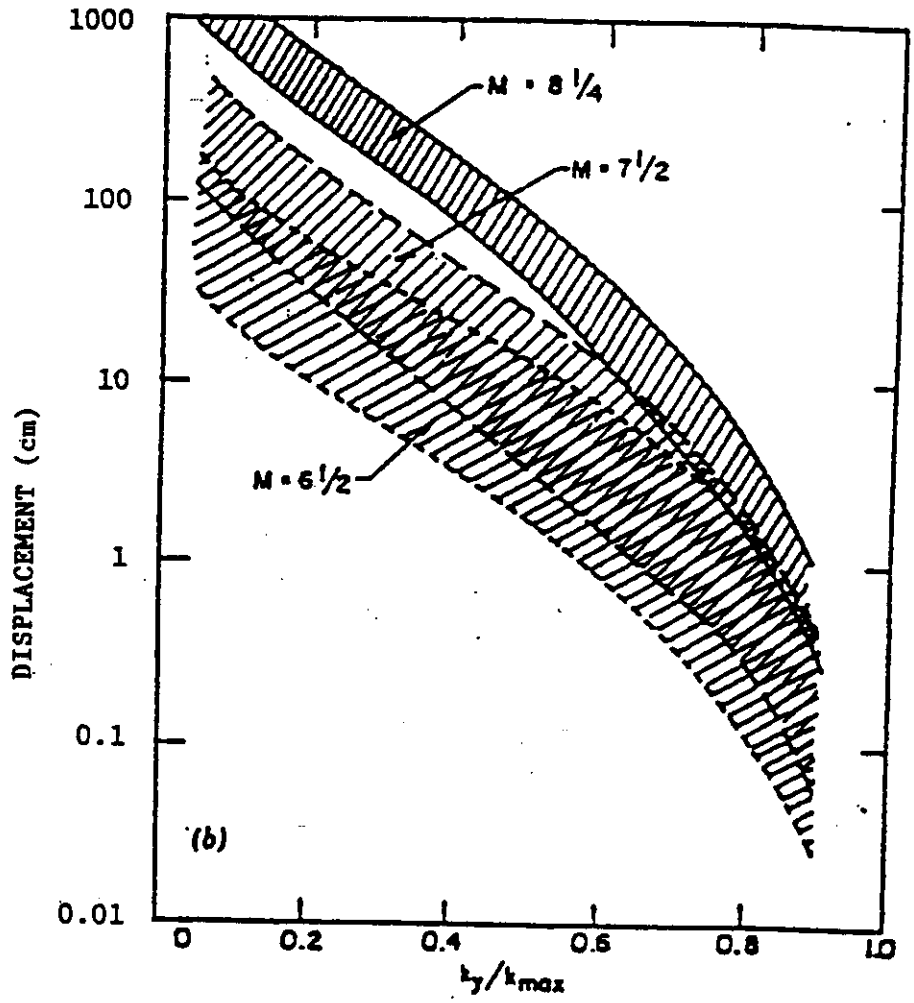


Figure 2. Variation of Permanent Displacement with Yield Acceleration (Makdisi and Seed, 1978)

SHEET 1 OF 1
OVERSIZED MAP
"Results - Mass Stability Analysis
Pagel Landfill - Significant Modification"
1 PAGE

MAY BE VIEWED AT:

U.S. EPA REGION V
SUPERFUND RECORDS CENTER
77 W. JACKSON
CHICAGO, IL 60604
(312) 886-0900

TSC

TESTING SERVICE CORPORATION

Geotechnical Engineering
Environmental Services
Construction Materials Engineering & Testing
Laboratory Testing of Soils & Materials
Subsurface Exploration

Carol Stream, Illinois

7 May 1996

Andrews Environmental Engineering, Inc.
Dan Feezor, P.E.
3535 Mayflower Boulevard
Springfield, Illinois 62707

Re: Winnebago Reclamation Landfill
Permit Modification
Slope and Mass Stability Analyses
Rockford, Illinois
TSC Proj. No. 39645

Dear Dan:

In accordance with our Proposal No. 15882 dated 17 April 1996, we have completed a review of the stability of the final configuration and components of the final cover for the subject site. These analyses are based on final slopes pitched at 2-1/2 (horizontal) to 1 (vertical) final slopes, and amend previous analyses based on 3 (horizontal) to 1 (vertical) final slopes. The analyses herein do not consider trench excavation and liner leachate control system stability which were addressed in earlier studies and are essentially unaffected by the slope of the final cover. Neither settlement nor bearing capacity issues are addressed as the effects of steepening the slope are undetectable in comparison to background variations of the foundation material parameters; accordingly, our earlier conclusions remain unchanged.

We have analyzed the mass stability for the completed facility for short and long term static loadings. Under Federal EPA regulations, the site is not within a seismic impact zone, and therefore need not be analyzed for seismic stability. The Illinois regulations, however do require such an analysis, and previous reports for this site have included seismic considerations. Accordingly, seismic loadings were analyzed for the present study.

Previously, we have reported the Safety Factor for the seismic case as the Factor of Safety computed for the pseudo-static analysis. Contemporary practice in seismically active areas has moved away from this approach and toward an assessment of permanent deformations resulting from seismic loadings (Bray, et. al, 1995). We have followed this trend in the seismic slope stability analyses of this study. Using an appropriate method of analysis, we have used a pseudo-static analysis to establish the "yield acceleration" for the element in question. We have the calculated the Seismic Safety Factor as the ratio of that value to the design site acceleration. We have chosen the design site acceleration to be that value for which the probability of a greater acceleration is 10 percent for the exposure period (either 10 or 250 years). This definition corresponds well with the USEPA regulations which use the same criteria.

We selected the design acceleration using data from Nuttli and Herman (1978) and a modified probability density analysis similar to that used by Algermissen, et. al. (1982). Whereas Algermissen,

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et. al. included a probabilistic assessment as to whether a given earthquake would produce a specific level of acceleration, our simplified analysis assumed that it would, and is therefore apt to be conservative. The calculations accompany this report. Our analysis is summarized in Table 1.

TABLE NO. 1
DESIGN ACCELERATION VALUES

Case	Short Term (10 yr)	Long Term (250 yr)
Design a (g's)	0.028g	0.123g

These values are greater than those previously used in WRL studies.

Figure Nos. 2, 3, and 4 present the results of the mass stability analyses. They depict the slope geometry, the configuration of the 10 most critical surfaces, and the results of the analyses. On Figure Nos. 2 and 3, the Safety Factor associated with each of the most critical surfaces is tabulated. Figure No. 4 presents the results of the trial and error procedure for determining the "yield" acceleration in a tabulation of pseudo-static a and computed Factor of Safety. The "yield" acceleration for the section analyzed is 0.385.

Our analysis included a determination of the Safety Factor of the VLDP liner and the protective cover layer components of the final cover. We solved these cases graphically on Figure No. 5. The results of all analyses made for this study are presented in Table 2.

TABLE 2

SAFETY FACTORS

Case	Short Term	Long Term	Statutory Minimum
	Mass Stability		
Static	2.57	2.09	1.50
Seismic	13.8	2.20	1.30
	Interface Stability		
Static	3.79	3.00	1.50
Seismic	6.43	1.46	1.30

Examination of these values discloses that the present design provides Safety Factors in excess of the specified minimum values of 35IAC811. Taken together with previous analyses which are unaffected by the steepened slope, this study indicates that the proposed modifications to the Winnebago Landfill will not adversely impact its compliance with the requirements of 35IAC811.

We trust that the foregoing is satisfactory to your needs. Please call if you have further questions regarding these or other matters.

Respectfully submitted,

Testing Service Corporation

MICHAEL S. ROBINSON
62-37150
REGISTERED
PROFESSIONAL
ENGINEER
STATE OF ILLINOIS

Michael S. Robinson, P.E.
Manager - Design Services
Illinois Registered Professional Engineer No. 062-37150

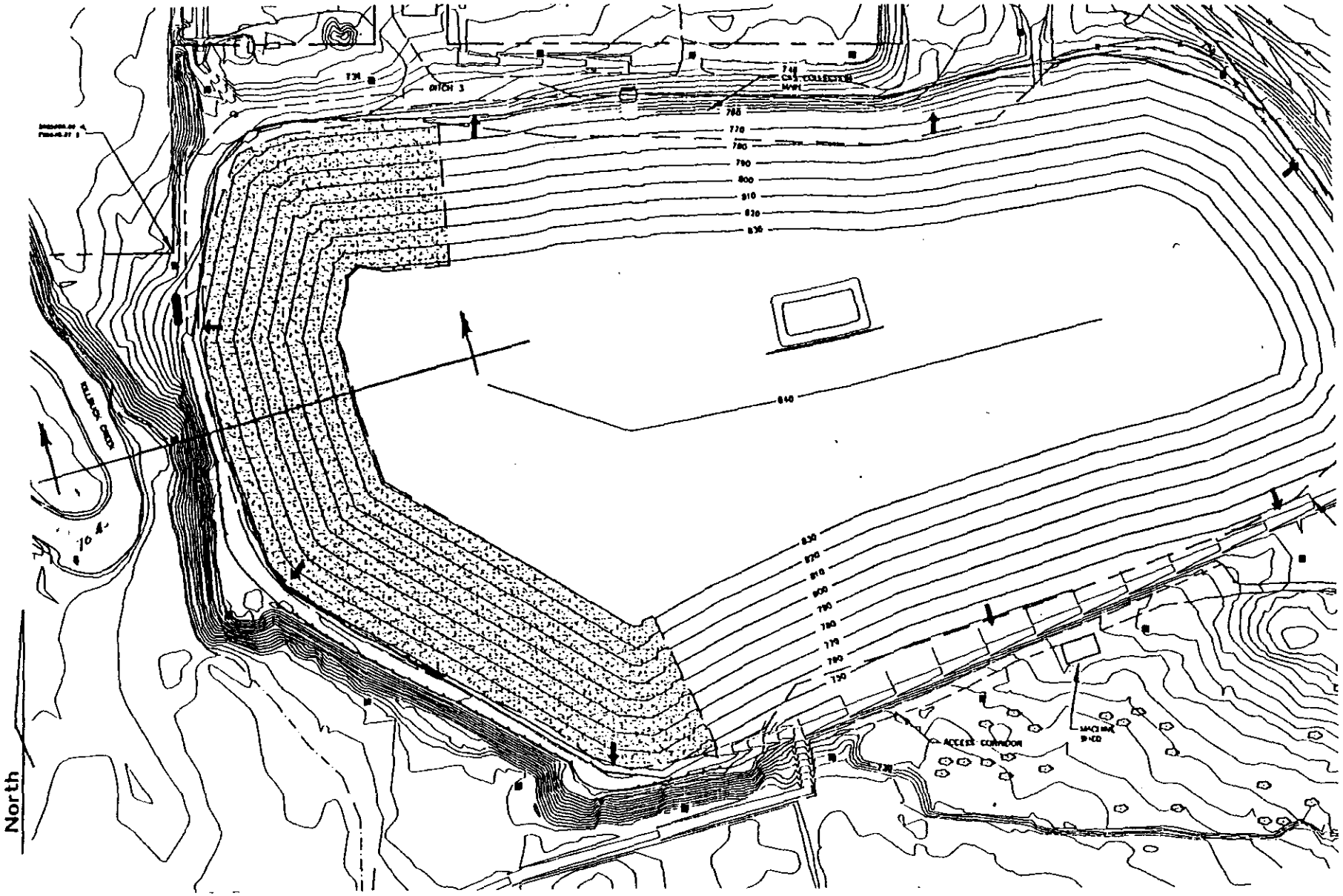
MSR/mr

Attachments: Figure Nos. 1 through 5
Seismic Analyses (12 Sheets)
STABL5M Output, Edited (11 Sheets)

[#16:\WRLRPT]

WINNEBAGO RECLAMATION LANDFILL
PROPOSED VERTICAL EXPANSION
ROCKFORD, ILLINOIS

TSC
TESTING SERVICE CORP.



SECTION FOR MASS STABILITY ANALYSIS

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Figure No. 1

WINNEBAGO RECLAMATION LANDFILL
PROPOSED VERTICAL EXPANSION
ROCKFORD, ILLINOIS

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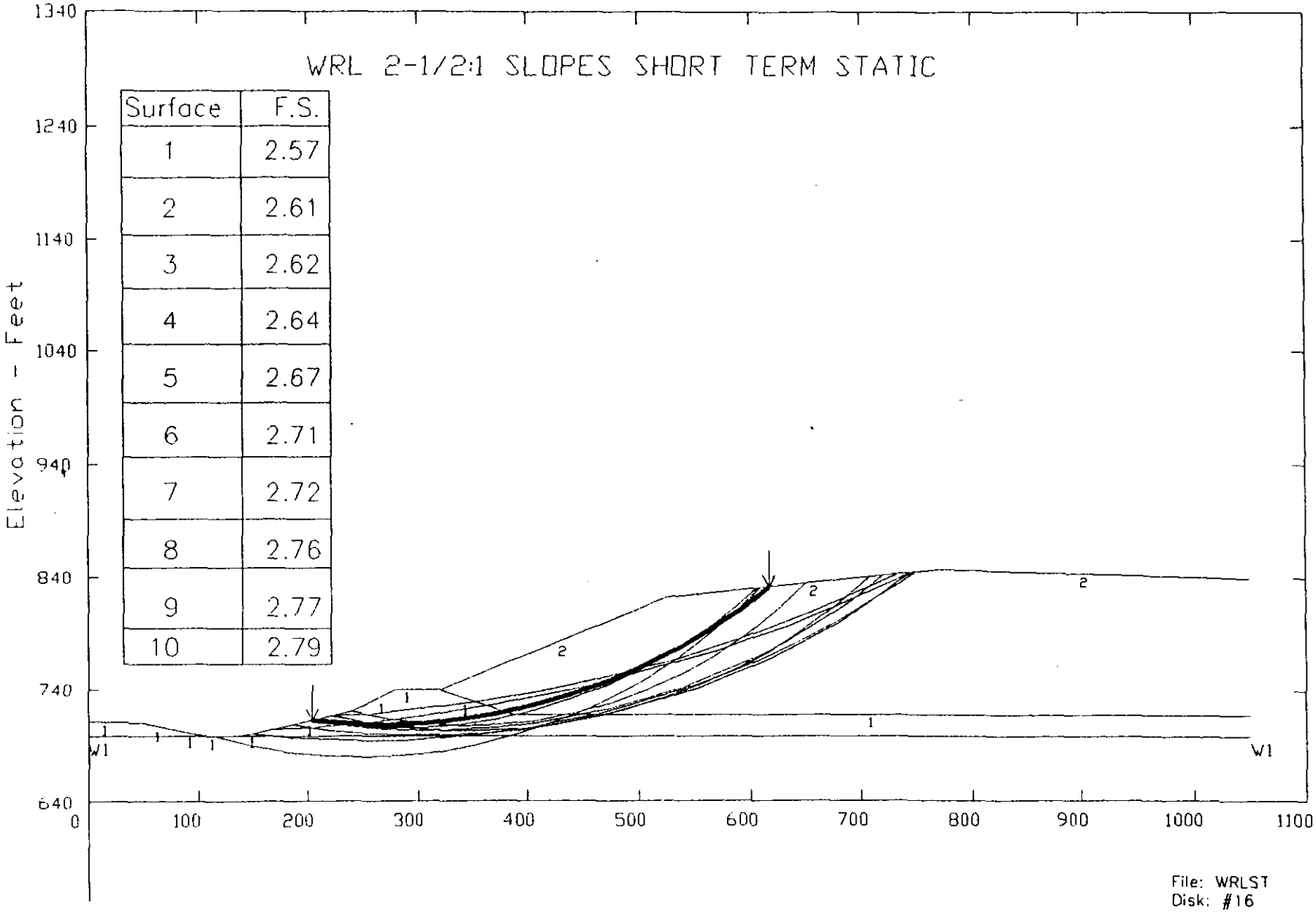
TESTING SERVICE CORP.



Surface	F.S.
1	2.57
2	2.61
3	2.62
4	2.64
5	2.67
6	2.71
7	2.72
8	2.76
9	2.77
10	2.79

Figure No. 2

WINNEBAGO RECLAMATION LANDFILL
PROPOSED VERTICAL EXPANSION
ROCKFORD, ILLINOIS

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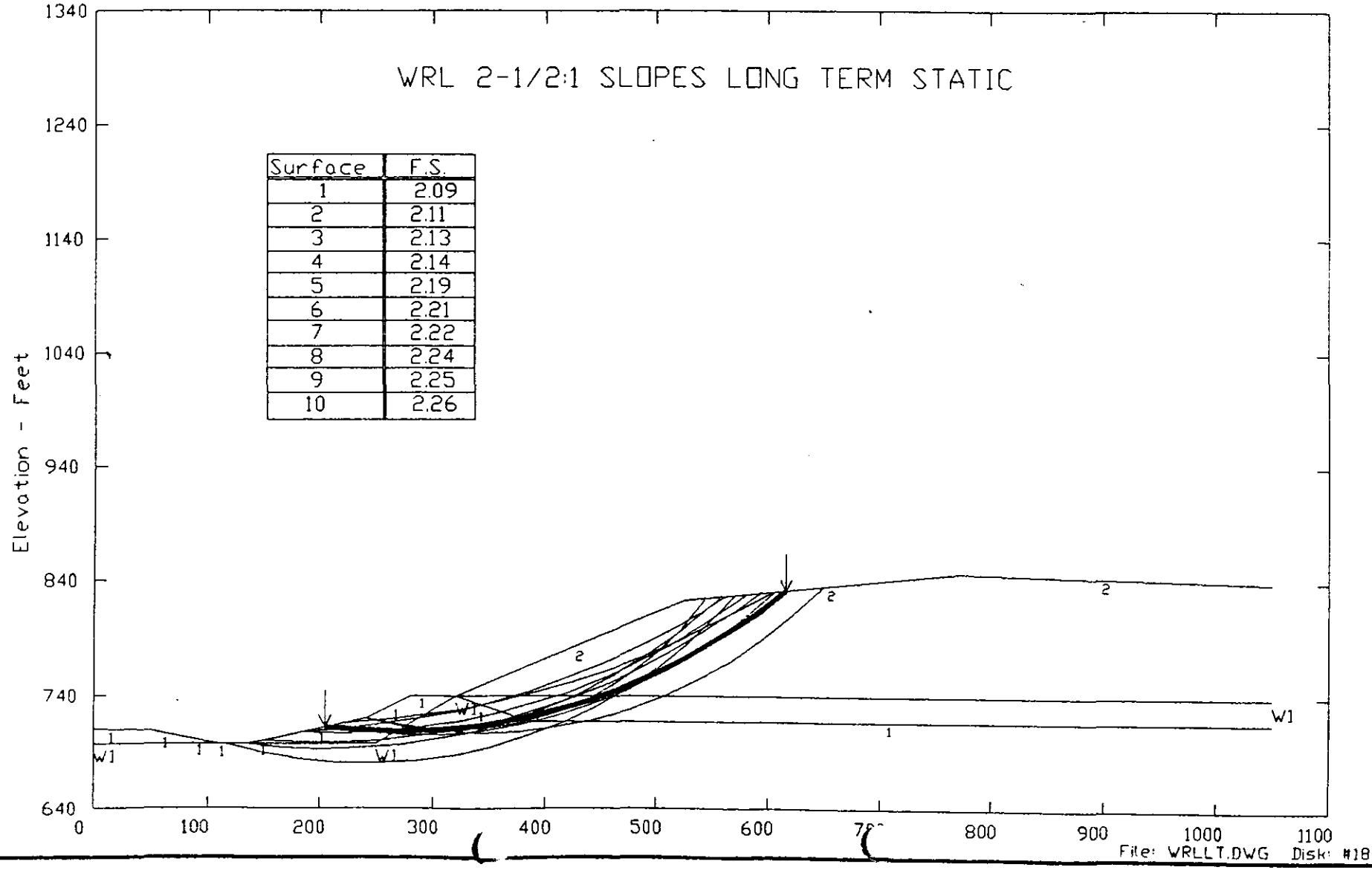

Surface	F.S.
1	2.09
2	2.11
3	2.13
4	2.14
5	2.19
6	2.21
7	2.22
8	2.24
9	2.25
10	2.26

Figure No. 3

WINNEBAGO RECLAMATION LANDFILL
PROPOSED VERTICAL EXPANSION
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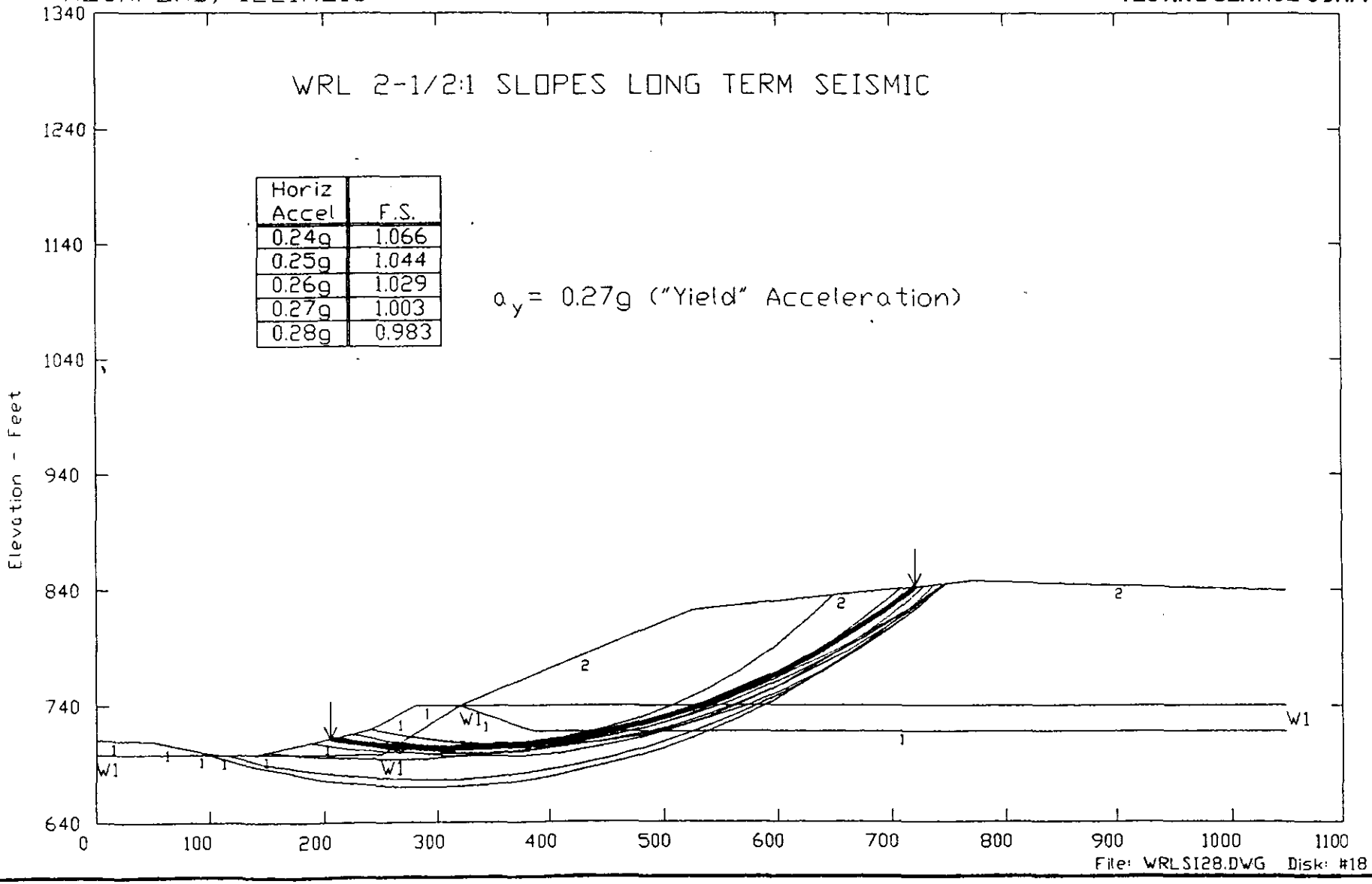

Horiz Accel	F.S.
0.24g	1.066
0.25g	1.044
0.26g	1.029
0.27g	1.003
0.28g	0.983

Figure No. 4

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Project No. 39654 Sheet 1 of 1
Project WRL PERMIT MODIFICATION
Subject INTERFACE STABILITY Computed MSR Date 5/6/96 Checked

I. INTERFACES

PROTECTIVE COVER / LLDPE

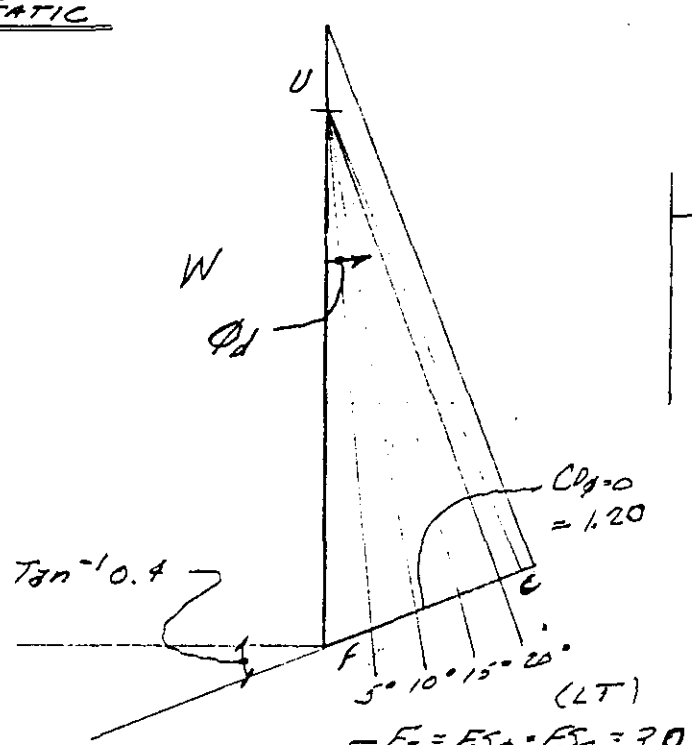
PROPERTIES Total $\phi = 0$ $c = 1500$ psf

Effective $\phi = 23°$ $c = 200$ $\gamma = 110$ $t = 3'$ $h_w = 9''$

STATIC

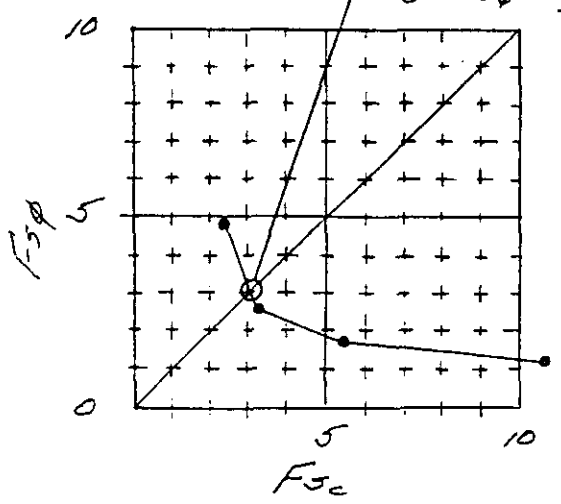
$110 \times 3 = 330 = 3.3'' = Wt.$

$U = \frac{62.4}{110} \times \frac{9}{12} = 0.43'' = \text{BUOYANCY}$

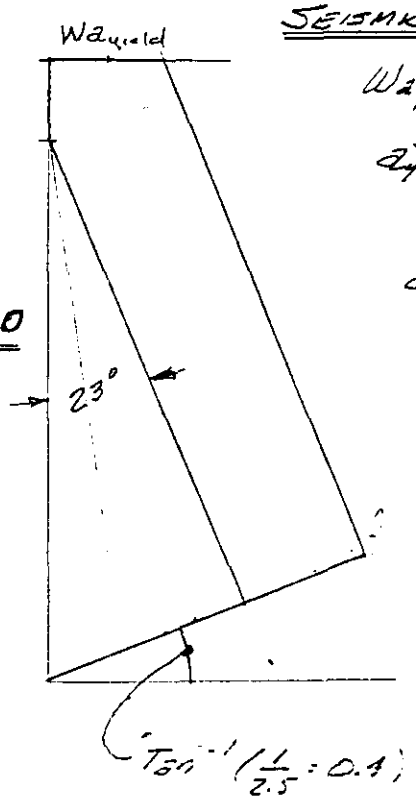


ϕ_d	FS_ϕ	C/W	C_d	C	FS_c
5	4.85	0.278	85.1	200	2.35
10	2.41	0.206	63.1	|	3.17
15	1.58	0.127	38.9	|	5.14
20	1.17	0.041	18.7	|	10.7
23	1	0.024	7.4	200	

$F_3 = FS_\phi \cdot FS_c = 3.0$



SEISMIC



$W a_{yield} = 0.61$

$a_{yield} = \frac{0.61}{3.30} = 0.18$

$a_{des} = 0.123$

$FS = \frac{0.18}{0.123} = 1.46$ LT

$\frac{0.18}{0.028} = 6.43$ Short Term

$FS_{ST} = \frac{1500}{1.2(330)} = 3.79$

By Inspection, OK for LLDPE/CLAY
$\phi = 26.5°$ vs $23°$

Figure No. 5

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ANALYSIS OF GROUND MOTIONS FOR WRL PERMIT MODIFICATION

Data for Northern Illinois Seismic Zone

Indexing Variables

$j := 1..8$ $i := 0..8$

Area: $A_z := 55128$

Recurrence Intercept: $a := 2.64$

Index for Recurrence - Yrs.: $n := 1..1000$

Expression for Frequency: $f_n := n^{-1}$

Body Wave Magnitude as a function of Recurrence Interval

$$m_{b_n} := \frac{\log(f_n) - a}{-0.92}$$

$Short := 10$ Average Interval between events of this Magnitude is 10 years.

$m_{b_{Short}} = 3.96$

$Long := 200$ Average Interval between events of this Magnitude is 200 years.

$m_{b_{Long}} = 5.37$

$R_0 := 15$ $R_{site} := 15$

$Long := 1000$ $m_{b_{Long}} = 6.13$ Average Interval between events of this Magnitude is 1000years. The maximum probable event.

For NISZ Source

NORTHERN ILLINOIS SEISMIC SOURCE ZONE

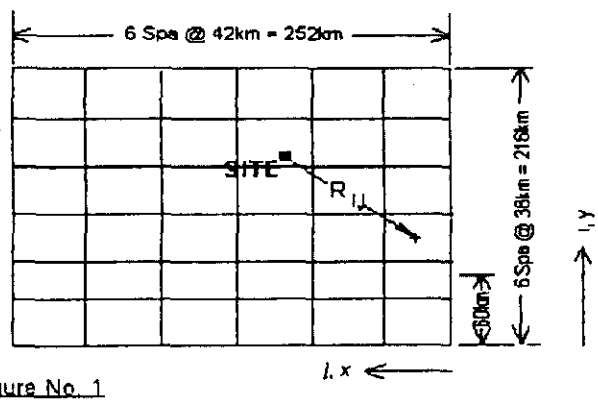

Figure No. 1

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ANALYSIS OF GROUND MOTIONS FOR WRL PERMIT MODIFICATION

Maximum Ground Motion (occurs when Earthquake is within 15 km of site): $R_{site} = 15$

$$aH_0 := \left(10^{-0.36+0.52\cdot m_{b_{Long}}}\right)\cdot\frac{cm}{sec^2} \qquad aH_{site} := \left(10^{0.84+0.52\cdot m_{b_{Long}}-1.02\cdot\log(R_{site})}\right)\cdot\frac{cm}{sec^2}$$

$$aH_0 = 673\cdot\frac{cm}{sec^2} \qquad aH_{site} = 673\cdot\frac{cm}{sec^2} \qquad aH_{site} = 0.69\cdot g$$

PROBABILITY ANALYSIS:

For Probability Analysis, assume a_H and backcalculate the m_b to produce it, then back calculate the average recurrence for that mb, and finally, the Poissonian Non-exceedance of the event during the exposure period. Finally, multiply that probability by the ratio of the area of the SSZ within that radius, less any previously considered areas of the SSZ, When all of the SSZ has been considered, sum the probabilities.

The radii are designated by double subscript, $(_{i,j})$ with i the row designation and j the column designation (see sketch above). The distance from the site to the center of any sub-area is calculated by the Pythagorean Theorem.

$x_0 := 90 \quad y_0 := 150$

Coordinates of Site
(Origin is at SE Corner of NISSZ)

$m := 1..6 \quad x_m := 42\cdot m - 21 \quad i := 0..5 \quad x_1 = 21$

$n := 1..6 \quad y_n := 36\cdot n - 18 \quad j := 0..5$

$$R_{(n-1,m-1)} := \sqrt{(x_m - x_0)^2 + (y_n - y_0)^2}$$

Assume aH_{site} $\quad g := 0.100$

$aH_{site} := 980\cdot g$

$\log(aH) = 0.84 + 0.52\cdot mb - 1.102\cdot\log(R_{site})$

Nuttli & Hermann Basic magnitude/acceleration attenuation relationship.

$$mb_{(i,j)} := \frac{\log(aH_{site}) + 1.102\cdot\log[R_{(i,j)}] - 0.84}{0.52}$$

Solved for mb required to produce assigned acceleration.

Determine Recurrence for each magnitude:

Basic Nuttli & Hermann Magn./Recurrence Relationship

$$mb_n = \frac{\log(f_n) - a}{-0.92}$$

Solved for log(fn)

$\log(f_n) = a - 0.92\cdot m_{b_n}$

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ANALYSIS OF GROUND MOTIONS FOR WRL PERMIT MODIFICATION

Frequency corresponding to Calculated mb

$$f_{(i,j)} := 10^{\left[a - 0.92 \cdot mb_{(i,j)}\right]}$$

Recurrence Interval corresponding to Calculated Frequency

$$R_{y_{(i,j)}} := \frac{1}{\left(f_{i,j}\right)}$$

Area of Subunit Seismic Source Zone

$$A := \frac{216 \cdot 252}{36}$$

To be conservative, the maximum earthquake will be taken as that event occuring on average once every 1200 years, even though the Nuttli and Hermann relationship is based on 1000 years. The probablility of an event of sufficient magnitude to produce the designated acceleration at the site is conditional on whether the calculated recurrence (R_y) is less than 1200 (in which case, the calculated Probability is retained) or greater than 1200 (in which case the probability is assigned a value of 0).

For: $t := 10$ Short term Exposure Period

By Columns:

$$P_{i,0} := \text{if}\left(R_{y_{i,0}} \geq 1200, 0, 1 - e^{-\frac{t}{R_{y_{i,0}}}}\right) \cdot \frac{A}{55210} \qquad P_{i,2} := \text{if}\left(R_{y_{i,2}} \geq 1200, 0, 1 - e^{-\frac{t}{R_{y_{i,2}}}}\right) \cdot \frac{A}{55210}$$

$$P_{i,1} := \text{if}\left(R_{y_{i,1}} \geq 1200, 0, 1 - e^{-\frac{t}{R_{y_{i,1}}}}\right) \cdot \frac{A}{55210} \qquad P_{i,3} := \text{if}\left(R_{y_{i,3}} \geq 1200, 0, 1 - e^{-\frac{t}{R_{y_{i,3}}}}\right) \cdot \frac{A}{55210}$$

$$P_{i,4} := \text{if}\left(R_{y_{i,0}} \geq 1200, 0, 1 - e^{-\frac{t}{R_{y_{i,4}}}}\right) \cdot \frac{A}{55210} \qquad P_{i,5} := \text{if}\left(R_{y_{i,0}} \geq 1200, 0, 1 - e^{-\frac{t}{R_{y_{i,4}}}}\right) \cdot \frac{A}{55210}$$

Calculated mb required to produce acceleration a at distance from site *equal to R*

$$mb = \begin{bmatrix} 6.82 & 6.73 & 6.71 & 6.79 & 6.91 & 7.06 \\ 6.61 & 6.45 & 6.43 & 6.55 & 6.75 & 6.94 \\ 6.37 & 6.07 & 6.01 & 6.28 & 6.59 & 6.85 \\ 6.16 & 5.52 & 5.29 & 6.01 & 6.47 & 6.78 \\ 6.12 & 5.33 & 4.93 & 5.95 & 6.45 & 6.77 \\ 6.29 & 5.90 & 5.82 & 6.18 & 6.54 & 6.82 \end{bmatrix}$$

Distance from site to center of Subunit of Northern Illinois Seismic Source Zone

$$R = \begin{bmatrix} 149 & 135 & 133 & 144 & 165 & 193 \\ 118 & 100 & 97 & 112 & 138 & 171 \\ 91 & 66 & 62 & 83 & 116 & 153 \\ 73 & 36 & 28 & 62 & 102 & 143 \\ 70 & 30 & 19 & 58 & 100 & 142 \\ 84 & 55 & 50 & 75 & 110 & 149 \end{bmatrix}$$

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ANALYSIS OF GROUND MOTIONS FOR WRL PERMIT MODIFICATION

Recurrence Interval Calculated from mb

$$R_y = \begin{bmatrix} 4301 & 3537 & 3441 & 4015 & 5250 & 7138 \\ 2741 & 1967 & 1870 & 2452 & 3701 & 5602 \\ 1661 & 874 & 775 & 1368 & 2631 & 4545 \\ 1072 & 272 & 169 & 775 & 2050 & 3974 \\ 988 & 184 & 79 & 690 & 1967 & 3892 \\ 1410 & 618 & 518 & 1115 & 2383 & 4301 \end{bmatrix}$$

Probability Matrix

Probability of Exceedence, $t = 10$

$$P = \begin{bmatrix} 0.000 & 0.000 & 0.000 & 0.000 & 0.000 & 0.000 \\ 0.000 & 0.000 & 0.000 & 0.000 & 0.000 & 0.000 \\ 0.000 & 0.031 & 0.035 & 0.000 & 0.000 & 0.000 \\ 0.025 & 0.099 & 0.158 & 0.035 & 0.013 & 0.013 \\ 0.028 & 0.145 & 0.324 & 0.039 & 0.014 & 0.014 \\ 0.000 & 0.044 & 0.052 & 0.024 & 0.000 & 0.000 \end{bmatrix} \cdot \%$$

Convert Probability matrix columns to vectors, sum the vectors, and add to calculate the Probability

$vP1_i := P_{i,0}$ $vP2_i := P_{i,1}$ $vP3_i := P_{i,2}$ $vP4_i := P_{i,3}$ $vP5_i := P_{i,4}$ $vP6_i := P_{i,5}$

$P_{exced} := \sum vP1 + \sum vP2 + \sum vP3 + \sum vP4 + \sum vP5 + \sum vP6$

$t = 10$ $g = 0.10$ $P_{exced} = 1.10 \cdot \%$

Repeat the Proceedure for an exposure period of 250 years

$t := 250$ Long term Exposure Period

PROBABILITY ANALYSIS:

$$P_{i,0} := \text{if}\left(R_{y_{i,0}} \geq 1200, 0, 1 - e^{-\frac{t}{R_{y_{i,0}}}}\right) \cdot \frac{A}{55210} \qquad P_{i,2} := \text{if}\left(R_{y_{i,2}} \geq 1200, 0, 1 - e^{-\frac{t}{R_{y_{i,2}}}}\right) \cdot \frac{A}{55210}$$

$$P_{i,1} := \text{if}\left(R_{y_{i,1}} \geq 1200, 0, 1 - e^{-\frac{t}{R_{y_{i,1}}}}\right) \cdot \frac{A}{55210} \qquad P_{i,3} := \text{if}\left(R_{y_{i,3}} \geq 1200, 0, 1 - e^{-\frac{t}{R_{y_{i,3}}}}\right) \cdot \frac{A}{55210}$$

$$P_{i,4} := \text{if}\left(R_{y_{i,0}} \geq 1200, 0, 1 - e^{-\frac{t}{R_{y_{i,4}}}}\right) \cdot \frac{A}{55210} \qquad P_{i,5} := \text{if}\left(R_{y_{i,0}} \geq 1200, 0, 1 - e^{-\frac{t}{R_{y_{i,4}}}}\right) \cdot \frac{A}{55210}$$

$vP1_i := P_{i,0}$ $vP2_i := P_{i,1}$ $vP3_i := P_{i,2}$ $vP4_i := P_{i,3}$ $vP5_i := P_{i,4}$ $vP6_i := P_{i,5}$

$P_{exced} := \sum vP1 + \sum vP2 + \sum vP3 + \sum vP4 + \sum vP5 + \sum vP6$

$t = 250$ $g = 0.10$ $P_{exced} = 16.42 \cdot \%$

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ANALYSIS OF GROUND MOTIONS FOR WRL PERMIT MODIFICATION

Recurrence Interval Calculated from mb

$$R_y = \begin{bmatrix} 481 & 396 & 385 & 449 & 588 & 799 \\ 307 & 220 & 209 & 274 & 414 & 627 \\ 186 & 98 & 87 & 153 & 294 & 509 \\ 120 & 30 & 19 & 87 & 229 & 445 \\ 111 & 21 & 9 & 77 & 220 & 436 \\ 158 & 69 & 58 & 125 & 267 & 481 \end{bmatrix}$$

Probability Matrix

Probability of Exceedence, $t = 10$

$$P = \begin{bmatrix} 0.056 & 0.068 & 0.070 & 0.060 & 0.046 & 0.046 \\ 0.088 & 0.122 & 0.128 & 0.098 & 0.065 & 0.065 \\ 0.143 & 0.266 & 0.298 & 0.173 & 0.091 & 0.091 \\ 0.219 & 0.768 & 1.126 & 0.298 & 0.117 & 0.117 \\ 0.237 & 1.055 & 1.851 & 0.333 & 0.122 & 0.122 \\ 0.168 & 0.369 & 0.434 & 0.211 & 0.101 & 0.101 \end{bmatrix} \cdot \%$$

Convert Probability matrix columns to vectors, sum the vectors, and add to calculate the Probability

$vP1_i := P_{i,0}$ $vP2_i := P_{i,1}$ $vP3_i := P_{i,2}$ $vP4_i := P_{i,3}$ $vP5_i := P_{i,4}$ $vP6_i := P_{i,5}$

$P_{exced} := \sum vP1 + \sum vP2 + \sum vP3 + \sum vP4 + \sum vP5 + \sum vP6$

$t = 10$ $g = 0.029$ $P_{exced} = 9.72\,\%$

Repeat the Proceedure for an exposure period of 250 years

$t := 250$ Long term Exposure Period

PROBABILITY ANALYSIS:

$$P_{i,0} := \text{if}\left(R_{y_{i,0}} \ge 1200, 0, 1 - e^{-\frac{t}{R_{y_{i,0}}}}\right) \cdot \frac{A}{55210} \qquad P_{i,2} := \text{if}\left(R_{y_{i,2}} \ge 1200, 0, 1 - e^{-\frac{t}{R_{y_{i,2}}}}\right) \cdot \frac{A}{55210}$$

$$P_{i,1} := \text{if}\left(R_{y_{i,1}} \ge 1200, 0, 1 - e^{-\frac{t}{R_{y_{i,1}}}}\right) \cdot \frac{A}{55210} \qquad P_{i,3} := \text{if}\left(R_{y_{i,3}} \ge 1200, 0, 1 - e^{-\frac{t}{R_{y_{i,3}}}}\right) \cdot \frac{A}{55210}$$

$$P_{i,4} := \text{if}\left(R_{y_{i,0}} \ge 1200, 0, 1 - e^{-\frac{t}{R_{y_{i,4}}}}\right) \cdot \frac{A}{55210} \qquad P_{i,5} := \text{if}\left(R_{y_{i,0}} \ge 1200, 0, 1 - e^{-\frac{t}{R_{y_{i,4}}}}\right) \cdot \frac{A}{55210}$$

$vP1_i := P_{i,0}$ $vP2_i := P_{i,1}$ $vP3_i := P_{i,2}$ $vP4_i := P_{i,3}$ $vP5_i := P_{i,4}$ $vP6_i := P_{i,5}$

$P_{exced} := \sum vP1 + \sum vP2 + \sum vP3 + \sum vP4 + \sum vP5 + \sum vP6$

$t = 250$ $g = 0.03$ $P_{exced} = 70.28\,\%$

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ANALYSIS OF GROUND MOTIONS FOR WRL PERMIT MODIFICATION

Recurrence Interval Calculated from mb

$$R_y = \begin{bmatrix} 424 & 349 & 339 & 396 & 518 & 704 \\ 270 & 194 & 184 & 242 & 365 & 552 \\ 164 & 86 & 76 & 135 & 259 & 448 \\ 106 & 27 & 17 & 76 & 202 & 392 \\ 97 & 18 & 8 & 68 & 194 & 384 \\ 139 & 61 & 51 & 110 & 235 & 424 \end{bmatrix}$$

Probability Matrix

Probability of Exceedence, $t = 10$

$$P = \begin{bmatrix} 0.064 & 0.077 & 0.080 & 0.068 & 0.052 & 0.052 \\ 0.099 & 0.138 & 0.145 & 0.111 & 0.074 & 0.074 \\ 0.162 & 0.300 & 0.336 & 0.196 & 0.104 & 0.104 \\ 0.247 & 0.853 & 1.237 & 0.336 & 0.132 & 0.132 \\ 0.267 & 1.162 & 1.976 & 0.375 & 0.138 & 0.138 \\ 0.190 & 0.414 & 0.487 & 0.238 & 0.114 & 0.114 \end{bmatrix} \cdot \%$$

Convert Probability matrix columns to vectors, sum the vectors, and add to calculate the Probability

$vP1_i := P_{i,0}$ $vP2_i := P_{i,1}$ $vP3_i := P_{i,2}$ $vP4_i := P_{i,3}$ $vP5_i := P_{i,4}$ $vP6_i := P_{i,5}$

$P_{exced} := \sum vP1 + \sum vP2 + \sum vP3 + \sum vP4 + \sum vP5 + \sum vP6$

$t = 10$ $g = 0.027$ $P_{exced} = \boxed{10.79 \cdot \%}$

Repeat the Proceedure for an exposure period of 250 years

$t := 250$ Long term Exposure Period

PROBABILITY ANALYSIS:

$$P_{i,0} := \text{if}\left(R_{y_{i,0}} \geq 1200, 0, 1 - e^{-\frac{t}{R_{y_{i,0}}}}\right) \cdot \frac{A}{55210} \qquad P_{i,2} := \text{if}\left(R_{y_{i,2}} \geq 1200, 0, 1 - e^{-\frac{t}{R_{y_{i,2}}}}\right) \cdot \frac{A}{55210}$$

$$P_{i,1} := \text{if}\left(R_{y_{i,1}} \geq 1200, 0, 1 - e^{-\frac{t}{R_{y_{i,1}}}}\right) \cdot \frac{A}{55210} \qquad P_{i,3} := \text{if}\left(R_{y_{i,3}} \geq 1200, 0, 1 - e^{-\frac{t}{R_{y_{i,3}}}}\right) \cdot \frac{A}{55210}$$

$$P_{i,4} := \text{if}\left(R_{y_{i,0}} \geq 1200, 0, 1 - e^{-\frac{t}{R_{y_{i,4}}}}\right) \cdot \frac{A}{55210} \qquad P_{i,5} := \text{if}\left(R_{y_{i,0}} \geq 1200, 0, 1 - e^{-\frac{t}{R_{y_{i,4}}}}\right) \cdot \frac{A}{55210}$$

$vP1_i := P_{i,0}$ $vP2_i := P_{i,1}$ $vP3_i := P_{i,2}$ $vP4_i := P_{i,3}$ $vP5_i := P_{i,4}$ $vP6_i := P_{i,5}$

$P_{exced} := \sum vP1 + \sum vP2 + \sum vP3 + \sum vP4 + \sum vP5 + \sum vP6$

$t = 250$ $g = 0.03$ $P_{exced} = 73.50 \cdot \%$

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ANALYSIS OF GROUND MOTIONS FOR WRL PERMIT MODIFICATION

Recurrence Interval Calculated from mb

$$R_y = \begin{bmatrix} 452 & 372 & 362 & 422 & 552 & 751 \\ 288 & 207 & 197 & 258 & 389 & 589 \\ 175 & 92 & 82 & 144 & 277 & 478 \\ 113 & 29 & 18 & 82 & 216 & 418 \\ 104 & 19 & 8 & 73 & 207 & 409 \\ 148 & 65 & 54 & 117 & 251 & 452 \end{bmatrix}$$

Probability Matrix

Probability of Exceedence, $t = 10$

$$P = \begin{bmatrix} 0.060 & 0.073 & 0.075 & 0.064 & 0.049 & 0.049 \\ 0.093 & 0.129 & 0.136 & 0.104 & 0.069 & 0.069 \\ 0.152 & 0.282 & 0.316 & 0.184 & 0.097 & 0.097 \\ 0.232 & 0.809 & 1.179 & 0.316 & 0.124 & 0.124 \\ 0.251 & 1.107 & 1.913 & 0.353 & 0.129 & 0.129 \\ 0.179 & 0.390 & 0.459 & 0.224 & 0.107 & 0.107 \end{bmatrix} \cdot \%$$

Convert Probability matrix columns to vectors, sum the vectors, and add to calculate the Probability

$vP1_i := P_{i,0}$ $vP2_i := P_{i,1}$ $vP3_i := P_{i,2}$ $vP4_i := P_{i,3}$ $vP5_i := P_{i,4}$ $vP6_i := P_{i,5}$

$P_{exced} := \sum vP1 + \sum vP2 + \sum vP3 + \sum vP4 + \sum vP5 + \sum vP6$

$t = 10$ $g = 0.028$ $P_{exced} = 10.23\ \%$

Repeat the Proceedure for an exposure period of 250 years

$t := 250$ Long term Exposure Period

PROBABILITY ANALYSIS:

$$P_{i,0} := \text{if}\left(R_{y_{i,0}} \geq 1200, 0, 1 - e^{-\frac{t}{R_{y_{i,0}}}}\right) \cdot \frac{A}{55210} \qquad P_{i,2} := \text{if}\left(R_{y_{i,2}} \geq 1200, 0, 1 - e^{-\frac{t}{R_{y_{i,2}}}}\right) \cdot \frac{A}{55210}$$

$$P_{i,1} := \text{if}\left(R_{y_{i,1}} \geq 1200, 0, 1 - e^{-\frac{t}{R_{y_{i,1}}}}\right) \cdot \frac{A}{55210} \qquad P_{i,3} := \text{if}\left(R_{y_{i,3}} \geq 1200, 0, 1 - e^{-\frac{t}{R_{y_{i,3}}}}\right) \cdot \frac{A}{55210}$$

$$P_{i,4} := \text{if}\left(R_{y_{i,0}} \geq 1200, 0, 1 - e^{-\frac{t}{R_{y_{i,4}}}}\right) \cdot \frac{A}{55210} \qquad P_{i,5} := \text{if}\left(R_{y_{i,0}} \geq 1200, 0, 1 - e^{-\frac{t}{R_{y_{i,4}}}}\right) \cdot \frac{A}{55210}$$

$vP1_i := P_{i,0}$ $vP2_i := P_{i,1}$ $vP3_i := P_{i,2}$ $vP4_i := P_{i,3}$ $vP5_i := P_{i,4}$ $vP6_i := P_{i,5}$

$P_{exced} := \sum vP1 + \sum vP2 + \sum vP3 + \sum vP4 + \sum vP5 + \sum vP6$

$t = 250$ $g = 0.03$ $P_{exced} = 71.87\ \%$

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ANALYSIS OF GROUND MOTIONS FOR WRL PERMIT MODIFICATION

Recurrence Interval Calculated from mb

$$R_y = \begin{bmatrix} 5090 & 4186 & 4073 & 4752 & 6215 & 8449 \\ 3245 & 2328 & 2213 & 2902 & 4380 & 6631 \\ 1966 & 1035 & 917 & 1619 & 3114 & 5380 \\ 1269 & 322 & 200 & 917 & 2427 & 4704 \\ 1169 & 217 & 94 & 816 & 2328 & 4607 \\ 1668 & 732 & 613 & 1319 & 2820 & 5090 \end{bmatrix}$$

Probability Matrix

Probability of Exceedence, $t = 10$

$$P = \begin{bmatrix} 0.000 & 0.000 & 0.000 & 0.000 & 0.000 & 0.000 \\ 0.000 & 0.000 & 0.000 & 0.000 & 0.000 & 0.000 \\ 0.000 & 0.026 & 0.030 & 0.000 & 0.000 & 0.000 \\ 0.000 & 0.084 & 0.134 & 0.030 & 0.000 & 0.000 \\ 0.023 & 0.123 & 0.277 & 0.033 & 0.012 & 0.012 \\ 0.000 & 0.037 & 0.044 & 0.000 & 0.000 & 0.000 \end{bmatrix} \cdot \%$$

Convert Probability matrix columns to vectors, sum the vectors, and add to calculate the Probability

$vP1_i := P_{i,0}$ $\quad vP2_i := P_{i,1}$ $\quad vP3_i := P_{i,2}$ $\quad vP4_i := P_{i,3}$ $\quad vP5_i := P_{i,4}$ $\quad vP6_i := P_{i,5}$

$P_{exced} := \sum vP1 + \sum vP2 + \sum vP3 + \sum vP4 + \sum vP5 + \sum vP6$

$t = 10$ $\quad g = 0.11$ $\quad P_{exced} = 0.86\,\%$

Repeat the Proceedure for an exposure period of 250 years

$t := 250$ Long term Exposure Period

PROBABILITY ANALYSIS:

$$P_{i,0} := \text{if}\left(R_{y_{i,0}} \geq 1200, 0, 1 - e^{-\frac{t}{R_{y_{i,0}}}}\right) \cdot \frac{A}{55210} \qquad P_{i,2} := \text{if}\left(R_{y_{i,2}} \geq 1200, 0, 1 - e^{-\frac{t}{R_{y_{i,2}}}}\right) \cdot \frac{A}{55210}$$

$$P_{i,1} := \text{if}\left(R_{y_{i,1}} \geq 1200, 0, 1 - e^{-\frac{t}{R_{y_{i,1}}}}\right) \cdot \frac{A}{55210} \qquad P_{i,3} := \text{if}\left(R_{y_{i,3}} \geq 1200, 0, 1 - e^{-\frac{t}{R_{y_{i,3}}}}\right) \cdot \frac{A}{55210}$$

$$P_{i,4} := \text{if}\left(R_{y_{i,0}} \geq 1200, 0, 1 - e^{-\frac{t}{R_{y_{i,4}}}}\right) \cdot \frac{A}{55210} \qquad P_{i,5} := \text{if}\left(R_{y_{i,0}} \geq 1200, 0, 1 - e^{-\frac{t}{R_{y_{i,4}}}}\right) \cdot \frac{A}{55210}$$

$vP1_i := P_{i,0}$ $\quad vP2_i := P_{i,1}$ $\quad vP3_i := P_{i,2}$ $\quad vP4_i := P_{i,3}$ $\quad vP5_i := P_{i,4}$ $\quad vP6_i := P_{i,5}$

$P_{exced} := \sum vP1 + \sum vP2 + \sum vP3 + \sum vP4 + \sum vP5 + \sum vP6$

$t = 250$ $\quad g = 0.11$ $\quad P_{exced} = 13.27\,\%$

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ANALYSIS OF GROUND MOTIONS FOR WRL PERMIT MODIFICATION

Recurrence Interval Calculated from mb

$$R_y = \begin{bmatrix} 5938 & 4883 & 4751 & 5543 & 7249 & 9855 \\ 3785 & 2716 & 2582 & 3385 & 5110 & 7735 \\ 2293 & 1207 & 1070 & 1888 & 3632 & 6276 \\ 1481 & 375 & 233 & 1070 & 2831 & 5486 \\ 1364 & 253 & 109 & 952 & 2716 & 5373 \\ 1946 & 853 & 715 & 1539 & 3290 & 5938 \end{bmatrix}$$

Probability Matrix

Probability of Exceedence, $t = 10$

$$P = \begin{bmatrix} 0.000 & 0.000 & 0.000 & 0.000 & 0.000 & 0.000 \\ 0.000 & 0.000 & 0.000 & 0.000 & 0.000 & 0.000 \\ 0.000 & 0.000 & 0.025 & 0.000 & 0.000 & 0.000 \\ 0.000 & 0.072 & 0.115 & 0.025 & 0.000 & 0.000 \\ 0.000 & 0.106 & 0.239 & 0.029 & 0.000 & 0.000 \\ 0.000 & 0.032 & 0.038 & 0.000 & 0.000 & 0.000 \end{bmatrix} \cdot \%$$

Convert Probability matrix columns to vectors, sum the vectors, and add to calculate the Probability

$vP1_i := P_{i,0}$ $vP2_i := P_{i,1}$ $vP3_i := P_{i,2}$ $vP4_i := P_{i,3}$ $vP5_i := P_{i,4}$ $vP6_i := P_{i,5}$

$P_{exced} := \sum vP1 + \sum vP2 + \sum vP3 + \sum vP4 + \sum vP5 + \sum vP6$

$t = 10$ $g = 0.12$ $P_{exced} = 0.68 \cdot \%$

Repeat the Proceedure for an exposure period of 250 years

$t := 250$ Long term Exposure Period

PROBABILITY ANALYSIS:

$$P_{i,0} := \text{if}\left(R_{y_{i,0}} \geq 1200, 0, 1 - e^{-\frac{t}{R_{y_{i,0}}}}\right) \cdot \frac{A}{55210} \qquad P_{i,2} := \text{if}\left(R_{y_{i,2}} \geq 1200, 0, 1 - e^{-\frac{t}{R_{y_{i,2}}}}\right) \cdot \frac{A}{55210}$$

$$P_{i,1} := \text{if}\left(R_{y_{i,1}} \geq 1200, 0, 1 - e^{-\frac{t}{R_{y_{i,1}}}}\right) \cdot \frac{A}{55210} \qquad P_{i,3} := \text{if}\left(R_{y_{i,3}} \geq 1200, 0, 1 - e^{-\frac{t}{R_{y_{i,3}}}}\right) \cdot \frac{A}{55210}$$

$$P_{i,4} := \text{if}\left(R_{y_{i,0}} \geq 1200, 0, 1 - e^{-\frac{t}{R_{y_{i,4}}}}\right) \cdot \frac{A}{55210} \qquad P_{i,5} := \text{if}\left(R_{y_{i,0}} \geq 1200, 0, 1 - e^{-\frac{t}{R_{y_{i,4}}}}\right) \cdot \frac{A}{55210}$$

$vP1_i := P_{i,0}$ $vP2_i := P_{i,1}$ $vP3_i := P_{i,2}$ $vP4_i := P_{i,3}$ $vP5_i := P_{i,4}$ $vP6_i := P_{i,5}$

$P_{exced} := \sum vP1 + \sum vP2 + \sum vP3 + \sum vP4 + \sum vP5 + \sum vP6$

$t = 250$ $g = 0.12$ $P_{exced} = 10.59 \cdot \%$

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ANALYSIS OF GROUND MOTIONS FOR WRL PERMIT MODIFICATION

Recurrence Interval Calculated from mb

$$R_y = \begin{bmatrix} 6841 & 5626 & 5474 & 6386 & 8352 & 11354 \\ 4360 & 3129 & 2974 & 3900 & 5887 & 8911 \\ 2642 & 1391 & 1233 & 2175 & 4185 & 7230 \\ 1706 & 432 & 269 & 1233 & 3262 & 6321 \\ 1571 & 292 & 126 & 1097 & 3129 & 6191 \\ 2242 & 983 & 824 & 1773 & 3790 & 6841 \end{bmatrix}$$

Probability Matrix

Probability of Exceedence, $t = 10$

$$P = \begin{bmatrix} 0.000 & 0.000 & 0.000 & 0.000 & 0.000 & 0.000 \\ 0.000 & 0.000 & 0.000 & 0.000 & 0.000 & 0.000 \\ 0.000 & 0.000 & 0.000 & 0.000 & 0.000 & 0.000 \\ 0.000 & 0.063 & 0.100 & 0.000 & 0.000 & 0.000 \\ 0.000 & 0.092 & 0.209 & 0.025 & 0.000 & 0.000 \\ 0.000 & 0.028 & 0.033 & 0.000 & 0.000 & 0.000 \end{bmatrix} \cdot \%$$

Convert Probability matrix columns to vectors, sum the vectors, and add to calculate the Probability

$vP1_i := P_{i,0}$ $vP2_i := P_{i,1}$ $vP3_i := P_{i,2}$ $vP4_i := P_{i,3}$ $vP5_i := P_{i,4}$ $vP6_i := P_{i,5}$

$P_{exced} := \sum vP1 + \sum vP2 + \sum vP3 + \sum vP4 + \sum vP5 + \sum vP6$

$t = 10$ $g = 0.13$ $P_{exced} = 0.55 \cdot \%$

Repeat the Proceedure for an exposure period of 250 years

$t := 250$ Long term Exposure Period

PROBABILITY ANALYSIS:

$$P_{i,0} := \text{if}\left(R_{y_{i,0}} \geq 1200, 0, 1 - e^{-\frac{t}{R_{y_{i,0}}}}\right) \cdot \frac{A}{55210} \qquad P_{i,2} := \text{if}\left(R_{y_{i,2}} \geq 1200, 0, 1 - e^{-\frac{t}{R_{y_{i,2}}}}\right) \cdot \frac{A}{55210}$$

$$P_{i,1} := \text{if}\left(R_{y_{i,1}} \geq 1200, 0, 1 - e^{-\frac{t}{R_{y_{i,1}}}}\right) \cdot \frac{A}{55210} \qquad P_{i,3} := \text{if}\left(R_{y_{i,3}} \geq 1200, 0, 1 - e^{-\frac{t}{R_{y_{i,3}}}}\right) \cdot \frac{A}{55210}$$

$$P_{i,4} := \text{if}\left(R_{y_{i,0}} \geq 1200, 0, 1 - e^{-\frac{t}{R_{y_{i,4}}}}\right) \cdot \frac{A}{55210} \qquad P_{i,5} := \text{if}\left(R_{y_{i,0}} \geq 1200, 0, 1 - e^{-\frac{t}{R_{y_{i,4}}}}\right) \cdot \frac{A}{55210}$$

$vP1_i := P_{i,0}$ $vP2_i := P_{i,1}$ $vP3_i := P_{i,2}$ $vP4_i := P_{i,3}$ $vP5_i := P_{i,4}$ $vP6_i := P_{i,5}$

$P_{exced} := \sum vP1 + \sum vP2 + \sum vP3 + \sum vP4 + \sum vP5 + \sum vP6$

$t = 250$ $g = 0.13$ $P_{exced} = \boxed{8.69 \cdot \%}$

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HORIZONTAL ACCELERATIONS W/10% PROBABILITY OF EXCEEDANCE FOR STATED EXPOSURE PERIOD

See Analysis MCAD\WRLSEISx for calculation of individual acceleration - probability pairs.

$$P_{10} := \begin{pmatrix} 10.79 \\ 10.23 \\ 9.72 \end{pmatrix} \cdot \% \quad P_{250} := \begin{pmatrix} 13.27 \\ 10.59 \\ 8.69 \end{pmatrix} \cdot \% \quad a_{10} := \begin{pmatrix} 0.027 \\ 0.028 \\ 0.029 \end{pmatrix} \quad a_{250} := \begin{pmatrix} 0.11 \\ 0.12 \\ 0.13 \end{pmatrix}$$

$$i := 0..2$$

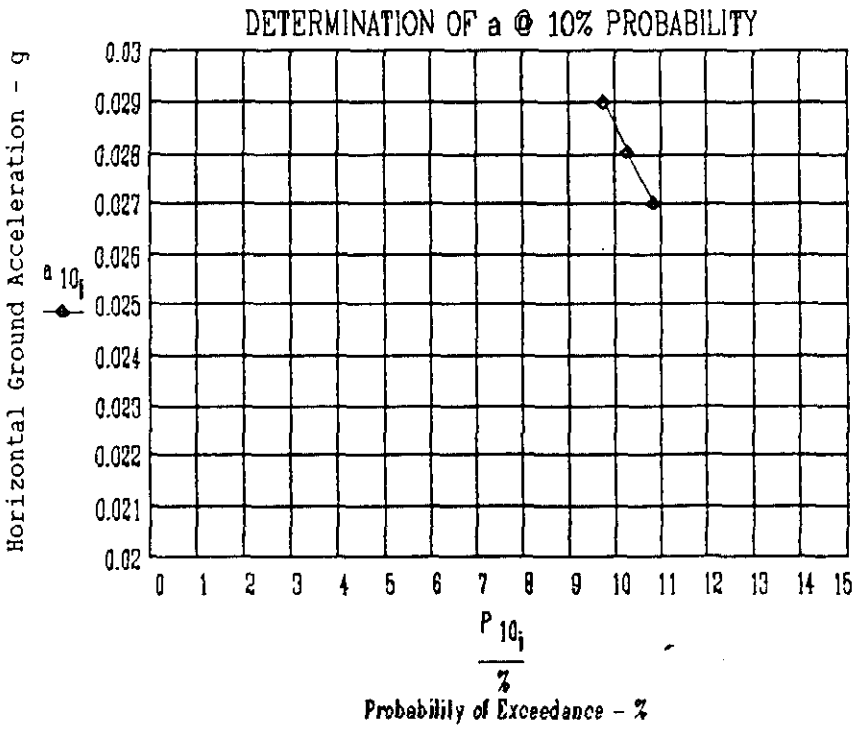
Rearrange Probabilities and Corresponding Accelerations into ascending order:

$$P_{10} := \mathrm{sort}(P_{10}) \quad P_{250} := \mathrm{sort}(P_{250}) \quad a_{10} := \mathrm{sort}(a_{10}) \quad a_{250} := \mathrm{sort}(a_{250})$$

$$a_{10} := \mathrm{reverse}(a_{10}) \quad a_{250} := \mathrm{reverse}(a_{250})$$

10 Year Exposure Period:

Plot the values and use linear Interpolation to establish a at P = 10%



$$a_{10} := \mathrm{linterp}(P_{10}, a_{10}, 0.10) \qquad a_{10} = 0.028$$

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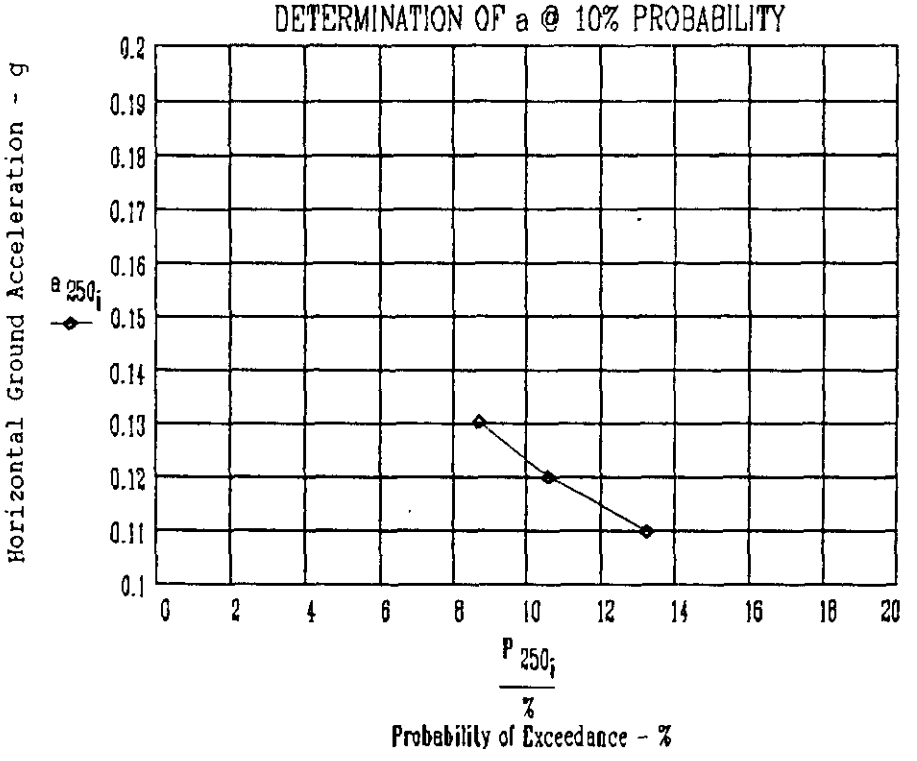
HORIZONTAL ACCELERATIONS W/10% PROBABILITY OF EXCEEDANCE FOR STATED EXPOSURE PERIOD

250 Year Exposure Period:

Plot the values and use linear interpolation to establish a at P = 10%



$a_{250} := \text{linterp}(P_{250}, a_{250}, 0.10)$ $\qquad$ $a_{250} = 0.123$

** PCSTABL5M **
by
Purdue University

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer's Method of Slices

Run Date: 05-04-96
Time of Run: 2:26pm
Run By: M. S. Robinson
Input Data Filename: A:WRLSTATS.DAT
Output Filename: A:WRLSTATS.OUT
Unit:
Plotted Output Filename: A:WRLSTATS.PLT

PROBLEM DESCRIPTION WRL 2-1/2:1 SLOPES
SHORT TERM STATIC

BOUNDARY COORDINATES
11 Top Boundaries
13 Total Boundaries

Boundary No.	X-Left (ft,m)	Y-Left (ft,m)	X-Right (ft,m)	Y-Right (ft,m)	Soil Type Below Bnd
1	.00	71.00	50.00	70.00	1
2	50.00	70.00	95.00	60.00	1
3	95.00	60.00	110.00	58.00	1
4	110.00	58.00	135.00	58.00	1
5	135.00	58.00	150.00	60.00	1
6	150.00	60.00	240.00	80.00	1
7	240.00	80.00	280.00	100.00	1
8	280.00	100.00	320.00	100.00	1
9	320.00	100.00	525.00	182.00	2
10	525.00	182.00	770.00	208.00	2
11	770.00	208.00	1050.00	200.00	2
12	320.00	100.00	386.00	78.00	1
13	386.00	78.00	1050.00	78.00	1

ISOTROPIC SOIL PARAMETERS
2 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf,KN/m3)	Saturated Unit Wt. (pcf,KN/m3)	Cohesion Intercept (psf,KPa)	Friction Angle (deg)	Pore Param.	Pressure Constant (psf,KPa)	Piez. Surface No.
1	120.0	125.0	200.0	36.0	.00	.0	1
2	70.0	70.0	1500.0	.0	.00	.0	1

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Piezometric Surface No. 1 Specified by 2 Coordinate Points

Point No.	X-Water (ft,m)	Y-Water (ft,m)
1	.00	58.00
2	1050.00	58.00

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Circular Surfaces, Has Been Specified.
100 Trial Surfaces Have Been Generated.
10 Surfaces Initiate From Each Of 10 Points Equally Spaced Along The Ground Surface Between X = 80.00 (ft,m)
and X = 240.00 (ft,m)
Each Surface Terminates Between X = 500.00 (ft,m)
and X = 750.00 (ft,m)
Unless Further Limitations Were Imposed, The Minimum Elevation At Which A Surface Extends Is Y = .00 (ft,m)
34.00 (ft,m) Line Segments Define Each Trial Failure Surface.

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.
* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf (ft,m)	Y-Surf (ft,m)
1	204.44	72.10
2	238.33	69.26
3	272.32	68.50
4	306.29	69.83
5	340.12	73.24
6	373.68	78.71
7	406.84	86.22
8	439.47	95.76
9	471.46	107.27
10	502.69	120.72
11	533.03	136.06
12	562.38	153.23
13	590.62	172.17
14	616.17	191.67

Circle Center At X = 267.7 ; Y = 622.9 and Radius, 554.4
*** 2.569 ***

Individual data on the 18 slices

Slice No.	Width (ft,m)	Weight (lbs,kg)	Water Force Top (lbs,N)	Water Force Bot (lbs,N)	Tie Force Norm (lbs,N)	Tie Force Tan (lbs,N)	Earthquake Force Hor (lbs,N)	Earthquake Force Ver (lbs,N)	Surcharge Load (lbs,N)
1	33.9	21075.5	.0	.0	.0	.0	.0	.0	.0
2	1.7	2123.3	.0	.0	.0	.0	.0	.0	.0
3	32.3	74522.2	.0	.0	.0	.0	.0	.0	.0
4	7.7	27126.6	.0	.0	.0	.0	.0	.0	.0
5	26.3	96806.9	.0	.0	.0	.0	.0	.0	.0
6	13.7	48493.8	.0	.0	.0	.0	.0	.0	.0
7	20.1	69363.6	.0	.0	.0	.0	.0	.0	.0
8	33.6	110795.4	.0	.0	.0	.0	.0	.0	.0
9	6.1	18921.3	.0	.0	.0	.0	.0	.0	.0
10	27.1	87527.3	.0	.0	.0	.0	.0	.0	.0
11	32.6	114848.7	.0	.0	.0	.0	.0	.0	.0
12	32.0	117954.9	.0	.0	.0	.0	.0	.0	.0
13	31.2	115480.7	.0	.0	.0	.0	.0	.0	.0
14	22.3	79922.5	.0	.0	.0	.0	.0	.0	.0
15	8.0	27205.5	.0	.0	.0	.0	.0	.0	.0
16	29.3	81674.8	.0	.0	.0	.0	.0	.0	.0
17	28.2	48947.8	.0	.0	.0	.0	.0	.0	.0
18	25.6	15017.2	.0	.0	.0	.0	.0	.0	.0

Failure Surface Specified By 14 Coordinate Points
Circle Center At X = 283.5 ; Y = 542.4 and Radius, 476.9

*** 2.613 ***

Failure Surface Specified By 15 Coordinate Points
Circle Center At X = 343.2 ; Y = 498.4 and Radius, 430.9

*** 2.625 ***

Failure Surface Specified By 18 Coordinate Points
Circle Center At X = 312.8 ; Y = 729.6 and Radius, 666.3

*** 2.636 ***

Failure Surface Specified By 19 Coordinate Points
Circle Center At X = 105.9 ; Y = 1574.3 and Radius, 1511.4

*** 2.672 ***

Failure Surface Specified By 20 Coordinate Points
Circle Center At X = 257.5 ; Y = 925.8 and Radius, 872.0

*** 2.714 ***

Failure Surface Specified By 17 Coordinate Points
Circle Center At X = 160.4 ; Y = 1402.7 and Radius, 1328.1

*** 2.715 ***

Failure Surface Specified By 19 Coordinate Points
Circle Center At X = 304.8 ; Y = 792.8 and Radius, 734.2

*** 2.759 ***

Failure Surface Specified By 17 Coordinate Points
Circle Center At X = 343.6 ; Y = 609.9 and Radius, 547.5

*** 2.771 ***

Failure Surface Specified By 17 Coordinate Points
Circle Center At X = 251.0 ; Y = 534.7 and Radius, 495.6

*** 2.786 ***

** PCSTABL5M **
by
Purdue University

–Slope Stability Analysis–
Simplified Janbu, Simplified Bishop
or Spencer's Method of Slices

Run Date: 05-22-96
Time of Run: 10:45am
Run By: M. S. Robinson
Input Data Filename: A:WRLSTATL.DAT
Output Filename: A:WRLSTATL.OUT
Unit:
Plotted Output Filename: A:WRLSTATL.PLT

PROBLEM DESCRIPTION WRL 2-1/2:1 SLOPES
LONG TERM STATIC

BOUNDARY COORDINATES
11 Top Boundaries
13 Total Boundaries

Boundary No.	X-Left (ft,m)	Y-Left (ft,m)	X-Right (ft,m)	Y-Right (ft,m)	Soil Type Below Bnd
1	.00	71.00	50.00	70.00	1
2	50.00	70.00	95.00	60.00	1
3	95.00	60.00	110.00	58.00	1
4	110.00	58.00	135.00	58.00	1
5	135.00	58.00	150.00	60.00	1
6	150.00	60.00	240.00	80.00	1
7	240.00	80.00	280.00	100.00	1
8	280.00	100.00	320.00	100.00	1
9	320.00	100.00	525.00	182.00	2
10	525.00	182.00	770.00	208.00	2
11	770.00	208.00	1050.00	200.00	2
12	320.00	100.00	386.00	78.00	1
13	386.00	78.00	1050.00	78.00	1

ISOTROPIC SOIL PARAMETERS
2 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf,KN/m3)	Saturated Unit Wt. (pcf,KN/m3)	Cohesion Intercept (psf,KPa)	Friction Angle (deg)	Pore Pressure Param .	Pressure Constant (psf,KPa)	Piez. Surface No.
1	120.0	125.0	200.0	36.0	.00	.0	1
2	70.0	70.0	200.0	25.0	.00	.0	1

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Piezometric Surface No. 1 Specified by 4 Coordinate Points

Point No.	X-Water (ft,m)	Y-Water (ft,m)
1	.00	58.00
2	250.00	58.00
3	320.00	100.00
4	1050.00	100.00

A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.
100 Trial Surfaces Have Been Generated.
10 Surfaces Initiate From Each Of 10 Points Equally Spaced
Along The Ground Surface Between X = 80.00 (ft,m)
and X = 240.00 (ft,m)
Each Surface Terminates Between X = 500.00 (ft,m)
and X = 750.00 (ft,m)
Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = .00 (ft,m)

34.00 (ft,m) Line Segments Define Each Trial Failure Surface.

Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Examined. They Are Ordered - Most Critical
First.
* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 14 Coordinate Points

Circle Center At X = 267.7 ; Y = 622.9 and Radius, 554.4
*** 2.092 ***

Individual data on the 20 slices

Slice No.	Width (ft,m)	Weight (lbs,kg)	Water Force Top (lbs,N)	Water Force Bot (lbs,N)	Tie Force Norm (lbs,N)	Tie Force Tan (lbs,N)	Earthquake Force Hor (lbs,N)	Earthquake Force Ver (lbs,N)	Surcharge Load (lbs,N)
1	33.9	21075.5	.0	.0	.0	.0	.0	.0	.0
2	1.7	2123.3	.0	.0	.0	.0	.0	.0	.0
3	27.7	59799.3	.0	.0	.0	.0	.0	.0	.0
4	4.6	14751.9	.0	362.7	.0	.0	.0	.0	.0
5	7.7	27294.6	.0	2098.6	.0	.0	.0	.0	.0
6	26.3	98468.8	.0	20757.1	.0	.0	.0	.0	.0
7	13.7	50002.3	.0	18922.3	.0	.0	.0	.0	.0
8	20.1	71820.8	.0	35052.4	.0	.0	.0	.0	.0
9	33.6	112763.5	.0	50980.7	.0	.0	.0	.0	.0
10	6.1	18972.9	.0	8007.2	.0	.0	.0	.0	.0
11	27.1	87527.3	.0	29196.4	.0	.0	.0	.0	.0
12	32.6	114848.7	.0	19117.0	.0	.0	.0	.0	.0
13	11.8	43138.8	.0	1659.2	.0	.0	.0	.0	.0
14	20.2	74816.1	.0	.0	.0	.0	.0	.0	.0
15	31.2	115480.7	.0	.0	.0	.0	.0	.0	.0
16	22.3	79922.5	.0	.0	.0	.0	.0	.0	.0
17	8.0	27205.5	.0	.0	.0	.0	.0	.0	.0
18	29.3	81674.8	.0	.0	.0	.0	.0	.0	.0
19	28.2	48947.8	.0	.0	.0	.0	.0	.0	.0
20	25.6	15017.2	.0	.0	.0	.0	.0	.0	.0

Failure Surface Specified By 14 Coordinate Points

Circle Center At X = 283.5 ; Y = 542.4 and Radius, 476.9
*** 2.113 ***

Failure Surface Specified By 14 Coordinate Points

Circle Center At X = 214.6 ; Y = 682.5 and Radius, 615.0
*** 2.132 ***

Circle Center At X = 169.8 ; Y = 946.1 and Radius, 871.6
*** 2.139 ***

Failure Surface Specified By 15 Coordinate Points

Circle Center At X = 201.0 ; Y = 707.3 and Radius, 648.9
*** 2.190 ***

Failure Surface Specified By 12 Coordinate Points

Circle Center At X = 317.0 ; Y = 350.4 and Radius, 281.2
*** 2.211 ***

Failure Surface Specified By 15 Coordinate Points

Circle Center At X = 207.2 ; Y = 583.1 and Radius, 530.3
*** 2.224 ***

Failure Surface Specified By 15 Coordinate Points

Circle Center At X = 343.2 ; Y = 498.4 and Radius, 430.9
*** 2.243 ***

Failure Surface Specified By 16 Coordinate Points

Circle Center At X = 240.4 ; Y = 484.2 and Radius, 444.1
*** 2.248 ***

Failure Surface Specified By 13 Coordinate Points

Circle Center At X = 150.3 ; Y = 843.2 and Radius, 775.9
*** 2.258 ***

** PCSTABL5M **
by
Purdue University

–Slope Stability Analysis–
Simplified Janbu, Simplified Bishop
or Spencer's Method of Slices

Run Date: 05-22-96
Time of Run: 12:50pm
Run By: M. S. Robinson
Input Data Filename: B:WRLSI24.DAT
Output Filename: B:WRLSI24.OUT
Unit:
Plotted Output Filename: B:WRLSI24.PLT

PROBLEM DESCRIPTION WRL 2-1/2:1 SLOPES
LONG TERM SEISMIC

BOUNDARY COORDINATES
11 Top Boundaries
13 Total Boundaries

Boundary No.	X-Left (ft,m)	Y-Left (ft,m)	X-Right (ft,m)	Y-Right (ft,m)	Soil Type Below Bnd
1	.00	71.00	50.00	70.00	1
2	50.00	70.00	95.00	60.00	1
3	95.00	60.00	110.00	58.00	1
4	110.00	58.00	135.00	58.00	1
5	135.00	58.00	150.00	60.00	1
6	150.00	60.00	240.00	80.00	1
7	240.00	80.00	280.00	100.00	1
8	280.00	100.00	320.00	100.00	1
9	320.00	100.00	525.00	182.00	2
10	525.00	182.00	770.00	208.00	2
11	770.00	208.00	1050.00	200.00	2
12	320.00	100.00	386. 00	78.00	1
13	386.00	78.00	1050.00	78.00	1

1

ISOTROPIC SOIL PARAMETERS
2 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf,KN/m3)	Saturated Unit Wt. (pcf,KN/m3)	Cohesion Intercept (psf,KPa)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf,KPa)	Piez. Surface No.
1	120.0	125.0	200.0	36.0	.00	.0	1
2	70.0	70.0	1500.0	.0	.00	.0	1

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Piezometric Surface No. 1 Specified by 4 Coordinate Points

Point No.	X-Water (ft,m)	Y-Water (ft,m)
1	.00	58.00
2	250.00	58.00
3	320.00	100.00
4	1050.00	100.00

A Horizontal Earthquake Loading Coefficient
Of .240 Has Been Assigned
A Vertical Earthquake Loading Coefficient
Of .000 Has Been Assigned
Cavitation Pressure = .0 (psf,KPa)

A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.
100 Trial Surfaces Have Been Generated.
10 Surfaces Initiate From Each Of 10 Points Equally Spaced
Along The Ground Surface Between X = 80.00 (ft,m)
and X = 240.00 (ft,m)
Each Surface Terminates Between X = 500.00 (ft,m)
and X = 750.00 (ft,m)
Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = .00 (ft,m)

34.00 (ft,m) Line Segments Define Each Trial Failure Surface.

Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Examined. They Are Ordered - Most Critical
First.
* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 18 Coordinate Points

Circle Center At X = 312.8 ; Y = 729.6 and Radius, 666.3

*** 1.066 ***

** PCSTABL5M **
by
Purdue University

–Slope Stability Analysis–
Simplified Janbu, Simplified Bishop
or Spencer's Method of Slices

Run Date: 05-22-96
Time of Run: 12:50pm
Run By: M. S. Robinson
Input Data Filename: B:WRLSI25.DAT
Output Filename: B:WRLSI25.OUT
Unit:
Plotted Output Filename: B:WRLSI25.PLT

PROBLEM DESCRIPTION WRL 2-1/2:1 SLOPES
LONG TERM SEISMIC

BOUNDARY COORDINATES
11 Top Boundaries
13 Total Boundaries

Boundary No.	X-Left (ft,m)	Y-Left (ft,m)	X-Right (ft,m)	Y-Right (ft,m)	Soil Type Below Bnd
1	.00	71.00	50.00	70.00	1
2	50.00	70.00	95.00	60.00	1
3	95.00	60.00	110.00	58.00	1
4	110.00	58.00	135.00	58.00	1
5	135.00	58.00	150.00	60.00	1
6	150.00	60.00	240.00	80.00	1
7	240.00	80.00	280.00	100.00	1
8	280.00	100.00	320.00	100.00	1
9	320.00	100.00	525.00	182.00	2
10	525.00	182.00	770.00	208.00	2
11	770.00	208.00	1050.00	200.00	2
12	320.00	100.00	386. 00	78.00	1
13	386.00	78.00	1050.00	78.00	1

1

ISOTROPIC SOIL PARAMETERS
2 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf,KN/m3)	Saturated Unit Wt. (pcf,KN/m3)	Cohesion Intercept (psf,KPa)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf,KPa)	Piez. Surface No.
1	120.0	125.0	200.0	36.0	.00	.0	1
2	70.0	70.0	1500.0	.0	.00	.0	1

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Piezometric Surface No. 1 Specified by 4 Coordinate Points

Point No.	X-Water (ft,m)	Y-Water (ft,m)
1	.00	58.00
2	250.00	58.00
3	320.00	100.00
4	1050.00	100.00

A Horizontal Earthquake Loading Coefficient
Of .250 Has Been Assigned
A Vertical Earthquake Loading Coefficient
Of .000 Has Been Assigned
Cavitation Pressure = .0 (psf,KPa)

A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.
100 Trial Surfaces Have Been Generated.
10 Surfaces Initiate From Each Of 10 Points Equally Spaced
Along The Ground Surface Between X = 80.00 (ft,m)
and X = 240.00 (ft,m)
Each Surface Terminates Between X = 500.00 (ft,m)
and X = 750.00 (ft,m)
Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = .00 (ft,m)

34.00 (ft,m) Line Segments Define Each Trial Failure Surface.

Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Examined. They Are Ordered - Most Critical
First.
* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 18 Coordinate Points

Circle Center At X = 312.8 ; Y = 729.6 and Radius, 666.3

*** 1.044 ***

** PCSTABL5M **
by
Purdue University

–Slope Stability Analysis–
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date: 05-22-96
Time of Run: 12:50pm
Run By: M. S. Robinson
Input Data Filename: B:WRLSI26DAT
Output Filename: B:WRLSI26.OUT
Unit:
Plotted Output Filename: B:WRLSI26.PLT

PROBLEM DESCRIPTION WRL 2-1/2:1 SLOPES
LONG TERM SEISMIC

BOUNDARY COORDINATES
11 Top Boundaries
13 Total Boundaries

Boundary No.	X-Left (ft,m)	Y-Left (ft,m)	X-Right (ft,m)	Y-Right (ft,m)	Soil Type Below Bnd
1	.00	71.00	50.00	70.00	1
2	50.00	70.00	95.00	60.00	1
3	95.00	60.00	110.00	58.00	1
4	110.00	58.00	135.00	58.00	1
5	135.00	58.00	150.00	60.00	1
6	150.00	60.00	240.00	80.00	1
7	240.00	80.00	280.00	100.00	1
8	280.00	100.00	320.00	100.00	1
9	320.00	100.00	525.00	182.00	2
10	525.00	182.00	770.00	208.00	2
11	770.00	208.00	1050.00	200.00	2
12	320.00	100.00	386. 00	78.00	1
13	386.00	78.00	1050.00	78.00	1

1

ISOTROPIC SOIL PARAMETERS
2 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf,KN/m3)	Saturated Unit Wt. (pcf,KN/m3)	Cohesion Intercept (psf,KPa)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf,KPa)	Piez. Surface No.
1	120.0	125.0	200.0	36.0	.00	.0	1
2	70.0	70.0	1500.0	.0	.00	.0	1

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Piezometric Surface No. 1 Specified by 4 Coordinate Points

Point No.	X-Water (ft,m)	Y-Water (ft,m)
1	.00	58.00
2	250.00	58.00
3	320.00	100.00
4	1050.00	100.00

A Horizontal Earthquake Loading Coefficient
Of .260 Has Been Assigned
A Vertical Earthquake Loading Coefficient
Of .000 Has Been Assigned
Cavitation Pressure = .0 (psf,KPa)

A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.
100 Trial Surfaces Have Been Generated.
10 Surfaces Initiate From Each Of 10 Points Equally Spaced
Along The Ground Surface Between X = 80.00 (ft,m)
and X = 240.00 (ft,m)
Each Surface Terminates Between X = 500.00 (ft,m)
and X = 750.00 (ft,m)
Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = .00 (ft,m)

34.00 (ft,m) Line Segments Define Each Trial Failure Surface.

Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Examined. They Are Ordered - Most Critical
First.
* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 18 Coordinate Points

Circle Center At X = 312.8 ; Y = 729.6 and Radius, 666.3

*** 1.029 ***

** PCSTABL5M **
by
Purdue University

–Slope Stability Analysis–
Simplified Janbu, Simplified Bishop
or Spencer's Method of Slices

Run Date: 05-22-96
Time of Run: 12:50pm
Run By: M. S. Robinson
Input Data Filename: B:WRLSI28.DAT
Output Filename: B:WRLSI28.OUT
Unit:
Plotted Output Filename: B:WRLSI28.PLT

PROBLEM DESCRIPTION WRL 2-1/2:1 SLOPES
LONG TERM SEISMIC

BOUNDARY COORDINATES
11 Top Boundaries
13 Total Boundaries

Boundary No.	X-Left (ft,m)	Y-Left (ft,m)	X-Right (ft,m)	Y-Right (ft,m)	Soil Type Below Bnd
1	.00	71.00	50.00	70.00	1
2	50.00	70.00	95.00	60.00	1
3	95.00	60.00	110.00	58.00	1
4	110.00	58.00	135.00	58.00	1
5	135.00	58.00	150.00	60.00	1
6	150.00	60.00	240.00	80.00	1
7	240.00	80.00	280.00	100.00	1
8	280.00	100.00	320.00	100.00	1
9	320.00	100.00	525.00	182.00	2
10	525.00	182.00	770.00	208.00	2
11	770.00	208.00	1050.00	200.00	2
12	320.00	100.00	386. 00	78.00	1
13	386.00	78.00	1050.00	78.00	1

1

ISOTROPIC SOIL PARAMETERS
2 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf,KN/m3)	Saturated Unit Wt. (pcf,KN/m3)	Cohesion Intercept (psf,KPa)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf,KPa)	Piez. Surface No.
1	120.0	125.0	200.0	36.0	.00	.0	1
2	70.0	70.0	1500.0	.0	.00	.0	1

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Piezometric Surface No. 1 Specified by 4 Coordinate Points

Point No.	X-Water (ft,m)	Y-Water (ft,m)
1	.00	58.00
2	250.00	58.00
3	320.00	100.00
4	1050.00	100.00

A Horizontal Earthquake Loading Coefficient
Of .280 Has Been Assigned
A Vertical Earthquake Loading Coefficient
Of .000 Has Been Assigned
Cavitation Pressure = .0 (psf,KPa)

A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.
100 Trial Surfaces Have Been Generated.
10 Surfaces Initiate From Each Of 10 Points Equally Spaced
Along The Ground Surface Between X = 80.00 (ft,m)
and X = 240.00 (ft,m)
Each Surface Terminates Between X = 500.00 (ft,m)
and X = 750.00 (ft,m)
Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = .00 (ft,m)

34.00 (ft,m) Line Segments Define Each Trial Failure Surface.

Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Examined. They Are Ordered - Most Critical
First.
* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 18 Coordinate Points

Circle Center At X = 312.8 ; Y = 729.6 and Radius, 666.3

*** 0.983 ***

A Horizontal Earthquake Loading Coefficient
Of .260 Has Been Assigned
A Vertical Earthquake Loading Coefficient
Of .000 Has Been Assigned
Cavitation Pressure = .0 (psf,KPa)

A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.
100 Trial Surfaces Have Been Generated.
10 Surfaces Initiate From Each Of 10 Points Equally Spaced
Along The Ground Surface Between X = 80.00 (ft,m)
and X = 240.00 (ft,m)
Each Surface Terminates Between X = 500.00 (ft,m)
and X = 750.00 (ft,m)
Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = .00 (ft,m)

34.00 (ft,m) Line Segments Define Each Trial Failure Surface.

Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Examined. They Are Ordered - Most Critical
First.
* * *Safety Factors Are Calculated By The Modified Bishop Method* *

Failure Surface Specified By 18 Coordinate Points

Circle Center At X = 312.8 ; Y = 729.6 and Radius, 666.3

*** 1.029 ***

** PCSTABL5M **
by
Purdue University

—Slope Stability Analysis—
Simplified Janbu, Simplified Bishop
or Spencer's Method of Slices

Run Date: 05-22-96
Time of Run: 12:50pm
Run By: M. S. Robinson
Input Data Filename: B:WRLSI28.DAT
Output Filename: B:WRLSI28.OUT
Unit:
Plotted Output Filename: B:WRLSI28.PLT

PROBLEM DESCRIPTION WRL 2-1/2:1 SLOPES
LONG TERM SEISMIC

BOUNDARY COORDINATES
11 Top Boundaries
13 Total Boundaries

Boundary No.	X-Left (ft,m)	Y-Left (ft,m)	X-Right (ft,m)	Y-Right (ft,m)	Soil Type Below Bnd
1	.00	71.00	50.00	70.00	1
2	50.00	70.00	95.00	60.00	1
3	95.00	60.00	110.00	58.00	1
4	110.00	58.00	135.00	58.00	1
5	135.00	58.00	150.00	60.00	1
6	150.00	60.00	240.00	80.00	1
7	240.00	80.00	280.00	100.00	1
8	280.00	100.00	320.00	100.00	1
9	320.00	100.00	525.00	182.00	2
10	525.00	182.00	770.00	208.00	2
11	770.00	208.00	1050.00	200.00	2
12	320.00	100.00	386. 00	78.00	1
13	386.00	78.00	1050.00	78.00	1

1

ISOTROPIC SOIL PARAMETERS
2 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf,KN/m3)	Saturated Unit Wt. (pcf,KN/m3)	Cohesion Intercept (psf,KPa)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf,KPa)	Piez. Surface No.
1	120.0	125.0	200.0	36.0	.00	.0	1
2	70.0	70.0	1500.0	.0	.00	.0	1

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Piezometric Surface No. 1 Specified by 4 Coordinate Points

Point No.	X-Water (ft,m)	Y-Water (ft,m)
1	.00	58.00
2	250.00	58.00
3	320.00	100.00
4	1050.00	100.00

A Horizontal Earthquake Loading Coefficient
Of .270 Has Been Assigned
A Vertical Earthquake Loading Coefficient
Of .000 Has Been Assigned
Cavitation Pressure = .0 (psf,KPa)

A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.
100 Trial Surfaces Have Been Generated.
10 Surfaces Initiate From Each Of 10 Points Equally Spaced
Along The Ground Surface Between X = 80.00 (ft,m)
and X = 240.00 (ft,m)
Each Surface Terminates Between X = 500.00 (ft,m)
and X = 750.00 (ft,m)
Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = .00 (ft,m)

34.00 (ft,m) Line Segments Define Each Trial Failure Surface.

Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Examined. They Are Ordered - Most Critical
First.
* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 18 Coordinate Points

Circle Center At X = 312.8 ; Y = 729.6 and Radius, 666.3

*** 1.003 ***

** PCSTABL5M **
by
Purdue University

–Slope Stability Analysis–
Simplified Janbu, Simplified Bishop
or Spencer's Method of Slices

Run Date: 05-22-96
Time of Run: 12:50pm
Run By: M. S. Robinson
Input Data Filename: B:WRLSI28.DAT
Output Filename: B:WRLSI28.OUT
Unit:
Plotted Output Filename: B:WRLSI28.PLT

PROBLEM DESCRIPTION WRL 2-1/2:1 SLOPES
LONG TERM SEISMIC

BOUNDARY COORDINATES
11 Top Boundaries
13 Total Boundaries

Boundary No	X-Left (ft,m)	Y-Left (ft,m)	X-Right (ft,m)	Y-Right (ft,m)	Soil Type Below Bnd
1	.00	71.00	50.00	70.00	1
2	50.00	70.00	95.00	60.00	1
3	95.00	60.00	110.00	58.00	1
4	110.00	58.00	135.00	58.00	1
5	135.00	58.00	150.00	60.00	1
6	150.00	60.00	240.00	80.00	1
7	240.00	80.00	280.00	100.00	1
8	280.00	100.00	320.00	100.00	1
9	320.00	100.00	525.00	182.00	2
10	525.00	182.00	770.00	208.00	2
11	770.00	208.00	1050.00	200.00	2
12	320.00	100.00	386. 00	78.00	1
13	386.00	78.00	1050.00	78.00	1

1

ISOTROPIC SOIL PARAMETERS
2 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf,KN/m3)	Saturated Unit Wt. (pcf,KN/m3)	Cohesion Intercept (psf,KPa)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf,KPa)	Piez. Surface No.
1	120.0	125.0	200.0	36.0	.00	.0	1
2	70.0	70.0	1500.0	.0	.00	.0	1

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Piezometric Surface No. 1 Specified by 4 Coordinate Points

Point No.	X-Water (ft,m)	Y-Water (ft,m)
1	.00	58.00
2	250.00	58.00
3	320.00	100.00
4	1050.00	100.00

A Horizontal Earthquake Loading Coefficient
Of .280 Has Been Assigned
A Vertical Earthquake Loading Coefficient
Of .000 Has Been Assigned
Cavitation Pressure = .0 (psf,KPa)

A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.
100 Trial Surfaces Have Been Generated.
10 Surfaces Initiate From Each Of 10 Points Equally Spaced
Along The Ground Surface Between X = 80.00 (ft,m)
and X = 240.00 (ft,m)
Each Surface Terminates Between X = 500.00 (ft,m)
and X = 750.00 (ft,m)
Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = .00 (ft,m)

34.00 (ft,m) Line Segments Define Each Trial Failure Surface.

Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Examined. They Are Ordered - Most Critical
First.
* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 18 Coordinate Points

Circle Center At X = 312.8 ; Y = 729.6 and Radius, 666.3

*** 0.983 ***