86 774
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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 II OF II

Submitted To:

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

May 1996

Prepared By:

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ATTACHMENTS

VOLUME II of II

(In order of occurrence)

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ATTACHMENTS

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Leachate Management Plan

LEACHATE MANAGEMENT PLAN

INTRODUCTION

This Leachate Management Plan will supplement the accompanying Permit Application, Construction Plan and Operating Plan for this facility.

A leachate collection system utilizing dual leachate/gas vertical extraction wells will be employed at this facility. Leachate will be pumped from the extraction wells to underground leachate storage tanks. A leachate storage lagoon will be used to provide additional leachate storage capacity. Leachate will ultimately be disposed of by discharge to a publicly owned treatment works (POTW) or other permitted treatment facilities.

This plan addresses leachate generation, implementation and routine operation, disposal, monitoring, time of operation, inspection, and maintenance of the leachate control systems.

LEACHATE GENERATION

In the initial stages of operation, Leachate generation will be dictated by the removal of leachate necessary to lower the average head to about 2 ft above the asphalt liner. Once the leachate head has been lowered to this level, leachate generation will depend primarily on the impact of precipitation percolating through the surface. After the final cover has been placed, leachate generation should decrease substantially.

The U.S. Army Corps of Engineers' Hydrologic Evaluation of Landfill Performance (HELP version 2.03 and 3.01) computer program was used to estimate leachate generation from the facility. HELP uses daily climatological data to estimate various components in the hydrologic regime for a municipal waste disposal facility over extended periods of time. Leachate generation was estimated by observing percolation through the cover. Assuming that the in-place waste is at field capacity, all water that percolates through the cover becomes leachate. Because waste is generally well below field capacity and has the capacity for some additional moisture storage when deposited, this represents a conservative assumption.

Percolation through the cover was estimated for the facility during the operating period and after closure. HELP predicted that an average flux of 2.34 inches/year, or 363,800 ft^3/year would percolate through the cap during the operating period. After the closure period, the average flux would decrease to 0.018 inches/year, or about 2,832 ft^3/year. This simulation was based on actual climatological data for Rockford, Illinois over a 25-year period from 1959 through 1983. Output files from the HELP simulations are provided in Appendix 1.

Water balance calculations, as detailed in Appendix 2, accounting for percolation through the cap, leakage through the liner, and changes in head level, were performed to simulate the change in leachate head over time. A target leachate level of 2 ft was chosen, representing the lowest leachate level obtainable without jeopardizing the integrity of the liner during well installation. For leachate extraction and storage calculations, 1,200,000 ft^3/year was selected as a conservative estimate of the potential pumping rate. It should be noted that this is a theoretical estimate, and in field conditions, leachate removal may be limited by well recharge and/or leachate levels may decrease faster of slower than anticipated. Accounting for these factors, the leachate removal rate will be adjusted accordingly. After closure, the required removal rate was estimated to be, at a maximum, equal to the percolation through the cover, or 2,832 ft^3/year.

IMPLEMENTATION

The facility is currently equipped with a leachate collection system that will continue to function throughout the unit's operating life. The entire unit is underlain by a sand drainage layer immediately above the asphalt liner. In the northwest portion of the unit, where the liner elevation is lowest, this sand drainage layer is equipped with a collection piping network that connects to leachate collection manholes. Also, a number of dual leachate/gas vertical extraction wells are already in existence at the facility. Leachate will manually pumped from these wells to a storage lagoon or tank truck on a rotational basis. Wells that exhibit consistently good recharge characteristics will be equipped with a dedicated, level-actuated, submersible pump and appropriate appurtenances to convey leachate to designated storage areas. Prior to completion of the final cover system and construction of the proposed leachate storage lagoon, leachate will be pumped and/or trucked from the individual extraction walls, manholes, or storage tanks to the

existing lagoon. Once the proposed leachate storage lagoon has been constructed and is fully operational, the existing storage lagoon will be abandoned and waste will be placed over the emptied lagoon. All existing leachate wells and manholes, however, will be abandoned or removed as a permanent and more automated leachate collection system is installed. The locations of all existing leachate collection system components are detailed on Sheet B-6 of the site developmental drawings.

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 to the top of the sand drainage layer that lies 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. Leachate collection system pipe capacity calculations are detailed in Appendix 2. 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 leachate storage lagoon with be constructed with a witness zone and a secondary recompacted earthen liner with a 30 mil (min.) Very Flexible Polyethylene (VFPE) liner. 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 bounded on all sides with a 6 ft chain link fence to prevent unauthorized access.

ROUTINE OPERATION

For an initial period of approximately three to five years, leachate will be removed in larger quantities than it is generated to facilitate the lowering of the average leachate head. The total removal rate will depend on the recharge rates of individual leachate extraction wells. Leachate removal from individual wells will be monitored periodically to provide information on the leachate production from various sections of the fill area. The overall removal rate will be measured with a flow meter in the sanitary sewer system connection. A significant decrease in leachate removal should be encountered after the placement of final cover has been completed.

Initially, the leachate accumulation in the storage lagoon will be checked on days during, and immediately following, major rainfall or snowmelt and at least every two weeks. Based upon the actual leachate accumulations observed, this frequency may be varied as appropriate. As necessary, leachate accumulation will be removed to retain storage capacity. Leachate will either be pumped directly to a permitted sanitary sewer system connection or to a tank truck for off-site

disposal. In this manner, the landfill operator will have complete control of the flow of leachate from the lagoon at all times.

During transfer operations care will be exercised to prevent spills. All fittings will be maintained in a tightly secured condition to minimize dripping. During winter operation, all exposed hoses and piping will be drained when not in use, or buried, heat-traced, insulated, etc. to prevent freezing. Should a spill occur, sorbent materials will be used to soak up the spill, and the spent sorbent and any contaminated soil will be removed and landfilled.

DISPOSAL

The primary method planned for disposal of leachate generated by this facility will be off-site treatment at a publicly owned treatment works (POTW). This will be accomplished via a direct connection to the Rock River Water Reclamation District (RRWRD) sewer system, which is tributary to the District's sewage treatment plant. If necessary, this transfer of leachate could also be accomplished using tank trucks.

Disposal of leachate from this facility is currently authorized by the RRWRD's Permit No. 122G and IEPA-DLPC Waste Stream Permit No. 850518. The on-site connection/extension to the District's sanitary sewer system is authorized by IEPA-DWPC Permits No. 1991-EN-2120 and 1991-HB-2118. Copies of these Permits and the Permit Application for the sewer connection/extension are provided in Appendix 3.

The RRWRD sewage treatment plant is the POTW that serves the City of Rockford. As such, its discharge must meet the requirements of 35 IAC 309, and its operation is by an operator certified under the requirements of 35 IAC 312. Leachate from the subject facility will constitute only a small percentage of the plant's influent flow, much less than 50 percent.

The Rock River Water Reclamation District does not currently impose any flow restrictions on leachate discharged by the facility. Should concentration restriction or mass loading restrictions be enacted in the future, any required on-site pre-treatment facilities will be installed. This and

the issuance of the District's Permit No. 122G show compliance with the requirements of 35 IAC 310.

At this time, on-site leachate recycling facilities are not proposed. Should it become desirable to employ these or other alternative treatment or disposal options in the future, appropriate permits and/or permit modifications will be secured. At no time will any leachate be discharged to waters of the State.

MONITORING

Representative samples of leachate will be collected from the unit and tested in accordance with 35 IAC 811.309(g) at a frequency of once per quarter while the leachate management system is in operation. These leachate samples will be obtained from the two on-site underground storage tanks. The quarterly indicator List L1 will be monitored during quarters when the List L2 (Annual Organics and Inorganics) parameters are not tested. The List L2 parameters will be tested on leachate from the sampling stations on a rotating basis (i.e., LP-101 will be sampled for the L2 list during the first quarter, LP-102 will be sampled for the L2 list on the second quarter, etc.). The frequency of testing may be changed to once per year for any monitored constituent if it is not detected in the leachate. However, if such a constituent is detected in the leachate at some future time, the testing frequency will return to a quarterly schedule.

Leachate from the facility will be tested for the following constituents prior to treatment or pretreatment:

a) Five day biochemical oxygen demand (BOD_5);

b) Chemical oxygen demand;

c) Total Suspended Solids;

d) Total Iron;

e) pH;

f) Any other constituents required by a publicly or privately owned treatment works, pursuant to 35 IAC 310; and

g) All of the routine indicator constituents chosen in accordance with 35 IAC 811.319(a)(2)(B) and used by the operator for groundwater monitoring.

As directed by the RRWRD, the following constituents will be tested for every 6 months:

a) Flow

b) Total Cyanide

c) Cadmium

d) Zinc

e) Chromium (Total)

f) Nickel

g) Copper

h) Lead

In addition, the following groups of constituents, as defined by the RRWRD, will be tested for every 12 months:

a) Toxic/Reactive Organic Pollutants (TROP)

b) Total Organic Priority Pollutants of Concern (TOPPOC)

Leachate 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.

The lists of the leachate constituents to be monitored (the IEPA-DLPC Lists L1 and L2) are included in Appendix 4.

TIME OF OPERATION

Leachate will be collected and disposed of for a minimum of 30 years after closure unless it can be demonstrated by the landfill operator that the leachate no longer poses a threat to human health and the environment.

SYSTEM INSPECTION AND MAINTENANCE

All hoses, transfer pipelines, pumping stations, fittings, and headers associated with the leachate collection and disposal system will be inspected on at least a quarterly basis. All dedicated leachate well pumps and transfer pumps will be maintained in accordance with the manufacturer's recommendations and inspected at least weekly to insure continuous operation. As reasonable and appropriate, any observed damage or deficiencies will be repaired or corrected as soon as practical after detection. Any faulty or worn equipment will be replaced as soon as practical as well.

APPENDIX 1

Leachate Generation Simulations

LEACHATE GENERATION SIMULATIONS

INTRODUCTION

Simulations of the hydrologic conditions expected at the facility were generated using the U.S. Army Corps of Engineers Hydraulic Evaluation of Landfill Performance (HELP) model, versions 2.03 and 3.01. The model uses daily climatological data, including precipitation, temperature, and solar radiation, coupled with landfill design characteristics to estimate various components of the hydrologic regime. Water balance calculations are performed by the model on a daily basis and annual, monthly, or daily output can be generated.

Specifically, the model was used to estimate leachate generation and piezometric head levels in the landfill by predicting infiltration through the intermediate cover and final cover configurations. Three modeling scenarios were evaluated for this purpose. The first (`WBG-OP.OUT`) represents open conditions when the landfill is covered with daily and intermediate cover. The second and third simulations represent closed conditions on the crown (`WBG-PCC.OUT`) and sideslopes (`WBG-PCS.OUT`), respectively. These two simulations were necessary because of the different final cover configurations on the crown and sideslopes, and were combined using a weighted average to obtain a final result.

INPUT PARAMETERS

The climatological data used was taken from actual precipitation, temperature, and solar radiation data for Rockford, Illinois during the period from 1959 to 1983. The soils data used was taken from default HELP soil types corresponding to the soil types expected to be used at the facility.

The properties of the geomembrane used in the final cover configuration were chosen as the default properties for Low Density Polyethylene (LDPE). One installation defect and one manufacturing defect per acre, along with poor contact between the geomembrane and underlying soil layer were chosen for the geomembrane installation characteristics.

ASSUMPTIONS

All soil layers in the model were assumed to have an initial moisture content equal to field capacity. In addition, it is assumed that all liquid that infiltrates through the final cover becomes leachate. This implies that the waste itself has a moisture content equal to field capacity. Since waste is usually placed at a moisture content well below field capacity and therefore has considerable moisture storage capacity, this results in a conservative estimate of leachate generation.

RESULTS

The HELP model predicted that infiltration, and thus leachate generation, for open conditions will average 2.34 in./yr, or 363,000 ft^3/yr. After closure of the facility, infiltration will decrease to an average of 0.018 in./yr. The results of all individual simulations are detailed below.

Table 1. HELP model results.

Description	Filename	Area (Acres)	Infiltration (in./yr)	ΣAI (ac•in./yr)	Infiltration (cu. ft/yr)
Open Conditions	WBG-OP.OUT	42.65	2.34	----	363,027
Closed Conditions					
Crown	WBG-PCC.OUT	16.68	0.00907	0.151	549.7
Sideslopes	WBG-PCS.OUT	25.97	0.02418	0.628	2282.0
Total		42.65	----	0.779	2831.7
	Weighted Average = 0.779 ÷ 42.65 = 0.01827 in./yr				

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 WINNEBAGO RECLAMATION SERVICE, INC.
 OPEN LANDFILL
 JUNE 29, 1994

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FAIR GRASS

LAYER 1

VERTICAL PERCOLATION LAYER

THICKNESS	=	6.00 INCHES
POROSITY	=	.5010 VOL/VOL
FIELD CAPACITY	=	.2837 VOL/VOL
WILTING POINT	=	.1353 VOL/VOL
INITIAL SOIL WATER CONTENT	=	.2837 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY	=	.000570000000 CM/SEC

LAYER 2

BARRIER SOIL LINER

THICKNESS	=	18.00 INCHES
POROSITY	=	.4300 VOL/VOL
FIELD CAPACITY	=	.3663 VOL/VOL
WILTING POINT	=	.2802 VOL/VOL
INITIAL SOIL WATER CONTENT	=	.4300 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY	=	.000000220000 CM/SEC

GENERAL SIMULATION DATA

SCS RUNOFF CURVE NUMBER	=	81.48
TOTAL AREA OF COVER	=	1860000. SQ FT
EVAPORATIVE ZONE DEPTH	=	36.00 INCHES
POTENTIAL RUNOFF FRACTION	=	.750000
UPPER LIMIT VEG. STORAGE	=	3.0060 INCHES
INITIAL VEG. STORAGE	=	1.7022 INCHES
INITIAL SNOW WATER CONTENT	=	.0000 INCHES
INITIAL TOTAL WATER STORAGE IN SOIL AND WASTE LAYERS	=	9.4422 INCHES

SOIL WATER CONTENT INITIALIZED BY USER.

CLIMATOLOGICAL DATA

USER SPECIFIED RAINFALL WITH SYNTHETIC DAILY TEMPERATURES AND SOLAR RADIATION FOR CHICAGO ILLINOIS

MAXIMUM LEAF AREA INDEX = 2.00
START OF GROWING SEASON (JULIAN DATE) = 128
END OF GROWING SEASON (JULIAN DATE) = 282

NORMAL MEAN MONTHLY TEMPERATURES, DEGREES FAHRENHEIT

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
21.40	26.00	36.00	48.80	59.10	68.60
73.00	71.90	64.70	53.50	39.80	27.70

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 59 THROUGH 83

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	1.50	1.18	2.76	4.46	3.86	4.83
	4.25	3.84	4.17	2.99	2.48	2.00
STD. DEVIATIONS	1.22	.74	1.34	1.86	1.68	2.19
	2.24	2.60	3.01	2.03	1.28	1.15
RUNOFF						
TOTALS	.651	.365	.760	1.207	.748	.875
	.625	.434	1.075	.787	.654	.963
STD. DEVIATIONS	1.039	.507	1.061	1.444	1.026	1.376
	1.021	.878	1.688	1.264	.888	.937
EVAPOTRANSPIRATION						
TOTALS	.532	.847	1.944	3.148	3.559	3.818
	3.695	3.316	2.478	1.897	1.012	.534
STD. DEVIATIONS	.132	.288	.484	.511	.970	1.038
	1.589	1.551	1.074	.702	.308	.164
PERCOLATION FROM LAYER 2						
TOTALS	.2721	.2425	.2656	.2377	.2102	.1474
	.0845	.0876	.1088	.1961	.2159	.2736
STD. DEVIATIONS	.0789	.0762	.0510	.0580	.0736	.0760
	.0743	.0898	.0895	.0990	.0976	.0740

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AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 59 THROUGH 83

	(INCHES)		(CU. FT.)	PERCENT
PRECIPITATION	38.33	(8.153)	5940530.	100.00
RUNOFF	9.143	(5.447)	1417241.	23.86
EVAPOTRANSPIRATION	26.779	(3.558)	4150720.	69.87
PERCOLATION FROM LAYER 2	2.3421	(.4458)	363027.	6.11
CHANGE IN WATER STORAGE	.062	(.818)	9540.	.16

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PEAK DAILY VALUES FOR YEARS 59 THROUGH 83

	(INCHES)	(CU. FT.)
PRECIPITATION	5.56	861800.0
RUNOFF	4.151	643473.1
PERCOLATION FROM LAYER 2	.0102	1586.4
HEAD ON LAYER 2	6.7	
SNOW WATER	2.42	374646.7

MAXIMUM VEG. SOIL WATER (VOL/VOL) .5010

MINIMUM VEG. SOIL WATER (VOL/VOL) .1263

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FINAL WATER STORAGE AT END OF YEAR 83

LAYER	(INCHES)	(VOL/VOL)
1	2.85	.4747
2	7.74	.4300
SNOW WATER	.39	

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**              HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE               **
**               HELP MODEL VERSION 3.01   (14 OCTOBER 1994)                **
**                  DEVELOPED BY ENVIRONMENTAL LABORATORY                   **
**                    USAE WATERWAYS EXPERIMENT STATION                     **
**             FOR USEPA RISK REDUCTION ENGINEERING LABORATORY              **
**                                                                          **
**                                                                          **
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PRECIPITATION DATA FILE:      C:\HELP3\DATA4.D4
TEMPERATURE DATA FILE:        C:\HELP3\DATA7.D7
SOLAR RADIATION DATA FILE:    C:\HELP3\DATA13.D13
EVAPOTRANSPIRATION DATA:      C:\HELP3\DATA11.D11
SOIL AND DESIGN DATA FILE:    C:\HELP3\WBG-PCC.D10
OUTPUT DATA FILE:             C:\HELP3\WBG-PCC.OUT


TIME:  16:50     DATE:   5/10/1996


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     TITLE:  WINNEBAGO RECLAMATION SERVICE, INC.

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     NOTE:  INITIAL MOISTURE CONTENT OF THE LAYERS AND SNOW WATER
              WERE SPECIFIED BY THE USER.


                                  LAYER  1
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                     TYPE 1 - VERTICAL PERCOLATION LAYER
                         MATERIAL TEXTURE NUMBER   9
          THICKNESS                    =     28.00   INCHES
          POROSITY                     =      0.5010 VOL/VOL
          FIELD CAPACITY               =      0.2840 VOL/VOL
          WILTING POINT                =      0.1350 VOL/VOL
          INITIAL SOIL WATER CONTENT   =      0.2840 VOL/VOL
          EFFECTIVE SAT. HYD. COND.    =  0.190000006000E-03 CM/SEC
        NOTE:  SATURATED HYDRAULIC CONDUCTIVITY IS MULTIPLIED BY  4.48
                 FOR ROOT CHANNELS IN TOP HALF OF EVAPORATIVE ZONE.
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LAYER 2

TYPE 2 - LATERAL DRAINAGE LAYER
MATERIAL TEXTURE NUMBER 1

THICKNESS	=	8.00	INCHES
POROSITY	=	0.4170	VOL/VOL
FIELD CAPACITY	=	0.0450	VOL/VOL
WILTING POINT	=	0.0180	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0450	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.999999978000E-02	CM/SEC
SLOPE	=	10.00	PERCENT
DRAINAGE LENGTH	=	300.0	FEET

LAYER 3

TYPE 4 - FLEXIBLE MEMBRANE LINER
MATERIAL TEXTURE NUMBER 36

THICKNESS	=	0.04	INCHES
POROSITY	=	0.0000	VOL/VOL
FIELD CAPACITY	=	0.0000	VOL/VOL
WILTING POINT	=	0.0000	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0000	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.399999993000E-12	CM/SEC
FML PINHOLE DENSITY	=	1.00	HOLES/ACRE
FML INSTALLATION DEFECTS	=	1.00	HOLES/ACRE
FML PLACEMENT QUALITY	=	4 - POOR	

LAYER 4

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 0

THICKNESS	=	12.00	INCHES
POROSITY	=	0.4450	VOL/VOL
FIELD CAPACITY	=	0.3930	VOL/VOL
WILTING POINT	=	0.2770	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.4450	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.999999997000E-06	CM/SEC

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT SOIL DATA BASE USING SOIL TEXTURE # 9 WITH A FAIR STAND OF GRASS, A SURFACE SLOPE OF 10.% AND A SLOPE LENGTH OF 300. FEET.

SCS RUNOFF CURVE NUMBER	=	82.40	
FRACTION OF AREA ALLOWING RUNOFF	=	100.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	16.700	ACRES
EVAPORATIVE ZONE DEPTH	=	36.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	8.312	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	17.364	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	3.924	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	13.652	INCHES
TOTAL INITIAL WATER	=	13.652	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM ROCKFORD ILLINOIS

MAXIMUM LEAF AREA INDEX	=	3.30
START OF GROWING SEASON (JULIAN DATE)	=	128
END OF GROWING SEASON (JULIAN DATE)	=	282
AVERAGE ANNUAL WIND SPEED	=	10.30 MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	71.00 %
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	65.00 %
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	70.00 %
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	72.00 %

NOTE: PRECIPITATION DATA FOR ROCKFORD ILLINOIS WAS CONVERTED FROM A HELP V.2 DATA FILE.

NOTE: TEMPERATURE DATA FOR ROCKFORD ILLINOIS WAS CONVERTED FROM A HELP V.2 DATA FILE.

NOTE: SOLAR RADIATION DATA FOR ROCKFORD ILLINOIS WAS CONVERTED FROM A HELP V.2 DATA FILE.

STATION LATITUDE = 42.10 DEGREES

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 59 THROUGH 83

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	1.51	1.17	2.76	4.46	3.86	4.83
	4.25	3.84	4.17	2.99	2.48	2.00
STD. DEVIATIONS	1.21	0.75	1.34	1.86	1.68	2.19
	2.24	2.60	3.01	2.03	1.28	1.15
RUNOFF						
TOTALS	0.536	0.541	1.262	0.579	0.136	0.257
	0.201	0.139	0.234	0.096	0.048	0.306
STD. DEVIATIONS	0.907	0.599	1.236	0.758	0.202	0.393
	0.322	0.302	0.499	0.186	0.107	0.474
EVAPOTRANSPIRATION						
TOTALS	0.560	0.714	1.612	2.908	3.508	4.589
	4.669	2.910	2.926	1.658	0.914	0.659
STD. DEVIATIONS	0.117	0.223	0.397	0.465	0.901	0.704
	1.317	1.227	0.873	0.463	0.192	0.143
LATERAL DRAINAGE COLLECTED FROM LAYER 2						
TOTALS	0.1915	0.0378	0.0907	0.5076	1.3205	1.2165
	0.5561	0.1729	0.3054	0.5576	0.7346	0.5948
STD. DEVIATIONS	0.2209	0.0439	0.2966	0.5795	1.0847	0.7343
	0.5674	0.4317	0.7206	0.8646	0.9170	0.6946
PERCOLATION/LEAKAGE THROUGH LAYER 4						
TOTALS	0.0003	0.0001	0.0001	0.0007	0.0019	0.0017
	0.0008	0.0002	0.0005	0.0008	0.0011	0.0009
STD. DEVIATIONS	0.0003	0.0001	0.0004	0.0008	0.0016	0.0010
	0.0008	0.0006	0.0013	0.0013	0.0013	0.0010

AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ACROSS LAYER 4						
AVERAGES	0.3282	0.0722	0.1563	0.9213	2.3945	2.1779
	0.9589	0.2981	0.6522	1.0013	1.3569	1.0324
STD. DEVIATIONS	0.3794	0.0837	0.5113	1.0729	2.2153	1.3306
	0.9783	0.7442	1.7505	1.6337	1.8026	1.2179

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AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 59 THROUGH 83

	INCHES		CU. FEET	PERCENT
PRECIPITATION	38.33	(8.153)	2323360.5	100.00
RUNOFF	4.335	(2.4721)	262799.47	11.311
EVAPOTRANSPIRATION	27.625	(3.1852)	1674669.12	72.080
LATERAL DRAINAGE COLLECTED FROM LAYER 2	6.28610	(4.34190)	381069.469	16.40165
PERCOLATION/LEAKAGE THROUGH FROM LAYER 4	0.00907	(0.00628)	549.730	0.02366
AVERAGE HEAD ACROSS TOP OF LAYER 4	0.946	(0.690)		
CHANGE IN WATER STORAGE	0.070	(2.0142)	4272.65	0.184

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PEAK DAILY VALUES FOR YEARS 59 THROUGH 83

	(INCHES)	(CU. FT.)
PRECIPITATION	5.56	337052.781
RUNOFF	2.607	158048.8120
DRAINAGE COLLECTED FROM LAYER 2	0.15049	9122.90039
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.000346	20.94892
AVERAGE HEAD ACROSS LAYER 4	14.693	
SNOW WATER	4.58	277787.1870

MAXIMUM VEG. SOIL WATER (VOL/VOL)	0.3739
MINIMUM VEG. SOIL WATER (VOL/VOL)	0.1023

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****

FINAL WATER STORAGE AT END OF YEAR 83

LAYER	(INCHES)	(VOL/VOL)
1	8.2987	0.2964
2	0.8676	0.1084
3	0.0000	0.0000
4	5.3400	0.4450
SNOW WATER	0.000	

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****

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******************************************************************************
******************************************************************************
**                                                                          **
**                                                                          **
**              HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE               **
**               HELP MODEL VERSION 3.01    (14 OCTOBER 1994)               **
**                  DEVELOPED BY ENVIRONMENTAL LABORATORY                   **
**                    USAE WATERWAYS EXPERIMENT STATION                     **
**             FOR USEPA RISK REDUCTION ENGINEERING LABORATORY              **
**                                                                          **
**                                                                          **
******************************************************************************
******************************************************************************


PRECIPITATION DATA FILE:      C:\HELP3\DATA4.D4
TEMPERATURE DATA FILE:        C:\HELP3\DATA7.D7
SOLAR RADIATION DATA FILE:    C:\HELP3\DATA13.D13
EVAPOTRANSPIRATION DATA:      C:\HELP3\DATA11.D11
SOIL AND DESIGN DATA FILE:    C:\HELP3\WBG-PCS.D10
OUTPUT DATA FILE:             C:\HELP3\WBG-PCS.OUT


TIME:  16:37     DATE:   5/10/1996


******************************************************************************

     TITLE:  WINNEBAGO RECLAMATION SERVICE, INC.

******************************************************************************


     NOTE:  INITIAL MOISTURE CONTENT OF THE LAYERS AND SNOW WATER
              WERE SPECIFIED BY THE USER.


                                  LAYER  1
                                  --------

                     TYPE 1 - VERTICAL PERCOLATION LAYER
                         MATERIAL TEXTURE NUMBER   9
          THICKNESS                    =     24.00   INCHES
          POROSITY                     =      0.5010 VOL/VOL
          FIELD CAPACITY               =      0.2840 VOL/VOL
          WILTING POINT                =      0.1350 VOL/VOL
          INITIAL SOIL WATER CONTENT   =      0.2840 VOL/VOL
          EFFECTIVE SAT. HYD. COND.    =  0.190000006000E-03 CM/SEC
        NOTE:  SATURATED HYDRAULIC CONDUCTIVITY IS MULTIPLIED BY  4.48
                 FOR ROOT CHANNELS IN TOP HALF OF EVAPORATIVE ZONE.
```

LAYER 2

TYPE 2 - LATERAL DRAINAGE LAYER
MATERIAL TEXTURE NUMBER 6

THICKNESS	=	12.00	INCHES
POROSITY	=	0.4530	VOL/VOL
FIELD CAPACITY	=	0.1900	VOL/VOL
WILTING POINT	=	0.0850	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.1900	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.720000011000E-03	CM/SEC
SLOPE	=	33.30	PERCENT
DRAINAGE LENGTH	=	250.0	FEET

LAYER 3

TYPE 4 - FLEXIBLE MEMBRANE LINER
MATERIAL TEXTURE NUMBER 36

THICKNESS	=	0.04	INCHES
POROSITY	=	0.0000	VOL/VOL
FIELD CAPACITY	=	0.0000	VOL/VOL
WILTING POINT	=	0.0000	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0000	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.399999993000E-12	CM/SEC
FML PINHOLE DENSITY	=	1.00	HOLES/ACRE
FML INSTALLATION DEFECTS	=	1.00	HOLES/ACRE
FML PLACEMENT QUALITY	=	4 - POOR	

LAYER 4

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 0

THICKNESS	=	12.00	INCHES
POROSITY	=	0.4450	VOL/VOL
FIELD CAPACITY	=	0.3930	VOL/VOL
WILTING POINT	=	0.2770	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.4450	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.999999997000E-06	CM/SEC

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT SOIL DATA BASE USING SOIL TEXTURE # 9 WITH A FAIR STAND OF GRASS, A SURFACE SLOPE OF 33.% AND A SLOPE LENGTH OF 250. FEET.

SCS RUNOFF CURVE NUMBER	=	83.20	
FRACTION OF AREA ALLOWING RUNOFF	=	100.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	26.000	ACRES
EVAPORATIVE ZONE DEPTH	=	36.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	9.096	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	17.460	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	4.260	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	14.436	INCHES
TOTAL INITIAL WATER	=	14.436	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
ROCKFORD ILLINOIS

MAXIMUM LEAF AREA INDEX	=	3.30
START OF GROWING SEASON (JULIAN DATE)	=	128
END OF GROWING SEASON (JULIAN DATE)	=	282
AVERAGE ANNUAL WIND SPEED	=	10.30 MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	71.00 %
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	65.00 %
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	70.00 %
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	72.00 %

NOTE: PRECIPITATION DATA FOR ROCKFORD ILLINOIS
WAS CONVERTED FROM A HELP V.2 DATA FILE.

NOTE: TEMPERATURE DATA FOR ROCKFORD ILLINOIS
WAS CONVERTED FROM A HELP V.2 DATA FILE.

NOTE: SOLAR RADIATION DATA FOR ROCKFORD ILLINOIS
WAS CONVERTED FROM A HELP V.2 DATA FILE.

STATION LATITUDE = 42.10 DEGREES

****

AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 59 THROUGH 83

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	1.51	1.17	2.76	4.46	3.86	4.83
	4.25	3.84	4.17	2.99	2.48	2.00
STD. DEVIATIONS	1.21	0.75	1.34	1.86	1.68	2.19
	2.24	2.60	3.01	2.03	1.28	1.15
RUNOFF						
TOTALS	0.544	0.553	1.287	0.617	0.173	0.314
	0.235	0.162	0.265	0.115	0.061	0.318
STD. DEVIATIONS	0.914	0.609	1.239	0.800	0.250	0.461
	0.362	0.345	0.529	0.210	0.131	0.482
EVAPOTRANSPIRATION						
TOTALS	0.551	0.704	1.594	2.859	3.537	5.019
	5.385	3.110	3.004	1.677	0.866	0.642
STD. DEVIATIONS	0.126	0.223	0.397	0.472	0.799	0.665
	1.108	1.217	0.858	0.414	0.212	0.155
LATERAL DRAINAGE COLLECTED FROM LAYER 2						
TOTALS	0.2218	0.1143	0.1342	0.3612	0.8579	0.9268
	0.5068	0.1702	0.2023	0.2766	0.4555	0.4148
STD. DEVIATIONS	0.2321	0.1197	0.2241	0.4634	0.7207	0.5886
	0.4736	0.3515	0.4697	0.5454	0.6358	0.4749
PERCOLATION/LEAKAGE THROUGH LAYER 4						
TOTALS	0.0012	0.0006	0.0007	0.0019	0.0045	0.0048
	0.0026	0.0009	0.0011	0.0015	0.0024	0.0021
STD. DEVIATIONS	0.0012	0.0007	0.0011	0.0023	0.0039	0.0032
	0.0023	0.0018	0.0025	0.0031	0.0034	0.0024

AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ACROSS LAYER 4						
AVERAGES	1.4546	0.8337	0.8848	2.5077	5.9777	6.6064
	3.3516	1.1220	1.4585	1.9996	3.2828	2.7985
STD. DEVIATIONS	1.5236	0.8735	1.4773	3.2549	5.4511	4.5247
	3.1367	2.3170	3.4810	4.2170	4.7575	3.2666

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AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 59 THROUGH 83

	INCHES		CU. FEET	PERCENT
PRECIPITATION	38.33	(8.153)	3617208.0	100.00
RUNOFF	4.641	(2.6388)	438029.56	12.110
EVAPOTRANSPIRATION	28.946	(3.1289)	2731951.75	75.527
LATERAL DRAINAGE COLLECTED FROM LAYER 2	4.64241	(3.44766)	438150.562	12.11295
PERCOLATION/LEAKAGE THROUGH FROM LAYER 4	0.02418	(0.01827)	2282.015	0.06309
AVERAGE HEAD ACROSS TOP OF LAYER 4	2.690	(2.102)		
CHANGE IN WATER STORAGE	0.072	(2.8382)	6794.26	0.188

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PEAK DAILY VALUES FOR YEARS 59 THROUGH 83

	(INCHES)	(CU. FT.)
PRECIPITATION	5.56	524752.812
RUNOFF	2.620	247293.8590
DRAINAGE COLLECTED FROM LAYER 2	0.11679	11022.90040
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.000628	59.25105
AVERAGE HEAD ACROSS LAYER 4	26.700	
SNOW WATER	4.58	432483.0310

MAXIMUM VEG. SOIL WATER (VOL/VOL)	0.4359
MINIMUM VEG. SOIL WATER (VOL/VOL)	0.1128

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FINAL WATER STORAGE AT END OF YEAR 83

LAYER	(INCHES)	(VOL/VOL)
1	7.4975	0.3124
2	2.4905	0.2075
3	0.0000	0.0000
4	5.3400	0.4450
SNOW WATER	0.000	

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****

APPENDIX 2

Leachate Collection System Calculations

Vertical Leachate Extraction Calculations

In order to decrease the leachate head on the landfill, it will be necessary to pump a large volume of leachate from the landfill during the operating period. After the leachate head is lowered and the landfill is closed, the required leachate removal volume will decrease substantially. The following calculations were performed to estimate the change in leachate head over time.

Given:

1. Water balance for the landfill is governed by the following equation:

$$Q_{SURF} = Q_{LINER} + Q_{PUMP} + \Delta S$$

Where:

Q_{SURF}	=	flow through the low-permeability layer (ft^3/yr)
Q_{LINER}	=	flow through the liner (ft^3/yr)
Q_{PUMP}	=	pumping rate from vertical extraction wells (ft^3/yr)
ΔS	=	change in storage (ft^3/yr)

2. Q_{LINER} is governed by Darcy's Law:

$$Q_{LINER} = K \cdot A \cdot \frac{dH}{dx}$$

Where:

k	=	saturated hydraulic conductivity (ft/yr)
A	=	area of fill (ft^2)
$\frac{dH}{dx}$	=	hydraulic gradient (ft/ft)

3. ΔS is a function of the leachate head and the effective porosity of in-place waste.

$$\Delta S = (H_1 - H_0) \cdot N_e \cdot A$$

Where:

H_1	=	head of time t
N_e	=	effective porosity of in-place waste

4. Q_{SURF}, as estimated with the HELP model, is 363,000 ft^3/yr for open conditions and 2,832 ft^3/yr for closed conditions.

Assumptions:

1. A 15.0 feet leachate head exists on the asphalt liner.

2. The effective porosity of in-place waste is approximately 0.226 vol/vol.

3. The asphalt liner has a thickness of 2 inches and a saturated hydraulic conductivity of 1 x 10^{-9} cm/sec.

4. Q_{PUMP} will be 1,200,000 ft^3/yr until the leachate head decreases to approximately 2.0 ft, after which it will be decreased to 349,100 ft^3/yr. After closure of the landfill, Q_{PUMP} will be at most 2,832 ft^3/yr.

Solution:

By rearranging the equation in Item 2, the change in leachate head can be calculated for a specified time interval:

$$H_1 = \frac{(Q_{SURF} - Q_{LINER} - Q_{PUMP}) \frac{d}{365}}{N_e \cdot A} + H_o$$

Where:

H_o = leachate head at t_0
H_1 = leachate head at t_1
d = number of days in time increment

An EXCEL spreadsheet was used to calculate the change in leachate head level in 30 day increments. The results predicted that 5.9 years would be required to lower the leachate head to 2 ft at the given leachate removal rates. Detailed output from of this analysis is provided in the following pages.

WNBGSIM0.XLS

LEACHATE HEAD MONITOR

Hit <F9> to Iterate

CAP		
Qin	363,000	ft3/yr
PUMP		
Qout	1,200,000	ft3/yr
LINER		
Thickness	0.17	ft
Ksat	1.03E-03	ft/yr
Qout	174,303	ft3/yr
AREA	1,860,000	ft2
WASTE		
Sp Yield	0.226	vol/vol

TIME		
Step	30	days
Elapsed	0	days
	0.0	years

LEACHATE HEAD

Time t-1	15.00	ft
Time t	14.80	ft

WNBGSIM2.XLS

LEACHATE HEAD MONITOR

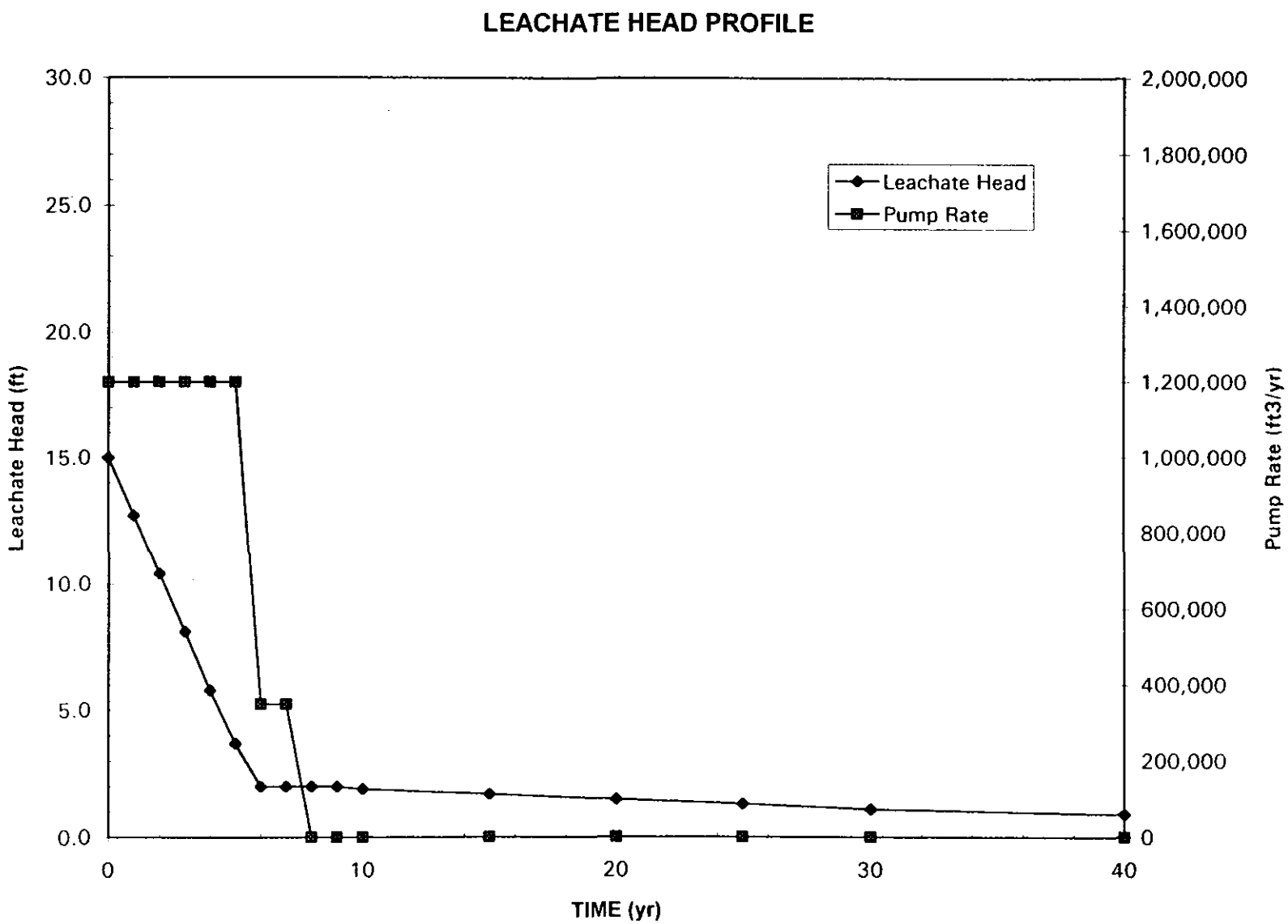
Hit <F9> to Iterate

CAP		
Qin	363,000	ft3/yr
PUMP		
Qout	1,200,000	ft3/yr
LINER		
Thickness	0.17	ft
Ksat	1.03E-03	ft/yr
Qout	26,657	ft3/yr
AREA	1,860,000	ft2
WASTE		
Sp Yield	0.226	vol/vol

TIME		
Step	30	days
Elapsed	2160	days
	5.9	years

LEACHATE HEAD

Time t-1	1.98	ft
Time t	1.81	ft


LEACHATE HEAD PROFILE
Leachate Head
Pump Rate
Leachate Head (ft)
Pump Rate (ft3/yr)
TIME (yr)
30.0
25.0
20.0
15.0
10.0
5.0
0.0
2,000,000
1,800,000
1,600,000
1,400,000
1,200,000
1,000,000
800,000
600,000
400,000
200,000
0
0
10
20
30
40

Leachate Collection Piping Capacity Calculations

Gravity Drain Lines

Given:

1. At most, 10 submersible pumps, each with a capacity of 10 gpm, will discharge into one gravity drain line.

2. The gravity drain lines will be constructed of smooth-walled HDPE Standard Dimension Ratio (SDR) 17, 6 in. diameter pipe or equivalent.

3. The minimum slope the piping will be placed is 1.0%

4. Manning's Equation for flow in pipe is:

$$Q = \frac{1.49}{n} A R_h^{2/3} S^{1/2}$$

Where	Q	=	flow (cfs)
	A	=	area of flow (ft^2)
	R_h	=	hydraulic radius (ft)
	S	=	slope (ft/ft)
	n	=	Manning's roughness coefficient

5. Typical Manning's coefficient for smooth-walled plastic pipes is 0.015.

6. At peak flow, the gravity drain line should be no more than one-half full.

Peak Flow:

$$Q_{peak} = (10)\ (10\ gpm)\ (0.134\ ft^3/gal)\ (60\ min/hr)\ (24\ hr/day)$$

$$Q_{peak} = 19{,}300\ ft^3/day$$

Pipe Capacity:

A	=	$1/2\ \pi\ r^2$	=	$(0.5)\ \pi\ ((5.845/2)/12)^2$	=	$0.093\ ft^2$
P_w	=	$1/2\ \pi\ d$	=	$(0.5)\ \pi\ (5.845/12)$	=	$0.765\ ft$
R_h	=	$A\ /\ P_w$	=	$0.093\ /\ 0.785$	=	$0.122\ ft$
S	=	0.01				
n	=	0.015				

$$Q_{pipe} = \frac{1.49}{0.015}\ (0.093)\ (0.122)^{2/3}\ (0.01)^{1/2}$$

$$Q_{pipe} = 0.227 ft^3/sec = 19{,}600 ft^3/day$$

Since Q_{pipe} (19,600 ft^3/day) > Q_{peak} (19,300 ft^3/day), 6 in. diameter smooth-walled HDPE is appropriate for the gravity drain lines.

APPENDIX 3
Permit for Off-site Leachate Treatment

WDP 122

AMENDED 2/28/94

RRWRD 1903

ROCK RIVER WATER RECLAMATION DISTRICT

Wastewater Discharge Permit

SECTION I

Winnebago Reclamation
Company Name

Business Address

Street 4920 Forest Hills Road

City Rockford Zip 61111

Location of Premise Permitted

Street 8304 Lindenwood Road

City Rockford Zip 61109

The above named Industrial User is hereby authorized to discharge wastewater to the Rock River Water Reclamation District subject to compliance with applicable pretreatment standards and the terms and conditions stated in this permit.

Issuance Date February 25, 1991

Expiration Date February 25, 1996

Plant Operations Manager — February 28, 1994 Date

District Director — February 28, 1994 Date

RRWRD Board President — February 28, 1994 Date

SECTION II
Discharge Limitations

A. **Effluent Limitations**

1. During the effective period of this permit, **Winnebago Reclamation** is authorized to discharge landfill leachate to the Rock River Water Reclamation District from the discharge lines listed below.

Description of discharge:

DISCHARGE NUMBER	LOCATION
1903	Sampling manhole #4, Station 20, Rydberg Road

2. During the effective period of this permit, the discharge from **Winnebago Reclamation** shall not exceed the effluent limitations below and is subject to compliance with Ordinance 367, Local Limits.

DISCHARGE LIMITS

LOCAL LIMITS	
DISCHARGE NO. 1903	
POLLUTANT	DAILY COMPOSITE (mg/L)
Cadmium	0.9
Chromium (T)	8.0
Chromium +6	8.0
Copper	4.0
Lead	2.0
Nickel	10.0
Zinc	5.0
Silver	6.0
Cyanide (T)	1.7
TROP (1)	
TOPPOC (2)	2.13
FOG (Polar)	900
FOG (Non-Polar)	150
Ammonia-N	1000
Manganese	55.0
Antimony	40.00
Molybdenum	1.0
Mercury	0.1
Selenium	0.8
Arsenic	0.4

(1) See Appendix A for discharge limitations for Toxic/Reactive Organic Pollutants (TROPs).
(2) See Appendix B for the list of compounds that are the Total Organic Priority Pollutants of Concern (TOPPC

B. **General Discharge Prohibition**

1. **Winnebago Reclamation** shall not discharge or cause to be discharged any storm water, foundation drain water, ground water, roof runoff, surface drainage, cooling waters, or any unpolluted water to any sanitary sewer.

2. **Winnebago Reclamation** shall not contribute or cause to be contributed, directly or indirectly, any pollutant or wastewater, which will interfere with the operation or performance of the District's treatment plant. The following general prohibitions shall apply to all users of the District whether or not a user is subject to National Categorical Pretreatment Standards or any other National, State or Local Pretreatment Standards or requirements.

   A user may not contribute the following substances to District:

   a. Any liquids, solids or gases, which by reason of their nature or quantity are, or may be, sufficient either alone or by interaction with other substances to cause fire or explosion or be injurious or hazardous in any other way to the treatment plant or the operation of the treatment plant.

      At no time shall the waste stream have a closed cup flash point of less than 140°F (60°C) using the Pensky-Martens Close Cup Tester Method. The user's discharge to District shall be less than the TROPs listed in Appendix A of this permit.

   b. Solid or viscous substances which may cause obstruction to the flow in a sewer or other interference with the operation of the wastewater treatment facilities such as, but not limited to: grease, garbage with particles greater than one-half inch (1/2") in any dimension, animal guts or tissues, paunch manure, bones, hair, hides or fleshings, entrails, whole blood, feathers, ashes, cinders, sand, spent lime, stone or marble dust, metal, glass, straw, shavings, grass clippings, rags, spent grains, spent hops, waste paper, wood, plastics, tar, asphalt residues from refining or processing of fuel or lubricating oil, mud or glass grinding or polishing wastes, or tumbling and de-burring stones.

   c. Any wastewater having a pH less than 5.0 or greater than 11.0 standard units.

   d. Any wastewater containing incompatible pollutants in sufficient quantity, either singly or by interaction with other pollutants, to injure or interfere with any wastewater treatment process, a hazard to humans or animals, create an incompatible effect in the receiving water or the wastewater treatment facility, exceed the limitation set forth in the categorical pretreatment standard (when effective), or in Section 2 of Ordinance 361, Article IV or create a public nuisance. An incompatible pollutant shall include, but not be limited to, any pollutant identified pursuant to Section 307(a) of the Act.

   e. Any noxious or malodorous liquids, gases, or solids which either singly or by interaction with other wastewaters are sufficient to create a public nuisance or hazard to life or are sufficient to prevent entry into sewers for their maintenance and repair. The user's discharge to District shall be less than the sum of 2.13 mg/L for all pollutants listed in Appendix B of this permit.

   f. Any substance, which will cause the District to be in non-compliance with sludge use or disposal criteria, guideline or regulations developed under Section 405 of the Act; any criteria guidelines or regulations affecting a sludge use or disposal developed pursuant to the RCRA, SWDA, the Clean Water Act, the Toxic Substances Control Act, or State criteria applicable to the sludge management method being used.

   g. Any substance which will cause the District to violate its NPDES Permit or receiving water quality standards.

   h. Any wastewater having a temperature at the point of discharge to the District which will inhibit biological activity in the District treatment plant resulting in interference; and in no case shall wastewater be introduced to the District which exceeds 65°C (157°F) or which exceeds 40°C (104°F) at the District treatment plant.

   i. Any pollutants, including compatible pollutants released at the flow or pollutant concentration which a User knows or has reason to know will cause interference to the District. In no case shall a slug measured at the point of discharge to the District have a flow rate or contain concentrations of pollutants that exceed, more than five (5) times the average twenty-four (24) hour concentrations, or 24-hour flow during normal operation; provided, however, that a User subject to National Categorical Pretreatment Standards shall comply with such standards in addition to this subsection.

   j. Any wastewater containing any radioactive wastes or isotopes of such half life or concentration as may exceed limits established by State or Federal regulations.

   k. Any wastewater which may contain more than 150 mg/l of non-polar fat, oil, grease (FOG) or 900 mg/L of polar FOG.

   l. Any wastewater containing Biochemical Oxygen Demand (BOD), or total suspended solids (TSS) of such character and quantity that unusual attention or expense is required to handle such materials at the sewage treatment plant; provided however, that a User may be permitted by specific, written agreement with the District, which agreement to discharge such BOD or TSS may provide for special charges, payments or provisions for treating and testing equipment.

3. All discharges shall comply with all other applicable laws, regulations, standards, and requirements contained in Ordinance 361 and any applicable State and Federal Pretreatment laws, regulations, standards, and requirements including any such laws, regulations, standards, or requirements that may become effective during the term of this permit.

SECTION III
Self Monitoring Requirements

From the period beginning on the effective date of this permit, the permittee shall monitor their discharge at **sampling manhole #4, station 20, Rydberg Road** for the following parameters at the indicated frequency:

SAMPLE PARAMETER	REPORT FREQUENCY	SAMPLE TYPE*
Flow (gpd)	Once per 6 months	Meter
BOD	—	—
TSS	—	—
Total Cyanide	Once per 6 months	CFP
Cadmium	Once per 6 months	CFP
Zinc	Once per 6 months	CFP
Chromium (total)	Once per 6 months	CFP
Chromium Hexavalent	—	—
Nickel	Once per 6 months	CFP
Copper	Once per 6 months	CFP
Lead	Once per 6 months	CFP
Silver	—	—
FOG (Total)	—	—
FOG (Polar)	—	—
FOG (Non-Polar)	—	—
TROP	Once per 12 months	G
TOPPOC	Once per 12 months	G
Ammonia	Once per 6 months	CFP
pH	—	—
Molybdenum	—	—
Mercury	—	—
Antimony	—	—
Arsenic	—	—
Manganese	—	—

* Composite flow proportional (CFP), composite time proportional (CTP), Grab (G).

1. Representative samples may be taken every hour or half hour properly refrigerated, preserved and composited in proportion to the wastewater flow or a continuous sample may be taken and mixed from which a representative 24 hour sample is taken. This is flow proportional sampling.

   If flow is relatively constant, samples may be taken every 15 minutes and composited. This is time proportional sampling. Where automatic composite sampling is not feasible, a minimum of four grab samples composited together is acceptable if prior approval has been received from the District.

2. All handling and preservation of samples and laboratory analyses of samples shall be performed in accordance with 40 CFR, Part 136 or other Rock River Water Reclamation District approved methods.

These results of the self monitoring will be reported to the Rock River Water Reclamation District on forms to be provided by the District. These reports are due on or before the 20th of January and July for the preceding six months.

3. The semi-annual samples for self monitoring are to be analyzed once every six months and shall consist of a minimum of three daily samples collected in a two week period.

4, *Daily flows are to be recorded from the permittee's flow meter or water meters.*

5. Whenever the analyses for Total FOG exceeds 150 mg/L, the sample shall be analyzed for Non-Polar FOG and reported as Polar and Non-Polar FOG. Polar FOG is Total FOG minus Non-Polar FOG

SECTION IV
Reporting Requirements

1. Monitoring results obtained shall be summarized and reported on an Industrial User Monitoring Report Form provided by the District. The reports are due on or before the 20th of January and July for the preceding two calendar quarters. The report *shall indicate the nature and concentration of all pollutants in the effluent for which sampling and analyses were performed.* The submission of each report shall include the measured maximum and average daily flows.

2. If **Winnebago Reclamation** monitors any pollutant more frequently than required by this permit, using test procedures prescribed in 40 CFR 136 or other Rock River Water Reclamation District approved methods, as specified in this permit, the results of such monitoring shall be included in any calculations of actual daily maximum or monthly average pollutant discharge results and shall be reported in the self monitoring report submitted to the Rock River Water Reclamation District.

3. If the results of the permittee's wastewater analysis indicates that a violation of this permit has occurred, the permittee must:

   A. Inform the Rock River Water Reclamation District of the violation within 24 hours; and

   B. Repeat the sampling and pollutant analysis and submit, in writing, the results of this second analysis within 30 days of the first violation.

4. **Winnebago Reclamation** shall notify the Rock River Water Reclamation District immediately upon the occurrence of an accidental discharge of substances prohibited by District Ordinance 361 or any slug loads or spills that may enter the public sewer. During normal business hours, the Rock River Water Reclamation District should be notified by telephone at 397-9700. At all other times, the Rock River Water Reclamation District shall be notified by telephone at 397-9422.

   This emergency spill report telephone number shall be used after 4:30 p.m., Monday - Friday or weekends and holidays. Notification shall include the location of discharge, date and time of the spill, type of waste spilled, including concentration and *volume and corrective actions taken. The permittee's notification of accidental release(s), in accordance with this section, does* not relieve it of other reporting requirements that arise under Local, State, or Federal laws.

   Within five days following an accidental discharge, the permittee shall report to the Rock River Water Reclamation District a detailed written report.

5. All reports required by this permit shall be submitted to the Rock River Water Reclamation District at the following address:

ROCK RIVER WATER RECLAMATION DISTRICT
3333 KISHWAUKEE STREET - PO BOX 7480
ROCKFORD IL 61126-7480
ATTN: RICHARD W. EICK

SECTION V
Special Conditions

1. The self monitoring reports as required in Section III shall also include measured or estimated average and maximum daily flows for the reporting period. These flows, which should be of the same type stated in Section II of the Wastewater Discharge Permit Application, must be verified. Certification, on forms to be provided by the District, by the permittee of the reported volumes are due with each self monitoring report. Where necessary, the District will require that water meters or other devices as appropriate be installed at the permittees expense to allow the District accurate measurement.

2. *All measurements, tests, and analyses of the characteristics of wastewater shall be determined in accordance with 40 CFR 136.* The following types and numbers of samples shall be taken for applicable regulated pollutants as indicated in Section III unless otherwise specified by the District.

   A. A minimum of 4 grab samples for pH, cyanide, total phenols, FOG, sulfide, and volatile organics. pH grab samples shall be analyzed separately and immediately upon sampling. Grab samples for FOG and volatile organics may be composited at the laboratory using appropriate procedures to ensure that there is no loss prior to analysis of the contaminate being measured. The four grab samples must be taken during consecutive 24 hour period.

B. A minimum of one 24-hour composite sample for all other pollutants.

C. As an alternative to sub-paragraph (a), cyanide, phenols and sulfide may be taken as part of a 24-hour composite sample if proper preservation techniques are used. If grab samples for these pollutants are taken, they may be composited prior to analysis.

3. Where the District performs any of the required sampling and analysis in Section III in lieu of the industrial user, the user will not be required to analyze for those pollutants. However, the industrial user shall provide analysis for those regulated pollutants that were not monitored for by the District.

SECTION VI
Standard Conditions

The following standard conditions apply to each wastewater discharge permit issued by the Rock River Water Reclamation District.

1. **Winnebago Reclamation** must comply with all conditions of this permit. Failure to comply with requirements of this permit may be grounds for administrative action including, but not limited to, the District's enforcement procedures and penalties pursuant to Ordinance 361, Article VII, Section I.

2. The District shall notify **Winnebago Reclamation** two hundred ten (210) days prior to the expiration of **Winnebago Reclamation** permit. Within seventy five (75) days of the notification, **Winnebago Reclamation** shall apply for reissuance of the permit on application forms provided by the District. The terms and conditions of the permit are subject to modification by the District during the terms of the permit as limitations or requirements are modified or for other just cause. This permit may be re-opened and modified to incorporate any new or revised requirements contained in the National Categorical Pretreatment Standard or this permit may be re-opened or modified to incorporate any new or revised requirements resulting from Rock River Water Reclamation District re-evaluation of its Local Limits or this permit may be re-opened or modified to incorporate any new or revised requirements developed by Rock River Water Reclamation District as are necessary to insure compliance with applicable sludge management requirements promulgated by EPA (40 CFR 503). **Winnebago Reclamation** shall be informed of any proposed changes in this permit at least thirty (30) days prior to the effective date of change. Changes or additions to the permit shall include a time schedule for compliance.

3. This permit shall be revoked because:

   A. Falsification or intentional misrepresentation of data or statements pertaining to the wastewater discharge permit application or any required reporting form, or

   B. When, after inspection, monitoring or analysis, it is determined that the discharge of wastewater to the sanitary sewer is in violation of Federal, State, or District laws, ordinances or regulations.

4. **Winnebago Reclamation** may petition to appeal the terms of this permit within thirty (30) days of notice of the permit.

5. This permit is issued to **Winnebago Reclamation** for the specific operation or operations permitted and is not transferrable without the approval of the District.

6. No discharge permit shall be issued to any user whose discharge of pollutants to the sanitary sewer whether shown upon the application or determined after inspection, monitoring or analysis by the District is not in conformance with Federal, State or District laws, ordinances, or regulations. The Board may grant interim limits of District standards and requirements in accordance with Ordinance 361, Article VI, Section 3, D.

7. **Winnebago Reclamation** shall not increase the use of potable or process water or, in any way, attempt to dilute an effluent as a partial or complete substitute for adequate treatment to achieve compliance with the limitations contained in this permit.

8. Bypass of any pretreatment is prohibited and District shall take enforcement action against an industrial user for a bypass unless a) Bypass was unavoidable to prevent loss of life, personal injury or severe property damage, b) There were no feasible alternatives to the bypass limited to the use of auxiliary treatment facilities, retention of untreated wastes or maintenance during normal periods of equipment down time. This condition is not satisfied if adequate back up equipment should have been installed in the exercise of reasonable engineering judgement to prevent a bypass during normal periods of equipment down time or preventative maintenance, and c) The industrial user submitted notices as required under Ordinance 361, Article VI, Section 7.

9. Where required, **Winnebago Reclamation** shall provide monitoring facilities, install and maintain at all times, at the users expense to allow inspection, sampling, and flow measurement at locations identified in Section III of this permit. There shall be ample room in and near such monitoring facilities to allow sampling and monitoring equipment to be installed and to prepare samples for analysis.

   Such facilities shall be accessible to authorized representatives of the District at all times upon presentation of suitable identification from 8:00 a.m. to 5:00 p.m. fives days per week, provided that authorized representatives of the District personnel shall under exceptional circumstances have access upon presentation of suitable identification from 8:00 a.m. to 5:00 p.m. seven days per week.

   Where required by Federal or State regulations, such monitoring facilities shall be provided at the end of a process or unit of production from which regulated toxic pollutants are discharged.

10. If flow measurement is required by this permit, the appropriate flow measurement devices and methods consistent with approved scientific practices shall be selected and used to insure the accuracy and reliability of measurements of the volume of monitored discharges. The devices shall be installed, calibrated, and maintained to insure that the accuracy of the measurements are consistent with the accepted capability of that type of device. The devices selected shall be capable of measuring flows through a maximum deviation of less than 10% from true discharge rates throughout the range of expected discharge volumes.

11. **Winnebago Reclamation** shall allow the Rock River Water Reclamation District or an authorized representative, upon the presentation of suitable identification as may be required by law to enter the premises, have access to and copy any records that must be kept under the conditions of this permit, inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices or operations regulated or required under this permit, sample or monitor any substances or parameters at any location, and inspect any production manufacturing fabricating or storage are where pollutants regulated under this permit could originate, be stored, or be discharged to the sanitary sewer.

12. **Winnebago Reclamation** shall retain wastewater monitoring records for a period of three years. During this period, said record shall be available for inspection and duplication by authorized representatives of the District.

13. **Winnebago Reclamation** shall notify the District prior to the introduction of new wastewater or pollutants or any substantial change in the volume or characteristics of the wastewater being introduced into the POTW from the users processes. Formal written notification shall follow within thirty (30) days of such introduction on "Change of Condition" forms provided by the District.

14. **Winnebago Reclamation** shall develop a Slug Control Plan designed to prevent slug loading discharges. The plan shall include specific requirements of a Slug Control Plan based upon a Slug Control Plan Evaluation performed by the District and outlined under separate correspondence.

    Upon development of a written Slug Control Plan, **Winnebago Reclamation** shall comply with the conditions stated within such plan. Failure to comply with the Slug Control Plan provisions submitted to the District shall constitute a violation of this permit, as well as the specific requirements of District Ordinance 361.

15. The user that experiences an upset in operations or any accidental or slug discharge to the sanitary sewer that places the permittee in a temporary state of non-compliance with the provisions of this permit or with Ordinance 361 shall inform the Rock River Water Reclamation District within 24 hours of becoming aware of the upset. A written follow up report of the upset shall be filed by the permittee with the Rock River Water Reclamation District within five (5) days.

    The report shall specify: a) Description of the upset, the cause(s) thereof and the upsets impact on the permittee's compliance status; b) Duration of non-compliance including exact dates and times of non-compliance, and if not corrected, the anticipated time the non-compliance is expected to continue; and steps taken or to be taken to reduce, eliminate and prevent recurrence of such an upset.

16. *A list of all industrial users, which were subject to the District's enforcement management system during the previous 12 months* shall be published annually by the Rock River Water Reclamation District in the largest daily newspaper within it's service area. Accordingly, the permittee is apprised that non-compliance with this permit may lead to an enforcement action and may result in publication of it's name in appropriate newspaper in accordance with District Ordinance 361, Article VI, Section 8.

17. Nothing in this permit shall be construed to relieve the permittee from civil and/or criminal penalties for non-compliance under Ordinance 361, Article VII or State or Federal laws or regulations.

    In addition to civil and criminal liability, the permittee violating any of the provisions of this permit or Ordinance 361 or causing damage to otherwise inhibiting the Rock River Water Reclamation District wastewater disposal system shall be liable to the Rock River Water Reclamation District for any expense, loss, or damage caused by such violation or discharge. The Rock River Water Reclamation District shall bill the permittee for the cost incurred by the Rock River Water Reclamation District for any cleaning, repair, or replacement work caused by the violation or discharge. Refusal to pay the assess costs shall constitute a separate violation of Ordinance 361.

ATTACHMENT A
DISCHARGE SCREENING LEVELS BASED ON GAS/VAPOR TOXICITY AND EXPLOSIVITY (1)
TOXIC/REACTIVE ORGANIC POLLUTANT (TROP)

COMPOUND	Local Limit (mg/l)
Acrylonitrile	1.19
Benzene	0.13
Bromomethane (4)	0.002
Carbon disulfide	0.06
Carbon tetrachloride	0.03
Chlorobenzene	2.31
Chloroethane	1.6
Chloroform	0.41
Chloromethane	0.29
1,2-Dichlorobenzene	3.75
1,4-Dichlorobenzene	3.55
Dichlorodifluoromethane	0.04
1,1-Dichloroethane	4.58
trans-1,2-dichloroethylene	0.28
1,2-dichloropropane	3.62
1,3-Dichloropropene	0.08
Ethyl benzene	1.59
Ethylene dichloride	1.05
Formaldehyde	0.06
Heptachlor (4)	0.003
Hexachloro-1,3 butadiene (4)	0.0002
Hexachloroethane	0.93
Methly ethyl ketone	249
Methylene chloride	2.06
Napthalene	Reserved
Nitrobenzene	Reserved
Tetrachloroethylene	0.53
Toluene	1.36
1,2,4-Trichlorobenzene	0.39
1,1,1-Trichloroethane	1.55
Trichloroethylene	0.71
Trichlorofluoromethane	1.23
Vinyl chloride (4)	0.004
Vinylidene chloride	0.003
Aroclor 1242 (2)	0.01
Aroclor 1254 (2) (4)	0.005

(1) Ref: Guide to Protect POTW Workers from Toxic and Reactive Gases and Vapors (EPA). EP 812-V-92-001 NTIS #PB92-173-236, June 1992. Table 4-2.

(2) Analyzed using GC.

(4) Concentrations below the GC/MS detection limit must be confirmed by GC.

ATTACHMENT B

ROCK RIVER WATER RECLAMATION DISTRICT

Total Organic Priority Pollutants of Concern (TOPPOC) to
Prevent Pass Through, Sludge Contamination, and Inhibition at the Treatment Plant

Base/Neutral Compounds	Pesticides and PCBs	Volatile Compounds
Acenaphthene	Aldrin	Acrolein
Anthracene	Alpha-BHC	Chlorodibromomethane
Benzo(a)Anthracene	Beta-BHC	2-Chloroethylvinyl Ether
Benzo(b)Fluoranthene	4,4'DDT	Dichlorobromomethane
Benzo(k)Fluoranthene	4,4'-DDD	1,2-Dichloroethane
4-Chlorophenyl Phenyl Ether	Alpha-endosulfan	Methyl Chloride
Dibenzo(a,h)Anthracene	Endosulfan Sulfate	1,1,2,2-Tetrachloroethane
1,3-Dichlorobenzene	Endrin Aldehyde	Bromoform
3,3-Dichlorobenzidine	Heptachlor Epoxide	1,1-Dichloroethylene
2,4-Dinithrotoluene	PCB-1232	Methyl Bromide
Fluoranthene	PCB-1260	1,1,2-Trichloroethane
Fluorene	Toxaphene	
Isophorone	Gamma-BHC	
Nitrobenzene	Delta-BHC	
N-Nitrosodi-N-Propylamine	Chlordane	**Miscellaneous**
Phenanthrene	4,4'-DDE	2,3,7,8-Tetrachlorodibenzo-P-Dioxin (TCDD)
Acenaphthylene	Dieldrin	
Benzidine	Beta-Endosulfan	
Benzo(a)Pyrene	Endrin	
Benzo(ghi)Perylene	PCB-1221	
Bis(2-Chloroethoxy)Methane	PCB-1248	
Bis(2-Chloroisopropyl)Ether	PCB-1016	
4-Bromophenyl Phenyl Ether		
2-Chloronaphthalene		
Chrysene	**Acid Compounds**	
2,6-Dinitrotoluene	4,6-Dinitro-O-Cresol	
1,2-Diphenylhydrazine (as Azobenzene)	P-Chloto-M-Cresol	
Hexachlorobenzene		
Hexachlorocyclopentadien		
Indeno(1,2,3-cd)Pyrene		
Naphthalene		
N-Nitrosodimethylamine		
N-Nitrosodiphenylamine		
Pyrene		

* Source: 40CFR Part 403 Appendix B

Water Reclamation District
3333 Kishwaukee St. • P.O. Box 7480 • Rockford, IL 61126-7480 • (815) 397-9700 • Fax (815) 397-75

March 13, 1991

Winnebago Reclamation
Mr. James Kroeplin
4920 Forest Hills Road
Rockford, IL 61111

RE: General Wastewater Discharge Permit No. 122G

Dear Mr. Kroeplin:

At the February 25, 1991, Rock River Water Reclamation District Board of Trustees' meeting, the board approved your General Wastewater Discharge Permit No 122G.

The District will send you a notification 180 days prior to the expiration of your permit. Within 90 days of notification, you must apply for reissuance of your permit. You will be supplied with a form. The terms and conditions of your permits are subject to modification by the District during the term of the permit as limitations or requirements as identified in Ordinance 361, Article IV, Section 2 are modified or other just cause exists. You will be informed of any proposed changes in your permit at least 30 days prior to the effective date of change. Where any changes are made in a user's permit, a reasonable time will be given to achieve compliance.

Please pay particular attention to Page 3 on which your self monitoring requirements are written. Enclosed is your copy of the General Permit. If you have any questions regarding your permit, please contact my office.

Sincerely,

ROCK RIVER WATER RECLAMATION DISTRICT

Richard W. Eick

Richard W. Eick
Plant Operations Manager

Enclosures
ls letters\renu

TRUSTEES

Robert Stringer, President
Frank St. Angel, Vice President
Roger Erkert, Clerk/Treasurer
Lillie King, Trustee
Donald Massler, Trustee

Jon L. Olson, District Director

Copy

WDP 122G

Amended

RRWRD# 1127

ROCK RIVER WATER RECLAMATION DISTRICT

GENERAL WASTEWATER DISCHARGE PERMIT

SECTION I

WINNEBAGO RECLAMATION
(Company Name)

Business Address

Street 4920 Forest Hills Road

City Rockford Zip 61111

Location of Premise Permitted

Street 8304 Lindenwood Road

City Rockford Zip 61109

The above name Industrial User is hereby authorized to discharge wastewater to the Rock River Water Reclamation District subject to said Industrial User's compliance with applicable pretreatment standards and the terms and conditions stated in this permit.

Issuance Date February 25, 1991

Expiration Date February 25, 1996

Chief Class I Operator — February 25, 1991 Date

District Director — February 25, 1991 Date

Rock River Water Reclamation District Board President — February 25, 1991 Date

SECTION II

DISCHARGE LIMITATIONS

A. Winnebago Reclamation shall not discharge or cause to be discharged any stormwater, foundation drainwater, groundwater, roof runoff, surface drainage, cooling waters, or any unpolluted water to any sanitary sewer.

B. Winnebago Reclamation shall not contribute or causes to be contributed, directly or indirectly, any pollutant or wastewater which will interfere with the operation or performance of the POTW. The following general prohibitions shall apply to all Users of District's POTW whether or not a User is subject to National Categorical Pretreatment Standards or any other National, State or local pretreatment standards, or requirements. A User may not contribute the following substances to District's POTW:

1. Any liquids, solids or gases which by reason of their nature or quantity are, or may be, sufficient either alone or by interaction with other substances to cause fire or explosion or be injurious or hazardous in any other way to the POTW or to the operation of the POTW. At no time, shall two successive readings on a meter capable of reading L.E.L. (lower explosive limit) at a point at the nearest accessible point to the POTW in a sanitary sewer, at the point

of discharge into the POTW, or at any point in the POTW be more than five percent (5%) nor any single reading greater than ten percent (10%). Materials in this subsection include, but are not limited to, gasoline, kerosene, naphtha, benzene, toluene,xylene, ethers, alcohols, ketones,. aldehydes, peroxides, chlorates, perchlorates, bromates, polychlorinated biphenlys, polybrominated biphenlys, carbides, hydrides, stoddard solvents and sulfides.

2. Solid or viscous substances which may cause obstruction to the flow in a sewer or other interference with the operation of the wastewater treatment facilities such as, but not limited to: grease, garbage with particles greater than on-half inch (1/2") in any dimension, animal guts or tissues, paunch manure, bones, hair, hides or fleshings, entrails, whole blood, feathers, ashes, cinders, sand, spent lime, stone or marble dust, metal, glass, straw, shavings, grass clippings, rags, spent grains, spent hops, waste paper, wood, plastics, tar, asphalt residues from refining or processing of fuel or lubricating oil, mud or glass grinding or polishing wastes, or tumbling and de-burring stones.

3. Any wastewater having a Ph less than 5.0, unless more strictly limited elsewhere in the ordinance.

4. Any wastewater containing incompatible pollutants in sufficient quantity, either singly or by interaction with other pollutants, to injure or interfere with any wastewater treatment process, a hazard to humans or animals, crease an incompatible effect in the receiving water or the POTW, exceed the limitation set forth in the categorical pretreatment standard (when effective), or in Section 3 of Ordinance 361, Article IV or create a public nuisance. An incompatible pollutant shall include, but not be limited to, any pollutant identified pursuant to Section 307(a) of the Act.

5. Any noxious or malodorous liquids, gases, or solids which either singly or by interaction with other wastewaters are sufficient to create a public nuisance or hazard to life or are sufficient to prevent entry into sewers for their maintenance and repair.

6. In no case shall a substance discharged into the POTW cause the POTW to be in non-compliance with sludge use or disposal criteria, guideline or regulations de eloped under Section 405 of the Act; any criteria guidelines or regulations affecting a sludge use or disposal developed pursuant to the RCRA, SWDA, the Clean Water Act, the Toxic Substances control Act, or State criteria applicable to the sludge management method being used.

7. Any substance which will cause the POTW to violate its NPDES Permit or receiving water quality standards.

8. Any wastewater having a temperature at the point or discharge to the POTW which will inhibit biological activity in the POTW treatment plant resulting in interference; and in no case shall wastewater be introduced to the POTW which exceeds 65°C (157°F) or which exceeds 40°C (104°F) at the POTW treatment plant.

9. Any pollutants, including compatible pollutants released at the flow or pollutant concentration which a User knows or has reason to know will cause interference to the POTW. In no case shall a slug measured at the point of discharge to the POTW have a flow rate or contain concentrations of pollutants that exceed, more than five (5) times the average twenty-four (24) concentrations, or 24-hour flow during normal operation; provided, however, that a User subject to National Categorical Pretreatment Standards shall comply with such standards in addition to this subsection B.9.

10. Any wastewater containing any radioactive wastes or isotopes of such halflife or concentration as may exceed limits established by State or Federal regulations.

11. Any wastewater which may contain more than 250 mg/l weight of fat, oil, grease (FOG) or freon extractable material.

12. Any wastewater containing BOD, total solids, or suspended solids of such character and quantity that unusual attention or expense is required to handle such materials at the sewage treatment plant; provided however, that a User may be permitted by specific, written agreement with the District, which agreement to discharge such BOD or TSS may provide for special charges, payments or provisions for treating and testing equipment.

13. Ammonia nitrogen in amounts that would cause District to fail to comply with regulations of IEPA.

Discharges from each separate discharge of Winnebago Reclamation, as measured under the provisions of the ordinance, shall not during the period set forth in this section, contain in excess of the following concentrations based upon a 24-hour composite sample. Multiple industrial wastewater discharges from a permitted facility may be combined in a flow weighted manner to determine compliance with the following limitations for a 24-hour composite sample:

Cyanide, Total by Distillation	1.7 mg/l
Cadmium, Total	0.9 mg/l
Zinc, Total	20.0 mg/l
Chromium, Total Hexavalent, Plus Total Trivalent	25.0 mg/l
Nickel, Total	10.0 mg/l
Iron, Total	100.0 mg/l
Copper, Total	15.0 mg/l
Lead, Total	5.0 mg/l
Manganese, Total	100.0 mg/l
Antimony, Total	30.0 mg/l
Arsenic, Total	7.0 mg/l
Silver, Total	12.0 mg/l

SECTION III
SELF MONITORING REQUIREMENTS

Representative samples may be taken every hour or half hour, properly refrigerated, preserved, and composited in proportion to the wastewater flow or a continuous sample may be taken and mixed from which a representative 24-hour sample is taken. If flow is relatively constant, samples may be taken every 15 minutes and composited.

These samples shall be analyzed using procedures outlined in Standard Methods or other ROCK RIVER WATER RECLAMATION DISTRICT approved methods.

Representative wastewater samples shall be taken by Winnebago Reclamation in accordance with the following schedule. The results will be reported semi-annually to the ROCK RIVER WATER RECLAMATION DISTRICT on a form, Statement of Industrial Discharge Quality. These reports are due on or before the 20th day of the month following the end of January and July.

Self Monitoring Schedule

Sampling Point	Frequency of Sampling	Pollutants to be Analyzed
Manhole #4 Station 20 Rydberg Rd	Twice a Year	Copper, Nickel, Zinc, T Chromium, Lead, Cadmium, Cyanide, Ammonia (N)
Manhole #4 Station 20 Rydberg Rd	Twice a Year	Total Organic Priority Pollutants

Samples shall be taken flow proportionally. Volatiles samples shall be a grab.

SECTION IV

Compliance Schedule

NOT APPLICABLE

SECTION V

SPECIAL CONDITIONS

1. The District shall be granted written access rights to the dedicated sampling manhole. Should public sewer ever be extended from this location, a public manhole will be required to be installed downstream of manhole Number 4, Station 20.0.

SECTION VI

WASTEWATER DISCHARGE PERMIT STANDARD CONDITIONS

The following Standard Conditions apply to each Wastewater Discharge Permit issued by the ROCK RIVER WATER RECLAMATION DISTRICT.

1. Where required, Winnebago Reclamation shall provide monitoring facilities, installed and maintained at all times at the User's expense to allow inspection, sampling, and flow measurement at locations specified in Section III of this permit. There shall be ample room in and near such monitoring facilities to allow accurate sampling and monitoring equipment to be installed and to prepare samples for analysis. Such facilities shall be accessible to authorized representatives of the district at all times upon presentation of suitable identification from 8:00 a.m. to 5:00 p.m. five days per week provided that authorized representatives of the District personnel shall under exceptional circumstances have access upon presentation of suitable identification from 8:00 a.m. to 5:00 p.m. seven days per week. Where required by Federal or State Regulations, such monitoring facilities shall be provided at the end of a process or until production from which regulated toxic pollutants are discharged. These facilities shall be installed in the Rydberg manhole identified as Monitoring Manhole #4, Station 20.0. This manhole shall be a private manhole maintained by Winnebago Reclamation for purposes of this section.

2. Behr Metals shall retain wastewater monitoring records for a period of three (3) years. During this period said records shall be available for inspection and duplication by authorized representatives of the ROCK RIVER WATER RECLAMATION DISTRICT.

3. Winnebago Reclamation shall notify the ROCK RIVER WATER RECLAMATION DISTRICT prior to the introduction of new wastewater or pollutants or any substantial change in the volume or characteristics of the wastewater being introduced into the POTW from the User's processes. Formal written notification shall follow within 30 days of such introduction.

4. Winnebago Reclamation shall notify the ROCK RIVER WATER RECLAMATION DISTRICT immediately upon any accidental or slug discharge to the sanitary sewer as outlined in the industrial spill reporting requirements of the District.

5. No discharge permit shall be issued to any user whose discharge of pollutants to the sanitary sewer whether shown upon the application or determined after inspection, monitoring or analysis by the District, is not in conformance with Federal, State, or ROCK RIVER WATER RECLAMATION DISTRICT laws, ordinances or regulations. The Board may grant variances of District standards and requirements in accordance with District ordinance.

6. The discharge Permit issued to Winnebago Reclamation by the ROCK RIVER WATER RECLAMATION DISTRICT may be revoked when, after inspection, monitoring or analysis it is determined that the discharge of wastewater to the sanitary sewer is in violation of Federal, State, or District laws, ordinances or regulations.

7. This permit shall be revoked due to falsification or intentional misrepresentation of data or statements pertaining to the General Wastewater Discharge Permit Application or any required reporting form.

8. The District shall notify Winnebago Reclamation one hundred and eighty (180) days prior to the expiration of the User's permit. Within ninety (90) days of the notification, the User shall apply (for reissuance of the permit) on a form provided by the District. The terms and conditions of the permit are subject to modification by the ROCK RIVER WATER RECLAMATION DISTRICT during the term of the permit as limitations or requirements are modified or for other just cause. The user shall be informed of any proposed changes in this permit at least 30 days prior to the effective date of change. changes or additions of the permit shall include a time schedule for compliance.

9. This Permit is issued to Winnebago Reclamation for the specific operation or operations permitted and is not transferrable without the approval of the District.

10. Not later than fourteen (14) days following each date in the compliance schedule and the final date for compliance given by Behr Metals in the General Wastewater Discharge Permit Application and included as part of this permit, the User shall submit a progress report to the Director.

11. The compliance dates for the increments of progress given the compliance schedule, will be revised only at the discretion of the District. Failure to meet the compliance dates without just reason for delay is a violation of the conditions of this permit.

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

217/782-6762

AUGUST 17, 1990 WASTE STREAM NUMBER 850518
APPLICATION RECEIVED: 07/26/90 PERMIT EXPIRES: 08/19/95
PERMIT NUMBER 850518-2010300045
PERMIT ISSUED TO:

ROCKFORD SANITARY DISTRICT
3333 KISHWAUKEE ST
P.O. BOX 918
ROCKFORD , IL
611267480

ROCKFORD SANITARY DISTRICT
3333 KISHWAUKEE ST
P.O. BOX 918
ROCKFORD , IL
611267480

WASTE NAME: LEACHATE
WASTE CLASS AS: NON-HAZARDOUS

PERMIT TO RECEIVE THE INDICATED WASTE IS GRANTED.

SITE NAME: ROCKFORD SANITARY DISTRICT IEPA SITE NO.: 2010300045

DISPOSITION OF WASTE: 20
WASTE TREATMENT

WASTE TREATMENT: 22
BIOLOGICAL TREATMENT
STORAGE:

ATTENTION: JOHN LICHTY IEPA GENERATOR NO.: 2010153002
WASTE GENERATOR: WINNEBAGO RECLAMATION SERVICE
600 BOYLSTON ST
LOVES PARK IL
61111

THIS PERMIT IS GRANTED SUBJECT TO THE ATTACHED STANDARD CONDITIONS AND ANY SPECIAL CONDITIONS LISTED BELOW.

Lawrence W. Eastep by DWK

LWE:MAS
CC:WINNEBAGO RECLAMATION SERVICE
REGION: ROCKFORD

LAWRENCE W. EASTEP, P.E.
MANAGER, PERMIT SECTION
DIVISION OF LAND POLLUTION CONTROL

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
WATER POLLUTION CONTROL PERMIT

LOG NUMBERS: 2120-90 PERMIT NO.: 1991-EN-2120

FINAL PLANS, SPECIFICATIONS, APPLICATION AND SUPPORTING DOCUMENTS DATE ISSUED: January 16, 1991
PREPARED BY: Rockford Blacktop Construction Company -- James Kroeplin

SUBJECT: WINNEBAGO RECLAMATION, INC. (PAGELS LANDFILL) -- Sewer Connection for Landfill Leachate -- Sanitary District of Rockford

PERMITTEE TO CONSTRUCT
Winnebago Reclamation, Inc.
P.O. Box 2071
Loves Park, Illinois 61130

Permit is hereby granted to the above designated permittee to construct water pollution control facilities described as follows:

Installation of 6,750 linear feet of 4 inch PVC pipe and all necessary pumps, pressure relief valves, drain valves, and appurtenances required to serve the existing landfill leachate collection system located at Pagel's Landfill in Winnebago County. Discharge (DAF = 21,000 gpd, DMF = 42,000 gpd, PE = 701) will be to the Rockford Sanitary District via a proposed 8 inch sewer extension to be located along the west side of Rydberg Road.

This Permit is issued subject to the following Special Condition(s). If such Special Condition(s) require(s) additional or revised facilities, satisfactory engineering plan documents must be submitted to this Agency for review and approval for issuance of a Supplement Permit.

SPECIAL CONDITION 1: The operational portion of this permit is contingent upon completion of construction and start of operation of all down stream transporting and treating facilities.

SPECIAL CONDITION 2: The issuance of this permit does not relieve the permittee of the responsibility of complying with 35 Ill. Adm. Code, Part 307 and/or the General Pretreatment Regulations (40 CFR 403) and any guidelines developed pursuant to Section 301, 306, or 307 of the Federal Clean Water Act of 1977.

SPECIAL CONDITION 3: The issuance of this permit does not relieve the permittee of the responsibility of complying with any limitations and provisions imposed by Sanitary District of Rockford.

Continued on Page 2

THE STANDARD CONDITIONS OF ISSUANCE INDICATED ON THE REVERSE SIDE MUST BE COMPLIED WITH IN FULL. READ ALL CONDITIONS CAREFULLY.

TGM:SFN/mls/4322n/1-2
cc: EPA - Rockford Region
Rockford Blacktop Construction Co.
Sanitary District of Rockford
Record
Binds

DIVISION OF WATER POLLUTION CONTROL

Thomas G. McSwiggin, P.E.
Manager, Permit Section

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
WATER POLLUTION CONTROL PERMIT

LOG NUMBERS: 2120-90 PERMIT NO.: 1991-EN-2120

FINAL PLANS, SPECIFICATIONS, APPLICATION AND SUPPORTING DOCUMENTS DATE ISSUED: January 16, 1991
PREPARED BY: Rockford Blacktop Construction Company -- James Kroeplin

SUBJECT: WINNEBAGO RECLAMATION, INC. (PAGELS LANDFILL) -- Sewer Connection for Landfill Leachate -- Sanitary District of Rockford

SPECIAL CONDITION 4: The operation of this sewer connection shall be governed by the Sanitary District of Rockford and their pretreatment program. However, flows or loadings beyond those permitted in this permit or addition of any pretreatment equipment must be done in accordance with 35 Ill. Adm. Code 309.201.

SPECIAL CONDITION 5: Standard Specifications for Water and Sewer Main Construction in Illinois, Current Edition, shall govern the materials, material testing, construction and project testing of this sanitary sewer project.

SPECIAL CONDITION 6:

a) Liquids, solids, or gases which by reason of their nature or quantity may cause fire or explosion; or be injurious in any other way to sewers, treatment works, structures or to the operation of the treatment works, or cause a safety hazard to the personnel operating the treatment works, or cause the effluent from the treatment works to violate applicable effluent standards are prohibited;

b) Solid or viscous wastes which cause obstruction to the flow in sewers or other interference with the proper operation of any sewer or treatment works are prohibited.

SPECIAL CONDITION 7: All sludges generated on site and at cleanouts shall be disposed of at a site and in a manner acceptable to the Agency.

SPECIAL CONDITION 8: When wastewater is recovered from any cleanout point along this connection, it must be either returned to the landfill leachate collection system or disposed of at some point along the sewer connection described in this permit. If wastewater is to be disposed of at any other location, it must be done in accordance with the permit requirements of 35 Ill. Adm. Code 309.201.

READ ALL CONDITIONS CAREFULLY:
STANDARD CONDITIONS

The Illinois Environmental Protection Act (Illinois Revised Statutes, Chapter 111-1/2, Section 1039) grants the Environmental Protection Agency authority to impose conditions on permits which it issues.

1. Unless the construction for which this permit is issued has been completed, this permit will expire (1) two years after the date of issuance for permits to construct sewers or wastewater sources or (2) three years after the date of issuance for permits to construct treatment works or pretreatment works.

2. The construction or development of facilities covered by this permit shall be done in compliance with applicable provisions of Federal laws and regulations, the Illinois Environmental Protection Act, and Rules and Regulations adopted by the Illinois Pollution Control Board.

3. There shall be no deviations from the approved plans and specifications unless a written request for modification of the project, along with plans and specifications as required, shall have been submitted to the Agency and a supplemental written permit issued.

4. The permittee shall allow any agent duly authorized by the Agency upon the presentation of credentials:

   a. to enter at reasonable times, the permittee's premises where actual or potential effluent, emission or noise sources are located or where any activity is to be conducted pursuant to this permit,

   b. to have access to and copy at reasonable times any records required to be kept under the terms and conditions of this permit,

   c. to inspect at reasonable times, including during any hours of operation of equipment constructed or operated under this permit, such equipment or monitoring methodology or equipment required to be kept, used, operated, calibrated and maintained under this permit,

   d. to obtain and remove at reasonable times samples of any discharge or emission of pollutants,

   e. to enter at reasonable times and utilize any photographic, recording, testing, monitoring or other equipment for the purpose of preserving, testing, monitoring, or recording any activity, discharge, or emission authorized by this permit.

5. The issuance of this permit:

   a. shall not be considered as in any manner affecting the title of the premises upon which the permitted facilities are to be located;

   b. does not release the permittee from any liability for damage to person or property caused by or resulting from the construction, maintenance, or operation of the proposed facilities;

   c. does not release the permittee from compliance with other applicable statutes and regulations of the United States, of the State of Illinois, or with applicable local laws, ordinances and regulations;

   d. does not take into consideration or attest to the structural stability of any units or parts of the project;

   e. in no manner implies or suggests that the Agency (or its officers, agents or employees) assumes any liability, directly or indirectly, for any loss due to damage, installation, maintenance, or operation of the proposed equipment or facility.

6. Unless a joint construction/operation permit has been issued, a permit for operating shall be obtained from the Agency before the facility or equipment covered by this permit is placed into operation.

7. These standard conditions shall prevail unless modified by special conditions.

8. The Agency may file a complaint with the Board for suspension or revocation of a permit:

   a. upon discovery that the permit application contained misrepresentations, misinformation or false statements or that all relevant facts were not disclosed; or

   b. upon finding that any standard or special conditions have been violated; or

   c. upon any violation of the Environmental Protection Act or any Rule or Regulation effective thereunder as a result of the construction or development authorized by this permit.

PRINTED ON RECYCLED PAPER

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
WATER POLLUTION CONTROL PERMIT

LOG NUMBERS: 2118-90 PERMIT NO.: 1991-HB-2118

FINAL PLANS, SPECIFICATIONS, APPLICATION AND SUPPORTING DOCUMENTS
PREPARED BY: Rockford Blacktop Construction Co.

DATE ISSUED: January 23, 1991

SUBJECT: ROCK RIVER WATER RECLAMATION DISTRICT - Pagels Landfill (Rock River Water Reclamation District Sewage Treatment Plant) -- Sanitary Sewer Permit

PERMITTEE TO CONSTRUCT
Winnebago Reclamation, Inc.
Post Office Box 2071
Loves Park, Illinois 61130

PERMITTEE TO OWN AND OPERATE
Rock River Water Reclamation District
3333 Kishwaukee Street
Rockford, Illinois 61109

Permit is hereby granted to the above designated permittee(s) to construct and/or operate water pollution control facilities described as follows (quantities are approximate):

1378 feet of 8 inch sanitary sewer, and 4 manhole(s) to serve a landfill leachate collection system (0 P.E., 0 GPD DAF) located at Baxter Road and Rydberg Road with discharge to an existing 12 inch sanitary sewer tributary to the above indicated sewage treatment plant.

This Permit is issued subject to the following Special Condition(s). If such Special Condition(s) require(s) additional or revised facilities, satisfactory engineering plan documents must be submitted to this Agency for review and approval for issuance of a Supplement Permit.

1. Any connections to this sanitary sewer extension must be in accordance with this permit and the latest Revisions of Subtitle C, Chapter 1. Permits must be obtained if required by said regulations.

2. Standard Specifications for Water and Sewer Main Construction in Illinois, Current Edition, shall govern the materials, material testing, construction and project testing of this sanitary sewer project.

3. If this project is located within a wetlands, the U.S. Army Corps of Engineers may require a permit for construction pursuant to Section 404 of the Clean Water Act.

4. The proposed sanitary sewer connection from Pagels landfill shall not be constructed until all of the necessary approvals and/or permits from this Agency have been obtained by the above referenced Permittees.

THE STANDARD CONDITIONS OF ISSUANCE INDICATED ON THE REVERSE SIDE MUST BE COMPLIED WITH IN FULL. READ ALL CONDITIONS CAREFULLY.

TGM:MPH:kkw/4325n,56
cc: EPA - Region 1
Rockford Blacktop Construction Co.
Records
Binds

DIVISION OF WATER POLLUTION CONTROL

Thomas G. McSwiggin, P.E.
Manager, Permit Section

Rockford Blacktop Construction Company

November 26, 1990

Illinois Environmental Protection Agency
Division of Water Pollution Control
2200 Churchill Rd.
P.O. Box 19276
Springfield, IL 62794-9276

Earthmoving, asphalt paving, highway and underground construction

5290 Nimtz Road
Loves Park
Illinois 61111

P.O. Box 2071
Loves Park
Illinois 61130

815.654.4700
815.654.4736

Attn: Mr. Steve Nightingale

Reference Log 2120-90

Re: Pagels Landfill Sanitary Sewer

Dear Mr. Nightingale:

In response to our recent phone conversation, I have enclosed a brief explanation of the proposed system. Currently, landfill leachate is pumped to an existing storage pond on top of the landfill. From this pond, the leachate is transferred into tanker trucks and hauled to the Rock River Water Reclamation District for treatment. The proposed sewer line would be used to discharge leachate directly from the landfill to the existing sewer.

Attached are the calculations showing the proposed design flows and velocities when the system is in operation. Sketches of the leachate storage pond and elevated tank are also included.

As previously discussed, the leachate will continue to be pumped into the storage pond on top of the landfill. From the pond, it will be pumped into the elevated storage tank. The primary purpose of the tank is to provide temporary storage to eliminate continuous pumping.

In the event that the sewer line is not in use for an extended period of time or if sedimentation occurs, the separate sections of the 4" pipe can be drained through the drain manholes. Sedimentation would most likely occur at these points and could be controlled by draining the sediment into the manhole and then pumping into a tanker and hauling to the sewer plant.

Please be advised that actual separating conditions will change based on operations at the landfill. In the event that this 4" line is not adequate, a pumping station could be added to increase the capacity of the system.

Should you have any additional questions during your review, please feel free to contact me.

Sincerely,

ROCKFORD BLACKTOP CONSTRUCTION CO.

James W. Kroeplin, P.E.

JWK:ji

Enc.

ROCKFORD BLACKTOP
CONSTRUCTION CO.
PO BOX 2071 LOVES PARK, ILLINOIS 61130 815/654-4700
FAX #815/654-4736

Design maximum flow = 42,000 G.P.D.
= 29.16 G.P.M.

From Head loss tables

4" PVC SDR 26 30 GPM

Velocity .72 ft/sec
head loss .05 ft/100 ft.

Length of 4" service 6750 LF. = 67.5 100 ft

head loss due to friction

67.5 × .05 = 3.375 ft.

Available head.

Elevation of ground @ landfill top	185.0
Elevation of pipe invert @ gravity	170.2
Available head	14.8 ft

Max flow due to available head.

$\frac{14.8 \text{ ft}}{67.5 \ 100\text{ft}}$ = .22 ft/100 ft. max head loss.

From head loss Tables ⇒ 65 G.P.M. = 93600 GPD

TABLE 40 – Continued

4" IPS (ASTM D-2241)

	SDR 26			SDR 21		
Flow Gals./Min.	Velocity Ft./Sec.	Loss of Head Ft./100 Ft.	Press. Drop PSI/100 Ft.	Velocity Ft./Sec.	Loss of Head Ft./100 Ft.	Press. Drop PSI/100 Ft.
20	0.48	0.02	0.009	0.50	0.03	0.013
25	0.60	0.04	0.017	0.62	0.04	0.017
30	0.72	0.05	0.022	0.75	0.06	0.026
35	0.84	0.07	0.030	0.87	0.08	0.035
40	0.96	0.09	0.039	1.00	0.10	0.043
45	1.08	0.11	0.048	1.12	0.12	0.052
50	1.20	0.14	0.061	1.25	0.15	0.065
60	1.44	0.19	0.082	1.50	0.21	0.091
70	1.67	0.25	0.11	1.75	0.28	0.12
75	1.79	0.29	0.13	1.87	0.32	0.14
80	1.91	0.32	0.14	2.00	0.36	0.16
90	2.15	0.40	0.17	2.25	0.45	0.19
100	2.39	0.49	0.21	2.50	0.54	0.23
125	2.99	0.74	0.33	3.13	0.82	0.36
150	3.59	1.04	0.45	3.75	1.15	0.50
175	4.19	1.39	0.60	4.37	1.54	0.67
200	4.79	1.77	0.77	4.99	1.96	0.85
250	5.98	2.68	1.16	6.24	2.97	1.29
300	7.18	3.75	1.62	7.49	4.16	1.80
350	8.38	5.00	2.17	8.74	5.54	2.40
400	9.57	6.39	2.77	9.99	7.09	3.07
450	10.77	7.95	3.44	11.24	8.82	3.82
500	11.96	9.66	4.18	12.48	10.72	4.64

6" IPS (ASTM D-2241)

	SDR 26			SDR 21		
Flow Gals./Min.	Velocity Ft./Sec.	Loss of Head Ft./100 Ft.	Press. Drop PSI/100 Ft.	Velocity Ft./Sec.	Loss of Head Ft./100 Ft.	Press. Drop PSI/100 Ft.
50	0.55	0.02	0.009	0.58	0.02	0.009
60	0.66	0.03	0.013	0.69	0.03	0.013
70	0.77	0.04	0.017	0.81	0.04	0.017
75	0.83	0.04	0.017	0.86	0.05	0.022
80	0.88	0.05	0.022	0.92	0.05	0.022
90	0.99	0.06	0.026	1.04	0.07	0.030
100	1.10	0.07	0.030	1.15	0.08	0.035
125	1.39	0.11	0.047	1.44	0.125	0.054
150	1.66	0.16	0.069	1.73	0.18	0.078
175	1.94	0.21	0.091	2.02	0.24	0.103
200	2.21	0.27	0.12	2.31	0.30	0.13
250	2.76	0.41	0.18	2.89	0.46	0.20
300	3.31	0.57	0.25	3.46	0.63	0.27
350	3.87	0.76	0.33	4.04	0.85	0.37
400	4.42	0.97	0.42	4.61	1.08	0.47
450	4.97	1.21	0.52	5.19	1.34	0.58
500	5.52	1.47	0.64	5.76	1.63	0.71
750	8.28	3.12	1.35	8.64	3.46	1.50
1000	11.05	5.30	2.30	11.53	5.89	2.55

TABLE 40 – Continued

8" IPS (ASTM D-2241)

	SDR 26			SDR 21		
Flow Gals./Min.	Velocity Ft./Sec.	Loss of Head Ft./100 Ft.	Press. Drop PSI/100 Ft.	Velocity Ft./Sec.	Loss of Head Ft./100 Ft.	Press. Dr PSI/100 F
100	0.66	0.03	0.012	0.67	0.03	0.012
125	0.83	0.037	0.015	0.85	0.037	0.015
150	0.98	0.04	0.017	1.02	0.05	0.022
175	1.14	0.06	0.026	1.19	0.065	0.028
200	1.30	0.07	0.030	1.36	0.08	0.035
250	1.63	0.11	0.048	1.70	0.125	0.054
300	1.95	0.16	0.069	2.04	0.18	0.078
350	2.28	0.21	0.091	2.38	0.24	0.103
400	2.61	0.27	0.12	2.72	0.30	0.13
450	2.93	0.33	0.14	3.06	0.37	0.16
500	3.26	0.41	0.18	3.40	0.45	0.19
750	4.89	0.86	0.37	5.10	0.96	0.42
1000	6.51	1.47	0.64	6.80	1.63	0.64
1250	8.15	2.23	0.96	8.50	2.47	1.07
1500	9.77	3.11	1.35	10.19	3.45	1.49
2000	13.03	5.30	2.29	13.59	5.87	2.54

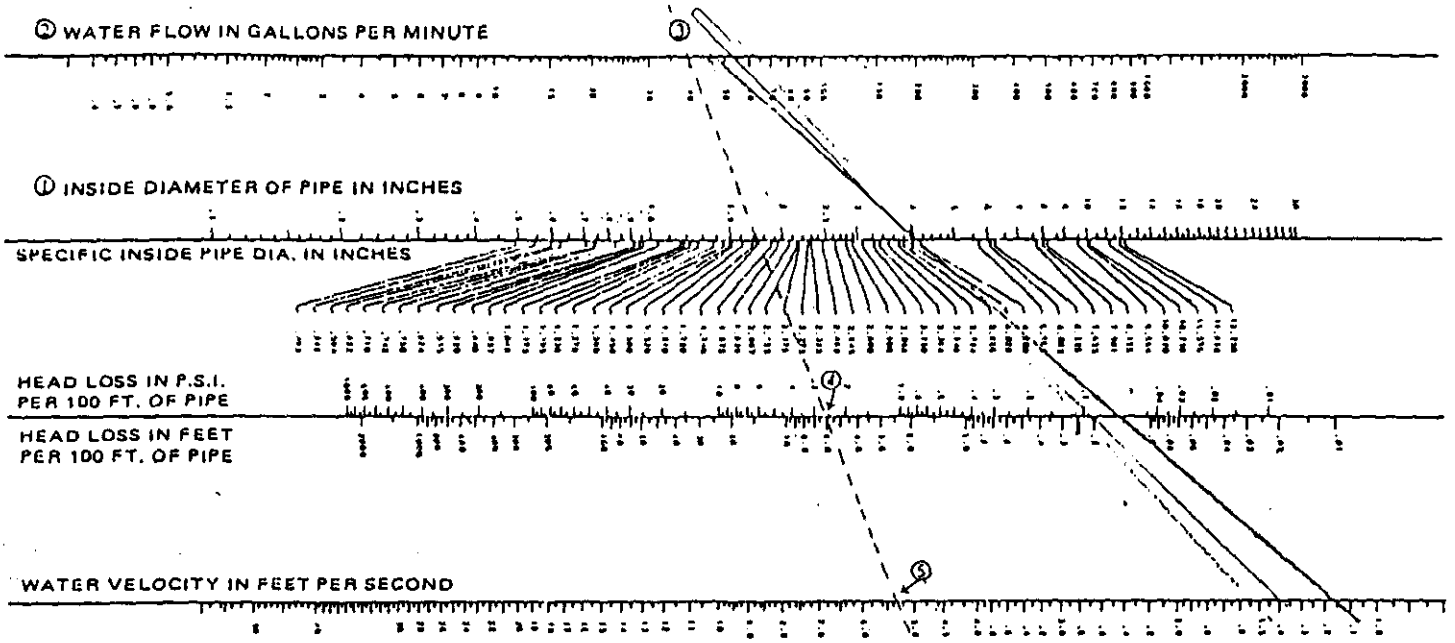
10" IPS (ASTM D-2241)

	SDR 26			SDR 21		
Flow Gals./Min.	Velocity Ft./Sec.	Loss of Head Ft./100 Ft.	Press. Drop PSI/100 Ft.	Velocity Ft./Sec.	Loss of Head Ft./100 Ft.	Press. Dro PSI/100 F
200	0.83	0.027	0.012	0.86	0.027	0.012
250	1.05	0.04	0.017	1.10	0.045	0.020
300	1.26	0.05	0.022	1.31	0.06	0.026
350	1.47	0.075	0.033	1.54	0.08	0.035
400	1.68	0.09	0.039	1.75	0.10	0.043
450	1.89	0.11	0.048	1.97	0.13	0.056
500	2.10	0.14	0.061	2.19	0.15	0.065
750	3.14	0.29	0.13	3.29	0.33	0.14
1000	4.19	0.50	0.22	4.38	0.56	0.24
1250	5.27	0.76	0.33	5.48	0.85	0.37
1500	6.29	1.06	0.46	6.57	1.18	0.51
2000	8.38	1.81	0.78	8.76	2.02	0.87
2500	10.48	2.74	1.19	10.96	3.06	1.33
3000	12.58	3.84	1.66	13.15	4.27	1.85

12" IPS (ASTM D-2241)

	SDR 26			SDR 21		
Flow Gals./Min.	Velocity Ft./Sec.	Loss of Head Ft./100 Ft.	Press. Drop PSI/100 Ft.	Velocity Ft./Sec.	Loss of Head Ft./100 Ft.	Press. Dro PSI/100 F
350	1.04	0.04	0.017	1.08	0.036	0.016
400	1.19	0.04	0.017	1.24	0.04	0.017
450	1.34	0.05	0.022	1.40	0.06	0.026
500	1.49	0.06	0.026	1.55	0.07	0.030
750	2.23	0.13	0.056	2.33	0.14	0.061

FIGURE 26 – FRICTION LOSS CHARACTERISTICS OF WATER FLOW THROUGH PVC PIPE



HOW TO USE THIS GRAPH:

1. Select the desired pipe size (inside diameter).
2. Determine the amount of water to flow through the pipe.
3. Place a straight-edge on these two points.
4. The point at which the straight-edge intersects the head-loss line and the velocity line give these two values under the given conditions.

EXAMPLE:

1½" schedule A pipe (I.D. = 1.740") ①
40 gallon per minute service ②

1. Line up these points with a straight-edge ③
2. Read 2.6 psi (or 6 ft.) from the head-loss line ④
3. Read 5.38 ft. per second from the velocity line ⑤

THE VALUES ON THIS GRAPH ARE BASED ON THE WILLIAMS AND HAZEN FORMULA:

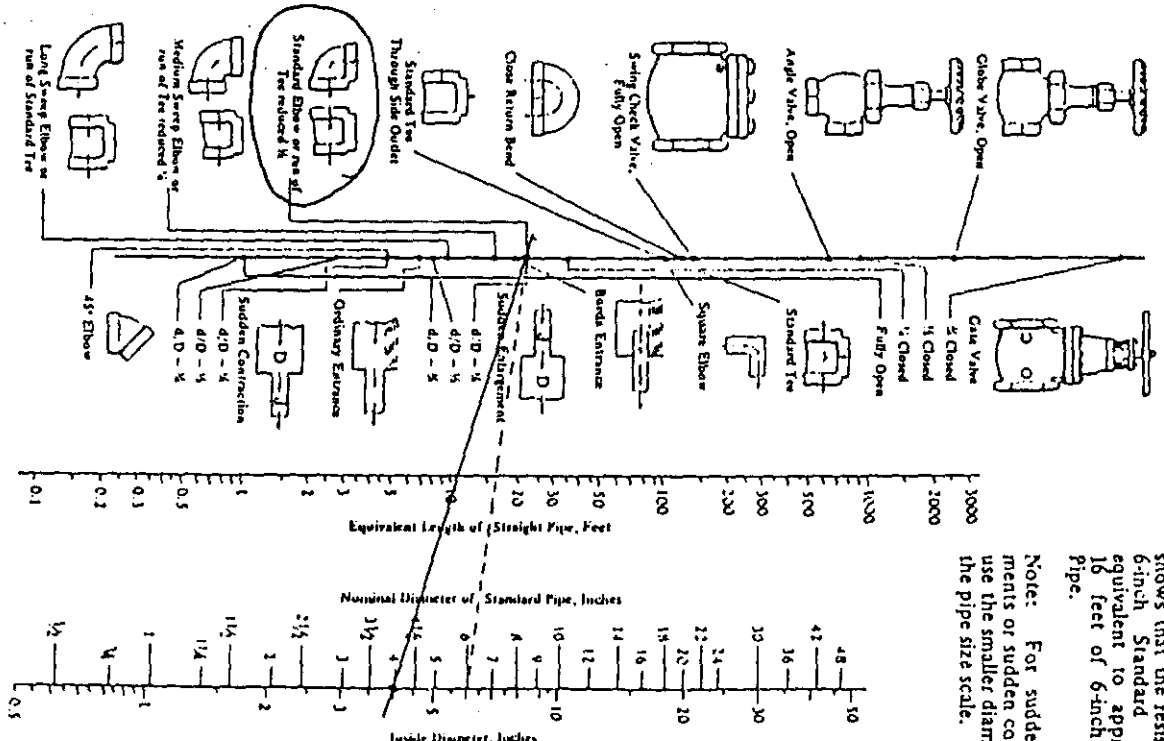
(EQUATION 80) $f = .2083 \left(\frac{100}{C}\right)^{1.85} \times \frac{Q^{1.852}}{d_i^{4.8655}}$

WHERE:

- f = friction head in feet of water per 100 feet of pipe
- d_i = inside diameter of pipe in inches
- Q = Flow in gallons per minute
- C = Constant for inside roughness of pipe (150 for PVC)

FIGURE 27 – RESISTANCE OF VALVES AND FITTINGS TO FLOW OF FLUI

Note: Head loss through check valves varies with types manufactured. Consult manufacturer for correct values.

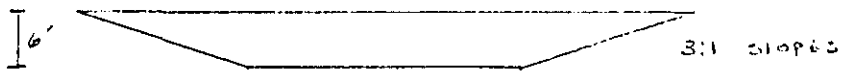


Example: The dotted lin shows that the resistance of 6-inch Standard Elbow i equivalent to approximately 16 feet of 6-inch Standard Pipe.

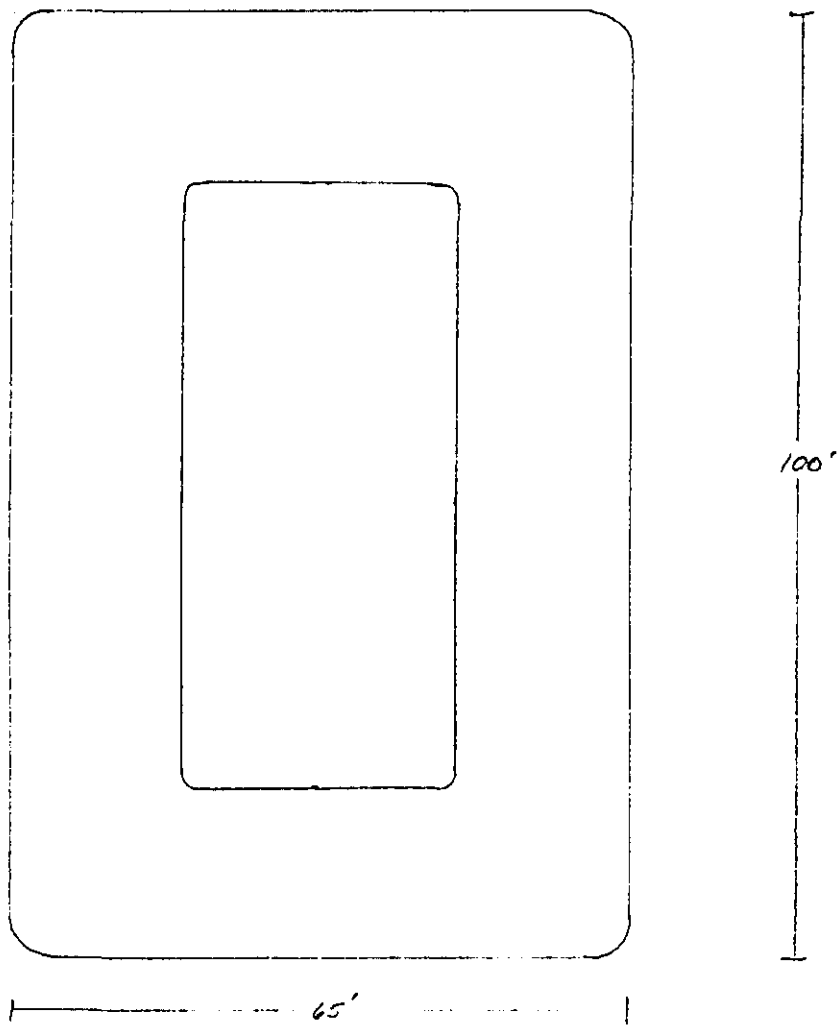
Note: For sudden enlarge ments or sudden contractions use the smaller diameter, d, on the pipe size scale.

Fittings Headless – (7 Elbows @ 11' Ea = 77 LF Pipe

PAGE 63 LANDFILL SANITARY SEWER
LEACHATE STORAGE POND

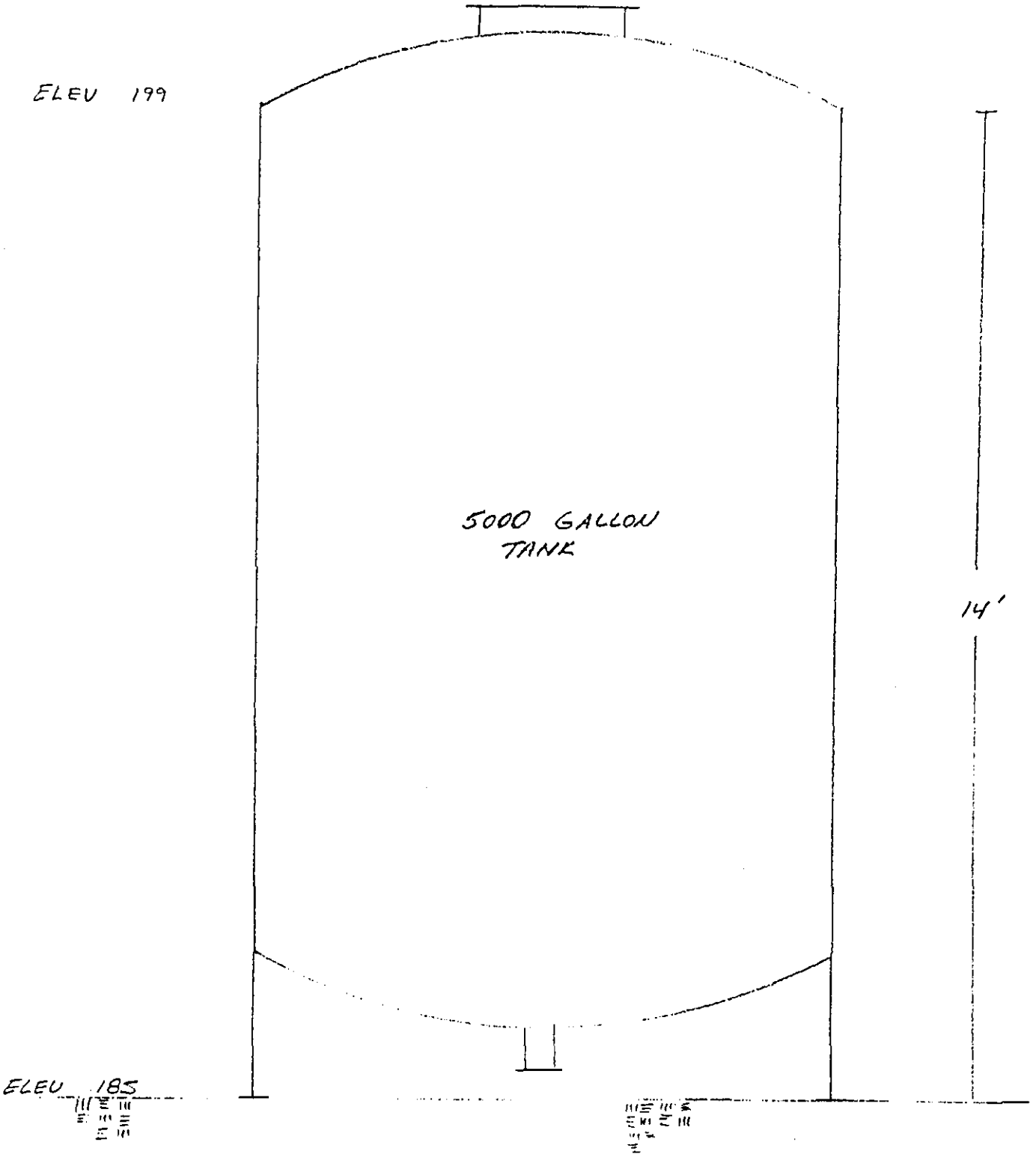


CROSS SECTION



SCALE 1" = 20'
11/23/90 JWK

PAGELS LANDFILL SANITARY SEWER
LEACHATE STORAGE TANK



SCALE 1" = 2'
11/29/90 JWK

Illinois Environmental Protection Agency
Division of Water Pollution Control
Permit Section
Springfield, Illinois 62706

For IEPA Use:
Log Number:
Date Received:

Application For Permit Or Construction Approval

WPC-PS-1

1. **Name and Location:**

Name of project: PAGELS LANDFILL SANITARY SEWER

Municipality or Township: SANITARY DIST OF RKFD. County: WINNEBAGO

2. **Brief Description of Project:** INSTALL 4" PRIVATE SERVICE FROM LANDFILL TO PROPOSED 8" PUBLIC SEWER

3. **Documents Being Submitted:** If the project involves any of the items listed below, submit the corresponding schedule, and check the appropriate spaces.

Project

Private Sewer Connection	A	X	Spray Irrigation	H	
Public Sewer Extension	B		Septic Tanks	I	
Sewer Extension Construct Only	C		Industrial Treatment or Pretreatment	J	
Sewage Treatment Works	D		Cyanide Acceptance	L	
Excess Flow Treatment	E		Updating Cyanide Acceptance Form	M	
Lift Station/Force Main	F		Waste Characteristics	N	X
Sludge Disposal	G		Erosion Control	P	X
			Trust Disclosure	T	

4. **Land Trust:** Is the project identified in item number 1 herein, for which a permit is requested, to be constructed on land which is the subject of a trust? ☐ Yes ☒ No

If yes, Schedule T (Trust Disclosure) must be completed and item number 7.1.1 must be signed by a beneficiary, trustee or trust officer.

Plans:-Title Pagels Landfill Sanitary Sewer Number of Pages: 8 sheets

Specifications: Title RRWRD Standard Number of Books/Pages: 1 book

Other Documents (Please Specify)

5. **This is an Application for (Check Appropriate Line):**

X A. Joint Construction And Operating Permit
___ B. Authorization To Construct (See Instructions) NPDES Permit No. IL00____ Issue Date ____
___ C. Construct Only Permit (Does Not Include Operations)
___ D. Operate Only Permit (Does Not Include Construction)

6. **Certifications and Approval:**

6.1 **Certificate by Design Engineer**
I hereby certify that I am familiar with the information contained in this application, including the attached schedules indicated above, and that to the best of my knowledge and belief such information is true, complete and accurate. The plans and specifications (specifications other than Standard Specifications or local specifications on file with this Agency) as described above were prepared by me or under my direction.

Engineer JAMES W. KROEPLIN (Name) 062-042258 (Registration Number) (Seal)

Firm: ROCKFORD BLACKTOP CONSTRUCTION CO.

Address: 5290 NIMTZ RD. ., LOVES PARK, IL 61111

Phone Number: 815 , 654-4700

Signature X James W. Kroeplin

7. **Certifications and Approvals for Permits:**

7.1 **Certificate by Applicant(s)**
I/We hereby certify that I/we have read and thoroughly understand the conditions and requirements of this Application, and am/are authorized to sign this application in accordance with the Rules and Regulations of the Illinois Pollution Control Board.
I/We hereby agree to conform with the Standard Conditions and with any other Special Conditions made part of this Permit.

7.1.1 Name Of Applicant For Permit Or Authorization To Construct WINNEBAGO RECLAMATION INC.

Street	City	State	Zip Code
P.O. BOX 2071	LOVES PARK	ILLINOIS	61130

Signature X

Title ____ Organization ____

The IEPA 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.

7.1.2 Name Of Applicant For Permit To Own and Operate WINNEBAGO RECLAMATION INC.

P. O. BOX 2071	LOVES PARK	ILLINOIS	61130
Street	City	State	Zip Code

Signature X G L Mazzat

Title V I P

7.2 Attested (Units of Government)

Signature X ..... Date _____ Title _____

(City Clerk, Village Clerk, Sanitary District Clerk, Etc.)

7.3 Applications from non-governmental applicants which are not signed by the owner, must be signed by a principal executive officer of at least the level of vice president, or his duly authorized representative.

7.4 Certificate By Intermediate Sewer Owner

I hereby certify that (Please check one):

X 1. The sewers to which this project will be tributary have adequate reserve capacity to transport the wastewater that will be added by this project without causing a violation of the Environmental Protection Act or Subtitle C, Chapter I, or

_____ 2. The Illinois Pollution Control Board, in PCB _____ dated _____ granted a variance from Subtitle C, Chapter I to allow construction and operation of the facilities that are the subject of this application.

Name and location of sewer system to which this project will be tributary:

NEW MILFORD TRUNK LINE

Sewer System Owner SANITARY DISTRICT DIST. OF ROCKFORD

3333 KISHWAUKEE ST.	ROCKFORD	ILLINOIS	61109
Street	City	State	Zip Code

Signature X Jack B Burger Date 10/25/90 Title ENGINEERING MANAGER

7.4.1 Additional Certificate By Intermediate Sewer Owner

I hereby certify that (Please check one):

_____ 1. The sewers to which this project will be tributary have adequate reserve capacity to transport the wastewater that will be added by this project without causing a violation of the Environmental Protection Act or Subtitle C, Chapter I, or

_____ 2. The Illinois Pollution Control Board, in PCB _____ dated _____ granted a variance from Subtitle C, Chapter I to allow construction and operation of the facilities that are the subject of this application.

Name and location of sewer system to which this project will be tributary: _____

Sewer System Owner _____

Street	City	State	Zip Code

Signature X ..... Date _____ Title _____

7.5 Certificate By Waste Treatment Works Owner

I hereby certify that (Please check one):

X 1. The waste treatment plant to which this project will be tributary has adequate reserve capacity to treat the wastewater that will be added by this project without causing a violation of the Environmental Protection Act or Subtitle C, Chapter I, or

_____ 2. The Illinois Pollution Control Board, in PCB _____ dated _____ granted a variance from Subtitle C, Chapter I to allow construction and operation of the facilities that are the subject of this application.

I also certify that the industrial waste discharges described in the application is capable of being treated by the treatment works, and such waste discharges will be in compliance with all currently applicable local, state or federal pretreatment requirements.

Name and location of waste treatment works to which this project will be tributary: SANITARY DISTRICT OF ROCKFORD

Treatment Works Owner SANITARY DISTRICT OF ROCKFORD

3333 KISHWAUKEE ST.	ROCKFORD	ILLINOIS	61109
Street Richard W. Eick	City Plant Operations Manager	State	Zip Code 10-15-90

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. The form has been approved by the Forms Management Center.

Log # _____

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
DIVISION OF WATER POLLUTION CONTROL
PERMIT SECTION
Springfield, Illinois 62794-9276

SCHEDULE A PRIVATE SEWER CONNECTION(S) OR SCHEDULE B SEWER EXTENSION(S)
(Please Circle One or Both)

1. NAME OF PROJECT: PAGELS LANDFILL SANITARY SEWER

2. TYPE OF SERVICE(S): Residential ____; Commercial ____; Light Industrial (Domestic Waste Only) ____; Manufacturing ____; Recreational ____ Other LANDFILL

3. NATURE OF PROJECT: Project consists of: a sewer connection X; a trunk sewer ____; a replacement sewer ____; a relief sewer ____; an interceptor sewer ____; a complete new sanitary sewer system X.

4. PROJECT LOCATION, SERVICE AREA AND POPULATION: Submit map(s) of the service area that includes the following:
   - 4.1 The proposed sewer layout and project location.
   - 4.2 Residential and/or non-residential areas and their associated waste loads to be immediately served by the sewers of this project.
   - 4.3 Potential residential and/or non-residential areas and their associated loads must be included in the overall design of the sewers of this project.

5. FACILITIES PLANNING AREA: This project is X is not ____ being constructed entirely within the SANITARY DISTRICT OF ROCKFORD Facilities Planning Area (FPA) boundaries. If not, please explain. _____

6. TYPE OF DEVELOPMENT
   - 6.1 RESIDENTIAL BUILDINGS: Number of building(s) _____; Number of single dwelling building(s) _____; total dwelling units* _____; Estimated total population _____.

**Please provide the number of bedrooms per unit and number of units per building.*

   - 6.2 NON-RESIDENTIAL BUILDINGS: Describe use of building(s) LANDFILL

     Principal product(s) or activities LANDFILL

     Number of building(s) to be served under this Permit N/A

     Estimated number of employees _____; Estimated number of occupants (transients) _____. Estimated population equivalent (one population equivalent is 100 gallons of sewage per day, containing 0.17 pounds of BOD_5 and 0.20 pounds of suspended solids). Flow P.E. _____; BOD P.E. _____; Suspended Solids P.E. _____.

   - 6.3 Total flow and P.E. for this project: Design Average Flow 21,000 GPD; Design Max. Flow 42,000 GPD; PE 420.

   - 6.4 Non domestic liquid waste is X is not ____ produced inside the building(s). If liquid wastes other than domestic are produced, submit Schedule N.

7. DEVIATION FROM DESIGN CRITERIA: The design criteria for sewers are contained in the "Illinois Recommended Standards for Sewage Works", Current Edition. This submittal does ____ does not X include deviations from said criteria. If deviations are included, justification for said deviations must be attached.
   - 7.1 Will "Standard Specifications for Water and Sewer Main Construction in Illinois", Current Edition, govern the construction of this system? YES X NO ____. If "NO" specifications must be furnished for the construction of the sewer.

8. INFILTRATION LIMITS: 200 gallons per inch diameter of sewer pipe per mile per day.

9. SUMMARY OF SEWERS: *Submit plan and profile drawings.*

	Connections			Extensions		
Pipe size - inches	4"					
Total Length - feet	6750					
Min. slope used - %	N.A.					
Max. slope used - %	N.A.					
Min. cover over sewers - feet	6'					
Pipe Material & Specs.	ASTM 1784					
Joint Material & Specs.	ASTM 3139					
Total Manholes	N.A.					
Max. Distance Between Manholes	N.A.					
Bedding Class for Rigid Pipe (A, B, or C per ASTM C12)	N.A.					
Bedding Class for Flexible Pipe (I, II, or III per ASTM 2321)	1					

Is the project located in a flood plain? YES ____ NO X If it is, contact the Illinois Department of Transportation, Division of Water Resources Management for further permit requirements.

10. EROSION CONTROL: The design criteria for Erosion Control are contained in the "Illinois Environmental Protection Agency - Standard and Specifications for Soil Erosion and Sedimentation Control" Current Edition. This submittal does _ does not _ include deviation from said criteria. If deviations are included, justification for said criteria must be attached. (See instructions for Schedule P to determine if this form must be submitted.)

11. EXISTING SEWER SYSTEM:

11.1 Size and location of the existing sanitary sewer to which this project will connect 12" SANITARY SEWER AT NORTHWEST CORNER OF RYDBERG AND ROTARY ROAD

Tributary to Interceptors NEW MILFORD TRUNK LINE

11.2 Tributary to Pump Station(s) NEW MILFORD PUMP STATION NORTH AND SOUTH

Adequate Reserve Pumping Capacity? YES X NO ____

11.3 Name of sewage treatment plant this project is tributary to SANITARY DISTRICT OF ROCKFORD

Adequate Reserve Treatment Capacity? YES X NO ____

12. WATER SUPPLY PROTECTION: The horizontal and/or vertical separation between sanitary sewers and watermains is in accordance with "Standard Specifications for Water and Sewer Main Construction in Illinois," Current Edition. YES X NO ____

Describe the precautionary features against contamination N.A.

Proximity to wells, reservoirs, and other water sources; indicate distance and precautions taken N.A.

Minimum distance ---- feet; Not applicable ---.

13. PIPE TESTING:

Is infiltration test included in specifications? YES X NO ____

or, exfiltration test included in specifications? YES X NO ____

or air testing included in specifications? YES X NO ____

14. FLEXIBLE PIPE TESTING:

Is deflection test included in specifications in accordance with the Illinois Recommended Standards for Sewage Works, Current Edition? YES X NO ____

FOR AGENCY USE ONLY

Comments: _____

This Agency is authorized to require this information under Illinois Revised Statutes, 1979, Chapter III 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.

FOR IEPA USE:
LOG #
DATE RECEIVED:

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
DIVISION OF WATER POLLUTION CONTROL
PERMIT SECTION
Springfield, Illinois 62706

SCHEDULE N WASTE CHARACTERISTICS

1. Name of Project PAGELS LANDFILL SANITARY SEWER

2. FLOW DATA

	EXISTING	PROPOSED-DESIGN
2.1 Average Flow (gpd)	--------	21,000
2.2 Maximum Daily Flow (gpd)	--------	42,000

2.3 TEMPERATURE

Time of year	Ave. Intake Temp. F	Avg. Effluent Temp. F	Max. Intake Temp. F	Max. Effluent Temp. F	Max. Temp. Outside Mixing Zone F
SUMMER					
WINTER					

2.4 Minimum 7-day, 10-year flow: _____ cfs _____ MGD.

2.5 Dilution Ratio: _____ : _____

2.6 Stream flow rate at time of sampling _____ cfs _____ MGD.

3. CHEMICAL CONSTITUENT Existing Permitted Conditions ___ ; Existing conditions X ; Proposed Permitted Conditions _____.

Type of sample: X grab (time of collection ___); ___ composite (Number of samples per day _____)

(see instructions for analyses required)

Constituent	RAW WASTE (mg/l)	TREATED EFFLUENT Avg. (mg/l) Max.	UPSTREAM DOWNSTREAM SAMPLES (mg/l) (mg/l)
Ammonia Nitrogen (asN)	-----		N.A
Arsenic (total)	-----		N.A.
Barium	-----		N.A
Boron	-----		N.A.
BOD_5	680		N.A.
Cadmium	0.03		N.A.
Carbon Chloroform Extract	-----		N.A.
Chloride	-----		N.A.
Chromium (total hexavalent)	0.06		N.A.
Chromium (total trivalent)	-----		N.A.
Copper	0.40		N.A.
Cyanide (total)	-----		N.A.
Cyanide (readily released @150°F & pH 4.5)	-----		N.A.
Dissolved Oxygen	-----		N.A.
Fecal Coliform	-----		N.A.

IL 532-0019

	RAW WASTE (mg/l)	TREATED EFFLUENT Avr. (mg/l) Max.	UPSTREAM (mg/l)	DOWNSTREAM SAMPLES (mg/l)
Fluoride	---		N.A.	N.A.
Hardness (as Ca CO_3)	---		N.A.	N.A.
Iron (total)	14.40		N.A.	N.A.
Lead	0.24		N.A.	N.A.
Manganese	---		N.A.	N.A.
MBAS	---		N.A.	N.A.
Mercury	---		N.A.	N.A.
Nickel	0.80		N.A.	N.A.
Nitrates (asN)	---		N.A.	N.A.
Oil & Grease (hexane solubles or equivalents)	---		N.A.	N.A.
Organic Nitrogen (as N)	---		N.A.	N.A.
pH	8.8		N.A.	N.A.
Phenols	---		N.A.	N.A.
Phosphorous (as P)	---		N.A.	N.A.
Radioactivity	---		N.A.	N.A.
Selenium	---		N.A.	N.A.
Silver	---		N.A.	N.A.
Sulfate	---		N.A.	N.A.
Suspended Solids	200		N.A.	N.A.
Total Dissolved Solids	---		N.A.	N.A.
Zinc	1.30		N.A.	N.A.
Others			N.A.	N.A.
COD	3099			

This Agency is authorized to require this information under Illinois Revised Statutes, 1985, 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.

For IEPA Use:
Log Number:
Date Received:

Illinois Environmental Protection Agency
Division of Water Pollution Control
Permit Section
2200 Churchill Road P.O. Box 19276
Springfield, Illinois 62794-9276
Schedule P — Erosion Control

1. Name of project Pagels Landfill Sanitary Sewer
2. Total area disturbed by excavation 5 acres
3. Summary of erosion control practices:

		Area Controlled (Sq. Ft.)	Permanent (P) or Temporary (T)
Vegetative Control	7224 (Feet)	216720	P
Interceptor Ditches	--- (Feet)	---	---
Berms	--- (Feet)	---	---
Sediment Basins	--- (Cu.Yd.)	---	---
Debris Basins	--- (Cu.Ft.)	---	---
Desilting Basins	--- (Cu.Ft.)	---	---
Silt Traps	--- (Cu.Ft.)	---	---
Mulching and Matting	216720 (~~XXX~~/Sq.Ft.)	216720	P
Other	--- (Indicate)	---	---

4. Attach topographical or plan maps of construction area and indicate erosion control practices.
5. Drainage area (above and including construction site) 20 acres
6. Slope categories of construction site:

		Area (acres)	Disposition of collected sediment
6.1	0-2% slope	2.2	
6.2	3-4% slope	1.6	
6.3	4-6% slope	.7	
6.4	6% slope	.4	

☐ Erosion control practices identified above will be constructed in accordance with standard specifications for soil erosion and sediment control as contained in IEPA/WPC/87-012 or current edition.

or

☒ Plans and specifications for the above referenced erosion control practices are attached.

Please check one of the above

Seeding shall be done in accordance with Section 642 of the Standard Specifications for Road and Bridge Construction in Illinois, adopted October 1, 1983. Seeding shall be Class I, fertilizer shall be applied in a ratio of 10-10-10 and at the rate of 60 pounds of nutrients per acre.

Illinois Environmental Protection Agency
Division of Water Pollution Control
Permit Section
Springfield, Illinois 62706

For IEPA Use:
Log Number:
Date Received:

Application For Permit Or Construction Approval

WPC-PS-1

1. **Name and Location:**

Name of project: PAGELS LANDFILL SANITARY SEWER

Municipality or Township: SANITARY DIST OF RKFD. County: WINNEBAGO

2. **Brief Description of Project:** EXTEND 8" PUBLIC SEWER

3. **Documents Being Submitted:** If the project involves any of the items listed below, submit the corresponding schedule, and check the appropriate spaces.

Project

Private Sewer Connection	A		Spray Irrigation	H	
Public Sewer Extension	B	X	Septic Tanks	I	
Sewer Extension Construct Only	C		Industrial Treatment or Pretreatment	J	
Sewage Treatment Works	D		Cyanide Acceptance	L	
Excess Flow Treatment	E		Updating Cyanide Acceptance Form	M	
Lift Station/Force Main	F		Waste Characteristics	N	X
Sludge Disposal	G		Erosion Control	P	X
			Trust Disclosure	T	

4. **Land Trust:** Is the project identified in item number 1 herein, for which a permit is requested, to be constructed on land which is the subject of a trust? ☐ Yes ☒ No

If yes, Schedule T (Trust Disclosure) must be completed and item number 7.1.1 must be signed by a beneficiary, trustee or trust officer.

Plans:-Title Pagels Landfill Sanitary Sewer Number of Pages: 8 sheets

Specifications: Title RRWRD Standard Number of Books/Pages: 1 book

Other Documents (Please Specify)

5. **This is an Application for (Check Appropriate Line):**

X A. Joint Construction And Operating Permit
___ B. Authorization To Construct (See Instructions) NPDES Permit No. IL00___ Issue Date ___
___ C. Construct Only Permit (Does Not Include Operations)
___ D. Operate Only Permit (Does Not Include Construction)

6. **Certifications and Approval:**

6.1 **Certificate by Design Engineer**
I hereby certify that I am familiar with the information contained in this application, including the attached schedules indicated above, and that to the best of my knowledge and belief such information is true, complete and accurate. The plans and specifications (specifications other than Standard Specifications or local specifications on file with this Agency) as described above were prepared by me or under my direction.

Engineer JAMES W. KROEPLIN (Name) 062-042258 (Registration Number) ___ (Seal)

Firm: ROCKFORD BLACKTOP CONSTRUCTION CO.

Address: 5290 NIMTZ RD. , LOVES PARK, IL 61111

Phone Number: 815 / 654-4700

Signature X James W. Kroeplin

7. **Certifications and Approvals for Permits:**

7.1 **Certificate by Applicant(s)**
I/We hereby certify that I/we have read and thoroughly understand the conditions and requirements of this Application, and am/are authorized to sign this application in accordance with the Rules and Regulations of the Illinois Pollution Control Board.
I/We hereby agree to conform with the Standard Conditions and with any other Special Conditions made part of this Permit.

7.1.1 Name Of Applicant For Permit Or Authorization To Construct WINNEBAGO RECLAMATION INC.

P. O. BOX 2071 (Street) LOVES PARK (City) ILLINOIS (State) 61130 (Zip Code)

Signature X J L Marzet

Title VP Organization

The IEPA 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.

IL 532-0010

7.1.2 Name Of Applicant For Permit To Own and Operate SANITARY DISTRICT OF ROCKFORD

3333 KISHWAUKEE ST. ROCKFORD ILLINOIS 61109

Street City State Zip Code

Signature X .....

Title Engineering Manager

7.2 Attested (Units of Government)

Signature X ..... Date _____ Title _____

(City Clerk, Village Clerk, Sanitary District Clerk, Etc.)

7.3 Applications from non-governmental applicants which are not signed by the owner, must be signed by a principal executive officer of at least the level of vice president, or his duly authorized representative.

7.4 Certificate By Intermediate Sewer Owner

I hereby certify that (Please check one):

__X__ 1. The sewers to which this project will be tributary have adequate reserve capacity to transport the wastewater that will be added by this project without causing a violation of the Environmental Protection Act or Subtitle C, Chapter I, or

_____ 2. The Illinois Pollution Control Board, in PCB _____ dated _____, granted a variance from Subtitle C, Chapter I to allow construction and operation of the facilities that are the subject of this application.

Name and location of sewer system to which this project will be tributary:

NEW MILFORD TRUNK LINE

Sewer System Owner SANITARY DISTRICT OF ROCKFORD

3333 KISHWAUKEE ST. ROCKFORD ILLINOIS 61109

Street City State Zip Code

Signature X ..... Date 10/25/90 Title ENGINEERING MANAGER

7.4.1 Additional Certificate By Intermediate Sewer Owner

I hereby certify that (Please check one):

_____ 1. The sewers to which this project will be tributary have adequate reserve capacity to transport the wastewater that will be added by this project without causing a violation of the Environmental Protection Act or Subtitle C, Chapter I, or

_____ 2. The Illinois Pollution Control Board, in PCB _____ dated _____, granted a variance from Subtitle C, Chapter I to allow construction and operation of the facilities that are the subject of this application.

Name and location of sewer system to which this project will be tributary: _____

Sewer System Owner _____

Street City State Zip Code

Signature X ..... Date _____ Title _____

7.5 Certificate By Waste Treatment Works Owner

I hereby certify that (Please check one):

__X__ 1. The waste treatment plant to which this project will be tributary has adequate reserve capacity to treat the wastewater that will be added by this project without causing a violation of the Environmental Protection Act or Subtitle C, Chapter I, or

_____ 2. The Illinois Pollution Control Board, in PCB _____ dated _____, granted a variance from Subtitle C, Chapter I to allow construction and operation of the facilities that are the subject of this application.

I also certify that the industrial waste discharges described in the application is capable of being treated by the treatment works, and such waste discharges will be in compliance with all currently applicable local, state or federal pretreatment requirements.

Name and location of waste treatment works to which this project will be tributary: SANITARY DISTRICT OF ROCKFORD

Treatment Works Owner SANITARY DISTRICT OF ROCKFORD

3333 KISHWAUKEE ST. ROCKFORD ILLINOIS 61109

Street City State Zip Code

Signature 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.

Log # _____

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
DIVISION OF WATER POLLUTION CONTROL
PERMIT SECTION
Springfield, Illinois 62794-9276

SCHEDULE A PRIVATE SEWER CONNECTION(S) OR SCHEDULE B SEWER EXTENSION(S)
(Please Circle One or Both)

1. NAME OF PROJECT: PAGELS LANDFILL SANITARY SEWER

2. TYPE OF SERVICE(S): Residential ____; Commercial ____; Light Industrial (Domestic Waste Only) ____; Manufacturing ____; Recreational ____; Other LANDFILL

3. NATURE OF PROJECT: Project consists of: a sewer connection X; a trunk sewer ____; a replacement sewer ____; a relief sewer ____; an interceptor sewer ____; a complete new sanitary sewer system X.

4. PROJECT LOCATION, SERVICE AREA AND POPULATION: Submit map(s) of the service area that includes the following:
   - 4.1 The proposed sewer layout and project location.
   - 4.2 Residential and/or non residential areas and their associated waste loads to be immediately served by the sewers of this project.
   - 4.3 Potential residential and/or non residential areas and their associated loads must be included in the overall design of the sewers of this project.

5. FACILITIES PLANNING AREA: This project is X is not ____ being constructed entirely within the SANITARY DISTRICT OF ROCKFORD Facilities Planning Area (FPA) boundaries. If not, please explain. _____

6. TYPE OF DEVELOPMENT
   - 6.1 RESIDENTIAL BUILDINGS: Number of building(s) _____; Number of single dwelling building(s) _____; total dwelling units* _____; Estimated total population _____.

**Please provide the number of bedrooms per unit and number of units per building.*

   - 6.2 NON-RESIDENTIAL BUILDINGS: Describe use of building(s) LANDFILL

     Principal product(s) or activities LANDFILL

     Number of building(s) to be served under this Permit N/A

     Estimated number of employees _____; Estimated number of occupants (transients) _____. Estimated population equivalent (one population equivalent is 100 gallons of sewage per day, containing 0.17 pounds of BOD_5 and 0.20 pounds of suspended solids). Flow P.E. _____; BOD P.E. _____; Suspended Solids P.E. _____.

   - 6.3 Total flow and P.E. for this project: Design Average Flow 21,000 GPD; Design Max. Flow 42,000 GPD; PE 420

   - 6.4 Non domestic liquid waste is X is not ____ produced inside the building(s). If liquid wastes other than domestic are produced, submit Schedule N.

7. DEVIATION FROM DESIGN CRITERIA: The design criteria for sewers are contained in the "Illinois Recommended Standards for Sewage Works", Current Edition. This submittal does ____ does not X include deviations from said criteria. If deviations are included, justification for said deviations must be attached.
   - 7.1 Will "Standard Specifications for Water and Sewer Main Construction in Illinois", Current Edition, govern the construction of this system? YES X NO ____. If "NO" specifications must be furnished for the construction of the sewer.

8. INFILTRATION LIMITS: 200 gallons per inch diameter of sewer pipe per mile per day.

9. SUMMARY OF SEWERS: *Submit plan and profile drawings.*

	Connections			Extensions		
Pipe size - inches				8"		
Total Length - feet				1378		
Min. slope used - %				.63		
Max. slope used - %				3.75%		
Min. cover over sewers - feet				6'		
Pipe Material & Specs.				ASTM D3034		
Joint Material & Specs.				ASTM D3212		
Total Manholes				4		
Max. Distance Between Manholes				400		
Bedding Class for Rigid Pipe (A, B, or C per ASTM C12)				---		
Bedding Class for Flexible Pipe (I, II, or III per ASTM 2321)				1		

Is the project located in a flood plain? YES ____ NO X If it is, contact the Illinois Department of Transportation, Division of Water Resources Management for further permit requirements.

10. EROSION CONTROL: The design criteria for Erosion Control are contained in the "Illinois Environmental Protection Agency - Standard and Specifications for Soil Erosion and Sedimentation Control" Current Edition. This submittal does _ does not X include deviation from said criteria. If deviations are included, justification for said criteria must be attached. (See instructions for Schedule P to determine if this form must be submitted.)

11. EXISTING SEWER SYSTEM:

11.1 Size and location of the existing sanitary sewer to which this project will connect 12" SANITARY SEWER @ NORTHWEST CORNER OF RYDBERG AND ROTARY ROADS

Tributary to Interceptors NEW MILFORD TRUNK LINE

11.2 Tributary to Pump Station(s) NEW MILFORD PUMP STATION NORTH AND SOUTH

Adequate Reserve Pumping Capacity? YES X NO ____

11.3 Name of sewage treatment plant this project is tributary to SANITARY DISTRICT OF ROCKFORD

Adequate Reserve Treatment Capacity? YES X NO ____

12. WATER SUPPLY PROTECTION: The horizontal and/or vertical separation between sanitary sewers and watermains is in accordance with "Standard Specifications for Water and Sewer Main Construction in Illinois," Current Edition. YES X NO ____

Describe the precautionary features against contamination N.A.

Proximity to wells, reservoirs, and other water sources; indicate distance and precautions taken N.A

Minimum distance ---- feet; Not applicable ----.

13. PIPE TESTING:

Is infiltration test included in specifications? YES X NO ____

or, exfiltration test included in specifications? YES X NO ____

or air testing included in specifications? YES X NO ____

14. FLEXIBLE PIPE TESTING:

Is deflection test included in specifications in accordance with the Illinois Recommended Standards for Sewage Works, Current Edition? YES X NO ____

FOR AGENCY USE ONLY

Comments: _____

This Agency is authorized to require this information under Illinois Revised Statutes, 1979, Chapter III 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.

FOR IEPA USE:
LOG #
DATE RECEIVED:

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
DIVISION OF WATER POLLUTION CONTROL
PERMIT SECTION
Springfield, Illinois 62706

SCHEDULE N WASTE CHARACTERISTICS

1. Name of Project PAGELS LANDFILL SANITARY SEWER

2. FLOW DATA

	EXISTING	PROPOSED-DESIGN
2.1 Average Flow (gpd)	---------	21,000
2.2 Maximum Daily Flow (gpd)	---------	42,000

2.3 TEMPERATURE

Time of year	Ave. Intake Temp. F	Avg. Effluent Temp. F	Max. Intake Temp. F	Max. Effluent Temp. F	Max. Temp. Outside Mixing Zone F
SUMMER					
WINTER					

2.4 Minimum 7-day, 10-year flow: _____ cfs _____ MGD.

2.5 Dilution Ratio: _____ ; _____

2.6 Stream flow rate at time of sampling _____ cfs _____ MGD.

3. CHEMICAL CONSTITUENT Existing Permitted Conditions ___; Existing conditions X; Proposed Permitted Conditions _____.
Type of sample: X grab (time of collection ___); ___ composite (Number of samples per day _____)
(see instructions for analyses required)

Constituent	RAW WASTE (mg/l)	TREATED EFFLUENT Avg. (mg/l) Max.	UPSTREAM DOWNSTREAM SAMPLES (mg/l) (mg/l)
Ammonia Nitrogen (asN)	-----		N.A
Arsenic (total)	-----		N.A.
Barium	-----		N.A.
Boron	-----		N.A.
BOD_5	680		N.A.
Cadmium	0.03		N.A.
Carbon Chloroform Extract	-----		N.A.
Chloride	-----		N.A.
Chromium (total hexavalent)	0.06		N.A.
Chromium (total trihalent)	-----		N.A.
Copper	0.40		N.A.
Cyanide (total)	-----		N.A.
Cyanide (readily released @150°F & pH 4.5)	-----		N.A.
Dissolved Oxygen	-----		N.A.
Fecal Coliform	-----		N.A.

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	RAW WASTE (mg/l)	TREATED EFFLUENT Avg. (mg/l) Max.	UPSTREAM (mg/l)	DOWNSTREAM SAMPLES (mg/l)
Fluoride	---		N.A.	N.A.
Hardness (as Ca CO_3)	---		N.A.	N.A.
Iron (total)	14.40		N.A.	N.A.
Lead	0.24		N.A.	N.A.
Manganese	---		N.A.	N.A.
MBAS	---		N.A.	N.A.
Mercury	---		N.A.	N.A.
Nickel	0.80		N.A.	N.A.
Nitrates (asN)	---		N.A.	N.A.
Oil & Grease (hexane solubles or equivalents)	---		N.A.	N.A.
Organic Nitrogen (as N)	---		N.A.	N.A.
pH	8.8		N.A.	N.A.
Phenols	---		N.A.	N.A.
Phosphorous (as P)	---		N.A.	N.A.
Radioactivity	---		N.A.	N.A.
Selenium	---		N.A.	N.A.
Silver	---		N.A.	N.A.
Sulfate	---		N.A.	N.A.
Suspended Solids	200		N.A.	N.A.
Total Dissolved Solids	---		N.A.	N.A.
Zinc	1.30		N.A.	N.A.
Others			N.A.	N.A.
COD	3099			

This Agency is authorized to require this information under Illinois Revised Statutes, 1985, 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.

For IEPA Use:
Log Number:
Date Received:

Illinois Environmental Protection Agency
Division of Water Pollution Control
Permit Section
2200 Churchill Road P.O. Box 19276
Springfield, Illinois 62794-9276
Schedule P — Erosion Control

1. Name of project Pagels Landfill Sanitary Sewer
2. Total area disturbed by excavation 5 acres
3. Summary of erosion control practices:

		Area Controlled (Sq. Ft.)	Permanent (P) or Temporary (T)
Vegetative Control	7224 (Feet)	216720	P
Interceptor Ditches	--- (Feet)	---	---
Berms	--- (Feet)	---	---
Sediment Basins	--- (Cu.Yd.)	---	---
Debris Basins	--- (Cu.Ft.)	---	---
Desilting Basins	--- (Cu.Ft.)	---	---
Silt Traps	--- (Cu.Ft.)	---	---
Mulching and Matting	216720 (XXXX/Sq.Ft.)	216720	P
Other	--- (Indicate)	---	---

4. Attach topographical or plan maps of construction area and indicate erosion control practices.
5. Drainage area (above and including construction site) 20 acres
6. Slope categories of construction site:

		Area (acres)	Disposition of collected sediment
6.1	0-2% slope	2.2	
6.2	3-4% slope	1.6	
6.3	4-6% slope	.7	
6.4	6% slope	.4	

☐ Erosion control practices identified above will be constructed in accordance with standard specifications for soil erosion and sediment control as contained in IEPA/WPC/87-012 or current edition.

or

☒ Plans and specifications for the above referenced erosion control practices are attached.

Please check one of the above

Seeding shall be done in accordance with Section 642 of the Standard Specifications for Road and Bridge Construction in Illinois, adopted October 1, 1983. Seeding shall be Class I, fertilizer shall be applied in a ratio of 10-10-10 and at the rate of 60 pounds of nutrients per acre.

APPENDIX 4
Leachate Analytical Lists L1 and L2

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LEACHATE MONITORING WINNEBAGO RECLAMATION SERVICE
PAGEL LANDFILL O & M MONITORING
Wells monitored during assesment monitoring

PROGRAM No. 1B

WELL NUMBER	EASTING	NORTHING	HYDRAULIC CONDUCTIVITY (cm/s)	MEASURING POINT ELEV. TOIC	SAMPLED INTERVAL*	COMMENTS
L101						
L102						
L103						
L104						

Total Number of Samples 4

Sampling Quarter	Analytical Parameters	Well List	Unit Cost	Total Cos
Jan-Feb	List L1	All	$272.25	$1,089.00
April-May	List L1	All	$272.25	$1,089.00
July-Aug	List L1	All	$272.25	$1,089.00
Oct-Nov	List L2	All	$2,245.40	$8,981.60

LIST L1 - (Indicator List)

FIELD PARAMETERS	CAS Number	Method	UNITS	Unit Cost
Leachate level in storage tank	n/a	Field	ft	
pH(unfiltered)	n/a	Field	units	
Specific Conductance<unfiltered, umhos/cm 25C>	n/a	Field	umhos	
Leachate Temp<deg. F>	n/a	Field	deg	

MISCELLANEOUS CONSTITUENTS	CAS Number	Method	UNITS	
Alkalinity (total)	n/a	E310.2	mg/l	$8.25
Biological Oxygen Demand (BOD)	n/a	E405.1	mg/l	$16.50
Chemical Oxygen Demand (COD)	n/a	E410.4	mg/l	$16.50
Total Dissolved Solids (TDS)	n/a	E160.1	mg/l	$11.00
Total Suspended Solids				$11.00
Total Organic Carbon (TOC)	n/a	E415.1	mg/l	$22.00

INORGANIC PARAMETERS	CAS Number	Method	UNITS	
Ammonia	7664-41-7	E350.2	ug/l	$19.25
Boron	7440-42-8	E200.7	ug/l	$8.25
Cadmium	7440-43-9	E213.2	ug/l	$16.50
Chloride(dis)	6887-00-6	E325.2	ug/l	$8.25
Chromium	7440-47-3	E200.7	ug/l	$8.25
Copper (dis)	7440-50-8	E200.7	ug/l	$8.25
Iron (dis)	7439-89-6	E200.7	ug/l	$8.25

Lead	7439-92-1	E239.2	ug/l	$16.50
Manganese(dis)	7439-96-5	E200.7	ug/l	$8.25
Mercury	7439-97-6	E245.1	ug/l	$22.00
Nickel	7440-02-0	E200.7	ug/l	$8.25
Nitrate (as Nitrogen)	7727-37-9	E353.2	ug/l	$8.25
Selenium	7782-49-2	E270.2	ug/l	$16.50
Silver	7440-22-4	E200.7	ug/l	$8.25
Sulfates	4808-79-8	E375.2	ug/l	$13.75
Zinc	7440-66-6	E200.7	ug/l	$8.25

LIST L2 - (Annual Organics and Inorganics)

FIELD PARAMETERS	CAS Number	Method	UNITS	List L2
Leachate level in storage tank	n/a	Field	ft	
pH(unfiltered)	n/a	Field	units	
Specific Conductance<unfiltered, umhos/cm 25C>	n/a	Field	umhos	
Leachate Temp<deg. F>	n/a	Field	deg	

MISCELLANEOUS CONSTITUENTS	CAS Number	Method	UNITS	
Alkalinity (total)	n/a	E310.2	mg/l	$8.25
Biological Oxygen Demand (BOD)	n/a	E405.1	mg/l	$16.50
Chemical Oxygen Demand (COD)	n/a	E410.4	mg/l	$16.50
Total Dissolved Solids (TDS)	n/a	E160.1	mg/l	$11.00
Total Suspended Solids				$11.00
Total Organic Carbon (TOC)	n/a	E415.1	mg/l	$22.00

INORGANIC PARAMETERS	CAS Number	Method	UNITS	
Aluminum	7429-90-5	E200.7	ug/l	$8.25
Ammonia	7664-41-7	E350.2	ug/l	$19.25
Antimony	7440-36-0	E200.7	ug/l	$11.00
Arsenic	7440-38-2	E206.2	ug/l	$16.50
Barium	7440-39-3	E200.7	ug/l	$8.25
Beryllium	7440-41-7	E200.7	ug/l	$8.25
Boron	7440-42-8	E200.7	ug/l	$8.25
Cadmium	7440-43-9	E213.2	ug/l	$16.50
Calcium	7440-70-2	E200.7	ug/l	$8.25
Chloride(dis)	6887-00-6	E325.2	ug/l	$8.25
Chromium	7440-47-3	E200.7	ug/l	$8.25
Cobalt	7440-48-4	E200.7	ug/l	$8.25
Copper	7440-50-8	E200.7	ug/l	$8.25
Cyanide (Total as Cn-)	57-12-5	E335.3	ug/l	$22.00
Fluoride (Total as F-)	7782-41-4	E340.2	ug/l	$8.25
Iron (Total)	7439-89-6	E200.7	ug/l	$8.25
Lead	7439-92-1	E239.2	ug/l	$16.50
Magnesium	7439-95-4	E200.7	ug/l	$8.25
Manganese	7439-96-5	E200.7	ug/l	$8.25
Mercury	7439-97-6	E245.1	ug/l	$22.00
Nickel	7440-02-0	E200.7	ug/l	$8.25
Nitrate (as Nitrogen)	7727-37-9	E353.2	ug/l	$8.25
Potassium	7440-09-7	•V	ug/l	$11.00
Selenium	7782-49-2	E270.2	ug/l	$16.50
Silver	7440-22-4	E200.7	ug/l	$8.25
Sodium	7440-23-5	E200.7	ug/l	$8.25
Sulfates	4808-79-8	E375.2	ug/l	$13.75
Thallium	7440-28-0	E279.2	ug/l	$16.50
Tin	7440-31-5	E200.7	ug/l	$8.25
Vanadium	7440-62-2	E200.7	ug/l	$11.00
Zinc	7440-66-6	E200.7	ug/l	$8.25

* Analytical Methods for Flame Spectrophotometry, Varian, 1979

ORGANIC CONSTITUENTS	CAS Number	Method	UNITS	
2,4-D;2,4-dichlorophenoxy-acetic acid	94-75-7	SW8260	ug/l	$266.75
Acetone;2-Propane	67-64-1	SW8270	ug/l	$650.00
Acrolein	107-02-8	SW8080	ug/l	$110.00
Acrylonitrile;2-Propenenitrile	107-13-1	SW8150	ug/l	$150.00
Alachor*	15972-60-8	SW8015	ug/l	$297.00
Aldicarb; Temik	116-06-3	E619	ug/l	$337.15
Aldrin; Aldrex	309-00-2		ug/l	
Atrazine	1912-24-9		ug/l	

LIST L2 - (Annual Organics and Inorganics)

ORGANIC CONSTITUENTS - Cont'd	CAS Number	Method	UNITS
Benzene*	71-43-2		ug/l
Benzoic Acid	65-85-0		ug/l
bis (2-Chloroethoxy) methane	111-91-1		ug/l
bis (2-Ethylhexyl) phthalate	117-81-7		ug/l
bis Chloromethyl ether	542-88-1		ug/l
Bromobenzene; Phenyl bromide	108-86-1		ug/l
Bromochloromethane; Chlorobromomethane	74-97-5		ug/l
Bromodichloromethane; Dibromochloromethane	75-27-4		ug/l
Bromoform; Tribromomethane	75-25-2		ug/l
Bromomethane; Methyl bromide	74-83-9		ug/l
Butanol,1 n-Butyl alcohol	71-36-3		ug/l
Butanol 1,2;sec-butyl alcohol	78-92-2		ug/l
Butanone, 2-; Methyl ethyl ketone; MEK	73-93-3		ug/l
Butylbenzene, n-; 1-Phenylbutane	104-51-8		ug/l
Butylbenzene, sec-; (1-Methylpropyl)benzene	135-98-8		ug/l
Butylbenzene, tert-; (1,1-Dimethylethly)benzene	98-06-6		ug/l
Butylbenzyl phthalate	85-68-7		ug/l
Carbofuran	1563-66-2		ug/l
Carbon disulfide	75-15-0		ug/l
Carbon tetrachloride	56-23-5		ug/l
Chlordane*	57-74-9		ug/l
Chlorobenzene; Monochlorobenzene	108-90-7		ug/l
Chlorodibromomethane; Dibromochloromethane	124-48-1		ug/l
Chloroethane; ethyl chloride	75-00-3		ug/l
Chloroethyl Vinyl Ether, 2-; (2-Chloroethoxy)ethene	110-75-8		ug/l
Chloroform; Trichloromethane	67-66-3		ug/l
Chloronaphthalene, 2	91-58-7		ug/l
Chlorotoluene, o-	95-49-8		ug/l
Chlorotoluene, p-	106-43-4		ug/l
Cresol, p-; cresol, 4-methylphenol	106-44-5		ug/l
Cumene; (1-Methylethyl)benzene; Isopropylbenzene	98-82-8		ug/l
Cymene; p-Isopropyltoluene, Dolcymene	25515-15-1		ug/l
Dalapon			
DDD;1,1'-(2,2-dichloroethylidene)bis[4 chlorobenzene]	72-54-8		ug/l
DDE;1,1'-(dichloroethenylidene)bis[4 chlorobenzene]	72-55-9		ug/l
DDT; 1,1'-(2,2,2-Trichloroethylidene)bis[4-chlorbenzene	50-29-3		ug/l
Di-n-butyl pthalate; Dibutyl pthalate	84-74-2		ug/l
Dibromo-3-chloropropane, 1,2-; (DBCP)	96-12-8		ug/l
Dichloro-2-butene, trans-1,4-	110-57-6		ug/l
Dichlorobenzene, 1,2; o-Dichlorobenzene	95-50-1		ug/l
Dichlorobenzene, 1,3; m-Dichlorobenzene	541-73-1		ug/l
Dichlorobenzene, 1,4; p-Dichlorobenzene	106-46-7		ug/l
Dichlorodifluoromethane; Difluorodichloromethane; Freon 12	75-71-8		ug/l
Dichloroethane, 1,1-; Ethylidene chloride	75-34-3		ug/l

Dichloroethane, 1,2-; ethylene dichloride*	107-06-2		ug/l
Dichloroethylene, 1,1-	75-35-4		ug/l
Dichloroethylene, 1,2-	540-59-0		ug/l
Dichloroethylene, cis-1,2-	156-59-0		ug/l
Dichloroethylene, trans-1,2-	156-60-5		ug/l
Dichloropropane, 1,2-*	78-87-5		ug/l
Dichloropropane, 1,3-; Trimethylene dichloride	142-28-9		ug/l
Dichloropropane, 2,2-; Isopropylene chloride	594-20-7		ug/l
Dichloropropene, 1,1-; 1,1-Dichloropropylene	563-58-6		ug/l
Dichloropropene, 1,3-; 1,3-Dichloropropylene	542-75-6		ug/l
Dichloropropene, cis-1,3-	10060-01-2		ug/l

LIST L2 - (Annual Organics and Inorganics)

ORGANIC CONSTITUENTS - Cont'd	CAS Number	Method	UNITS
Dichloropropene, trans-1,3-	10061-02-6		ug/l
Dieldrin	60-57-1		ug/l
Diethyl phthalate	84-66-2		ug/l
Difluorobenzene, 1,4-; p-Difluorobenzene	540-36-3		ug/l
Dimethyl phthalate	131-11-3		ug/l
Dimethylphenol,2,4-	1300-71-6		ug/l
Dinoseb			
Endosulfan I	959-98-8		ug/l
Endosulfan II	33213-65-9		ug/l
Endosulfan Sulfate	1031-07-8		ug/l
Endothall			
Endrin	72-20-8		ug/l
Endrin Aldehyde	7421-93-4		ug/l
Endrin Ketone			ug/l
Ethyl acetate	141-78-6		ug/l
Ethyl Alchohol; Ethanol	64-17-5		ug/l
Ethyl Methacrylate	97-63-2		ug/l
Ethylbenzene	100-41-4		ug/l
Ethylene dibromide (EDB); 1,2-Dibromoethane	106-93-4		ug/l
gamma-BHC; 1,2,3,4,5,6-Hexachlorocyclohexane; Lindane	58-89-9		ug/l
Heptachlor*	76-44-8		ug/l
Heptachlor Epoxide*	1024-57-3		ug/l
Hexachlorobutadiene	87-68-3		ug/l
Hexanone, 2-; Methyl butyl ketone	591-78-6		ug/l
Iodomethane; Methyl iodide	74-88-4		ug/l
Isophorone	78-59-1		ug/l
Methoxchlor	72-43-5		ug/l
Methyl chloride; chloromethane	74-87-3		ug/l
Methyl-2-pentanone, 4-; Methyl isobutyl ketone	108-10-1		ug/l
Methylene bromide; Dibromoethane	74-95-3		ug/l
Methylene chloride; Dichloromethane	75-09-2		ug/l
Naphthalene	91-20-3		ug/l
Nitrobenzene	98-95-3		ug/l
Nitrophenol, 4-; p-Nitrohenol	100-07-7		ug/l
Parathion; 0,0-Diethyl phosphorotioic acid	56-38-2		ug/l
PCBs; Polychlorinated biphenyls*	1336-36-3		ug/l
Pentachlorophenol*	87-86-5		ug/l
Phenanthrene	85-01-8		ug/l
Phenol	108-95-2		ug/l
Picloram			
Propanol, 1-; n-Propyl alcohol	71-23-8		ug/l
Propanol, 2-; isopropyl alcohol	67-63-0		ug/l
Propylbenzene, n-; 1-Phenylpropane	103-65-1		ug/l
Silvex; 2-(2,4,5-trichlorophenoxy)propionic acid; 2,4,5-TP	93-72-1		ug/l

Simazine	100-42-5		ug/l
Styrene; Ethenylbenzene	630-20-6		ug/l
Tetrachloroethane, 1,1,1,2-	79-34-5		ug/l
Tetrachloroethane, 1,1,2,2-	127-18-4		ug/l
Tetrachloroethene, 1,1,2,2-; Tetrachloroethylene*	109-99-9		ug/l
Tetrahydrofuran; Tetramethylene oxide	108-88-3		ug/l
Toluene; Methylbenzene	8001-35-2		ug/l
Toxaphene	87-61-6		ug/l
Trichlorobenzene, 1,2,3-	120-82-1		ug/l
Trichlorobenzene, 1,2,4-	71-55-6		ug/l
Trichloroethane, 1,1,1-; Methylchloroform			

LIST L2 - (Annual Organics and Inorganics)

ORGANIC CONSTITUENTS - Cont'd	CAS Number	Method	UNITS
Trichloroethane, 1,1,2-	79-00-5		ug/l
Trichloroethylene, Trichloroethene	79-01-6		ug/l
Trichlorofluoromethane; Fluorotrichloromethane; Freon 11	75-69-4		ug/l
Trichlorophenoxyacetic acid, 2,4,5-; 2,4,5-T	93-76-5		ug/l
Trichloropropane, 1,2,3-	96-18-4		ug/l
Trimethylbenzene, 1,2,4-; Pseudocumene	95-63-6		ug/l
Trimethylbenzene, 1,3,5-; Mesitylene	108-67-8		ug/l
Vinyl acetate; Ethenyl ester acetic acid	108-05-4		ug/l
Vinyl chloride; Chloroethene*	75-01-4		ug/l
Xylene, m-	108-38-3		ug/l
Xylene, o-	95-47-6		ug/l
Xylene, p-	106-42-3		ug/l
Xylenes	1330-20-7		ug/l

ATTACHMENT 14

Gas Management Plan

GAS MANAGEMENT PLAN

INTRODUCTION

This Gas Management Plan will supplement the accompanying Permit Application, Construction Plan, and Operating Plan for this facility.

An active gas collection system will be used at this facility 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. These wells will connect to a network of collection piping, upon which a pressure gradient will be induced with compressors or mechanical vacuum blowers. Landfill gas will ultimately be used in an emission-controlled incinerator operated by NRG Technologies, Inc. to provide energy for the thermal dewatering of sewage sludge. Landfill gas will be incinerated with an on-site flare whenever the sludge drying plant is not in operation.

This plan addresses gas generation, implementation and routine operation, treatment and disposal, time of operation, inspection, and maintenance of the gas collection system.

GAS GENERATION

The Landfill Air Emissions Estimation Model, Version 1.1a, was used to predict gas generation from the facility. This approach assumes that the rate of landfill gas produced by a unit weight of refuse peaks after a negligible time lag and then decreases according to a first order logarithmic decay constant, as in the following equation:

$$\frac{dG}{dt} = kL_0e^{-kt}$$

where:

G	=	gas volume,
k	=	rate constant,
L_0	=	methane generation potential, and
t	=	time.

The average annual waste acceptance rate was estimated by dividing the approximate in-place waste volume by the number of operational years over four different time periods. From April of 1972 to April of 1990 the average annual waste acceptance rate was 164,722 yd^3/yr, from April 1990 to January 1993 the average annual acceptance rate was 153,393 yd^3/yr and from January 1995 to November 1995 the average annual acceptance rate was 303,849 yd^3/yr. Upon closure in the year 2001, the final projected volume is 6.1 million yd^3. Subtracting the total in-place volume, as of November 1995, of 4.3 million yd^3 from 6.1 million yd^3 the average annual acceptance rate is 363,740 yd^3/yr from November of 1995 to the year of closure.

Using a methane generation potential (L_0) and a methane generation rate constant (k) of 4,411 ft^3/yr and .04 yr^{-1}, respectively, a peak gas flow of 7.8×10^8 ft^3/yr or 1,484 cfm occurred one year after closure. The values used for L_0 and k were taken from the U.S. Environmental Protection Agency's 1995 compilation of air pollutant emissions factors, AP-42. Good correlation was observed between the predicted present-day gas generation rate and current collection rates which are generally around 800-1,000 cfm.

IMPLEMENTATION

An active gas collection system is already in existence at the subject facility. Approximately 90 vertical gas collection wells and a system of subsurface gas collection trenches are connected to three 800 cfm compressors, one of which is generally in operation. As final elevations are reached, however, all existing wells will be abandoned as a permanent and more automated gas collection system is installed. Subsurface gas collection trenches may continue to be used in conjunction with the permanent gas collection system. The existing gas collection system is detailed on Sheet B-6 of the site developmental drawings.

Upon issuance of a permit, permanent dual leachate/gas vertical extraction wells will be installed around the perimeter of the facility where the existing cover is 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. Additional wells will be added as necessary according to criteria described under the Routine Operation section.

Permanent dual leachate/gas vertical extraction wells will be constructed of 8 in. (min) diameter PVC or HDPE pipe, perforated or slotted 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 to the top of the sand drainage layer that lies above the existing asphalt liner. The boreholes 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 wellhead assembly that will allow the monitoring and adjustment of gas flow and the collection of gas samples.

Landfill gas will be conveyed through an 8 in. (min) PVC or HDPE collection piping to a central point using compressors or mechanical vacuum blowers. The collection piping system will be buried to protect against freezing and to allow vehicular access where 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. Three 800 cfm blowers 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 facility operated by NRG Technologies, Inc.

ROUTINE OPERATION

The gas collection system will be operated in a manner that maximizes gas collection while minimizing air infiltration. To accomplish this, it will be necessary to monitor the gage pressure and nitrogen or oxygen concentration to indicate air infiltration at the wellhead on a regular basis. If the nitrogen or oxygen concentration at a wellhead is excessive, the control valve will be closed slightly to decrease air infiltration.

The gas collection system will be operated such that a negative pressure is established at each wellhead, except in the case that a fire or increased well temperature is observed. If a positive

gauge pressure is measured at a wellhead, corrective action will be taken to establish a negative operating pressure at that wellhead. Corrective measure may include:

1. Adjusting the wellhead valve to increase the vacuum applied to the well;

2. Increasing of the vacuum rate at the compressor; or

3. Final cover maintenance, including repair of any piping that may be blocked or damaged due to differential settlement.

In the event that the previously stated corrective measures are unable to establish a negative pressure, it may be necessary to install an additional gas extraction well.

Landfill gas will be provided to NRG Technologies whenever possible. On weekends, holidays, and other times when the plant may not be in operation, gas will be routed to an on-site flare for incineration.

PROCESSING AND DISPOSAL

Landfill gas will be processed on-site by Winnebago Gas Company. Compressed landfill gas will then be transferred off-site to NRG Technologies for use as an alternative fuel during the thermal dewatering of local municipal wastewater treatment sludges. NRG maintains an air permit with the IEPA-DAPC specifying the use of landfill gas as a fuel source during the operation of the plant.

Winnebago Reclamation Service has filed an application for and was issued a permit to construct and operate a flare system, pursuant to 35 IAC 201.163, by the IEPA-DAPC. The permit and Application are provided herewith as Appendix 2. The flare system will ensure that a mechanism for landfill gas disposal is available at all times.

Representative flow rate measurements will be made of gas flow into the combustion device. Landfill gas will also be measured for heat value and moisture content, along with combustion parameters including, but not limited to, oxygen and carbon dioxide prior to combustion.

NRG Technologies currently has a contract with the Rock River Water Reclamation District to accept sludge through the year 2003. If, at any time in the future, NRG Technologies ceases to exist or accept landfill gas, alternative means for the disposal or beneficial use of landfill gas will be implemented, and any applicable permit will be obtained.

MONITORING

The most likely paths of landfill gas migration from the existing unit are considered to be vertically through the landfill cover and laterally through the sidewall liner. Given the existing site geology, lateral gas migration is expected to be essentially uniform in all directions.

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. The monitoring period may be reduced if the landfill operator can demonstrate that landfill gas is no longer a threat to human health or the environment.

Monitoring of gas within the landfill will be accomplished by sampling gas from the main collection line, prior to the point that it enters the compressor. This sample will provide a flow-weighted composite, representative of the gas being produced within the entire facility. In addition, a pressure reading will be taken at the wellhead of each gas extraction well at 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. Where possible, gas monitoring probes will be installed approximately 100 ft from the fill boundary. The lateral spacing between probes will range from 150 ft along the eastern boundary of the facility where the unit is closest to other properties, to 500 ft along the northern boundary where on-site buildings will be equipped with continuous methane monitoring devices. The locations of the proposed gas monitoring probes are detailed on Sheet B-7 of the site developmental drawings.

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.

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 a GEM-500 as well. A Copy of manufacturer's literature for this device is provided in Attachment 17.

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.

TIME OF OPERATION

The gas collection system will be operated until the waste has stabilized enough to no longer produce methane in quantities that exceed the minimum allowable concentration as detailed in 35 IAC 811.311 Subsections (a)(1), (a)(2), and (a)(3). Winnebago Reclamation Service, Inc. will obtain the necessary authorization to discontinue operation of the gas collection system if and when the above conditions are met.

SYSTEM INSPECTION AND MAINTENANCE

All wellheads, fittings, valves, header piping, laterals, and gas mains, and other components associated with the gas collection system will be inspected for leaks and structural damage on at least a monthly basis. A gage pressure measurement at each wellhead will be taken at this time as well. All compressors or mechanical vacuum blowers will be maintained in accordance with the manufacturer's recommendations and inspected at least weekly to insure continuous operation. As reasonable and appropriate, any observed damage due to settlement or other deficiencies will be repaired or corrected as soon as practical after detection. Any faulty or worn equipment will be replaced as soon as practical as well.

APPENDIX 1

Gas Generation Calculations

Gas Generation Calculations

An estimate of landfill gas production is needed to size mechanical vacuum blowers and gas collection equipment. Peak gas generation will occur in the year of landfill closure.

Given:

1. The Landfill Air Emissions Model, Version 1.1a, produces an estimate of landfill gas generation based on the following equation:

$$\frac{dG}{dt} = K L_0 e^{-kt}$$

Where:

$\frac{dG}{dt}$ = rate of landfill gas generation (m^3/yr)

k = rate constant (yr^{-1})
L_0 = ultimate gas production (m^3/Mg)
t = time (yr)

2. Values of k and L_0 are 0.04 and 4,411 ft^3/Mg, respectively, according to AP-42 Sec. 2.4.

3. The annual in-place waste acceptance rate was approximately 164,722 yd^3/year from 1972 until 1990, 153,393 yd^3/yr from April 1990 to January 1993, and 303,849 yd^3/yr from January 1993 until November 1995. The annual waste acceptance rate from 1996 until closure in 2001 is expected to be approximately 363,740 yd^3/yr.

4. The average density of in-place municipal waste is 1200 lb/yd^3

Solution:

Convert average annual acceptance rates to Mg/yr.

1972-1990:

(164,722 yd^3/yr) (1200 lb/yd^3) (4.54×10^{-4} Mg/lb) = 89,740 Mg/yr

1990-1993:

(153,393 yd^3/yr) (1200 lb/yd^3) (4.54×10^{-4} Mg/lb) = 83,570 Mg/yr

1993-1995:

(303,849 yd^3/yr) (1200 lb/yd^3) (4.54×10^{-4} Mg/lb) = 165,540 Mg/yr

1995-2001:

(363,740 yd^3/yr) (1200 lb/yd^3) (4.54×10^{-4} Mg/lb) = 198,165 Mg/yr

Calculate peak gas generation in the year of closure by summing the gas generation from the volume of waste placed in each year.

$$Q_{peak} = \sum_{i=1}^{n} k \; L_0 \; M_i \; (e^{-kti})$$

Where:

M_i	=	mass of refuse placed in year i (Mg)
n	=	age of landfill upon closure (yr)

Output from the Landfill Air Emissions Estimation Model are included on the following pages. The model produced a peak flow of 7.8×10^8 ft^3/yr or 1,484 cfm occurring the year after closure of the landfill in 2001.

Model Parameters

Lo : 124.91 m^3 / Mg
k : 0.0400 1/yr
NMOC : 595.00 ppmv
Methane : 50.0000 % volume
Carbon Dioxide : 50.0000 % volume

Landfill Parameters

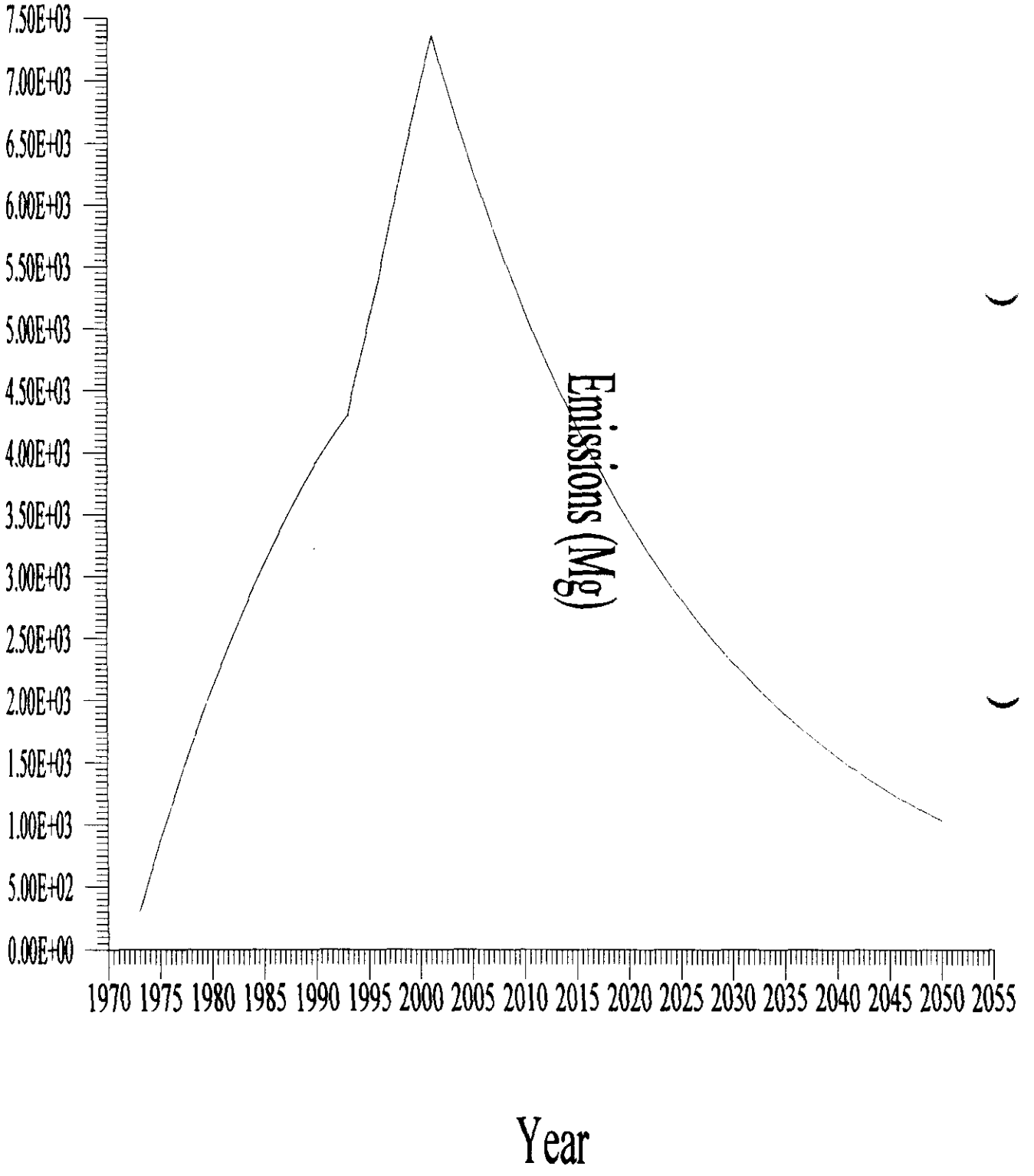
Year Opened : 1972 Current Year : 1996 Year Closed: 2001
Capacity : 3320000 Mg
Average Acceptance Rate Required from
Current Year to Closure Year : 190255.60 Mg/year

Model Results

Year	Refuse In Place (Mg)	Methane Emission Rate (Mg/yr)	Methane Emission Rate (Cubic m/yr)
1973	8.966E+04	2.989E+02	4.480E+05
1974	1.793E+05	5.860E+02	8.784E+05
1975	2.690E+05	8.619E+02	1.292E+06
1976	3.586E+05	1.127E+03	1.689E+06
1977	4.483E+05	1.382E+03	2.071E+06
1978	5.380E+05	1.626E+03	2.438E+06
1979	6.276E+05	1.861E+03	2.790E+06
1980	7.173E+05	2.087E+03	3.129E+06
1981	8.069E+05	2.304E+03	3.454E+06
1982	8.966E+05	2.513E+03	3.766E+06
1983	9.863E+05	2.713E+03	4.067E+06
1984	1.076E+06	2.906E+03	4.355E+06
1985	1.166E+06	3.091E+03	4.632E+06
1986	1.255E+06	3.268E+03	4.899E+06
1987	1.345E+06	3.439E+03	5.155E+06
1988	1.435E+06	3.603E+03	5.401E+06
1989	1.524E+06	3.761E+03	5.637E+06
1990	1.614E+06	3.912E+03	5.864E+06
1991	1.700E+06	4.046E+03	6.065E+06
1992	1.786E+06	4.175E+03	6.257E+06
1993	1.873E+06	4.298E+03	6.443E+06
1994	2.038E+06	4.681E+03	7.017E+06
1995	2.203E+06	5.049E+03	7.568E+06
1996	2.369E+06	5.402E+03	8.097E+06
1997	2.559E+06	5.824E+03	8.730E+06
1998	2.749E+06	6.230E+03	9.339E+06
1999	2.939E+06	6.620E+03	9.923E+06
2000	3.130E+06	6.995E+03	1.048E+07
2001	3.320E+06	7.355E+03	1.102E+07
2002	3.320E+06	7.066E+03	1.059E+07

Year	Refuse In Place (Mg)	(Mg/yr)	(Cubic Ft/yr)
2013	3.320E+06	4.551E+03	6.821E+06
2014	3.320E+06	4.372E+03	6.554E+06
2015	3.320E+06	4.201E+03	6.297E+06
2016	3.320E+06	4.036E+03	6.050E+06
2017	3.320E+06	3.878E+03	5.813E+06
2018	3.320E+06	3.726E+03	5.585E+06
2019	3.320E+06	3.580E+03	5.366E+06
2020	3.320E+06	3.440E+03	5.156E+06
2021	3.320E+06	3.305E+03	4.953E+06
2022	3.320E+06	3.175E+03	4.759E+06
2023	3.320E+06	3.051E+03	4.573E+06
2024	3.320E+06	2.931E+03	4.393E+06
2025	3.320E+06	2.816E+03	4.221E+06
2026	3.320E+06	2.706E+03	4.055E+06
2027	3.320E+06	2.600E+03	3.896E+06
2028	3.320E+06	2.498E+03	3.744E+06
2029	3.320E+06	2.400E+03	3.597E+06
2030	3.320E+06	2.306E+03	3.456E+06
2031	3.320E+06	2.215E+03	3.320E+06
2032	3.320E+06	2.128E+03	3.190E+06
2033	3.320E+06	2.045E+03	3.065E+06
2034	3.320E+06	1.965E+03	2.945E+06
2035	3.320E+06	1.888E+03	2.829E+06
2036	3.320E+06	1.814E+03	2.718E+06
2037	3.320E+06	1.743E+03	2.612E+06
2038	3.320E+06	1.674E+03	2.509E+06
2039	3.320E+06	1.609E+03	2.411E+06
2040	3.320E+06	1.545E+03	2.317E+06
2041	3.320E+06	1.485E+03	2.226E+06
2042	3.320E+06	1.427E+03	2.138E+06
2043	3.320E+06	1.371E+03	2.055E+06
2044	3.320E+06	1.317E+03	1.974E+06
2045	3.320E+06	1.265E+03	1.897E+06
2046	3.320E+06	1.216E+03	1.822E+06
2047	3.320E+06	1.168E+03	1.751E+06
2048	3.320E+06	1.122E+03	1.682E+06
2049	3.320E+06	1.078E+03	1.616E+06
2050	3.320E+06	1.036E+03	1.553E+06
2051	3.320E+06	9.953E+02	1.492E+06
2052	3.320E+06	9.563E+02	1.433E+06
2053	3.320E+06	9.188E+02	1.377E+06
2054	3.320E+06	8.828E+02	1.323E+06
2055	3.320E+06	8.482E+02	1.271E+06
2056	3.320E+06	8.149E+02	1.221E+06
2057	3.320E+06	7.830E+02	1.174E+06
2058	3.320E+06	7.523E+02	1.128E+06
2059	3.320E+06	7.228E+02	1.083E+06
2060	3.320E+06	6.944E+02	1.041E+06
2061	3.320E+06	6.672E+02	1.000E+06
2062	3.320E+06	6.410E+02	9.609E+05
2063	3.320E+06	6.159E+02	9.232E+05

Projected Methane Emissions



APPENDIX 2

Supplemental Gas Processing Facility Information

Thomas Hilbert
Environmental Engineer
Winnebago Reclamation
8403 Lindenwood Rd.
Rockford, IL 61109
(815) 874-4806
August 7, 1995

Mr. Chris Leibman
Illinois Environmental Protection Agency
Division of Land Pollution Control
2200 Churchill Rd
Springfield, IL 62706

Re: Permit No. 1972-24-LF (Pagel Landfill) Significant Modification Completeness Review.

Dear Chris:

Winnebago Reclamation Service (WRS) apologizes for the confusion regarding the need for a written response to your concerns regarding the inclusion of the NRG Sludge Dehydration Facility in the operating permit for the Pagel Landfill. WRS appreciates the opportunity to respond to Illinois Environmental Protection Agency (IEPA) questions regarding the completeness of the current application for Significant Modification of the existing operating permit for Pagel Landfill. It is also our understanding that the IEPA would like additional information regarding the construction quality assurance for the installation of landfill gas monitoring probes. This information will be provided by Andrews Engineering via courier no later than the end of the business day today (August 7, 1995).

WRS considers that the sludge drying facility (NRG) is not governed by 35 IAC 811.312(g) and as such should not be included in the "SIG MOD" permit application. Nonetheless, if it is determined, after review of this letter, that NRG is required to be included in the landfill permit, then the permit should be written in such manner as to allow operational changes, equipment replacement, and similar activities to occur at NRG without requiring supplemental permits to the landfills operating permit.

WRS maintains a system of active gas collection wells to collect landfill gas generated at Pagel Landfill. The landfill gas is collected and processed by Winnebago Gas Company. This company is considered part of the overall landfill operations and is operated under the direction of the landfill management (it was originally organized as a separate company to pursue gas processing opportunities at other landfills). In the past the Winnebago Gas

Company operated a series of adsorption towers, condensate traps, heat exchangers, and desiccants that were utilized to upgrade the gas quality through the removal of CO_2 and moisture. During this period it was anticipated that the gas would be sold to the Greater Rockford Energy and Technology corporation (GRET) for fuel to during the production of methanol from grain. The methanol production facility was unsuccessful and the Winnebago Gas Company (WGC) than entered into a contract with NRG to sell gas to the sludge drying facility. This contract is long term and expected to last until at least 2003. Since the NRG facility does not require high quality gas for its operations much of the initial processing equipment excepting the condensate removal tanks have been removed.

In the past, the WGC shut down during periods in which NRG Technology was unable to accept gas from the landfill. The current "SIG MOD" submittal contains an application for an air permit to construct and operate a landfill gas flare. During periods in which the NRG Technology facility is not operating the landfill gas collected would be disposed by burning the gas in a permitted flare. WGC and WRS are also investigating the possibility of constructing a small cogeneration facility to make beneficial use of the gas during periods in which an offsite user of the gas is unavailable. It is our intent to have the capability to provide a responsible and beneficial mechanism for disposal of landfill gas at the WGC facility that is available at all times. In addition, the removal and disposal of gas condensate is the responsibility of WGC and is done in conjunction with leachate disposal at the landfill. WGC is currently constructing a small scale pretreatment system to reduce ammonia levels within the gas condensate that would allow a more direct discharge to the local waste water treatment facility.

We believe that the purpose of the regulations is to ensure that off-site operations which are primarily devoted to the collection and processing of landfill gases should be under the control of the landfill and covered under the landfills permit. In this case WGC is exclusively engaged in the collection, processing and distribution of the gas from Pagel Landfill. As such, the WGC facility should be considered part of the landfill gas control system.

NRG Technologies operates a sludge dehydration plant which dehydrates municipal wastewater treatment sludge prior to disposal at the landfill. It is not under common ownership with WRS or WGC. The gas which it purchases from WGC together with natural gas obtained from Northern Illinois Gas Company provide the fuel to operate the plant. The NRG facility is simply a user of processed landfill gas. Its' operations are independent of the fuel that it receives from WGC and would continue to operate if the landfill gas were to become unavailable.

An appropriate mechanism for disposal of landfill gas will always be available at the WGC facility irrespective of the operations at the NRG Technology facility. Under these circumstances we believe that the solid waste management permit for Pagels Landfill should cover all of the equipment and apparatus in the gas collection system on the landfill and the gas processing facility of Winnebago Gas Corporation. The NRG Technologies Sludge Dehydration Plant, however, should be considered as a separate facility. Please note that the NRG plant is and will continue to be subject to regulation and permitting under the Clean Air

Act and the Illinois Air Pollution Control Regulations.

If you have any questions or would like any additional information, please feel free to give me a call.

Sincerely,

Thomas Hilbert

cc: John Holmstrom - William Charles, LTD

APPENDIX 3

Air Emissions Permit Application

State of Illinois
ENVIRONMENTAL PROTECTION AGENCY

Mary A. Gade, Director
P. O. Box 19506, Springfield, IL 62794-9506
217/782-2113

JOINT CONSTRUCTION AND OPERATING PERMIT

PERMITTEE

Winnebago Reclamation Service, Inc.
Attn: Gary L. Marzorati
4920 Forest Hills Road
Loves Park, IL 61111

Application No.: 94070003
Applicant's Designation: FLARE-WRS
Subject: Flare Station
Date Issued: August 22, 1995

I.D. No.: 201801AAF
Date Received: July 12, 1995

Operating Permit Expiration Date: August 21, 1997

Location: 8403 Lindenwood Road, Rockford

Permit is hereby granted to the above-designated Permittee to CONSTRUCT and OPERATE emission source(s) and/or air pollution control equipment consisting of a flare station for combustion of landfill gas as described in the above-referenced application. This Permit is subject to standard conditions attached hereto and the following special condition(s):

1. Operation of the emission source(s) included in this permit shall not begin until all associated air pollution control equipment has been constructed and is operational.

2. The flare station shall be operated and maintained for effective combustion of landfill gas. Flame monitor(s) shall be installed, operated and maintained on the flare system to confirm the presence of a flame when landfill gas is being fed.

3. The landfill gas consumption of the flare station in million cubic feet (mcf) shall not exceed 1.7 mcf/day and 620.21 mcf/year.

4a. Emissions of nitrogen oxides (NO_x), carbon monoxide (CO), sulfur dioxide (SO_2) and volatile organic material (VOM) and operation of the flare station shall not exceed the following limits:

Emission Source	Gas Flow Rate (scfm)	EMISSIONS NO_x lb/hr	NO_x ton/yr	CO lb/hr	CO ton/yr	SO_2 lb/hr	SO_2 ton/yr	VOM lb/hr	VOM ton/yr
Flare Station	1180	4.1	18	29.5	129.2	1.2	5.2	8.2	35.9

The NO_x, CO and SO_2 emission limits are based on the maximum gas flow rate allowed and using standard emission factors. The VOM emission limits are based on the maximum concentration of VOM in the landfill gas of 27300 PPMV with a weighted average molecular weight of 80 lb/lb-mole at a maximum flow rate of 1180 scfm and the flare achieving a destruction efficiency of 98%.

b. This permit is issued based on negligible emissions of particulate matter from the flare station. For this purpose, emissions shall not exceed nominal emission rates of 0.1 lb/hour and 0.44 ton/year.

5. Compliance with annual limits shall be determined from a running total of 12 months of data.

6. The Permittee shall install, maintain and operate a continuous monitoring system to monitor and record the fuel consumption for the flare station.

7a. The Permittee shall sample and analyze the landfill gas entering the flare station at least once every six months for net heating valve, methane, sulfur compounds and non methane organic materials. A report of the analysis result must be submitted to the Agency within 30 days of the sampling.

b. The Agency will revise this requirement to allow for annual analysis of the landfill gas upon written request from the Permittee, if the Permittee can demonstrate that the measured values remain relatively constant based on the gas analysis data of at least two years.

8a. The Permittee shall keep the following records:

i. The landfill gas consumption by the flare station, on a daily basis.

ii. Record of flare station inspection/maintenance completed log, and operating condition of the flare station. This log should at least include the following:

A. Date of inspection.

B. Date maintenance performed and completed.

C. Type of maintenance needed.

b. The Permittee shall keep records of the sampling and analysis of landfill gas required by Condition 7.

9. All records required by this permit shall be retained at a readily accessible location at the plant for at least 3 years from the date of entry and shall be made available for inspection and copying by the Agency upon request.

10. Upon exceedance of the requirements of this permit determined by the records required by this permit or any violation of the requirements of this permit, the Permittee shall submit a report to the Agency within 30 days after the exceedance. The report shall include the hourly emissions occurring during the times of exceedance, a copy of the relevant records and a description of the exceedance or violation and efforts to reduce emissions and future occurrences. This report should be sent to:

Illinois Environmental Protection Agency
Bureau of Air
P.O. Box 19506
Springfield, IL 62794-9506

11. With the Annual Emission report required to be submitted to the Agency pursuant to 35 Ill. Adm. Code Part 254, the Permittee shall report the annual emissions of nitrogen oxides, volatile organic material, carbon monoxide, and sulfur dioxide with supporting calculations and a description of any exceedance of applicable limitations of this permit, if not previously reported.

It should be noted that in the future, this landfill may be subject to air pollution control regulations specifically governing emissions of organic materials from landfill. The USEPA has proposed Emission Guidelines for organic material emissions from existing landfills (56 FR 24468, May 30, 1991). Existing landfills will become subject to these Emission Guidelines upon their adoption by USEPA and the State of Illinois.

If you have any questions on this, please call Syed Rizwan at 217/782-2113.

Donald E. Sutton/drk

Donald E. Sutton, P.E.
Manager, Permit Section
Division of Air Pollution Control

DES:SAR:drk

cc: Region 2

STATE OF ILLINOIS
ENVIRONMENTAL PROTECTION AGENCY
DIVISION OF AIR POLLUTION CONTROL
2200 CHURCHILL ROAD
SPRINGFIELD, ILLINOIS 62706

STANDARD CONDITIONS FOR OPERATING PERMITS

July 1, 1985

The Illinois Environmental Protection Act (Illinois Revised Statutes, Chapter 111-1/2, Section 1039) grants the Environmental Protection Agency authority to impose conditions on permits which it issues.

The following conditions are applicable unless superseded by special permit condition(s).

1. The issuance of this permit does not release the permittee from compliance with state and federal regulations which are part of the Illinois State Implementation Plan, as well as with other applicable statutes and regulations of the United States or the State of Illinois or with applicable local laws, ordinances and regulations.

2. The Agency has issued this permit based upon the information submitted by the permittee in the permit application. Any misinformation, false statement or misprescntation in the application shall be grounds for revocation under 35 Ill. Adm. Code 201.207.

3. a. The permittee shall not authorize, cause, direct or allow any modification, as defined in 35 Ill. Adm. Code 201.102, of equipment, operations or practices which are reflected in the permit application as submitted unless a new application or request for revision of the existing permit is filed with the Agency and unless a new permit or revision of the existing permit(s) is issued for such modification.

   b. This permit only covers emission sources and control equipment while physically present at the indicated plant location(s). Unless the permit specifically provides for equipment relocation, this permit is void for an item of equipment on the day it is removed from the permitted location(s) or if all equipment is removed, notwithstanding the expiration date specified on the permit.

4. The permittee shall allow any duly authorized agent of the Agency, upon the presentation of credentials, at reasonable times:

   a. to enter the permittee's property where actual or potential effluent, emission or noise sources are located or where any activity is to be conducted pursuant to this permit,

   b. to have access to and to copy any records required to be kept under the terms and conditions of this permit,

   c. to inspect, including during any hours of operation of equipment constructed or operated under this permit, such equipment and any equipment required to be kept, used, operated, calibrated and maintained under this permit,

   d. to obtain and remove samples of any discharge or emission of pollutants, and

   e. to enter and utilize any photographic, recording, testing, monitoring or other equipment for the purpose of preserving, testing, monitoring or recording any activity, discharge or emission authorized by this permit.

5. The issuance of this permit:

   a. shall not be considered as in any manner affecting the title of the premises upon which the permitted facilities are located,

   b. does not release the permittee from any liability for damage to person or property caused by or resulting from the construction, maintenance, or operation of the facilities,

c. does not take into consideration or attest to the structural stability of any unit or part of the project, and

d. in no manner implies or suggests that the Agency (or its officers, agents or employees) assumes any liability, directly or indirectly, for any loss due to damage, installation, maintenance, or operation of the proposed equipment or facility.

6. The facilities covered by this permit shall be operated in such a manner that the disposal of air contaminants collected by the equipment shall not cause a violation of the Environmental Protection Act or regulations promulgated thereunder.

7. The permittee shall maintain all equipment covered under this permit in such a manner that the performance of such equipment shall not cause a violation of the Environmental Protection Act or regulations promulgated thereunder.

8. The permittee shall maintain a maintenance record on the premises for each item of air pollution control equipment. This record shall be made available to any agent of the Environmental Protection Agency at any time during normal working hours and/or operating hours. As a minimum, this record shall show the dates of performance and nature of preventative maintenance activities.

9. No person shall cause or allow continued operation during malfunction, breakdown or startup of any emission source or related air pollution control equipment if such operation would cause a violation of an applicable emission standard or permit limitation. Should a malfunction, breakdown or startup occur which results in emissions in excess of any applicable standard or permit limitation, the permittee shall:

   a. immediately report the incident to the Agency's Regional Field Operations Section Office by telephone, telegraph, or other method as constitutes the fastest available alternative, and shall comply with all reasonable directives of the Agency with respect to the incident;

   b. maintain the following records for a period of no less than two (2) years:

      i. date and duration of malfunction, breakdown or startup,

      ii. full and detailed explanation of the cause,

      iii. contaminants emitted and an estimate of quantity of emissions,

      iv. measures taken to minimize the amount of emissions during the malfunction, breakdown or startup,

      v. measures taken to reduce future occurrences and frequency of incidents.

10. If the permit application contains a compliance program and project completion schedule, the permittee shall submit a project completion status report within thirty (30) days of any date specified in the compliance program and project completion schedule or at six month intervals, whichever is more frequent.

11. The Permittee shall submit an Annual Emission Report as required by 35 Ill. Adm. Code. 201.302 and 35 Ill. Adm. code Part 254.

STATE OF ILLINOIS
ENVIRONMENTAL PROTECTION AGENCY
DIVISION OF AIR POLLUTION CONTROL
2200 CHURCHILL ROAD
SPRINGFIELD, ILLINOIS 62706

STANDARD CONDITIONS FOR CONSTRUCTION/DEVELOPMENT PERMITS ISSUED BY THE ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

July 1, 1985

The Illinois Environmental Protection Act (Illinois Revised Statutes, Chapter 111-1/2, Section 1039) authorizes the Environmental Protection Agency to impose conditions on permits which it issues.

The following conditions are applicable unless susperseded by special condition(s).

1. Unless this permit has been extended or it has been voided by a newly issued permit, this permit will expire one year from the date of issuance, unless a continuous program of construction or development on this project has started by such time.

2. The construction or development covered by this permit shall be done in compliance with applicable provisions of the Illinois Environmental Protection Act and Regulations adopted by the Illinois Pollution Control Board.

3. There shall be no deviations from the approved plans and specifications unless a written request for modification, along with plans and specifications as required, shall have been submitted to the Agency and a supplemental written permit issued.

4. The permittee shall allow any duly authorized agent of the Agency upon the presentation of credentials, at reasonable times:

   a. to enter the permittee's property where actual or potential effluent, emission or noise sources are located or where any activity is to be conducted pursuant to this permit,

   b. to have access to and to copy any records required to be kept under the terms and conditions of this permit,

   c. to inspect, including during any hours of operation of equipment constructed or operated under this permit, such equipment and any equipment required to be kept, used, operated, calibrated and maintained under this permit,

   d. to obtain and remove samples of any discharge or emissions of pollutants, and

   e. to enter and utilize any photographic, recording, testing, monitoring or other equipment for the purpose of preserving, testing, monitoring, or recording any activity, discharge, or emission authorized by this permit.

5. The issuance of this permit:

   a. shall not be considered as in any manner affecting the title of the premises upon which the permitted facilities are to be located,

   b. does not release the permittee from any liability for damage to person or property caused by or resulting from the construction, maintenance, or operation of the proposed facilities,

   c. does not release the permittee from compliance with other applicable statutes and regulations of the United States, of the State of Illinois, or with applicable local laws, ordinances and regulations,

   d. does not take into consideration or attest to the structural stability of any units or parts of the project, and

e. in no manner implies or suggests that the Agency (or its officers, agents or employees) assumes any liability, directly or indirectly, for any loss due to damage, installation, maintenance, or operation of the proposed equipment or facility.

6. a. Unless a joint construction/operation permit has been issued, a permit for operation shall be obtained from the Agency before the equipment covered by this permit is placed into operation.

   b. For purposes of shakedown and testing, unless otherwise specified by a special permit condition, the equipment covered under this permit may be operated for a period not to exceed thirty (30) days.

7. The Agency may file a complaint with the Board for modification, suspension or revocation of a permit:

   a. upon discovery that the permit application contained misrepresentations, misinformation or false statements or that all relevant facts were not disclosed, or

   b. upon finding that any standard or special conditions have been violated, or

   c. upon any violations of the Environmental Protection Act or any regulation effective thereunder as a result of the construction or development authorized by this permit.

Directory
Environmental Protection Agency
Bureau of Air

September 1, 1992

For assistance in preparing a permit application, contact the Permit Section:

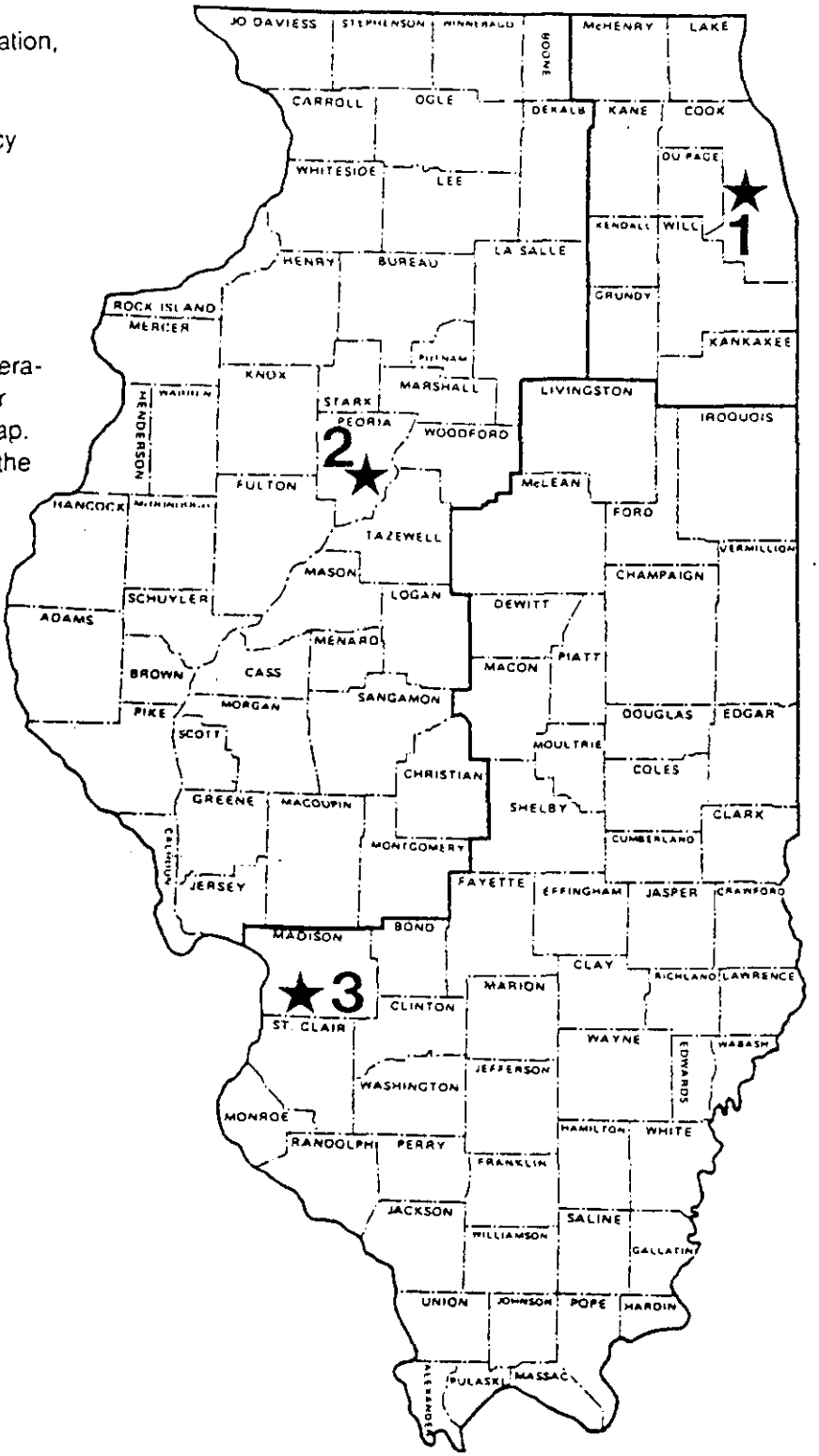
Illinois Environmental Protection Agency
Division of Air Pollution Control
Permit Section
2200 Churchill Road
Springfield, Illinois 62706
217/782-2113

Or contact a regional office of the Field Operations Section. The regional offices and their areas of responsibility are shown on the map. The addresses and telephone numbers of the regional offices are as follows:

Illinois EPA
Region 1
Intercontinental Center
1701 South 1st Avenue
Maywood, Illinois 60153
708/531-5900

Illinois EPA
Region 2
5415 North University
Peoria, Illinois 61614
309/693-5461

Illinois EPA
Region 3
2009 Mall Street
Collinsville, Illinois 62234
618/346-5120



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STATE OF ILLINOIS
ENVIRONMENTAL PROTECTION AGENCY
DIVISION OF AIR POLLUTION CONTROL
2200 CHURCHILL ROAD
SPRINGFIELD, ILLINOIS 62794-9276

APPLICATION FOR PERMIT (A)	FOR AGENCY USE ONLY
[X] CONSTRUCT [X] OPERATE	I.D. NO.
	PERMIT NO.
NAME OF EQUIPMENT TO BE CONSTRUCTED OR OPERATED: Flare Station (B)	DATE

1a. NAME OF OWNER: Winnebago Reclamation Service, Inc.		2a. NAME OF OPERATOR: Winnebago Reclamation Service, Inc.	
1b STREET ADDRESS OF OWNER: 4920 Forest Hills Road		2b. STREET ADDRESS OF OPERATOR: 4920 Forest Hills Road	
1c. CITY OF OWNER: Loves Park		2c. CITY OF OPERATOR: Loves Park	
1d. STATE OF OWNER: Illinois	1e. ZIP CODE: 61111	2d. STATE OF OPERATOR: Illinois	2e. ZIP CODE: 61111

3a. NAME OF CORPORATE DIVISION OR PLANT: Pagel Landfill		3b. STREET ADDRESS OF EMISSION SOURCE: 8403 Lindenwood Road		
3c. CTIY OF EMISSION SOURCE: Rockford	3d. LOCATED WITHIN CITY LIMITS: [ ] YES [X] NO	3e. TOWNSHIP: 36	3f. COUNTY: Winnebago	3g. ZIP CODE: 61109

4. ALL CORRESPONDENCE TO: (TITLE AND/OR NAME OF INDIVIDUAL) Gary L. Marzorati	5. TELEPHONE NUMBER FOR AGENCY TO CALL: (815) 654-4779
6. ADDRESS FOR CORRESPONDENCE: (CHECK ONLY ONE) [X] OWNER [ ] OPERATOR [ ] EMISSION SOURCE	7. YOUR DESIGNATION FOR THIS APPLICATION (C) FLARE-WRS

8. THE UNDERSIGNED HEREBY MAKES APPLICATION FOR A PERMIT AND CERTIFIES THAT THE STATEMENTS CONTAINED HEREIN ARE TRUE AND CORRECT, AND FURTHER CERTIFIES THAT ALL PREVIOUSLY SUBMITTED INFORMATION REFERENCED IN THIS APPLICATION REMAINS TRUE, CORRECT AND CURRENT. BY AFFIXING HIS SIGNATURE HERETO HE FURTHER CERTIFIES THAT HE IS AUTHORIZED TO EXECUTE THIS APPLICATION.

AUTHORIZED SIGNATURE(S): (D)

BY _____ SIGNATURE _____ DATE	BY _____ SIGNATURE _____ DATE
Gary L. Marzorati — TYPED OR PRINTED NAME OF SIGNER	Gary L. Marzorati — TYPED OR PRINTED NAME OF SIGNER
Executive Vice President — TITLE OF SIGNER	Executive Vice President — TITLE OF SIGNER

(A) THIS FORM IS TO PROVIDE THE AGENCY WITH GENERAL INFORMATION ABOUT THE EQUIPMENT TO BE CONSTRUCTED OR OPERATED. THIS FORM MAY BE USED TO REQUEST A CONSTRUCTION PERMIT, AN OPERATING PERMIT, A CONSTRUCTION OR OPERATING PERMIT.

(B) ENTER THE GENERIC NAME OF THE EQUIPMENT TO BE CONSTRUCTED OR OPERATED. THIS NAME WILL APPEAR ON THE PERMIT WHICH MAY BE ISSUED PURSUANT TO THIS APPLICATION. THIS FORM MUST BE ACCOMPANIED BY OTHER APPLICABLE FORMS AND INFORMATION.

C) PROVIDE A DESIGNATION IN ITEM 7 ABOVE WHICH YOU WOULD LIKE THE AGENCY TO USE FOR IDENTIFICATION OF YOUR EQUIPMENT. YOUR DESIGNATION WILL BE REFERENCED IN CORRESPONDENCE FROM THIS AGENCY RELATIVE TO THIS APPLICATION. YOUR DESIGNATION MUST NOT EXCEED TEN (10) CHARACTERS.

(D) THIS APPLICATION MUST BE SIGNED IN ACCORDANCE WITH 35 ILL. ADM. CODE 201.154 OR 201.159 WHICH STATES: "ALL APPLICATIONS AND SUPPLEMENTS THERETO SHALL BE SIGNED BY THE OWNER AND OPERATOR OF THE EMISSION SOURCE OR AIR POLLUTION CONTROL EQUIPMENT, OR THEIR AUTHORIZED AGENT, AND SHALL BE ACCOMPANIED BY EVIDENCE OF AUTHORITY TO SIGN THE APPLICATION."

IF THE ONWER OR OPERATOR IS A CORPORATION, SUCH CORPORATION MUST HAVE ON FILE WITH THE AGENCY A CERTIFIED COPY OF A RESOLUTION OF THE CORPORATION'S BOARD OF DIRECTORS AUTHORIZING THE PERSONS SIGNING THIS APPLICATION TO CAUSE OR ALLOW THE CONSTRUCTION OR OPERATION OF THE EQUIPMENT TO BE COVERED BY THE PERMIT.

IL 532-0238
APC 200 Rev. 8/89

9. DOES THIS APPLICATION CONTAIN A PLOT PLAN/MAP:

[X] YES [ ] NO

IF A PLOT PLAN/MAP HAS PREVIOUSLY BEEN SUBMITTED, SPECIFY:

AGENCY I.D. NUMBER _____ APPLICATION NUMBER _____

IS THE APPROXIMATE SIZE OF APPLICANT'S PREMISES LESS THAN 1 ACRE?

[ ] YES [X] NO: SPECIFY 235 ACRES

10. DOES THIS APPLICATION CONTAIN A PROCESS FLOW DIAGRAM(S) THAT ACCURATELY AND CLEARLY REPRESENTS CURRENT PRACTICE.

[X] YES [ ] NO

11a. WAS ANY EQUIPMENT, COVERED THIS APPLICATION, OWNED OR CONTRACTED FOR, BY THE APPLICANT PRIOR TO APRIL 14, 1972:

[ ] YES [X] NO

IF "YES" ATTACH AN ADDITIONAL SHEET, EXHIBIT A, THAT:

(a) LISTS OR DESCRIBES THE EQUIPMENT

(b) STATES WHETHER THE EQUIPMENT WAS IN COMPLIANCE WITH THE RULES AND REGULATIONS GOVERNING THE CONTROL OF AIR POLLUTION PRIOR TO APRIL 4, 1972

11b. HAS ANY EQUIPMENT, COVERED BY THIS APPLICATION, NOTPREVIOUSLY RECEIVED AN OPERATING PERMIT:

[ ] YES [X] NO

IF "YES", ATTACH AN ADDITIONAL SHEET, EXHIBIT B, THAT:

(a) LISTS OR DESCRIBES THE EQUIPMENT

(b) STATES WHETHER THE EQUIPMENT

(i) IS ORIGINAL OR ADDITIONAL EQUIPMENT

(ii) REPLACES EXISTING EQUIPMENT, OR

(iii) MODIFIES EXISTING EQUIPMENT

(c) PROVIDES THE ANTICIPATED OR ACTUAL DATES OF THE COMMENCEMENT OF CONSTRUCTION AND THE START-UP OF THE EQUIPMENT

12. IF THIS APPLICATION INCORPORATES BY REFERENCE A PREVIOUSLY GRANTED PERMIT(S), HAS FORM APC-210, "DATA AND INFORMATION—INCORPORATION BY REFERENCE" BEEN COMPLETED.

APPLICATION FOR OPERATING PERMIT ONLY

13. DOES THE STARTUP OF AN EMISSION SOURCE COVERED BY THIS APPLICATION PRODUCE AIR CONTAMINANT EMISSION IN EXCESS OF APPLICABLE STANDARDS:

[ ] YES [X] NO

IF "YES," HAS FORM APC-203, "OPERATION DURING STARTUP" BEEN COMPLETED FOR THIS SOURCE.

[ ] YES [ ] NO

14. DOES THIS APPLICATION REQUEST PERMISSION TO OPREATE AN EMISSION SOURCE DURING MALFUNCTIONS OR BREAKDOWNS:

[ ] YES [X] NO

IF "YES," HAS FORM APC-204, "OPERATION DURING MALFUNCTION AND BREAKDOWN" BEEN COMPLETED FOR THIS SOURCE

[ ] YES [ ] NO

15. IS AN EMISSION SOURCE COVERED BY THIS APPLICATION SUBJECT TO A FUTURE COMPLIANCE DATE:

[ ] YES [X] NO

IF "YES," HAS FORM APC-202, "COMPLIANCE PROGRAM & PROJECT COMPLETION SCHEDULE," BEEN COMPLETED FOR THIS SOURCE:

[ ] YES [ ] NO

16. DOES THE FACILITY COVERED BY THIS APPLICATION REQUIRE AN EPISODE ACTION PLAN (REFER TO GUIDELINES FOR EPISODE ACTION PLANS):

[ ] YES [X] NO

17. LIST AND IDENTIFY ALL FORMS, EXHIBITS, AND OTHER INFORMATION SUBMITTED AS PART OF THIS APPLICATION. INCLUDE THE PAGE NUMBERS OF EACH ITEM (ATTACH ADDITIONAL SHEETS IF NECESSARY):

APC 200
APC 220

APC 260
Narrative Information

Exhibit 1: Site Location Map
Exhibit 2: Landfill Air Emissions Estimate
Exhibit 3: Landfill Gas Analyses
Exhibit 4: Emission Calculations
Exhibit 5: Site Drawings
Exhibit 6: Typical Manufacturer's Proposal

TOTAL NUMBER OF PAGES _____

STATE OF ILLINOIS
ENVIRONMENTAL PROTECTION AGENCY
DIVISION OF AIR POLLUTION CONTROL
2200 CHURCHILL ROAD
SPRINGFIELD, ILLINOIS 62706

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.

*DATA AND INFORMATION PROCESS EMISSION SOURCE	

*THIS INFORMATION FORM IS TO BE COMPLETED FOR AN EMISSION SOURCE OTHER THAN A FUEL COMBUSTION EMISSION SOURCE OR AN INCINERATOR. A FUEL COMBUSTION EMISSION SOURCE IS A FURNACE, BOILER, OR SIMILAR EQUIPMENT USED PRIMARILY FOR PRODUCING HEAT OR POWER BY INDIRECT HEAT TRANSFER. AN INCINERATOR IS AN APPARATUS IN WHICH REFUSE IS BURNED.

1. NAME OF PLANT OWNER: Winnebago Reclamation Service, Inc.	2. NAME OF CORPORATE DIVISION OR PLANT (IF DIFFERENT FROM OWNER):
3. STREET ADDRESS OF EMISSION SOURCE: 8403 Lindenwood Road	4. CITY OF EMISSION SOURCE: Rockford, Illinois

GENERAL INFORMATION

5. NAME OF PROCESS: Flaring of Landfill Gas	6. NAME OF EMISSION SOURCE EQUIPMENT: Flare Station	
7. EMISSION SOURCE EQUIPMENT MANUFACTURER: See Attached Narrative	8. MODEL NUMBER:	9. SERIAL NUMBER:

10. FLOW DIAGRAM DESIGNATION(S) OF EMISSION SOURCE:
See Exhibit 5

11. IDENTITY(S) OF ANY SIMILAR SOURCE(S) AT THE PLANT OR PREMISES NOT COVERED BY THE FORM (IF THE SOURCE IS COVERED BY ANOTHER APPLICATION, IDENTIFY THE APPLICATION): N/A

12. AVERAGE OPERATING TIME OF EMISSION SOURCE: * 24 HRS/DAY 2 DAYS/WK 52 WKS/YR	13. MAXIMUM OPERATING TIME OF EMISSION SOURCE: * 24 HRS/DAY 7 DAYS/WK 52 WKS/YR

14. PERCENT OF ANNUAL THROUGHPUT:
DEC-FEB 20 % MAR-MAY 30 % JUN-AUG 30 % SEPT-NOV 20 %

* See Attached Narrative Information.

INSTRUCTIONS

1. COMPLETE THE ABOVE IDENTIFICATION AND GENERAL INFORMATION SECTION.
2. COMPLETE THE RAW MATERIAL, PRODUCT, WASTE MATERIAL, AND FUEL USAGE SECTIONS FOR THE PARTICULAR SOURCE EQUIPMENT. COMPOSITIONS OF MATERIALS MUST BE SUFFICIENTLY DETAILED TO ALLOW DETERMINATION OF THE NATURE AND QUANTITY OF POTENTIAL EMISSIONS. IN PARTICULAR, THE COMPOSITION OF PAINTS, INKS, ETC., AND ANY SOLVENTS MUST BE FULLY DETAILED.
3. EMISSION AND EXHAUST POINT INFORMATION MUST BE COMPLETED, UNLESS EMISSIONS ARE EXHAUSTED THROUGH AIR POLLUTION CONTROL EQUIPMENT.
4. OPERATING TIME AND CERTAIN OTHER ITEMS REQUIRE BOTH AVERAGE AND MAXIMUM VALUES.
5. FOR GENERAL INFORMATION REFER TO "GENERAL INSTRUCTIONS FOR PERMIT APPLICATIONS," APC-201.

DEFINITIONS

AVERAGE - THE VALUE THAT SUMMARIZES OR REPRESENTS THE GENERAL CONDITION OF THE EMISSION SOURCE, OR THE GENERAL STATE OF PRODUCTION OF THE EMISSION SOURCE. SPECIFICALLY:
AVERAGE OPERATING TIME - ACTUAL TOTAL HOURS OF OPERATION FOR THE PRECEDING TWELVE MONTH PERIOD.
AVERAGE RATE - ACTUAL TOTAL QUANTITY OF "MATERIAL" FOR THE PRECEDING TWELVE MONTH PERIOD, DIVIDED BY THE AVERAGE OPERATING TIME.
AVERAGE OPERATION - OPERATION TYPICAL OF THE PRECEDING TWELVE MONTH PERIOD, AS REPRESENTED BY AVERAGE OPERATING TIME AND AVERAGE RATES.

MAXIMUM - THE GREATEST VALUE ATTAINABLE OR ATTAINED FROM THE EMISSION SOURCE, OR THE PERIOD OF GREATEST OR UTMOST PRODUCTION OF THE EMISSION SOURCE. SPECIFICALLY:
MAXIMUM OPERATING TIME - GREATEST EXPECTED TOTAL HOURS OF OPERATIONS FOR ANY TWELVE MONTH PERIOD.
MAXIMUM RATE - GREATEST QUANTITY OF "MATERIAL" EXPECTED PER ANY ONE HOUR OF OPERATION.
MAXIMUM OPERATION - GREATEST EXPECTED OPERATION, AS REPRESENTED BY MAXIMUM OPERATING TIME AND MAXIMUM RATES.

RAW MATERIAL INFORMATION		
NAME OF RAW MATERIAL	AVERAGE RATE PER IDENTICAL SOURCE	MAXIMUM RATE PER IDENTICAL SOURCE
20a. N/A	b. LB/HR	c. LB/HR
21a.	b. LB/HR	c. LB/HR
22a.	b. LB/HR	c. LB/HR
23a.	b. LB/HR	c. LB/HR
24a.	b. LB/HR	c. LB/HR

PRODUCT INFORMATION		
NAME OF PRODUCT	AVERAGE RATE PER IDENTICAL SOURCE	MAXIMUM RATE PER IDENTICAL SOURCE
30a. N/A	b. LB/HR	c. LB/HR
31a.	b. LB/HR	c. LB/HR
32a.	b. LB/HR	c. LB/HR
33a.	b. LB/HR	c. LB/HR
34a.	b. LB/HR	c. LB/HR

WASTE MATERIAL INFORMATION		
NAME OF WASTE MATERIAL	AVERAGE RATE PER IDENTICAL SOURCE	MAXIMUM RATE PER IDENTICAL SOURCE
40a. N/A	b. LB/HR	c. LB/HR
41a.	b. LB/HR	c. LB/HR
42a.	b. LB/HR	c. LB/HR
43a.	b. LB/HR	c. LB/HR
44a.	b. LB/HR	c. LB/HR

*FUEL USAGE INFORMATION		
FUEL USED	TYPE	HEAT CONTENT
50a. NATURAL GAS ☐	b.	c. 1000 BTU/SCF
OTHER GAS ☐		BTU/SCF
OIL ☐		BTU/GAL
COAL ☐		BTU/LB
OTHER ☐		BTU/LB
d. AVERAGE FIRING RATE PER IDENTICAL SOURCE: BTU/HR	e. MAXIMUM FIRING RATE PER IDENTICAL SOURCE: BTU/HR	

*THIS SECTION IS TO BE COMPLETED FOR ANY FUEL USED DIRECTLY IN THE PROCESS EMISSION SOURCE, E.G. GAS IN A DRYER, OR COAL IN A MELT FURNACE.

*EMISSION INFORMATION
51. NUMBER OF IDENTICAL SOURCES (DESCRIBE AS REQUIRED):

N/A*

AVERAGE OPERATION

CONTAMINANT	CONCENTRATION OR EMISSION RATE PER IDENTICAL SOURCE		METHOD USED TO DETERMINE CONCENTRATION OR EMISSION RATE
PARTICULATE MATTER	52a. GR/SCF	b. LB/HR	c.
CARBON MONOXIDE	53a. PPM (VOL)	b. LB/HR	c.
NITROGEN OXIDES	54a. PPM (VOL)	b. LB/HR	c.
ORGANIC MATERIAL	55a. PPM (VOL)	b. LB/HR	c.
SULFUR DIOXIDE	56a. PPM (VOL)	b. LB/HR	c.
**OTHER (SPECIFY)	57a. PPM (VOL)	b. LB/HR	c.

MAXIMUM OPERATION

CONTAMINANT	CONCENTRATION OR EMISSION RATE PER IDENTICAL SOURCE		METHOD USED TO DETERMINE CONCENTRATION OR EMISSION RATE
PARTICULATE MATTER	58a. GR/SCF	b. LB/HR	c.
CARBON MONOXIDE	59a. PPM (VOL)	b. LB/HR	c.
NITROGEN OXIDES	60a. PPM (VOL)	b. LB/HR	c.
ORGANIC MATERIAL	61a. PPM (VOL)	b. LB/HR	c.
SULFUR DIOXIDE	62a. PPM (VOL)	b. LB/HR	c.
**OTHER (SPECIFY)	63a. PPM (VOL)	b. LB/HR	c.

*ITEMS 52 THROUGH 63 NEED NOT BE COMPLETED IF EMISSIONS ARE EXHAUSTED THROUGH AIR POLLUTION CONTROL EQUIPMENT.
**"OTHER" CONTAMINANT SHOULD BE USED FOR AN AIR CONTAMINANT NOT SPECIFICALLY NAMED ABOVE. POSSIBLE OTHER CONTAMINANTS ARE ASBESTOS, BERYLLIUM, MERCURY, VINYL CHLORIDE, LEAD, ETC.

N/A*

***EXHAUST POINT INFORMATION

64. FLOW DIAGRAM DESIGNATION(S) OF EXHAUST POINT:	
65. DESCRIPTION OF EXHAUST POINT (LOCATION IN RELATION TO BUILDINGS, DIRECTION, HOODING, ETC.):	
66. EXIT HEIGHT ABOVE GRADE:	67. EXIT DIAMETER:
68. GREATEST HEIGHT OF NEARBY BUILDINGS: FT	69. EXIT DISTANCE FROM NEAREST PLANT BOUNDARY: FT
AVERAGE OPERATION	MAXIMUM OPERATION
70. EXIT GAS TEMPERATURE: °F	72. EXIT GAS TEMPERATURE: °F
71. GAS FLOW RATE THROUGH EACH EXIT: ACFM	73. GAS FLOW RATE THROUGH EACH EACH EXIT: ACFM

***THIS SECTION SHOULD NOT BE COMPLETED IF EMISSIONS ARE EXHAUSTED THROUGH AIR POLLUTION CONTROL EQUIPMENT.

* Emission and Exhaust Point Information is provided on Form APC-260.

STATE OF ILLINOIS
ENVIRONMENTAL PROTECTION AGENCY
DIVISION OF AIR POLLUTION CONTROL
2200 CHURCHILL ROAD
SPRINGFIELD, ILLINOIS 62706

This agency is authorized to require this information under Illinois Revised Statutes, 1979, Chapter 111½, 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

*DATA AND INFORMATION AIR POLLUTION CONTROL EQUIPMENT	

*THIS INFORMATION FORM IS FOR AN INDIVIDUAL UNIT OF AIR POLLUTION CONTROL EQUIPMENT OR AN AIR POLLUTION CONTROL SYSTEM.

1. NAME OF OWNER: Winnebago Reclamation Service, Inc.	2. NAME OF CORPORATE DIVISION OR PLANT (IF DIFFERENT FROM OWNER):
3. STREET ADDRESS OF CONTROL EQUIPMENT: 8403 Lindenwood Road	4. CITY OF CONTROL EQUIPMENT: Rockford, Illinois
5. NAME OF CONTROL EQUIPMENT OR CONTROL SYSTEM: Flare Station	

INSTRUCTIONS

1. COMPLETE THE ABOVE IDENTIFICATION.
2. COMPLETE THE APPROPRIATE SECTION FOR THE UNIT OF CONTROL EQUIPMENT, OR THE APPROPRIATE SECTIONS FOR THE CONTROL SYSTEM. BE CERTAIN THAT THE ARRANGEMENT OF VARIOUS UNITS IN A CONTROL SYSTEM IS MADE CLEAR IN THE PROCESS FLOW DIAGRAM.
3. COMPLETE PAGE 6 OF THIS FORM, EMISSION INFORMATION AND EXHAUST POINT INFORMATION.
4. EFFICIENCY VALUES SHOULD BE SUPPORTED WITH A DETAILED EXPLANATION OF THE METHOD OF CALCULATION, THE MANNER OF ESTIMATION, OR THE SOURCE OF INFORMATION. REFERENCE TO THIS FORM ANY RELEVANT INFORMATION OR EXPLANATION INCLUDED IN THIS PERMIT APPLICATION.
5. EFFICIENCY VALUES AND CERTAIN OTHER ITEMS OF INFORMATION ARE TO BE GIVEN FOR AVERAGE AND MAXIMUM OPERATION OF THE SOURCE EQUIPMENT. FOR EXAMPLE, "MAXIMUM EFFICIENCY" IS THE EFFICIENCY OF THE CONTROL EQUIPMENT WHEN THE SOURCE IS AT MAXIMUM OPERATION, AND "AVERAGE FLOW RATE" IS THE FLOW RATE INTO THE CONTROL EQUIPMENT WHEN THE SOURCE IS AT AVERAGE OPERATION.
6. FOR GENERAL INFORMATION REFER TO "GENERAL INSTRUCTIONS FOR PERMIT APPLICATIONS", APC-201.

DEFINITIONS

AVERAGE - THE VALUE THAT SUMMARIZES OR REPRESENTS THE GENERAL CONDITION OF THE EMISSION SOURCE OR THE GENERAL STATE OF PRODUCTION OF THE EMISSION SOURCE. SPECIFICALLY:
AVERAGE OPERATION - OPERATION TYPICAL OF THE PRECEDING TWELVE MONTH PERIOD, AS REPRESENTED BY AVERAGE OPERATING TIME AND AVERAGE RATES.

MAXIMUM - THE GREATEST VALUE ATTAINABLE OR ATTAINED FROM THE EMISSION SOURCE, OR THE PERIOD OF GREATEST OR UTMOST PRODUCTION OF THE EMISSION SOURCE. SPECIFICALLY:
MAXIMUM OPERATION - THE GREATEST EXPECTED OPERATION, AS REPRESENTED BY MAXIMUM OPERATING TIME AND MAXIMUM RATES.

ADSORPTION UNIT	
1. FLOW DIAGRAM DESIGNATION(S) OF ADSORPTION UNIT: N/A	
2. MANUFACTURER:	3. MODEL NAME AND NUMBER:
4. ADSORBENT: ☐ ACTIVATED CHARCOAL: TYPE _____ ☐ OTHER: SPECIFY _____	
5. ADSORBATE(S):	
6. NUMBER OF BEDS PER UNIT:	7. WEIGHT OF ADSORBENT PER BED: LB
8. DIMENSIONS OF BED: THICKNESS _____ IN, SURFACE AREA _____ SQUARE IN	
9. INLET GAS TEMPERATURE: °F	10. PRESSURE DROP ACROSS UNIT: INCH H_2O GAUGE
11. TYPE OF REGENERATION: ☐ REPLACEMENT ☐ STEAM ☐ OTHER: SPECIFY _____	
12. METHOD OF REGENERATION: ☐ ALTERNATE USE OF _____ ENTIRE UNITS ☐ ALTERNATE USE OF _____ BEDS IN A SINGLE UNIT ☐ SOURCE SHUT DOWN ☐ OTHER: DESCRIBE	
AVERAGE OPERATION OF SOURCE	MAXIMUM OPERATION OF SOURCE
13. TIME ON LINE BEFORE REGENERATION: MIN/BED	15. TIME ON LINE BEFORE REGENERATION: MIN/BED
14. EFFICIENCY OF ADSORBER (SEE INSTRUCTION 4): %	16. EFFICIENCY OF ADSORBER (SEE INSTRUCTION 4): %

AFTERBURNER	
1. FLOW DIAGRAM DESIGNATION(S) OF AFTERBURNER: N/A	
2. MANUFACTURER:	3. MODEL NAME AND NUMBER:
4. COMBUSTION CHAMBER DIMENSIONS: LENGTH _____ IN, CROSS-SECTIONAL AREA _____ SQUARE IN.	
5. INLET GAS TEMPERATURE: °F	7. FUEL: ☐ GAS ☐ OIL: SULFUR _____ WT%
6. OPERATING TEMPERATURE OF COMBUSTION CHAMBER: °F	8. BURNERS PER AFTERBURNER: @ BTU/HR EACH
9. CATALYST USED: ☐ NO ☐ YES: DESCRIBE CATALYST _____	
10. HEAT EXCHANGER USED: ☐ NO ☐ YES: DESCRIBE HEAT EXCHANGER _____	
AVERAGE OPERATION OF SOURCE	MAXIMUM OPERATION OF SOURCE
11. GAS FLOW RATE: SCFM	13. GAS FLOW RATE: SCFM
12. EFFICIENCY OF AFTERBURNER (SEE INSTRUCTION 4): %	14. EFFICIENCY OF AFTERBURNER (SEE INSTRUCTION 4): %

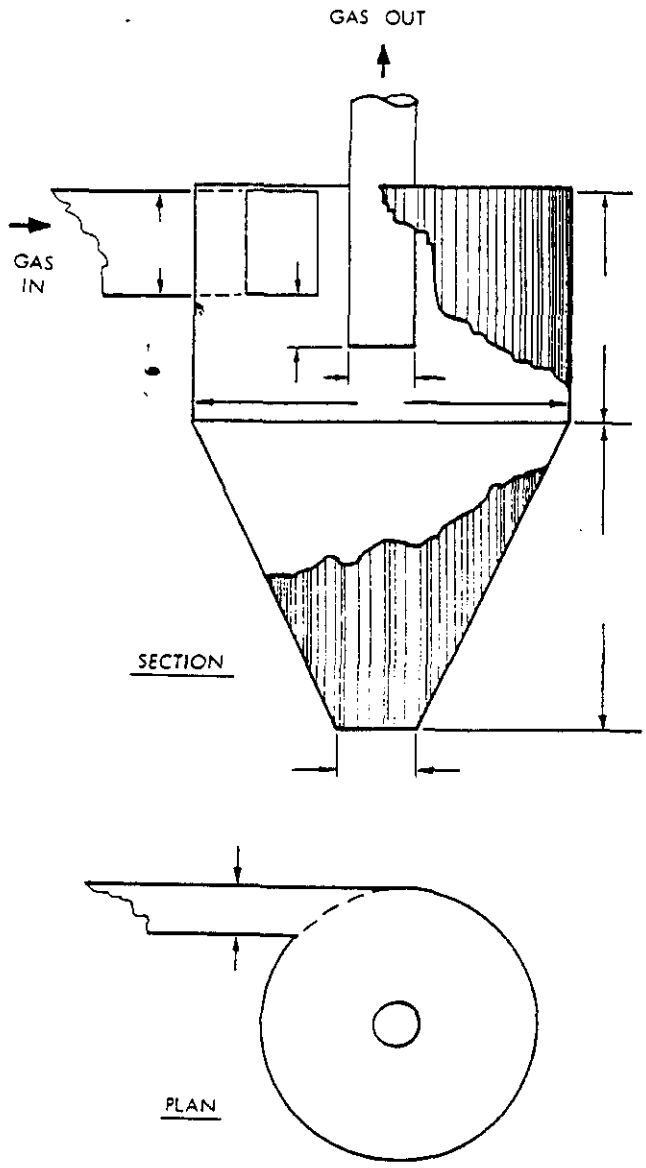
CYCLONE

1. FLOW DIAGRAM DESIGNATION(S) OF CYCLONE:
   N/A

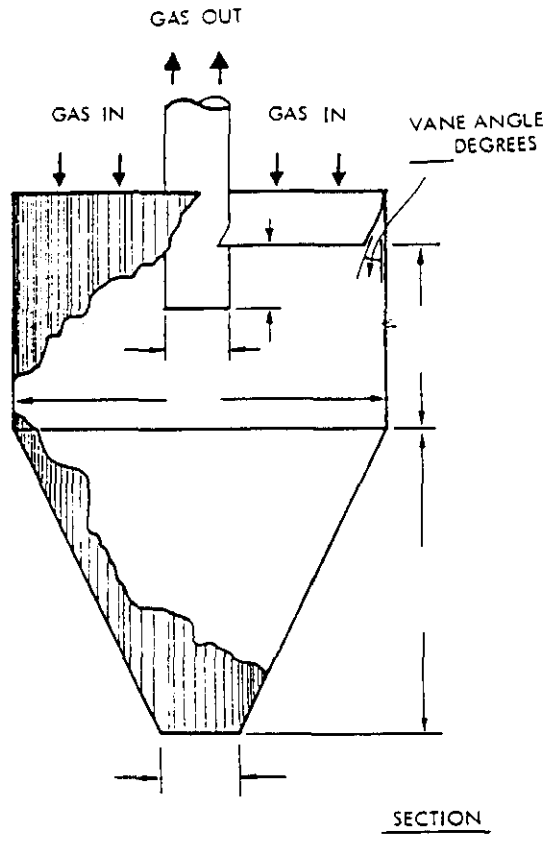
2. MANUFACTURER:	3. MODEL:
4. TYPE OF CYCLONE: ☐ SIMPLE ☐ MULTIPLE	5. NUMBER OF CYCLONES IN EACH MULTIPLE CYCLONE:

6. DIMENSION THE APPROPRIATE SKETCH (IN INCHES) OR PROVIDE A DRAWING WITH EQUIVALENT INFORMATION:

TANGENTIAL INLET CYCLONE



AXIAL INLET CYCLONE
(INDIVIDUAL CYCLONE OF MULTIPLE CYCLONE)



NOT TO SCALE

AVERAGE OPERATION OF SOURCE	MAXIMUM OPERATION OF SOURCE
7. GAS FLOW RATE: SCFM	9. GAS FLOW RATE: SCFM
8. EFFICIENCY OF CYCLONE (SEE INSTRUCTION 4): %	10. EFFICIENCY OF CYCLONE (SEE INSTRUCTION 4): %

CONDENSER

1. FLOW DIAGRAM DESIGNATION(S) OF CONDENSER:
N/A

2. MANUFACTURER:

3. MODEL NAME AND NUMBER:

4. HEAT EXCHANGE AREA: FT^2

AVERAGE OPERATION OF SOURCE	MAXIMUM OPERATION OF SOURCE
5. COOLANT FLOW RATE PER CONDENSER: WATER _____ GPM AIR _____ SCFM OTHER: TYPE _____, FLOW RATE _____	10. COOLANT FLOW RATE PER CONDENSER: WATER _____ GPM AIR _____ SCFM OTHER: TYPE _____, FLOW RATE _____
6. GAS FLOW RATE: SCFM	11. GAS FLOW RATE: SCFM
7. COOLANT TEMPERATURE: INLET ___ °F OUTLET ___ °F 8. GAS TEMPERATURE: INLET ___ °F OUTLET ___ °F	12. COOLANT TEMPERATURE: INLET ___ °F OUTLET ___ °F 13. GAS TEMPERATURE: INLET ___ °F OUTLET ___ °F
9. EFFICIENCY OF CONDENSER (SEE INSTRUCTION 4): %	14. EFFICIENCY OF CONDENSER (SEE INSTRUCTION 4): %

*ELECTRICAL PRECIPITATOR

1. FLOW DIAGRAM DESIGNATION OF ELECTRICAL PRECIPITATOR:
N/A

2. MANUFACTURER:

3. MODEL NAME AND NUMBER:

4. COLLECTING ELECTRODE AREA PER CONTROL DEVICE: FT^2

AVERAGE OPERATION OF SOURCE	MAXIMUM OPERATION OF SOURCE
5. GAS FLOW RATE: SCFM	7. GAS FLOW RATE: SCFM
6. EFFICIENCY OF ELECTRICAL PRECIPITATOR (SEE INSTRUCTION 4): %	8. EFFICIENCY OF ELECTRICAL PRECIPITATOR (SEE INSTRUCTION 4): %

SUBMIT THE MANUFACTURER'S SPECIFICATIONS FOR THE ELECTRICAL PRECIPITATOR. REFERENCE THE INFORMATION TO THIS FORM.

*ELECTRICAL PRECIPITATORS VARY GREATLY IN THEIR DESIGN AND IN THEIR COMPLEXITY. THE ITEMS IN THIS SECTION PROVIDE A MINIMUM AMOUNT OF INFORMATION. THE APPLICANT MUST, HOWEVER, SUBMIT WITH THIS APPLICATION THE MANUFACTURER'S SPECIFICATIONS, INCLUDING ANY DRAWINGS, TECHNICAL DOCUMENTS, ETC. IF THE INFORMATION PROVIDED BY THE MANUFACTURER'S SPECIFICATIONS IS INSUFFICIENT FOR FULL AND ACCURATE ANALYSIS, THE AGENCY WILL REQUEST SPECIFIC ADDITIONAL INFORMATION.

FILTER UNIT

1. FLOW DIAGRAM DESIGNATION(S) OF FILTER UNIT:
N/A

2. MANUFACTURER:

3. MODEL NAME AND NUMBER:

4. FILTERING MATERIAL:

5. FILTERING AREA:

6. CLEANING METHOD:
☐ SHAKER ☐ REVERSE AIR ☐ PULSE AIR ☐ PULSE JET ☐ OTHER: SPECIFY _____

7. GAS COOLING METHOD: ☐ DUCTWORK: LENGTH _____ FT., DIAM _____ IN.
☐ BLEED-IN AIR ☐ WATER SPRAY ☐ OTHER: SPECIFY

AVERAGE OPERATION OF SOURCE	MAXIMUM OPERATION OF SOURCE
8. GAS FLOW RATE (FROM SOURCE): SCFM	12. GAS FLOW RATE (FROM SOURCE): SCFM
9. GAS COOLING FLOW RATE: BLEED-IN AIR _____ SCFM, WATER SPRAY _____ GPM	13. GAS COOLING FLOW RATE: BLEED-IN AIR _____ SCFM, WATER SPRAY _____ GPM
0. INLET GAS CONDITION: TEMPERATURE _____ °F DEWPOINT _____ °F	14. INLET GAS CONDITION: TEMPERATURE _____ °F DEWPOINT _____ °F
11. EFFICIENCY OF FILTER UNIT (SEE INSTRUCTION 4): %	15. EFFICIENCY OF FILTER UNIT (SEE INSTRUCTION 4): %

SCRUBBER

1. FLOW DIAGRAM DESIGNATION(S) OF SCRUBBER:
N/A

2. MANUFACTURER:

3. MODEL NAME AND NUMBER:

4. TYPE OF SCRUBBER:

☐ HIGH ENERGY: GAS STREAM PRESSURE DROP _____ INCH H_2O

☐ PACKED: PACKING TYPE _____, PACKING SIZE _____, PACKED HEIGHT _____ IN.

☐ SPRAY: NUMBER OF NOZZLES _____, NOZZLE PRESSURE _____ PSIG

☐ OTHER: SPECIFY _____ ATTACH DESCRIPTION AND SKETCH WITH DIMENSIONS

5. TYPE OF FLOW:
☐ COCURRENT ☐ COUNTERCURRENT ☐ CROSSFLOW

6. SCRUBBER GEOMETRY:
LENGTH IN DIRECTION OF GAS FLOW _____ IN., CROSS-SECTIONAL AREA _____ SQUARE IN.

7. CHEMICAL COMPOSITION OF SCRUBBANT:

AVERAGE OPERATION OF SOURCE	MAXIMUM OPERATION OF SOURCE
8. SCRUBBANT FLOW RATE: GPM	12. SCRUBBANT FLOW RATE: GPM
9. GAS FLOW RATE: SCFM	13. GAS FLOW RATE: SCFM
10. INLET GAS TEMPERATURE: °F	14. INLET GAS TEMPERATURE: °F
11. EFFICIENCY OF SCRUBBER (SEE INSTRUCTION 4): _____ % PARTICULATE _____ % GASEOUS	15. EFFICIENCY OF SCRUBBER (SEE INSTRUCTION 4): _____ % PARTICULATE _____ % GASEOUS

OTHER TYPE OF CONTROL EQUIPMENT

1. FLOW DIAGRAM DESIGNATION(S) OF "OTHER TYPE" OF CONTROL EQUIPMENT:
See Exhibit 5

2. GENERIC NAME OF "OTHER" EQUIPMENT:
Flare Station

3. MANUFACTURER:

4. MODEL NAME AND NUMBER:

5. DESCRIPTION AND SKETCH, WITH DIMENSIONS AND FLOW RATES, OF "OTHER" EQUIPMENT:

See Exhibit 6

AVERAGE OPERATION OF SOURCE	MAXIMUM OPERATION OF SOURCE
6. FLOW RATES: _____ GPM 800 SCFM	8. FLOW RATES: GPM 1,180 SCFM
7. EFFICIENCY OF "OTHER" EQUIPMENT (SEE INSTRUCTION 4): 98 %	9. EFFICIENCY OF "OTHER" EQUIPMENT (SEE INSTRUCTION 4): 98 %

EMISSION INFORMATION

1. NUMBER OF IDENTICAL CONTROL UNITS OR CONTROL SYSTEMS (DESCRIBE AS REQUIRED):
None

AVERAGE OPERATION OF SOURCE

CONTAMINANT	CONCENTRATION OR EMISSION RATE PER IDENTICAL CONTROL UNIT OR CONTROL SYSTEM		METHOD USED TO DETERMINE CONCENTRATION OR EMISSION RATE
PARTICULATE MATTER	2a. N/A GR/SCF	b. Negligible LB/HR	c. Emission Factor
CARBON MONOXIDE	3a. N/A PPM (VOL)	b. 15.3 LB/HR	c. Emission Factor
NITROGEN OXIDES	4a. N/A PPM (VOL)	b. 2.1 LB/HR	c. Emission Factor
ORGANIC MATERIAL	5a. N/A PPM (VOL)	b. 5.6 LB/HR	c. Mass Balance
SULFUR DIOXIDE	6a. N/A PPM (VOL)	b. 0.6 LB/HR	c. Emission Factor
OTHER Methane (SPECIFY)	7a. N/A PPM (VOL)	b. 32.1 LB/HR	c. Emission Factor

MAXIMUM OPERATION OF SOURCE

CONTAMINANT	CONCENTRATION OR EMISSION RATE PER IDENTICAL CONTROL UNIT OR CONTROL SYSTEM		METHOD USED TO DETERMINE CONCENTRATION OR EMISSION RATE
PARTICULATE MATTER	8a. N/A GR/SCF	b. Negligible LB/HR	c. Emission Factor
CARBON MONOXIDE	9a. N/A PPM (VOL)	b. 22.4 LB/HR	c. Emission Factor
NITROGEN OXIDES	10a. N/A PPM (VOL)	b. 3.1 LB/HR	c. Emission Factor
ORGANIC MATERIAL	11a. N/A PPM (VOL)	b. 8.2 LB/HR	c. Mass Balance
SULFUR DIOXIDE	12a. N/A PPM (VOL)	b. 0.9 LB/HR	c. Emission Factor
OTHER Methane (SPECIFY)	13a. N/A PPM (VOL)	b. 47.1 LB/HR	c. Emission Factor

**"OTHER" CONTAMINANT SHOULD BE USED FOR AN AIR CONTAMINANT NOT SPECIFICALLY NAMED ABOVE. POSSIBLE OTHER CONTAMINANTS ARE ASBESTOS, BERYLLIUM, MERCURY, VINYL CHLORIDE, LEAD, ETC.

EXHAUST POINT INFORMATION

1. FLOW DIAGRAM DESIGNATION(S) OF EXHAUST POINT:
See Exhibit 4

2. DESCRIPTION OF EXHAUST POINT (LOCATION IN RELATION TO BUILDINGS, DIRECTION, HOODING, ETC.):
See Exhibit 4

3. EXIT HEIGHT ABOVE GRADE: 35 ft (typ)	4. EXIT DIAMETER: 12 in. (typ)
5. GREASTEST HEIGHT OF NEARBY BUILDINGS: 30 FT	6. EXIT DISTANCE FROM NEAREST PLANT BOUNDARY: 175 FT
AVERAGE OPERATION OF SOURCE	**MAXIMUM OPERATION OF SOURCE**
7. EXIT GAS TEMPERATURE: °F	9. EXIT GAS TEMPERATURE: °F
8. GAS FLOW RATE THROUGH EACH EXIT: 800 ACFM	10. GAS FLOW RATE THROUGH EACH EXIT: 1,180 ACFM

NARRATIVE INFORMATION

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 that has not yet been fully developed. The 42.7 acre 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. A proposed expansion unit 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. A Site Location Map detailing the location of the facility and the nearby residences, schools, and other buildings is included as Exhibit 1.

The existing unit is equipped with an active gas collection system that utilizes vertical gas extraction wells connected to a gas collection piping network. A pressure gradient is induced on the system through the use of two 800 cfm compressors located in an on-site gas processing plant operated by Winnebago Gas Company. Compressed landfill gas is then transferred to a plant operated by NRG Technologies, Inc. where the gas is used for the thermal dewatering of sewage sludge. As filling progresses at the existing unit, a new, more-automated active gas collection system will be installed. Installation will be completed upon closure of the existing unit in the year 2001. NRG Technologies currently has a contract with the Rock River Water Reclamation District to accept sewage sludge through the year 2003.

The Application submitted herewith is in reference to the proposed construction and operation of a flare station for the combustion of landfill gas produced at the existing unit. The flare station will be located on property owned by Winnebago Reclamation Service, Inc. and will be utilized when the NRG plant is not in operation, primarily on weekends and holidays. The flare station will also provide an alternative means of landfill gas disposal if the NRG plant shuts down for breakdowns or maintenance, or ceases operations for any reason.

NATURE OF THE EMISSION SOURCE

The existing unit accepts municipal solid waste, construction/demolition debris, and non-hazardous special waste. As of January 5, 1993, it had a remaining refuse capacity of approximately 1.75 million cu. yd. This translates to an anticipated in-place acceptance rate of about 219,000 cu. yd per year for the remainder of the unit's operating life.

The decomposition of municipal solid waste produces a gas consisting primarily of methane and carbon dioxide, with small amounts of nitrogen, oxygen, and hydrogen. It may also contain trace amounts of hydrogen sulfide, ammonia, carbon monoxide, sulfur compounds, and non-methane organic compounds (NMOC). Landfill gas production generally starts within 6 months to a year of the placement of refuse and may continue for more than 20 years.

Landfill gas is harvested at the existing unit using an active gas collection system consisting of approximately 90 vertical extraction wells and subsurface gas collection trenches. The existing system is detailed on Sheet U1-1 of the accompanying set of drawings included as Exhibit 5.

As filling progresses, however, all existing wells will be removed or abandoned as a permanent and more-automated gas collection system is installed. The proposed gas collection system will consist of approximately 36 vertical extraction wells as detailed on Sheet U1-2 of the accompanying set of drawings. A more detailed design of the proposed system is included in a document entitled *Application for Significant Modification to Permit for an Existing Unit* that will be submitted concurrently to the IEPA-DLPC.

In conjunction with construction of the proposed gas collection system, a flare station will be installed at the subject facility that will be used for the combustion of landfill gas during periods when the NRG plant is not in operation, primarily on weekends and holidays. The flare station will be a commercially-manufactured, standardized, skid mounted unit, capable of achieving combustion efficiencies greater than 98%. It will be located on property owned by Winnebago Reclamation Service, Inc., as detailed on Sheet U1-2 of the accompanying set of drawings included as Exhibit 5.

Several manufacturers of candle-type or utility flare stations are being considered as suppliers of the necessary equipment. At minimum, the flare station will be designed to handle the peak flow predicted by the gas generation calculations and will be in compliance with all criteria for open flares as detailed in 40 CFR 60.18. A typical flow diagram for the flare station is provided on Sheet U1-3 of the accompanying set of drawings included in Exhibit 5.

Potential manufacturers include Landfill Gas Specialties, Inc., Landtec, and NEO. As an example of the type of system to be installed, a proposal by one of the potential manufacturers is included in Exhibit 6. When a specific manufacturer is selected, plans and specifications will be provided to IEPA if requested.

It is expected that the flare station will operate 24 hours per day, two days per week, for the entire year. The flare may also be operated continuously for a period of up to 120 days during the summer months when sewage sludge is land-applied rather than landfilled. However, for emission calculations it was assumed that the flare may operate for 365 days per year.

CONTAMINANT EMISSIONS

The Landfill Air Emissions Estimation Model, version 1.1a, was used to predict gas generation from the existing unit. This approach assumes that the rate of landfill gas produced by a unit weight of refuse peaks after a negligible time lag and then decreases according to a first order logarithmic decay constant, as in the following equation:

where:

$$\frac{dG}{dt} = kL_0 e^{-kt}$$

G	=	gas volume;
k	=	rate constant;
L_0	=	methane generation potential; and
t	=	time.

The annual rate of waste acceptance was estimated from the in-place volume of approximately 3.4 million yd^3 as of April, 1990 and the projected final volume of 5.5 million yd^3 upon closure in the year 2001. This yielded an annual average in-place acceptance rate of 170,000 yd^3/yr (156,500 Mg/yr) for the 18-year period ending in 1990 and 210,000 yd^3/yr (193,100 Mg/yr) for the remaining operating period from 1991 to the year 2001. In-place acceptance rates are based on assumptions that 10% of in-place volume consists of daily soil cover and that the in-place density of waste is 75 lb/ft^3.

The methane generation potential (L_0) was estimated to be 4,411 ft^3/Mg (125 m^3/Mg) based on information presented in section 2.4 of AP-42. The rate constant (k) was chosen to be 0.02 based on regulatory defaults published in the Federal Register on May 30, 1991.

This approach yielded a peak flow of 8.8×10^8 ft^3/yr, or 1685 scfm, occuring the year after the landfill's closure in 2001. Good corellation was observed between the predicted present-day gas generation rate and actual collection rates which are generally around 800-1000 cfm. Output from the Landfill Air Emissions Estimation Model is included as Exhibit 2.

The peak flow reduced by a 70% collection efficiency was used as the design capacity for the gas collection system and for Potential To Emit (PTE) calculations. However, due to less than ideal field conditions, the actual gas yields may vary significantly.

Analyses of gas samples taken from the existing gas collection system are included as Exhibit 3. As expected, the sample was comprised primarily of methane, carbon dioxide, nitrogen, and oxygen. Although as low as 15.4% in the EMT sample, the methane concentration in the collected gas is more likely between 35 and 40% as is confirmed through routine on-site analyses on a monthly basis. The high nitrogen content in the samples (25-35%) indicates that there is significant infiltration of air into the system. The EMT analysis also indicates that the NMOC concentration is 26,000 ppmv. The IGT analysis reports a total sulfur content of 0.2 ppmv is also present in the gas. The net heating value (dry) of the sample was 354 Btu/scf.

Emission calculations for CO_2, CO, NO_X, CH_4, and SO_2, included as Exhibit 4, were based on emission factors for industrial flares reported in Section 2.4 of AP-42. VOM emissions were obtained through mass-balance calculations based on a combustion efficiency of 98% as reported in the manufacturer's proposal. The results of emission calculations are detailed in Table 1.

Table 1. Potential To Emit (PTE) for a Landfill Gas Flare Station (tons/yr).

Pollutant	*Peak Flow Rate*	*Current Flow Rate*
CO_2	16,600	11,300
CO	98.2	67.0
NO_X	13.7	9.4
CH_4	206.1	140.7
SO_2	3.9	2.7
VOM	35.9	24.5

START-UP PROCEDURES

During normal operation of the flare station, it is expected that start-up will be required approximately once per week. The flare station will be equipped with a propane pilot system that will facilitate this start-up. No significant increase in emissions is expected during start-up procedures.

BRAKEDOWNS AND OUTTAGES

Pre-packaged flare stations are generally reliable and require a minimum of down-time. The flare station will be equipped with a "down time" timer that will automatically deactivate the blowers and reignite the flame if the flare is extinguished by wind or inadequate methane content in the gas. Any significant maintenance or repair work will be completed, if possible, when the NRG compressors are being utilized, thereby minimizing down-time.

In general, odor problems should be abated by the installation of the flare system. Using the flare station as an alternate landfill gas destruction mechanism will allow the facility nearly continuous operation of its gas collection system. This will reduce the amount of uncontrolled emissions that are released from the facility and improve any existing odor problems.

INSTRUMENTATION AND MONITORING

The flare station will be equipped with a flow meter mounted on the main gas collection header. Records of monthly landfill gas combustion will be kept on-site. In addition, landfill gas will be sampled and analyzed at least monthly for methane content, carbon dioxide, nitrogen, and oxygen.

EXHIBIT 1

Site Location Map

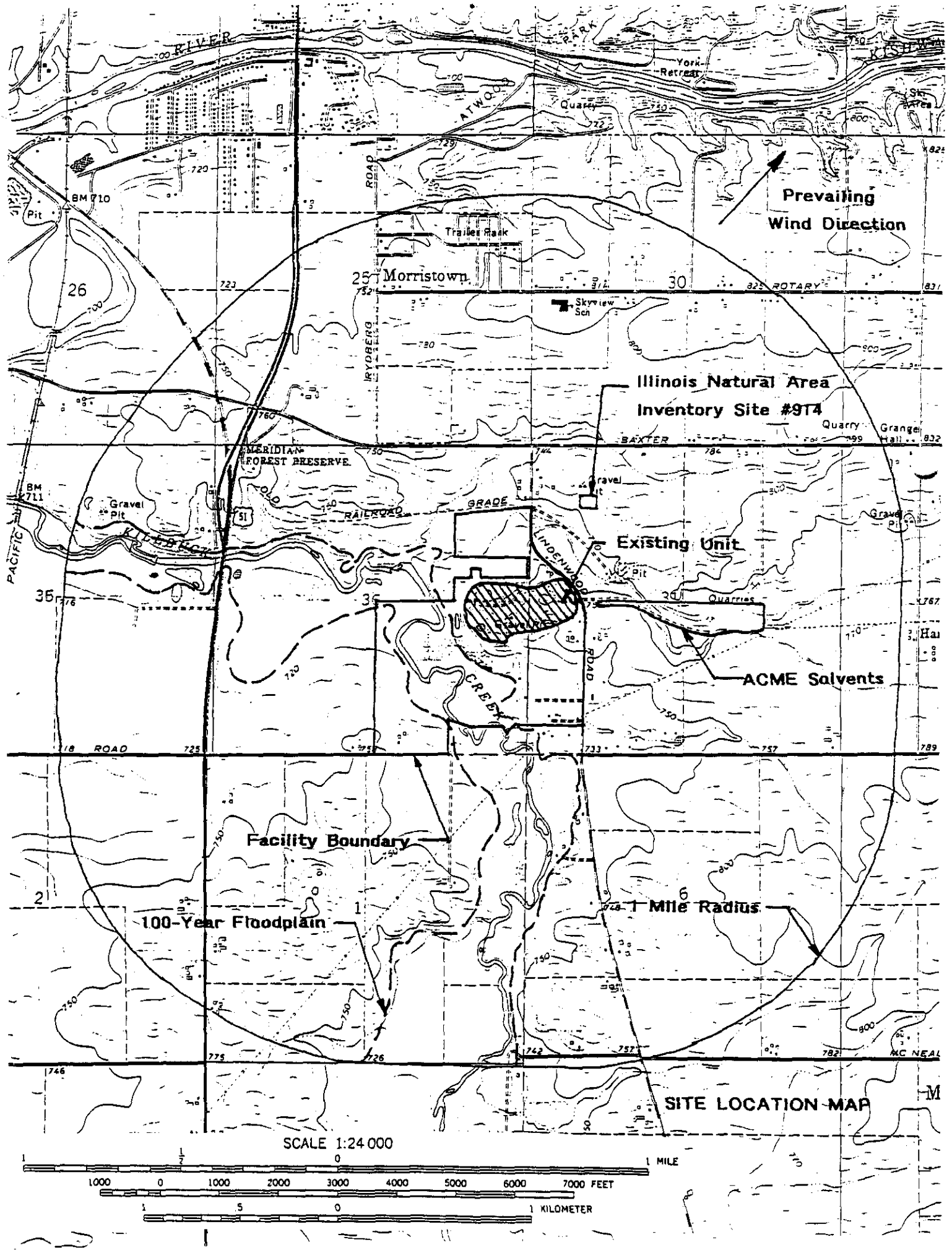

Prevailing
Wind Direction
Illinois Natural Area
Inventory Site #914
Existing Unit
ACME Solvents
Facility Boundary
100-Year Floodplain
1 Mile Radius
SITE LOCATION MAP
Morristown
MERIDIAN FOREST PRESERVE
SCALE 1:24 000
1 MILE
7000 FEET
1 KILOMETER

EXHIBIT 2

Landfill Air Emissions Estimate

Model Parameters

Lo : 4411.000000 ft^3 / Mg ***** Note : Default value not used ****
k : 0.020000 1/yr

NMOC : 26000.000000 ppmv ***** Note : Default value not used ****
Methane : 38.000000 % volume ***** Note : Default value not used ****
Carbon Dioxide : 62.000000 % volume

Air Toxics Parameters

Chemical Name	Molecular Wt	Concentration

Landfill Parameters

Year Opened : 1972 Current Year : 1995 Year Closed: 2001
Capacity : 4904500.000000 Mg
Average Acceptance Rate : 162865.217391 Mg/year
Average Acceptance Rate Required from
Current Year to Closure Year : 193100.000000 Mg/year

Model Parameters

Year	Refuse In Place (Mg)	Methane Emission Rate (Mg/yr)	(Cubic Ft/yr)
1973	1.565E+005	2.608E+002	1.381E+007
1974	3.130E+005	5.165E+002	2.734E+007
1975	4.695E+005	7.671E+002	4.060E+007
1976	6.260E+005	1.013E+003	5.361E+007
1977	7.825E+005	1.253E+003	6.635E+007
1978	9.390E+005	1.489E+003	7.884E+007
1979	1.096E+006	1.721E+003	9.109E+007
1980	1.252E+006	1.948E+003	1.031E+008
1981	1.409E+006	2.170E+003	1.149E+008
1982	1.565E+006	2.388E+003	1.264E+008
1983	1.722E+006	2.601E+003	1.377E+008
1984	1.878E+006	2.811E+003	1.488E+008
1985	2.035E+006	3.016E+003	1.596E+008
1986	2.191E+006	3.217E+003	1.703E+008
1987	2.348E+006	3.414E+003	1.807E+008
1988	2.504E+006	3.607E+003	1.909E+008
1989	2.661E+006	3.797E+003	2.010E+008
1990	2.817E+006	3.982E+003	2.108E+008
1991	2.974E+006	4.164E+003	2.204E+008
1992	3.167E+006	4.404E+003	2.331E+008
1993	3.360E+006	4.638E+003	2.455E+008
1994	3.553E+006	4.868E+003	2.577E+008
1995	3.746E+006	5.094E+003	2.696E+008
1996	3.939E+006	5.315E+003	2.813E+008
1997	4.132E+006	5.531E+003	2.928E+008
1998	4.325E+006	5.743E+003	3.040E+008
1999	4.518E+006	5.952E+003	3.150E+008
2000	4.711E+006	6.156E+003	3.258E+008
2001	4.905E+006	6.355E+003	3.364E+008
2002	4.905E+006	6.230E+003	3.298E+008
2003	4.905E+006	6.106E+003	3.232E+008
2004	4.905E+006	5.985E+003	3.168E+008
2005	4.905E+006	5.867E+003	3.106E+008
2006	4.905E+006	5.751E+003	3.044E+008
2007	4.905E+006	5.637E+003	2.984E+008
2008	4.905E+006	5.525E+003	2.925E+008
2009	4.905E+006	5.416E+003	2.867E+008
2010	4.905E+006	5.309E+003	2.810E+008
2011	4.905E+006	5.203E+003	2.754E+008
2012	4.905E+006	5.100E+003	2.700E+008
2013	4.905E+006	4.999E+003	2.646E+008
2014	4.905E+006	4.900E+003	2.594E+008
2015	4.905E+006	4.803E+003	2.543E+008
2016	4.905E+006	4.708E+003	2.492E+008
2017	4.905E+006	4.615E+003	2.443E+008

2018	4.905E+006	4.524E+003	2.395E+008
2019	4.905E+006	4.434E+003	2.347E+008
2020	4.905E+006	4.346E+003	2.301E+008
2021	4.905E+006	4.260E+003	2.255E+008
2022	4.905E+006	4.176E+003	2.210E+008
2023	4.905E+006	4.093E+003	2.167E+008
2024	4.905E+006	4.012E+003	2.124E+008
2025	4.905E+006	3.933E+003	2.082E+008
2026	4.905E+006	3.855E+003	2.040E+008
2027	4.905E+006	3.778E+003	2.000E+008
2028	4.905E+006	3.704E+003	1.960E+008
2029	4.905E+006	3.630E+003	1.922E+008
2030	4.905E+006	3.558E+003	1.884E+008
2031	4.905E+006	3.488E+003	1.846E+008
2032	4.905E+006	3.419E+003	1.810E+008
2033	4.905E+006	3.351E+003	1.774E+008
2034	4.905E+006	3.285E+003	1.739E+008
2035	4.905E+006	3.220E+003	1.704E+008
2036	4.905E+006	3.156E+003	1.671E+008
2037	4.905E+006	3.094E+003	1.638E+008
2038	4.905E+006	3.032E+003	1.605E+008
2039	4.905E+006	2.972E+003	1.573E+008
2040	4.905E+006	2.913E+003	1.542E+008
2041	4.905E+006	2.856E+003	1.512E+008
2042	4.905E+006	2.799E+003	1.482E+008
2043	4.905E+006	2.744E+003	1.452E+008
2044	4.905E+006	2.689E+003	1.424E+008
2045	4.905E+006	2.636E+003	1.395E+008
2046	4.905E+006	2.584E+003	1.368E+008
2047	4.905E+006	2.533E+003	1.341E+008
2048	4.905E+006	2.483E+003	1.314E+008
2049	4.905E+006	2.433E+003	1.288E+008
2050	4.905E+006	2.385E+003	1.263E+008
2051	4.905E+006	2.338E+003	1.238E+008

Year	Refuse In Place (Mg)	Carbon Dioxide Emission Rate (Mg/yr)	(Cubic Ft/yr)
1973	1.565E+005	1.168E+003	2.253E+007
1974	3.130E+005	2.312E+003	4.461E+007
1975	4.695E+005	3.434E+003	6.625E+007
1976	6.260E+005	4.534E+003	8.746E+007
1977	7.825E+005	5.611E+003	1.083E+008
1978	9.390E+005	6.668E+003	1.286E+008
1979	1.096E+006	7.704E+003	1.486E+008
1980	1.252E+006	8.719E+003	1.682E+008
1981	1.409E+006	9.714E+003	1.874E+008
1982	1.565E+006	1.069E+004	2.062E+008
1983	1.722E+006	1.164E+004	2.247E+008
1984	1.878E+006	1.258E+004	2.427E+008
1985	2.035E+006	1.350E+004	2.605E+008
1986	2.191E+006	1.440E+004	2.778E+008
1987	2.348E+006	1.528E+004	2.948E+008
1988	2.504E+006	1.615E+004	3.115E+008
1989	2.661E+006	1.700E+004	3.279E+008
1990	2.817E+006	1.783E+004	3.439E+008
1991	2.974E+006	1.864E+004	3.596E+008
1992	3.167E+006	1.971E+004	3.803E+008
1993	3.360E+006	2.076E+004	4.006E+008
1994	3.553E+006	2.179E+004	4.204E+008
1995	3.746E+006	2.280E+004	4.399E+008
1996	3.939E+006	2.379E+004	4.590E+008
1997	4.132E+006	2.476E+004	4.777E+008
1998	4.325E+006	2.571E+004	4.960E+008
1999	4.518E+006	2.664E+004	5.140E+008
2000	4.711E+006	2.756E+004	5.316E+008
2001	4.905E+006	2.845E+004	5.489E+008
2002	4.905E+006	2.789E+004	5.380E+008
2003	4.905E+006	2.734E+004	5.274E+008
2004	4.905E+006	2.679E+004	5.169E+008
2005	4.905E+006	2.626E+004	5.067E+008

2006	4.905E+006	2.574E+004	4.967E+008
2007	4.905E+006	2.523E+004	4.868E+008
2008	4.905E+006	2.473E+004	4.772E+008
2009	4.905E+006	2.424E+004	4.677E+008
2010	4.905E+006	2.376E+004	4.585E+008
2011	4.905E+006	2.329E+004	4.494E+008
2012	4.905E+006	2.283E+004	4.405E+008
2013	4.905E+006	2.238E+004	4.318E+008
2014	4.905E+006	2.194E+004	4.232E+008
2015	4.905E+006	2.150E+004	4.148E+008
2016	4.905E+006	2.108E+004	4.066E+008
2017	4.905E+006	2.066E+004	3.986E+008
2018	4.905E+006	2.025E+004	3.907E+008
2019	4.905E+006	1.985E+004	3.829E+008
2020	4.905E+006	1.946E+004	3.754E+008
2021	4.905E+006	1.907E+004	3.679E+008
2022	4.905E+006	1.869E+004	3.606E+008
2023	4.905E+006	1.832E+004	3.535E+008
2024	4.905E+006	1.796E+004	3.465E+008
2025	4.905E+006	1.761E+004	3.396E+008
2026	4.905E+006	1.726E+004	3.329E+008
2027	4.905E+006	1.691E+004	3.263E-008
2028	4.905E+006	1.658E+004	3.199E+008
2029	4.905E+006	1.625E+004	3.135E+008
2030	4.905E+006	1.593E+004	3.073E+008
2031	4.905E+006	1.561E+004	3.012E+008
2032	4.905E+006	1.531E+004	2.953E+008
2033	4.905E+006	1.500E+004	2.894E+008
2034	4.905E+006	1.471E+004	2.837E+008
2035	4.905E+006	1.441E+004	2.781E+008
2036	4.905E+006	1.413E+004	2.726E+008
2037	4.905E+006	1.385E+004	2.672E+008
2038	4.905E+006	1.357E+004	2.619E+008
2039	4.905E+006	1.331E+004	2.567E+008
2040	4.905E+006	1.304E+004	2.516E+008
2041	4.905E+006	1.278E+004	2.466E+008
2042	4.905E+006	1.253E+004	2.417E+008
2043	4.905E+006	1.228E+004	2.370E+008
2044	4.905E+006	1.204E+004	2.323E+008
2045	4.905E+006	1.180E+004	2.277E+008
2046	4.905E+006	1.157E+004	2.232E+008
2047	4.905E+006	1.134E+004	2.187E+008
2048	4.905E+006	1.111E+004	2.144E+008
2049	4.905E+006	1.089E+004	2.102E+008
2050	4.905E+006	1.068E+004	2.060E+008
2051	4.905E+006	1.047E+004	2.019E+008

Year	Refuse In Place (Mg)	NMOC Emission Rate (as Hexane) (Mg/yr)	(Cubic Ft/yr)
1973	1.565E+005	9.588E+001	9.447E+005
1974	3.130E+005	1.899E+002	1.871E+006
1975	4.695E+005	2.820E+002	2.778E+006
1976	6.260E+005	3.723E+002	3.668E+006
1977	7.825E+005	4.608E+002	4.540E+006
1978	9.390E+005	5.476E+002	5.395E+006
1979	1.096E+006	6.326E+002	6.232E+006
1980	1.252E+006	7.160E+002	7.054E+006
1981	1.409E+006	7.977E+002	7.859E+006
1982	1.565E+006	8.777E+002	8.648E+006
1983	1.722E+006	9.563E+002	9.421E+006
1984	1.878E+006	1.033E+003	1.018E+007
1985	2.035E+006	1.109E+003	1.092E+007
1986	2.191E+006	1.183E+003	1.165E+007
1987	2.348E+006	1.255E+003	1.236E+007
1988	2.504E+006	1.326E+003	1.306E+007
1989	2.661E+006	1.396E+003	1.375E+007
1990	2.817E+006	1.464E+003	1.442E+007
1991	2.974E+006	1.531E+003	1.508E+007
1992	3.167E+006	1.619E+003	1.595E+007
1993	3.360E+006	1.705E+003	1.680E+007

1994	3.553E+006	1.790E+003	1.763E-007
1995	3.746E+006	1.872E+003	1.845E-007
1996	3.939E+006	1.954E+003	1.925E-007
1997	4.132E+006	2.033E+003	2.003E-007
1998	4.325E+006	2.111E+003	2.080E-007
1999	4.518E+006	2.188E+003	2.156E-007
2000	4.711E+006	2.263E+003	2.229E-007
2001	4.905E+006	2.336E+003	2.302E-007
2002	4.905E+006	2.290E+003	2.256E-007
2003	4.905E+006	2.245E+003	2.212E-007
2004	4.905E+006	2.200E+003	2.168E-007
2005	4.905E+006	2.157E+003	2.125E-007
2006	4.905E+006	2.114E+003	2.083E-007
2007	4.905E+006	2.072E+003	2.042E-007
2008	4.905E+006	2.031E+003	2.001E-007
2009	4.905E+006	1.991E+003	1.961E-007
2010	4.905E+006	1.951E+003	1.923E-007
2011	4.905E+006	1.913E+003	1.885E-007
2012	4.905E+006	1.875E+003	1.847E-007
2013	4.905E+006	1.838E+003	1.811E-007
2014	4.905E+006	1.801E+003	1.775E-007
2015	4.905E+006	1.766E+003	1.740E-007
2016	4.905E+006	1.731E+003	1.705E-007
2017	4.905E+006	1.697E+003	1.671E-007
2018	4.905E+006	1.663E+003	1.638E-007
2019	4.905E+006	1.630E+003	1.606E-007
2020	4.905E+006	1.598E+003	1.574E-007
2021	4.905E+006	1.566E+003	1.543E-007
2022	4.905E+006	1.535E+003	1.512E-007
2023	4.905E+006	1.505E+003	1.482E-007
2024	4.905E+006	1.475E+003	1.453E-007
2025	4.905E+006	1.446E+003	1.424E-007
2026	4.905E+006	1.417E+003	1.396E-007
2027	4.905E+006	1.389E+003	1.368E-007
2028	4.905E+006	1.362E+003	1.341E-007
2029	4.905E+006	1.335E+003	1.315E-007
2030	4.905E+006	1.308E+003	1.289E-007
2031	4.905E+006	1.282E+003	1.263E-007
2032	4.905E+006	1.257E+003	1.238E-007
2033	4.905E+006	1.232E+003	1.214E-007
2034	4.905E+006	1.208E+003	1.190E-007
2035	4.905E+006	1.184E+003	1.166E-007
2036	4.905E+006	1.160E+003	1.143E-007
2037	4.905E+006	1.137E+003	1.120E-007
2038	4.905E+006	1.115E+003	1.098E-007
2039	4.905E+006	1.093E+003	1.076E-007
2040	4.905E+006	1.071E+003	1.055E-007
2041	4.905E+006	1.050E+003	1.034E-007
2042	4.905E+006	1.029E+003	1.014E-007
2043	4.905E+006	1.009E+003	9.937E+006
2044	4.905E+006	9.887E+002	9.740E+006
2045	4.905E+006	9.691E+002	9.548E+006
2046	4.905E+006	9.499E+002	9.358E+006
2047	4.905E+006	9.311E+002	9.173E+006
2048	4.905E+006	9.126E+002	8.992E+006
2049	4.905E+006	8.946E+002	8.813E+006
2050	4.905E+006	8.769E+002	8.639E+006
2051	4.905E+006	8.595E+002	8.468E+006

EXHIBIT 3

Landfill Gas Analyses

eceived: 04/14/94 06/01/94 15:46:16

REPORT TO
NRG Technologies, Inc.
4920 Forest Hills Road
Loves Park, Illinois, 61111
(815) 874-4806
ATTEN Thomas Hilbert

PREPARED BY
Chemical Research Services
Institute of Gas Technology
3424 S. State Street
Chicago, IL 60616-3896
ATTEN S. S. Chao | Business Phone
PHONE 312-949-3838 | 312-949-3650

CERTIFIED BY

CONTACT KONCAR 3815

CLIENT NRG TECH SAMPLES 1
COMPANY NRG Technologies, Inc.
ACILITY 8403 Lindenwood Road
Rockford, Illinois, 61109

(For additional information, phone the CONTACT above.)
NEITHER IGT NOR ANY PERSON ACTING ON BEHALF OF IGT ASSUMES ANY LIABILITY WITH RESPECT TO THE USE OF, OR FOR DAMAGES RESULTING FROM THE USE OF, ANY INFORMATION PRESENTED IN THIS REPORT.

WORK ID LFG41494 Gas Sample
TAKEN
TRANS
TYPE
P.O. # 6469
NVOICE under separate cover

SAMPLE IDENTIFICATION
Gas LFG41494

TEST CODES and NAMES used on this workorder

HALTG	Trace Halocarbons in Gas
SLFRTG	Trace Sulfur in Gas
SYNGAS	ASTM D1946 Gas Analysis

MPLE ID Gas LF641494 FRACTION D1A TEST CODE HALTC NAME Trace Halocarbons in Gas
Date & Time Collected not specified Category

Date Sample Received 04/14/94
Date Sample Analyzed 05/31/94

TRACE HALOCARBON DETERMINATION BY GAS CHROMATOGRAPHY

COMPOUND		FORMULA	Ppmv
Tetrafluoromethane	(CFC-14)	C.F4	BDL
Difluoroethane	(CFC-1132A)	C2.F2.H2	BDL
Chlorodifluoromethane	(CFC-22)	C.CL.F2.H	0.5
Dichlorodifluoromethane	(CFC-12)	C.CL2.F2	1.4
Chlorotetrafluoroethane		C2.CL.F4.H	BDL
Dichlorotetrafluoroethane	(CFC-114)	C2.CL2.F4	BDL
Chloromethane		C.CL.H3	0.07
Chlorofluoromethane		C.CL.F.H2	BDL
Chloroethene	(Vinyl chloride)	C2.CL.H3	1.3
Bromomethane		C.BR.H3	BDL
Chloroethane		C2.CL.H5	BDL
Dichlorofluoromethane	(CFC-21)	C.CL2.F.H	0.08
Trichlorofluoromethane	(CFC-11)	C.CL3.F	BDL
Trichlorotrifluoroethane	(CFC-113)	C2.CL3.F3	BDL
1,1-Dichloroethene		C2.CL2.H2	0.1
Dichloromethane		C.CL2.H2	BDL
trans-1,2-Dichloroethene		C2.CL2.H2	BDL
1,1-Dichloroethane		C2.CL2.H4	BDL
Trichloromethane		C.CL3.H	BDL
1,1,1-Trichloroethane		C2.CL3.H3	BDL
1,2-Dichloroethane		C2.CL2.H4	BDL
Tetrachloromethane		C.CL4	BDL
1,2-Dichloropropane		C3.CL2.H6	BDL
Trichloroethene		C2.CL3.H	0.1
Bromodichloromethane		C.BR.CL2.H	BDL

(Report continues on following page.)

SAMPLE ID Gas LFG41494 FRACTION D1A TEST CODE HALTG NAME Trace Halocarbons in Gas
Date & Time Collected not specified Category

(Report continued from preceding page.)

COMPOUND	FORMULA	ppmv
2-Chloroethyl Vinyl Ether	C4.CL.O.H7	BDL
trans-1,3-Dichloropropene	C3.CL2.H4	BDL
cis-1,3-Dichloropropene	C3.CL2.H4	BDL
1,1,2-Trichloroethane	C2.CL3.H3	BDL
Dibromochloromethane	C.CL.2R2.H	BDL
Tetrachloroethene	C2.CL4	0.06
Chlorobenzene	C6.CL.H5	BDL
1,4-Dichlorobenzene	C6.CL2.H4	2.1
Tribromomethane	C.3R3.H	BDL
1,1,2,2-Tetrachloroethane	C2.CL4.H2	BDL
Total other halocarbon compounds not specified above:		0.25
cis-1,2 Dichloroethene		0.4

NOTES: "BDL" = Below Detection Limit (0.05 ppmv)

Analyst: GJK

eceived: 04/14/94

Results by Sample

AMPLE ID Gas LFG41494 FRACTION 01A TEST CODE SLFRTG NAME Trace Sulfur In Gas

Date & Time Collected not specified Category

Date Sample Received 04/19/94

Date Sample Analyzed 04/20/94

TRACE SULFUR DETERMINATION BY GAS CHROMATOGRAPHY

COMPOUND	ppmv	COMPOUND	ppmv
Hydrogen Sulfide	BDL	Thiophene	BDL
Sulfur Dioxide	BDL	C1-Thiophenes	BDL
Carbonyl Sulfide	BDL	C2-Thiophenes	BDL
Carbon Disulfide	BDL	C3-Thiophenes	BDL
Methyl Mercaptan	BDL	Benzothiophene	BDL
Ethyl Mercaptan	BDL	C1-Benzothiophenes	BDL
i-Propyl Mercaptan	BDL	C2-Benzothiophenes	BDL
n-Propyl Mercaptan	BDL		
t-Butyl Mercaptan	BDL	Thiophane	BDL
Dimethyl Sulfide	0.2	Thiophenol	BDL
Methyl Ethyl Sulfide	BDL		
Diethyl Sulfide	BDL		
Di-t-Butyl Sulfide	BDL	Total unidentified sulfur compounds:	0
Dimethyl Disulfide	BDL		
Methyl Ethyl Disulfide	BDL	(all quantitated as monosulfides)	
Methyl i-Propyl Disulfide	BDL		
Diethyl Disulfide	BDL		
Methyl n-Propyl Disulfide	BDL		
Methyl t-Butyl Disulfide	BDL		
Ethyl i-Propyl Disulfide	BDL		
Ethyl n-Propyl Disulfide	BDL		
Ethyl t-Butyl Disulfide	BDL		
Di-i-Propyl Disulfide	BDL		
i-Propyl n-Propyl Disulfide	BDL		
Di-n-Propyl Disulfide	BDL		
i-Propyl t-Butyl Disulfide	BDL		
n-Propyl t-Butyl Disulfide	BDL		
Di-t-Butyl Disulfide	BDL		
Di-t-Butyl Trisulfide	BDL		

OTES: "BDL" = Below Detection Limit:
1 ppmv for Hydrogen Sulfide,
0.2 ppmv for all other compounds

Total Sulfur content: 0.20 ppm, or 0.013 grains/100 SCF

Analyst: LZ

MPLE ID Gas LFG41494 FRACTION 01A TEST CODE STNGAS NAME ASTM D1946 Gas Analysis
Date & Time Collected not specified Category

Date received: 04/14/94 Date analyzed: 05/16/94

COMPONENT	MOLE%	D. L.	WEIGHT%
Helium	ND		
Hydrogen	BDL	0.04	
Oxygen & Argon	2.90	0.03	3.31
Nitrogen	30.3	0.03	30.4
Carbon dioxide	28.0	0.03	44.0
Carbon monoxide	BDL	0.03	
Methane	38.8	0.03	22.3
Ethane	BDL	0.03	
Ethene	BDL	0.03	
Ethyne (Acetylene)	BDL	0.002	
Propane	BDL	0.002	
Propene	BDL	0.002	
Propyne	BDL	0.002	
Propadiene	BDL	0.002	
i-Butane	BDL	0.002	
n-Butane	BDL	0.002	
1-Butene	BDL	0.002	
Iso-Butene	BDL	0.002	
trans-2-Butene	BDL	0.002	
cis-2-Butene	BDL	0.002	
Butadiene	BDL	0.002	
neo-Pentane	BDL	0.002	
i-Pentane	BDL	0.002	
n-Pentane	BDL	0.002	
Pentenes	BDL	0.002	
C-6 & heavier	0.002	0.002	0.007
Hydrogen sulfide	ND		
Carbonyl sulfide	ND		
Total	100.0		100.0

CALCULATED PROPERTIES at 60°F / 14.73 psia (per ASTM D3588-91)

Relative Density : 0.967 Wobbe Index (BTU/SCF) : 401
Compressibility (z) : 0.9980

Gross Heating Value (BTU/SCF)		Net Heating Value (BTU/SCF)	
-- dry -- :	394	-- dry -- :	354
-- sat.-- :	387	-- sat.-- :	348

Analyst : cla

NOTES: "BDL" = Below Detection Limit (D. L.); "ND" = Component Not Determined

G Technologies, Inc.

TRACE BTEX ANALYSIS BY GC/PID

der Number: 9404054-01A
mple Name : Gas LFG41494

ponent Name	PPMV
---	---
nzene	BDL
uene	0.0005
yl-Benzene	0.0002
enes	0.0005

= Below Detection Limit of 0.0001 ppmv
V = Parts Per Million by Volume

Received: 4/14/94
nalyzed: 5/13/94

lyst CLA

Report Number 94-131
Source Testing Program for
Winnebago Reclamation Service
Rockford, Illinois
November 28, 1994

1 OBJECTIVE

Winnebago Reclamation Service contracted with Environmental Monitoring and Technologies to test at the pipeline which carries gas from the landfill and feeds the sludge dryer, at their facility in Rockford, Illinois.

Testing was done as per the guidelines of the Illinois Environmental Protection Agency (IEPA) as well as Federal Agencies.

Coordinating the sampling program were:

Tom Hilbert.....Winnebago Reclamation Service
Keith Linsley.....EMT

2 INTRODUCTION

2.1 Description of Installation

Winnebago Reclamation Service has a landfill located at 8403 Lindenwood Road, Rockford, Illinois.

The purpose of the system tested is to collect the gas, which is a natural byproduct of a landfill operation, and utilize it as fuel for a sludge dryer.

2.2 Sampling Locations

The sampling location was at the flare of the landfill.

3 Summary of Sampling

EMT performed the following procedures to meet the requirements of the specified work. All EPA methods may be referenced in Title 40 of the Code of Federal Regulations, Part 60, Appendix A, and the applicable ASTM documents.

* EPA Methods 3, 4 -	Carbon Dioxide, Oxygen, and Moisture
* EPA Method 18 -	Acetone, Carbon Tetrachloride, Methyl Ethyl Ketone, and Vinyl Acetate
* EPA Method 25A -	Methane, Total Non-methane Hydrocarbons.
* NIOSH Method 6013 -	Hydrogen Sulfide
* NIOSH Method 1003 -	Total Volatile Halogens

4. Summary of Results

Results of testing performed at flare, 9/28/94 and 11/1/94

Parameter	Result	
Hydrogen Sulfide	0.278	mg/m^3
Total Volatile Halogens	<8.119	mg/m^3
Acetone	41.5	ug/L (ppb)
Carbon Tetrachloride	0.78	ug/L (ppb)
Methyl Ethyl Ketone	33.93	ug/L (ppb)
Vinyl Acetate	0.19	ug/L (ppb)
Non-methane VOCs	49,000	ppm
Carbon Dioxide	12.0	% by volume
Oxygen	3.5	% by volume
Nitrogen	25.4	% by volume
Moisture at standard temp. & pressure (68 degrees F. and 29.92 in Hg)	<2	% by weight
Methane	54.2	% by weight

DRAFT

Laboratory Data

ENVIRONMENTAL MONITORING AND TECHNOLOGIES, INC.

8100 North Austin Avenue
Morton Grove, Illinois 60053-3203
708/967-6666
FAX: 708/967-6735

LABORATORY REPORT

109529

Winnebago Reclamation Service
8403 Lindenwood Road
Rockford, IL 61109

Report Date: 11/7/94
Sample Received: 11/1/94

Sample Description: Air, 1101-OB
Sample No.: 99222

Halogenated Hydrocarbons Compound	Concentration Found In Sample (mg/M^3)
1. benzyl chloride	<0.0820
2. bromoform	<0.0820
3. carbon tetrachloride	<0.0820
4. chlorobenzene	<0.0820
5. chlorobromomethane	<0.0820
6. chloroform	<0.0820
7. o-dichlorobenzene	<0.0820
8. p-dichlorobenzene	<0.0820
9. 1,1-dichloroethane	<8.20
10. 1,2-dichloroethane	<8.20
11. ethylene dichloride (1,1-dichloroethene)	<8.20
12. hexachloroethane	<0.0820
13. 1,1,1-trichloroethane	<0.0820
14. tetrachloroethene	<0.0820
15. 1,1,2-trichloroethane	<0.0820
16. 1,2,3-trichloropropane	<0.0820

Analysis conducted according to NIOSH Method 1003, Issue 2.

The contents of this report apply to the sample analyzed. No duplication of this report is allowed except its entirety.

Leah E. Zuber

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FAX: 708/967-6735

LABORATORY REPORT

109527

Winnebago Reclamation Service
8403 Lindenwood Road
Rockford, IL 61109

Report Date: 11/7/94
Sample Received: 11/1/94

Sample Description: Air, 1101-3A
Sample No.: 99227

Halogenated Hydrocarbons Compound	Concentration Found In Sample (mg/M^3)
1. benzyl chloride	<0.102
2. bromoform	<0.102
3. carbon tetrachloride	<0.102
4. chlorobenzene	0.257
5. chlorobromomethane	<0.102
6. chloroform	<0.102
7. o-dichlorobenzene	0.128
8. p-dichlorobenzene	1.66
9. 1,1-dichloroethane	<10.2
10. 1,2-dichloroethane	<10.2
11. ethylene dichloride (1,1-dichloroethene)	<10.2
12. hexachloroethane	<0.102
13. 1,1,1-trichloroethane	<0.102
14. tetrachloroethene	0.222
15. 1,1,2-trichloroethane	<0.102
16. 1,2,3-trichloropropane	<0.102

Analysis conducted according to NIOSH Method 1003, Issue 2.

The contents of this report apply to the sample analyzed. No duplication of this report is allowed except its entirety.

Leah E. Zehr

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LABORATORY REPORT

109528

Winnebago Reclamation Service
8403 Lindenwood Road
Rockford, IL 61109

Report Date: 11/7/94
Sample Received: 11/1/94

Sample Description: Air, 1101-3B
Sample No.: 99228

Halogenated Hydrocarbons Compound	Concentration Found In Sample (mg/M^3)
1. benzyl chloride	<0.102
2. bromoform	<0.102
3. carbon tetrachloride	<0.102
4. chlorobenzene	<0.102
5. chlorobromomethane	<0.102
6. chloroform	<0.102
7. o-dichlorobenzene	<0.102
8. p-dichlorobenzene	<0.102
9. 1,1-dichloroethane	<10.2
10. 1,2-dichloroethane	<10.2
11. ethylene dichloride (1,1-dichloroethene)	<10.2
12. hexachloroethane	<0.102
13. 1,1,1-trichloroethane	<0.102
14. tetrachloroethene	<0.102
15. 1,1,2-trichloroethane	<0.102
16. 1,2,3-trichloropropane	<0.102

Analysis conducted according to NIOSH Method 1003, Issue 2.

The contents of this report apply to the sample analyzed. No duplication of this report is allowed except its entirety.

Leah E. Zeher

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LABORATORY REPORT

109525

Winnebago Reclamation Service
8403 Lindenwood Road
Rockford, IL 61109

Report Date: 11/7/94
Sample Received: 11/1/94

Sample Description: Air, 1101-4A
Sample No.: 99229

Halogenated Hydrocarbons Compound	Concentration Found In Sample (mg/M^3)
1. benzyl chloride	<0.0820
2. bromoform	<0.0820
3. carbon tetrachloride	<0.0820
4. chlorobenzene	0.0191
5. chlorobromomethane	<0.0820
6. chloroform	<0.0820
7. o-dichlorobenzene	0.092
8. p-dichlorobenzene	1.16
9. 1,1-dichloroethane	<8.20
10. 1,2-dichloroethane	<8.20
11. ethylene dichloride (1,1-dichloroethene)	<8.20
12. hexachloroethane	<0.0820
13. 1,1,1-trichloroethane	<0.0820
14. tetrachloroethene	0.176
15. 1,1,2-trichloroethane	<0.0820
16. 1,2,3-trichloropropane	<0.0820

Analysis conducted according to NIOSH Method 1003, Issue 2.

The contents of this report apply to the sample analyzed. No duplication of this report is allowed except its entirety.

Leah E. Zeller

LABORATORY DIRECTOR

ENVIRONMENTAL MONITORING AND TECHNOLOGIES, INC.

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LABORATORY REPORT

109526

Winnebago Reclamation Service
8403 Lindenwood Road
Rockford, IL 61109

Report Date: 11/7/94
Sample Received: 11/1/94

Sample Description: Air, 1101-4B
Sample No.: 99230

Halogenated Hydrocarbons Compound	Concentration Found In Sample (mg/M^3)
1. benzyl chloride	<0.0820
2. bromoform	<0.0820
3. carbon tetrachloride	<0.0820
4. chlorobenzene	<0.0820
5. chlorobromomethane	<0.0820
6. chloroform	<0.0820
7. o-dichlorobenzene	<0.0820
8. p-dichlorobenzene	<0.0820
9. 1,1-dichloroethane	<8.20
10. 1,2-dichloroethane	<8.20
11. ethylene dichloride (1,1-dichloroethene)	<8.20
12. hexachloroethane	<0.0820
13. 1,1,1-trichloroethane	<0.0820
14. tetrachloroethene	<0.0820
15. 1,1,2-trichloroethane	<0.0820
16. 1,2,3-trichloropropane	<0.0820

Analysis conducted according to NIOSH Method 1003, Issue 2.

The contents of this report apply to the sample analyzed. No duplication of this report is allowed except its entirety.

Leah E. Zeher

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LABORATORY REPORT

108897

Winnebago Reclamation Service
8403 Lindenwood Road
Rockford, IL 61109

Report Date: 10/28/94
Sample Received: 9/28/94

Sample Description: Air Sample 1
Sample No.: 95425

Compound Purgeables	Concentration Found IN Sample (Vppm)	Concentration Found IN Blank (ppb)	Method Detection Limit (MDL) ug/L (Vppm)	Quantitation Limit ug/L (ppb)
1. Chloromethane	<0.102	<1.0	0.102	1.02
2. Bromomethane	<0.068	<0.7	0.068	0.68
3. Vinyl chloride	<0.054	<0.7	0.054	0.54
4. Chloroethane	<0.053	<0.7	0.053	0.53
5. Dichloromethane	<0.046	<0.8	0.046	0.46
6. Acrolein	<6.5	<15.0	6.5	65
7. Acrylonitrile	<2.3	<5.0	2.3	10.0
8. Trichlorofluoromethane	<0.018	<0.5	0.018	0.18
9. 1,1-Dichloroethene	<0.025	<0.5	0.025	0.25
10. 1,1-Dichloroethane	<0.025	<0.5	0.025	0.25
11. trans-1,2-Dichloroethene	<0.025	<0.5	0.025	0.25
12. Chloroform	<0.020	<0.5	0.020	0.20
13. 1,2-Dichloroethane	<0.080	<1.6	0.080	0.80
14. 1,1,1-Trichloroethane	<0.015	<0.5	0.015	0.15
15. Carbon tetrachloride	<0.019	<0.6	0.019	0.19
16. Bromodichloromethane	<0.018	<0.6	0.018	0.18
17. 1,2-Dichloropropane	<0.022	<0.5	0.022	0.22
18. cis-1,3-Dichloropropene	<0.022	<0.5	0.022	0.22
19. Trichloroethene	<0.019	<0.5	<0.019	0.19
20. Benzene	<0.031	<0.5	0.031	0.31
21. Dibromochloromethane	<0.077	<1.8	0.077	0.77
22. Trans-1,3-Dichloropropene	<0.040	<0.9	0.040	0.40
23. 1,1,2-Trichloroethane	<0.092	<2.5	0.092	0.92
24. 2-Chloroethyl vinyl ether	<20.7	<90.2	20.7	100

Leah E. Zehr

LABORATORY DIRECTOR

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LABORATORY REPORT

108897

Winnebago Reclamation Service
8403 Linderwood Road
Rockford, IL 61109

Report Date: 10/28/94
Sample Received: 9/28/94

Sample Description: Air Sample 1
Sample No.: 95425

Compound Purgeables	Concentration Found IN Sample (ppb)	Blank (ppb)	Method Detection Limit (MDL) ug/L (ppb)	Quantitation Limit ug/L (ppb)
25. Bromoform	<0.078	<4.0	0.078	0.78
26. Tetrachloroethene	<0.021	<0.7	0.021	0.21
27. 1,1,2,2-Tetrachloroethane	<0.15	<3.9	0.15	1.15
28. Toluene	0.97	<0.5	0.026	0.26
29. Chlorobenzene	<0.026	<0.6	0.026	0.26
30. Ethylbenzene	0.28	<0.6	0.027	0.27
31. Acetone	<4.15	<4.15	4.15	41.5
32. Carbon tetrachloride	<0.078	<0.078	0.078	0.78
33. MEK	<3.393	<3.393	3.393	33.93
34. Vinyl acetate	<3.393	<3.393	3.393	33.93

All results expressed as ppb unless otherwise indicated.

Analyses performed using EPA approved Method No. 624 in accordance with 40 CFR136.

The contents of this report apply only to the sample analyzed. No duplication of this report is allowed except in its entirety.

Leah E. Zehr

LABORATORY DIRECTOR

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LABORATORY REPORT

108898

Winnebago Reclamation Service
8403 Linderwood Road
Rockford, IL 61109

Report Date: 10/28/94
Sample Received: 9/28/94

Sample Description: Air Sample 2
Sample No.: 95426

Compound Purgeables	Concentration Found IN Sample (Vppm)	Concentration Found IN Blank (ppb)	Method Detection Limit (MDL) ug/L (Vppm)	Quantitation Limit ug/L (ppb)
1. Chloromethane	<0.102	<1.0	0.102	1.02
2. Bromomethane	<0.068	<0.7	0.068	0.68
3. Vinyl chloride	<0.054	<0.7	0.054	0.54
4. Chloroethane	<0.053	<0.7	0.053	0.53
5. Dichloromethane	<0.046	<0.8	0.046	0.46
6. Acrolein	<6.5	<15.0	6.5	65
7. Acrylonitrile	<2.3	<5.0	2.3	10.0
8. Trichlorofluoromethane	<0.018	<0.5	0.018	0.18
9. 1,1-Dichloroethene	<0.025	<0.5	0.025	0.25
10. 1,1-Dichloroethane	<0.025	<0.5	0.025	0.25
11. trans-1,2-Dichloroethene	<0.025	<0.5	0.025	0.25
12. Chloroform	<0.020	<0.5	0.020	0.20
13. 1,2-Dichloroethane	<0.080	<1.6	0.080	0.80
14. 1,1,1-Trichloroethane	<0.015	<0.5	0.015	0.15
15. Carbon tetrachloride	<0.019	<0.6	0.019	0.19
16. Bromodichloromethane	<0.018	<0.6	0.018	0.18
17. 1,2-Dichloropropane	<0.022	<0.5	0.022	0.22
18. cis-1,3-Dichloropropene	<0.022	<0.5	0.022	0.22
19. Trichloroethene	<0.019	<0.5	<0.019	0.19
20. Benzene	<0.031	<0.5	0.031	0.31
21. Dibromochloromethane	<0.077	<1.8	0.077	0.77
22. Trans-1,3-Dichloropropene	<0.040	<0.9	0.040	0.40
23. 1,1,2-Trichloroethane	<0.092	<2.5	0.092	0.92
24. 2-Chloroethyl vinyl ether	<20.7	<90.2	20.7	100

Leah E. Zehr

LABORATORY DIRECTOR

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LABORATORY REPORT

108898

Winnebago Reclamation Service
8403 Lindenwood Road
Rockford, IL 61109

Report Date: 10/28/94
Sample Received: 9/28/94

Sample Description: Air Sample 12
Sample No.: 95426

Compound Purgeables	Concentration Found IN Sample (ppb)	Blank (ppb)	Method Detection Limit (MDL) ug/L (ppb)	Quantitation Limit ug/L (ppb)
25. Bromoform	<0.078	<4.0	0.078	0.78
26. Tetrachloroethene	<0.021	<0.7	0.021	0.21
27. 1,1,2,2-Tetrachloroethane	<0.15	<3.9	0.15	1.15
28. Toluene	0.33	<0.5	0.026	0.26
29. Chlorobenzene	<0.026	<0.6	0.026	0.26
30. Ethylbenzene	0.28	<0.6	0.027	0.27
31. Acetone	<4.15	<4.15	4.15	41.5
32. Carbon tetrachloride	<0.078	<0.078	0.078	0.78
33. MEK	<3.393	<3.393	3.393	33.93
34. Vinyl acetate	<3.393	<3.393	3.393	33.93

All results expressed as ppb unless otherwise indicated.

Analyses performed using EPA approved Method No. 624 in accordance with 40 CFR136.

The contents of this report apply only to the sample analyzed. No duplication of this report is allowed except in its entirety.

Leah E. Zehr

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LABORATORY REPORT

109570

Winnebago Reclamation Service
8403 Lindenwood Road
Rockford, IL 61109

Report Date: 11/8/94
Sample Received: 11/1/94

Sample Description: Air Grab

Date	Sample No.	Location	Hydrogen Sulfide
11/1	99223	1101-1A	<0.250 mg/M^3
11/1	99224	1101-1B	<0.250 mg/M^3
11/1	99225	1101-2A	<0.306 mg/M^3
11/1	99226	1101-2B	<0.306 mg/M^3

Analysis conducted according to NIOSH Method 6013 Issue 1.

Methods performed according to SW-846, "Test Methods for Evaluating Solid Waste".

Gary W. Wright

EXHIBIT 4

Emissions Calculations

EMISSIONS CALCULATIONS
Flare Station

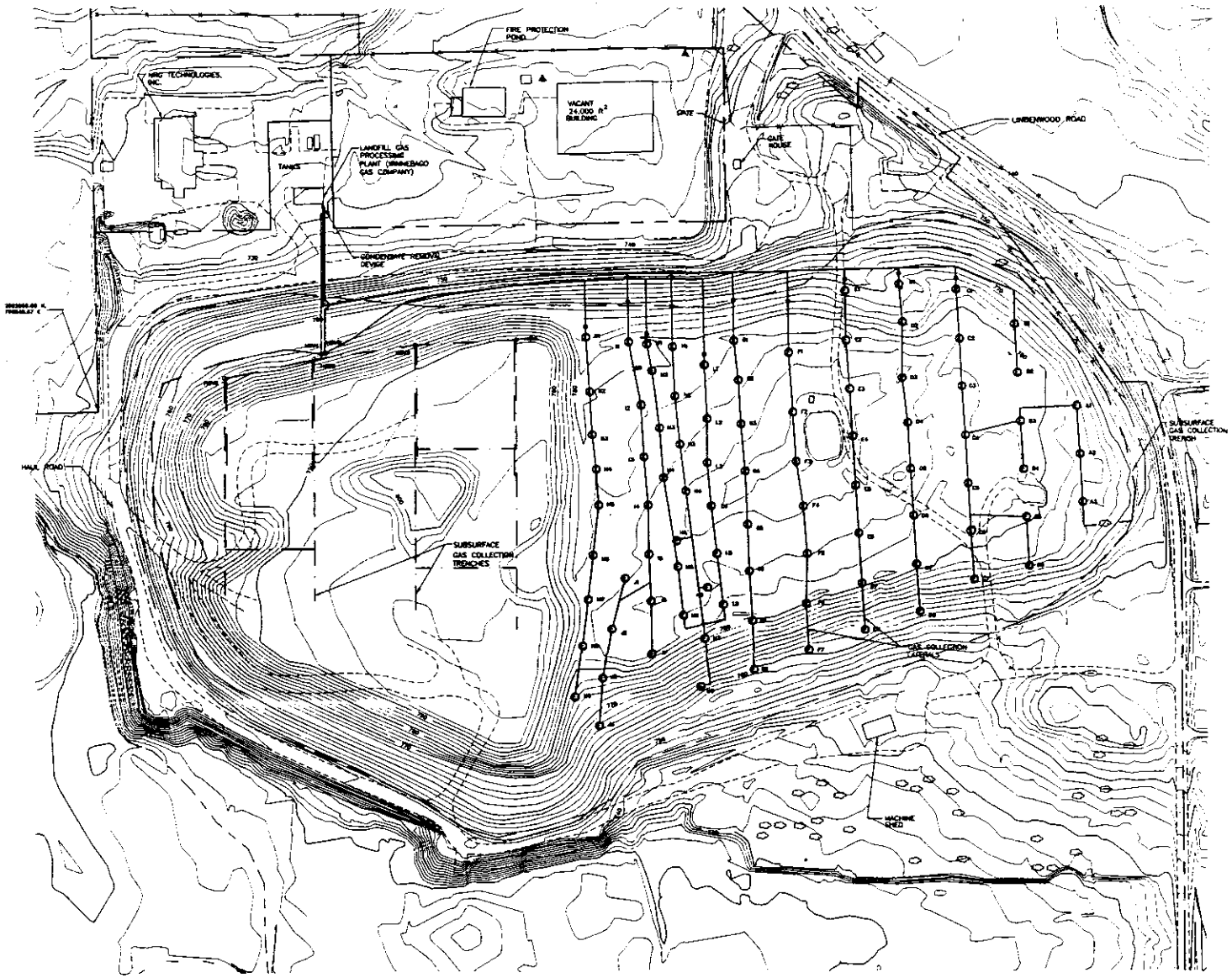
SITE: Winnebago Reclamation Service, Inc.
LOCATION: Rockford, Illinois
JOB NUMBER: 90-114

Input Parameters	Peak Flow Rate			Current Flow Rate		
Gas Generation Rate:	1685	1685	scfm	1150	1150	scfm
Collection Efficiency:	0.70	0.70		0.70	0.70	
Percent Methane:	38.0	38.0	%	38.0	38.0	%
Concentration NMOC:	26,000	26,000	ppmv	26,000	26,000	ppmv
Hours of Operation:	8760	2496	hr/yr	8760	2496	hr/yr
Carbon Dioxide (CO2)						
Emission Factor:	8.450	8.450	lb/hr/scfm	8.450	8.450	lb/hr/scfm
Emission Rate:	3,787.4	3,787.4	lb/hr	2,584.9	2,584.9	lb/hr
	16,588.7	**4,726.6**	ton/yr	**11,321.7**	**3,225.9**	ton/yr
Carbon Monoxide (CO)						
Emission Factor:	0.050	0.050	lb/hr/scfm	0.050	0.050	lb/hr/scfm
Emission Rate:	22.4	22.4	lb/hr	15.3	15.3	lb/hr
	98.2	28.0	ton/yr	**67.0**	**19.1**	ton/yr
Nitrogen Dioxide (NO2)						
Emission Factor:	0.007	0.007	lb/hr/scfm	0.007	0.007	lb/hr/scfm
Emission Rate:	3.1	3.1	lb/hr	2.1	2.1	lb/hr
	13.7	**3.9**	ton/yr	**9.4**	**2.7**	ton/yr
Methane (CH4)						
Emission Factor:	0.105	0.105	lb/hr/scfm	0.105	0.105	lb/hr/scfm
Emission Rate:	47.1	47.1	lb/hr	32.1	32.1	lb/hr
	206.1	**58.7**	ton/yr	**140.7**	**40.1**	ton/yr
Sulfur Dioxide (SO2)						
Emission Factor:	0.002	0.002	lb/hr/scfm	0.002	0.002	lb/hr/scfm
Emission Rate:	0.9	0.9	lb/hr	0.6	0.6	lb/hr
	3.9	**1.1**	ton/yr	**2.7**	**0.8**	ton/yr
Volatile Organic Material (VOM)						
Combustion Eff:	98.0	98.0	%	98.0	98.0	%
Emission Rate:	8.2	2.3	lb/hr	5.6	1.6	lb/hr
	35.9	**10.2**	ton/yr	**24.5**	**7.0**	ton/yr

Note: The emission factors reported are from Section 2.4 of AP-42 entitled "Municipal Solid Waste Landfills." Emissions of VOM were calculated assuming a molecular weight of 80.0 for Non-methane Organic Compounds and a gas density of 0.791 scf/mole.

EXHIBIT 5

Site Drawings



NOTES:

1. THIS DRAWING IS INTENDED TO DEPICT THE LAYOUT OF THE EXISTING ACTIVE GAS COLLECTION SYSTEM. THE LOCATIONS OF GAS COLLECTION LATERALS AND SUBSURFACE GAS COLLECTION TRENCHES ARE APPROXIMATE.
2. GAS EXTRACTION WELLS ARE CONSTRUCTED OF 6-8 IN. DIA. (MIN.) PERFORATED PVC INSTALLED IN A 3 FT. DIA. (MIN.) BOREHOLE. TWO 800 CFM COMPRESSORS ARE LOCATED IN THE LANDFILL GAS PROCESSING PLANT.
3. ALL EXISTING GAS EXTRACTION WELLS WILL BE ABANDONED OR REMOVED UPON INSTALLATION OF THE PROPOSED GAS COLLECTION SYSTEM AS DETAILED ON SHEET U1-2. SUBSURFACE GAS COLLECTION TRENCHES MAY BE UTILIZED IN CONJUNCTION WITH THE PROPOSED GAS COLLECTION SYSTEM.

LEGEND

- ▲ FIRE HYDRANT
- —x— FENCE
- — — — CURRENTLY PERMITTED FILL BOUNDARY
- — — — 100 YEAR FLOODPLAIN BOUNDARY
- — — GAS COLLECTION SYSTEM
- ○ TREE
- ○ MANHOLE/CONTROL VALVE
- ◉F4 GAS EXTRACTION WELL

N

GRAPHIC SCALE

100 0 50 100 200 400

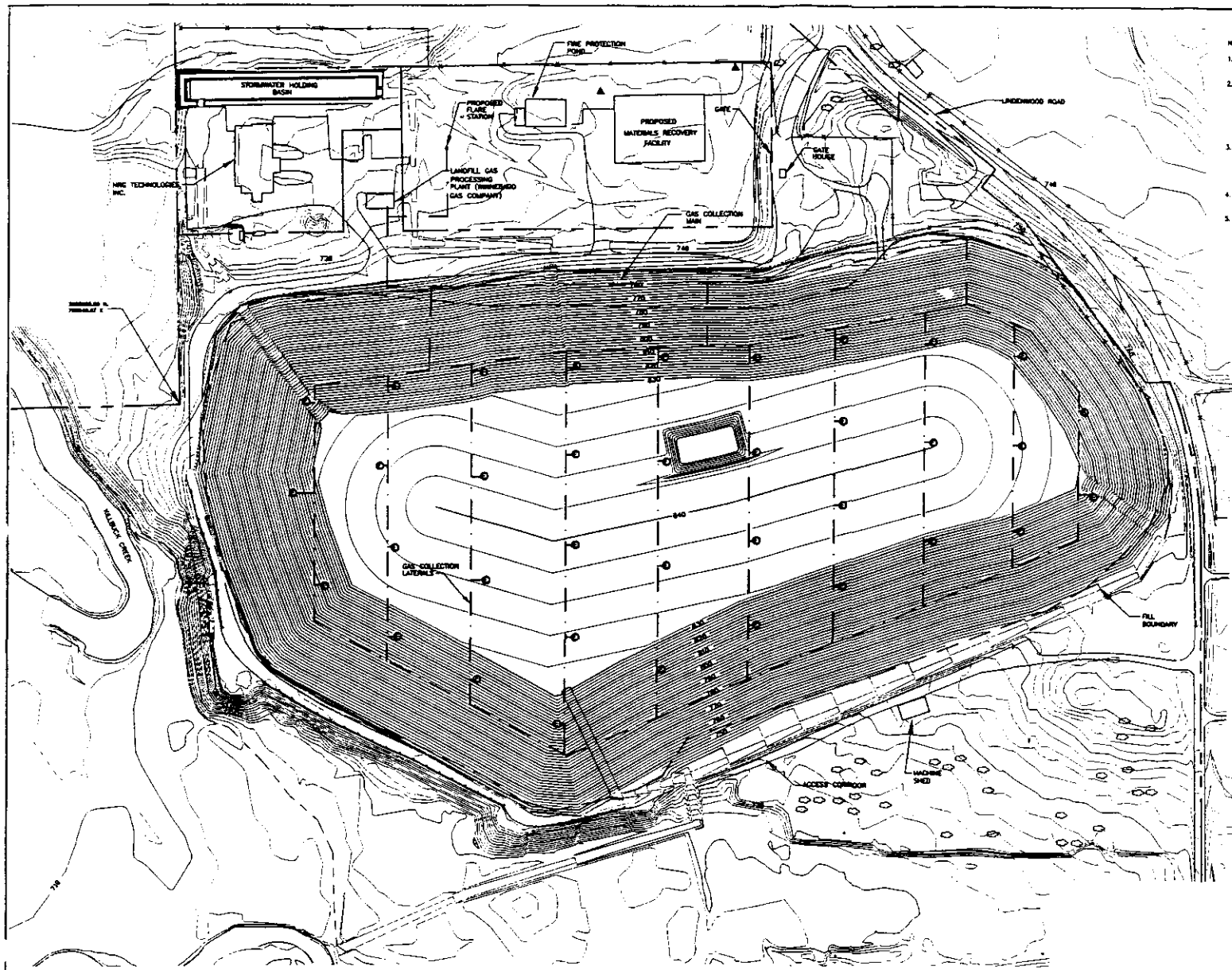
(IN FEET)
1 inch = 100 ft.

ANDREWS ENVIRONMENTAL ENGINEERING INC.
3535 MAYFLOWER BOULEVARD
SPRINGFIELD, ILLINOIS 62707
(217)787-2334 FAX (217)787-9495

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

EXISTING GAS COLLECTION SYSTEM

DRAWN BY: BLR	DATE: MAY 1994	SHEET NUMBER	
DESIGNED BY: EML	PROJECT #90-114	U1-1	
APPROVED BY: DRF	FILE #E:\U1-1		



NOTES:

1. THIS DRAWING IS INTENDED TO DEPICT THE LAYOUT OF THE PROPOSED ACTIVE GAS COLLECTION SYSTEM, AND THE LOCATION OF GAS EXTRACTION WELLS.
2. 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. ALL EXISTING GAS EXTRACTION WELLS (NOT SHOWN) WILL BE REMOVED OR ABANDONED UPON INSTALLATION OF THE PERMANENT GAS COLLECTION SYSTEM. EXISTING SUBSURFACE GAS COLLECTION TRENCHES MAY BE UTILIZED IN CONJUNCTION WITH THE PROPOSED ACTIVE GAS COLLECTION SYSTEM.
3. GAS EXTRACTION WELLS WILL BE CONSTRUCTED OF 8 IN. DIA. (MIN.) PVC OR HDPE PIPE AND WILL EXTEND TO WITHIN 2-5 FT. OF THE ASPHALT LINER. GAS COLLECTION LATERALS WILL BE CONSTRUCTED OF 8 IN. DIA. (MIN.) PVC OR HDPE PIPE. THREE 800 CFM COMPRESSORS WILL BE LOCATED IN THE LANDFILL GAS PROCESSING PLANT.
4. CONDENSATE REMOVAL DEVICES WILL BE INSTALLED ON EACH GAS COLLECTION LATERAL AND ON THE GAS MAIN BEFORE IT ENTERS THE PROCESSING PLANT.
5. THE LOCATIONS OF ALL GAS COLLECTION SYSTEM COMPONENTS ARE APPROXIMATE. MINOR CHANGES IN THE ACTUAL LAYOUT MAY BE MADE AS NECESSARY DURING INSTALLATION.

LEGEND

- GAS EXTRACTION WELL
- GAS COLLECTION SYSTEM
- FIRE HYDRANT
- FENCE
- CURRENTLY PERMITTED FILL BOUNDARY
- 100 YEAR FLOODPLAIN BOUNDARY

N

GRAPHIC SCALE

100 0 50 100 200 400

(IN FEET)
1 inch = 100 ft.

ANDREWS ENVIRONMENTAL ENGINEERING INC.
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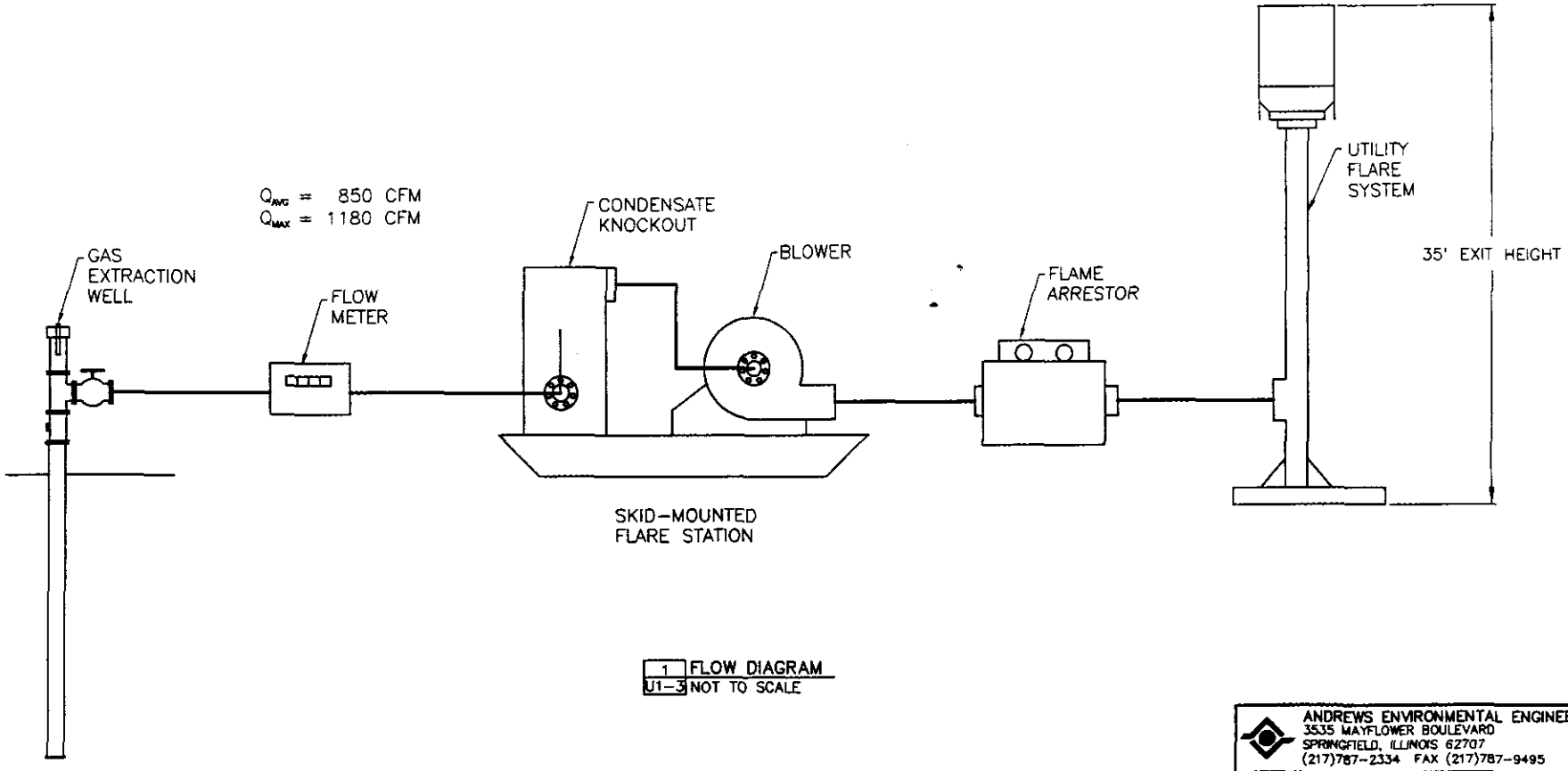
AIR PERMIT APPLICATION
WINNEBAGO RECLAMATION SERVICE INC.
PAGEL LANDFILL FACILITY
ROCKFORD, WINNEBAGO COUNTY, ILLINOIS

PROPOSED GAS COLLECTION SYSTEM

DRAWN BY: BLR	DATE: MAY 1994		SHEET NUMBER
DESIGNED BY: EML	PROJECT # 90-114		III-2



1 FLOW DIAGRAM
U1-3 NOT TO SCALE

ANDREWS ENVIRONMENTAL ENGINEERING INC.
3535 MAYFLOWER BOULEVARD
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(217)787-2334 FAX (217)787-9495

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

PROPOSED FLARE STATION

DRAWN BY: JDL	DATE: JULY 1995	SHEET NUMBER	
DESIGNED BY: EML	PROJECT # 90-114	U1-3	
APPROVED BY: EML	FILE #U1-3		

EXHIBIT 6

Typical Manufacturer's Proposal

II. LANDFILL GAS UTILITY FLARE SYSTEM:

Each 8 in. diameter x 23 ft. OAH utility "candle type" landfill gas flare system complete with Flame-Trol I automatic flare controller and associated peripheral equipment as described:

This flare is sized for the following conditions:

Flows

Maximum	1050	SCFM
Minimum	105	SCFM

LFG (landfill gas)

Methane content	40-60	%
Supply temperature	100	°F
Supply pressure	8	in. W.C.

The flare will be LFG Specialties, Model ~~CF820I6~~ CF 1020I8 stud mounted and include the following standard equipment:

FLARE STACK

*** Constructed of 6 in. x 15 ft. of standard schedule 40 pipe

*** Self supporting base plate with pre-drilled anchor bolt holes and support gussets

*** 6 in. 150# flanged LFG inlet connection

*** 2 in. NPT drain port with plug at base of stack

COMBUSTOR ASSEMBLY

*** 8 in. x 5 ft. 304 stainless steel burner tip flange connected to stack

*** Flame retainer, 304 stainless steel ribbing system in burner tip to produce optimum swirl, obtaining high efficiency mixing and holding the flame at the flare tip.

*** 22 in. x 4 ft. 304 stainless steel windshield to retain flame at the flare tip and provide retention time for efficient combustion

*** 3 each 2 in. lifting eyes, 120° apart, cut into windshield support ribs at tip of stack for ease of installation

IGNITOR ASSEMBLY

*** 2 in. diameter 304 stainless steel pilot tip with integral spark plug connection/housing

*** Spark plug ignitor, eliminates gap problems often incurred with straight rod type ignitors

*** 110/5,000V single pole transformer mounted in NEMA 4 enclosure

*** High temperature ignitor leads in ½ in. conduit

*** Pilot nozzle in ½ in. stainless steel pipe

*** Chromel-Alumel (type k) thermocouple in stainless steel thermal well to give pilot confirmation

*** Ultraviolet flame scanner to give flame confirmation and provide flare safety shutdown

PERIPHERAL EQUIPMENT - INCLUDED WITH UTILITY METHANE FLARE

*** 1 each 6 in. Varec or equal all aluminum horizontal flame arrestor with clean out cover to facilitate in place maintenance

*** 1 each 6 in. bubble-tight carbon steel wafer type butterfly valve with a GH-Bettis or equal pneumatic actuator and 3-way solenoid valve. Unit will have a spring operated "fail safe" closing in case of a power failure

*** Flare system will include 4 copies of the Operation and Maintenance Manual. The manual provides complete description of the equipment including shop drawings, installation and operation information, service contacts, components and instrumentation literatures, etc.

FLAME-TROL I
UTILITY FLARE CONTROL SYSTEM

The LFG Specialties Flame-Trol I is a technically advanced fully integrated, 100% automatic flare controller. The Flame-Trol I is specifically designed to provide the operator full flexibility to set or change any temperature and/or time setting utilized in the automatic operation of a utility "candle type" flare.

FEATURES OF THE FLAME-TROL I INCLUDE:

1) Ultraviolet Flame Scanner

   A) The ultraviolet scanner and associated controller provide flame confirmation and initiate "flare safety shutdown". Upon loss of flame, the scanner will automatically shutdown the blowers and close the automated header valve (if utilized). The flame scanner has a maximum response time of 4 seconds, providing almost immediate system shutdown.

   B) The scanner also provides a safety lockout on the start up of the blowers and opening of the header valve, until confirmation of the pilot flame.

2) Temperature controller which offers complete flexibility to set temperature points at which certain functions will be initiated. These functions are:

   A) "System shutdown", should the ultraviolet scanner fail to operate for any reason, the temperature controller will act as a back-up safety shutdown. Upon loss of temperature at the flare tip the controller will also automatically shutdown the system.

   B) "Blower on", When the pilot burner reaches the appropriate temperature, set by operator, to indicate the pilot is in fact burning, the controller starts the blower motor automatically.

   C) "Pilot off", After the blower has been started, the pilot remains burning until the temperature at the flare tip has reached the ideal burning temperatures as set by operator, and the Flame-Trol I shuts off the propane supply to the pilot.

   The system will then operate as long as there is any flame at the flare tip. The controller also features a constant L-E-D temperature read-out.

3) Pilot Timer and Pilot Failure Indicator

A) This timer begins the instant the ignition cycle begins. It is set by the operator at the maximum time required for the propane pilot to achieve the blower on temperature and the methane supply to be ignited. This time will typically be 2 to 3 minutes. At the end of this time, the propane supply valve will be closed and the pilot flame extinguished, if not already shut off by the temperature controller.

B) The pilot timer also controls the "pilot failure" function of Flame-Trol I. Upon initiation of the automatic ignition cycle this timer begins timing down. Should the pilot not achieve the "blower on" temperature (set in the pilot temperature controller) in the time set in the pilot timer, the entire system will be shut down. The "pilot failure" indicator light will then come on. The system will not attempt to automatically reignite until the pilot problem has been remedied. If it is determined that the propane supply has not been exhausted or another problem with the pilot system cannot be found, the operator may attempt automatic reignition by pushing the "reset" button.

4) Down Time Timer

A) If the methane supply to the flare tip has been exhausted or the flame is extinguished by wind or other causes, the blowers are automatically shut down and the down timer starts. This timer has a range of one second to 999 hours. The operator determines the length of time necessary to rejuvenate the methane supply and sets this timer accordingly. Once the timer has completed its cycle, the system will open the pilot valve and the ignitor will fire to automatically reignite the flare. The timer has an LCD display in effect when the system is in the "down time" function.

5) Ignitor Timer

A) The ignitor timer allows the operator to set the time the ignitor will spark during the ignition cycle. This allows for the adjustment of the spark duration to compensate for the distance of the propane supply from the flare; thus extending the life of the ignitor plug, transformer and other pilot components.

6) Manual/Auto Switch

A) The system also features a convenient manual/off/auto switch which allows the operator to completely bypass the automatic controls and operate the flare manually.

7) The Flame-Trol I is enclosed in a NEMA 4 "outdoor" weather proof enclosure, suitable for control rack/wall mounting.

A) "Indicator Lights", Mounted on the controller are indication lights for; power on, ignition on, pilot on, blowers on, flare safety shutdown.

B) Also, mounted to the controller is a 110V, 15A duplex outlet in a NEMA 5-20R receptacle box with covers.

ADDITIONAL CONTROL EQUIPMENT

*** CONTROL RACK ***

The Flame-Trol I automatic flare controller, associated motor starters, main control power supply and pilot supply controls will all be mounted on a free standing control rack. The rack will be fabricated from 6 in. x 2 in. channel A-36, sandblasted and painted with rust resistant zinc oxide primer and overcoat of heavy duty industrial enamel.

The following will be fully mounted, piped and wired on the control rack:

*** Flame-Trol I automatic flare controller in NEMA 4 enclosure

*** 1 each appropriately sized induction motor starter, 3 pole, 460 VAC magnetic, full voltage type, with normally open holding circuit, manual reset and overload relay, installed in NEMA 4 enclosure, (for landfill gas blower motor)

*** 1 each AC ammeter on gas blower motor circuit with 200% scale

*** 1 each hour meter on gas blower motor circuit

*** The main power panel for 460V, 3 phase, 60HZ power supply with solid copper neutral and ground bus connections, multi-pole circuit breaker with common trip, installed in a weatherproof enclosure

*** A 460V to 120V transformer with terminal board installed in a weatherproof enclosure

*** A 170W mercury vapor security light with photocell and on/off switch (shipped loose for field installation)

*** A 120V, 15A duplex outlet in a weatherproof NEMA 5-20R receptacle box with covers

*** Pilot gas control system including: strainer, pressure control regulator, pressure gauge with isolation valve, fail-close solenoid valve, bypass around solenoid valve with manual block valve and main manual shut off valve

TECHNICAL DATA

A. Flare Tip size -- 8 in.

B. Overall Height -- 23 ft.

C. Turndown Ratio -- 10:1

D. Destruction efficiency at design flow with gas methane content 40 to 60% -- 98% overall destruction of total hydrocarbons

Guaranteed to meet E.P.A. emission standards for landfill gas disposal in utility "candle type" flares.

Note: Flare is designed in accordance with the United States Environmental Protection Agency (EPA) established criteria for open flares, 40 CFR 60.18

E. Minimum flow rate to maintain stable flame and 98% destruction efficiency -- 105 SCFM

F. Minimum methane content required to maintain stable flame and 98% destruction efficiency -- 30%

G. Equipment drawing -- typical attached

H. P&ID -- typical attached

NOTE:

Wind loads: Designed for 100 mph wind loading (per ASCE 7-88, Exp. C)

COMMERCIAL

LFG Specialties, Inc. hereby proposes to furnish the Equipment and Services as described in this Proposal No. 49407 per the following and subject to the standard "Terms and Conditions of Sales" attached:

A. Budgetary Pricing:

I. LANDFILL GAS ENCLOSED FLARE SYSTEM:

One LFG Specialties enclosed flare Model EF630I6 with peripheral equipment including purge air blower flame arrestor and electric actuated butterfly valve

PRICE PER UNIT $ 59,900.00

One Thermal Instrument flow meter for the main header line

PRICE PER UNIT $ 4,100.00

One LFG Specialties Flame-Trol II automatic flare controller

PRICE PER UNIT $ 15,300.00

One control rack including motor starters, voltage regulator, circuit breakers, etc. as described in proposal

PRICE PER UNIT $ 6,000.00

II. LANDFILL GAS UTILITY FLARE SYSTEM:

One LFG Specialties utility flare Model CF820I6 with peripheral equipment including flame arrestor and electric actuated butterfly valve

PRICE PER UNIT $ 16,000.00

One LFG Specialties Flame-Trol I controller

PRICE PER UNIT $ 7,000.00

One control rack including motor starters voltage regulator, circuit breakers, etc., as described in proposal

PRICE PER UNIT $ 5,500.00

ALL PRICING IS FOB - LFG SPECIALTIES PLANT, NEW CONCORD, OHIO

B. Payment Terms:

Terms of payment to be 100% net due 30 days from date of invoice. Invoices will be issued on a progress basis according to the following schedule:

Milestone	Amount
Drawing Submittal	20%
50% Fabrication	50%
Shipment	30%

Prices are FOB LFG Specialties, New Concord, Ohio, with freight prepaid and added to final invoice, unless stated otherwise.

Prices are quoted firm for prompt acceptance and shipment per delivery schedule. Proposals are valid for 45 days from date of issue.
Prices do not include any taxes, duties or assessments.

C. Delivery Schedule:

LFG Specialties makes every effort to meet our Customers delivery requests and special requirements. Delivery for the flare system outlined in this Proposal No. 49407 is:

Enclosed Flare System
10-12 weeks from receipt of firm order and submittal approval

Utility Flare System
8-10 weeks from receipt of firm order and submittal approval

D. Equipment Warranty:

LFG Specialties guarantees the Equipment as outlined and specified in this Proposal No. 49407 for the period of eighteen (18) months from date of shipment or twelve (12) months from date of start-up, whichever occurs first.

Along with standard Material, Workmanship and Performance Warranties outlined in the standard "Terms and Conditions of Sales" attached, LFG Specialties guarantees the equipment to meet present E.P.A. emission standards when installed and operated in accordance with specified design conditions.

E. Start-up Assistance:

LFG Specialties will furnish an on site advisor during any aspect of the installation or start-up of our equipment deemed necessary by our Customers in accordance with our standard "Terms and Conditions of Sales". Included in the flare pricing, less travel and living expenses, is:

Enclosed Flare	--- 3 days service time
Utility Flare	--- 2 days service time

Note: Travel and living expenses to be charged customer at actual cost.

F. Field Service Rates and Availability

Additional field service time will be charged at $450.00 per day for service technicians and $660.00 per day for engineers, plus expenses. Associated travel, lodging, living, and miscellaneous expenses will be charged at actual costs.

Service personnel should be scheduled two weeks in advance for standard installation, start-up or service work. Service personnel are available on a 24 hour notice for emergency service requirements.

G. Scope of Work:

LFG Specialties will furnish all the Equipment and Services as outlined in this Proposal No. 49407. Equipment will be fully fabricated, painted and tested as described in proposal at LFG Specialties facility, New Concord, Ohio.

Any material/instrumentation that may be damaged in shipment will be removed, tagged and boxed separately for shipment and re-assembly in field.

This proposal only covers the supply of Equipment and installation advisory service as defined. The following items are not included or should be constructed to be included in LFG Specialties scope of supply.

* Construction drawings. LFG Specialties drawings will outline field installation connections (location and size), foundation bolt layouts and loading data. All equipment layout, interconnect details and foundations are the responsibilities of Customer or Customer's Representatives.

* All installation and civil work including foundations, equipment erection, main and interconnecting piping and wiring including required equipment and materials are the responsibilities of Customer or Customer's Representatives.

* All permits/licenses required for installation and/or operation of the Equipment are the responsibility of Customer or Customer's Representatives. LFG Specialties will provide necessary manufacturers data on the equipment as required for permit/license applications.

* Compliance testing - All compliance/performance testing will be the responsibility of the Customer. LFG Specialties will have representative/s present for tests at Customer's request and expense. LFG Specialties fully guarantees the Equipment to meet E.P.A. emission standards when operated within the specified conditions.

ATTACHMENT 15

Leachate and Gas Collection System Chemical Compatibility Documentation

PB89-109670

Lining of Waste Containment and
Other Impoundment Facilities

Matrecon, Inc., Alameda, CA

Prepared for

Environmental Protection Agency, Cincinnati, OH

Sep 88

U.S. Department of Commerce
National Technical Information Service
NTIS

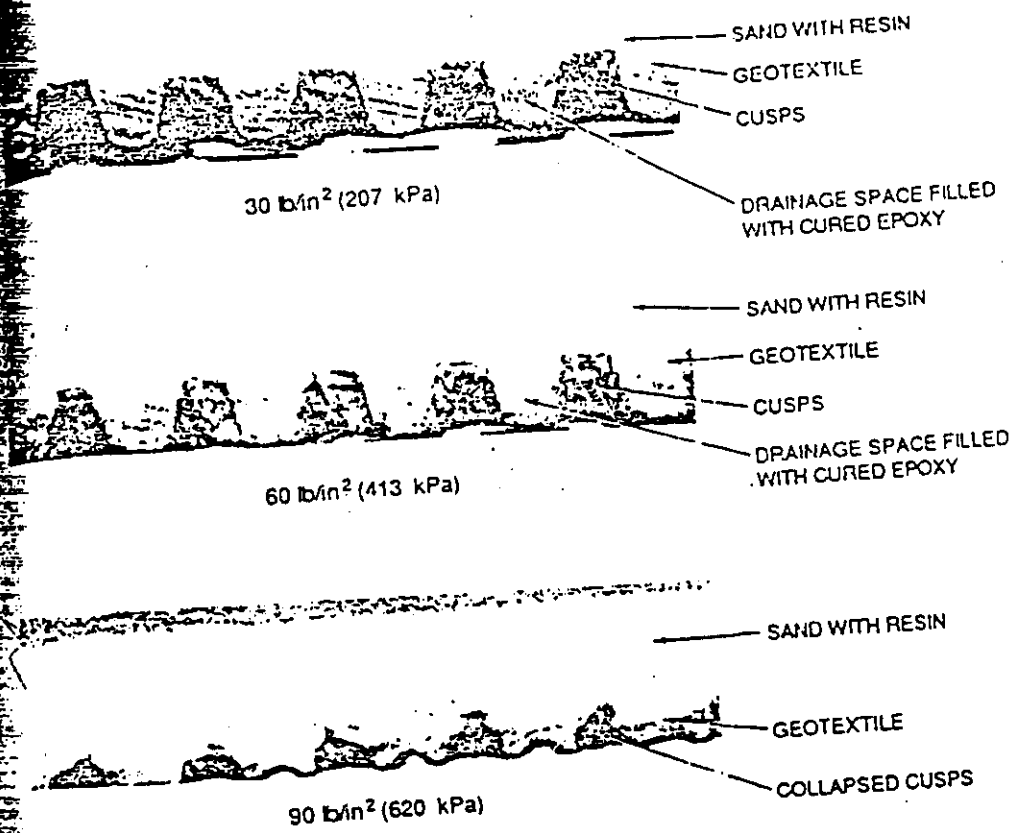

Figure 4-64. Sequence of photographs showing the intrusion of a filter geotextile into drainage core flow space of a drainage composite with extruded cuspations when under various loads for short periods of time. Photographs were taken of the cross sections of a series of test assemblies after the setting of an epoxy resin which had been introduced in assembly after it had been under the indicated load for a few minutes. Note that the cusps had collapsed under 90 psi load with almost complete loss of drainage space.

Thermoplastic pipe materials, such as PVC and HDPE, are preferred over nonplastic pipe materials for leachate collection and drainage above a liner because of the wide range of chemical resistance of the thermoplastics, particularly to inorganic chemicals. Typically, for use beneath the liner, design engineers have specified a wider range of materials (E. C. Jordan Co., 1984). Polymeric pipe materials that may be appropriate for use in below liner leachate collection systems and their properties are presented in Table 4-36. The structural properties of pipes range considerably. Flexible and semiflexible pipes derive structural stability from bedding materials, while rigid pipes require less structural support.

CHEMICAL RESISTANCE OF DRISCOPIPE

S—SATISFACTORY
U—UNSATISFACTORY
M—MARGINAL
N—NOT KNOWN

ALL CONCENTRATIONS ARE 100% UNLESS NOTED OTHERWISE.

ON REAGENTS MARKED MARGINAL, CHEMICAL ATTACK WILL BE RECOGNIZED BY A LOSS OF PHYSICAL PROPERTIES OF THE PIPE WHICH MAY REQUIRE A CHANGE IN DESIGN FACTORS.

REAGENT	70°F (21°C)	140°F (60°C)
Acetic Acid 1-10%	S	S
Acetic Acid 10-60%	S	M
Acetic Acid 60-100%	S	M
Acetone	M	U
Acrylic Emulsions	S	S
Aluminum Chloride-Dilute	S	S
Aluminum Chloride Conc.	S	S
Aluminum Fluoride Conc.	S	S
Aluminum Sulfate Conc.	S	S
Alums (All Types) Conc.	S	S
Ammonia 100% Dry Gas	S	S
Ammonium Carbonate	S	S
Ammonium Chloride Sat'd	S	S
Ammonium Fluoride 20%	S	S
Ammonium Hydroxide 0.888 S.G.	S	S
Ammonium Metaphosphate Sat'd	S	S
Ammonium Nitrate Sat'd	S	S
Ammonium Persulfate Sat'd	S	S
Ammonium Sulfate Sat'd	S	S
Ammonium Sulfide Sat'd	S	S
Ammonium Thiocyanate Sat'd	S	S
Amyl Acetate	M	U
Amyl Alcohol 100%	S	S
Amyl Chloride 100%	N	U
Aniline 100%	S	N
Antimony Chloride	S	S
Aqua Regia	U	U
Barium Carbonate Sat'd	S	S
Barium Chloride	S	S
Barium Hydroxide	S	S
Barium Sulfate Sat'd	S	S
Barium Sulfide Sat'd	S	S
Beer	S	S
Benzene	M	U
Benzene Sulfonic Acid	S	S
Bismuth Carbonate Sat'd	S	S
Bleach Lye 10%	S	S
Black Liquor	S	S
Borax Cold Sat'd	S	S
Boric Acid Dilute	S	S
Boric Acid Conc.	S	S

REAGENT	70°F (21°C)	140°F (60°C)
Bromic Acid 10%	S	S
Bromine Liquid 100%	M	U
Butanediol 10%	S	S
Butanediol 60%	S	S
Butanediol 100%	S	S
Butyl Alcohol 100%	S	S
Calcium Bisulfide	S	S
Calcium Carbonate Sat'd	S	S
Calcium Chlorate Sat'd	S	S
Calcium Chloride Sat'd	S	S
Calcium Hydroxide	S	S
Calcium Hypochlorite Bl'ch Sol.	S	S
Calcium Nitrate 50%	S	S
Calcium Sulfate	S	S
Camphor Oil	N	U
Carbon Dioxide 100% Dry	S	S
Carbon Dioxide 100% Wet	S	S
Carbon Dioxide Cold Sat'd	S	S
Carbon Disulphide	N	U
Carbon Monoxide	S	S
Carbon Tetrachloride	M	U
Carbonic Acid	S	S
Castor Oil Conc.	S	S
Chlorine Dry Gas 100%	S	M
Chlorine Moist Gas	M	U
Chlorine Liquid	M	U
Chlorobenzene	M	U
Chloroform	M	U
Chlorosulfonic Acid 100%	M	U
Chrome Alum Sat'd	S	S
Chromic Acid 20%	S	S
Chromic Acid Up to 50%	S	S
Chromic Acid and Sulfuric Acid	S	M
Cider	S	S
Citric Acid Sat'd	S	S
Coconut Oil Alcohols	S	S
Cola Concentrates	S	S
Copper Chloride Sat'd	S	S
Copper Cyanide Sat'd	S	S
Copper Fluoride 2%	S	S
Copper Nitrate Sat'd	S	S
Copper Sulfate Dilute	S	S
Copper Sulfate Sat'd	S	S
Cottonseed Oil	S	S
Cuprous Chloride Sat'd	S	S
Cyclohexanol	S	S
Cyclohexanone	M	U
Detergents Synthetic	S	S
Developers, Photographic	S	S
Dextrin Sat'd	S	S
Dextrose Sat'd	S	S
Dibutylphthalate	S	M
Disodium Phosphate	S	S
Diazo Salts	S	S
Diethylene Glycol	S	S

REAGENT	70°F (21°C)	140°F (60°C)
Diglycolic Acid	S	S
Dimethylamine	M	U
Emulsions, Photographic	S	S
Ethyl Acetate 100%	M	U
Ethyl Alcohol 100%	S	S
Ethyl Alcohol 35%	S	S
Ethyl Butyrate	M	U
Ethyl Chloride	M	U
Ethyl Ether	U	U
Ethylene Chloride	U	U
Ethylene Chlorohydrin	U	U
Ethylene Dichloride	M	U
Ethylene Glycol	S	S
Ferric Chloride Sat'd	S	S
Ferric Nitrate Sat'd	S	S
Ferrous Chloride Sat'd	S	S
Ferrous Sulphate	S	[illegible]
Fish Solubles	S	[illegible]
Fluoboric Acid	S	S
Fluorine	S	U
Fluosilicic Acid 32%	S	S
Fluosilicic Acid Conc.	S	S
Formaldehyde 40%	S	N
Formic Acid 0-20%	S	S
Formic Acid 20-50%	S	S
Formic Acid 100%	S	S
Fructose Sat'd	S	S
Fruit Pulp	S	S
Fuel Oil	S	U
Furfural 100%	M	U
Furfuryl Alcohol	M	U
Gallic Acid Sat'd	S	S
Gasoline	M	U
Gin	S	U
Glucose	S	[illegible]
Glycerine	S	[illegible]
Glycol	S	S
Glycolic Acid 30%	S	S
Grape Sugar Sat'd Aq.	S	S
Hexanol, Tert.	S	S
Hydrobromic Acid 50%	S	S
Hydrocyanic Acid Sat'd	S	S
Hydrochloric Acid 10%	S	S
Hydrochloric Acid 30%	S	S
Hydrochloric Acid 35%	S	S
Hydrochloric Acid Conc.	S	S
Hydrofluoric Acid 40%	S	S
Hydrofluoric Acid 60%	S	S
Hydrofluoric Acid 75%	S	S
Hydrogen 100%	S	S
Hydrogen Bromide 10%	S	S
Hydrogen Chloride Gas Dry	S	S
Hydrogen Peroxide 30%	S	S
Hydrogen Peroxide 90%	S	M
Hydrogen Phosphide 100%	S	S

REAGENT	70°F (21°C)	140°F (60°C)
Hydroquinone	S	S
Hydrogen Sulfide	S	S
Hypochlorus Acid Conc.	S	S
Inks	S	S
Iodine (Alc. Sol.) Conc.	S	U
Lactic Acid 10%	S	S
Lactic Acid 90%	S	S
Latex	S	S
Lead Acetate Sat'd	S	S
Lube Oil	S	M
Magnesium Carbonate Sat'd	S	S
Magnesium Chloride Sat'd	S	S
Magnesium Hydroxide Sat'd	S	S
Magnesium Nitrate Sat'd	S	S
Magnesium Sulphate Sat'd	S	S
Mercuric Chloride Sat'd	S	S
Mercuric Cyanide Sat'd	S	S
Mercurous Nitrate Sat'd	S	S
Mercury	S	S
Methyl Alcohol 100%	S	S
Methyl Bromide	M	U
Methyl Chloride	M	U
Methyl Ethyl Ketone 100%	M	U
Methylsulfuric Acid	S	S
Methylene Chloride 100%	M	U
Milk	S	S
Mineral Oils	S	U
Molasses Comm.	S	S
Nickel Chloride Sat'd	S	S
Nickel Nitrate Conc.	S	S
Nickel Sulfate Sat'd	S	S
Nicotine Dilute	S	S
Nicotinic Acid	S	S
Nitric Acid 0-30%	S	S
Nitric Acid 30-50%	S	M
Nitric Acid 70%	S	M
Nitric Acid 95-98%	U	U
Nitrobenzene 100%	U	U
Octyl Cresol	S	U
Oils and Fats	S	U
Oleic Acid Conc.	S	U
Oleum Conc.	U	U
Orange Extract	S	S
Oxalic Acid Dilute	S	S
Oxalic Acid Sat'd	S	S
Ozone 100%	S	U
Perchloric Acid 10%	S	S
Petroleum Ether	U	U
Phenol 90%	U	U
Phosphoric Acid Up to 30%	S	S
Phosphoric Acid Over 30%	S	S
Phosphoric Acid 90%	S	S
Phosphorous (Yellow) 100%	S	N
Phosphorus Pentoxide 100%	S	N
Photographic Solutions	S	S

REAGENT	70°F (21°C)	140°F (60°C)
Pickling Baths		
Sulfuric Acid	S	S
Hydrochloric Acid	S	S
Sulfuric-Nitric	S	U
Plating Solutions		
Brass	S	S
Cadmium	S	S
Chromium	N	N
Copper	S	S
Gold	S	S
Indium	S	S
Lead	S	S
Nickel	S	S
Rhodium	S	S
Silver	S	S
Tin	S	S
Zinc	S	S
Potassium Bicarbonate Sat'd	S	S
Potassium Borate 1%	S	S
Potassium Bromate 10%	S	S
Potassium Bromide Sat'd	S	S
Potassium Carbonate	S	S
Potassium Chlorate Sat'd	S	S
Potassium Chloride Sat'd	S	S
Potassium Chromate 40%	S	S
Potassium Cyanide Sat'd	S	S
Potassium Dichromate 40%	S	S
Potassium Ferri/ Ferro Cyanide Sat'd	S	S
Potassium Fluoride	S	S
Potassium Hydroxide 20%	S	S
Potassium Hydroxide Conc.	S	S
Potassium Nitrate Sat'd	S	S
Potassium Perborate Sat'd	S	S
Potassium Perchlorate 10%	S	S
Potassium Sulfate Conc.	S	S
Potassium Sulfide Conc.	S	S
Potassium Sulfite Conc.	S	S
Potassium Persulphate Sat'd	S	S
Propargyl Alcohol	S	S
Propyl Alcohol	S	S
Propylene Dichloride 100%	U	U
Propylene Glycol	S	S
Rayon Coagulating Bath	S	S
Sea Water	S	S
Selenic Acid	S	S
Shortening	S	S
Silicic Acid	S	S
Silver Nitrate Sol.	S	S
Soap Solution Any Conc'n	S	S
Sodium Acetate Sat'd	S	S
Sodium Benzoate 35%	S	S
Sodium Bicarbonate Sat'd	S	S
Sodium Bisulfate Sat'd	S	S
Sodium Bisulfite Sat'd	S	S

REAGENT	70°F (21°C)	140°F (60°C)
Sodium Borate	S	S
Sodium Bromide Dilute Sol.	S	S
Sodium Carbonate Con.	S	S
Sodium Carbonate	S	S
Sodium Chlorate Sat'd	S	S
Sodium Chloride Sat'd	S	S
Sodium Cyanide	S	S
Sodium Dichromate Sat'd	S	S
Sodium Ferricyanide	S	S
Sodium Ferrocyanide Sat'd	S	S
Sodium Fluoride Sat'd	S	S
Sodium Hydroxide Conc.	S	S
Sodium Hypochlorite	S	S
Sodium Nitrate	S	S
Sodium Sulfate	S	S
Sodium Sulfide 25%	S	S
Sodium Sulfide Sat'd Sol.	S	S
Sodium Sulfite Sat'd	S	S
Stannous Chloride Sat'd Sol.	S	S
Stannic Chloride Sat'd	S	S
Starch Solution Sat'd	S	S
Stearic Acid 100%	S	S
Sulfuric Acid 0-50%	S	S
Sulfuric Acid 70%	S	M
Sulfuric Acid 80%	S	U
Sulfuric Acid 96%	M	U
Sulfuric Acid 98%	M	U
Sulfuric Acid, Fuming	U	U
Sulfurous Acid	S	S
Tallow	S	M
Tannic Acid 10%	S	S
Tanning Extracts Comm.	S	S
Tartaric Acid Sat'd	N	N
Tetrahydrofurane	N	U
Titanium Tetrachloride Sat'd	N	U
Toluene	M	U
Transformer Oil	S	M
Trisodium Phosphate Sat'd	S	S
Trichloroethylene	U	U
Urea Up to 30%	S	S
Urine	S	S
Vinegar Comm.	S	S
Vanilla Extract	S	S
Wetting Agents	S	S
Whiskey	S	N
Wines	S	S
Xylene	M	U
Yeast	S	S
Zinc Chloride Sat'd	S	S
Zinc Sulfate Sat'd	S	S

Chemicals & Plastics, Inc.

Raritan Plaza II
Raritan Center
Edison, New Jersey 08838 (201) 225-4840

Plants & Sales Offices

P.O. Box 156
Collax, N.C. 27235
(919) 996-2711
(800) 334-3516 - National
(800) 672-4203 - N.C.

861 N. Lisbon St.
Carrollton, Ohio 44615
(216) 627-2151
(800) 643-5438 - National
(800) 643-5446 - Ohio

2615 N.E. Fifth Ave.
Pompano Beach, Florida 33064
(305) 943-6530
(800) 327-1184 - National
(800) 432-1392 - Fla.

Chemical Resistance Chart

TYPE I and TYPE II
POLYVINYL CHLORIDE

Chemicals & Plastics, Inc.

Raritan Plaza II
Raritan Center
Edison, New Jersey 08837 (201) 225-4640

Plants & Sales Offices
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(800) 672-4203 – N. C.

861 N. Lisbon St.
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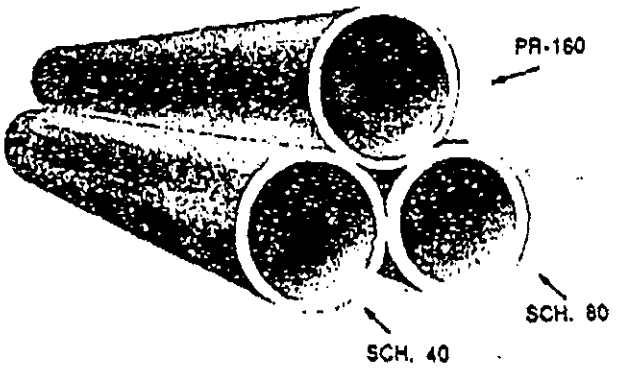
(800) 643-5448 – Ohio

2615 N. E. Fifth Ave.
Pompano Beach, Florida 33064
(305) 943-6530
(800) 327-1184 – National
(800) 432-1392 – Fla.

PVC Pipe

Plumbing Pipe & Fittings



EXAMPLES OF RELATIVE WALL THICKNESSES
SDR-13.5 PR-315
SDR-21 PR-200
SDR 26 PR-160
SCH. 40

ALL TYPE SCHEDULES ARE NSF APPROVED AND MEET EXISTING ASTM STANDARDS AS SHOWN.

Type I pressure-rated pipe is offered in four classes with standard pressure ratings at 75° F as indicated. Type I PVC is often referred to as "normal impact" – actually LCP Type I Grade I PVC has the highest chemical resistance and tensile strength.

ALL PIPES ARE MARKED WITH SIZE, TYPE AND SCHEDULE. 20 FT. LENGTHS ARE STANDARD – OTHER LENGTHS ON SPECIAL ORDER ONLY.

Schedule 40 and 80 are also offered in Type I material. They have standard Schedule 40 and 80 wall thicknesses which give variable pressure ratings as shown. Schedule 40 is considered medium weight. Schedule 80 is a heavy wall industrial pipe suitable for threading.

Type 1 PVC Pipe

TYPICAL VALUES

MECHANICAL PROPERTIES	A.S.T.M. TEST	TYPE 1 GRADE 1 PVC
Specific Gravity	D 792	1.418
Tensile Strength (PSI) @ 78°F	D 638	7600
Tensile Modulus (PSI)	D 638	460,000
Izod Impact Lbs. in. notched	D 256	0.75
Flexural Strength (PSI)	D 790	13270
Compressive Strength (PSI)	D 695	9380
Hardness (Durometer D)	D 676	83
THERMAL PROPERTIES		
Coefficient of Thermal Expansion in./in./C°	D 696	5.9×10^{-5}
Coefficient of Thermal Expansion in./in./F° (properties @ 73.4)	D 696	3.3×10^{-5}
Heat Distortion °F @ 264 PSI	D 648	171°
Thermal Conductivity BTU/ft. 2/hr./F°/in.		1.0
ELECTRICAL PROPERTIES		
Dielectric Strength volts/mil	D 149	1400
Dielectric Constant 60 CPS @ 30°C	D 150	3.70
Power Factor 60 CPS @ 30°C	D 150	1.255
OTHER PROPERTIES		
Flammability	Non Burning—S.E.	

All sales of goods offered in this catalog are subject to seller's conditions of sale, a copy of which will be furnished upon request.

Chemicals & Plastics, Inc.

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Edison, New Jersey 08838 (201) 226-4840

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SCHEDULE 80 PIPE						PE			THREADED	
Nom. Size	O. D.	Min. Wall	Avg. Wgt.	Std. Bdl.	Max. Press. @ 73° F	Part No.	Price 100'	Pallet Qty.	Part No.	Price 100'
½	.840	.147	20.2	500'	850 PSI	28502	27.27	8920	28802	31.77
¾	1.050	.154	27.4	400'	690 PSI	28503	36.99	5540	28803	43.00
1	1.315	.179	40.2	300'	630 PSI	28504	54.27	4420	28804	60.27
1¼	1.660	.191	55.4	200'	520 PSI	28505	74.79	5620	28805	86.98
1½	1.900	.200	67.1	100'	470 PSI	28506	77.84	4500	28806	93.94
2	2.375	.218	92.7	100'	400 PSI	28508	107.53	2800	28808	130.00
2½	2.875	.276	140.7	60'	420 PSI	28510	168.84	2040	28810	205.00
3	3.500	.300	188.2	60'	370 PSI	28512	218.31	1260	28812	271.00
4	4.500	.337	274.5	40'	320 PSI	28516	318.42	760	28816	419.00
6	6.625	.432	521.9	20'	280 PSI	28524	605.40	780	N/A	
8	8.625	.500	792.4	20'	250 PSI	28532	990.50	360	N/A	
10	10.750	.593	1172.7	20'	230 PSI	28540	1641.78	220	N/A	
12	12.750	.687	1610.5	20'	230 PSI	28548	2254.70	220	N/A	

Standard 20' Lengths

* FAB Couplings for 8", 10" & 12". See FAB Fittings Price Sheet.

* Sch. 80 fittings see next page this section.

* For additional information contact your local LCP representative.

All sales of goods offered in this catalog are made subject to seller's conditions of sale, a copy of which will be furnished upon request.

P.V.C. TYPE I - GRADE 2

30 Day Immersions At-

CHEMICAL REAGENT	Room Temperature		60°C		
	Tensile Strength (psi)	Weight Change (%)	Original Tensile (psi)	Tensile Strength (psi)	Weight Change (%)
Sulfuric Acid - (95%)	5400	+ 8.46	7700	4800	+25.76
(96.5%)	4400	+21.29		4700	+38.37
Transformer Oil (Bank 62)	7600	- 0.02		8500	- 0.06
Transformer Oil (Bank 110)	7600	- 0.01		8300	- 0.05
Trimethylamine	7300	- 0.02	7400	7900	+ 3.40
Water (Distilled)	7695	+ 0.27	7458	9048	+ 0.79

P.V.C. TYPE I - GRADE 2

CHEMICAL REAGENT	30 Days @ Room Temperature			30 Days @ 60°C	
	Tensile Strength (psi)	Weight Change (%)	Original Tensile (psi)	Tensile Strength (psi)	Weight Change (%)
30% Nitric Acid	7700	+0.25	7000	8300	+ 0.49
60% Nitric Acid	7500	+0.18	7000	7700	+ 2.31
Conc. Nitric Acid	7500	+0.41	7000	7900	+ 2.83
20% Acetic Acid	7900	+0.22	7000	8500	+ 0.71
80% Acetic Acid	7700	+0.08	7000	7600	+ 1.62
Glacial Acetic Acid	7400	+1.14	7000	2900	+12.83
30% Hydrochloric Acid	7600	+0.17	7000	7900	+ 0.97
Conc. Hydrochloric Acid	7600	+0.33	7000	7000	+ 1.55
80% Sulphuric Acid	7500	+0.03	7000	8600	+ 0.05
85% Sulphuric Acid	7800	+0.08	7000	8800	- 0.02
90% Sulphuric Acid	7700	-0.02	7000	8300	+ 1.25
95% Sulphuric Acid	7700	-0.03	7000	6600	+ 7.62

TABLE II

CHEMICAL RESISTANCE OF ASTM TYPE I AND TYPE II P.V.C. RIGID VINYL

REAGENT	TEMPERATURE 72°F	TEMPERATURE 140°F
-A-		
Acetaldehyde	NR	NR
Acetic ACid, pure	NR	NR
Acetic Acid, 10%	R	R
Acetic Acid, 20%, Type I	R	R
Type II	R	NR
Acetic Acid, 80%, Type I Grade I	R	R
Type I Grade 2	R	NR
Type II	R	NR
Acetic ACid, Glacial, Type I	R	NR
Type II	NR	NR
Acetic Anhydride	NR	NR
Acetone	NR	NR
Acetyl Nitrile	NR	NR
Acetylene	R	R
Acrylic Acid Ethyl Ester	NR	NR
Adipic Acid	R	R
Alcohols Methyl	R	
Butyl	R	
Propyl	R	
Allyl Alcohol, 96%, Type I	R	NR
Type II	NR	NR
Allyl Chloride	NR	NR
Alum	R	R
Alum, Crome	R	
Alum, Potassium	R	
Aluminum Alum	R	R
Aluminum Chloride	R	R
Aluminum Fluoride	R	R
Aluminum Hydroxide	R	R
Aluminum Oxylchloride	R	R
Aluminum Nitrate	R	R
Aluminum Sulfate	R	R
Ammonia (Gas-dry)	R	R
Ammonia (Liquid)	NR	NR
Ammonium Acetate	R	R
Ammonium Alum	R	R
Ammonium Bifluoride	R	R
Ammonium Bisulfate, Type I	R	R
Ammonium Carbonate	R	R
Ammonium Chloride	R	R
Ammonium Dichromate	R	
Ammonium Fluoride, 25%, Type I	R	NR
Type II	NR	NR
Ammonium Hydroxide	R	R
Ammonium Hydroxide, 10%	R	R
Ammonium Hydroxide, 28%	R	R
Ammonium Metaphosphate	R	R
Ammonium Nitrate	R	R
Ammonium Persulfate	R	R
Ammonium Phosphate	R	R
Ammonium Sulfate	R	R
Ammonium Sulfide	R	R
Ammonium Thiocyanate	R	R
Amyl Acetate	NR	NR
Amyl Alcohol, Type, I	R	NR
Type, II	NR	NR
Amyl Chloride	NR	NR
Aniline	NR	NR
Aniline Chlorohydrate	NR	NR
Aniline Hydrochloride	NR	NR
Anthraquinone, Type II	R	NR
Anthraquinonesulfonic Acid	R	R
Antimony Trichloride	R	R
Aqua Regia, Type I	R	R
Type II	NR	NR
Aromatic Hydrocarbons	NR	NR
Arsenic Acid, 80%	R	R
Arsenic Trioxide (Powder)	R	
Arylsulfonic Acid, Type I	R	R
Type II	R	NR
- B -		
Barium Nitrate	R	
Barium Carbonate	R	R
Barium Chloride	R	R
Barium Hydroxide (10%)	R	R
Barium Sulfate	R	R
Barium Sulfide	R	R
Beer	R	R
Beet Sugar Liquors	R	R
Benzaldehyse, 10%, Type I	R	R
Type II	NR	NR
Benzaldehyse, above 10%	NR	NR
Benzalkonium Chloride	R	
Benzene	NR	NR
Benzoic Acid	R	R
Bismuth Carbonate	R	R
Black Liquor	R	R
Bleach (12% CL)	R	R
Borax	R	R
Boric Acid	R	R
Breeder Pellets (fish deriv.)	R	R
Brine (Acid)	R	
Bromic Acid	R	R
Bromine, Liquid	NR	NR
Bromine, Vapor (25%)	R	R
Bromine, Water, Type I	R	R
Type II	NR	NR
Bromobenzene	NR	

TABLE II

CHEMICAL RESISTANCE OF ASTM TYPE I AND TYPE II P.V.C. RIGID VINYL

REAGENT	TEMPERATURE 72°F	140°F
Bromotoluene	NR	
Butadiene, Type I	R	R
Type II	NR	NR
Butane, Type I	R	
Type II	NR	NR
Butanol, Primary, Type I	R	R
Type II	NR	NR
Butanol, Secondary, Type I	R	NR
Type II	NR	NR
Butyl Acetate, Type I	R	NR
Type II	NR	NR
Butyl Alcohol, Type I	R	R
Type II	R	NR
Butyl Cellosolve	R	
Butyl Mercaptan, Type II	NR	NR
Butyl Phenol	R	NR
Butyl Stearate	R	
Butyne Diol, Type I	R	NR
Type II	NR	NR
Butyric Acid, Type I	R	NR
Type II	NR	NR
- C -		
Cadmium Cyanide	R	R
Caffeine Citrate (Sat.)	R	
Calcium Bisulfide	R	R
Calcium Bisulfite	R	R
Calcium Bisulfite Bleach Liquor	R	
Calcium Carbonate	R	R
Calcium Chlorate	R	R
Calcium Chloride	R	R
Calcium Hydroxide	R	R
Copper Hypochlorite	R	R
Calcium Nitrate	R	R
Calcium Oxide, Type I	R	R
Calcium Sulphate	R	R
Camphor (Crystals)	R	
Cane Sugar Liquors	R	R
Carbitol	R	
Carbon Bisulfide	NR	NR
Carbon Dioxide	R	R
Carbon Dioxide-Aqueous Solution	R	R
Carbon Disulfide	R	
Carbon Monoxide	R	R
Carbon Tetrachloride, Type I	R	NR
Type II	NR	NR
Carbonic ACid	R	R
Castor Oil	R	R
Caustic Potash	R	R
Caustic Soda	R	R
Cellosolve	R	NR
Cellosolve Acetate	R	

REAGENT	TEMPERATURE 72°F	140°F
Chloracetic Acid, Type I	R	R
Type II	R	NR
Chloral Hydrate	R	R
Chloramine	R	
Chloric Acid, 20%	R	R
Chloride (Water)	R	R
Chlorinated Solvents	NR	
Chlorine (Dry-Liquid)	NR	NR
Chlorine (Liquid)--(Under	NR	
Chlorine Gas (Dry) Pressure)	NR	NR
Chlorine Gas (Wet)	NR	NR
Chlorine Water	R	R
Chloroacetic Acid	R	NR
Chloroacetyl Chloride	R	
Chlorobenzene	NR	NR
Chloroform	NR	NR
Chloropicrin	NR	
Chlorosulfonic Acid	R	NR
Chlorox Bleach Solution	R	
Chrome Alum	R	R
Chromic Acid, 10%	R	R
Chromic Acid, 50%	NR	NR
Chromic/Nitric Acid, Type I	R	R
15% - 35% Type II	NR	NR
Chromic/Sulfuric/Water, 50/15/35 Type I	R	NR
Citric Acid	R	R
Coconut Oil Alcohol, Type I	R	R
Copper Carbonate	R	R
Copper Chloride	R	R
Copper Cyanide	R	R
Copper Fluoride	R	R
Copper Nitrate	R	R
Copper Sulfate	R	R
Corn Syrup	R	R
Cottonseed Oil	R	R
Cresol, Type I	R	NR
Type II	NR	NR
Cresylic Acid, 50%, Type I	R	R
Type II	R	NR
Crotonaldehyde	NR	NR
Crude Oil, Type I	R	R
Type II	R	NR
Cupric Fluoride	R	R
Cupric Sulfate	R	R
Cuprous Chloride	R	R
Cyclanones, Type I	R	R
Cyclohexanol	NR	NR
Cyclohenxanone	NR	NR

TABLE II

CHEMICAL RESISTANCE OF ASTM TYPE I AND TYPE II P.V.C. RIGID VINYL

REAGENT	TEMPERATURE 72°F	140°F
-D-		
D. D. T. (Xylene Base)	NR	
Desocyephedrine Hydrochloride	R	
Detergents	R	R
Dextrin	R	R
Dextrose	R	R
Diacetone Alcohol	R	
Diazo Salts	R	R
Dibutoxy Ethyl Phthalate	NR	
Dibutyl Phthalate	NR	
Dibutyl Sebacate	R	
Dichlorbenzene	NR	
Diesel Fuels	R	
Diethyl Ether	R	
1.4 - Dioxane	NR	
Di Methyl Hydrazine	NR	NR
Diglycolic Acid	R	R
Dimethylamine, Type I	R	R
Type II	NR	NR
Dioctylphthalate	NR	NR
Disodium Phosphate	R	R
Distilled Water	R	R
-E-		
Epsom Salt	R	
Esters	NR	NR
Ethers	NR	NR
Ethyl Acetate	NR	NR
Ethyl Acrylate	NR	NR
Ethyl Alcohol, Type I	R	R
Type II	R	NR
Ethyl Chloride	NR	NR
Ethyl Chloroacetate	NR	
Ethyl Ether	NR	NR
Ethylene Bromide	NR	NR
Ethylene Chlorohydrin	NR	NR
Ethylene Dichloride	NR	NR
Ethylene Glycol	R	R
Ethylene Oxide	NR	NR
-F-		
Fatty Acids	R	R
Ferric Acetate	R	NR
Ferric Chloride	R	R
Ferric Hydroxide	R	R
Ferric Nitrate	R	R
Ferric Sulfate	R	R
Ferrous Chloride	R	R
Ferrous Hydroxide	R	
Ferrous Nitrate	R	
Ferrous Sulfate	R	R
Fish Solubles	R	R
Flourboric Acid	R	R
Fluorine Gas (Wet)	R	R
Fluorine Gas, Type I	R	NR
Type II	NR	NR
Fluorosilicic Acid, 25%	R	R
Formaldehyde, Type I	R	R
Type II	NR	NR
Formic Acid	R	NR
Fructose	R	R
Fruit Juices and Pulp	R	R
Furfural	NR	NR
Freon II, Type I	R	R
Type II	NR	NR
Freon 12	R	R
Freon 21	NR	NR
Freon 22	NR	NR
Freon 113	R	
Freon 114	R	
Carene 500, Type I	R	
Type II	NR	
-G-		
Gallic Acid	R	R
Gas (Coke Oven)	NR	NR
Gasoline, Type I	R	R
Type II	R	NR
Gasoline, High Octane, Type I	R	
Gasoline, Jet Fuel, JP-4	R	R
JP-5	R	R
Glucose	R	R
Glycerine	R	R
Glycol	R	R
Glycolic Acid	R	R
Grapesugar	R	R
Green Liquor	R	R
Gulfpride #10 Oil	R	R

TABLE II

CHEMICAL RESISTANCE OF ASTM TYPE I AND TYPE II P.V.C. RIGID VINYL

REAGENT	TEMPERATURE 72°F	TEMPERATURE 140°F
-H-		
Heptane, Type I	R	R
Type II	R	NR
Hercolyn	R	
Hexane, Type I	R	
Type II	NR	NR
Hexanol, Tertiary, Type I	R	R
Type II	R	NR
Hydrobromic Acid, 20%	R	R
Hydrochloric Acid, 10%	R	R
Hydrochloric Acid, 30%	R	R
Hydrochloric Acid, Type I Grade I	R	R
Conc. Type I Grade 2	R	NR
Type II	R	NR
Hydrochloric Acid Pickling	R	R
Hydrocyanic Acid	R	R
Hydrofluoric Acid, 48%	R	NR
Hydrofluoric ACid, 50% Type I	R	NR
Type II	NR	NR
Hydrofluoric Acid, 70%	NR	NR
Hydrofluorsilicic Acid	R	R
Hydrogen	R	R
Hydrogen Peroxide, 30%	R	R
Hydrogen Peroxide, 50%	R	R
Hydrogen Peroxide, 90%	R	R
Hydrogen Phosphide, Type I	R	R
Type 11	NR	NR
Hydrogen Sulfide	R	R
Hydroquinone	R	R
Hydroxylamine Sulfate	R	R
Hypochlorene Acid	R	R
Hypochlorite	R	
Hypochlorous Acid	R	R
Hydrazine (Anhydrous) 97%	NR	NR
-I-		
Iodine	NR	NR
Iodine Solution (10%)	R	
- K -		
Kerosene	R	R
Ketones	NR	NR
Kraft Liquors	R	R
-L-		
Lactic Acid, 25%	R	R
Lactic Acid, 80%	R	
Lard Oil	R	R
Lauric Acid	R	R
Lauryl Chloride, Type I	R	
Type II	R	NR
Lead Acetate	R	R
Lead Chloride	R	R
Lead Nitrate	R	R
Lead Sulfate	R	R
Linoleic Acid	R	R
Linoleic Oil, Type I	R	R
Type II	R	NR
Linseed Oil	R	R
Liquors, Type I	R	R
Type II	NR	NR
Lithium Bromide	R	R
Lubricating Oil, ASTM #1	R	R
ASTM #2	R	R
Lubricating Oil, ASTM #3 Type I	R	R
Type II	R	NR
Lux Liquid	R	NR
- M -		
Machine Oil	R	R
Magnesium Carbonate	R	R
Magnesium Chloride	R	R
Magnesium Citrate, Type I	R	
Magnesium Hydroxide	R	R
Magnesium Nitrate	R	R
Magnesium Sulfate	R	R
Manganese Chloride	R	R
Manganese Sulphate (Sat.)	R	
Manganese Sulphate (10%)	R	
Manganese Sulpfate (20%)	R	
Maleic Acid	R	R
Malic Acid	R	R
Manufactured Gas	R	R
Mercural Ointment, Blue (5%)	R	
Mercuric Chloride	R	R
Mercuric Cyanide	R	R
Mercurous Nitrate	R	R
Mercury	R	R
Mercury Ointment (Ammoniated)	R	
Methelene Clorobromide	NR	

TABLE II

CHEMICAL RESISTANCE OF ASTM TYPE I AND TYPE II P.V.C. RIGID VINYL

REAGENT	TEMPERATURE 72°F	140°F
Methoxyethyl Oleate	R	
Methyl Alcohol	R	R
Methyl Cellosolve	R	
Methyl Chloride	NR	NR
Methyl Ethyl Ketone	NR	NR
Methyl Iso-butyl Ketone	NR	NR
Methyl Methacrylate	R	
Methyl Salicylate	R	
Methyl Sulfate	R	NR
Methyl Sulfuric Acid	R	R
Methylamine	NR	NR
Methylene Bromide	R	
Methylene Chloride	NR	NR
Methylene Iodine	R	
Milk	R	R
Mineral Oils	R	R
Mixed Acids	R	R
Molasses	R	R
Muriatic Acid	R	R
-N-		
Naptha, Type I	R	R
Type II	R	NR
Napthalene	NR	NR
Natural Gas	R	R
Nickel Acetate	R	
Nickel Chloride	R	R
Nickel Nitrate	R	R
Nickel Sulphate	R	R
Nicotine	R	R
Nicotine Acid	R	R
Nitric Acid 84% + Sulphuric Acid 16%	R	
Nitric Acid, Anhydrous	NR	NR
Nitric Acid, 10% Type I	R	R
Type II	R	NR
Nitric Acid, 30% Type I	R	R
Type II	R	NR
Nitric Acid, 60% Type I	R	R
Type II	R	NR
Nitric Acid, 68% Type I	R	R
Type II	NR	NR
Nitrobenzene	NR	NR
Nitroglycerine	NR	NR
Nitrous Oxide	R	R
Nitrogylcol	NR	NR

REAGENT	TEMPERATURE 72°F	140°F
-O-		
Ocenol, Type I	R	R
Oils and Fats	R	R
Oils, Sour Crude	R	R
Oleic Acid	R	R
Oleum	NR	NR
Oxalic Acid	R	R
Oxygen	R	R
Ozone	R	R
-P-		
Palmitic Acid, 10%	R	R
Palmitic Acid, 70%, Type I	R	NR
Type II	NR	NR
Paraffin, Type I	R	R
Peracetic Acid, 40%, Type I	R	NR
Type II	NR	NR
Perchloric Acid, 10%	R	R
Perchloric Acid, 15%, Type I	R	NR
Type II	NR	NR
Perchloric Acid, 70% Type I	R	NR
Type II	NR	NR
Perphosphate	R	
Petroleum Liquifier	R	R
Petroleum Oils (Sour)	R	NR
Phenol	R	NR
Phenylhydrazine	NR	NR
Phenylydrazine Hydrochloride	R	NR
Phosgene, Liquid	NR	NR
Phosgene, Gas, Type I	R	
Type II	R	R
Phosphoric Acid, 10%	R	R
Phosphoric Acid, 26%	R	R
Phosphoric Acid, 50%	R	R
Phosphoric Acid, 75%	R	R
Phosphoric Acid, 85%	R	R
Phosphorous (Yellow), Type I	R	
Type II	R	NR
Phosphorous Pentoxide, Type I	R	
Type II	R	NR
Phosphorous Trichloride	NR	NR
Photographic Solutions:		
DK #3	R	R
Dektal Developer	R	R
Kodak Fixer	R	R
Kodak Short Stop	R	R

TABLE II

CHEMICAL RESISTANCE OF ASTM TYPE I AND TYPE II P.V.C. RIGID VINYL

REAGENT	TEMPERATURE 72°F	140°F
Picric Acid	NR	NR
Potash (Sat. Aq.), Type I	R	R
Potassium Alum	R	R
Potassium Amyl Xanthate, Type I	R	NR
Type II	NR	NR
Potassium Bicarbonate	R	R
Potassium Bisulfate	R	R
Potassium Borate	R	R
Potassium Bromate	R	R
Potassium Bromide	R	R
Potassium Carbonate		
Potassium Chromate	R	R
Potassium Chlorate	R	R
Potassium Chloride	R	R
Potassium Cyanide	R	R
Potassium Dichromate	R	R
Potassium Ethyl Xanthate, Type I	R	NR
Type II	NR	NR
Potassium Ferricyanide	R	R
Potassium Ferrocyanide	R	R
Potassium Fluoride	R	R
Potassium Hydroxide	R	R
Potassium Nitrate	R	R
Potassium Perborate	R	R
Potassium Perchlorate	R	R
Potassium Permanganate, 10%	R	R
Type I, 25%	R	NR
Type II	R	@125°F
Potassium Persulfate	R	R
Potassium Sulfate	R	R
Propane	R	R
Propane Gas	R	R
Propargyl Alcohol, Type I	R	R
Type II	R	NR
Propyl Alcohol, Type I	R	R
Type II	R	NR
Propylene Dichloride	NR	NR
Plating Solutions:		
Brass	R	R
Cadmium	R	R
Copper	R	R
Gold	R	R
Indium	R	R
Lead	R	R
Nickel	R	R
Rhodium	R	R
Silver	R	R
Tin	R	R
Zinc	R	R

REAGENT	TEMPERATURE 72°F	140°F
Pyridine Type I	NR	R
Pyrogallic Acid	R	NR
Propylene Oxide	NR	
-R-		
Rayon Coagulating Bath	R	R
Refinery Crudes	R	R
Rochelle Salts, Type I	R	R
-S-		
Salicylic Acid	R	R
Santicizer	NR	
Sea Water	R	R
Selenic Acid	R	R
Sewerage	R	R
Silicic Acid	R	R
Silver Cyanide	R	R
Silver Nitrate	R	R
Silver Plating Solution	R	R
Silver Sulfate	R	R
Soaps	R	R
Sodium Acetate	R	R
Sodium Alum	R	R
Sodium Benzoate	R	R
Sodium Bicarbonate	R	R
Sodium Bichromate	R	R
Sodium Bisulfate	R	R
Sodium Bisulfite	R	R
Sodium Bromide	R	R
Sodium Carbonate	R	R
Sodium Chlorate	R	R
Sodium Chloride	R	R
Sodium Chlorite	NR	NR
Sodium Cyanide	R	R
Sodium Dichromate	R	R
Sodium Ferricyanide	R	R
Sodium Ferrocyanide	R	R
Sodium Fluoride	R	R
Sodium Hydroxide, 10%	R	R
Sodium Hydroxide, 30%	R	R
Sodium Hydroxide, 50%	R	R
Sodium Hypochlorite	R	
Sodium Nitrate	R	R
Sodium Nitrite	R	R
Sodium Peroxide, 8750	R	R
Sodium Perchlorate	R	R
Sodium Sulfate	R	R

TABLE II

CHEMICAL RESISTANCE OF ASTM TYPE I AND TYPE II P.V.C. RIGID VINYL

REAGENT	TEMPERATURE 72°F	140°F
Sodium Sulfide	R	R
Sodium Sulfite	R	R
Sodium Thiosulfate	R	R
Sour Crude Oil (West Texas)	R	R
Stannic Chloride	R	R
Stannous Chloride	R	R
Starch	R	R
Stearic Acid	R	R
Stoddards Solvent	NR	NR
Succinic Acid	R	R
Sulfite Liquor	R	R
Sulfur	R	R
Sulfur Dioxide, (Dry)	R	R
Sulfur Dioxide, (Wet), Type I	R	NR
Type II	NR	NR
Sulfur Trioxide	R	R
Sulfuric Acid, 3%	R	R
Sulfuric Acid, 10%	R	R
Sulfuric Acid, 20%	R	R
Sulfuric Acid, 33%	R	R
Sulfuric Acid, 50%	R	R
Sulfuric Acid, 70%	R	R
Sulfuric, 80% Type I	R	R
Type II	NR	NR
Sulfuric Acid, 85%, Type I	R	R
Type II	NR	NR
Sulfuric Acid, 90%		
Type I Grade 1	R	NR
Type 1 Grade 2	NR	NR
Type II	NR	NR
Sulfuric ACid, 95%		
Type 1 Grade 1	R	NR
Type 1 Grade 2	NR	NR
Type II	NR	NR
Sulfuric ACid Pickling	R	R
Sulfurous Acid	R	R
Sulfuric/Nitric (50/50) 69% 68%	NR	NR
-T-		
Tall Oil	R	R
Tannic Acid	R	R
Tanning Liquors	R	R
Tartaric Acid	R	R
Tetra Sodium Pyrophosphate	R	R
Tetraethyl Lead, Type 1	R	
Type II	R	NR
Tetrahyrodurane	NR	NR
Thionyl Chloride	NR	NR
Thread Cutting Oil	R	
Tirpineol	R	
Titanium Tetrachloride	NR	NR
Toluol Toleune	NR	NR
Transformer Oil	R	R
Tri Butyl Phosphate	NR	NR
Tributyl Citrate	R	
Trichloroacetic Acid	R	
Trichloroethylene	NR	NR
Triethanolamine	R	NR
Trilones	NR	NR
Trimethyl Propane, Type I	R	R
Type II	R	NR
Trisodium Phosphate	R	R
Turpentine, Type I	R	R
Type II	NR	NR
Trimethylamine, Type I	R	NR
Type II	NR	NR
-U-		
Urea	R	R
Urine	R	R
-V-		
Vegetable Oil	R	
Vinegar	R	R
Vinyl Acetate	NR	NR
-W-		
Water Acid Mine	R	R
Water Deionized	R	R
Water Demineralized	R	R
Water Distilled-Water Fresh	R	R
Water Salt	R	R
Whiskey	R	R
White Liquor	R	R
Wines	R	R

LANDFILL METHANE RECOVERY

Edited by M.M. Schumacher

Based on research by:

Johns Hopkins University Applied Physics Laboratory
EMCON Associates
ESCOR, Inc.
Argonne National Laboratory
Public Service Electric & Gas Company
Wehran Energy Corporation
SCS Engineers
The Brooklyn Union Gas Company

NOYES DATA CORPORATION
Park Ridge, New Jersey, U.S.A.
1983

lly equipped with
lity in system
a central point by
ion header. A
on and the central
it may be suitable

ystem)

hole in the refuse
to 36 inches are
diameter holes of
les provide greater
, should require a
do smaller drill
the refuse removed.
refuse at the hole
potential of flow

chickness are
the base of refuse
ically, collection
s backfilled with
of the well depth.
ld be far enough

a truck-mounted
bit. Progress is
use. For example,
automobile bodies
drilled in poorly
ional refuse. For
about 8 to 30 feet
. A core barrel
debris or other

Materials

Various materials have been used for the well casing and associated fittings. Although polyvinyl chloride (PVC) pipe is the most common material selected for well casing, fiberglass, high density polyethylene, and steel have also been used. PVC has been the most popular choice because of its relatively low cost and its generally satisfactory performance. However, PVC pipe may be unacceptable where gas temperatures are high (>150°F). There appears to be an increase in the use of schedule 80 PVC in wells. Fiberglas is also increasingly popular because of its light weight and nearly competitive cost relative to PVC. A principal concern in using fiberglas is resealing the fiber with resin where the pipe is cut or drilled. Otherwise the exposed fibers will weaken rapidly. Polyethylene has been used by the utility industry in underground natural-gas installations, with a great deal of success.

Pipe casings are sized on the basis of the expected gas flow rate and the pressure loss within the well casing. Casings with diameters of 3 to 6 inches are common. Often, casing lengths of two different diameters are alternated to permit telescoping of the casings to accommodate landfill settlement. Alternating pipe lengths of different diameters are joined by slip joints, which permit one pipe to slide within the other but prevents their pulling apart beyond some fixed point. These telescoping joints are used mainly where refuse thicknesses are great; their absolute need and performance remain to be documented. The recent trend appears to be toward the elimination of telescoping joints or the use of a single joint near the top of the refuse. A generalized gas well design is shown in Fig. 7.

Along that length of the well from slightly below to slightly above the well casing's perforated interval, the borehole is backfilled with gravel to facilitate the flow of gas from the refuse to the perforations. Commonly, rounded to sub-rounded gravel from 1-1/2 to 3 inches in size is used. A 2-foot-thick concrete plug is normally poured around the casing, above the gravel backfill, as a seal against the inflow of air from the surface and ravelling of soil from above. A relatively dry concrete mixture should be used to prevent plugging of the gravel-filled gas collection interval of the well. Above the concrete plug, the borehole is backfilled around the well

ATTACHMENT 16

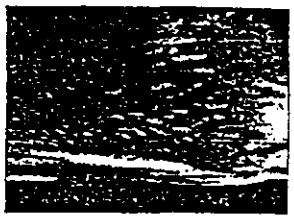
Leachate Tankage and Pump Information

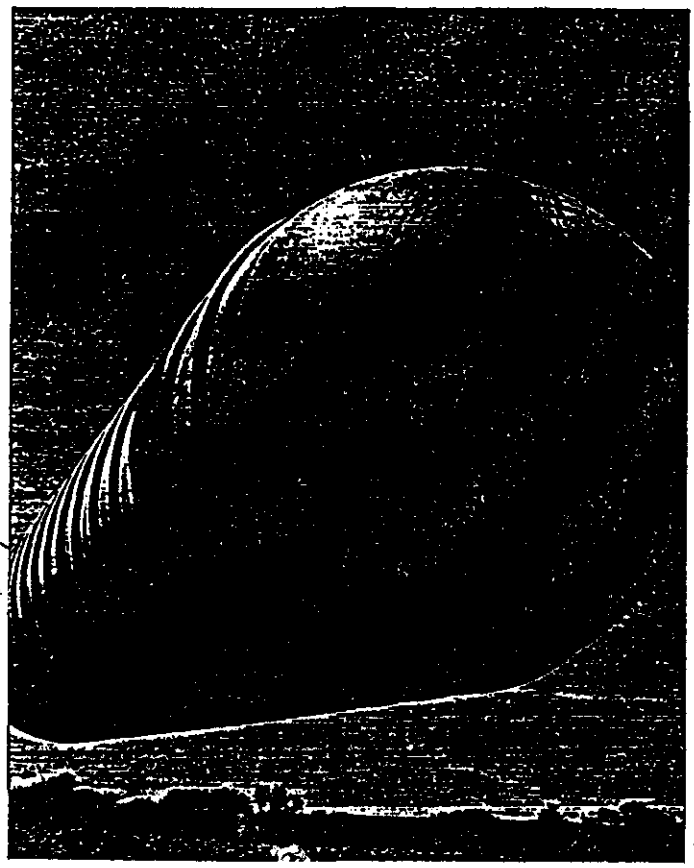
PERKIN-ELMER

CORPORATION

THE XERXES MISSION STATEMENT

Xerxes Corporation
is a leading producer
of fiberglass structural products
for the industrial and
commercial marketplace.
Our efforts are dedicated to
providing high-quality,
competitively priced
products that satisfy all the
requirements
of our customers.
We are committed
to a philosophy of continual
improvement of our products,
services, processes, and
personnel in order to serve
our customers,
suppliers, employees
and our stockholders.





Xerxes is dedicated to delivering high-quality products that help preserve the environment.

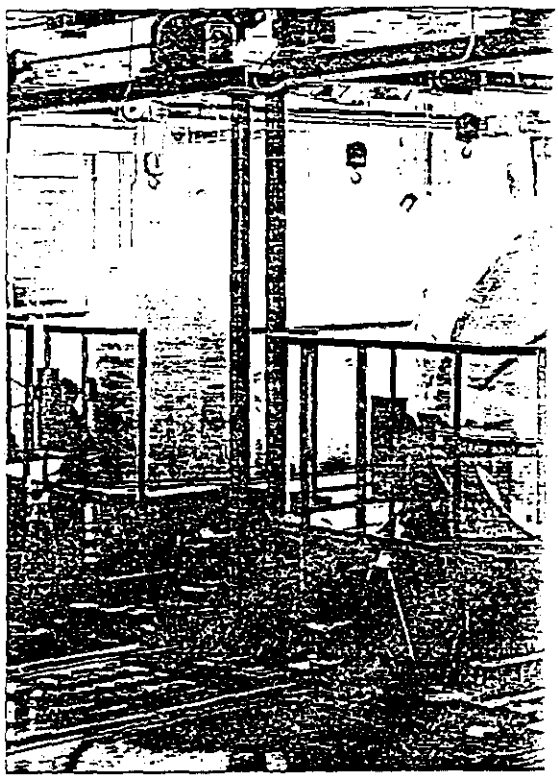
XERXES STRUCTURAL FIBERGLASS PRODUCTS PROTECT ECONOMICALLY AND ECOLOGICALLY

Nature found an ally in the innovators and leaders at Xerxes. For nearly sixty years, we've been designing and manufacturing economical products that help protect the fragile relationship between humans and the planet.

Xerxes believes that progress should always be achieved in concert with nature. That philosophy is reflected in the images of air and water intermingled with Xerxes products here.

We're proud of the long-standing Xerxes commitment to the future, proud of our products, and proud of our contributions as a leader in this essential endeavor.

Meticulous manufacturing control ensures every Xerxes tank is a superior investment.



The resin-rich surfaces of Xerxes fiberglass tanks eliminate the need for corrosion monitoring.

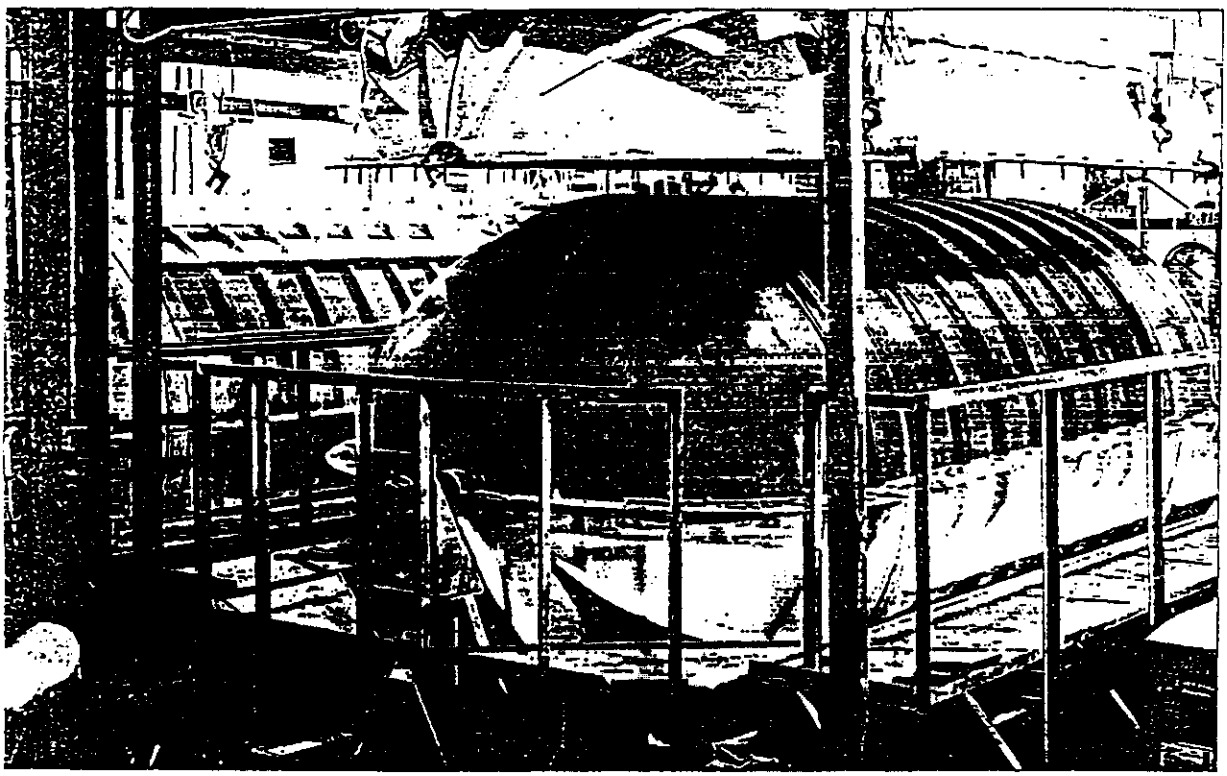
A HISTORY OF LEADERSHIP AND INNOVATION

Behind every Xerxes product stands six decades of proven, on-the-job experience developing and fabricating fiberglass equipment. A spirit of innovation and leadership thrives throughout our operations.

Xerxes engineers were the first to add integrally constructed ribs for underground fiberglass tanks, dramatically increasing strength. We were also the first to manufacture a U.L.-listed, fiberglass double-wall tank.

UNSURPASSED FIBERGLASS CONSTRUCTION

Xerxes builds its tanks using only the finest materials. We combine high-quality resin and glass for ultra-strong laminate products. Like fluting in corrugated board, the integral ribs in our fiberglass tanks add strength and guard against collapse. The integral ribs and tanks are made of the same material and manufactured simultaneously, ensuring a very robust product.



Xerxes tanks are manufactured of highly tested resin and glass, and feature integral ribs, all of which assures a quality product.

STEEL RUSTS, FIBERGLASS DOESN'T

No amount of "protective coating" can change the fact that steel rusts. In fact, buried steel rusts even faster because the ground is, by nature, electrically alive; every steel tank installation inherently — and unavoidably — has all the elements needed for rust. And, while coating a steel tank and adding an anode to the outside can sometimes delay this process, it does not change steel's natural tendency to rust.

Even properly working external cathodic protection does not guard against internal corrosion. Experts estimate that internal corrosion is responsible for up to 29% of the underground tanks currently leaking.

Introduced in 1963, single-wall fiberglass tanks presented a rust-immune alternative to steel. Since then, fiberglass tank usage has grown remarkably. Today, about 50% of all new installations are fiberglass. And an estimated 90% of all tank purchases by major oil marketers are fiberglass.

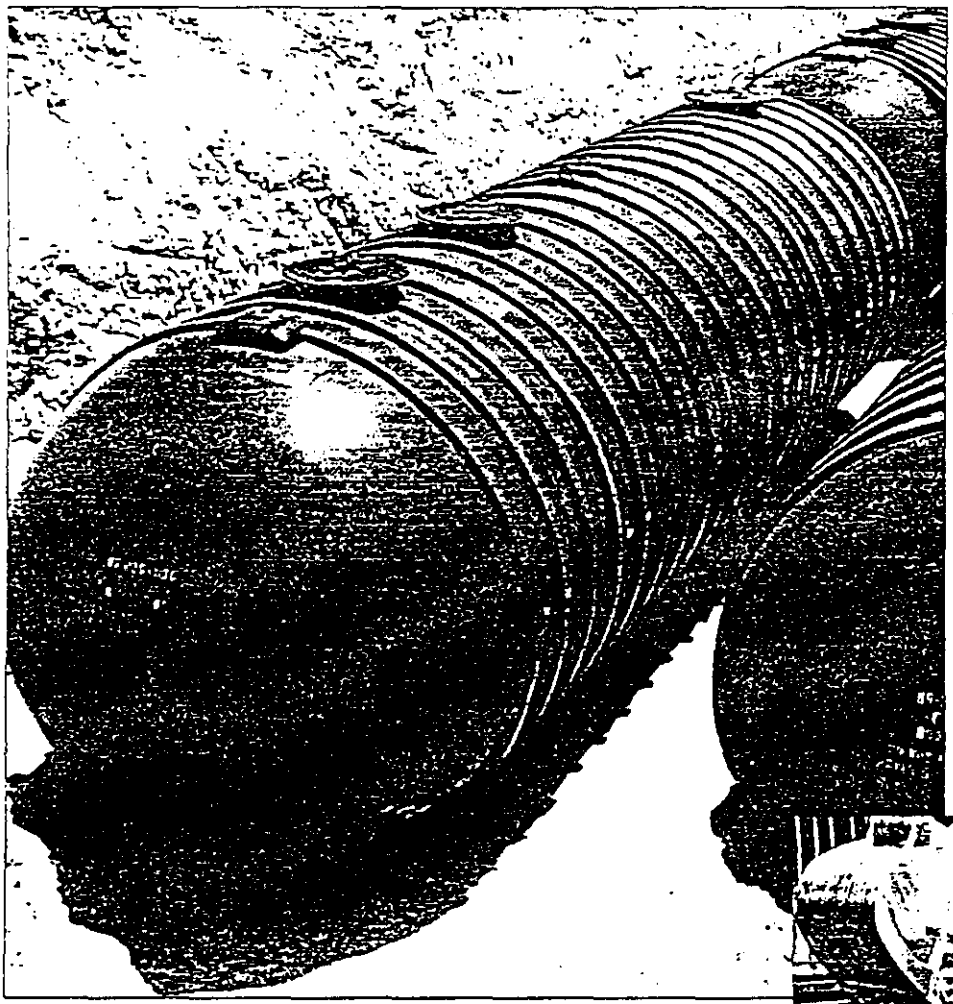
FIBERGLASS REDUCES EXPENSES

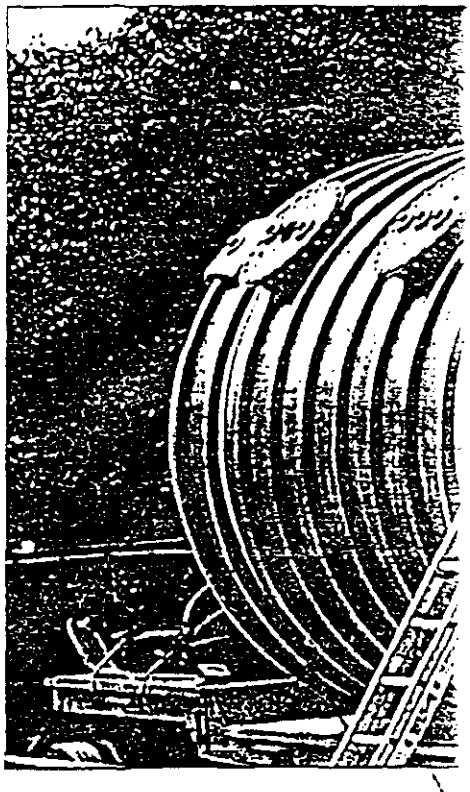
Once installed, Xerxes tanks require no corrosion maintenance or E.P.A.-mandated corrosion monitoring. Many steel tanks must be monitored and tested periodically to be certain the cathodic protection is still functioning. The sacrificial anode may also have to be replaced, which may necessitate exhuming the tank. With Xerxes fiberglass tanks, such inconveniences and expenses can be avoided.

The fiberglass integral ribs also provide for a structurally sound tank. Tested again and again before it leaves the manufacturing plant, each Xerxes tank must meet all of our strict standards before it can leave the plant.

Every Xerxes petroleum underground tank will provide long, trouble-free service[1]. Our underground tanks may be removed, and after recertification by Xerxes at the new location, the tanks may be reinstalled and the extensive warranty will continue.

[1] *See specific warranty for details.*





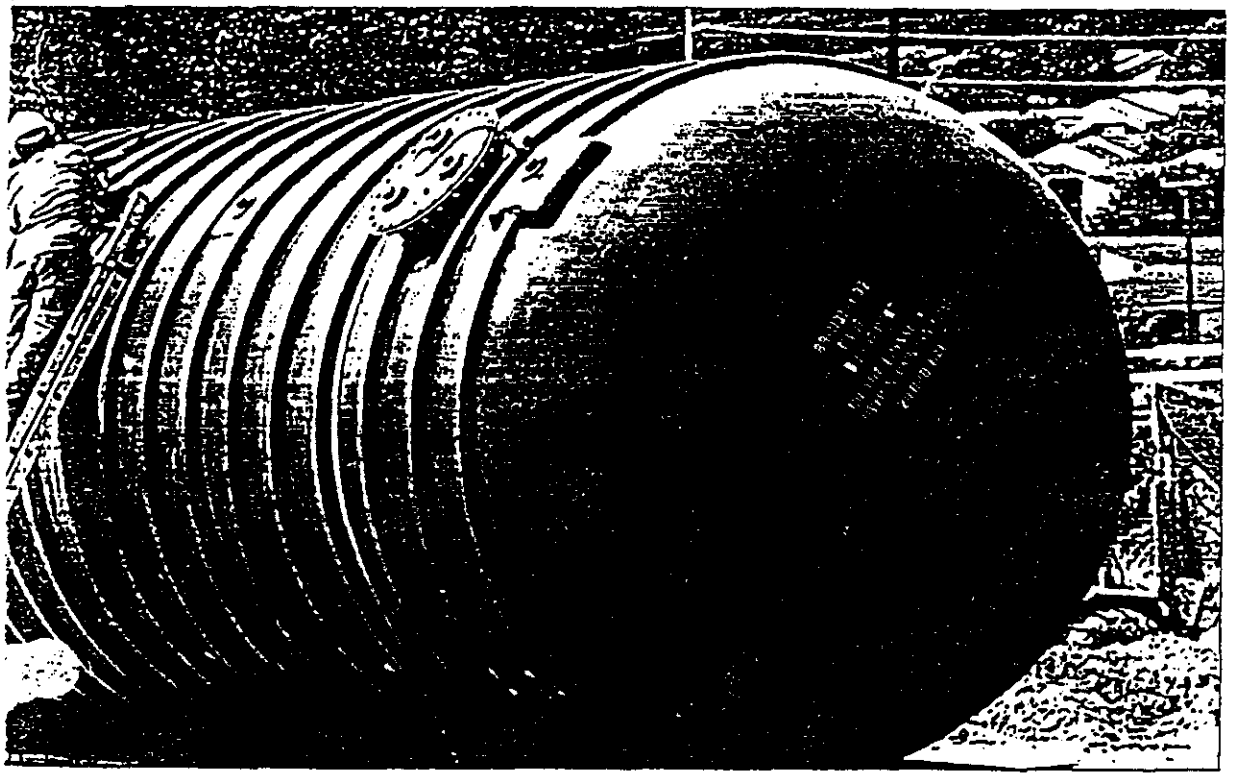
The double-wall tank is designed to absorb and distribute loads, even in the worst conditions, for optimum stress handling.

SINGLE AND DOUBLE-WALL OPTIONS

The first U.S. manufacturer to introduce a U.L.-listed double-wall fiberglass underground storage tank, Xerxes also developed state-of-the-art DWT-II tanks. These tanks are rust-free, cost-efficient and compatible with all petroleum products, alcohols and alcohol-gasoline mixtures[1]. The new design innovations of the DWT-II tanks make Xerxes a leader in underground storage of petroleum products. Large or small, single-wall or double-wall, Xerxes tanks fit virtually any application — from industry giants to the neighborhood station or convenience store.

[1] *See specific warranty for details.*

Both the single-wall and double-wall models deliver strength, easy installation and cost-efficiency.



The new Xerxes DWT-II Double-Wall Tank is a prime example of advanced underground tank technology. Developed by Xerxes, these tanks are compatible with all alcohol fuels for decades of worry-free use.

A LEADER IN QUALITY

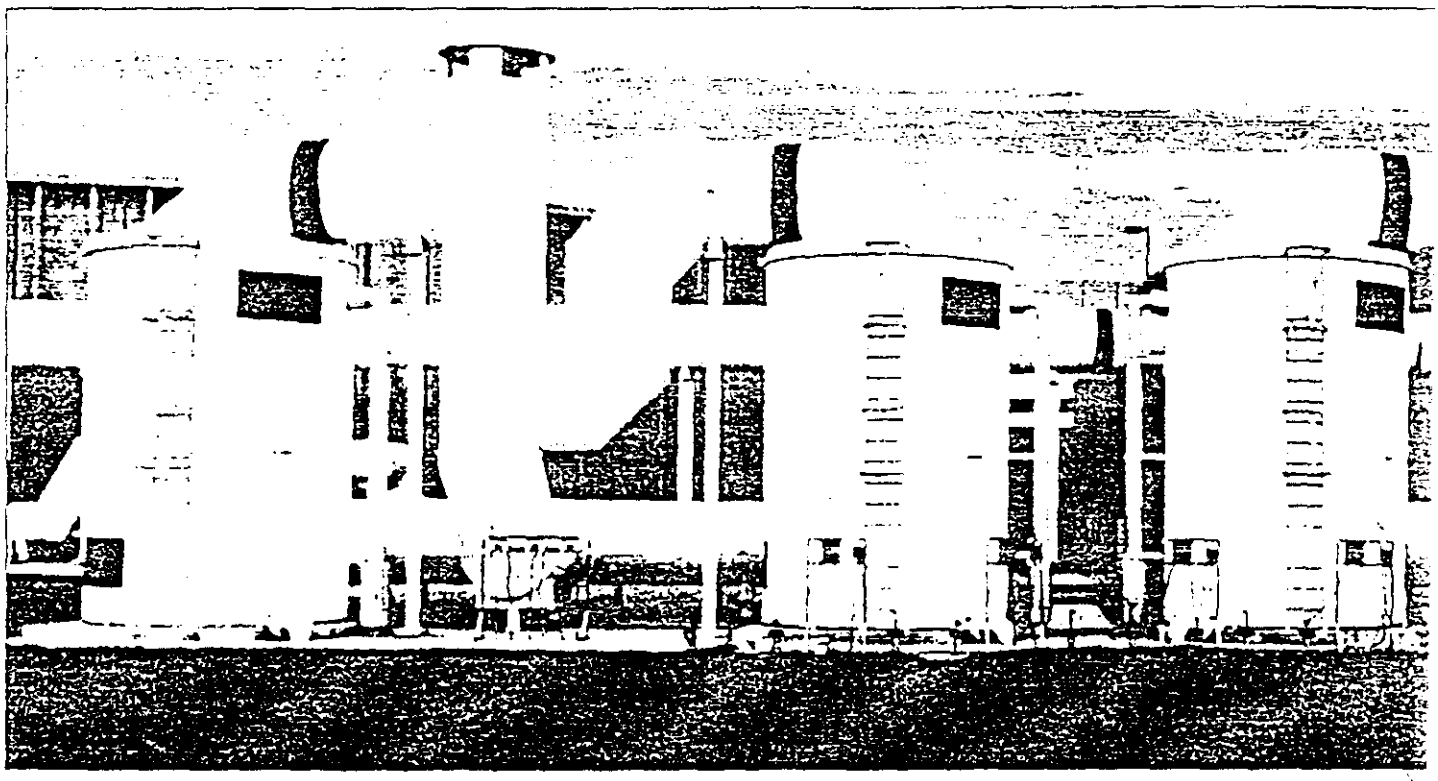
Too much is at stake, environmentally and economically, for Xerxes' quality to be anything less than superior. Our policy is to supply competitive, high-quality products and services that meet our customers' requirements, every time, without error.

The Xerxes Quality Improvement Process is facilitated by Quality Improvement Teams (QITs) at Headquarters and each manufacturing facility. The Process puts an emphasis on doing things right the first time, preventing errors and improving relationships with customers, employees and suppliers.

Our long- and short-term operation planning requirements are met by the Material Requirements Planning System (MRP-II). And, as part of the quality control effort, Xerxes headquarters is linked to the engineering departments and plants via dedicated phone lines to ensure the flow of current data. Manufacturing and Design Engineering are linked through the Medusa® CAD/CAM System for data transfer and analysis, allowing continuous feedback on process equipment and product design. For statistical analysis, we use software such as MINITAB®. Design Engineering also applies the latest Finite Element Analysis and Differences techniques (FEA). Product information can be electronically transferred to customers from Xerxes through the AutoCAD® system.

Throughout our process, statistical methods are utilized better to understand variations and measure improvements. We also simulate conditions more severe than actual underground pressures to earn a U.L. listing and carry Factory Mutual approval.

All of this ensures Xerxes maintains its extremely high standards of quality in every aspect of its business.



Heil Process Systems are custom-designed to solve specific pollution problems.

XERXES' HEIL PROCESS EQUIPMENT™

Heil Process Equipment's commitment to a safer environment began in 1928 as a manufacturer of corrosion-resistant products to contain and process toxic and corrosive materials. Today, Heil provides research, development, engineering and manufacturing to solve a wide variety of industrial, environmental and corrosion problems. Heil Process Systems, utilizing wet scrubbing, venturi, stripping and adsorption technology, provide cost-effective solutions to pollution problems.

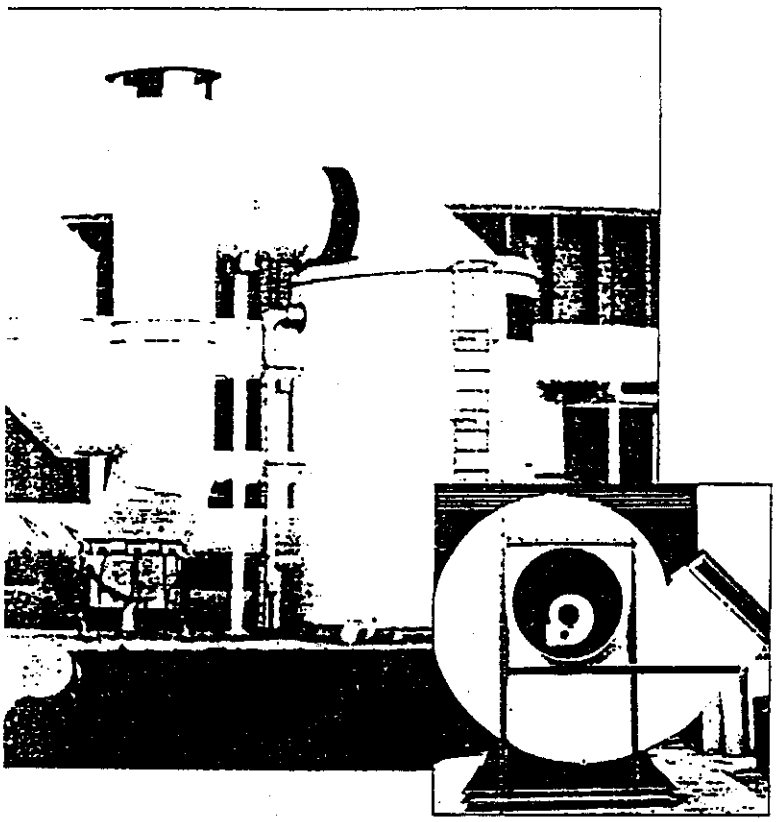
Heil pioneered the use of fiberglass-reinforced plastics in products for the storage, handling and control of corrosive and toxic chemicals. Utilizing state-of-the-art composite laminate design, production and quality assurance technologies, Heil can offer cost-effective storage tanks, piping, ventilation systems, fume scrubbers, fans and related products to handle the most demanding applications.

CUSTOM ENGINEERING AND FABRICATION

Each customer's particular need is given the full attention of our engineers, and a system is custom-built to solve that problem. Heil Systems may be tested before installation, and monitored in action. Plant tests, field tests, and laboratory research give our engineers the information they need to make improvements and changes.

Research and testing, plus a quality assurance program that warrants all materials and workmanship... *that's Heil Process.*

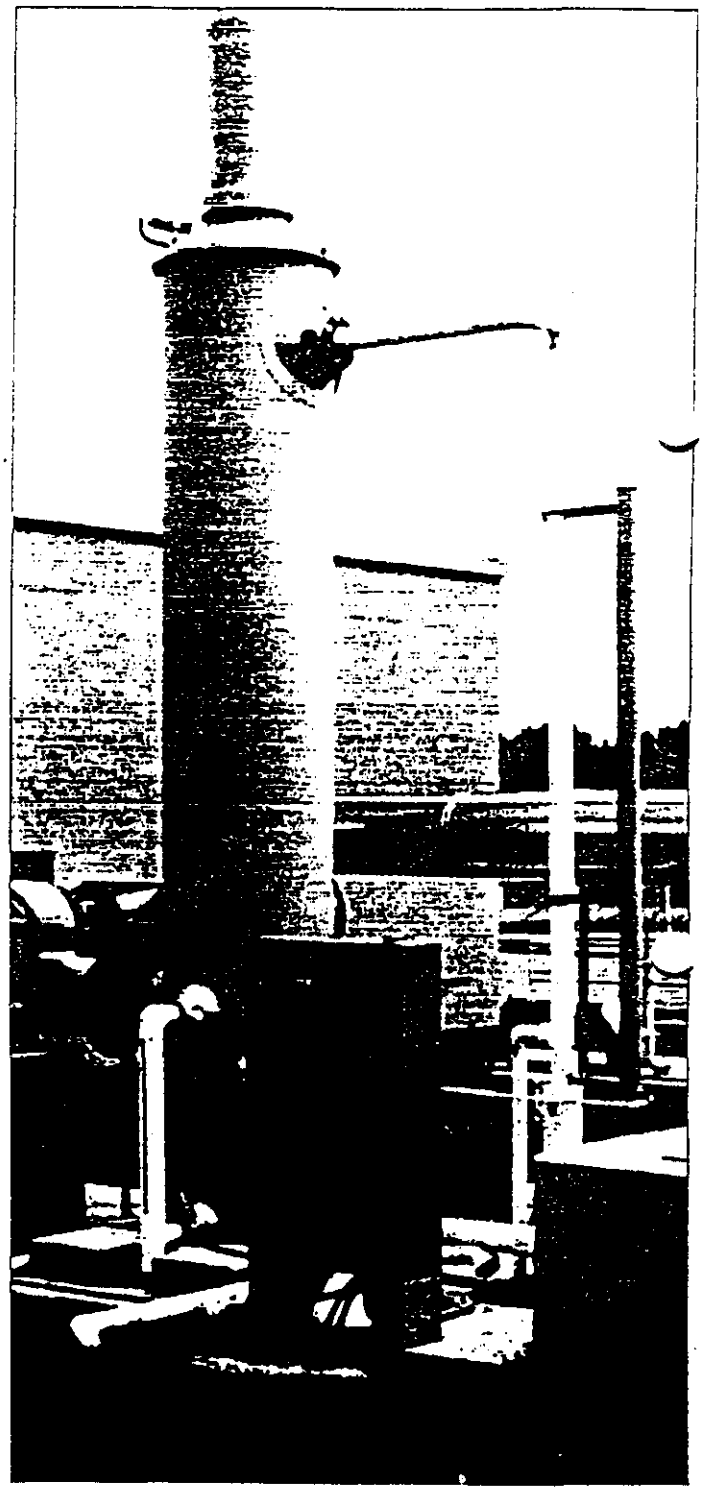
For more than 60 years, Heil has provided products and systems that have led the way to a cleaner, safer environment.



OUTSTANDING CORROSION-RESISTANT SYSTEMS

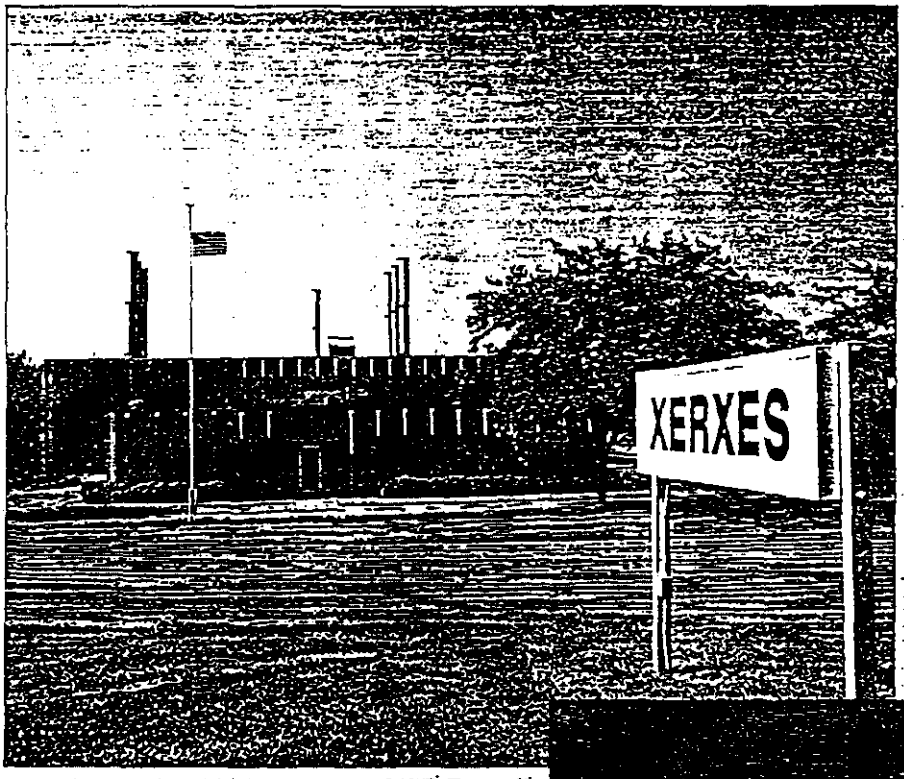
Nationwide, major corporations depend on customized systems to store and process noxious chemicals, sewage, agricultural and petroleum products, de-ionized water, and other liquids that require corrosion-resistant containment. Our custom fabrication accomplishments include:

- World's tallest free-standing fiberglass exhaust stack (170 feet without guy-wires);
- Environmentally controlled fiberglass "cocoons" to protect communications space satellite instrumentation during ground and air transportation;
- Custom process and storage tanks for agriculture;
- Special trailer-mounted bulk food transporters; and
- Complex pollution control systems for chemical processing in paper and steel mills, water treatment facilities, metal finishing plants, and other industrial settings.



Xerxes is noted for its extensive range of customized agricultural and industrial applications.

Xerxes manufacturing plants use the latest process equipment and quality controls, and the finest materials.

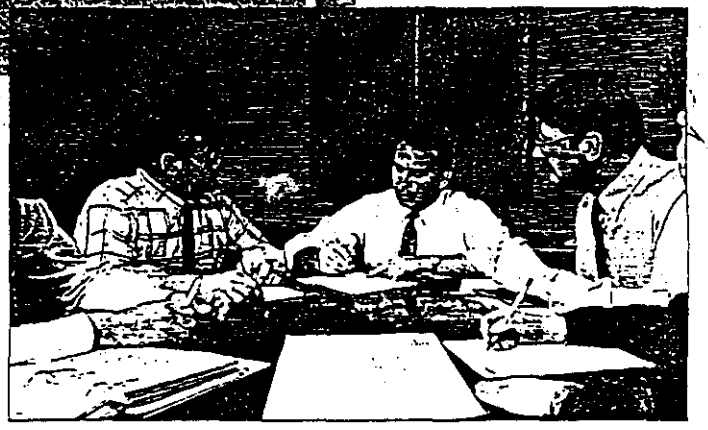


XERXES FIBERGLASS STRUCTURES FOR TODAY AND TOMORROW

Our commitment to quality is the foundation of the strong, long-lasting relationships we share with our customers. Unlike less durable goods, Xerxes tanks absolutely must perform up to standards for decades.

We believe in going the extra mile for our customers. Xerxes operates more manufacturing facilities in the U.S. than any other single UST tank manufacturer. Our eight strategically located plants allow us to provide prompt delivery and quality service, both economically and efficiently, to any location.

Indeed, it is our commitment to customer satisfaction and quality products that makes us the first choice in underground fiberglass storage. For today, and tomorrow.



Xerxes' commitment to quality products and superb customer service permeates every part of our business, and is reflected in our corporate policy:

"To supply competitive products and services that meet our customers' requirements every time, without error."

Goulds

Submersible Pumps

MODEL

10EJ

For 4" and larger wells

SPECIFICATIONS

- Capacities: to 16 GPM.
- Best efficiency point: 10 GPM.
- Horsepower: ⅓ – 3 HP.
- Discharge connection: ⅓-¾ HP – 1" NPT, 1-3 HP – 1¼ NPT.
- Rotation: counterclockwise when looking into discharge.
- Recommended for 4" wells or larger.

FEATURES

Powered for Continuous Operation: All ratings are within the working limits of the motor as recommended by the motor manufacturer. Pump can be operated continuously without damage to the motor.

Completely Field Serviceable: No special tools needed for repair and no shipping back to the factory.

Abrasion-Resistant Construction: Face clearance design and floating impellers make for an extremely abrasion resistant configuration.

Corrosion-Free Components: Diffusers and impellers made of rugged thermoplastic — resists mineral and algae deposits.

Stainless Steel Bowls: Stack up and rabbet lock together.

Polished Stainless Steel Casing: Durable in the most corrosive waters.

No Gaskets: Interstage leakage controlled by compression of diffuser between bowls.

Cast Bronze Motor Adapters and Discharge Heads: Are on all four inch submersible pumps.

Rugged Check Valve: Positive sealing, cast bronze with cast bronze poppet, monel spring and stainless steel self locking nut, and retainer.

Urethane Discharge Head Bearing: Replaceable bearing allows excellent sand handling capabilities.

Hex Shaft Design: Six sided shaft eliminates impeller keys and provides more positive drive.

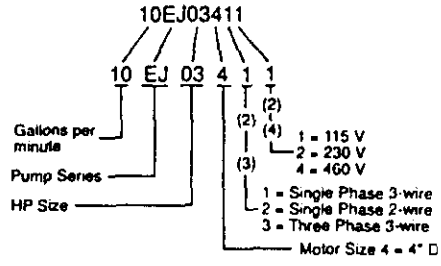
Stainless Steel Shaft Sleeve: Corrosion resistant.

Stainless Steel Shaft Coupling: Provides greater strength and corrosion resistance.

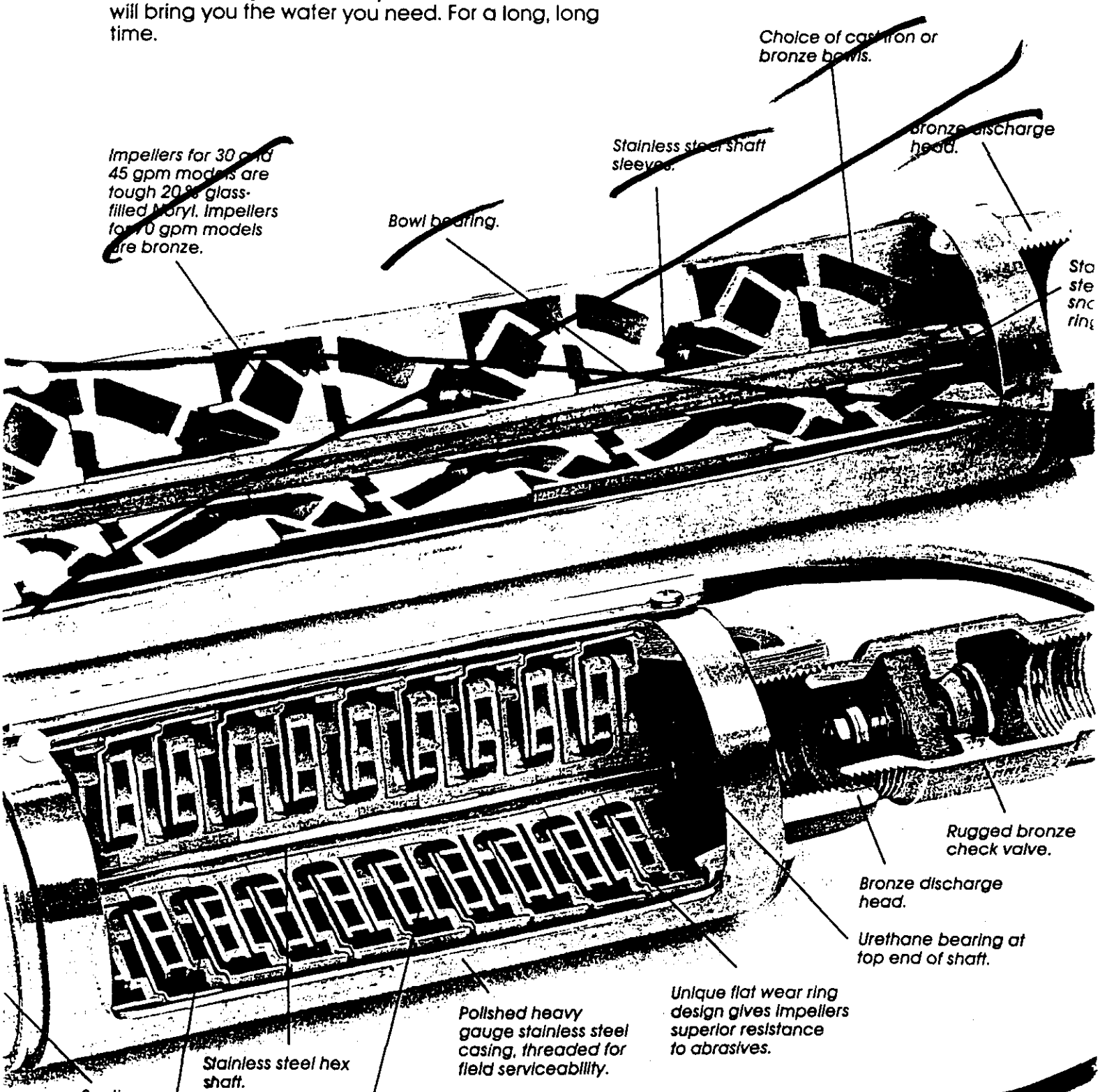
Franklin Electric Motor:

- Corrosion resistant all stainless steel construction through 2 HP, stainless steel casing with nickel plated gray iron end bells on motors over 3 HP.
- Built-in surge arrestor is provided on single phase motor through 3 H
- Stainless steel splined shaft.
- Hermetically sealed windings.
- Replaceable motor lead assembly
- UL 778 recognized.
- NEMA mounting dimensions.
- Control box is required with all single phase units.
- Three phase units require a magnetic starter with three leg protection. Magnetic starter and heaters must be ordered separatel

NUMBER CODE



More Goulds submersibles are installed than any other brand. Because they are quiet and dependable. Built from quality materials. And individually hand assembled and tested at the factory. Put a Goulds in the ground, and you can be confident it will bring you the water you need. For a long, long time.



Series E Submersible Pumps (Flat Bowls) for 4" and larger wells.

Rockford Pump & Supply

2344 - 18th AVENUE
ROCKFORD, IL. 61104
(815) 399-0179

Mr. Tom Hilbert
Winnebago Reclamation Service
8403 Lindenwood Road
Rockford, IL 61109

Dear Tom:

I have enclosed literature on the Goulds Submersible Well Pumps that we have been supplying your company since 1989.

Your company decided to try the Goulds pumps because of their corrosion-free construction, and their better pricing over competitive brands.

Your company's own experience with these pumps during the last five years is the greatest evidence of their durability and cost-effectiveness. Please let me know if you need any additional information.

Sincerely,

George LaMarca/sb

George LaMarca

GL/sb

Enclosure

ATTACHMENT 17

Gas Monitoring Equipment

LANDTEC's GEM-500 Analyzer Provides a Convenient Link Between Your Landfill Data and Office Computer

Key GEM-500 Features:

Multi-Functional Analyzer...provides automatic sampling and analysis of gas composition (% by volume CH_4 (100% & LEL), CO_2, O_2 and % remaining gas balance), temperature, pressures. Also calculates gas flow rates as well as Btu rates.

Diverse Field Applications...monitors migration control systems, gas collection systems, flares, migration probes, temperatures, and more.

Light-Weight Compact Size...is easy to carry. Weighs less than five pounds.

Quick Analysis...displays gas analysis and flow results in usually less than one minute.

Infrared Gas Analyzer...provides high-tech accurate measurements of methane (CH_4),and carbon dioxide (CO_2).

Reference Beam...provided by infrared analyzer for self compensation.

Durable Oxygen Analyzer...provided by the galvanic cell principle, unaffected by other gases such as CH_4, CO_2, or H_2S.

User Friendly On-Screen Menu...guides the user step-by-step through all functions and options available.

PC Data Down-Loading...provided by RS232 interface with compatible computers.

Data Storage/Retrieval...stores last set of measurements taken for each monitoring point, up to 500 monitoring points total.

Prior Data Recall...allows user to recall last stored data for each monitoring point.

Methane Analysis...displayed as either %CH_4 by volume or LEL.

Durable Construction...built of strong, durable plastic material for harsh landfill environment. Sealed keyboard.

All Weather Use...designed to operate in hot/wet weather extremes from 14°F to 104°F. Weather proof.

Built-In Adjustable Alarms...allows user to set alarm limits for CH_4 and O_2.

Rechargeable Batteries...provides all day field use.

Battery Check...monitors battery life remaining.

Monitoring Point I.D. Codes...provides alphanumeric identification of monitoring points for data storage.

Maintenance Codes...allows user to note typical maintenance needs using eight preset maintenance codes.

Date/Time Stamp...recorded for all stored data.

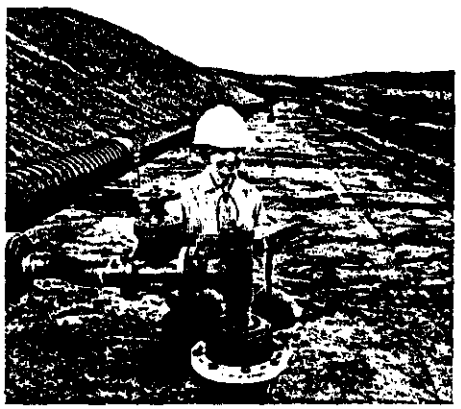
Imperial vs. SI Units...displays measurements in Imperial (USA) or SI (metric) units.

Unattended Auto-Log Option...allows readings to be taken automatically (unattended) at user selected intervals.

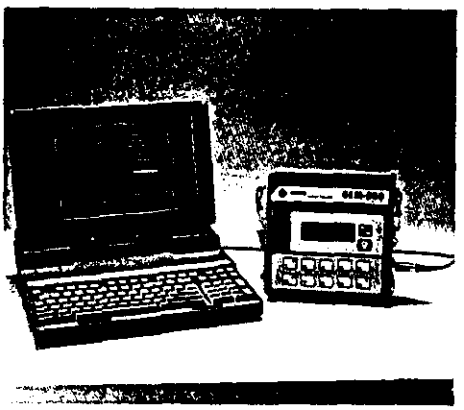
Interfaces to LANDTEC Data Management Software...which provides statistical management and reporting of LFG data.

Multiple Flow Meter Analysis...supported by GEM-500 to calculate gas flow rates from Accu-Flo wellheads, orifice plates and Pitot tubes.

From: Landfill Field Data



To: Computer Gas Management



Quality Landfill Gas Management Begins with Accurate Field Data Correctly Recorded

GEM-500 Packs Nine LFG Instruments and Computer into Five Pound Case

The highly accurate and reliable GEM-500 provides field technicians with the most commonly used LFG instrumentation, linked to an on-board computer for quick data calculations, storage and retrieval – all within a compact, all weather case the size of a dictionary.

The GEM-500 was designed by LANDTEC to support the ever-increasing instrumentation requirements of LFG monitoring. The multi-functional unit expedites the analysis and storage of field data. Software allows easy downloading of stored data to a personal computer for further analysis and reporting.

Couple the GEM-500 with a LANDTEC Accu-Flo landfill gas wellhead, and field monitoring becomes faster and more efficient. With the GEM-500 and Accu-Flo combination, you can forget about carrying analyzers for methane, carbon dioxide and oxygen. You can also eliminate handling high and low pressure and temperature gauges, Pitot tube, orifice plate or other cumbersome flow meters, vacuum pump, flow calculator and data sheets.

GEM-500 Specifications

	Sensor Range Imperial	Resolution Imperial
Methane - CH_4	0 - 100%	0.1
Carbon dioxide - CO_2	0 - 75%	0.1
Oxygen - O_2	0 - 100%	0.1
Pressures (diff)	0 - 10" W.C.	0.01
(static)	0 - 100" W.C.	0.1

GEM- 500 Typical Accuracy

Concentration	% CH_4 by Volume	% CO_2 by Volume	% O_2 by Volume
5% (LEL CH_4)	±0.3%	n.a.	±0.25%
75%	±1.9%	±3.0%	n.a.
100%	±1.9%	n.a.	n.a.

Additional Information

Technical information is available on the GEM-500 including product specifications, and user instructions. Information is also available on LANDTEC's family of integrated landfill products including: wellheads, wellbore seals, knock-outs, instrumentation, condensate/leachate treatment, flares and landfill gas management software.

LANDTEC also provides technical and educational literature on specific landfill subjects and issues. Please call our toll free telephone number (800) 821-0496 (8 a.m. - 5 p.m. Pacific Time) for additional information and placement on our mailing list.

SWANA MEMBER

NSWMA

An involved and contributing member of the Solid Waste Association of North America and the National Solid Waste Management Association

LANDTEC
LANDFILL CONTROL TECHNOLOGIES
West Coast Sales Office
(800) 821-0496, (310) 908-7665 FAX
East Coast Sales Office
(800) 844-4538, (301) 309-6583 FAX

Product designs and specifications are subject to change without notice. User is responsible for determining suitability of product

LANDTEC

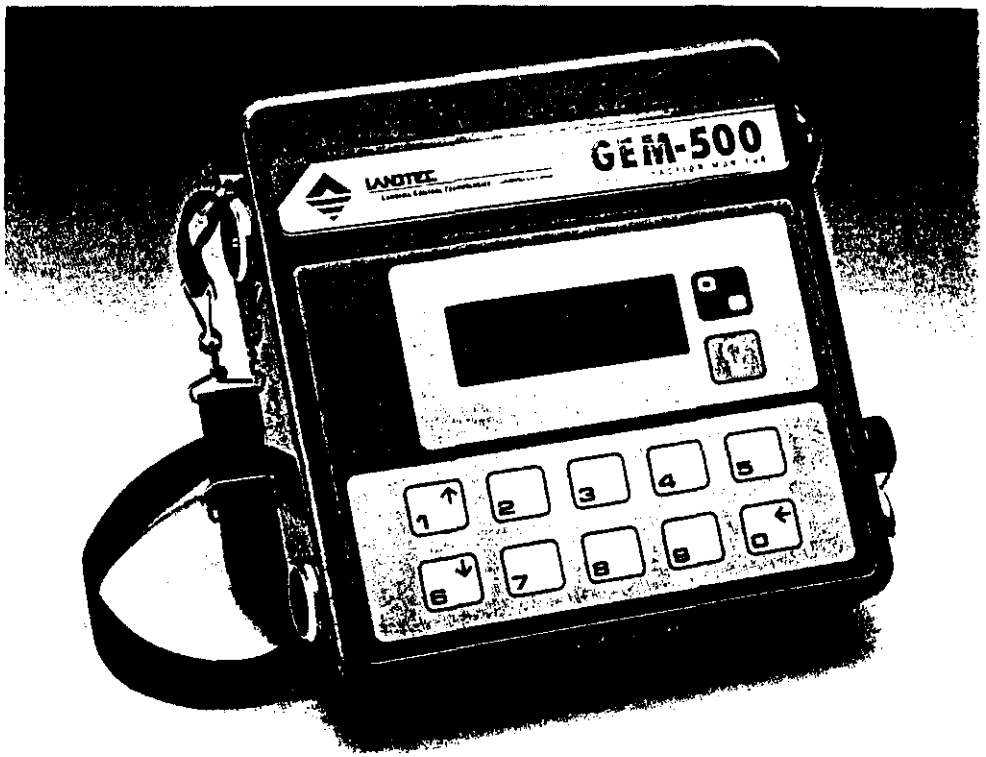
LANDFILL CONTROL TECHNOLOGIES

GEM™

Series: 500

METERING/INSTRUMENTATION
Gas Extraction Monitor

GEM-500 Integrates Nine Landfill Gas Field Instruments with On-Board Computer



Versatile Analyzer Simplifies LFG Monitoring and Control

The GEM-500 was specifically designed by Landfill Control Technologies (LANDTEC) for use on landfills to monitor landfill gas (LFG) migration control systems, gas collection systems, flares, migration probes, LEL levels, subsurface fires, and more.

The light-weight, portable unit links nine field instruments with an on-board computer. The versatile monitor provides landfill technicians with an array of analysis and computation functions. The results can be stored and later down-loaded to a personal computer to provide error-free data management.

Multi-Functional Features

The GEM-500 automatically samples and analyzes the methane, carbon dioxide and oxygen content of landfill gas. The easy to read LCD screen shows the results as percentages of CH_4, CO_2, O_2 and "balance" gas (typically nitrogen). The GEM-500 also calculates and displays gas flow rate, Btu content, temperature, pressures and LEL (Lower Explosive Limit).

In addition, the user can recall prior data stored at up to 500 monitoring points for contrast with current data. Alarms can easily be set for methane, oxygen and temperature measurements.

The GEM-500 can automatically calculate gas flow rates, adjusted to standard temperature and pressure. The results can be displayed in either Imperial (USA) or SI (metric) units.

LANDTEC'S versatile GEM-500 can be used on orifice plate and Pitot tube meters, but most effectively on LANDTEC's Accu-Flo wellheads, which incorporates a built-in precalibrated gas flow meter and quick-connect sample ports.

The Accu-Flo wellhead and GEM-500 were designed to work together to expedite information required by environmental regulations.

Rugged, User Friendly Design

The GEM-500 is an all-weather, self-contained portable monitor which uses a self-compensating infrared gas analyzer, rechargeable power supply for all day use, an internal sample pump capable of drawing a gas sample at up to 70" vacuum.

An easy to follow on-screen menu guides the operator through the sampling process which can be completed in less than a minute. I.D. codes allow the user to store and recall the last set of measurements for each monitoring point. Preset maintenance codes can be used to note field work required. The stored data can be later retrieved or down-loaded to a personal computer for use in a database, such as LANDTEC's LFG management software.

Time Saving Conveniences

Users will readily appreciate the built-in, time-saving conveniences provided by the GEM-500. Instead of fumbling with data sheets, temperature gauges, Pitot tubes, methane/oxygen/carbon dioxide analyzers, pressure gauges, calculators and other field equipment, the GEM-500 provides it all, and more, in an easy to carry light-weight case.

LANDTEC's Family of Landfill Products

The GEM-500 is part of a family of products developed by LANDTEC for the landfill industry. These products are based on a decade of corporate operating and regulatory experience at multiple sites by LANDTEC's parent, Pacific Energy.

© 1993 Landfill Control Technologies Corporate Headquarters 6055 E. Washington Blvd., Commerce, California U.S.A. GEM is a product tradmark.

ATTACHMENT 18

Surface Water Control

SURFACE WATER CONTROL

INTRODUCTION

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 this surface water control system is described in greater detail below. The proposed locations of all permanent surface water control structures are depicted on Sheet B-3 of the site developmental drawings.

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. The NPDES Permit Application is included in Appendix 1.

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, therefore reducing the chance of impacting the 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 riprap. The perimeter ditches flowing to the north of the landfill will be tributary outlet ditches through pipe-drop inlets which 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 riprap lined chute. 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 and assuming 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, these ditches and any receiving channels should be adequately protected from erosion and scouring.

The runoff collection ditches and culverts will be operated as described above until at least such time that the final cover is in place and erosion stability is provided by the vegetation and other approved means over their tributary area. Calculations for ditches and pipe-drop inlet structures are included in Appendix 2.

APPENDIX 1

NPDES Permit Application

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

April 1, 1993

Mr. Tim Kluge, Manager
Industrial Permits Unit
Illinois Environmental Protection Agency
Division of Water Pollution Control
2200 Churchill Road
Springfield, IL 62706

re: Winnebago Reclamation Service, Inc. - Pagel Landfill
Winnebago County/Rockford, Illinois
IEPA-DLPC Site Number 2018080001
NPDES Stormwater Application

Dear Mr. Kluge:

On behalf of our client, Winnebago Reclamation Service, Inc., enclosed herewith is an original and one copy of the NPDES Form 2F to discharge stormwater from the above referenced facility. The Notice of Intent Form for General Permit was submitted to the IEPA/DWPC on October 1, 1992.

Please contact us, is there are any questions or comments regarding this permit application submittal. Thank you.

Sincerely,

Daniel R. Feezor
Environmental Engineer II
Division of Solid Waste Management

CC: Winnebago Reclamation Service, Inc.

Enclosures

DRF:njm

FAX: (217) 787-9495

WINNEBAGO RECLAMATION SERVICE, INC.

PAGEL LANDFILL

STORMWATER RUNOFF NPDES PERMIT APPLICATION

National Pollution Discharge Elimination System (NPDES) Permit is hereby requested for outfall 001 at the subject site. 40 CFR 122.26 requires that stormwater discharges associated with an industrial activity obtain an NPDES Permit. 40 CFR 122.26(b)(14)(v) defines landfills that receive or have received any industrial waste as an industry whose stormwater discharge needs to be permitted.

The Winnebago Reclamation Service, Inc. (WRL), Pagel Landfill is an existing facility located about two miles south of Rockford, Illinois. The facility is currently comprised of a single waste disposal unit. This application requests the NPDES permit for the discharges associated with the landfill.

NPDES PERMITTING

In accordance with 40 CFR 122.26(c)(1), since the discharge points 001 and 002 are comprised entirely of stormwater, enclosed herewith is the NPDES Form 2F. This NPDES Form is submitted to correspond with the Notice of Intent for General Permit filed with the IEPA/DWPC on October 1, 1992. The following narrative will supplement these forms.

Site Location Map

A Site Location Map has been included which shows the approximate location of outfalls 001 and 002. This map was constructed using the Rockford South Illinois USGS 7.5 minute topography map.

Form 2F

Form 2F has been completed and enclosed along with the Site Drainage Map which also show outfalls 001 and 002.

I. Outfall Location

The latitude and longitude of outfall 001 and 002 were determined by using the Rockford South USGS 7.5 minute topography map.

II. Improvements

Winnebago Reclamation Service, Inc., Pagel Landfill is not required by any Federal, State, or Local authority to meet any implementation schedule for the construction, upgrading, or operation of wastewater treatment equipment or practices or any other environmental programs which may affect the discharges described in this application.

III. Site Drainage Map

A Site Drainage Map showing topography depicting the facility has been included. The entire drainage areas for outfalls 001 and 002 are depicted.

IV. Narrative Description of Pollutant Sources

A. For outfall 001, the 12.55 acre drainage area contains no impervious surfaces. For outfall 002, the 20.56 acre drainage area contains no impervious surfaces.

B. Since the landfill uses daily cover, there have been no nor will be any significant materials that are stored, treated, or disposed in a manner to allow exposure to stormwater. No pesticides, herbicides, soil conditioners, or fertilizers have been applied at this facility. Future applications will be in accordance with applicable regulations and/or permits.

C. Outfall 001 consists of a 24 inch corrugated metal culvert. Outfall 002 consists of an earthen ditch which sheet flows to Killbuck Creek. This will be replaced with a culvert in the future.

V. Non-Stormwater Discharges

The discharges from 001 and 002 will be comprised of entirely stormwater.

VI. Significant Leaks or Spills

There has been no history of significant leaks or spills of toxic or hazardous pollutants in the past three years.

VII. Discharge Information

40 CFR 122.26(c)(2)(E) states that: Quantitative data based on samples collected during storm events and collected in accordance with 40 CFR 122.21 of this part from all outfalls containing a storm water discharge associated with industrial activity for the following parameters: (1) Any pollutant limited in an effluent guideline to which the facility is subject; (2)Any pollutant listed in the facility's NPDES Permit for its process wastewater (if the facility is operating under an existing NPDES Permit);(3)Oil and grease, pH, BOD5, COD, TSS, total phosphorus, total Kjeldahl nitrogen, and nitrate plus nitrite nitrogen; (4) Any information on the discharge required under paragraph 40 CFR 122.21(g)(7)(iii) and (iv) of this part; (5) Flow measurements or estimates of the flow rate, and the total amount of discharge for the storm event(s) sampled, and the method of flow measurement or estimation; and (6) The date and duration (in hours) of the storm event(s) sampled, rainfall measurements or estimates of the storm event (in inches) which generated the sampled runoff and the duration between the storm event sampled and the end of the previous measurable (greater than 0.1 inch rainfall) storm event (in hours).

Therefore using this information, the following parameters were sampled:

BODs
COD
Oil and Grease
Kjeldahl Nitrogen

Nitrite and Nitrate Nitrogen
Total Phosphorous
Suspended Solids
Barium
Iron
Lead
Manganese
Zinc
Fecal Coliform

The storm that was sampled occurred on March 2, 1993. The storm lasted 410 minutes and had a total rainfall of 0.13 inches. This storm occurred 120 hours after the end of the previous measurable rain event. The maximum flow rate through outfall 001 was measured to be 951.58 gallons per minute. The maximum flow rate was calculated using an algorithm using Bernoulli's equation for the culvert given a depth value. The total flow from the rain event was estimated using the SCS TR-55 method using a Curve Number of 88. This rainfall runoff event was sampled during the winter.

The grab samples were taken within the first 30 minutes after the commencement of the discharge. The composite sample was created by taking grab samples every 15 minutes for three hours. The samples were mixed with the same percentage as the percent of total flow with the specific interval.

VIII. Biological Toxicity Testing Data

Biological Toxicity Testing was not conducted for this facility.

IX. Contract Analysis Information

The analysis information was conducted by National Environmental Testing, Inc. (NET). All pollutants were analyzed by NET except for pH which was measured on-site using a Cole-Parmer pH pen.

X. Certification

The permit application was signed by an officer of Winnebago Reclamation Service, Inc.

EPA Number: ILDO

FORM 1 General

U.S. ENVIRONMENTAL PROTECTION AGENCY
GENERAL INFORMATION
Consolidated Permits Program
(Read the "General Instructions" before starting.)

I. EPA I.D. NUMBER
Winnebago Reclamation Service, Inc.
Pagel Landfill

III. FACILITY NAME

V. FACILITY MAILING ADDRESS
8403 Lindenwood Road

VI. FACILITY LOCATION
Rockford, IL 61109

PLEASE PLACE LABEL IN THIS SPACE

GENERAL INSTRUCTIONS

If a preprinted label has been provided, affix it in the designated space. Review the information carefully; if any of it is incorrect, cross through it and enter the correct data in the appropriate fill-in area below. Also, if any of the preprinted data is absent (the area to the left of the label space lists the information that should appear), please provide it in the proper fill-in area(s), below. If the label is complete and correct, you need not complete Items I, III, V, and VI (except VI-B which must be completed regardless). Complete all Items if no label has been provided. Refer to the instructions for detailed item descriptions and for the legal authorizations under which this data is collected.

II. POLLUTANT CHARACTERISTICS

INSTRUCTIONS: Complete A through J to determine whether you need to submit any permit application forms to the EPA. If you answer "yes" to any questions, you must submit this form and the supplemental form listed in the parenthesis following the question. Mark "X" in the box in the third column if the supplemental form is attached. If you answer "no" to each question, you need not submit any of these forms. You may answer "no" if your activity is excluded from permit requirements; see Section C of the instructions. See also, Section D of the instructions for definitions of bold-faced terms.

Specific Questions	MARK "X"			Specific Questions	MARK "X"		
	Yes	No	Form Attached		Yes	No	Form Attached
A. Is this facility a publicly owned treatment works which results in a discharge to waters of the U.S.?		X		B. Does or will this facility (either existing or proposed) include a concentrated animal feeding operation or aquatic animal production facility which results in a discharge to waters of the U.S.? (FORM 2B)		X	
C. Is this a facility which currently results in discharges to waters of the U.S. other than those described in A or B above? (FORM 2C or FORM 2F)	X		2F	D. Is this is a proposed facility (other than those described in A or B above) which will result in a discharge to waters of the U.S.? (FORM 2D or FORM 2F)		X	
E. Does or will this facility treat, store, or dispose of hazardous wastes?		X		F. Do you or will you inject at this facility industrial or municipal effluent below the lowermost stratum containing, within one quarter mile of the well bore, underground sources of drinking water?		X	
G. Do you or will you inject at this facility any produced water or other fluids which are brought to the surface in connection with conventional oil or natural gas production, inject fluids used for enhanced recovery of oil or natural gas, or inject fluids for storage of liquid hydrocarbons?		X		H. Do you or will you inject at this facility fluids for special processes such as mining of sulfur by the Frasch process, solution mining of minerals, in situ combustion of fossil fuel, or recovery of geothermal energy?		X	
I. Is this facility a proposed stationary source which is one of the 28 industrial categories listed in the instructions and which will potentially emit 100 tons per year of any air pollutant regulated under the Clean Air Act and may affect or be located in an attainment area?		X		J. Is this facility a proposed stationary source which is NOT one of the 28 industrial categories listed in the instructions and which will potentially emit 250 tons per year of any air pollutant regulated under the Clean Air Act and may affect or be located in an attainment area?		X	

III. NAME OF FACILITY

Winnebago Reclamation Service, Inc. - Pagel Landfill

IV. FACILITY CONTACT

A. Name (last, first) and Title: Marzorati, Gary - Executive Vice President

B. Phone (area code & no.): (815) 654-4779

V. FACILITY MAILING ADDRESS

A. Street or P.O. Box, B. City or Town, C. State, D. Zip Code: 8403 Lindenwood Road
Rockford, IL 61109

VI. FACILITY LOCATION

A. Street, Route No. or other Specific Identifier, B. County Name, C. City or Town, D. State, E. Zip Code
8403 Lindenwood Road, Winnebago County, Rockford, IL 61109

F. County Code (if known)

Continue on Page 2

Continued from Page 1

VII. SIC CODES (4-digit, in order of priority)

A. FIRST		B. SECOND	
4953	(specify) Landfill, Sanitary: Operation of		(specify)
C. THIRD		**D. FOURTH**	
	(specify)		(specify)

VIII. OPERATOR INFORMATION

A. Name: Winnebago Reclamation Service, Inc.

B. Is the name listed in Item VIII-A also the owner? ☒ YES ☐ NO

C. Status of Operator (Enter the appropriate letter into the answer box; if "Other", specify.) P

F = FEDERAL; M = PUBLIC (other than federal or state); S = STATE; P = PRIVATE; O = OTHER (specify)

(specify)

D. Phone (area code and number): (815) 654-4779

E. Street or P.O. Box: 8403 Lindenwood Road

F. City or Town	G. State	H. Zip Code
Rockford	Illinois	61109

IX. INDIAN LAND

Is the facility located on Indian lands? ☐ YES ☒ NO

X. EXISTING ENVIRONMENTAL PERMITS

A. NPDES (Discharges to Surface Water)	D. PSD (Air Emissions from Proposed Sources)	IEPA/DLPC Supplemental
		1985-96
B. UIC (Underground Injection of Fluids)	E. OTHER (specify) IEPA/DLPC OP/DE	(specify)
	1972-24	
C. RCRA (Hazardous Wastes)	E. OTHER (specify) IEPA/DLPC Supple-	(specify)
	mental 1979-923	

XI. MAP

Attach to this application a topographic map of the area extending to at least one mile beyond property boundaries. The map must show the outline of the facility, the location of each of its existing and proposed intake and discharge structures, each of its hazardous waste treatment, storage, or disposal facilities, and each well where it injects fluids underground. Include all springs, rivers and other surface water bodies in the map area. See instructions for precise requirements.

XII. NATURE OF BUSINESS (provide a brief description)

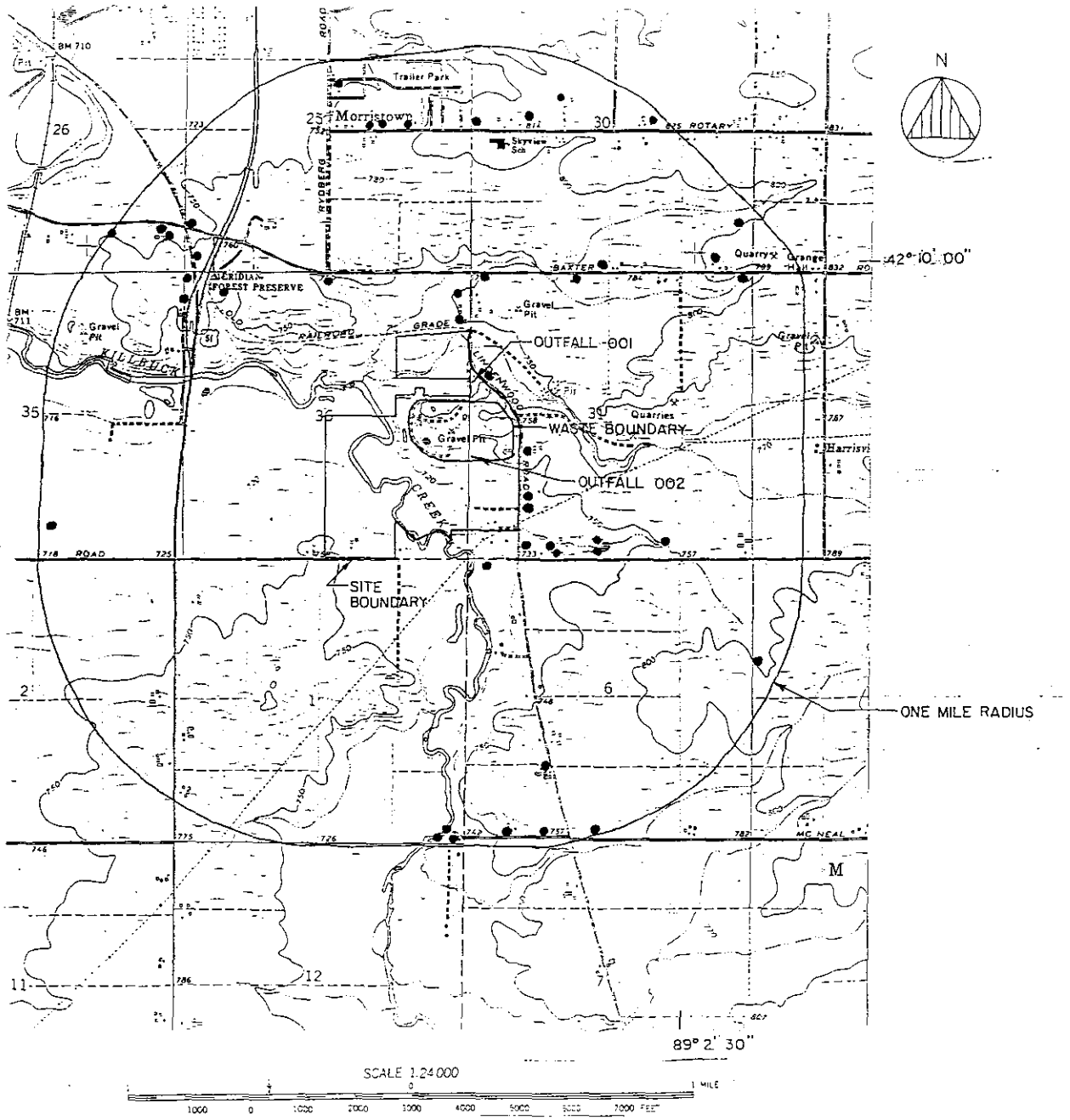
Winnebago Reclamation Service, Inc. Pagel Landfill is a operating sanitary landfill.

XIII. CERTIFICATION (see instructions)

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this application and all attachments and that, based on my inquiry of those persons immediately responsible for obtaining the information contained in the application, I believe that the information is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

A. Name and Official Title (type or print)	B. Signature	C. Date Signed
Gary L. Marzorati, Executive Vice President		March 30, 1993

COMMENTS FOR OFFICIAL USE ONLY



NOTES:

1) TOPOGRAPHY TAKEN FROM ILLINOIS STATE GEOLOGICAL SURVEY 1976 ROCKFORD SOUTH QUADRANGLE MAP.

2) OUTFALL 001 IS A 24" CORRUGATED METAL PIPE CULVERT LOCATED IN THE NORTHERN PORTION OF THE SITE. OUTFALL 002, LOCATED IN THE SOUTHERN PORTION OF THE SITE, CURRENTLY SHEET FLOWS OFF SITE. IT IS ANTICIPATED THAT A CULVERT WILL BE INSTALLED AT THIS LOCATION IN THE FUTURE.

3) THERE ARE NO HAZARDOUS WASTE MANAGEMENT FACILITIES ON SITE AND NONE ARE ANTICIPATED IN THE FUTURE.

4) THERE ARE NO UNDERGROUND INJECTION WELLS ON SITE AND NONE ARE ANTICIPATED IN THE FUTURE.

5) DRINKING WATER WELLS WITHIN ONE MILE OF THE FACILITY ARE SHOWN AS DOTS AND ARE BASED ON RECENT WATER WELL LOGS FROM THE ILLINOIS STATE GEOLOGICAL SURVEY AND THE STATE WATER SURVEY. FOR COMPLETENESS, IT MAY BE ASSUMED THAT EACH RESIDENCE SHOWN IS SERVED BY A PRIVATE WATER WELL.

WINNEBAGO RECLAMATION SERVICE, INC.

PAGEL LANDFILL

SITE LOCATION MAP

EPA ID Number (Copy from Item 1 of Form 1): _____

Form 2F
NPDES U.S. EPA

APPLICATION FOR PERMIT TO DISCHARGE STORMWATER DISCHARGES ASSOCIATED WITH INDUSTRIAL ACTIVITY

Paperwork Reduction Act Notice

Public reporting burden for this application is estimated to average 28.6 hours per application, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate, any other aspect of this collection of information, or suggestions for improving this form, including suggestions which may increase or reduce this burden to: Chief, Information Policy Branch, PM-223, U.S. Environmental Protection Agency, 401 M St., SW, Washington, DC 20460, or Director, Office of Information and Regulatory Affairs, Office of Management and Budget, Washington, DC 20503.

I. Outfall Location

For each outfall, list the latitude and longitude of its location to the nearest 15 seconds and the name of the receiving water.

A. Outfall Number (list)	B. Latitude			C. Longitude			D. Receiving Water (name)
001	42°	09'	30"	89°	03'	30"	~~Unnamed Tributary to~~ Killbuck Creek
002	42°	09'	45"	89°	03'	30"	Unnamed Tributary to Killbuck Creek

II. Improvements

A. *Are you now required by any Federal, State, or local authority to meet any implementation schedule for the construction, upgrading or operation of wastewater treatment equipment or practices or any other environmental programs which may affect the discharges described in this application?* This includes, but is not limited to, permit conditions, administrative or enforcement orders, enforcement compliance schedule letters, stipulations, court orders, and grant or loan conditions.

1. Identification of Conditions, Agreements, Etc.	2. Affected Outfalls		3. Brief Description of Project	4. Final Compliance Date	
	number	source of discharge		a. req.	b. proj.
N/A					

B. *You may attach additional sheets describing any additional water pollution (or other environmental projects which may affect your discharges) you now have under way or which you plan.* Indicate whether each program is now under way or planned, and indicate your actual or planned schedules for construction.

III. Site Drainage Map

Attach a site map showing topography (or indicating the outline of drainage areas served by the outfall(s) covered in the application if a topographic map is unavailable) depicting the facility including : each of its intake and discharge structures, the drainage area of each storm water outfall; paved areas and buildings within the drainage area of each storm water outfall, each known past or present areas used for outdoor storage or disposal of significant materials, each existing structural control measure to reduce pollutants in storm water runoff, materials loading and access areas, areas where pesticides, herbicides, soil conditioners and fertilizers are applied; each of its hazardous waste treatment, storage or disposal units (including each area not required to have a RCRA permit which is used for accumulating hazardous waste under 40 CFR 262.34); each well where fluids from the facility are injected underground; springs, and other surface water bodies which receive storm water discharges from the facility.

 Continue on Page 2

Continued from Page 1

IV. Narrative Description of Pollutant Sources

A. For each outfall, provide an estimate of the area (include units) of impervious surfaces (including paved areas and building roof(s) drained to the outfall, and an estimate of the total surface area drained by the outfall.

Outfall Number	Area of Impervious Surface (provide units)	Total Area Drained (provide units)	Outfall Number	Area of Impervious Surface (provide units)	Total Area Drained (provide units)
001	0 Acres	12.55 Acres	002	0 Acres	20.56

B. Provide a narrative description of significant materials that are currently or in the past three years have been treated, stored, or disposed in a manner to allow exposure to storm water; method of treatment, storage, or disposal; past and present materials management practices employed, in the last three years, to minimize contact by these materials with storm water runoff; materials loading and access areas; and the location, manner, and frequency in which pesticides, herbicides, soil conditioners, and fertilizers are applied.

There have been no nor will be any significant materials that will be stored, treated, or disposed in a manner to allow exposure to stormwater. No pesticides, herbicides, soil conditionsers, or fertilizers have been applied at this facility. Future applications will be in accordance with applicable regulations and/or permits.

C. For each outfall, provide the location and a description of existing structural and nonstructural control measures to reduce pollutants in storm water runoff; and a description of the treatment the stormwater receives, including the schedule and type of maintenance for control and treatment measures and the ultimate disposal of any solid or fluid wastes other than by discharge.

Outfall Number	Treatment	List Codes from Table 2F-1
N/A		

V. Nonstormwater Discharges

A. I certify under penalty of law that the outfall(s) covered by this application have been tested or evaluated for the presence of nonstormwater discharges, and that all nonstormwater discharges from these outfall(s) are identified in either an accompanying Form 2C or Form 2E application for the outfall.

Name and Official Title (type or print)	Signature	Date Signed
Gary L. Marzorato, Executive Vice President	G L Marzorato	March 30, 1993

B. Provide a description of the method used, the date of any testing, and the onsite drainage points that were directly observed during a test.

The contributing watershed onsite for each outfall has been evaluated for the presence of processes involving non-stormwater discharges. No such processes are present.

VI. Significant Leaks or Spills

Provide existing information regarding the history of significant leaks or spills of toxic or hazardous pollutants at the facility in the last three years, including the approximate date and location of the spill or leak, and the type and amount of material released.

N/A

 Continued on Page 3

Continued from Page 2

EPA ID Number (Copy from Item 1 of Form 1): _____

VII. Discharge Information

A,B,C, & D: See instructions before proceeding. Complete one set of tables for each outfall. Annotate the outfall number in the space provided. Tables VII-A, VII-B, and VII-C are included on separate sheets numbered VII-1 and VII-2.

E. Potential discharges not covered by analysis - Is any pollutant listed in Table 2F-2 a substance or a component of a substance which you currently use or manufacture as an intermediate or final product or byproduct?

☐ Yes (list all such pollutants below) ☒ No (go to Section VIII)

VIII. Biological Toxicity Testing Data

☐ Yes (list results below) ☒ No (go to Section IX)

IX. Contract Analysis Information

☒ Yes ☐ No (go to Section X)

A. Name	B. Address	C. Area Code and Phone Number	D. Pollutants Analyzed
National Environmental Testing, Inc.	3548 35th Street Rockford, IL 61109	(815) 874-2171	All except pH, which was measured on-site using a Cole-Parmer pH pen.

X. Certification

A. Name and Official Title (type or print)	B. Area Code and Phone Number
Gary L. Marzorati - Executive Vice President	(815) 654-4779
C. Signature	D. Date Signed
	March 30, 1993

EPA ID Number (Copy from item 1 of Form 1): _____

VII. Discharge Information (Continued from page 3 Form 2F)

Part A You must provide the results of at least one analysis for every pollutant in this table. Complete one table for each outfall. See instructions for additional details.

Pollutant and CAS Number (if available)	Maximum Values (include units)		Average Values (include units)		Number of Storm Events Sampled	Sources of Pollutants
	Grab Sample Taken During First 30 Minutes	Flow-weighted Composite	Grab Sample Taken During First 30 Minutes	Flow-weighted Composite		
Oil and Grease	1.0	N/A			1	Stormwater
Biological Oxygen Demand (BOD5)	4.0	4.0			1	Runoff
Chemical Oxygen Demand (COD)	<20.0	67.0			1	(Testing
Total Suspended Solids (TSS)	368.0	100.0			1	Required)
Total Kjeldahl Nitrogen	2.85	2.98			1	" "
Nitrate plus Nitrite Nitrogen	1.41	1.56			1	" "
Total Phosphorus	0.99	0.62			1	" "
ph 7.8	Minimum	Maximum	Minimum	Maximum		

Part B List each pollutant that is limited in an effluent guideline which the facility is subject to or any pollutant listed in the facility's NPDES permit for its process wastewater (if the facility is operating under an existing NPDES permit). Complete one table for each outfall. See the instructions for additional details and requirements.

Pollutant and CAS Number (if available)	Maximum Values (including units)		Average Values (include units)		Number Of Storm Events Sampled	Sources of Pollutants
	Grab Sample Taken During First 30 Minutes	Flow-weighted Composite	Grab Sample Taken During First 30 Minutes	Flow-weighted Composite		
N/A						

Part C - List each pollutant shown in Tables 2F-2, 2F-3, and 2F-4 that you know or have reason to believe is present. See the instructions for additional details and requirements. Complete one table for each outfall.

Pollutant and CAS Number (if available)	Maximum Values (include units)		Average Values (include units)		Number of Storm Events Sampled	Sources of Pollutants
	Grab Sample Taken During First 30 Minutes	Flow-weighted Composite	Grab Sample Taken During First 30 Minutes	Flow-weighted Composite		
Fecal Coliform	20/100 mL	N/A			1	Sludge Component
Barium, Total	0.12 mg/L	<0.10 mg/L			1	Soil Constituent
Iron, Total	23 mg/L	7.3 mg/L			1	Soil Constituent
Lead, Total	<0.20 mg/L	<0.20 mg/L			1	Soil Constituent
Manganese, Total	0.675 mg/L	0.195 mg/L			1	Soil Constituent
Zinc, Total	1.56 mg/L	0.222 mg/L			1	Soil Constituent

Part D - Provide data for the storm event(s) which resulted in the maximum values for the flow weighted composite sample.

1. Date of Storm Event	2. Duration of Storm (in minutes)	3. Total rainfall during storm event (in inches)	4. Number of hours between beginning of storm measured and end of previous measurable rain event	5. Maximum flow rate during rain event (gallons/minute or specify units)	6. Total flow from rain event (gallons or specify units)	7. Season sample was taken	8. Form of Precipitation of (rainfall, snowmelt)
March 2, 1993	410 min.	0.13 inches	120 hours	951.58 gal/min	5,792.9 gal.	Winter	Rainfall

9. Provide a description of the method of flow measurement or estimate.

The maximum flow rate was calculated using an algorithm using Bernoulli's Formula for culverts given a depth value.

The total flow was estimated using the SCS TR-55 Method of runoff estimation.

WINNEBAGO RECLAMATION SERVICE, INC.

PAGEL LANDFILL

SITE DRAINAGE MAP

NOTES:

1) TOPOGRAPHY DEVELOPED BY GEONEX-CHICAGO AERIAL SURVEY OF DES PLAINES, ILLINOIS. DATE OF PHOTOGRAPHY APRIL 26, 1990. CONDITIONS ARE SUBJECT TO CHANGE DUE TO ON-GOING LANDFILLING.

2) CONTOUR INTERVAL IS 2 FEET.

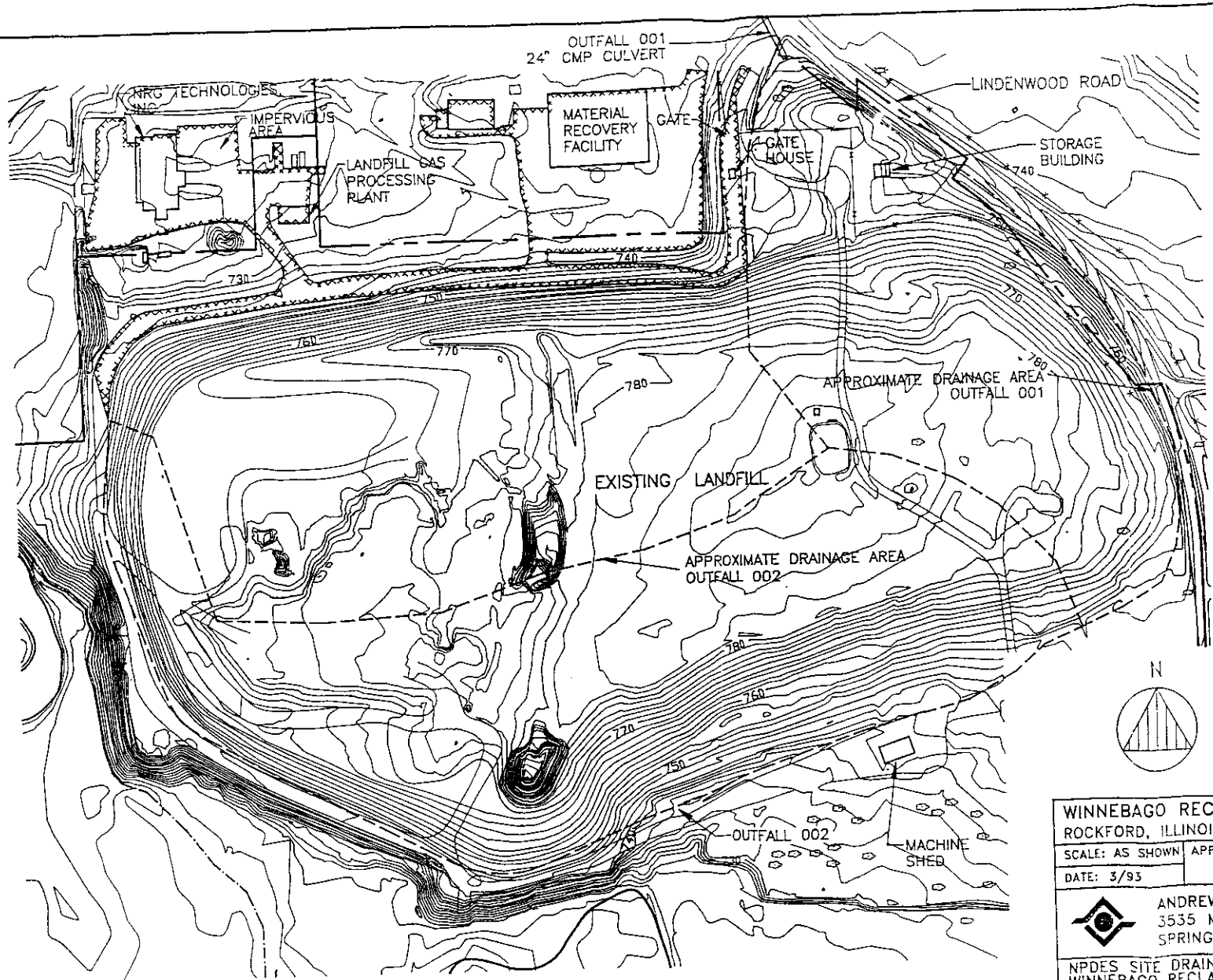
3) OUTFALL 001 IS A STORM WATER RUNOFF POINT SOURCE DISCHARGE INTO AN EXISTING 24" CMP CULVERT. OUTFALL 002 IS A STORM WATER RUNOFF SOURCE CURRENTLY SHEET FLOWS OFF SITE. IT IS ANTICIPATED THAT A CULVERT AND RELATED DITCHING WILL BE INSTALLED IN THE FUTURE.

4) THE TOTAL DRAINAGE AREA OF STORM WATER OUTFALL 001 IS APPROXIMATELY 12.6 ACRES, WITH NO IMPERVIOUS AREAS. THE DRAINAGE AREA OF OUTFALL 002 IS APPROXIMATELY 20.6 ACRES, ALSO WITH NO IMPERVIOUS AREAS.

5) UNLOADING OF NON-HAZARDOUS SOLID WASTE WILL OCCUR AT THE ACTIVE FACE OF THE LANDFILL. THIS ACTIVE FACE'S LOCATION WILL CHANGE AS LANDFILLING PROGRESSES. ALL LANDFILLED AREAS ARE COVERED BY 6" SOIL AT THE END OF EACH DAY.

6) PESTICIDES, HERBICIDES, SOIL CONDITIONERS, AND FERTILIZERS ARE NOT UTILIZED ANYWHERE ON SITE. IF SUCH ITEMS SHOULD BECOME NECESSARY, THEY WILL BE USED IN FULL COMPLIANCE WITH ANY APPLICABLE REGULATIONS.

7) OUTDOOR STORAGE OF MATERIALS HAS NOT OCCURRED IN THE PAST. IT IS NOT ANTICIPATED THAT OUTDOOR STORAGE OF ANY MATERIAL WILL PROVE NECESSARY IN THE FUTURE.



SEE ACCOMPANYING SHEET FOR APPLICABLE NOTES.

WINNEBAGO RECLAMATION SERVICE, INC.
ROCKFORD, ILLINOIS

SCALE: AS SHOWN	APPROVED BY:	REVISED:	DRAWN BY: VJM
DATE: 3/93			DESIGNED BY: DRF

ANDREWS ENVIRONMENTAL ENGINEERING, INC.
3535 MAYFLOWER BOULEVARD
SPRINGFIELD, ILLINOIS 62707 (217) 787-2334

NPDES SITE DRAINAGE MAP
WINNEBAGO RECLAMATION SERVICE, INC.
PAGEL LANDFILL

DRAWING NUMBER
90-114-SDM3

APPENDIX 2

Drainage Calculations

Project:	Winnebago Reclamation Service	By:	JB	05-96
Location:	Rockford, Illinois	Checked:	DRF	05-96
	Terrace 1			

Newly graded landfill

Soil name and hydrologic group	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN Table 2-2	Area (ac)	Product of CN * Area
Clay Cap D	newly graded, no vegetation	94	2.0	184.8
Clay Cap D	Open space, poor condition Grass cover ~ 50%	87	0.0	0.0
Vegetative Soil D	Meadow	78	0.0	0.0
Use only one CN source per line		Totals	2.0	184.8

CN (weighted) = total product/total area CN = 94

	storm	
Frequency	25	yr
Rainfall, P (24-hour)	5.60	in
Runoff, Q	4.90	in

Vegetated landfill

Soil name and hydrologic group	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN~ Table 2-2	Area acres	Product of CN * area
Vegetative Soil D	Meadow	78	2.0	153.3
Use only one CN source per line		Totals	2.0	153.3

CN (weighted) = total product/total area CN = 78

	storm	
Frequency	100	yr
Rainfall, P (24-hour)	7.36	in
Runoff, Q	4.80	in

Project:	Winnebago Reclamation Service	By:	JB	05-96
Location:	Rockford, Illinois	Checked:	DRF	05-96
	Terrace 1			

Notes : Space for as many as two segments per flow type can be used for each worksheet

SHEET FLOW (Applicable to Tc only)	Segment ID				
1. Surface Description (table 3-1)		grass			
2. Manning's roughness coeff., n (table 3-1)		0.20			
3. Flow length, L (total L < = 50 ft)	ft	50.0			
4. Two-yr 24-hr rainfall, P2	in	3.11			
5. Land slope, s	ft/ft	0.10			
6. Tt = (0.007*(nL)^0.8)/((P2^0.5)*(s^0.4)) Compute Tt	hr	0.063		=	0.063

SHALLOW CONCENTRATED FLOW	Segment ID				
7. Surface description (paved or unpaved)		unpaved			
8. Flow length, L	ft	25.0			
9. Watercourse slope, s	ft/ft	0.10			
10. *Average velocity, V (figure 3-1)*	ft/s	5.10			
11. Tt = L / (3600 * V) Compute Tt	hr	0.001		=	0.001

CHANNEL FLOW	Segment ID				
12. Cross sectional flow area, a	ft^2	5.87			
13. Wetted perimeter, pw	ft	12.55			
14. Hydraulic radius, r = a/Pw Compute r	ft	0.47			
15. Channel slope, s	ft/ft	0.022			
16. Manning's roughness coeff., n		0.052			
17. V = (1.49 * (r^(2/3)) * (s^0.5))/n Compute V	ft/s	2.57			
18. Flow length, L	ft	388.0			
19. Tt = L / (3600 * V) Compute Tt	hr	0.042		=	0.042

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)	hr	0.106

Project:	Winnebago Reclamation Service	By:	JB	05-96
Location:	Rockford, Illinois	Checked:	DRF	05-96
	Terrace 1			

1. Data:

Drainage area , Am	0.0031	mi^2
Time of concentration, Tc	0.106	hr
Rainfall distribution type (I, IA, II, III)	II	
Pond and swamp areas spread throughout watershed	0	%
2. Frequency	25	yr
3. Rainfall, P (24-hour)	5.60	in
4 Runoff curve number	94	
5. Initial abstraction, Ia	0.128	in
6. Compute Ia/P	0.023	
7. Unit peak discharge, Qu	995	in/cms
8. Runoff, Q	4.90	in
9. Pond and swamp adjustment factor, Fp (Use percent pond and swamp area with table 4-2. Factor is 1.0 for zero percent pond and swamp area.)	1	
10. Peak discharge, Qp (Where Qp = QuAmQFp)	14.98	cfs

Project:	Winnebago Reclamation Service	By:	JB 05-96
Location:	Rockford, Illinois	Checked:	DRF 05-96
	Terrace 1		

Open Channel Flow - Trapezoidal/Triangular Channel

1	RETARDANCE	D	C	
2	depth	0.95	1.30	
3	n assumed	0.0518	0.0758	
4	n calc	0.0518	0.0758	Line 4 used only for vegetated channel.
5	channel slope	0.022	0.010	
6	bottom width	0	0	
7	left sideslope	3	3	
8	right sideslope	10	10	
9	Area	5.9	11.0	
10	Wetd Perimeter	12.6	17.2	
11	Hyd radius	0.5	0.6	
12	Top width	12.4	16.9	
13	Velocity fps	2.56	1.46	
14	Discharge cfs	15.03	15.99	Line 14 must be greater than or equal to minimum discharge.
15	vR	1.20	0.93	
16	vR metric	0.11	0.09	
17	minimum discharge (cfs) =		14.98	

Project:	Winnebago Reclamation Service	By:	JB	05-96
Location:	Rockford, Illinois	Checked:	DRF	05-96
	Terrace 2			

Newly graded landfill

Soil name and hydrologic group	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN Table 2-2	Area (ac)	Product of CN * Area
Clay Cap D	newly graded, no vegetation	94	3.8	358.2
Clay Cap D	Open space, poor condition Grass cover ~ 50%	87	0.0	0.0
Vegetative Soil D	Meadow	78	0.0	0.0
Use only one CN source per line		Totals	3.8	358.2

CN (weighted) = total product/total area CN = 94

	storm	
Frequency	25	yr
Rainfall, P (24-hour)	5.60	in
Runoff, Q	4.90	in

Vegetated landfill

Soil name and hydrologic group	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN~ Table 2-2	Area acres	Product of CN * area
Vegetative Soil D	Meadow	78	3.8	297.3
Use only one CN source per line		Totals	3.8	297.3

CN (weighted) = total product/total area CN = 78

	storm	
Frequency	100	yr
Rainfall, P (24-hour)	7.36	in
Runoff, Q	4.80	in

Project:	Winnebago Reclamation Service	By:	JB	05-96
Location:	Rockford, Illinois	Checked:	DRF	05-96
	Terrace 2			

Notes : Space for as many as two segments per flow type can be used for each worksheet

SHEET FLOW (Applicable to Tc only)	Segment ID				
1. Surface Description (table 3-1)		grass			
2. Manning's roughness coeff., n (table 3-1)		0.20			
3. Flow length, L (total L <= 50 ft)	ft	50.0			
4. Two-yr 24-hr rainfall, P2	in	3.11			
5. Land slope, s	ft/ft	0.10			
6. Tt = (0.007*(nL)^0.8)/((P2^0.5)*(s^0.4)) Compute Tt	hr	0.063		=	0.063

SHALLOW CONCENTRATED FLOW	Segment ID				
7. Surface description (paved or unpaved)		unpaved			
8. Flow length, L	ft	55.0			
9. Watercourse slope, s	ft/ft	0.10			
10. Average velocity, V (figure 3-1)	ft/s	5.10			
11. Tt = L / (3600 * V) Compute Tt	hr	0.003		=	0.003

CHANNEL FLOW	Segment ID				
12. Cross sectional flow area, a	ft^2	7.17			
13. Wetted perimeter, pw	ft	13.87			
14. Hydraulic radius, r = a/Pw Compute r	ft	0.52			
15. Channel slope, s	ft/ft	0.034			
16. Manning's roughness coeff., n		0.044			
17. V = (1.49 * (r^(2/3)) * (s^0.5))/n Compute V	ft/s	3.98			
18. Flow length, L	ft	920.0			
19. Tt = L / (3600 * V) Compute Tt	hr	0.064		=	0.064

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)	hr	0.130

Project:	Winnebago Reclamation Service	By:	JB	05-96
Location:	Rockford, Illinois	Checked:	DRF	05-96
	Terrace 2			

1. Data:

Drainage area , Am	0.0060	mi^2
Time of concentration, Tc	0.130	hr
Rainfall distribution type (I, IA, II, III)	II	
Pond and swamp areas spread throughout watershed	0	%
2. Frequency	25	yr
3. Rainfall, P (24-hour)	5.60	in
4 Runoff curve number	94	
5. Initial abstraction, Ia	0.128	in
6. Compute Ia/P	0.023	
7. Unit peak discharge, Qu	945	in/cms
8. Runoff, Q	4.90	in
9. Pond and swamp adjustment factor, Fp (Use percent pond and swamp area with table 4-2. Factor is 1.0 for zero percent pond and swamp area.)	1	
10. Peak discharge, Qp (Where Qp = QuAmQFp)	27.58	cfs

Project:	Winnebago Reclamation Service	By:	JB 05-96
Location:	Rockford, Illinois	Checked:	DRF 05-96
	Terrace 2		

Open Channel Flow - Trapezoidal/Triangular Channel

1	RETARDANCE	D	C	
2	depth	1.05	1.85	
3	n assumed	0.0444	0.0687	
4	n calc	0.0444	0.0687	Line 4 used only for vegetated channel.
5	channel slope	0.034	0.004	
6	bottom width	0	0	
7	left sideslope	10	10	
8	right sideslope	3	3	
9	Area	7.2	22.2	
10	Wetd Perimeter	13.9	24.4	
11	Hyd radius	0.5	0.9	
12	Top width	13.7	24.1	
13	Velocity fps	3.97	1.28	
14	Discharge cfs	28.47	28.58	Line 14 must be greater than or equal to minimum discharge.
15	vR	2.05	1.17	
16	vR metric	0.19	0.11	
17	minimum discharge (cfs) =		27.58	

Project:	Winnebago Reclamation Service	By:	JB	05-96
Location:	Rockford, Illinois Terrace 3	Checked:	DRF	05-96

Newly graded landfill

Soil name and hydrologic group	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN Table 2-2	Area (ac)	Product of CN * Area
Clay Cap D	newly graded, no vegetation	94	0.1	6.7
Clay Cap D	Open space, poor condition Grass cover ~ 50%	87	0.0	0.0
Vegetative Soil D	Meadow	78	0.0	0.0
Use only one CN source per line		Totals	0.1	6.7

CN (weighted) = total product/total area CN = 94

	storm	
Frequency	25	yr
Rainfall, P (24-hour)	5.60	in
Runoff, Q	4.90	in

Vegetated landfill

Soil name and hydrologic group	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN~ Table 2-2	Area acres	Product of CN * area
Vegetative Soil D	Meadow	78	0.1	5.6
Use only one CN source per line		Totals	0.1	5.6

CN (weighted) = total product/total area CN = 78

	storm	
Frequency	100	yr
Rainfall, P (24-hour)	7.36	in
Runoff, Q	4.80	in

Project:	Winnebago Reclamation Service	By:	JB	05-96
Location:	Rockford, Illinois	Checked:	DRF	05-96
	Terrace 3			

Notes : Space for as many as two segments per flow type can be used for each worksheet

SHEET FLOW (Applicable to Tc only)	Segment ID				
1. Surface Description (table 3-1)		grass			
2. Manning's roughness coeff., n (table 3-1)		0.20			
3. Flow length, L (total L < = 50 ft)	ft	50.0			
4. Two-yr 24-hr rainfall, P2	in	3.11			
5. Land slope, s	ft/ft	0.10			
6. Tt = (0.007*(nL)^0.8)/((P2^0.5)*(s^0.4)) Compute Tt	hr	0.063		=	0.063

SHALLOW CONCENTRATED FLOW	Segment ID				
7. Surface description (paved or unpaved)		unpaved			
8. Flow length, L	ft	25.0			
9. Watercourse slope, s	ft/ft	0.10			
10. Average velocity, V (figure 3-1)	ft/s	5.10			
11. Tt = L / (3600 * V) Compute Tt	hr	0.001		=	0.001

CHANNEL FLOW	Segment ID				
12. Cross sectional flow area, a	ft^2	0.80			
13. Wetted perimeter, pw	ft	4.62			
14. Hydraulic radius, r = a/Pw Compute r	ft	0.17			
15. Channel slope, s	ft/ft	0.082			
16. Manning's roughness coeff., n		0.126			
17. V = (1.49 * (r^(2/3)) * (s^0.5))/n Compute V	ft/s	1.05			
18. Flow length, L	ft	113.0			
19. Tt = L / (3600 * V) Compute Tt	hr	0.030		=	0.030

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)	hr	0.094

Project:	Winnebago Reclamation Service	By:	JB	05-96
Location:	Rockford, Illinois	Checked:	DRF	05-96
	Terrace 3			

1. Data:

Drainage area , Am	0.0001	mi^2
Time of concentration, Tc	0.094	hr
Rainfall distribution type (I, IA, II, III)	II	
Pond and swamp areas spread throughout watershed	0	%
2. Frequency	25	yr
3. Rainfall, P (24-hour)	5.60	in
4 Runoff curve number	94	
5. Initial abstraction, Ia	0.128	in
6. Compute Ia/P	0.023	
7. Unit peak discharge, Qu	1000	in/cms
8. Runoff, Q	4.90	in
9. Pond and swamp adjustment factor, Fp (Use percent pond and swamp area with table 4-2. Factor is 1.0 for zero percent pond and swamp area.)	1	
10. Peak discharge, Qp (Where Qp = QuAmQFp)	0.55	cfs

Project:	Winnebago Reclamation Service	By:	JB 05-96
Location:	Rockford, Illinois	Checked:	DRF 05-96
	Terrace 3		

Open Channel Flow - Trapezoidal/Triangular Channel

	RETARDANCE	D	C
1	RETARDANCE	D	C
2	depth	0.35	0.60
3	n assumed	0.1263	0.1600
4	n calc	0.1263	0.1600
5	channel slope	0.082	0.058
6	bottom width	0	0
7	left sideslope	10	10
8	right sideslope	3	3
9	Area	0.8	2.3
10	Wetd Perimeter	4.6	7.9
11	Hyd radius	0.2	0.3
12	Top width	4.6	7.8
13	Velocity fps	1.04	0.99
14	Discharge cfs	0.83	2.32
15	vR	0.18	0.29
16	vR metric	0.02	0.03
17	minimum discharge (cfs) =		0.55

Line 4 used only for vegetated channel.

Line 14 must be greater than or equal to minimum discharge.

Project:	Winnebago Reclamation Service	By:	JB	05-96
Location:	Rockford, Illinois	Checked:	DRF	05-96
	Terrace 4			

Newly graded landfill

Soil name and hydrologic group	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN Table 2-2	Area (ac)	Product of CN * Area
Clay Cap D	newly graded, no vegetation	94	1.3	124.7
Clay Cap D	Open space, poor condition Grass cover ~ 50%	87	0.0	0.0
Vegetative Soil D	Meadow	78	0.0	0.0
Use only one CN source per line		Totals	1.3	124.7

CN (weighted) = total product/total area CN = 94

	storm	
Frequency	25	yr
Rainfall, P (24-hour)	5.60	in
Runoff, Q	4.90	in

Vegetated landfill

Soil name and hydrologic group	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN~ Table 2-2	Area acres	Product of CN * area
Vegetative Soil D	Meadow	78	1.3	103.4
Use only one CN source per line		Totals	1.3	103.4

CN (weighted) = total product/total area CN = 78

	storm	
Frequency	100	yr
Rainfall, P (24-hour)	7.36	in
Runoff, Q	4.80	in

Project:	Winnebago Reclamation Service	By:	JB	05-96
Location:	Rockford, Illinois	Checked:	DRF	05-96
	Terrace 4			

Notes : Space for as many as two segments per flow type can be used for each worksheet

SHEET FLOW (Applicable to Tc only)	Segment ID				
1. Surface Description (table 3-1)		grass			
2. Manning's roughness coeff., n (table 3-1)		0.20			
3. Flow length, L (total L <= 50 ft)	ft	50.0			
4. Two-yr 24-hr rainfall, P2	in	3.11			
5. Land slope, s	ft/ft	0.10			
6. Tt = (0.007*(nL)^0.8)/((P2^0.5)*(s^0.4)) Compute Tt	hr	0.063		=	0.063

SHALLOW CONCENTRATED FLOW	Segment ID				
7. Surface description (paved or unpaved)		unpaved			
8. Flow length, L	ft	200.0			
9. Watercourse slope, s	ft/ft	0.10			
10. Average velocity, V (figure 3-1)	ft/s	5.10			
11. Tt = L / (3600 * V) Compute Tt	hr	0.011		=	0.011

CHANNEL FLOW	Segment ID				
12. Cross sectional flow area, a	ft^2	5.27			
13. Wetted perimeter, pw	ft	11.89			
14. Hydraulic radius, r = a/Pw Compute r	ft	0.44			
15. Channel slope, s	ft/ft	0.020			
16. Manning's roughness coeff., n		0.055			
17. V = (1.49 * (r^(2/3)) * (s^0.5))/n Compute V	ft/s	2.21			
18. Flow length, L	ft	370.0			
19. Tt = L / (3600 * V) Compute Tt	hr	0.046		=	0.046

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)	hr	0.120

Project:	Winnebago Reclamation Service	By:	JB	05-96
Location:	Rockford, Illinois	Checked:	DRF	05-96
	Terrace 4			

1. Data:

Drainage area , Am	0.0021	mi^2
Time of concentration, Tc	0.120	hr
Rainfall distribution type (I, IA, II, III)	II	
Pond and swamp areas spread throughout watershed	0	%

2. Frequency	25	yr
3. Rainfall, P (24-hour)	5.60	in
4 Runoff curve number	94	
5. Initial abstraction, Ia	0.128	in
6. Compute Ia/P	0.023	
7. Unit peak discharge, Qu	970	in/cms
8. Runoff, Q	4.90	in
9. Pond and swamp adjustment factor, Fp (Use percent pond and swamp area with table 4-2. Factor is 1.0 for zero percent pond and swamp area.)	1	
10. Peak discharge, Qp (Where Qp = QuAmQFp)	9.85	cfs

Project:	Winnebago Reclamation Service	By:	JB 05-96
Location:	Rockford, Illinois	Checked:	DRF 05-96
	Terrace 4		

Open Channel Flow - Trapezoidal/Triangular Channel

1	RETARDANCE	D	C	
2	depth	0.90	1.20	
3	n assumed	0.0553	0.0860	
4	n calc	0.0553	0.0860	Line 4 used only for vegetated channel.
5	channel slope	0.020	0.010	
6	bottom width	0	0	
7	left sideslope	3	3	
8	right sideslope	10	10	
9	Area	5.3	9.4	
10	Wetd Perimeter	11.9	15.9	
11	Hyd radius	0.4	0.6	
12	Top width	11.7	15.6	
13	Velocity fps	2.21	1.22	
14	Discharge cfs	11.62	11.38	Line 14 must be greater than or equal to minimum discharge.
15	vR	0.98	0.72	
16	vR metric	0.09	0.07	
17	minimum discharge (cfs) =		9.85	

Project:	Winnebago Reclamation Service	By:	JB	05-96
Location:	Rockford, Illinois Terrace 5	Checked:	DRF	05-96

Newly graded landfill

Soil name and hydrologic group	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN Table 2-2	Area (ac)	Product of CN * Area
Clay Cap D	newly graded, no vegetation	94	2.8	260.9
Clay Cap D	Open space, poor condition Grass cover ~ 50%	87	0.0	0.0
Vegetative Soil D	Meadow	78	0.0	0.0
Use only one CN source per line		Totals	2.8	260.9

CN (weighted) = total product/total area CN = 94

	storm	
Frequency	25	yr
Rainfall, P (24-hour)	5.60	in
Runoff, Q	4.90	in

Vegetated landfill

Soil name and hydrologic group	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN~ Table 2-2	Area acres	Product of CN * area
Vegetative Soil D	Meadow	78	2.8	216.5
Use only one CN source per line		Totals	2.8	216.5

CN (weighted) = total product/total area CN = 78

	storm	
Frequency	100	yr
Rainfall, P (24-hour)	7.36	in
Runoff, Q	4.80	in

Project:	Winnebago Reclamation Service	By:	JB	05-96
Location:	Rockford, Illinois	Checked:	DRF	05-96
	Terrace 5			

Notes : Space for as many as two segments per flow type can be used for each worksheet

SHEET FLOW (Applicable to Tc only)	Segment ID				
1. Surface Description (table 3-1)		grass			
2. Manning's roughness coeff., n (table 3-1)		0.20			
3. Flow length, L (total L <= 50 ft)	ft	50.0			
4. Two-yr 24-hr rainfall, P2	in	3.11			
5. Land slope, s	ft/ft	0.10			
6. Tt = (0.007*(nL)^0.8)/((P2^0.5)*(s^0.4)) Compute Tt	hr	0.063		=	0.063

SHALLOW CONCENTRATED FLOW	Segment ID				
7. Surface description (paved or unpaved)		unpaved			
8. Flow length, L	ft	210.0			
9. Watercourse slope, s	ft/ft	0.10			
10. Average velocity, V (figure 3-1)	ft/s	5.10			
11. Tt = L / (3600 * V) Compute Tt	hr	0.011		=	0.011

CHANNEL FLOW	Segment ID				
12. Cross sectional flow area, a	ft^2	5.27			
13. Wetted perimeter, pw	ft	11.89			
14. Hydraulic radius, r = a/Pw Compute r	ft	0.44			
15. Channel slope, s	ft/ft	0.050			
16. Manning's roughness coeff., n		0.045			
17. V = (1.49 * (r^(2/3)) * (s^0.5))/n Compute V	ft/s	4.26			
18. Flow length, L	ft	630.0			
19. Tt = L / (3600 * V) Compute Tt	hr	0.041		=	0.041

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)	hr	0.115

Project:	Winnebago Reclamation Service	By:	JB	05-96
Location:	Rockford, Illinois	Checked:	DRF	05-96
	Terrace 5			

1. Data:

Drainage area , Am	0.0043	mi^2
Time of concentration, Tc	0.115	hr
Rainfall distribution type (I, IA, II, III)	II	
Pond and swamp areas spread throughout watershed	0	%
2. Frequency	25	yr
3. Rainfall, P (24-hour)	5.60	in
4 Runoff curve number	94	
5. Initial abstraction, Ia	0.128	in
6. Compute Ia/P	0.023	
7. Unit peak discharge, Qu	980	in/cms
8. Runoff, Q	4.90	in
9. Pond and swamp adjustment factor, Fp (Use percent pond and swamp area with table 4-2. Factor is 1.0 for zero percent pond and swamp area.)	1	
10. Peak discharge, Qp (Where Qp = QuAmQFp)	20.83	cfs

Project:	**Winnebago Reclamation Service**	**By:**	**JB**	**05-96**
Location:	**Rockford, Illinois**	**Checked:**	**DRF**	**05-96**
	Terrace 5			

Open Channel Flow - Trapezoidal/Triangular Channel

1	RETARDANCE	D	C	
2	depth	0.90	1.62	
3	n assumed	0.0454	0.0696	
4	n calc	0.0454	0.0696	Line 4 used only for vegetated channel.
5	channel slope	0.050	0.006	
6	bottom width	0	0	
7	left sideslope	10	10	
8	right sideslope	3	3	
9	Area	5.3	17.1	
10	Wetd Perimeter	11.9	21.4	
11	Hyd radius	0.4	0.8	
12	Top width	11.7	21.1	
13	Velocity fps	4.25	1.42	
14	Discharge cfs	22.39	24.25	Line 14 must be greater than or equal to minimum discharge.
15	vR	1.88	1.13	
16	vR metric	0.17	0.11	
17	minimum discharge (cfs) =		20.83	

Project:	Winnebago Reclamation Service	By:	JB	05-96
Location:	Rockford, Illinois	Checked:	DRF	05-96
	Terrace 6			

Newly graded landfill

Soil name and hydrologic group	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN Table 2-2	Area (ac)	Product of CN * Area
Clay Cap D	newly graded, no vegetation	94	4.3	406.9
Clay Cap D	Open space, poor condition Grass cover ~ 50%	87	0.0	0.0
Vegetative Soil D	Meadow	78	0.0	0.0
Use only one CN source per line		Totals	4.3	406.9

CN (weighted) = total product/total area CN = 94

	storm	
Frequency	25	yr
Rainfall, P (24-hour)	5.60	in
Runoff, Q	4.90	in

Vegetated landfill

Soil name and hydrologic group	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN~ Table 2-2	Area acres	Product of CN * area
Vegetative Soil D	Meadow	78	4.3	337.6
Use only one CN source per line		Totals	4.3	337.6

CN (weighted) = total product/total area CN = 78

	storm	
Frequency	100	yr
Rainfall, P (24-hour)	7.36	in
Runoff, Q	4.80	in

Project:	Winnebago Reclamation Service	By:	JB	05-96
Location:	Rockford, Illinois	Checked:	DRF	05-96
	Terrace 6			

Notes : Space for as many as two segments per flow type can be used for each worksheet

SHEET FLOW (Applicable to Tc only)	Segment ID				
1. Surface Description (table 3-1)		grass			
2. Manning's roughness coeff., n (table 3-1)		0.20			
3. Flow length, L (total L <= 50 ft)	ft	50.0			
4. Two-yr 24-hr rainfall, P2	in	3.11			
5. Land slope, s	ft/ft	0.10			
6. Tt = (0.007*(nL)^0.8)/((P2^0.5)*(s^0.4)) Compute Tt	hr	0.063		=	0.063

SHALLOW CONCENTRATED FLOW	Segment ID				
7. Surface description (paved or unpaved)		unpaved			
8. Flow length, L	ft	100.0			
9. Watercourse slope, s	ft/ft	0.10			
10. Average velocity, V (figure 3-1)	ft/s	5.10			
11. Tt = L / (3600 * V) Compute Tt	hr	0.005		=	0.005

CHANNEL FLOW	Segment ID				
12. Cross sectional flow area, a	ft^2	5.87			
13. Wetted perimeter, pw	ft	12.55			
14. Hydraulic radius, r = a/Pw Compute r	ft	0.47			
15. Channel slope, s	ft/ft	0.068			
16. Manning's roughness coeff., n		0.042			
17. V = (1.49 * (r^(2/3)) * (s^0.5))/n Compute V	ft/s	5.61			
18. Flow length, L	ft	950.0			
19. Tt = L / (3600 * V) Compute Tt	hr	0.047		=	0.047

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)	hr	0.115

Project:	Winnebago Reclamation Service	By:	JB	05-96
Location:	Rockford, Illinois	Checked:	DRF	05-96
	Terrace 6			

1. Data:

Drainage area , Am	0.0068	mi^2
Time of concentration, Tc	0.115	hr
Rainfall distribution type (I, IA, II, III)	II	
Pond and swamp areas spread throughout watershed	0	%

2. Frequency	25	yr
3. Rainfall, P (24-hour)	5.60	in
4 Runoff curve number	94	
5. Initial abstraction, Ia	0.128	in
6. Compute Ia/P	0.023	
7. Unit peak discharge, Qu	980	in/cms
8. Runoff, Q	4.90	in
9. Pond and swamp adjustment factor, Fp (Use percent pond and swamp area with table 4-2. Factor is 1.0 for zero percent pond and swamp area.)	1	
10. Peak discharge, Qp (Where Qp = QuAmQFp)	32.48	cfs

Project:	**Winnebago Reclamation Service**	**By:**	**JB 05-96**
Location:	**Rockford, Illinois**	**Checked:**	**DRF 05-96**
	Terrace 6		

Open Channel Flow - Trapezoidal/Triangular Channel

1	RETARDANCE	D	C	
2	depth	0.95	1.62	
3	*n assumed*	0.0417	0.0593	
4	n calc	0.0417	0.0593	Line 4 used only for vegetated channel.
5	channel slope	0.068	0.010	
6	bottom width	0	0	
7	left sideslope	3	3	
8	right sideslope	10	10	
9	Area	5.9	17.1	
10	Wetd Perimeter	12.6	21.4	
11	Hyd radius	0.5	0.8	
12	Top width	12.4	21.1	
13	Velocity fps	5.60	2.15	
14	Discharge cfs	32.83	36.75	Line 14 must be greater than or equal to minimum discharge.
15	vR	2.62	1.72	
16	vR metric	0.24	0.16	
17	minimum discharge (cfs) =		32.48	

Project:	**Winnebago Reclamation Service**	**By:**	**JB 05-96**
Location:	**Rockford, Illinois**	**Checked:**	**DRF 05-96**
	Terrace 6		

Open Channel Flow - Trapezoidal/Triangular Channel

1	RETARDANCE	D	C	
2	depth	0.95	1.62	
3	n assumed	0.0417	0.0593	
4	n calc	0.0417	0.0593	Line 4 used only for vegetated
5	channel slope	0.068	0.010	channel.
6	bottom width	0	0	
7	left sideslope	3	3	
8	right sideslope	10	10	
9	Area	5.9	17.1	
10	Wetd Perimeter	12.6	21.4	
11	Hyd radius	0.5	0.8	
12	Top width	12.4	21.1	
13	Velocity fps	5.60	2.15	
14	Discharge cfs	32.83	36.75	Line 14 must be greater than or
15	vR	2.62	1.72	equal to minimum discharge.
16	vR metric	0.24	0.16	
17	minimum discharge (cfs) =		32.48	

Project:	Winnebago Reclamation Service	By:	JB	05-96
Location:	Rockford, Illinois	Checked:	DRF	05-96
	Terrace 7			

Newly graded landfill

Soil name and hydrologic group	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN Table 2-2	Area (ac)	Product of CN * Area
Clay Cap D	newly graded, no vegetation	94	0.8	71.5
Clay Cap D	Open space, poor condition Grass cover ~ 50%	87	0.0	0.0
Vegetative Soil D	Meadow	78	0.0	0.0
Use only one CN source per line		Totals	0.8	71.5

CN (weighted) = total product/total area CN = 94

	storm	
Frequency	25	yr
Rainfall, P (24-hour)	5.60	in
Runoff, Q	4.90	in

Vegetated landfill

Soil name and hydrologic group	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN~ Table 2-2	Area acres	Product of CN * area
Vegetative Soil D	Meadow	78	0.8	59.3
Use only one CN source per line		Totals	0.8	59.3

CN (weighted) = total product/total area CN = 78

	storm	
Frequency	100	yr
Rainfall, P (24-hour)	7.36	in
Runoff, Q	4.80	in

Project:	Winnebago Reclamation Service	By:	JB	05-96
Location:	Rockford, Illinois Terrace 7	Checked:	DRF	05-96

Notes : Space for as many as two segments per flow type can be used for each worksheet

SHEET FLOW (Applicable to Tc only)	Segment ID				
1. Surface Description (table 3-1)		grass			
2. Manning's roughness coeff., n (table 3-1)		0.20			
3. Flow length, L (total L <= 50 ft)	ft	50.0			
4. Two-yr 24-hr rainfall, P2	in	3.11			
5. Land slope, s	ft/ft	0.10			
6. Tt = (0.007*(nL)^0.8)/((P2^0.5)*(s^0.4)) Compute Tt	hr	0.063		=	0.063

SHALLOW CONCENTRATED FLOW	Segment ID				
7. Surface description (paved or unpaved)		unpaved			
8. Flow length, L	ft	100.0			
9. Watercourse slope, s	ft/ft	0.10			
10. Average velocity, V (figure 3-1)	ft/s	5.10			
11. Tt = L / (3600 * V) Compute Tt	hr	0.005		=	0.005

CHANNEL FLOW	Segment ID				
12. Cross sectional flow area, a	ft^2	3.66			
13. Wetted perimeter, pw	ft	9.91			
14. Hydraulic radius, r = a/Pw Compute r	ft	0.37			
15. Channel slope, s	ft/ft	0.024			
16. Manning's roughness coeff., n		0.062			
17. V = (1.49 * (r^(2/3)) * (s^0.5))/n Compute V	ft/s	1.92			
18. Flow length, L	ft	290.0			
19. Tt = L / (3600 * V) Compute Tt	hr	0.042		=	0.042

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)	hr	0.110

Project:	Winnebago Reclamation Service	By:	JB	05-96
Location:	Rockford, Illinois	Checked:	DRF	05-96
	Terrace 7			

1. Data:

Drainage area , Am	0.0012	mi^2
Time of concentration, Tc	0.110	hr
Rainfall distribution type (I, IA, II, III)	II	
Pond and swamp areas spread throughout watershed	0	%

2. Frequency	25	yr
3. Rainfall, P (24-hour)	5.60	in
4 Runoff curve number	94	
5. Initial abstraction, Ia	0.128	in
6. Compute Ia/P	0.023	
7. Unit peak discharge, Qu	1000	in/cms
8. Runoff, Q	4.90	in
9. Pond and swamp adjustment factor, Fp (Use percent pond and swamp area with table 4-2. Factor is 1.0 for zero percent pond and swamp area.)	1	
10. Peak discharge, Qp (Where Qp = QuAmQFp)	5.82	cfs

Project:	Winnebago Reclamation Service	By:	JB 05-96
Location:	Rockford, Illinois	Checked:	DRF 05-96
	Terrace 7		

Open Channel Flow - Trapezoidal/Triangular Channel

1	RETARDANCE	D	C	
2	depth	0.75	1.10	
3	n assumed	0.0620	0.1039	
4	n calc	0.0620	0.1039	Line 4 used only for vegetated channel.
5	channel slope	0.024	0.010	
6	bottom width	0	0	
7	left sideslope	10	10	
8	right sideslope	3	3	
9	Area	3.7	7.9	
10	Wetd Perimeter	9.9	14.5	
11	Hyd radius	0.4	0.5	
12	Top width	9.8	14.3	
13	Velocity fps	1.91	0.95	
14	Discharge cfs	6.98	7.47	Line 14 must be greater than or equal to minimum discharge.
15	vR	0.70	0.51	
16	vR metric	0.07	0.05	
17	minimum discharge (cfs) =		5.82	

Project:	Winnebago Reclamation Service	By:	JB	05-96
Location:	Rockford, Illinois	Checked:	DRF	05-96
	Terrace 8			

Newly graded landfill

Soil name and hydrologic group	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN Table 2-2	Area (ac)	Product of CN * Area
Clay Cap D	newly graded, no vegetation	94	0.3	31.6
Clay Cap D	Open space, poor condition Grass cover ~ 50%	87	0.0	0.0
Vegetative Soil D	Meadow	78	0.0	0.0
Use only one CN source per line		Totals	0.3	31.6

CN (weighted) = total product/total area CN = 94

	storm	
Frequency	25	yr
Rainfall, P (24-hour)	5.60	in
Runoff, Q	4.90	in

Vegetated landfill

Soil name and hydrologic group	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN~ Table 2-2	Area acres	Product of CN * area
Vegetative Soil D	Meadow	78	0.3	26.2
Use only one CN source per line		Totals	0.3	26.2

CN (weighted) = total product/total area CN = 78

	storm	
Frequency	100	yr
Rainfall, P (24-hour)	7.36	in
Runoff, Q	4.80	in

Project:	Winnebago Reclamation Service	By:	JB	05-96
Location:	Rockford, Illinois	Checked:	DRF	05-96
	Terrace 8			

Notes : Space for as many as two segments per flow type can be used for each worksheet

SHEET FLOW (Applicable to Tc only)	Segment ID				
1. Surface Description (table 3-1)		grass			
2. Manning's roughness coeff., n (table 3-1)		0.20			
3. Flow length, L (total L <= 50 ft)	ft	50.0			
4. Two-yr 24-hr rainfall, P2	in	3.11			
5. Land slope, s	ft/ft	0.10			
6. Tt = (0.007*(nL)^0.8)/((P2^0.5)*(s^0.4)) Compute Tt	hr	0.063		=	0.063

SHALLOW CONCENTRATED FLOW	Segment ID				
7. Surface description (paved or unpaved)		unpaved			
8. Flow length, L	ft	55.0			
9. Watercourse slope, s	ft/ft	0.10			
10. Average velocity, V (figure 3-1)	ft/s	5.10			
11. Tt = L / (3600 * V) Compute Tt	hr	0.003		=	0.003

CHANNEL FLOW	Segment ID				
12. Cross sectional flow area, a	ft^2	1.63			
13. Wetted perimeter, pw	ft	6.61			
14. Hydraulic radius, r = a/Pw Compute r	ft	0.25			
15. Channel slope, s	ft/ft	0.064			
16. Manning's roughness coeff., n		0.070			
17. V = (1.49 * (r^(2/3)) * (s^0.5))/n Compute V	ft/s	2.11			
18. Flow length, L	ft	320.0			
19. Tt = L / (3600 * V) Compute Tt	hr	0.042		=	0.042

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)	hr	0.108

Project:	Winnebago Reclamation Service	By:	JB	05-96
Location:	Rockford, Illinois	Checked:	DRF	05-96
	Terrace 8			

1. Data:

Drainage area , Am	0.0005	mi^2
Time of concentration, Tc	0.108	hr
Rainfall distribution type (I, IA, II, III)	II	
Pond and swamp areas spread throughout watershed	0	%

2. Frequency	25	yr
3. Rainfall, P (24-hour)	5.60	in
4 Runoff curve number	94	
5. Initial abstraction, Ia	0.128	in
6. Compute Ia/P	0.023	
7. Unit peak discharge, Qu	1000	in/cms
8. Runoff, Q	4.90	in
9. Pond and swamp adjustment factor, Fp (Use percent pond and swamp area with table 4-2. Factor is 1.0 for zero percent pond and swamp area.)	1	
10. Peak discharge, Qp (Where Qp = QuAmQFp)	2.57	cfs

Project:	Winnebago Reclamation Service	By:	JB 05-96
Location:	Rockford, Illinois	Checked:	DRF 05-96
	Terrace 8		

Open Channel Flow - Trapezoidal/Triangular Channel

	RETARDANCE	D	C
1	RETARDANCE	D	C
2	depth	0.50	1.35
3	n assumed	0.0700	0.1411
4	n calc	0.0700	0.1411
5	channel slope	0.064	0.004
6	bottom width	0	0
7	left sideslope	3	3
8	right sideslope	10	10
9	Area	1.6	11.8
10	Wetd Perimeter	6.6	17.8
11	Hyd radius	0.2	0.7
12	Top width	6.5	17.6
13	Velocity fps	2.11	0.51
14	Discharge cfs	3.43	6.01
15	vR	0.52	0.34
16	vR metric	0.05	0.03
17	minimum discharge (cfs) =		2.57

Line 4 used only for vegetated channel.

Line 14 must be greater than or equal to minimum discharge.

Project:	Winnebago Reclamation Service	By:	RJC	06-96
Location:	Rockford, Illinois Ditch D1A	Checked:		

Newly graded landfill

Soil name and hydrologic group	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN Table 2-2	Area (ac)	Product of CN * Area
Clay Cap D	newly graded, no vegetation	94	2.8	263.2
Clay Cap D	Open space, poor condition Grass cover ~ 50%	87	0.0	0.0
Vegetative Soil D	Meadow	78	0.0	0.0
Use only one CN source per line		Totals	2.8	263.2

CN (weighted) = total product/total area CN = 94

	storm	
Frequency	25	yr
Rainfall, P (24-hour)	5.60	*in*
Runoff, Q	4.90	in

Vegetated landfill

Soil name and hydrologic group	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN ~ Table 2-2	Area acres	Product of CN * area
Vegetative Soil D	Meadow	78	2.8	218.4
Use only one CN source per line		Totals	2.8	218.4

CN (weighted) = total product/total area CN = 78

	storm	
Frequency	100	yr
Rainfall, P (24-hour)	7.36	in
Runoff, Q	4.80	in

Project:	Winnebago Reclamation Service	By:	RJC	06-96
Location:	Rockford, Illinois Ditch D1A	Checked:		

Notes : Space for as many as two segments per flow type can be used for each worksheet

SHEET FLOW (Applicable to Tc only)	Segment ID				
1. Surface Description (table 3-1)		grass			
2. Manning's roughness coeff., n (table 3-1)		0.20			
3. Flow length, L (total L < = 50 ft)	ft	50.0			
4. Two-yr 24-hr rainfall, P2	in	3.11			
5. Land slope, s	ft/ft	0.40			
6. Tt = (0.007*(nL)^0.8)/((P2^0.5)*(s^0.4)) Compute Tt	hr	0.036		=	0.036

SHALLOW CONCENTRATED FLOW	Segment ID				
7. Surface description (paved or unpaved)		unpaved			
8. Flow length, L	ft	284.0			
9. Watercourse slope, s	ft/ft	0.40			
10. Average velocity, V (figure 3-1)	ft/s	10.20			
11. Tt = L / (3600 * V) Compute Tt	hr	0.008		=	0.008

CHANNEL FLOW	Segment ID				
12. Cross sectional flow area, a	ft^2	7.92			
13. Wetted perimeter, pw	ft	14.68			
14. Hydraulic radius, r = a/Pw Compute r	ft	0.54			
15. Channel slope, s	ft/ft	0.019			
16. Manning's roughness coeff., n		0.048			
17. V = (1.49 * (r^(2/3)) * (s^0.5))/n Compute V	ft/s	2.82			
18. Flow length, L	ft	301.0			
19. Tt = L / (3600 * V) Compute Tt	hr	0.030		=	0.030

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)	hr	0.073

Project:	Winnebago Reclamation Service	By:	RJC	06-96
Location:	Rockford, Illinois	Checked:		
	Ditch D1A			

1. Data:

Drainage area , Am	0.0044	mi^2
Time of concentration, Tc	0.073	hr
Rainfall distribution type (I, IA, II, III)	II	
Pond and swamp areas spread throughout watershed	0	%
2. Frequency	25	yr
3. Rainfall, P (24-hour)	5.60	in
4 Runoff curve number	94	
5. Initial abstraction, Ia	0.128	in
6. Compute Ia/P	0.023	
7. Unit peak discharge, Qu	1000	in/cms
8. Runoff, Q	4.90	in
9. Pond and swamp adjustment factor, Fp (Use percent pond and swamp area with table 4-2. Factor is 1.0 for zero percent pond and swamp area.)	1	
10. Peak discharge, Qp (Where Qp = QuAmQFp)	21.44	cfs

Project:	Winnebago Reclamation Service	By:	RJC 06-96
Location:	Rockford, Illinois	Checked:	
	Ditch D1A		

Open Channel Flow - Trapezoidal/Triangular Channel

1	RETARDANCE	D	C	
2	depth	1.40	1.55	
3	n assumed	0.0326	0.0386	
4	n calc	0.0326	0.0386	Line 4 used only for vegetated
5	channel slope	0.020	0.020	channel.
6	bottom width	12	12	
7	left sideslope	2	2	
8	right sideslope	2	2	
9	Area	20.7	23.4	
10	Wetd Perimeter	18.3	18.9	
11	Hyd radius	1.1	1.2	
12	Top width	17.6	18.2	
13	Velocity fps	7.01	6.27	
14	Discharge cfs	145.31	146.78	Line 14 must be greater than or
15	vR	7.96	7.75	equal to minimum discharge.
16	vR metric	0.74	0.72	
17	minimum discharge (cfs) =		139.00	Peak combined discharge of D1A, T1, T2, and D2.

Project:	Winnebago Reclamation Service	By:	RJC	06-96
Location:	Rockford, Illinois	Checked:		
	Ditch D1B			

Newly graded landfill

Soil name and hydrologic group	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN Table 2-2	Area (ac)	Product of CN * Area
Clay Cap D	newly graded, no vegetation	94	0.0	0.0
Clay Cap D	Open space, poor condition Grass cover ~ 50%	87	0.0	0.0
Vegetative Soil D	Meadow	86	8.1	696.6
Use only one CN source per line		Totals	8.1	696.6

CN (weighted) = total product/total area CN = 86

	storm	
Frequency	25	yr
Rainfall, P (24-hour)	5.60	in
Runoff, Q	4.03	in

Vegetated landfill

Soil name and hydrologic group	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN~ Table 2-2	Area acres	Product of CN * area
Vegetative Soil D	Meadow	86	8.1	696.6
Use only one CN source per line		Totals	8.1	696.6

CN (weighted) = total product/total area CN = 86

	storm	
Frequency	100	yr
Rainfall, P (24-hour)	7.36	in
Runoff, Q	5.71	in

Project:	Winnebago Reclamation Service	By:	RJC	06-96
Location:	Rockford, Illinois Ditch D1B	Checked:		

Notes : Space for as many as two segments per flow type can be used for each worksheet

SHEET FLOW (Applicable to Tc only)	Segment ID				
1. Surface Description (table 3-1)		grass			
2. Manning's roughness coeff., n (table 3-1)		0.20			
3. Flow length, L (total L <= 50 ft)	ft	50.0			
4. Two-yr 24-hr rainfall, P2	in	3.11			
5. Land slope, s	ft/ft	0.01			
6. Tt = (0.007*(nL)^0.8)/((P2^0.5)*(s^0.4)) Compute Tt	hr	0.158		=	0.158

SHALLOW CONCENTRATED FLOW	Segment ID				
7. Surface description (paved or unpaved)		unpaved			
8. Flow length, L	ft	300.0			
9. Watercourse slope, s	ft/ft	0.01			
10. Average velocity, V (figure 3-1)	ft/s	1.61			
11. Tt = L / (3600 * V) Compute Tt	hr	0.052		=	0.052

CHANNEL FLOW	Segment ID				
12. Cross sectional flow area, a	ft^2	14.81			
13. Wetted perimeter, pw	ft	16.70			
14. Hydraulic radius, r = a/Pw Compute r	ft	0.89			
15. Channel slope, s	ft/ft	0.019			
16. Manning's roughness coeff., n		0.037			
17. V = (1.49 * (r^(2/3)) * (s^0.5))/n Compute V	ft/s	5.19			
18. Flow length, L	ft	828.0			
19. Tt = L / (3600 * V) Compute Tt	hr	0.044		=	0.044

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)	hr	0.254

Project:	Winnebago Reclamation Service	By:	RJC 06-96
Location:	Rockford, Illinois	Checked:	
	Ditch D1B		

1. Data:

Drainage area , Am	0.0127	mi^2
Time of concentration, Tc	0.254	hr
Rainfall distribution type (I, IA, II, III)	II	
Pond and swamp areas spread throughout watershed	0	%
2. Frequency	100	yr
3. Rainfall, P (24-hour)	7.36	in
4 Runoff curve number	86	
5. Initial abstraction, Ia	0.326	in
6. Compute Ia/P	0.044	
7. Unit peak discharge, Qu	1000	in/cms
8. Runoff, Q	5.71	in
9. Pond and swamp adjustment factor, Fp (Use percent pond and swamp area with table 4-2. Factor is 1.0 for zero percent pond and swamp area.)	1	
10. Peak discharge, Qp (Where Qp = QuAmQFp)	72.30	cfs

Project:	Winnebago Reclamation Service	By:	RJC 06-96
Location:	Rockford, Illinois	Checked:	
	Ditch D1B		

Open Channel Flow - Trapezoidal/Triangular Channel

1	RETARDANCE	D	C	
2	depth	1.60	1.70	
3	n assumed	0.0303	0.0358	
4	n calc	0.0303	0.0358	Line 4 used only for vegetated channel.
5	channel slope	0.026	0.026	
6	bottom width	12	12	
7	left sideslope	2	2	
8	right sideslope	2	2	
9	Area	24.3	26.2	
10	Wetd Perimeter	19.2	19.6	
11	Hyd radius	1.3	1.3	
12	Top width	18.4	18.8	
13	Velocity fps	9.27	8.12	
14	Discharge cfs	225.50	212.50	Line 14 must be greater than or equal to minimum discharge.
15	vR	11.77	10.84	
16	vR metric	1.09	1.01	
17	minimum discharge (cfs) =		211.00	

Project:	Winnebago Reclamation Service	By:	RJC	06-96
Location:	Rockford, Illinois	Checked:		
	Ditch D1C			

Newly graded landfill

Soil name and hydrologic group	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN Table 2-2	Area (ac)	Product of CN * Area
Clay Cap D	newly graded, no vegetation	94	0.0	0.0
Clay Cap D	Open space, poor condition Grass cover ~ 50%	87	0.0	0.0
Vegetative Soil D	Meadow	86	2.6	223.6
Use only one CN source per line		Totals	2.6	223.6

CN (weighted) = total product/total area CN = 86

	storm	
Frequency	25	yr
Rainfall, P (24-hour)	5.60	in
Runoff, Q	4.03	in

Vegetated landfill

Soil name and hydrologic group	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN~ Table 2-2	Area acres	Product of CN * area
Vegetative Soil D	Meadow	86	2.6	223.6
Use only one CN source per line		Totals	2.6	223.6

CN (weighted) = total product/total area CN = 86

	storm	
Frequency	100	yr
Rainfall, P (24-hour)	7.36	in
Runoff, Q	5.71	in

Project:	Winnebago Reclamation Service	By:	RJC	06-96
Location:	Rockford, Illinois Ditch D1C	Checked:		

Notes : Space for as many as two segments per flow type can be used for each worksheet

SHEET FLOW (Applicable to Tc only)	Segment ID				
1. Surface Description (table 3-1)		grass			
2. Manning's roughness coeff., n (table 3-1)		0.20			
3. Flow length, L (total L <= 50 ft)	ft	50.0			
4. Two-yr 24-hr rainfall, P2	in	3.11			
5. Land slope, s	ft/ft	0.03			
6. Tt = (0.007*(nL)^0.8)/((P2^0.5)*(s^0.4)) Compute Tt	hr	0.102		=	0.102

SHALLOW CONCENTRATED FLOW	Segment ID				
7. Surface description (paved or unpaved)		unpaved			
8. Flow length, L	ft	295.0			
9. Watercourse slope, s	ft/ft	0.03			
10. Average velocity, V (figure 3-1)	ft/s	2.79			
11. Tt = L / (3600 * V) Compute Tt	hr	0.029		=	0.029

CHANNEL FLOW	Segment ID				
12. Cross sectional flow area, a	ft^2	8.65			
13. Wetted perimeter, pw	ft	14.91			
14. Hydraulic radius, r = a/Pw Compute r	ft	0.58			
15. Channel slope, s	ft/ft	0.019			
16. Manning's roughness coeff., n		0.046			
17. V = (1.49 * (r^(2/3)) * (s^0.5))/n Compute V	ft/s	3.10			
18. Flow length, L	ft	541.0			
19. Tt = L / (3600 * V) Compute Tt	hr	0.048		=	0.048

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)	hr	0.180

Project:	Winnebago Reclamation Service	By:	RJC	06-96
Location:	Rockford, Illinois	Checked:		
	Ditch D1C			

1. Data:

Drainage area , Am	0.0041	mi^2
Time of concentration, Tc	0.180	hr
Rainfall distribution type (I, IA, II, III)	II	
Pond and swamp areas spread throughout watershed	0	%

2. Frequency	100	yr
3. Rainfall, P (24-hour)	7.36	in
4 Runoff curve number	86	
5. Initial abstraction, Ia	0.326	in
6. Compute Ia/P	0.044	
7. Unit peak discharge, Qu	1000	in/cms
8. Runoff, Q	5.71	in
9. Pond and swamp adjustment factor, Fp (Use percent pond and swamp area with table 4-2. Factor is 1.0 for zero percent pond and swamp area.)	1	
10. Peak discharge, Qp (Where Qp = QuAmQFp)	23.21	cfs

Project:	Winnebago Reclamation Service	By:	RJC 06-96
Location:	Rockford, Illinois	Checked:	
	Ditch D1C		

Open Channel Flow - Trapezoidal/Triangular Channel

1	RETARDANCE	D	C	
2	depth	1.80	1.95	
3	n assumed	0.0301	0.0353	
4	n calc	0.0301	0.0353	Line 4 used only for vegetated channel.
5	channel slope	0.020	0.020	
6	bottom width	12	12	
7	left sideslope	2	2	
8	right sideslope	2	2	
9	Area	28.1	31.0	
10	Wetd Perimeter	20.0	20.7	
11	Hyd radius	1.4	1.5	
12	Top width	19.2	19.8	
13	Velocity fps	8.74	7.79	
14	Discharge cfs	245.41	241.48	Line 14 must be greater than or equal to minimum discharge.
15	vR	12.24	11.65	
16	vR metric	1.14	1.08	
17	minimum discharge (cfs) =		234.00	

Project:	Winnebago Reclamation Service	By:	RJC	06-96
Location:	Rockford, Illinois	Checked:		
	Ditch 2			

Newly graded landfill

Soil name and hydrologic group	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN Table 2-2	Area (ac)	Product of CN * Area
Clay Cap D	newly graded, no vegetation	94	5.0	470.0
Clay Cap D	Open space, poor condition Grass cover ~ 50%	87	4.7	408.9
Vegetative Soil D	Meadow	78	0.0	0.0
Use only one CN source per line		Totals	9.7	878.9

CN (weighted) = total product/total area CN = 91

	storm	
Frequency	25	yr
Rainfall, P (24-hour)	5.60	in
Runoff, Q	4.57	in

Vegetated landfill

Soil name and hydrologic group	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN ~ Table 2-2	Area acres	Product of CN * area
Vegetative Soil D	Meadow	78	9.7	756.6
Use only one CN source per line		Totals	9.7	756.6

CN (weighted) = total product/total area CN = 78

	storm	
Frequency	100	yr
Rainfall, P (24-hour)	7.36	in
Runoff, Q	4.80	in

Project:	Winnebago Reclamation Service	By:	RJC	06-96
Location:	Rockford, Illinois Ditch 2	Checked:		

Notes : Space for as many as two segments per flow type can be used for each worksheet

SHEET FLOW (Applicable to Tc only)	Segment ID				
1. Surface Description (table 3-1)		grass			
2. Manning's roughness coeff., n (table 3-1)		0.20			
3. Flow length, L (total L < = 50 ft)	ft	50.0			
4. Two-yr 24-hr rainfall, P2	in	3.11			
5. Land slope, s	ft/ft	0.33			
6. Tt = (0.007*(nL)^0.8)/((P2^0.5)*(s^0.4)) Compute Tt	hr	0.039		=	0.039

SHALLOW CONCENTRATED FLOW	Segment ID				
7. Surface description (paved or unpaved)		unpaved			
8. Flow length, L	ft	171.0			
9. Watercourse slope, s	ft/ft	0.33			
10. Average velocity, V (figure 3-1)	ft/s	9.27			
11. Tt = L / (3600 * V) Compute Tt	hr	0.005		=	0.005

CHANNEL FLOW	Segment ID				
12. Cross sectional flow area, a	ft^2	13.81			
13. Wetted perimeter, pw	ft	12.69			
14. Hydraulic radius, r = a/Pw Compute r	ft	1.09			
15. Channel slope, s	ft/ft	0.014			
16. Manning's roughness coeff., n		0.035			
17. V = (1.49 * (r^(2/3)) * (s^0.5))/n Compute V	ft/s	5.27			
18. Flow length, L	ft	1620.0			
19. Tt = L / (3600 * V) Compute Tt	hr	0.085		=	0.085

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)	hr	0.130

Project:	Winnebago Reclamation Service	By:	RJC	06-96
Location:	Rockford, Illinois	Checked:		
	Ditch 2			

1. Data:

Drainage area , Am	0.0152	mi^2
Time of concentration, Tc	0.130	hr
Rainfall distribution type (I, IA, II, III)	II	
Pond and swamp areas spread throughout watershed	0	%

2. Frequency	100	yr
3. Rainfall, P (24-hour)	7.36	in
4 Runoff curve number	78	
5. Initial abstraction, Ia	0.564	in
6. Compute Ia/P	0.077	
7. Unit peak discharge, Qu	1000	in/cms
8. Runoff, Q	4.80	in
9. Pond and swamp adjustment factor, Fp (Use percent pond and swamp area with table 4-2. Factor is 1.0 for zero percent pond and swamp area.)	1	
10. Peak discharge, Qp (Where Qp = QuAmQFp)	72.79	cfs

Project:	Winnebago Reclamation Service	By:	RJC 06-96
Location:	Rockford, Illinois	Checked:	
	Ditch 2		

Open Channel Flow - Trapezoidal/Triangular Channel

1	RETARDANCE	D	C	
2	depth	2.35	2.55	
3	n assumed	0.0349	0.0421	
4	n calc	0.0349	0.0421	Line 4 used only for vegetated channel.
5	channel slope	0.014	0.014	
6	bottom width	0	0	
7	left sideslope	3	3	
8	right sideslope	2	2	
9	Area	13.8	16.3	
10	Wetd Perimeter	12.7	13.8	
11	Hyd radius	1.1	1.2	
12	Top width	11.8	12.8	
13	Velocity fps	5.25	4.60	
14	Discharge cfs	72.53	74.76	Line 14 must be greater than or equal to minimum discharge.
15	vR	5.72	5.43	
16	vR metric	0.53	0.50	
17	minimum discharge (cfs) =		72.79	

Project:	Winnebago Reclamation Service	By:	DRF	05-96
Location:	Rockford, Illinois	Checked:	JB	05-96
	Ditch 3			

Newly graded landfill

Soil name and hydrologic group	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN Table 2-2	Area (ac)	Product of CN * Area
Clay Cap D	newly graded, no vegetation	94	3.4	319.6
Clay Cap D	Open space, poor condition Grass cover ~ 50%	87	0.0	0.0
Vegetative Soil D	Meadow	78	0.0	0.0
Use only one CN source per line		Totals	3.4	319.6

CN (weighted) = total product/total area CN = 94

	storm	
Frequency	25	yr
Rainfall, P (24-hour)	5.60	in
Runoff, Q	4.90	in

Vegetated landfill

Soil name and hydrologic group	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN~ Table 2-2	Area acres	Product of CN * area
Vegetative Soil D	Meadow	78	3.4	265.2
Use only one CN source per line		Totals	3.4	265.2

CN (weighted) = total product/total area CN = 78

	storm	
Frequency	100	yr
Rainfall, P (24-hour)	7.36	in
Runoff, Q	4.80	in

Project:	Winnebago Reclamation Service	By:	DRF	05-96
Location:	Rockford, Illinois Ditch 3	Checked:	JB	05-96

Notes : Space for as many as two segments per flow type can be used for each worksheet

SHEET FLOW (Applicable to Tc only)	Segment ID				
1. Surface Description (table 3-1)		grass			
2. Manning's roughness coeff., n (table 3-1)		0.20			
3. Flow length, L (total L < = 50 ft)	ft	50.0			
4. Two-yr 24-hr rainfall, P2	in	3.11			
5. Land slope, s	ft/ft	0.40			
6. Tt = (0.007*(nL)^0.8)/((P2^0.5)*(s^0.4)) Compute Tt	hr	0.036		=	0.036

SHALLOW CONCENTRATED FLOW	Segment ID				
7. Surface description (paved or unpaved)		unpaved			
8. Flow length, L	ft	284.0			
9. Watercourse slope, s	ft/ft	0.40			
10. Average velocity, V (figure 3-1)	ft/s	10.20			
11. Tt = L / (3600 * V) Compute Tt	hr	0.008		=	0.008

CHANNEL FLOW	Segment ID				
12. Cross sectional flow area, a	ft^2	9.38			
13. Wetted perimeter, pw	ft	15.13			
14. Hydraulic radius, r = a/Pw Compute r	ft	0.62			
15. Channel slope, s	ft/ft	0.019			
16. Manning's roughness coeff., n		0.044			
17. V = (1.49 * (r^(2/3)) * (s^0.5))/n Compute V	ft/s	3.39			
18. Flow length, L	ft	415.0			
19. Tt = L / (3600 * V) Compute Tt	hr	0.034		=	0.034

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)	hr	0.078

Project:	Winnebago Reclamation Service	By:	DRF	05-96
Location:	Rockford, Illinois	Checked:	JB	05-96
	Ditch 3			

1. Data:

Drainage area , Am	0.0053	mi^2
Time of concentration, Tc	0.078	hr
Rainfall distribution type (I, IA, II, III)	II	
Pond and swamp areas spread throughout watershed	0	%

2. Frequency	25	yr
3. Rainfall, P (24-hour)	5.60	in
4 Runoff curve number	94	
5. Initial abstraction, Ia	0.128	in
6. Compute Ia/P	0.023	
7. Unit peak discharge, Qu	1000	in/cms
8. Runoff, Q	4.90	in
9. Pond and swamp adjustment factor, Fp (Use percent pond and swamp area with table 4-2. Factor is 1.0 for zero percent pond and swamp area.)	1	
10. Peak discharge, Qp (Where Qp = QuAmQFp)	26.04	cfs

Project:	Winnebago Reclamation Service	By:	DRF 05-96
Location:	Rockford, Illinois	Checked:	JB 05-96
	Ditch 3		

Open Channel Flow - Trapezoidal/Triangular Channel

1	RETARDANCE	D	C	
2	depth	0.70	0.80	
3	n assumed	0.0441	0.0562	
4	n calc	0.0441	0.0562	Line 4 used only for vegetated channel.
5	channel slope	0.019	0.019	
6	bottom width	12	12	
7	left sideslope	2	2	
8	right sideslope	2	2	
9	Area	9.4	10.9	
10	Wetd Perimeter	15.1	15.6	
11	Hyd radius	0.6	0.7	
12	Top width	14.8	15.2	
13	Velocity fps	3.38	2.87	
14	Discharge cfs	31.68	31.22	Line 14 must be greater than or equal to minimum discharge.
15	vR	2.09	2.00	
16	vR metric	0.19	0.19	
17	minimum discharge (cfs) =		26.04	

Project:	Winnebago Reclamation Service	By:	DRF	05-96
Location:	Rockford, Illinois	Checked:	JB	05-96
	Ditch 4A			

Newly graded landfill

Soil name and hydrologic group	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN Table 2-2	Area (ac)	Product of CN * Area
Clay Cap D	newly graded, no vegetation	94	1.6	148.5
Clay Cap D	Open space, poor condition Grass cover ~ 50%	87	0.0	0.0
Vegetative Soil D	Meadow	78	0.0	0.0
Use only one CN source per line		Totals	1.6	148.5

CN (weighted) = total product/total area CN = 94

	storm	
Frequency	25	yr
Rainfall, P (24-hour)	5.60	in
Runoff, Q	4.90	in

Vegetated landfill

Soil name and hydrologic group	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN~ Table 2-2	Area acres	Product of CN * area
Vegetative Soil D	Meadow	78	1.6	123.2
Use only one CN source per line		Totals	1.6	123.2

CN (weighted) = total product/total area CN = 78

	storm	
Frequency	100	yr
Rainfall, P (24-hour)	7.36	in
Runoff, Q	4.80	in

Project:	Winnebago Reclamation Service	By:	DRF	05-96
Location:	Rockford, Illinois Ditch 4A	Checked:	JB	05-96

Notes : Space for as many as two segments per flow type can be used for each worksheet

SHEET FLOW (Applicable to Tc only)	Segment ID				
1. Surface Description (table 3-1)		grass			
2. Manning's roughness coeff., n (table 3-1)		0.20			
3. Flow length, L (total L <= 50 ft)	ft	50.0			
4. Two-yr 24-hr rainfall, P2	in	3.11			
5. Land slope, s	ft/ft	0.40			
6. Tt = (0.007*(nL)^0.8)/((P2^0.5)*(s^0.4)) Compute Tt	hr	0.036		=	0.036

SHALLOW CONCENTRATED FLOW	Segment ID				
7. Surface description (paved or unpaved)		unpaved			
8. Flow length, L	ft	222.0			
9. Watercourse slope, s	ft/ft	0.40			
10. Average velocity, V (figure 3-1)	ft/s	10.20			
11. Tt = L / (3600 * V) Compute Tt	hr	0.006		=	0.006

CHANNEL FLOW	Segment ID				
12. Cross sectional flow area, a	ft^2	8.00			
13. Wetted perimeter, pw	ft	10.47			
14. Hydraulic radius, r = a/Pw Compute r	ft	0.76			
15. Channel slope, s	ft/ft	0.006			
16. Manning's roughness coeff., n		0.048			
17. V = (1.49 * (r^(2/3)) * (s^0.5))/n Compute V	ft/s	2.00			
18. Flow length, L	ft	363.0			
19. Tt = L / (3600 * V) Compute Tt	hr	0.050		=	0.050

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)	hr	0.093

Project:	Winnebago Reclamation Service	By:	DRF	05-96
Location:	Rockford, Illinois	Checked:	JB	05-96
	Ditch 4A			

1. Data:

Drainage area , Am	0.0025	mi^2
Time of concentration, Tc	0.093	hr
Rainfall distribution type (I, IA, II, III)	II	
Pond and swamp areas spread throughout watershed	0	%

2. Frequency	25	yr
3. Rainfall, P (24-hour)	5.60	in
4 Runoff curve number	94	
5. Initial abstraction, Ia	0.128	in
6. Compute Ia/P	0.023	
7. Unit peak discharge, Qu	1000	in/cms
8. Runoff, Q	4.90	in
9. Pond and swamp adjustment factor, Fp (Use percent pond and swamp area with table 4-2. Factor is 1.0 for zero percent pond and swamp area.)	1	
10. Peak discharge, Qp (Where Qp = QuAmQFp)	12.10	cfs

Project:	Winnebago Reclamation Service	By:	DRF 05-96
Location:	Rockford, Illinois Ditch 4A	Checked:	JB 05-96

Open Channel Flow - Trapezoidal/Triangular Channel

1	RETARDANCE	D	C	
2	depth	1.00	1.10	
3	n assumed	0.0482	0.0667	
4	n calc	0.0482	0.0667	Line 4 used only for vegetated channel.
5	channel slope	0.006	0.006	
6	bottom width	6	6	
7	left sideslope	2	2	
8	right sideslope	2	2	
9	Area	8.0	9.0	
10	Wetd Perimeter	10.5	10.9	
11	Hyd radius	0.8	0.8	
12	Top width	10.0	10.4	
13	Velocity fps	2.00	1.52	
14	Discharge cfs	15.97	13.70	Line 14 must be greater than or equal to minimum discharge.
15	vR	1.52	1.26	
16	vR metric	0.14	0.12	
17	minimum discharge (cfs) =		12.10	

Project:	Winnebago Reclamation Service	By:	DRF	05-96
Location:	Rockford, Illinois	Checked:	JB	05-96
	Ditch 4B			

Newly graded landfill

Soil name and hydrologic group	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN Table 2-2	Area (ac)	Product of CN * Area
Clay Cap D	newly graded, no vegetation	94	2.3	212.4
Clay Cap D	Open space, poor condition Grass cover ~ 50%	87	0.0	0.0
Vegetative Soil D	Meadow	78	0.0	0.0
Use only one CN source per line		Totals	2.3	212.4

CN (weighted) = total product/total area CN = 94

	storm	
Frequency	25	yr
Rainfall, P (24-hour)	5.60	in
Runoff, Q	*4.90*	*in*

Vegetated landfill

Soil name and hydrologic group	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN~ Table 2-2	Area acres	Product of CN * area
Vegetative Soil D	Meadow	78	2.3	176.3
Use only one CN source per line		Totals	2.3	176.3

CN (weighted) = total product/total area CN = 78

	storm	
Frequency	100	yr
Rainfall, P (24-hour)	7.36	in
Runoff, Q	4.80	in

Project:	Winnebago Reclamation Service	By:	DRF	05-96
Location:	Rockford, Illinois Ditch 4B	Checked:	JB	05-96

Notes : Space for as many as two segments per flow type can be used for each worksheet

SHEET FLOW (Applicable to Tc only)	Segment ID				
1. Surface Description (table 3-1)		grass			
2. Manning's roughness coeff., n (table 3-1)		0.20			
3. Flow length, L (total L <= 50 ft)	ft	50.0			
4. Two-yr 24-hr rainfall, P2	in	3.11			
5. Land slope, s	ft/ft	0.40			
6. Tt = (0.007*(nL)^0.8)/((P2^0.5)*(s^0.4)) Compute Tt	hr	0.036		=	0.036

SHALLOW CONCENTRATED FLOW	Segment ID				
7. Surface description (paved or unpaved)		unpaved			
8. Flow length, L	ft	222.0			
9. Watercourse slope, s	ft/ft	0.40			
10. Average velocity, V (figure 3-1)	ft/s	10.20			
11. Tt = L / (3600 * V) Compute Tt	hr	0.006		=	0.006

CHANNEL FLOW	Segment ID				
12. Cross sectional flow area, a	ft^2	8.00	2.65		
13. Wetted perimeter, pw	ft	10.47	5.14		
14. Hydraulic radius, r = a/Pw Compute r	ft	0.76	0.51		
15. Channel slope, s	ft/ft	0.006	0.088		
16. Manning's roughness coeff., n		0.048	0.038		
17. V = (1.49 * (r^(2/3)) * (s^0.5))/n Compute V	ft/s	2.00	7.45		
18. Flow length, L	ft	363.0	114.0		
19. Tt = L / (3600 * V) Compute Tt	hr	0.050	0.004	=	0.055

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19) hr **0.097**

Project:	Winnebago Reclamation Service	By:	DRF	05-96
Location:	Rockford, Illinois	Checked:	JB	05-96
	Ditch 4B			

1. Data:

Drainage area , Am	0.0035	mi^2
Time of concentration, Tc	0.097	hr
Rainfall distribution type (I, IA, II, III)	II	
Pond and swamp areas spread throughout watershed	0	%
2. Frequency	25	yr
3. Rainfall, P (24-hour)	5.60	in
4 Runoff curve number	94	
5. Initial abstraction, Ia	0.128	in
6. Compute Ia/P	0.023	
7. Unit peak discharge, Qu	1000	in/cms
8. Runoff, Q	4.90	in
9. Pond and swamp adjustment factor, Fp (Use percent pond and swamp area with table 4-2. Factor is 1.0 for zero percent pond and swamp area.)	1	
10. Peak discharge, Qp (Where Qp = QuAmQFp)	17.31	cfs

Project:	Winnebago Reclamation Service	By:	DRF 05-96
Location:	Rockford, Illinois Ditch 4B	Checked:	JB 05-96

Open Channel Flow - Trapezoidal/Triangular Channel

1	RETARDANCE	D	C	
2	depth	1.15	1.20	
3	n assumed	0.0381	0.0484	
4	n calc	0.0381	0.0484	Line 4 used only for vegetated channel.
5	channel slope	0.088	0.088	
6	bottom width	0	0	
7	left sideslope	2	2	
8	right sideslope	2	2	
9	Area	2.6	2.9	
10	Wetd Perimeter	5.1	5.4	
11	Hyd radius	0.5	0.5	
12	Top width	4.6	4.8	
13	Velocity fps	7.43	6.01	
14	Discharge cfs	19.64	17.32	Line 14 must be greater than or equal to minimum discharge.
15	vR	3.82	3.23	
16	vR metric	0.35	0.30	
17	minimum discharge (cfs) =		17.31	

Project:	Winnebago Reclamation Service	By:	DRF	05-96
Location:	Rockford, Illinois	Checked:	JB	05-96
	Ditch 4C			

Newly graded landfill

Soil name and hydrologic group	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN Table 2-2	Area (ac)	Product of CN * Area
Clay Cap D	newly graded, no vegetation	94	3.8	359.1
Clay Cap D	Open space, poor condition Grass cover ~ 50%	87	0.0	0.0
Vegetative Soil D	Meadow	78	0.0	0.0
Use only one CN source per line		Totals	3.8	359.1

CN (weighted) = total product/total area CN 94

	storm	
Frequency	25	yr
Rainfall, P (24-hour)	5.60	in
Runoff, Q	4.90	in

Vegetated landfill

Soil name and hydrologic group	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN~ Table 2-2	Area acres	Product of CN * area
Vegetative Soil D	Meadow	78	3.8	298.0
Use only one CN source per line		Totals	3.8	298.0

CN (weighted) = total product/total area CN 78

	storm	
Frequency	100	yr
Rainfall, P (24-hour)	7.36	in
Runoff, Q	4.80	in

Project:	Winnebago Reclamation Service	By:	DRF	05-96
Location:	Rockford, Illinois Ditch 4C	Checked:	JB	05-96

Notes : Space for as many as two segments per flow type can be used for each worksheet

SHEET FLOW (Applicable to Tc only)	Segment ID				
1. Surface Description (table 3-1)		grass			
2. Manning's roughness coeff., n (table 3-1)		0.20			
3. Flow length, L (total L <= 50 ft)	ft	50.0			
4. Two-yr 24-hr rainfall, P2	in	3.11			
5. Land slope, s	ft/ft	0.40			
6. Tt = (0.007*(nL)^0.8)/((P2^0.5)*(s^0.4)) Compute Tt	hr	0.036		=	0.036

SHALLOW CONCENTRATED FLOW	Segment ID				
7. Surface description (paved or unpaved)		unpaved			
8. Flow length, L	ft	222.0			
9. Watercourse slope, s	ft/ft	0.40			
10. Average velocity, V (figure 3-1)	ft/s	10.20			
11. Tt = L / (3600 * V) Compute Tt	hr	0.006		=	0.006

CHANNEL FLOW	Segment ID					
12. Cross sectional flow area, a	ft^2	8.00	2.65	14.00		
13. Wetted perimeter, pw	ft	10.47	5.14	16.47		
14. Hydraulic radius, r = a/Pw Compute r	ft	0.76	0.51	0.85		
15. Channel slope, s	ft/ft	0.006	0.088	0.007		
16. Manning's roughness coeff., n		0.048	0.038	0.044		
17. V = (1.49 * (r^(2/3)) * (s^0.5))/n Compute V	ft/s	2.00	7.45	2.55		
18. Flow length, L	ft	363.0	114.0	269.0		
19. Tt = L / (3600 * V) Compute Tt	hr	0.050	0.004	0.029	=	0.084

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19) hr **0.126**

Project:	Winnebago Reclamation Service	By:	DRF	05-96
Location:	Rockford, Illinois	Checked:	JB	05-96
	Ditch 4C			

1. Data:

Drainage area , Am	0.0060	mi^2
Time of concentration, Tc	0.126	hr
Rainfall distribution type (I, IA, II, III)	II	
Pond and swamp areas spread throughout watershed	0	%
2. Frequency	25	yr
3. Rainfall, P (24-hour)	5.60	in
4 Runoff curve number	94	
5. Initial abstraction, Ia	0.128	in
6. Compute Ia/P	0.023	
7. Unit peak discharge, Qu	1000	in/cms
8. Runoff, Q	4.90	in
9. Pond and swamp adjustment factor, Fp (Use percent pond and swamp area with table 4-2. Factor is 1.0 for zero percent pond and swamp area.)	1	
10. Peak discharge, Qp (Where Qp = QuAmQFp)	29.25	cfs

Project:	Winnebago Reclamation Service	By:	DRF 05-96
Location:	Rockford, Illinois	Checked:	JB 05-96
	Ditch 4C		

Open Channel Flow - Trapezoidal/Triangular Channel

1	RETARDANCE	D	C	
2	depth	1.00	1.10	
3	n assumed	0.0438	0.0572	
4	n calc	0.0438	0.0572	Line 4 used only for vegetated
5	channel slope	0.007	0.007	channel.
6	bottom width	12	12	
7	left sideslope	2	2	
8	right sideslope	2	2	
9	Area	14.0	15.6	
10	Wetd Perimeter	16.5	16.9	
11	Hyd radius	0.8	0.9	
12	Top width	16.0	16.4	
13	Velocity fps	2.55	2.06	
14	Discharge cfs	35.66	32.19	Line 14 must be greater than or
15	vR	2.16	1.90	equal to minimum discharge.
16	vR metric	0.20	0.18	
17	minimum discharge (cfs) =		29.25	

Project:	Winnebago Reclamation Service	By:	DRF	05-96
Location:	Rockford, Illinois	Checked:	JB	05-96
	Ditch 5			

Newly graded landfill

Soil name and hydrologic group	Cover description (cover type, treatment, and hydrologic condition; percent impervious; *unconnected/connected impervious* area ratio)	CN Table 2-2	Area (ac)	Product of CN * Area
Clay Cap D	newly graded, no vegetation	94	4.5	422.1
Clay Cap D	Open space, poor condition Grass cover ~ 50%	87	0.0	0.0
Vegetative Soil D	Meadow	78	0.0	0.0
Use only one CN source per line		Totals	4.5	422.1

CN (weighted) = total product/total area CN = 94

	storm	
Frequency	25	yr
Rainfall, P (24-hour)	5.60	in
Runoff, Q	4.90	in

Vegetated landfill

Soil name and hydrologic group	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious *area ratio)*	CN~ Table 2-2	Area acres	Product of CN * area
Vegetative Soil D	Meadow	78	4.5	350.2
Use only one CN source per line		Totals	4.5	350.2

CN (weighted) = total product/total area CN = 78

	storm	
Frequency	100	yr
Rainfall, P (24-hour)	7.36	in
Runoff, Q	4.80	in

Project:	Winnebago Reclamation Service	By:	DRF	05-96
Location:	Rockford, Illinois Ditch 5	Checked:	JB	05-96

Notes : Space for as many as two segments per flow type can be used for each worksheet

SHEET FLOW (Applicable to Tc only)	Segment ID				
1. Surface Description (table 3-1)		grass			
2. Manning's roughness coeff., n (table 3-1)		0.20			
3. Flow length, L (total L <= 50 ft)	ft	50.0			
4. Two-yr 24-hr rainfall, P2	in	3.11			
5. Land slope, s	ft/ft	0.40			
6. Tt = (0.007*(nL)^0.8)/((P2^0.5)*(s^0.4)) Compute Tt	hr	0.036		=	0.036

SHALLOW CONCENTRATED FLOW	Segment ID				
7. Surface description (paved or unpaved)		unpaved			
8. Flow length, L	ft	270.0			
9. Watercourse slope, s	ft/ft	0.40			
10. Average velocity, V (figure 3-1)	ft/s	10.20			
11. Tt = L / (3600 * V) Compute Tt	hr	0.007		=	0.007

CHANNEL FLOW	Segment ID				
12. Cross sectional flow area, a	ft^2	12.42			
13. Wetted perimeter, pw	ft	16.02			
14. Hydraulic radius, r = a/Pw Compute r	ft	0.78			
15. Channel slope, s	ft/ft	0.010			
16. Manning's roughness coeff., n		0.043			
17. V = (1.49 * (r^(2/3)) * (s^0.5))/n Compute V	ft/s	2.90			
18. Flow length, L	ft	583.0			
19. Tt = L / (3600 * V) Compute Tt	hr	0.056		=	0.056

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)	hr	0.099

Project:	Winnebago Reclamation Service	By:	DRF	05-96
Location:	Rockford, Illinois	Checked:	JB	05-96
	Ditch 5			

1. Data:

Drainage area , Am	0.0070	mi^2
Time of concentration, Tc	0.099	hr
Rainfall distribution type (I, IA, II, III)	II	
Pond and swamp areas spread throughout watershed	0	%
2. Frequency	25	yr
3. Rainfall, P (24-hour)	5.60	in
4 Runoff curve number	94	
5. Initial abstraction, Ia	0.128	in
6. Compute Ia/P	0.023	
7. Unit peak discharge, Qu	1000	in/cms
8. Runoff, Q	4.90	in
9. Pond and swamp adjustment factor, Fp (Use percent pond and swamp area with table 4-2. Factor is 1.0 for zero percent pond and swamp area.)	1	
10. Peak discharge, Qp (Where Qp = QuAmQFp)	34.38	cfs

Project:	Winnebago Reclamation Service	By:	DRF 05-96
Location:	Rockford, Illinois Ditch 5	Checked:	JB 05-96

Open Channel Flow - Trapezoidal/Triangular Channel

1	RETARDANCE	D	C	
2	depth	0.90	1.05	
3	n assumed	0.0433	0.0541	
4	n calc	0.0433	0.0541	Line 4 used only for vegetated channel.
5	channel slope	0.010	0.010	
6	bottom width	12	12	
7	left sideslope	2	2	
8	right sideslope	2	2	
9	Area	12.4	14.8	
10	Wetd Perimeter	16.0	16.7	
11	Hyd radius	0.8	0.9	
12	Top width	15.6	16.2	
13	Velocity fps	2.90	2.54	
14	Discharge cfs	35.96	37.53	Line 14 must be greater than or equal to minimum discharge.
15	vR	2.24	2.25	
16	vR metric	0.21	0.21	
17	minimum discharge (cfs) =		34.38	

Project:	Winnebago Reclamation Service	By:	DRF	05-96
Location:	Rockford, Illinois	Checked:	JB	05-96
	Ditch 6A			

Newly graded landfill

Soil name and hydrologic group	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN Table 2-2	Area (ac)	Product of CN * Area
Clay Cap D	newly graded, no vegetation	94	5.0	470.0
Clay Cap D	Open space, poor condition Grass cover ~ 50%	87	3.6	313.2
Vegetative Soil D	Meadow	78	0.0	0.0
Use only one CN source per line		Totals	8.6	783.2

CN (weighted) = total product/total area CN = 91

	storm	
Frequency	25	yr
Rainfall, P (24-hour)	6.60	in
Runoff, Q	4.57	in

Vegetated landfill

Soil name and hydrologic group	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN~ Table 2-2	Area acres	Product of CN * area
Vegetative Soil D	Meadow	78	8.6	670.8
Use only one CN source per line		Totals	8.6	670.8

CN (weighted) = total product/total area CN = 78

	storm	
Frequency	100	yr
Rainfall, P (24-hour)	7.36	in
Runoff, Q	4.80	in

Project:	Winnebago Reclamation Service	By:	DRF	05-96
Location:	Rockford, Illinois	Checked:	JB	05-96
	Ditch 6A			

Notes : Space for as many as two segments per flow type can be used for each worksheet

SHEET FLOW (Applicable to Tc only)	Segment ID				
1. Surface Description (table 3-1)		grass			
2. Manning's roughness coeff., n (table 3-1)		0.20			
3. Flow length, L (total L < = 50 ft)	ft	50.0			
4. Two-yr 24-hr rainfall, P2	in	3.11			
5. Land slope, s	ft/ft	0.33			
6. Tt = (0.007*(nL)^0.8)/((P2^0.5)*(s^0.4)) Compute Tt	hr	0.039		=	0.039

SHALLOW CONCENTRATED FLOW	Segment ID				
7. Surface description (paved or unpaved)		unpaved			
8. Flow length, L	ft	170.0			
9. Watercourse slope, s	ft/ft	0.33			
10. Average velocity, V (figure 3-1)	ft/s	9.31			
11. Tt = L / (3600 * V) Compute Tt	hr	0.005		=	0.005

CHANNEL FLOW	Segment ID				
12. Cross sectional flow area, a	ft^2	1.63	14.00		
13. Wetted perimeter, pw	ft	6.61	16.47		
14. Hydraulic radius, r = a/Pw Compute r	ft	0.25	0.85		
15. Channel slope, s	ft/ft	0.064	0.022		
16. Manning's roughness coeff., n		0.070	0.037		
17. V = (1.49 * (r^(2/3)) * (s^0.5))/n Compute V	ft/s	2.11	5.43		
18. Flow length, L	ft	320.0	1013.0		
19. Tt = L / (3600 * V) Compute Tt	hr	0.042	0.052	=	0.094

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)	hr	0.138

Project:	Winnebago Reclamation Service	By:	DRF	05-96
Location:	Rockford, Illinois	Checked:	JB	05-96
	Ditch 6A			

1. Data:

Drainage area , Am	0.0134	mi^2
Time of concentration, Tc	0.138	hr
Rainfall distribution type (I, IA, II, III)	II	
Pond and swamp areas spread throughout watershed	0	%
2. Frequency	100	yr
3. Rainfall, P (24-hour)	7.36	in
4 Runoff curve number	78	
5. Initial abstraction, Ia	0.564	in
6. Compute Ia/P	0.077	
7. Unit peak discharge, Qu	1000	in/cms
8. Runoff, Q	4.80	in
9. *Pond and swamp adjustment factor, Fp* (Use percent pond and swamp area with table 4-2. Factor is 1.0 for zero percent pond and swamp area.)	1	
10. Peak discharge, Qp (Where Qp = QuAmQFp)	64.54	cfs

Project:	Winnebago Reclamation Service	By:	DRF	05-96
Location:	Rockford, Illinois	Checked:	JB	05-96
	Ditch 6A			

Open Channel Flow - Trapezoidal/Triangular Channel

1	RETARDANCE	D	C	
2	depth	1.00	1.05	
3	n assumed	0.0365	0.0457	
4	n calc	0.0365	0.0457	Line 4 used only for vegetated channel.
5	channel slope	0.022	0.022	
6	bottom width	12	12	
7	left sideslope	2	2	
8	right sideslope	2	2	
9	Area	14.0	14.8	
10	Wetd Perimeter	16.5	16.7	
11	Hyd radius	0.8	0.9	
12	Top width	16.0	16.2	
13	Velocity fps	5.42	4.45	
14	Discharge cfs	75.85	65.91	Line 14 must be greater than or equal to minimum discharge.
15	vR	4.61	3.95	
16	vR metric	0.43	0.37	
17	minimum discharge (cfs) =		64.54	

Project:	Winnebago Reclamation Service	By:	DRF	05-96
Location:	Rockford, Illinois	Checked:	JB	05-96
	Ditch 6B			

Newly graded landfill

Soil name and hydrologic group	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN Table 2-2	Area (ac)	Product of CN * Area
Clay Cap D	newly graded, no vegetation	94	5.0	470.0
Clay Cap D	Open space, poor condition Grass cover ~ 50%	87	5.0	435.0
Vegetative Soil D	Meadow	78	2.1	164.6
Use only one CN source per line		Totals	12.1	1069.6

CN (weighted) = total product/total area CN = 89

	storm	
Frequency	25	yr
Rainfall, P (24-hour)	5.60	in
Runoff, Q	4.35	in

Vegetated landfill

Soil name and hydrologic group	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN~ Table 2-2	Area acres	Product of CN * area
Vegetative Soil D	Meadow	78	12.1	944.6
Use only one CN source per line		Totals	12.1	944.6

CN (weighted) = total product/total area CN = 78

	storm	
Frequency	100	yr
Rainfall, P (24-hour)	7.36	in
Runoff, Q	4.80	in

Project:	Winnebago Reclamation Service	By:	DRF	05-96
Location:	Rockford, Illinois Ditch 6B	Checked:	JB	05-96

Notes : Space for as many as two segments per flow type can be used for each worksheet

SHEET FLOW (Applicable to Tc only)	Segment ID				
1. Surface Description (table 3-1)		grass			
2. Manning's roughness coeff., n (table 3-1)		0.20			
3. Flow length, L (total L <= 50 ft)	ft	50.0			
4. Two-yr 24-hr rainfall, P2	in	3.11			
5. Land slope, s	ft/ft	0.33			
6. Tt = (0.007*(nL)^0.8)/((P2^0.5)*(s^0.4)) Compute Tt	hr	0.039		=	0.039

SHALLOW CONCENTRATED FLOW	Segment ID				
7. Surface description (paved or unpaved)		unpaved			
8. Flow length, L	ft	170.0			
9. Watercourse slope, s	ft/ft	0.33			
10. Average velocity, V (figure 3-1)	ft/s	9.31			
11. Tt = L / (3600 * V) Compute Tt	hr	0.005		=	0.005

CHANNEL FLOW	Segment ID					
12. Cross sectional flow area, a	ft^2	1.63	14.00	17.28		
13. Wetted perimeter, pw	ft	6.61	16.47	17.37		
14. Hydraulic radius, r = a/Pw Compute r	ft	0.25	0.85	1.00		
15. Channel slope, s	ft/ft	0.064	0.022	0.016		
16. Manning's roughness coeff., n		0.070	0.037	0.036		
17. V = (1.49 * (r^(2/3)) * (s^0.5))/n Compute V	ft/s	2.11	5.43	5.29		
18. Flow length, L	ft	320.0	1013.0	616.0		
19. Tt = L / (3600 * V) Compute Tt	hr	0.042	0.052	0.032	=	0.126

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)	hr		0.170

Project:	Winnebago Reclamation Service	By:	DRF	05-96
Location:	Rockford, Illinois	Checked:	JB	05-96
	Ditch 6B			

1. Data:

Drainage area , Am	0.0189	mi^2
Time of concentration, Tc	0.170	hr
Rainfall distribution type (I, IA, II, III)	II	
Pond and swamp areas spread throughout watershed	0	%

2. Frequency	100	yr
3. Rainfall, P (24-hour)	7.36	in
4 Runoff curve number	78	
5. Initial abstraction, Ia	0.564	in
6. Compute Ia/P	0.077	
7. Unit peak discharge, Qu	950	in/cms
8. Runoff, Q	4.80	in
9. Pond and swamp adjustment factor, Fp (Use percent pond and swamp area with table 4-2. Factor is 1.0 for zero percent pond and swamp area.)	1	
10. Peak discharge, Qp (Where Qp = QuAmQFp)	86.33	cfs

Project:	Winnebago Reclamation Service	By:	DRF 05-96
Location:	Rockford, Illinois	Checked:	JB 05-96
	Ditch 6B		

Open Channel Flow - Trapezoidal/Triangular Channel

1	RETARDANCE	D	C	
2	depth	1.20	1.35	
3	n assumed	0.0355	0.0426	
4	n calc	0.0355	0.0426	Line 4 used only for vegetated channel.
5	channel slope	0.016	0.016	
6	bottom width	12	12	
7	left sideslope	2	2	
8	right sideslope	2	2	
9	Area	17.3	19.8	
10	Wetd Perimeter	17.4	18.0	
11	Hyd radius	1.0	1.1	
12	Top width	16.8	17.4	
13	Velocity fps	5.28	4.70	
14	Discharge cfs	91.19	93.32	Line 14 must be greater than or equal to minimum discharge.
15	vR	5.25	5.17	
16	vR metric	0.49	0.48	
17	minimum discharge (cfs) =		86.33	

Project:	Winnebago Reclamation Service	By:	DRF	05-96
Location:	Rockford, Illinois	Checked:	JB	05-96
	Ditch 7			

Newly graded landfill

Soil name and hydrologic group	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN Table 2-2	Area (ac)	Product of CN * Area
Clay Cap D	newly graded, no vegetation	94	0.5	46.2
Clay Cap D	Open space, poor condition Grass cover ~ 50%	87	0.0	0.0
Vegetative Soil D	Meadow	78	0.0	0.0
Use only one CN source per line		Totals	0.5	46.2

CN (weighted) = total product/total area CN = 94

	storm	
Frequency	25	yr
Rainfall, P (24-hour)	5.60	in
Runoff, Q	4.90	in

Vegetated landfill

Soil name and hydrologic group	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN~ Table 2-2	Area acres	Product of CN * area
Vegetative Soil D	Meadow	78	0.5	38.4
Use only one CN source per line		Totals	0.5	38.4

CN (weighted) = total product/total area CN = 78

	storm	
Frequency	100	yr
Rainfall, P (24-hour)	7.36	in
Runoff, Q	4.80	in

Project:	Winnebago Reclamation Service	By:	DRF	05-96
Location:	Rockford, Illinois	Checked:	JB	05-96
	Ditch 7			

Notes : Space for as many as two segments per flow type can be used for each worksheet

SHEET FLOW (Applicable to Tc only)	Segment ID				
1. Surface Description (table 3-1)		grass			
2. Manning's roughness coeff., n (table 3-1)		0.20			
3. Flow length, L (total L <= 50 ft)	ft	50.0			
4. Two-yr 24-hr rainfall, P2	in	3.11			
5. Land slope, s	ft/ft	0.33			
6. Tt = (0.007*(nL)^0.8)/((P2^0.5)*(s^0.4)) Compute Tt	hr	0.039		=	0.039

SHALLOW CONCENTRATED FLOW	Segment ID				
7. Surface description (paved or unpaved)		unpaved			
8. Flow length, L	ft	170.0			
9. Watercourse slope, s	ft/ft	0.33			
10. Average velocity, V (figure 3-1)	ft/s	9.31			
11. Tt = L / (3600 * V) Compute Tt	hr	0.005		=	0.005

CHANNEL FLOW	Segment ID				
12. Cross sectional flow area, a	ft^2	1.81			
13. Wetted perimeter, pw	ft	4.35			
14. Hydraulic radius, r = a/Pw Compute r	ft	0.42			
15. Channel slope, s	ft/ft	0.023			
16. Manning's roughness coeff., n		0.057			
17. V = (1.49 * (r^(2/3)) * (s^0.5))/n Compute V	ft/s	2.21			
18. Flow length, L	ft	176.0			
19. Tt = L / (3600 * V) Compute Tt	hr	0.022		=	0.022

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)	hr	0.066

Project:	Winnebago Reclamation Service	By:	DRF	05-96
Location:	Rockford, Illinois	Checked:	JB	05-96
	Ditch 7			

1. Data:

Drainage area , Am	0.0008	mi^2
Time of concentration, Tc	0.066	hr
Rainfall distribution type (I, IA, II, III)	II	
Pond and swamp areas spread throughout watershed	0	%
2. Frequency	25	yr
3. Rainfall, P (24-hour)	5.60	in
4 Runoff curve number	94	
5. Initial abstraction, Ia	0.128	in
6. Compute Ia/P	0.023	
7. Unit peak discharge, Qu	1000	in/cms
8. Runoff, Q	4.90	in
9. Pond and swamp adjustment factor, Fp (Use percent pond and swamp area with table 4-2. Factor is 1.0 for zero percent pond and swamp area.)	1	
10. Peak discharge, Qp (Where Qp = QuAmQFp)	3.77	cfs

Project:	Winnebago Reclamation Service	By:	DRF 05-96
Location:	Rockford, Illinois	Checked:	JB 05-96
	Ditch 7		

Open Channel Flow - Trapezoidal/Triangular Channel

1	RETARDANCE	D	C
2	depth	0.95	1.10
3	n assumed	0.0566	0.0803
4	n calc	0.0566	0.0803
5	channel slope	0.023	0.023
6	bottom width	0	0
7	left sideslope	3	3
8	right sideslope	1	1
9	Area	1.8	2.4
10	Wetd Perimeter	4.3	5.0
11	Hyd radius	0.4	0.5
12	Top width	3.8	4.4
13	Velocity fps	2.20	1.71
14	Discharge cfs	3.97	4.14
15	vR	0.91	0.82
16	vR metric	0.08	0.08
17	minimum discharge (cfs) =		3.77

Line 4 used only for vegetated channel.

Line 14 must be greater than or equal to minimum discharge.

Project:	Winnebago Reclamation Service	By:	RJC	06-96
Location:	Rockford, Illinois	Checked:		
	Outlet #1			

Newly graded landfill

Soil name and hydrologic group	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN Table 2-2	Area (ac)	Product of CN * Area
Clay Cap D	newly graded, no vegetation	94	5.0	470.0
Clay Cap D	Open space, poor condition Grass cover ~ 50%	87	5.0	435.0
Vegetative Soil D	Meadow	78	23.9	1864.2
Use only one CN source per line		Totals	33.9	2769.2

CN (weighted) = total product/total area CN = 82

	storm	
Frequency	25	yr
Rainfall, P (24-hour)	5.60	in
Runoff, Q	3.62	in

Vegetated landfill

Soil name and hydrologic group	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN~ Table 2-2	Area acres	Product of CN * area
Vegetative Soil D	Meadow	78	23.9	1864.2
Use only one CN source per line		Totals	23.9	1864.2

CN (weighted) = total product/total area CN = 78

	storm	
Frequency	100	yr
Rainfall, P (24-hour)	7.36	in
Runoff, Q	4.80	in

Project:	Winnebago Reclamation Service	By:	RJC	06-96
Location:	Rockford, Illinois Outlet #1	Checked:		

Notes : Space for as many as two segments per flow type can be used for each worksheet

SHEET FLOW (Applicable to Tc only)	Segment ID				
1. Surface Description (table 3-1)		grass			
2. Manning's roughness coeff., n (table 3-1)		0.20			
3. Flow length, L (total L <= 50 ft)	ft	0.0			
4. Two-yr 24-hr rainfall, P2	in	3.11			
5. Land slope, s	ft/ft	0.02			
6. Tt = (0.007*(nL)^0.8)/((P2^0.5)*(s^0.4)) Compute Tt	hr	0.000		=	0.000

SHALLOW CONCENTRATED FLOW	Segment ID				
7. Surface description (paved or unpaved)		unpaved			
8. Flow length, L	ft	0.0			
9. Watercourse slope, s	ft/ft	0.02			
10. Average velocity, V (figure 3-1)	ft/s	2.28			
11. Tt = L / (3600 * V) Compute Tt	hr	0.000		=	0.000

CHANNEL FLOW	Segment ID				
12. Cross sectional flow area, a	ft^2	34.02			
13. Wetted perimeter, pw	ft	21.39			
14. Hydraulic radius, r = a/Pw Compute r	ft	1.59			
15. Channel slope, s	ft/ft	0.015			
16. Manning's roughness coeff., n		0.030			
17. V = (1.49 * (r^(2/3)) * (s^0.5))/n Compute V	ft/s	8.40			
18. Flow length, L	ft	398.0			
19. Tt = L / (3600 * V) Compute Tt	hr	0.013		=	0.013

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)	hr	0.013

Project:	Winnebago Reclamation Service	By:	RJC	06-96
Location:	Rockford, Illinois	Checked:		
	Outlet #1			

1. Data:

Drainage area , Am	0.0530	mi^2
Time of concentration, Tc	0.013	hr
Rainfall distribution type (I, IA, II, III)	II	
Pond and swamp areas spread throughout watershed	0	%

2. Frequency	100	yr
3. Rainfall, P (24-hour)	7.36	in
4 Runoff curve number	78	
5. Initial abstraction, Ia	0.564	in
6. Compute Ia/P	0.077	
7. Unit peak discharge, Qu	1000	in/cms
8. Runoff, Q	4.80	in
9. Pond and swamp adjustment factor, Fp (Use percent pond and swamp area with table 4-2. Factor is 1.0 for zero percent pond and swamp area.)	1	
10. Peak discharge, Qp (Where Qp = QuAmQFp)	254.39	cfs

Project:	Winnebago Reclamation Service	By:	RJC 06-96
Location:	Rockford, Illinois	Checked:	
	Outlet #1		

Open Channel Flow - Trapezoidal/Triangular Channel

1	RETARDANCE	D	C	
2	depth	2.10	2.20	
3	n assumed	0.0296	0.0351	
4	n calc	0.0296	0.0351	Line 4 used only for vegetated channel.
5	channel slope	0.015	0.015	
6	bottom width	12	12	
7	left sideslope	2	2	
8	right sideslope	2	2	
9	Area	34.0	36.1	
10	Wetd Perimeter	21.4	21.8	
11	Hyd radius	1.6	1.7	
12	Top width	20.4	20.8	
13	Velocity fps	8.38	7.25	
14	Discharge cfs	284.99	261.45	Line 14 must be greater than or equal to minimum discharge.
15	vR	13.32	11.97	
16	vR metric	1.24	1.11	
17	minimum discharge (cfs) =		250.69	

Project:	Winnebago Reclamation Service	By:	RJC	06-96
Location:	Rockford, Illinois	Checked:		
	Outlet #2			

Newly graded landfill

Soil name and hydrologic group	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN Table 2-2	Area (ac)	Product of CN * Area
Clay Cap D	newly graded, no vegetation	94	5.0	470.0
Clay Cap D	Open space, poor condition Grass cover ~ 50%	87	5.0	435.0
Vegetative Soil D	Meadow	78	4.5	352.6
Use only one CN source per line		Totals	14.5	1257.6

CN (weighted) = total product/total area CN = 87

	storm	
Frequency	25	yr
Rainfall, P (24-hour)	5.60	in
Runoff, Q	4.14	in

Vegetated landfill

Soil name and hydrologic group	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN – Table 2-2	Area acres	Product of CN * area
Vegetative Soil D	Meadow	78	14.5	1131.0
Use only one CN source per line		Totals	14.5	1131.0

CN (weighted) = total product/total area CN = 78

	storm	
Frequency	100	yr
Rainfall, P (24-hour)	7.36	in
Runoff, Q	4.80	in

Project:	Winnebago Reclamation Service	By:	RJC	06-96
Location:	Rockford, Illinois Outlet #2	Checked:		

Notes : Space for as many as two segments per flow type can be used for each worksheet

SHEET FLOW (Applicable to Tc only)	Segment ID				
1. Surface Description (table 3-1)		grass			
2. Manning's roughness coeff., n (table 3-1)		0.20			
3. Flow length, L (total L <= 50 ft)	ft	0.0			
4. Two-yr 24-hr rainfall, P2	in	3.11			
5. Land slope, s	ft/ft	0.02			
6. Tt = (0.007*(nL)^0.8)/((P2^0.5)*(s^0.4)) Compute Tt	hr	0.000		=	0.000

SHALLOW CONCENTRATED FLOW	Segment ID				
7. Surface description (paved or unpaved)		unpaved			
8. Flow length, L	ft	0.0			
9. Watercourse slope, s	ft/ft	0.02			
10. Average velocity, V (figure 3-1)	ft/s	2.28			
11. Tt = L / (3600 * V) Compute Tt	hr	0.000		=	0.000

CHANNEL FLOW	Segment ID				
12. Cross sectional flow area, a	ft^2	16.45			
13. Wetted perimeter, pw	ft	17.14			
14. Hydraulic radius, r = a/Pw Compute r	ft	0.96			
15. Channel slope, s	ft/ft	0.028			
16. Manning's roughness coeff., n		0.034			
17. V = (1.49 * (r^(2/3)) * (s^0.5))/n Compute V	ft/s	7.24			
18. Flow length, L	ft	680.0			
19. Tt = L / (3600 * V) Compute Tt	hr	0.026		=	0.026

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)	hr	0.026

Project:	Winnebago Reclamation Service	By:	RJC 06-96
Location:	Rockford, Illinois	Checked:	
	Outlet #2		

1. Data:

Drainage area , Am	0.0227	mi^2
Time of concentration, Tc	0.026	hr
Rainfall distribution type (I, IA, II, III)	II	
Pond and swamp areas spread throughout watershed	0	%
2. Frequency	100	yr
3. Rainfall, P (24-hour)	7.36	in
4 Runoff curve number	78	
5. Initial abstraction, Ia	0.564	in
6. Compute Ia/P	0.077	
7. Unit peak discharge, Qu	1000	in/cms
8. Runoff, Q	4.80	in
9. Pond and swamp adjustment factor, Fp (Use percent pond and swamp area with table 4-2. Factor is 1.0 for zero percent pond and swamp area.)	1	
10. Peak discharge, Qp (Where Qp = QuAmQFp)	108.96	cfs

Project:	Winnebago Reclamation Service	By:	RJC 06-96
Location:	Rockford, Illinois	Checked:	
	Outlet #2		

Open Channel Flow - Trapezoidal/Triangular Channel

	RETARDANCE	D	C
1	RETARDANCE	D	C
2	depth	1.15	1.25
3	n assumed	0.0335	0.0403
4	n calc	0.0335	0.0403
5	channel slope	0.028	0.028
6	bottom width	12	12
7	left sideslope	2	2
8	right sideslope	2	2
9	Area	16.4	18.1
10	Wetd Perimeter	17.1	17.6
11	Hyd radius	1.0	1.0
12	Top width	16.6	17.0
13	Velocity fps	7.22	6.29
14	Discharge cfs	118.73	114.09
15	vR	6.93	6.49
16	vR metric	0.64	0.60
17	minimum discharge (cfs) =		98.74

Line 4 used only for vegetated channel.

Line 14 must be greater than or equal to minimum discharge.

PIPE DROP INLET SPILLWAY DISCHARGE

Winnebago Reclamation
Pipe Drop Inlet #1

RISER: El. Crest 748.0 ft. ; Diameter = 60 in.

BARREL: El. Inlet Invert = 740.0 ft.
El. Outlet Invert 738.0 ft.
Diameter 48 in. ; Length = 51 ft.
Manning n 0.024 C.M.P., n = 0.021 to 0.026
Concrete, n = 0.012 to 0.018

OUTLET CHANNEL : El. Channel Flow Surface = 738 ft.

STAGE ft.	WEIR FLOW	RISER ORIFICE	BARREL ORIFICE	PIPE FLOW	Q cfs	h, ft (O)	O, cfs
0.00	0.00	0.00	148.21	181.10	0.00		
0.05	0.54	21.14	148.83	181.69	0.54		
0.10	1.54	29.90	149.44	182.28	1.54		
0.15	2.83	36.62	150.05	182.88	2.83		
0.20	4.36	42.28	150.66	183.46	4.36		
0.25	6.09	47.27	151.27	184.05	6.09		
0.30	8.00	51.78	151.87	184.64	8.00		
0.35	10.08	55.93	152.47	185.22	10.08		
0.40	12.32	59.79	153.07	185.80	12.32		
0.45	14.70	63.42	153.67	186.38	14.70		
0.50	17.22	66.85	154.26	186.96	17.22		
0.55	19.86	70.11	154.85	187.54	19.86		
0.60	22.63	73.23	155.44	188.11	22.63		
0.65	25.52	76.22	156.03	188.68	25.52		
0.70	28.52	79.10	156.62	189.25	28.52		
0.75	31.63	81.88	157.20	189.82	31.63		
0.80	34.84	84.56	157.78	190.39	34.84		
0.85	38.16	87.16	158.36	190.96	38.16		
0.90	41.58	89.69	158.94	191.52	41.58		
0.95	45.09	92.15	159.51	192.08	45.09		
1.00	48.69	94.54	160.09	192.64	48.69		
1.05	52.39	96.88	160.66	193.20	52.39		
1.1	56.18	99.16	161.23	193.76	56.18		
1.15	60.05	101.38	161.79	194.32	60.05		
1.2	64.01	103.57	162.36	194.87	64.01		
1.25	68.05	105.70	162.92	195.42	68.05		
1.3	72.18	107.79	163.48	195.97	72.18		

1.35	76.38	109.85	164.04	196.52	76.38
1.4	80.66	111.86	164.60	197.07	80.66
1.45	85.02	113.84	165.15	197.62	85.02
1.5	89.46	115.79	165.70	198.16	89.46
1.55	93.97	117.70	166.26	198.71	93.97
1.6	98.55	119.59	166.81	199.25	98.55
1.65	103.21	121.44	167.35	199.79	103.21
1.7	107.93	123.27	167.90	200.33	107.93
1.75	112.73	125.07	168.44	200.87	112.73
1.8	117.60	126.84	168.99	201.40	117.60
1.85	122.53	128.59	169.53	201.94	122.53
1.9	127.53	130.32	170.07	202.47	127.53
1.95	132.60	132.02	170.60	203.00	132.02
2	137.73	133.70	171.14	203.54	133.70
2.05	142.93	135.36	171.67	204.07	135.36
2.1	148.19	137.00	172.21	204.59	137.00
2.15	153.51	138.63	172.74	205.12	138.63
2.2	158.90	140.23	173.27	205.64	140.23
2.25	164.34	141.81	173.79	206.17	141.81
2.3	169.85	143.38	174.32	206.69	143.38
2.35	175.42	144.93	174.84	207.21	144.93
2.4	181.05	146.46	175.37	207.73	146.46
2.45	186.74	147.98	175.89	208.25	147.98
2.5	192.48	149.48	176.41	208.77	149.48
2.55	198.29	150.97	176.92	209.28	150.97
2.6	204.15	152.44	177.44	209.80	152.44
2.65	210.06	153.90	177.96	210.31	153.90
2.7	216.04	155.35	178.47	210.83	155.35
2.75	222.07	156.78	178.98	211.34	156.78
2.8	228.15	158.20	179.49	211.85	158.20
2.85	234.29	159.61	180.00	212.36	159.61
2.9	240.48	161.00	180.51	212.86	161.00
2.95	246.73	162.38	181.02	213.37	162.38
3	253.03	163.75	181.52	213.87	163.75
3.05	259.38	165.11	182.02	214.38	165.11
3.1	265.78	166.46	182.53	214.88	166.46
3.15	272.24	167.80	183.03	215.38	167.80
3.2	278.74	169.12	183.53	215.88	169.12
3.25	285.30	170.44	184.02	216.38	170.44
3.3	291.91	171.74	184.52	216.88	171.74
3.35	298.57	173.04	185.02	217.38	173.04
3.4	305.28	174.33	185.51	217.87	174.33
3.45	312.04	175.60	186.00	218.37	175.60
3.5	318.85	176.87	186.49	218.86	176.87
3.55	325.70	178.13	186.98	219.35	178.13
3.6	332.61	179.38	187.47	219.84	179.38

PIPE DROP INLET SPILLWAY DISCHARGE

Winnebago Reclamation
Pipe Drop Inlet #2

RISER: El. Crest 742.0 ft. ; Diameter = 48 in.

BARREL: El. Inlet Invert = 736.0 ft.
El. Outlet Invert 732.0 ft.
Diameter 36 in. ; Length = 82 ft.
Manning n 0.024 C.M.P., n = 0.021 to 0.026
Concrete, n = 0.012 to 0.018

OUTLET CHANNEL : El. Channel Flow Surface = 732 ft.

STAGE ft.	WEIR FLOW	RISER ORIFICE	BARREL ORIFICE	PIPE FLOW	Q cfs	h, ft (O)	O, cfs
0.00	0.00	0.00	72.20	86.56	0.00		
0.05	0.44	13.53	72.60	86.83	0.44		
0.10	1.23	19.13	73.00	87.09	1.23		
0.15	2.26	23.43	73.39	87.35	2.26		
0.20	3.48	27.06	73.79	87.61	3.48		
0.25	4.87	30.25	74.18	87.87	4.87		
0.30	6.40	33.14	74.57	88.13	6.40		
0.35	8.07	35.80	74.95	88.39	8.07		
0.40	9.86	38.27	75.34	88.65	9.86		
0.45	11.76	40.59	75.72	88.91	11.76		
0.50	13.77	42.78	76.10	89.16	13.77		
0.55	15.89	44.87	76.48	89.42	15.89		
0.60	18.10	46.87	76.86	89.67	18.10		
0.65	20.41	48.78	77.24	89.93	20.41		
0.70	22.81	50.62	77.61	90.18	22.81		
0.75	25.30	52.40	77.98	90.43	25.30		
0.80	27.87	54.12	78.35	90.69	27.87		
0.85	30.53	55.78	78.72	90.94	30.53		
0.90	33.26	57.40	79.09	91.19	33.26		
0.95	36.07	58.97	79.46	91.44	36.07		
1.00	38.96	60.51	79.82	91.69	38.96		
1.05	41.91	62.00	80.18	91.94	41.91		
1.1	44.94	63.46	80.54	92.19	44.94		
1.15	48.04	64.89	80.90	92.43	48.04		
1.2	51.21	66.28	81.26	92.68	51.21		
1.25	54.44	67.65	81.61	92.93	54.44		
1.3	57.74	68.99	81.97	93.17	57.74		

1.35	61.10	70.30	82.32	93.42	61.10
1.4	64.53	71.59	82.67	93.66	64.53
1.45	68.02	72.86	83.02	93.90	68.02
1.5	71.57	74.11	83.37	94.15	71.57
1.55	75.17	75.33	83.72	94.39	75.17
1.6	78.84	76.54	84.06	94.63	76.54
1.65	82.57	77.72	84.40	94.87	77.72
1.7	86.35	78.89	84.75	95.11	78.89
1.75	90.18	80.04	85.09	95.35	80.04
1.8	94.08	81.18	85.43	95.59	81.18
1.85	98.02	82.30	85.77	95.83	82.30
1.9	102.02	83.40	86.10	96.07	83.40
1.95	106.08	84.49	86.44	96.31	84.49
2	110.18	85.57	86.77	96.54	85.57
2.05	114.34	86.63	87.11	96.78	86.63
2.1	118.55	87.68	87.44	97.02	87.44
2.15	122.81	88.72	87.77	97.25	87.77
2.2	127.12	89.75	88.10	97.49	88.10
2.25	131.48	90.76	88.43	97.72	88.43
2.3	135.88	91.76	88.75	97.95	88.75
2.35	140.34	92.76	89.08	98.19	89.08
2.4	144.84	93.74	89.40	98.42	89.40
2.45	149.39	94.71	89.73	98.65	89.73
2.5	153.99	95.67	90.05	98.88	90.05
2.55	158.63	96.62	90.37	99.11	90.37
2.6	163.32	97.56	90.69	99.34	90.69
2.65	168.05	98.50	91.01	99.57	91.01
2.7	172.83	99.42	91.33	99.80	91.33
2.75	177.65	100.34	91.64	100.03	91.64
2.8	182.52	101.25	91.96	100.26	91.96
2.85	187.43	102.15	92.27	100.49	92.27
2.9	192.38	103.04	92.59	100.71	92.59
2.95	197.38	103.92	92.90	100.94	92.90
3	202.42	104.80	93.21	101.17	93.21
3.05	207.50	105.67	93.52	101.39	93.52
3.1	212.62	106.53	93.83	101.62	93.83
3.15	217.79	107.39	94.14	101.84	94.14
3.2	223.00	108.24	94.44	102.06	94.44
3.25	228.24	109.08	94.75	102.29	94.75
3.3	233.53	109.92	95.05	102.51	95.05
3.35	238.86	110.75	95.36	102.73	95.36
3.4	244.22	111.57	95.66	102.96	95.66
3.45	249.63	112.39	95.96	103.18	95.96
3.5	255.08	113.20	96.27	103.40	96.27
3.55	260.56	114.00	96.57	103.62	96.57
3.6	266.09	114.80	96.87	103.84	96.87

PIPE DROP INLET SPILLWAY DISCHARGE

Winnebago Reclamation
Pipe Drop Inlet #3

RISER: El. Crest 732.0 ft. ; Diameter = 48 in.

BARREL: El. Inlet Invert = 722.0 ft.
El. Outlet Invert 720.0 ft.
Diameter 36 in. ; Length = 84 ft.
Manning n 0.024 C.M.P., n = 0.021 to 0.026
Concrete, n = 0.012 to 0.018

OUTLET CHANNEL : El. Channel Flow Surface = 720 ft.

STAGE ft.	WEIR FLOW	RISER ORIFICE	BARREL ORIFICE	PIPE FLOW	Q cfs	h, ft (O)	O, cfs
0.00	0.00	0.00	99.23	95.87	0.00		
0.05	0.44	13.53	99.52	96.11	0.44		
0.10	1.23	19.13	99.81	96.34	1.23		
0.15	2.26	23.43	100.10	96.58	2.26		
0.20	3.48	27.06	100.39	96.81	3.48		
0.25	4.87	30.25	100.68	97.04	4.87		
0.30	6.40	33.14	100.96	97.27	6.40		
0.35	8.07	35.80	101.25	97.51	8.07		
0.40	9.86	38.27	101.54	97.74	9.86		
0.45	11.76	40.59	101.82	97.97	11.76		
0.50	13.77	42.78	102.11	98.20	13.77		
0.55	15.89	44.87	102.39	98.43	15.89		
0.60	18.10	46.87	102.67	98.65	18.10		
0.65	20.41	48.78	102.95	98.88	20.41		
0.70	22.81	50.62	103.23	99.11	22.81		
0.75	25.30	52.40	103.51	99.34	25.30		
0.80	27.87	54.12	103.79	99.56	27.87		
0.85	30.53	55.78	104.07	99.79	30.53		
0.90	33.26	57.40	104.35	100.02	33.26		
0.95	36.07	58.97	104.63	100.24	36.07		
1.00	38.96	60.51	104.90	100.46	38.96		
1.05	41.91	62.00	105.18	100.69	41.91		
1.1	44.94	63.46	105.45	100.91	44.94		
1.15	48.04	64.89	105.73	101.14	48.04		
1.2	51.21	66.28	106.00	101.36	51.21		
1.25	54.44	67.65	106.27	101.58	54.44		
1.3	57.74	68.99	106.55	101.80	57.74		

1.35	61.10	70.30	106.82	102.02	61.10
1.4	64.53	71.59	107.09	102.24	64.53
1.45	68.02	72.86	107.36	102.46	68.02
1.5	71.57	74.11	107.63	102.68	71.57
1.55	75.17	75.33	107.90	102.90	75.17
1.6	78.84	76.54	108.17	103.12	76.54
1.65	82.57	77.72	108.43	103.34	77.72
1.7	86.35	78.89	108.70	103.56	78.89
1.75	90.18	80.04	108.97	103.77	80.04
1.8	94.08	81.18	109.23	103.99	81.18
1.85	98.02	82.30	109.50	104.21	82.30
1.9	102.02	83.40	109.76	104.42	83.40
1.95	106.08	84.49	110.02	104.64	84.49
2	110.18	85.57	110.29	104.85	85.57
2.05	114.34	86.63	110.55	105.07	86.63
2.1	118.55	87.68	110.81	105.28	87.68
2.15	122.81	88.72	111.07	105.50	88.72
2.2	127.12	89.75	111.33	105.71	89.75
2.25	131.48	90.76	111.59	105.92	90.76
2.3	135.88	91.76	111.85	106.14	91.76
2.35	140.34	92.76	112.11	106.35	92.76
2.4	144.84	93.74	112.37	106.56	93.74
2.45	149.39	94.71	112.62	106.77	94.71
2.5	153.99	95.67	112.88	106.98	95.67
2.55	158.63	96.62	113.14	107.19	96.62
2.6	163.32	97.56	113.39	107.40	97.56
2.65	168.05	98.50	113.65	107.61	98.50
2.7	172.83	99.42	113.90	107.82	99.42
2.75	177.65	100.34	114.16	108.03	100.34
2.8	182.52	101.25	114.41	108.24	101.25
2.85	187.43	102.15	114.66	108.44	102.15
2.9	192.38	103.04	114.92	108.65	103.04
2.95	197.38	103.92	115.17	108.86	103.92
3	202.42	104.80	115.42	109.07	104.80
3.05	207.50	105.67	115.67	109.27	105.67
3.1	212.62	106.53	115.92	109.48	106.53
3.15	217.79	107.39	116.17	109.68	107.39
3.2	223.00	108.24	116.42	109.89	108.24
3.25	228.24	109.08	116.67	110.09	109.08
3.3	233.53	109.92	116.91	110.30	109.92
3.35	238.86	110.75	117.16	110.50	110.50
3.4	244.22	111.57	117.41	110.71	110.71
3.45	249.63	112.39	117.66	110.91	110.91
3.5	255.08	113.20	117.90	111.11	111.11
3.55	260.56	114.00	118.15	111.32	111.32
3.6	266.09	114.80	118.39	111.52	111.52

Project:	Winnebago Reclamation Service	By:	JB 05-96
Location:	Rockford, Illinois	Checked:	EML 05-96
	Terrace Letdown 1		

Open Channel Flow - Trapezoidal/Triangular Channel

		D	C
1	RETARDANCE	D	C
2	depth	0.40	0.45
3	n assumed	0.0376	0.0457
4	n calc	0.0376	0.0457
5	channel slope	0.333	0.333
6	bottom width	9	9
7	left sideslope	3	3
8	right sideslope	3	3
9	Area	4.1	4.7
10	Wetd Perimeter	11.5	11.8
11	Hyd radius	0.4	0.4
12	Top width	11.4	11.7
13	Velocity fps	11.42	10.08
14	Discharge cfs	46.58	46.93
15	vR	4.04	3.96
16	vR metric	0.38	0.37
17	minimum discharge (cfs) =		42.56

Line 4 used only for vegetated channel.

Line 14 must be greater than or equal to minimum discharge.

Project:	Winnebago Reclamation Service	By:	JB 05-96
Location:	Rockford, Illinois	Checked:	EML 05-96
	Terrace Letdown 2		

Open Channel Flow - Trapezoidal/Triangular Channel

1	RETARDANCE	D	C	
2	depth	0.60	0.65	
3	n assumed	0.0409	0.0521	
4	n calc	0.0409	0.0521	Line 4 used only for vegetated channel.
5	channel slope	0.400	0.400	
6	bottom width	0	0	
7	left sideslope	3	3	
8	right sideslope	3	3	
9	Area	1.1	1.3	
10	Wetd Perimeter	3.8	4.1	
11	Hyd radius	0.3	0.3	
12	Top width	3.6	3.9	
13	Velocity fps	9.94	8.23	
14	Discharge cfs	10.74	10.44	Line 14 must be greater than or equal to minimum discharge.
15	vR	2.83	2.54	
16	vR metric	0.26	0.24	
17	minimum discharge (cfs) =		10.40	

Project:	Winnebago Reclamation Service	By:	JB 05-96
Location:	Rockford, Illinois	Checked:	EML 05-96
	Terrace Letdown 3		

Open Channel Flow - Trapezoidal/Triangular Channel

1	RETARDANCE	D	C	
2	depth	0.40	0.45	
3	n assumed	0.0365	0.0439	
4	n calc	0.0365	0.0439	Line 4 used only for vegetated channel.
5	channel slope	0.400	0.400	
6	bottom width	10	10	
7	left sideslope	3	3	
8	right sideslope	3	3	
9	Area	4.5	5.1	
10	Wetd Perimeter	12.5	12.8	
11	*Hyd radius*	0.4	0.4	
12	Top width	12.4	12.7	
13	Velocity fps	12.97	11.58	
14	Discharge cfs	58.11	59.12	Line 14 must be greater than or equal to minimum discharge.
15	vR	4.64	4.60	
16	vR metric	0.43	0.43	
17	minimum discharge (cfs) =		53.31	

Project:	Winnebago Reclamation Service	By:	JB 05-96
Location:	Rockford, Illinois	Checked:	EML 05-96
	Terrace Letdown 4		

Open Channel Flow - Trapezoidal/Triangular Channel

1	RETARDANCE	D	C	
2	depth	0.60	0.65	
3	n assumed	0.0421	0.0543	
4	n calc	0.0421	0.0543	Line 4 used only for vegetated channel.
5	channel slope	0.333	0.333	
6	bottom width	0	0	
7	left sideslope	3	3	
8	right sideslope	3	3	
9	Area	1.1	1.3	
10	Wetd Perimeter	3.8	4.1	
11	Hyd radius	0.3	0.3	
12	Top width	3.6	3.9	
13	Velocity fps	8.82	7.21	
14	Discharge cfs	9.52	9.14	Line 14 must be greater than or equal to minimum discharge.
15	vR	2.51	2.22	
16	vR metric	0.23	0.21	
17	minimum discharge (cfs) =		8.39	

ATTACHMENT 19

Construction Quality Assurance Program

CONSTRUCTION QUALITY ASSURANCE PROGRAM

INTRODUCTION

This attachment provides an outline of inspection activities and responsibilities to ensure proper performance of the landfill components. An independent Construction Quality Assurance Officer (CQAO), will be designated by the Operator to supervise, approve, and be responsible for all inspections, testing, and other activities required in this attachment. In addition, the CQAO will be responsible for providing documentation, "as-built" record drawings of completed construction and maintain records of the construction sequences throughout the development, operation and closure of the facility. The CQAO will be an Illinois Registered Professional Engineer. The CQAO may utilize one or more inspectors to assist him with the various inspections and testing to be conducted in the field. Any such inspector will work under the direct supervision of the CQAO and will be properly trained and/or experienced as appropriate.

INSPECTION ACTIVITIES

The CQAO shall be present to provide supervision and assume responsibility for performing all inspections of the following activities:

1. Installation of the leachate collection system;

2. Application of final cover;

3. Installation of gas control facilities; and

4. Construction of ponds, ditches, lagoons and berms.

If the CQAO is unable to be present to perform, then the CQAO shall provide, in writing, reasons for his absence, a designation of a person who shall exercise professional judgement in carrying out the duties of a CQAO as the designated CQAO-in-absentia, and a signed statement that the CQAO assumes full personal responsibility for all inspections performed and reports prepared by the designated CQAO-in-absentia during the absence of the CQAO.

SAMPLING PROGRAM

The CQAO shall review all specifications and requirements for the manufactured items used in the construction of those components requiring inspection. (See Inspection Activities section previously presented herein) He shall approve all materials based on satisfaction of their individual specification. Furthermore, he shall ensure that proper installation methods are used.

Table 1 provided herewith summarizes the basic testing requirements, frequencies, and specifications for acceptance. Additional testing and sampling may be required by the CQAO as in his judgement is necessary to ensure proper materials usage and construction operations. Furthermore, he may authorize additional sampling or sampling frequencies as necessary to ensure statistical sampling techniques are employed.

In addition to the testing requirements outlined in Table 1, the CQAO may require additional testing to prequalify materials used in the final cover system in terms of their frictional and strength parameters. The purpose of this testing shall be to verify the appropriateness of the parameters used in the Foundation and Mass Stability Analysis.

SOIL SAMPLING

The low permeability layer shall be randomly sampled to ensure the specified parameters depicted in Table 1 are met. To obtain an undisturbed sample, the procedures set forth in ASTM D 1587 shall be followed.

In accordance with ASTM D 4220-89 all thin-walled samples shall be preserved and transported in accordance with the Group C Classification. Once the samples are extracted, proper identification tags containing at least the following information will be affixed to the samples:

1. Job name or number, or both;

2. Sampling date;

3. Sample/boring number identification and location;

4. Sample depth or elevation;

5. Sample orientation;

6. Special shipping and/or laboratory handling instructions;

7. Penetration test data, if applicable;

8. A traceability record.

The traceability record used will document the sample location, the requested testing or analysis, the sampler's signature, the date the sample was shipped, the signature of the laboratory's representative, and the date when the laboratory received the sample.

Thin-walled tube samples will be preserved with end caps sealed with two or more layers of wax, or paraffin wax for long-term sealing (in excess of three days). During transportation, samples will be protected against vibration, shock, and from extreme heat or cold. Samples which are transported to the testing location on seats of automobiles or trucks need only to be placed in cardboard boxes or similar containers into which the sealed samples fit snugly, to prevent bumping, rolling, or dropping. For all other methods of transport including automobile trunk, bus, parcel services, truck, boat, or air samples shall be sealed in wood, metal, other applicable shipping containers to provide cushioning/insulation. The cushioning material shall be either sawdust, rubber, polystyrene, or a similar material. The samples shall be shipped in the same orientation in which they were sampled; i.e. vertical thin-walled tubes shall be transported vertically.

CONSTRUCTION MEETINGS

The CQAO shall hold meetings prior to and during construction to ensure proper construction techniques, understanding of the specifications and plans, the proper handling of deviations from the plans necessitated by site specific field conditions, and to review the appropriate chain-of-command used if unsuitable work is discovered. Meetings shall be held with all contractors and owner representatives involved with the project to discuss their individual responsibilities.

DOCUMENTATION

Daily Summary Report

A daily summary report shall be prepared by the CQAO, or under the direct supervision of the CQAO, during each day of activity. The report shall contain, at a minimum:

1. The date;
2. A summary of the weather conditions;
3. A summary of locations where construction is occurring;
4. Equipment and personnel on the project;
5. A summary of any meetings held and attendees;
6. A description of all materials used and references or results of testing and documentation;
7. The calibration and recalibration of test equipment; and
8. The daily inspection report from each inspector.

Daily Inspection Reports

Each inspector shall complete a daily inspection report containing the following information:

1. The location;
2. The type of inspection;
3. The procedure used;
4. Test data;
5. Acceptable limits for construction testing analysis;
6. Any unsuitable materials or construction techniques that were encountered including corrective actions taken and causes for the incongruity;
7. Results of the activity;
8. Personnel involved in the inspection and sampling activities; and
9. The signature of the inspector.

Acceptance Reports

Upon completion of the construction of each major phase, the CQAO shall submit an acceptance report to the Agency and Operator. The acceptance report shall be submitted before the structure is placed into service and shall contain the following:

1. A certification by the CQAO that the construction has been prepared and constructed in accordance with the engineering design;

2. "As-built" record drawings; and

3. All daily summary reports.

Photographic Records

Photographs may be used as tools to document the progress and acceptability of the work and may be incorporated into daily summary reports, daily inspection reports, and acceptance reports. Each photo shall be identified with the following information:

1. The date, time, and location of photograph;

2. The name of photographer; and

3. The signature of photographer.

LEACHATE COLLECTION SYSTEM

The leachate collection system will consist of dual leachate/gas extraction wells connected to a gravity flow pipeline. All materials shall be approved by the CQAO prior to installation.

Permanent leachate/gas extraction wells will be constructed of 8 inch (min) diameter PVC or HDPE pipe, perforated or slotted on at least the bottom two-thirds of the pipe. The boreholes for these wells will be 36 inches in diameter and will extend to a point approximately 2 ft above the existing asphalt liner. This 2 ft setback zone should be observed at all boreholes so that the integrity of the liner will not be jeopardized. 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. All boreholes will be drilled into the existing

refuse in compliance with all applicable OSHA guidelines. Appropriate safety measures should be instituted to prevent explosions, inhalation of landfill gas, and accidental entry into the borehole.

The leachate collection pipe shall be installed so as to minimize joints, couplers, and abrupt changes in the interior flow area of the pipe. The collection pipe shall be joined using a butt-fusing welder in accordance with the pipe manufacturer's approved installation methods consistent with ASTM D 2657. Each pipe joint shall be free from burrs, irregular edges and foreign impurities. The CQAO shall inspect all joints for uniformity to prevent any bridging. The pipe manufacturer shall provide assurance the pipe material is chemically resistant to leachate from general refuse.

Leachate piping shall be high density smooth-walled polyethylene (HDPE) containing no fillers or extenders. This pipe manufacturer shall provide assurance that the pipe material is chemically resistant to the leachate from general refuse. The collection pipe shall be manufactured to be free from blisters, undispersed raw materials, or any sign of contamination by foreign matter.

Leachate piping will be installed in a narrow trench with gravel backfill. The gravel backfill will be compacted thoroughly to minimize settlement. Vibrating compacting equipment will be used as necessary so that the finished density of the gravel is as high as possible without incurring damage to the pipe.

The grade and location of leachate drainage pipes shall be surveyed at 100 ft intervals. The grades shall be considered acceptable if deviation from plan grades is no less than 0.1 percent in the specified survey interval.

LEACHATE MANAGEMENT SYSTEM

The leachate management system consists of pumps, tankage, piping and necessary appurtenances. All materials to be used shall be approved by the CQAO, prior to installation. All materials shall be installed in accordance with the manufacturer's recommendations. The CQAO shall verify that the equipment and its installation is consistent with the permitted plans and specifications.

By observation/measurement in the field and review of the manufacturer's literature the CQAO shall verify pump capacity, corrosion resistance, its explosion-proof or intrinsically safe design, and proper level-actuated on/off switch position. Pump capacities shall be at least the minimum specified on the drawings with zero tolerance for under capacity. Zero tolerance will also apply to materials of construction which are not corrosion resistant and designs which are not explosion-proof or intrinsically safe. The pump "on" level-actuated switch in leachate collection piping shall be positioned in accordance with the pump manufacturer's recommendation to ensure a minimum pump submergence.

By field observations and review of the manufacturer's literature, the CQAO shall verify tank capacity, corrosion resistance, secondary containment, and tank integrity. All tanks will have secondary containment consisting of double walls with a leak detection system between the two walls.

The CQAO shall oversee construction of the leachate storage lagoon and the installation of all necessary appurtenances, and verify that the lagoon meets five-day storage requirements as detailed in the Leachate Management Plan (Attachment 13). The lagoon shall be constructed with a 2 ft recompacted earth layer overlain by a 30 mil VFPE geomembrane liner. The 2 ft recompacted earth layer and the recompacted earthen berms shall have a permeability of 1.0 x 10^{-7} cm (max.).

SURFACE WATER CONTROL

The CQAO shall inspect the ditches, culverts, and sediment control devices to ensure proper construction of these structures as indicated by the site developmental drawings. Deviations from the plans shall be noted on the "as-built" record drawings with the appropriate calculations showing that the hydraulic carrying capacity remains sufficient. All ditches shall be completed

with the appropriate erosion control coverings as soon as practicable. Repairs as warranted should be done prior to applying the coverings.

GAS COLLECTION SYSTEM

This facility shall 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. A mechanical blower will be used to induce a pressure gradient on the collection piping network to convey to gas to an end user.

Dual leachate/gas extraction wells will be installed as per the discussion in the Leachate Collection System section of this document.

Gas collection headers shall be, smooth walled high density polyethylene (HDPE) containing no fillers or extenders. The pipe manufacturer shall provide assurance the pipe material is chemically resistant to the leachate from the general refuse. The pipe shall be manufactured to be free from blisters, undispersed raw materials, or any size of contamination by foreign matter.

The collection piping network shall be placed above or below grade on an acceptable foundation material. Vehicle access shall be provided by the use of earthen ramps where the piping is above grade. The CQAO shall attest that the thickness of these earthen ramps appropriate.

The CQAO shall assure that the compressors or mechanical vacuum blowers are of proper size and capacity. In addition, the CQAO shall assure that the installation follows all applicable

manufacturer's specification. In addition, the unit(s) shall be properly attached to the collection piping network and to the end user.

ROADWAYS

The CQAO shall inspect the location of the roadways in relation to the transportation plan. His primary responsibility shall be to ensure proper grading of the roadway surfaces enabling runoff water to enter the stormwater runoff collection ditching as appropriate.

FINAL COVER

The CQAO shall oversee placement of the final cover. The final cover will include a low permeability layer and a final protective layer. The low permeability layer will consist of a 12 inch layer of compacted earthen material overlain by a geomembrane liner. The final protective layer will consist of an 8 inch granular drainage layer overlain by protective soils to a total depth of 36 inches. The granular drainage layer may be omitted on the side slopes. Before the placement of final cover, any existing daily or intermediate cover should be surveyed for elevation. Credit may be given for existing in-place soil if of its thickness is verified and the material is suitable for final cover material.

Adjustments to the surface contours shall be done as necessary to provide drainage and conformity to the lines and grades shown on the facility plans. These adjustments may be made with additional soil or adjusting the underlying refuse.

The low permeability earthen material layer will be constructed using on-site materials, placed in thin lifts (8 in. loose maximum), and compacted with a soil compactor or other appropriate vehicle. Materials should be placed at a moisture content between 0 and 6 percent above optimum moisture content. Each lift will be worked sufficiently to break down oversized clods, obtain a uniform moisture content, and ensure uniform density. Roots, cobbles, debris, and other deleterious materials will be removed prior to compaction. The hydraulic conductivity shall be equal or less than $K = 1.0 \times 10^{-6}$ cm/sec. The final surface of the low permeability earthen

material layer will be surveyed to ensure that the minimum thickness is obtained. Other testing requirements that apply to the low permeability earthen material layer are detailed in Table 1.

Soils used for final cover compacted clay shall 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 excavations south of the existing unit, and west of Killbuck Creek within the previously permitted expansion area, and from other on-site borrow areas.

The CQAO shall thoroughly inspect the surface of the low permeability earthen material layer on which the geomembrane liner is to be lain. The surface shall be consistent with the design plans in terms of grade and elevation, and should be free of depressions and raised areas, desiccation cracks, vegetative growth, and any undesirable objects that could damage the geomembrane. Additional finishing and smoothing of the final surface may be required to ensure intimate contact between the geomembrane and the earthen surface. The geomembrane installer shall conduct an additional inspection of the surface near the time of geomembrane liner installation and any necessary repairs shall be made.

The geomembrane liner will be constructed of 30 mil Very Flexible Polyethylene (VFPE). The geomembrane shall be textured on both sides for slope stability on all slopes greater than 5 percent. A smooth geomembrane may be used on surfaces with slopes less than or equal to 5 percent.

Prior to installation, the geomembrane installer shall provide the CQAO with a panel layout plan for the specific area included in his construction bid. The installer or manufacturer shall also provide assurance that the geomembrane material meets all geomembrane specifications as detailed in Table 2, is compatible with the soils that it will be in contact with, and has sufficient strength and durability to function at the site for the entire design period and under the maximum expected loadings imposed by heavy equipment and stresses imposed by settlement and changes in temperature. Alternatively, the CQAO may perform or subcontract any tests or calculations that he deems necessary for the assurance of these requirements. The CQAO will also ensure that, in relation to the materials that it will be in contact with, the geomembrane

utilized meets all friction efficiency requirements as detailed in the Report of Stability Analysis (Attachment 12).

Installation of the geomembrane liner shall proceed in accordance with all manufacturer's recommendations and instructions. Geomembrane boots will be installed and sealed as necessary on all leachate/gas extraction wells. Seaming will typically be accomplished through the use of fusion or extrusion welding techniques. Test welds on scrap geomembranes will be produced by each seamer at least twice daily, in the early morning and afternoon, under the same conditions that exist in the field. The CQAO Officer shall visually inspect all field seams and any defects shall be removed and reseamed as necessary. At no time will any equipment be allowed to operate directly on the geomembrane liner.

All field seams will be pressure or vacuum tested over their entire length. Samples of actual field seams will be tested at least once every 500 ft of seam length by sample removal and laboratory testing for bonded seam strength and peel adhesion as recommended in Standard No. 54 of the National Sanitation Foundation (NSF) or another appropriate and generally-recognized standard. Patches will be welded over holes created by sampling. The CQAO shall document the location of each geomembrane panel, sample point, and repaired area, and the results of all testing activities.

A uniform 8 inch thick layer of granular drainage material shall be placed in one lift immediately above the geomembrane liner. The granular drainage layer may be omitted on the side slopes. Operation of equipment on the drainage layer shall be kept to a minimum. Movement of equipment will be limited to straight lines, with no sudden starts, stops, or turns. The material used for the granular drainage layer shall have a saturated hydraulic conductivity of at least 1.0 x 10^{-2} cm/sec. The final surface of the granular drainage layer shall be surveyed to ensure that the minimum thickness is obtained.

The granular drainage layer shall 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 shall be wrapped with an appropriate geotextile filter

fabric prior to installation. The grade and location of drainage piping will be surveyed at 100 ft intervals.

The protective soils layer shall be placed as soon as practical over the entire granular drainage layer. The total depth of the granular drainage layer and protective soils shall be a minimum of 36 inches. The lower protective soils should be lightly compacted to hold the soil in place and resist erosion. However, the upper most 12 inches should not be compacted, and should be the best on-site, readily-available soil for supporting vegetation. The final surface of the protective layer shall be surveyed to ensure that the minimum thickness is obtained.

Unified Soils Classification System types GM, GC, SM, SC, ML, 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.

The finished surface of the final cover shall be surveyed on a spacing which shall not exceed 200 ft in any ordinate direction. The grades shall be considered acceptable which do not deviate from the plan grades more than $\pm$ 1 ft and $\pm$ 3 ft between the specified survey interval on the top and side slopes, respectively. This survey and acceptance criteria shall apply to both the low permeability and protective soil layers of the final cover system, with allowance for the minimum 36-inch difference between their surfaces.

For additional information concerning the final cover, see the accompanying Construction Plan.

VEGETATIVE COVER

Finalized areas shall be prepared and seeded as soon as practicable to prevent deterioration. Composite soil sample testing should be done to determine the amount of lime and/or fertilizer needed. 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/thickness, slopes, and moisture/climatological conditions that exist without the need for continued maintenance and with minimal potential for root penetration into the compacted final cover. It shall also be a diverse mix of native and introduced species that is tolerant of the landfill

gas expected to be generated and consistent with the"open space" post closure land use. Such a mixture could include, among others, Redtop, Perennial Ryegrass, Tall Fescue, Crested Wheatgrass, Hard Fescue, and Reed Canarygrass. 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, 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. Mulch consisting of straw, jute, wood excelsior, etc. shall be used as necessary to hold the seed in place and conserve moisture. The CQAO should record the amount of amendments, seed, and the boundaries of the completed areas on the "as-built" record drawings.

SLURRY TRENCHES OR CUTOFF WALLS

At this time, no slurry trenches or cutoff walls are proposed or anticipated for installation. Should such barriers be proposed in the future, details regarding construction and quality assurance for these items will be provided in a future permit application.

GAS MONITORING SYSTEM

The CQAO shall inspect all components of the Gas Monitoring System to ensure that the proper construction methods were used. In addition, he shall review the compatibility of all material used with landfill gas.

Gas monitoring probes shall be installed by a qualified geologist or other personnel experienced with monitoring well installation practices, and in accordance with Drawing 2 on Sheet B-10 of the site developmental drawings. The locations of gas monitoring probes shall be as depicted on Sheet B-7 of the site developmental drawings. Since all perimeter gas monitoring probes have the potential of intercepting groundwater, these devices shall be installed pursuant to 77 IAC 920 (Water Well Construction Code).

- TABLE 1 -

CONSTRUCTION QUALITY ASSURANCE TESTING

Item	Testing Parameters	Min.Testing Frequency	Specification
Low Permeability Layer	Nuclear Density (ASTM: D 2922)	1,000 yds^3	$\geq$ 90% Modified Proctor[1]
	Triaxial Laboratory Permeability (thin wall sample) (ASTM: D 5084)	10,000 yds^3	$K < 1.0 \times 10^{-6}$ cm/sec
	Moisture Content (ASTM: D 3017)	1,000 yds^3	0-6%[1] above opt.
	Atterberg Limits (ASTM: D 4318)	10,000 yds^3	LL% > 25 PI% > 4
	Grain Size Distribution (ASTM: D 422)	10,000 yds^3	$\geq$ 75% below 200 sieve
	Proctor Density (ASTM: D 1557)	10,000 yds^3	
	Thickness[2]	200' grid	$\geq$ 12" normal to surface
Leachate Storage Lagoon Earthen Berms	Triaxial Laboratory Permeability (thin wall sample) (ASTM: D 5084)	10,000 yds^3	$K < 1.0 \times 10^{-7}$ cm/sec
Granular Drainage Layer	Sieve Analysis (ASTM C 136)	1,000 yds^3	+
	Hydraulic Conductivity (rigid wall)	8,000 yds^3	$K \geq 1.0 \times 10^{-2}$ cm/sec
	Thickness[2]	200' grid	$\geq$ 8" normal to surface
Final Protective Layer	Thickness[2]	200' grid	$\geq$ 36" normal to surface (including granular drainage layer)

- TABLE 1 -

CONSTRUCTION QUALITY ASSURANCE TESTING -- CONTINUED

Item	Testing Parameters	Min.Testing Frequency	Specification
Gravel Envelope	Sieve Analysis (ASTM: C 136)		
HDPE Pipe	Visual Inspection of spliced joint (ASTM: D 2657)	250 linear feet	no voids in bonding
	Dimensions (ASTM: D 2122)	end sections of pipe and fittings	SDR -17 & 6" min.
	Physical Properties	each lot	equal to manufacturer's data

[1] The specification for density and moisture content are typical of values that will achieve the specified liner permeability. The CQAO may choose to perform laboratory testing over a range of density and moisture content values to more accurately determine the values needed to achieve the required liner permeability. As such, the CQAO may vary the specification accordingly.

[2] Thickness of final cover may be tested by advancing probe holes or topographic survey before and after placement.

- TABLE 2 -

TYPICAL PHYSICAL PROPERTIES OF VFPE GEOMEMBRANE LINER

Property	Test Method	Nominal Value	Unit
Thickness	ASTM D-1593	40	mil
Specific Gravity	ASTM D-792(A)	0.92	
Density		0.92	g/cm^3
Melt Index	ASTM D-1238	$\leq$ 1.00	g/10 min
Tensile Properties	ASTM D-638		
Tensile Strength at Break	Type IV	94	lb/in width
Elongation at Break		780	%
Dimensional Stability	ASTM D-1204 100° C, 15 min.	$\pm$3	%
Environmental Stress Crack	ASTM D-1693 Appendix A	1500	hours
Puncture Resistance (Min. requirement)	FTMS 101, 2065	45	lbs.
Tear Resistance (Min. requirement)	ASTM D-1004	12	lbs.
Low Temperature Brittleness	ASTM D-746 Procedure "B"	-107	°F
Carbon Content	ASTM D-1603	2.0 - 3.0	%

- TABLE 2 -

PHYSICAL PROPERTIES OF VFPE GEOMEMBRANE LINER -- CONTINUED

Property	Test Method	Required Value	Unit
Failure Mode for Seam Strengths			
Peel		FTB (Film Tear Bond)[2]	
Tension		FTB (Film Tear Bond)[2]	

1. Allowable variance from Tensile Properties.

2. The sheet fails before the weld. Elongation or Ductility must also be observed prior to sheet failure for tension mode.

3. Any geomembrane which does not meet one or more of the above listed physical property values may still be considered for use if adequate information/explanation is provided to the CQAO to justify the deviation.

ATTACHMENT 20

Closure Plan, Post-Closure Care Plan and Cost Estimates

CLOSURE PLAN, POST-CLOSURE CARE PLAN, AND COST ESTIMATES

INTRODUCTION

The Closure Plan, Post-Closure Care Plan, and Cost Estimates contained herein were prepared in accordance with the requirements of 35 IAC Subtitle G. These regulations require that a disposal site operator prepare a plan of closure and post-closure care, estimate the costs of these activities, and provide financial assurance to guarantee that proper closure and post-closure care of the facility. The purpose of these regulations is to ensure that all work can be completed in the event of operator default.

This document addresses both closure at the end of the facility's intended operating life and premature closure at the date during the next permit term when the cost of closure would be the greatest. A copy of this document is to be placed in the facility's Operating Record.

GENERAL INFORMATION

The Pagel Landfill Facility, operated by Winnebago Reclamation Service, Inc. is an existing facility located in Winnebago County near Rockford, Illinois. An expansion of this facility was approved on April 5, 1993 by Permit No. 1991-138-LF, which also contained a Closure/Post-Closure Care Plan for the permitted expansion area.

The existing unit is expected to cease accepting waste early in the year 2001 and will complete closure later that year. Portions of the landfill that reach final grade may be closed prior to that date. The Post-Closure Care Period will be 30 years from the date of closure. A previously approved Closure Plan for the existing unit is included as Appendix 4. A Report of Stability Analysis provided in Attachment 12 indicates that, upon closure, the unit will comply with all stability requirements of 35 IAC 814.302.

Closure activities will begin no later than 30 days after the date on which the unit receives the known final receipt of waste or, if the unit has remaining capacity and there is a reasonable likelihood that it will receive additional wastes, no later than one year after the most recent receipt of wastes.

Extensions beyond the one-year deadline for beginning closure may be granted by the IEPA if it can be demonstrated that the unit has the capacity to receive additional wastes and the owner or operator has taken and will continue to take all steps necessary to prevent threats to human health and the environment from the unclosed unit.

Closure activities will be completed in accordance with the plan within 180 days following the beginning of closure as specified above.

Extensions of the closure period may be granted in the permit if it can be demonstrated that the closure will, of necessity, take longer than 180 days and all steps are taken and will continue to be taken to prevent threats to human health and the environment from the unclosed unit.

The facility will also initiate and complete remedial activities in accordance with the CERCLA requirements during the Closure/Post-Closure Care Period. In addition, the facility is subject to an IEPA corrective action in accordance with the requirements of 35 IAC 811.324-326. Initiation of the corrective action measure will occur during the active life of the facility and continue during the Post-Closure Care Period. It is currently estimated that all remedial activities will be complete 10 years from the present date. The date for completion of remedial activities is estimated from the calculated time required to reduce leachate head levels to a level that results in an acceptable Groundwater Impact Assessment and an estimate on the time required to achieve Applicable Groundwater Quality Standards (AGQS) within the Groundwater Management Zone (GMZ). Calculation of the time required to reduce leachate head levels to an acceptable height are presented in Appendix B of the Groundwater Impact Assessment and are currently estimated at 5.9 years. The time required to achieve AGQS values within the GMZ after reduction of the leachate head are based on an estimated travel time for leachate impacted groundwater at the upgradient end of the landfill and predicted pore volume turnover times. The calibration report for the numerical flow model (GeoTrans 1995a) predicted a travel time of 2.5 to 3.0 years for

groundwater to travel from the upgradient end of the landfill to Killbuck Creek. Assuming that one pore volume of unimpacted groundwater will be required to adequately flush the impacted region it will take approximately 3 years to cleanup impacted groundwater after the source has been removed. Thus, it is currently estimated that it will take approximately 10 years during Post-Closure Care. **GeoTrans 1995a - "Construction and Calibration of a Three-Dimensional Numerical Groundwater Flow Model", July 1995.**

TEMPORARY SUSPENSION OF OPERATION

The temporary suspension of operation is not foreseen at the subject facility. However, if waste acceptance were to be suspended temporarily, the following steps taken. First, daily cover would be applied over the active fill area and graded to facilitate drainage and minimize infiltration. If the suspension were to occur for a period of longer than 60 days, intermediate cover would be applied to the fill area and graded similarly. All cracks, rills, gullies, and depressions would be repaired to prevent access to the solid waste by vectors, and to minimize infiltration and prevent standing water. If the temporary suspension of waste acceptance were to occur for a period of greater than 6 months, a more detailed plan would be submitted to the IEPA describing the additional steps that would be taken to protect the environment.

PREMATURE CLOSURE

Premature closure is closure of the site at some point in its operating life prior to all permitted areas being filled to capacity. For purposes of this plan, it is assumed that such closure will occur at a point when the maximum amount of closure expense would be incurred during the next permit term, which is referred to as the "Assumed Closure Date". It is further assumed that to such point in time, operation has been in conformance with the facility's permit and applicable regulations.

The "Assumed Closure Date" as defined by 35 IAC 811.700 (e), of the existing landfill is assumed to be the date of application (July 1, 1995). If the site were to prematurely close on this date, the greatest costs would be incurred as waste has been placed laterally over the entire permitted area. As final grades are reached upon additional filling, the final cover will be installed incrementally, thereby reducing the cost of premature closure as time progresses.

At the Assumed Closure Date, the average invert and top elevations will be approximately 720 ft and 800 ft MSL, respectively, yielding an average refuse depth of about 80 ft. The refuse depth has been reduced to account for required cover material.

If premature closure occurs at the Assumed Closure Date, some grading, berm construction, and backfilling may be necessary to promote drainage in the development area. As the site does not store water or serve as a transfer station, there should be no wastes on-site that would require disposal at closure. The major components of premature closure would be the additional cover placement and vegetation. All tasks that would be required for premature closure are detailed below:

Equipment Decontamination

No significant decontamination of equipment used in this operation will be required. Any equipment that has been in contact with waste material will be manually cleaned (e.g.; trash removal from tracks and undercarriage) and any cleaning residues generated will be placed in the fill at the time of covering. Equipment used in covering tasks should not become contaminated.

Drainage Control

At the time of premature closure, the entire unit will be above the surrounding grade. The only drainage control items required will be the construction and upgrading of the perimeter ditching. In addition, a cost allowance for 2,000 cubic yards of miscellaneous soil is provided to assure proper drainage.

Based upon the perimeter ditching and erosion control system provided and overall site topography, no adverse effects on local drainage are anticipated during premature closure.

All ditches are designed to pass the 100-year, 24-hour precipitation event without scouring or erosion after closure. Calculations are provided in Attachment 18. Provisions for runoff and runon are included in the Construction Plan.

Cover Placement

Cover Placement will involve the placement of a low permeability layer consisting of at least 12 inches of compacted earthen material overlain by a geomembrane, and a 36 inch protective layer. This cover would be placed over the entire existing unit, an area of 42.65 acres which is the largest area ever requiring cover during the site's active life. Cover estimates do not include any contribution from the intermediate cover that is required over any area not receiving more waste within 60 days.

Soils used for the compacted earthen material layer will be Unified Soils Classification System types ML-CL, CL or CH. The source of this material will be from the borrow area west of Killbuck Creek. The average haul distance for this material will be approximately 2,200 ft.

The compacted earthen material layer will be placed in lifts not to exceed 8-inches (loose) at a moisture content between 0 and 6 percent above optimum (ASTM:D698) moisture content. Earthen materials will be compacted with a self-propelled soil compactor or other suitable equipment and worked sufficiently to breakdown 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. The low permeability layer shall be compacted to achieve an average coefficient of permeability of 1.0×10^{-6} cm/sec. and minimize void spaces.

The adequacy of the compacted earthen material layer will be verified by conducting grain size, Atterberg limit, and moisture density relationship testing at least once for every 10,000 cubic yards of soil used. Also, nuclear density and moisture tests will be conducted at a rate

of at least one test per 1,000 cubic yards of final cover. The acceptable minimum thickness will be verified on a maximum 200 ft grid by either checking the depth at each grid point after placement or by surveying the topography before and after cover placement. Areas disturbed during testing procedures will be backfilled with a mixture of bentonite and cover spoils.

A geomembrane liner will be installed immediately above the compacted earthen material layer in accordance with all specifications and manufacturer's instructions by persons experienced in similar liner installation. Furthermore, the geomembrane liner will be installed in accordance with the installer's panel layout plan and as may be revised to suit field conditions at the time of installation. All field seaming will be in accordance with the manufacturer's specifications. Any necessary revisions during installation will be reflected on the "as-built" record drawings.

The protective layer will consist of a minimum 8 inch sand drainage layer overlain by protective soils to a total depth of at least 36 inches. The sand drainage layer may be omitted on the side slopes. Materials for the sand drainage layer will be obtained from on-site borrow areas and will have a saturated hydraulic conductivity of at least 1.0×10^{-2} cm/sec.

Loams of the USDA soils classification system or Unified Soils Classification System types GM, GC, SM, SC, ML and CL are all considered suitable soils for the protective layer. However, any of these soils which are used will be evaluated by an agronomist or other appropriate expert prior to seeding, to determine what, if any, soil amendments may be necessary for proper vegetative growth. The bottom 24 inches of the layer should be lightly compacted as necessary to resist erosion. The top 12 inches should not be compacted and should be the best on-site readily available soil for supporting vegetation. Verification of the minimum thickness of the protective layer will be achieved on a maximum 200 ft grid by depth checks or by surveying the topography before and after cover placement.

The protective soil layer may include soils from on-site and from adjacent property owned by Winnebago Reclamation Service.

The finished surface of the final cover will be surveyed on a spacing which will not exceed 100 ft in any ordinate direction. Grades will be considered acceptable that do not deviate from the plan grades more than ±1 ft and ±3 ft between the specified survey interval on the top and side slopes, respectively. This survey and acceptance criteria will apply to both the low permeability and protective soil layers of the final cover system, with allowance for the minimum 36-inch difference between their surfaces.

Vegetation

The entire finalized area will require the establishment of vegetative cover. The seed mixture selected must be amenable to the soil quality/thickness, slopes and moisture/climatological conditions that exist without the need for continued maintenance and with minimal potential for root penetration into the compacted final clay cover. It will be a diverse mix of native and introduced species that is tolerant of the landfill gas expected to be generated and consistent with the "open space" post closure land use. Such a mixture could include Kentucky Bluegrass, Perennial Ryegrass, Crownvetch and White Clover. Seed will typically be incorporated into the upper surface of the protective soil layer using a disk, harrow, or by using hydroseeding techniques. Fertilizer, lime, and mulch will be used as necessary to establish proper growth of the seed.

Landscaping or seeding professionals knowledgeable of local climatological conditions will be consulted in determining the specific seed mixtures to be sown, necessary soil amendments and application rates, based upon specific seasonal conditions at the time of closure. Such a professional was consulted and his recommendations are provided in a letter dated June 17, 1992 (Appendix 3). As warranted, additional consultation will be made to evaluate specific conditions at the time of seeding. 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. Contoured furrow plowing or an excelsior blanket will

be used for additional erosion control on sideslopes. Seeding will usually be done in the spring and fall.

Landfill Gas Management

An active gas/leachate collection system is currently operating at this unit. The system recovers landfill gas for either beneficial use at a neighboring facility or incineration using an on-site flare. In the event of premature closure, the existing gas collection system would remain in operation and would function throughout the post-closure care period. The continued operation of this existing system would not incur any further costs besides routine inspection and maintenance as discussed in the Post-Closure Care Plan.

All gas monitoring probes as discussed in the Gas Management Plan (Attachment 14) will be installed in a premature closure scenario. Fifteen probes have currently been installed, leaving two remaining probes to be installed in a premature closure scenario.

The proposed gas/leachate system as discussed in the Gas Management Plan (Attachment 14) would not be installed in a premature closure scenario.

Miscellaneous

In accordance with an Illinois Department of Transportation Permit for a low-water crossing of Killbuck Creek, financial assurance must be provided to remove material placed to create a low-water crossing.

Leachate Management

In the event of premature closure, the existing leachate collection system will be utilized throughout the post-closure care period, therefore precluding the need for any further construction. Leachate will be pumped from the dual gas/leachate extraction wells to a centrally located storage lagoon and will ultimately be discharged to a Publicly Owned Treatment Works (POTW) or other permitted treatment facility. The continued operation of

this system would not incur any further costs besides the routine inspection and maintenance as discussed in the Post-Closure Care Plan.

Certification of Closure

Both the Operator and a Professional Engineer must certify to the Illinois EPA that closure is in accordance with the Closure Plan. Plan sheets for the closed site must also accompany the certification. Therefore, the engineer should be retained at the outset of the closure process so that all aspects of closure can be overseen. The engineer will need to spend sufficient time on-site as required by 35 IAC 811 Subpart E to ensure adequate cover quality and thickness as well as the proper completion of the other tasks. Further, the engineer will conduct soil tests to ensure final cover quality. This will include verification of cover soil thicknesses as well as standard proctor density and other testing previously mentioned.

Upon completion of placement of the final cover, the Construction Quality Assurance Officer (CQAO) will submit an acceptance report of the construction to the Agency in accordance the Construction Quality Assurance Program. This will include a certification by the CQAO that the construction has been prepared and constructed in accordance with the engineering design; "as-built" record drawings; and all daily summary reports. The engineer will maintain records of inspections, test results, etc. used as a basis for certification and a record of any data supplied to the IEPA will also be maintained by the operator. If the engineer and CQAO described above are the same person, the acceptance report may be submitted in conjunction with the certification of closure.

As discussed in the General Information Document, the existing unit is currently on the CERCLA National Priority List. As part of the Consent Decree and the subsequent Remedial Design Work Plan for the Groundwater Extraction and Treatment System, an Air Sparging and Soil Vapor Extraction System was prepared as the Corrective Action.

It is not expected that a Premature Closure of the facility would impact the overall corrective action process. All of the remedial activities associated with the normal closure of the facility (capping, gas management, etc.) would proceed as outlined in the proceeding discussion.

The proposed Air Sparging System for in-situ treatment of impacted groundwater would be installed as scheduled, or if Premature Closure occurred after installation, continue to operate as designed. Premature Closure would have no effect on the overall Post-Closure Care costs since the estimated time for completion of remedial activities begins from the start of remedial activities which would initiate prior to or upon closure.

Documentation

Current regulations require that a plat of the completed site be filed with the appropriate County Land Recording Authority. It may be necessary, particularly during premature closure, to contract this work to an Illinois Registered Land Surveyor. Records of all documentation will be maintained by the engineer and applicable parties. Also, the owner or operator will record a notation on the deed to the landfill facility property, or some other instrument that is normally examined during title search, and notify the IEPA that the notation has been recorded and that a copy has been placed in the Operating Record. The notation on the deed will in perpetuity notify any potential purchasers of the property that the land has been used as a landfill facility and its use is restricted under 40 CFR 258.51(c)(3). The notation may be removed from the deed if all wastes are removed from the facility and permission is granted by the IEPA.

Time Schedule

It is anticipated that, given reasonable weather condition, the above tasks can be accomplished in about three (3) months. A time schedule by task provided in Appendix 2.

ROUTINE CLOSURE

Routine closure will occur when final grade is achieved in all areas and will be in accordance with 35 IAC 811 and 35 IAC 814. It is estimated that this closure will occur in the Year 2001. In contrast to premature closure or temporary suspension of operations, only a small area of about 5 acres will require the placement of final cover and stabilization. Under the proposed operating scenario, this area will be an above-grade face on the east side of the unit. The final

slopes and contours of the closed unit will compliment and blend with the surrounding topography for use as an open space area. Final site conditions are depicted on Sheet B-3 of the accompanying site developmental drawings.

When completed, the average invert and top elevations will be 720 and 820 ft MSL, respectively, yielding an average refuse depth of about 100 ft. The refuse depth has been reduced to account for required cover material.

The tasks required for routine closure of the facility are detailed below.

Equipment Decontamination

Equipment will be cleaned and decontaminated as described in the Premature Closure section.

Drainage Control

No backfill work is anticipated for routine closure. Grading of the final fill area is considered an operational task and is not considered an element of routine closure.

Based upon the perimeter ditching and erosion control system provided and overall site topography, no adverse effects on local drainage are anticipated during premature closure. All ditches are designed to pass the 100 year-24 hour precipitation event without scouring or erosion after closure. Provisions for runoff and runon are included in the Construction Plan.

Cover Placement

Daily cover in the final fill area will be upgrading to final cover. A minimum of 12 inches of compacted clay and 36 inches of protective soil will be required for this task. The cover placement will be conducted in a similar manner as described in the Premature Closure section.

Vegetation

The final fill area will require the establishment of vegetative cover as described in the Premature Closure Section.

Landfill Gas Management

All gas probes, ambient air monitor locations, and perimeter gas/leachate extraction wells will have been installed prior to routine closure. Approximately 5 interior gas/leachate extraction wells and their necessary appurtenances will be installed during routine closure. Some installation of additional gas collection system piping will be required at that time as well.

Leachate Management

All perimeter gas/leachate extraction wells, drainage laterals, intermediate transfer stations, and pumps, and the leachate storage lagoon will have been installed prior to routine closure. Approximately 5 interior gas/leachate extraction wells and their necessary appurtenances will be installed as discussed in the previous section.

Certification of Closure

Certification of closure will be accomplished as described in the Premature Closure section.

Documentation

Documentation will be accomplished as described in the Premature Closure section.

Time Schedule

The tasks associated with routine closure can normally be accomplished within approximately 3-4 weeks. However, a 60-day time period will be allowed for routine closure. A time schedule by task is provided in Appendix 2.

POST-CLOSURE CARE PLAN

In accordance with 35 IAC 811.111, the operator will treat, remove from the site, or dispose of all wastes and waste residues within 30 days after the receipt of the final volume of waste. In addition, the operator will remove all equipment or structures that will not be needed for post closure care operations, unless otherwise authorized.

In accordance with 35 IAC 814.302, the operator is responsible for maintaining and monitoring the site for a 30 year period. In accordance with 35 IAC 812.115, a Post Closure Care Plan must be submitted to the Agency describing how the post closure care will be conducted. Activities necessary for Post Closure Care at the subject facility are detailed below. Cost estimates are included in the next section.

Maintenance and Inspection

A maintenance program will ensure proper functioning of all systems that remain on the facility after closure. The maintenance program will include the following:

1. Inspections

   A walking, visual inspection of the entire site should be conducted quarterly with a written record of the inspection made and preserved. The inspector should assess the condition and need for repair of final cover, vegetation, fencing, gas probes, gas/leachate extraction wells, monitoring points, drainage structures, etc. These inspections will be conducted quarterly for a minimum of five years after closure, and after five years, the operator may reduce the frequency to annual inspections until settling has stopped and there are no eroded or scoured areas. These annual inspections must be continued for a minimum of 15 years after closure. However, in accordance with directives from the IEPA, it is assumed that these annual inspections will continue for a period of 30 years for cost estimation purposes.

In general, the following guidelines will be followed when assessing the need for remedial actions:

a) All rills, gullies, and crevices six inches or deeper in the compacted final cover will be filled. Areas identified by the operator or the Agency inspection as particularly suspectable to erosion will be recontoured;

b) All reworked surfaces and areas with failed or eroded vegetation in excess of 100 sq. ft will be revegetated in accordance with the approved closure plan;

c) Brush, trees or similar vegetation with tap roots growing in areas not so designated will be controlled by cutting or other suitable control method;

d) All holes and depressions created by settling will be filled and recontoured so as to prevent standing water;

e) All eroded and scoured drainage channels will be repaired and lining material will be replaced if necessary.

2. Cover

Differential settlement and erosion may cause the need for cover repairs. Any areas where ponding occurs or erosion cuts appear must be promptly repaired in order to maintain the quality of the clay cap as described in the closure plan. While recently filled and covered areas will require the most maintenance, the landfill will stabilize with time such that little, if any, maintenance will ultimately be required. Based upon experience with landfills of this size and location, an average maintenance rate of 1% of the site per year is assumed. A borrow area must be maintained for such activities.

3. Vegetation

Areas repaired in Item 2 above will require re-establishment of the vegetative cover. Further, any barren areas noted during inspections that will require repair. It is assumed that an average of 2% of the site will require annual repair during the post-closure care period. In addition, the site will be mowed at least once per year.

Groundwater Monitoring

Groundwater monitoring will be in accordance with the Groundwater Monitoring Plan provided by GeoTrans, Inc. in a separate document.

Groundwater monitoring records will be kept at the site operator's office in the Operating Record. Analytical results will be reviewed by properly trained individuals. The facility is currently in assessment monitoring and will maintain an Assessment Monitoring Program until completion of remedial activities. The current estimated time for completion of corrective action remedial continue is 10 years. Upon completion of remedial action the Groundwater Monitoring Program will be revised to reflect detection monitoring. The detection monitoring program consists of fewer monitoring wells and less frequent analysis for organic and inorganic parameters. The Post-Closure Care Cost Estimate reflects this anticipated change during the eleventh year of Post-Closure Care.

Landfill Gas Management and Monitoring

Evidence of any damage to the gas collection system will be noted and any necessary repairs be made at each inspection interval. It is estimated that the operation and maintenance of the gas collection system will require 4 hours per month. All gas monitoring probes, ambient air monitoring locations, and building methane detectors will be inspected and serviced at each inspection interval as well.

In accordance with 35 IAC 811.310, all gas monitoring devices, including ambient air monitoring locations, will be sampled on a yearly 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 unit of if monitoring points within the unit indicate that methane is no longer being produced in quantities that would result in migration from the facility.

Monitoring of landfill gas within the landfill will be accomplished by sampling gas from the main collection line, prior to the point at which it enters the compressor. This sample will provide a flow-weighted composite, represented of the gas being produced within the entire facility. In addition, a pressure reading will be taken at the head of each gas extraction well at each sampling period.

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 monitoring locations will be analyzed for methane only. For cost estimation purposes, it will be assumed monitoring will continue for 30 years.

Leachate Management and Monitoring

Evidence of any damage to the leachate collection and disposal system will be noted and any necessary repairs be made at each inspection interval. It is estimated that the operation and maintenance of the leachate management system will require 4 hours per month. No cleaning of the leachate collection system will be required.

Leachate will be monitored and treated for a minimum period of 30 years in accordance with 35 IAC 811.309. After this period, leachate collection and treatment may be discontinued if the operator can demonstrate that the discontinuation would pose no threat to human health or the environment. The "HELP" Model predicted the annual leachate collection volume to be 2,832 ft^3 or 21,200 gallons after closure. It is assumed that 6 pumps will be sufficient to handle this leachate volume and each pump will have to be replaced 6 times (estimated life of the pumps is 5 years) over the 30 year period.

Leachate will have to be monitored on a quarterly/annual basis for the L1/L2 Lists of the frequencies dictated within the Leachate Management Plan (Attachment 13).

Currently, WRS has a leachate discharge permit with the Rock River Water Reclamation District. Leachate treatment costs are based upon their current disposal costs. However, if it proves to be advantageous to use another POTW or other treatment methods, WRS reserves the right to use these facilities. It is assumed that the Post Closure Costs of alternative leachate treatment would be similar.

Additional analytical tests will be required In accordance with the General Wastewater Discharge Permit from the Rock River Water Reclamation District. Copper, nickel, zinc, total chromium, lead, cadmium, cyanide, and ammonia (N) will be tested for biannually. In addition, a Total Organic Priority Pollutant scan will be conducted biannually. This scan will include volatile, base neutral, and acid extractable compounds, pesticides, and PCB's. The costs associated with these analyses are included in the leachate treatment costs.

Recordkeeping

During site operation, records of field investigations, closure test results, inspections, groundwater/leachate/gas monitoring results will be maintained at the site. During the post-closure care period, these records will be maintained at the site operator's office and all records will indicate the date, problems encountered and their location, and any remedial action taken.

Security

Fencing, gates and other required security measures will be inspected and maintained during the post-closure care period.

Post Closure Land Use

Once the facility has been certified closed, it will be used as an open space.

COST ESTIMATES

Separate cost estimates for closure and post-closure care are provided on the following pages. These estimates reflect current third party costs, assuming that the Illinois EPA will contract for all closure and post-closure care work. Cost items are based upon the author's "informed judgement" of actual third party costs. References include knowledge of current engineering fees and published manuals for estimation of heavy construction costs.

CLOSURE COST ESTIMATE	$1,398,810.00
POST-CLOSURE CARE COST ESTIMATE	3,146,070.00
TOTAL COST ESTIMATE	**$4,544,880.00**

A Federal Extension of the RCRA Subtitle D Financial Assurance Requirements and corresponding Illinois Legislation was recently enacted into Law. Therefore, the following financial assurance amount will be used until the expiration of the Federal Extension. These costs have been reduced using a 4 percent reduction factor in accordance with IEPA Directive.

CLOSURE COST ESTIMATE	$1,398,810.00
POST-CLOSURE CARE COST ESTIMATE	2,103,053.00
TOTAL COST ESTIMATE	**$3,501,863.00**

A Financial Assurance document for these costs will be provided in accordance with 35 IAC 811 and RCRA Subtitle D.

APPENDIX 1

Cost Estimates

PREMATURE CLOSURE COST ESTIMATE

Equipment Decontamination		
Materials and Labor		
10 hrs. @ $30/hr.		$300.00
Drainage Control		
Miscellaneous Backfill - Excavate, Haul and Place		
2,000 cu. yds @ $1.50/cu. yd.		3,000.00
Final Cover		
Compacted Earthen Materials		
Excavate, Haul and Compact		
68,800 cu. yds. @ $1.80/ cu. yd.		123,840.00
Geomembrane Liner		
Materials and Installation		
1,860,000 ft^2 @ $0.30/$ft^2$		558,000.00
Protective Soils		
Excavate, Haul and Place		
206,500 cu. yds @ $1.10/cu. yd.		227,150.00
Vegetation		
Fertilize, Seed and Mulch		
42.7 acres @ $250.00/acre		10,675.00
Gas Monitoring		
Installation of probes		
2 @ $1,000.00/probe		2,000.00
Gas Collection		
Installation of Flare System		
1 @ $25,000.00		25,000.00
Inspection and Certification		
Engineer		
120 hrs. @ $70.00/hour	8,400.00	
Technical		
150 hrs. @ $50.00/hour	7,500.00	
Testing	2,500.00	
Mapping	1,000.00	
		19,400.00

PREMATURE CLOSURE COST ESTIMATE -- CONTINUED

Vapor Extraction System Construction		
Blower		
2 @ $10,000.00	20,000.00	
Piping		
1,500 ft. @ $15.00/ft.	22,500.00	
Air Sparging Well		
31 @ $6,300.00/each	195,300.00	
Well Heaps		
31 @ $1,500.00/each	46,500.00	
Building/Foundation		
300 sq. ft. @ $40.00/sq. ft.	12,000.00	
Electric/Piping and Valves		
1 L.S.	8,000.00	
Installation of Equipment		
1 L.S.	10,000.00	
Construction Service		
30 days @ $1,000.00/day	30,000.00	
Start-Up		
15 days @ $2,000.00/day	30,000.00	
Bid and Scope Contingency		
(15%)	47,145.00	
		421,445.00
Miscellaneous		
Demolition and Removal of Killbuck Creek Culvert		5,000.00
Documentation		3,000.00
	TOTAL COST:	**$1,398,810.00**

POST-CLOSURE CARE COST ESTIMATE

			Yrs 1-5	Yrs 6-30	
Inspections					
10	hrs @	$50.00			
4	@	$500.00	$2,000		
10	hrs @	$50.00			
1	@	$500.00		$500	
Cover Maintenance					
42.7	acres x 1.0% x 1 ft depth				
689	cu.yd @	$2.00	$1,378		
42.7	acres x 0.2% x 1 ft depth				
138	cu.yd @	$2.00		$276	
Vegetation Maintenance					
Fertilize, Reseed, Mulch					
42.7	acres x 2.0%				
0.85	acres @	$1,000.00	$850		
42.7	acres x 0.5%				
0.21	acres @	$1,000.00		$210	
Mowing					
42.7	acres @	$30.00	$1,281	$1,281	
Groundwater Monitoring			**Yrs 1-15**	**Year 16**	**Yrs 17-30**
(See Detailed Cost Analysis)					
Operations and Maintenance Monitoring (Assessment)					
Quarterly Groundwater Monitoring			$ 7,392		
Semi - Annual Monitoring			$ 20,419		
Annual Monitoring Organics / Inorganics			$ 65,101		
Verification Monitoring (Post Remediation)					
Annual Monitoring Organics / Inorganics				$ 140,218	
Detection Monitoring					
Quarterly Groundwater Monitoring					$11,088
Annual Monitoring Organics / Inorganics					$35,055

POST-CLOSURE CARE COST ESTIMATE

Leachate Management

				Yrs 1-30
Quarterly Leachate Monitoring				
2	leachate monitoring points,			
3	times per year @	$272.25		$1,634
Annual Leachate Monitoring				
2	leachate monitoring points,			
1	times per year @	$2,245.40		$4,491
Leachate Treatment				
21,200	gal @	$0.05		$1,060
Pump Replacement				
6	pumps @	$800.00		
Once every 5 years				$960

Gas Management

				Yrs 1-5	-	Yrs 6-30
Field Measurement, Documentation, Reporting						
17	probes @	0.25	hours/probe			
12	times/year @		$ 20.00	$1,020		
Field Measurement, Documentation, Reporting						
17	probes @	0.25	hours/probe			
4	times/year @		$ 20.00			$340
System Maintenance						
48	hrs @	$50.00		$2,400		$2,400

Vapor Extraction Annual O & M

				Yrs 1-15	Yrs 15-30
Total Annual O & M Costs					
1	L.S @	$36,800.00		$36,800	$0

	Yrs 1-5	Yrs 6-15	Year 16	Yrs 17-30
ANNUAL TOTAL	$146,786	$142,864	$153,370	$59,295
	X 5	X 10	X 1	X 14
	$733,930	$1,428,640	$153,370	$830,130
TOTAL COSTS				**$3,146,070**

Groundwater Monitoring
Detailed Cost Analysis

Operations and Maintenance Monitoring (Assessment)

Test Series	# of Wells	Frequency #/Year	Cost per Event	Yearly Cost	# of Years	Total Cost w/out Reduction
Quarterly Groundwater Monitoring	14	2	$ 264.00	$ 7,392.00	15	$ 110,880.00
Semi - Annual Monitoring	14	1	$ 1,458.50	$ 20,419.00	15	$ 306,285.00
Annual Monitoring Organics / Inorganics	26	1	$ 2,503.90	$ 65,101.40	15	$ 976,521.00

Verification Monitoring (Post Remediation)

Test Series	# of Wells	Frequency #/Year	Cost per Event	Yearly Cost	# of Years	Total Cost w/out Reduction
Annual Monitoring Organics / Inorganics	14	4	$ 2,503.90	$ 140,218.40	1	$ 140,218.40

Detection Monitoring

Test Series	# of Wells	Frequency #/Year	Cost per Event	Yearly Cost	# of Years	Total Cost w/out Reduction
Quarterly Groundwater Monitoring	14	3	$ 264.00	$ 11,088.00	14	$ 155,232.00
Annual Monitoring Organics / Inorganics	14	1	$ 2,503.90	$ 35,054.60	14	$ 490,764.40

POST-CLOSURE CARE BASED UPON A FOUR PERCENT (4%) DISCOUNT FACTOR

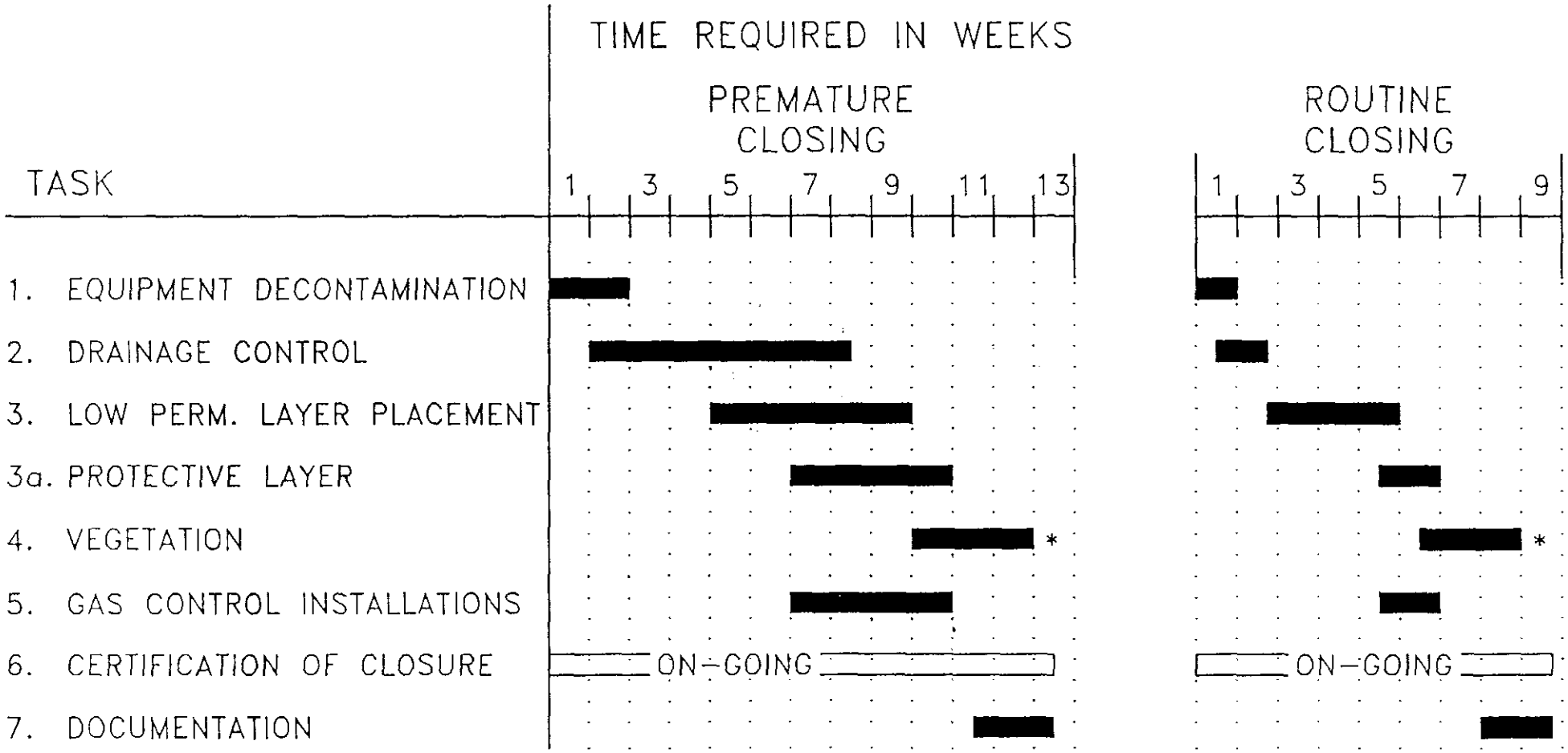
Period (Years)	Years (n)	Total Cost without Reduction	Uniform Series Present Worth Factor*	Single Payment Present Worth Factor*	Reduced Present Value
1 - 5	5	$146,786	4.6299	1.0	$679,605
6 - 15	10	$142,864	8.1109	0.8548	$990,504
16	1	$153,370	1.0	0.5553	$85,166
17 - 30	14	$59,295	10.9856	0.5339	$347,778
					$2,103,053

* Values for Uniform Series Present Worth Factor and Single Payment Present Worth Factor taken from Engineering Economics Analysis, Michael R. Lindburg, P.E., Professional Publications, Inc., Belmont, CA 1993.

APPENDIX 2

Closure Schedule

TIME REQUIRED FOR CLOSURE



* ESTABLISHMENT OF VEGETATION IS DICTATED BY SEASONAL CONSTRAINTS SUCH THAT SCHEDULE MODIFICATION MAY BE NECESSARY

APPENDIX 3

Vegetation Recommendations

Northwestern Agronomics SM
1925 South Meridian Rd. • Rockford, Illinois 61102
(815) 963-0053
Agricultural and Environmental Services

John Lichty
Winnebago Reclamation Service, Inc.
8403 Lindenwood Road
Rockford, IL 61109

June 17, 1992

Dear John:

At your request I have compiled a researched list of grasses suitable to be used as the specified vegetative cover for the landfill closure plans.

I recommend 30 to 50 total pounds per acre of a seed mixture consisting of the following grass varieties mixed in equal parts:

1. Reed Canarygrass.
2. Perennial Ryegrass.
3. Smooth Bromegrass.
4. Orchardgrass.

The vegetative cover recommended above fulfills the following requirements:

1. The mixture is very winter hardy, is drouth tolerant, and is tolerant of excessively wet conditions. Therefore this mixture is well adapted to the varying climactic conditions experienced in Winnebago County.

2. The recommended mixture requires little maintenance and may be considered to be suitable for a permanent vegetative cover.

3. The mixture recommended will form a dense sod cover and will therefore control both water and wind erosion under all seasonal conditions.

4. The species chosen have shallow, fibrous root systems unlikely to penetrate into the compacted clay cover.

5. The recommended seed mixture is compatible with the soil types as specified in attachment 14 page 9 of the application.

If you have any questions or need more information please do not hesitate to call me.

Sincerely Yours,

Daniel R. Peterson, Pres.
Northwestern Agronomics, Inc.

APPENDIX 4

Previously Approved Closure/Post-Closure Care Plan

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

217/782-6762

Refer to: 2018080001 -- Winnebago County
Pagel's Pit/Winnebago Reclamation Services
Permit No. IL 1972-24
Supplemental Permit No. 1990-454-SP
Log No. 1990-454
Permit File

January 9, 1991

Winnebago Reclamation Service, Inc.
Attention: John D. Lichty, Landfill Manager
Post Office Box 2071
Loves Park, Illinois 61130

Dear Mr. Lichty:

Supplemental permit is hereby granted to Winnebago Reclamation Services, Inc. to modify Pagel's Pit Landfill's closure/post-closure care plan all in accordance with the plans you prepared. Final plans, specifications, application and supporting documents as submitted and approved shall constitute part of this permit and are identified on the records of the Illinois Environmental Protection Agency, Division of Land Pollution Control by the permit number(s) and log number(s) designated in the heading above.

Specifically, Supplemental Permit No. 1990-454-SP approves a revised cost estimate for closure and fifteen years post-closure care. The revised cost estimate totals $341,524.00.

The permit is issued subject to the standard conditions attached hereto and incorporated herein by reference, and further subject to the following special conditions:

1. The closure/post-closure care plan approved by Permit No. 1989-125-SP is hereby modified to include the cost estimates contained in the application for Permit No. 1990-454-SP.

2. The operator shall notify the Agency within 30 days after receiving the final volume of waste.

3. The operator shall initiate implementation of the closure plan within 30 days after the site receives its final volume of waste.

4. The operator shall not file any application to modify the closure plan less than 180 days prior to receipt of the final volume of waste.

5. Financial assurance shall be maintained by the operator in accordance with 35 Ill. Adm. Code, Subtitle G, Part 807, Subpart F in an amount equal to the current cost estimate for closure and post-closure care.

The sum of the current cost estimates for closure and post-closure care is $341,524.00. Financial assurance is currently provided by a three Irrevocable Standby Letters of Credit -- No. 1044 issued by First National Bank of Rockford, Illinois for $100,000, No. 54853 issued by Bank One of Milwaukee, Wisconsin for $211,962.00 and No. 567 issued by First National Bank & Trust Company of Rockford, Illinois for $58,820.00. Thus, the total amount of financial assurance is $370,782.00, which exceeds the current cost estimates.

6. Groundwater quality records shall be maintained at the office of the site operator and shall be reviewed quarterly. A groundwater quality report shall be submitted quarterly. If the owner/operator or the Agency's Division of Land Pollution Control determines that adverse trends are developing, further investigation is to be performed. If corrective action becomes necessary, a plan is to be developed by the operator and submitted to the Permit Section, Division of Land Pollution Control for approval.

7. The owner and operator shall monitor gas, water and settling at the completed site for a period of 15 years after the site is closed and shall take whatever remedial action is necessary to abate any gas, water or settling problems which appear during that time. Post-closure groundwater monitoring shall be conducted and reported to the Agency on a quarterly basis for 15 years for the monitoring wells and parameters identified in Attachment A of Permit No. 1989-027-SP.

8. The operator shall notify the Agency when the site has been closed in accordance with the approved closure plan utilizing the Agency's Closure Affidavit Request Form.

9. Special wastes received at the site for recovery shall be transported to the facility utilizing the Agency's supplemental permit system and manifest system.

10. Special wastes generated at the site for disposal, storage, incineration or further treatment elsewhere shall be transported to the receiving facility utilizing the Agency's supplemental permit system and manifest system.

11. This permit is subject to review and modification by the Agency as deemed necessary to fulfill the intent and purpose of the Environmental Protection Act, and all applicable environmental rules and regulations.

12. This permit is issued with the expressed understanding that no process discharge to Waters of the State or to a sanitary sewer will occur from these facilities. If such discharge occurs, additional or alternate facilities shall be provided. The construction of such additional or alternate facilities may not be started until a permit for their construction has been issued by the Agency.

13. The Agency reserves the right to require the installation and monitoring of a groundwater monitoring system, to require analyses for certain parameters and to alter parameters as necessary to fulfill the intent and purpose of the Environmental Protection Act.

14. Any modification to the facility shall be the subject of an application for supplemental permit for site modification submitted to this Agency.

15. Permittee shall notify the Agency of any changes from the information submitted to the Agency in its application for a developmental and operating permit for this site. Permittee shall notify the Agency of any changes in the names or addresses of both beneficial and legal titleholders to the herein-permitted site. Such notification shall be made in writing within fifteen (15) days of such change and shall include the name or names or any parties in interest and the address of their place of abode; or, if a corporation, the name and address of its registered agent.

16. Site surface drainage, during development, during operation and after the site is closed, shall be such that no adverse effects are encountered by adjacent property owners.

17. The best available technology (mufflers, berms and other sound shielding devices) shall be employed to minimize equipment noise impacts on property adjacent to the site during both development and operation.

Except as modified in the above documents, the site shall be developed and operated in accordance with the terms and conditions of Permit No. 1972-24 April 7, 1972 and any supplemental permits issued to this facility.

The original and two (2) copies of all certifications, logs or reports and three (3) copies of groundwater monitoring chemical analysis forms which are required to be submitted to the Agency by the permittee should be mailed to the following address:

Illinois Environmental Protection Agency
Compliance Section
Technical Compliance Unit
Division of Land Pollution Control -- #24
2200 Churchill Road
Post Office Box 19276
Springfield, Illinois 62794-9276

Very truly yours,

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

LWE:JS:ct,19q,9-12

cc: Rockford Region
Planning and Reporting Section
Division File

STANDARD CONDITIONS FOR CONSTRUCTION/DEVELOPMENT PERMITS
ISSUED BY THE ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

July 1, 1979

The Illinois Environmental Protection Act (Illinois Revised Statutes, Chapter 111-1/2, Section 1039) grants the Environmental Protection Agency authority to impose conditions on permits which it issues.

These standard conditions shall apply to all permits which the Agency issues for construction or development projects which require permits under the Divisions of Water Pollution Control, Air Pollution Control, Public Water Supplies, and Land and Noise Pollution Control. Special conditions may also be imposed by the separate divisions in addition to these standard conditions.

1. Unless this permit has been extended or it has been voided by a newely issued permit, this permit will expire two years after date of issuance unless construction or development on this project has started on or prior to that date.

2. The construction or development of facilities covered by this permit shall be done in compliance with applicable provisions of Federal laws and regulations, the Illinois Environmental Protection Act, and Rules and Regulations adopted by the Illinos Pollution Control Board.

3. There shall be no deviations from the approved plans and specifications unless a written request for modification of the project, along with plans and specifications as required, shall have been submitted to the Agency and a supplemental written permit issued.

4. The permittee shall allow any agent duly authorized by the Agency upon the presentation of credentials:

   a. to enter at reasonable times the permittee's premises where actual or potential effluent, emission or noise sources are located or where any activity is to be conducted pursuant to this permit.

   b. to have access to and copy at reasonable times any records required to be kept under the terms and conditions of this permit.

   c. to inspect at reasonable times, including during any hours of operation of equipment constructed or operated under this permit, such equipment or monitoring methodology or equipment required to be kept, used, operated, calibrated and maintained under this permit.

Printed on Recycled Paper

September 25, 1990

Illinois Environmental Protection Agency
Permit Section
2200 Churchill Road
Springfield, Illinois 62706

Attention: Lawrence Eastep, Manager

Re: Application for 15 yr.
Post Closure care

Dear Mr . Eastep:

This letter is in regards to the regulation adopted July 1,1990 which extends the Post Closure care period for a sanitary landfill from 5 years to 15 years.

There have been no changes in the operating plan of our facility since our closure/post-closure care plan and cost estimate were approved on August 25, 1989. Therefore, the only part of the closure plan that is effected is the post-closure care plan and cost estimate. The additional 10 years of post-closure care will cost $58,820.00.

Enclosed please find:

General application for permit
Application to extend post closure care
Irrevocable standby letter of credit
Copies of notice to elected officials and concerned citizens.

If you have any further questions please feel free to contact me at 815-874-4806.

Sincerely,
Winnebago Reclamation Service, Inc.

John D. Lichty
Manager

cc: 7

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

General Application for Permit (LPC-PA1)

This form must be used for any application for permit from the Division of Land Pollution Control, except for waste stream permits and permits for the composting of landscape waste only. Attach any necessary plans, specifications, reports, etc. to fully support and describe the activities or modifications being proposed. If necessary, attach sufficient information to demonstrate compliance with all applicable RCRA requirements.

SITE IDENTIFICATION

Name: Winnebago Reclamation Service-Pagel's

Site # (IEPA): 2 0 1 8 0 8 0 0 0 1

City: Rockford

County: Winnebago

Existing DE/OP Permit Nos. (if applicable): 1972-24

	OWNER	OPERATOR
Name:	Winnebago Reclamation Service, Inc.	Winnebago Reclamation Service, Inc.
Address:	4920 Forest Hills Road	4920 Forest Hills Road
	Loves Park, Illinois 61111	Loves Park, Illinois 61111
Contact Name:	Gary Marzorati	John Lichty
Phone #:	815-654-4770	815-874-4806

TYPE SUBMISSION:		TYPE FACILITY:		TYPE WASTE:	
Developmental		Landfill	Y	General Municipal Refuse	X
Operating		Land Treatment		Hazardous	
Supplemental		Transfer Station		Special (Non-Hazardous)	
Permit Transfer		Treatment		Demo Debris (ex. putrescible)	
Name Change		Storage		Demo Debris (incl. putrescible)	
Closure/Post Closure Certification	Y	Incinerator		Used Oil	
		Composting		Solvents	
		Recycling/Reclamation		Landscape/Yard Waste	
		Other		Other (Specify)	

DESCRIPTION OF PROJECT: (Include a brief narrative description here.)

Extend existing 5 year post closure care plan and cost estimate to the required 15 years.

COMPLETENESS REQUIREMENTS

The following items must be submitted unless they are either not required, or have previously been approved. Any items marked "N/A" must be fully explained. For example, a treatment facility may indicate "N/A" for prior conduct certification and explain that certification is not required for treatment facilities. Please refer to the instructions for further guidance.

.. Have all public notice letters been mailed and is documentation enclosed? X Yes ___ No ___ N/A

This Agency is authorized to require this information under Ill. Rev. Stat. 1979, Chapter 111 1/2 Section 1039. Disclosure of this information is required and 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.

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

Application To Extend Post Closure Care From Five to Fifteen Years (LPC-PA14)

INSTRUCTIONS

Section 22.17 of the Environmental Protection Act has been amended to require fifteen (15) years of post-closure care for non-hazardous disposal sites, effective July 1, 1990. Pursuant to 35 IAC 807.603(b)(1), financial assurance must be increased by September 28, 1990.

In an effort to ease the paperwork burden on you and the Agency, a simple short filing form has been developed. [redacted] Complete and submit this application, only if the currently approved closure and post-closure care plans, cost estimates, and financial assurance are up to date, and the current post-closure care period is five years. For any other situation, new or revised plans, cost estimates, and financial assurance (if required), must be submitted to the Agency in the form of a regular application for supplemental permit utilizing LPC-PA11 and LPC-PA-1.

This "short form" application (LPC-PA14) must be accompanied by LPC-PA1 which must be signed by the owner and operator and must be accompanied by proof of mailing notification letters. Refer to the memo regarding notification letters. Certification by an engineer is not required when using this short form.

Revised financial assurance for the amount indicated is required to accompany this document. If revised financial assurance is not submitted, explain why it is not required based on the regulations.

If this method is not applicable to your increased post-closure care costs, provide complete documentation of your proposed estimates. This will most likely result in a need to submit a Supplemental Permit Request utilizing LPC-PA11 and LPC-PA1.

Please call 217/782-6762 for copies of the appropriate financial forms. Original Agency forms must be used.

Questions regarding these procedures should be directed to the Solid Waste Unit in the Permit Section 217/782-6762 or your facility's inspector in the appropriate Regional Office.

Site No.: 2 0 1 8 0 8 0 0 0 1 County: Winnebago

Site Name: Pagel's Landfill

Operating Permit No.: 1972-24

List the Most Recent Permit Approving Post-Closure Plan and Cost Estimates: 1989-125-SP

A. Closure and post-closure care cost estimate: $ 282,704.00

B. Closure cost estimate: $ 253,294.00

C. Current (five year) post-closure care costs: $ 29,410.00

D. Fifteen year post-closure care cost (Line C X 3): $ 88,230.00

E. New closure and post-closure are cost estimate (B+D): $ 341,524.00

Is revised financial assurance submitted to provide for costs described in E above? (circle): (Yes) No
If No, explain.

List financial assurance being submitted.

Type: Letter of Credit (Trust, Letter of Credit, etc.)

Amount: $58,820 * This should equal or exceed E above.

EB:bjh/2116n/49,50

* This letter of credit provides the necessary amount for the additional 10 years of post closure care.

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.

IRREVOCABLE STANDBY LETTER OF CREDIT

Director
Illinois Environmental Protection Agency
22(hurchill Road
Springfield, Illinois 62706

Dear Sir or Madam:

We have authority to issue letters of credit. Our letter-of-credit operations are regulated by the Illinois Commissioner of Banks and Trusts or our deposits are insured by the Federal Deposit Insurance Corporation or Federal Savings and Loan Insurance Corporation. (Omit language which does not apply).

We hereby establish our Irrevocable Standby Letter of Credit No. 567 in your favor, at the request and for the account of Winnebago Reclamation Service, Inc. up to the aggregate amount of Fifty Eight Thousand Eight Hundred twenty and no/100 U.S. dollars ($ 58,820.00), available upon presentation of:

1. your sight draft, bearing reference to this letter of credit No. 567; and,

2. your signed statement reading as follows: "I certify that the amount of the draft is payable pursuant to regulations issued under authority of the Environmental Protection Act, Ill. Rev. Stat. 1983, ch. 111 1/2, par. 1001 et seq. and 35 Ill. Adm. code 807.664(c)."

This letter of credit is effective as of October 4, 1990 and shall expire on: June 1, 1994; but, such expiration date shall be automatically extended for one period of twelve months starting with the expiration date if the operator fails to substitute alternate financial assurance prior to the expiration of this letter of credit and you notify us of such failure within 30 days after the above expiration date.

Whenever this letter of credit is drawn on under and in compliance with the terms of this credit, we shall duly honor such draft upon presentation to us, and we shall deposit the amount of the draft directly into the State of Illinois landfill closure and post-closure fund in accordance with your instructions.

This letter of credit is governed by the Uniform Commercial Code (Ill. Rev. Stat. 1983, ch. 26, pars. 1-101 et seq.).

Signature William Gorman

Typed Name
William Gorman

Title
Senior Vice President

Date
October 4, 1990

First National Bank & Trust Company of Rockford, 6000 East State Street
Name and address of issuing institution Rockford, IL. 61108

This credit is subject to _____

Agency is authorized to require, pursuant to Illinois Revised Statutes 1983, Chapter 111 1/2, Paragraphs 1021(d) and 1021.1, that this information be submitted to agency by any person conducting a waste disposal operation. Failure to provide this information or falsification of this information may result in a civil penalty of exceed $10,000 and an additional civil penalty not to exceed $1,000 per day of violation, and a fine not to exceed $1,000 and imprisonment up to one year. This form been approved by the Forms Management Center.

2-1301 IEPC 173 (Rev. 7/85)

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

John Hallock
211 West State Street
Rockford, Illinois 61101

Date: September 28, 1990

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, Division of Land Pollution Control, 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 217/782-6762, within twenty-one (21) days.

Illinois Environmental Protection Agency
Permit Section, Division of Land Pollution Control (#24)
2200 Churchill Road, P.O. Box 19276
Springfield, IL 62794-9276

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

SITE IDENTIFICATION

Site Name: Pagel's Landfill-Winnebago Reclamation Site # (IEPA): 2 0 1 8 0 8 0 0 0 1

Address: 8403 Lindenwood Road

City: Rockford, Illinois 61109 County: Winnebago

TYPE PERMIT SUBMISSION:		TYPE FACILITY:		TYPE WASTE:	
Development		Landfill	X	General Municipal Refuse	X
Operating		Land Treatment		Hazardous	
Supplemental	X	Transfer Station		Special (Non-Hazardous)	
Transfer		Treatment Facility		Demo Debris (ex. putrescible)	
Name Change		Storage		Demo Debris (incl. putrescible)	
Waste Stream		Incinerator		Used Oil	
		Composting		Solvents	
		Recycling/Reclamation		Landscape/Yard Waste	
		Other		Other (Specify _____)	

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

Extend post-closure care plan and cost estimate from five years to the required fifteen years.

L 227-0334
PC 40 (Rev. 11/90)

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

Ron Schultz
City of Rockford Legal Department
425 East State Street
Rockford, Il. 61104

Date: September 28, 1990

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, Division of Land Pollution Control, 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 217/782-6762, within twenty-one (21) days.

Illinois Environmental Protection Agency
Permit Section, Division of Land Pollution Control (#24)
2200 Churchill Road, P.O. Box 19276
Springfield, IL 62794-9276

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

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Site Name: Pagel's Landfill-Winnebago Reclamation Site # (IEPA): 2 0 1 8 0 8 0 0 0 1

Address: 8403 Lindenwood Road

City: Rockford, Illinois 61109 County: Winnebago

TYPE PERMIT SUBMISSION:		TYPE FACILITY:		TYPE WASTE:	
Development		Landfill	X	General Municipal Refuse	X
Operating		Land Treatment		Hazardous	
Supplemental	X	Transfer Station		Special (Non-Hazardous)	
Transfer		Treatment Facility		Demo Debris (ex. putrescible)	
Name Change		Storage		Demo Debris (incl. putrescible)	
Waste Stream		Incinerator		Used Oil	
		Composting		Solvents	
		Recycling/Reclamation		Landscape/Yard Waste	
		Other		Other (Specify _____)	

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

Extend post-closure care plan and cost estimate from five years to the required fifteen years.

532-0034
PC 46 (Rev. 11/88)

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

Honorable E.J. "Zeke " Giorgi
112 S. 2nd. Street,
Rockford, Il. 61104

Date: September 28, 1990

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, Division of Land Pollution Control, 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 217/782-6762, within twenty-one (21) days.

Illinois Environmental Protection Agency
Permit Section, Division of Land Pollution Control (#24)
2200 Churchill Road, P.O. Box 19276
Springfield, IL 62794-9276

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

SITE IDENTIFICATION

Site Name: Pagel's Landfill-Winnebago Reclamation Site I (IEPA): 2 0 1 8 0 8 0 0 0 1

Address: 8403 Lindenwood Road

City: Rockford, Illinois 61108 County: Winnebago

TYPE PERMIT SUBMISSION:		TYPE FACILITY:		TYPE WASTE:	
Development		Landfill	X	General Municipal Refuse	X
Operating		Land Treatment		Hazardous	
Supplemental	X	Transfer Station		Special (Non-Hazardous)	
Transfer		Treatment Facility		Demo Debris (ex. putrescible)	
Name Change		Storage		Demo Debris (incl. putrescible)	
Waste Stream		Incinerator		Used Oil	
		Composting		Solvents	
		Recycling/Reclamation		Landscape/Yard Waste	
		Other		Other (Specify)	

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

Extend post-closure care plan and cost estimate from five years to the required Fifteen years.

IL 532-0220
LPC-46 (Rev. 11/88)

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

County Board Chairman
Thomas Currier
Winnebago County Courthouse
400 West State Street,
Rockford, Il. 61101

Date: September 28, 1990

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, Division of Land Pollution Control, 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 217/782-6762, within twenty-one (21) days.

Illinois Environmental Protection Agency
Permit Section, Division of Land Pollution Control (#24)
2200 Churchill Road, P.O. Box 19276
Springfield, IL 62794-9276

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

SITE IDENTIFICATION

Site Name: Pagel's Landfill-Winnebago Reclamation Site # (IEPA): 2 0 1 8 0 8 0 0 0 1

Address: 8403 Lindenwood Road

City: Rockford, Illinois 61109 County: Winnebago

TYPE PERMIT SUBMISSION:		TYPE FACILITY:		TYPE WASTE:	
Development		Landfill	X	General Municipal Refuse	X
Operating		Land Treatment		Hazardous	
Supplemental	X	Transfer Station		Special (Non-Hazardous)	
Transfer		Treatment Facility		Demo Debris (ex. putrescible)	
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Waste Stream		Incinerator		Used Oil	
		Composting		Solvents	
		Recycling/Reclamation		Landscape/Yard Waste	
		Other		Other (Specify _____)	

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

xtend post-closure care plan and cost estimate from five years to the required

ifteen years.

[illegible]
[illegible] (Rev. 11/88)

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

Martha Summerlott
Village Clerk of New Milford
7354 Rydberg Road
Rockford, Illinois 61109

Date: September 28, 1990

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, Division of Land Pollution Control, 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 217/782-6762, within twenty-one (21) days.

Illinois Environmental Protection Agency
Permit Section, Division of Land Pollution Control (#24)
2200 Churchill Road, P.O. Box 19276
Springfield, IL 62794-9276

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

SITE IDENTIFICATION

Site Name: Pagel's Landfill-Winnebago Reclamation Site # (IEPA): 2 0 1 8 0 8 0 0 0 1

Address: 8403 Lindenwood Road

City: Rockford, Illinois 61109 County: Winnebago

TYPE PERMIT SUBMISSION:		TYPE FACILITY:		TYPE WASTE:	
Development		Landfill	X	General Municipal Refuse	X
Operating		Land Treatment		Hazardous	
Supplemental	X	Transfer Station		Special (Non-Hazardous)	
Transfer		Treatment Facility		Demo Debris (ex. putrescible)	
Name Change		Storage		Demo Debris (incl. putrescible)	
Waste Stream		Incinerator		Used Oil	
		Composting		Solvents	
		Recycling/Reclamation		Landscape/Yard Waste	
		Other		Other (Specify _____)	

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

Extend post-closure care plan and cost estimate from five years to the required Fifteen years.

L 532-0334
PC 40 (Rev. 11/88)

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

Paul A. Logli
Winnebago Couty Courthouse
400 West State Street
Rockford, Illinois 61101

Date: September 28, 1990

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, Division of Land Pollution Control, 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 217/782-6762, within twenty-one (21) days.

Illinois Environmental Protection Agency
Permit Section, Division of Land Pollution Control (#24)
2200 Churchill Road, P.O. Box 19276
Springfield, IL 62794-9276

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

IDENTIFICATION

Site Name: Pagel's Landfill-Winnebago Reclamation Site # (IEPA): 2 0 1 8 0 8 0 0 0 1

Address: 8403 Lindenwood Road

City: Rockford, Illinois 61109 County: Winnebago

TYPE PERMIT SUBMISSION:		TYPE FACILITY:		TYPE WASTE:	
Development		Landfill	X	General Municipal Refuse	X
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Waste Stream		Incinerator		Used Oil	
		Composting		Solvents	
		Recycling/Reclamation		Landscape/Yard Waste	
		Other		Other (Specify _____)	

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

Extend post-closure care plan and cost estimate from five years to the required fifteen years.

L 022-0034
PC 40 (Rev. 11/88)

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

Honorable Joyce Holmberg
825 North Main Street,
Rockford, Illinois 61103

Date: September 28, 1990

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, Division of Land Pollution Control, 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 ca he Permit Section at 217/782-6762, within twenty-one (21) days.

Illinois Environmental Protection Agency
Permit Section, Division of Land Pollution Control (#24)
2200 Churchill Road, P.O. Box 19276
Springfield, IL 62794-9276

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

S IDENTIFICATION

Site Name: Pagel's Landfill-Winnebago Reclamation Site # (IEPA): 2 0 1 8 0 8 0 0 0 1

Address: 8403 Lindenwood Road

City: Rockford, Illinois 61109 County: Winnebago

TYPE RMIT SUBMISSION:		TYPE FACILITY:		TYPE WASTE:	
Development		Landfill	X	General Municipal Refuse	X
Operating		Land Treatment		Hazardous	
Supplemental	X	Transfer Station		Special (Non-Hazardous)	
Transfer		Treatment Facility		Demo Debris (ex. putrescible)	
Name Change		Storage		Demo Debris (incl. putrescible)	
Waste Stream		Incinerator		Used Oil	
		Composting		Solvents	
		Recycling/Reclamation		Landscape/Yard Waste	
		Other		Other (Specify _____)	

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

Extend post-closure care plan and cost estimate from five years to the required ifteen years.

532-0334
PC 40 (Rev. 11/88)

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

217/782-6762

Refer to: 2018080001 -- Winnebago County
Pagel's Pit/Winnebago Reclamation Services
Permit No. 1972-24
Supplemental Permit No. 1989-125-SP
Log No. 1989-125
Permit File

August 25, 1989

Winnebago Reclamation Service, Inc.
Attn: John D. Lichty, Landfill Manager
Post Office Box 2071
Loves Park, Illinois 61130

Dear Mr. Lichty:

Supplemental permit is hereby granted to Winnebago Reclamation Services, Inc. to modify Pagel's Pit Landfill's closure/post-closure care plan all in accordance with the plans you prepared. Final plans, specifications, application and supporting documents as submitted and approved shall constitute part of this permit and are identified on the records of the Illinois Environmental Protection Agency, Division of Land Pollution Control by the permit number(s) and log number(s) designated in the heading above.

Specifically, Supplemental Permit No. 1989-125-SP approves revised cost estimates for closure/post-closure care. These revised cost estimates total $282,704.00.

The permit is issued subject to the standard conditions attached hereto and incorporated herein by reference, and further subject to the following special conditions:

1. The closure/post closure care plan approved by Permit No. 1987-060-SP is hereby modified to include the cost estimates contained in the appliation for Permit No. 1989-125-SP.

2. The operator shall notify the Agency within 30 days after receiving the final volume of waste.

3. The operator shall initiate implementation of the closure plan within 30 days after the site receives its final volume of waste.

4. The operator shall not file any application to modify the closure plan less than 180 days prior to receipt of the final volume of waste.

5. Financial assurance shall be maintained by the operator in accordance with 35 Ill. Adm. Code, Subtitle G, Part 807, Subpart F in an amount equal to the current cost estimate for closure and post-closure care.

   The sum of the current cost estimates for closure and post-closure care is $282,704.00. Financial assurance is currently provided by a two Irrevocable Standby Letters of Credit -- No. 1044 issued by First National Bank of Rockford, Illinois for $100,000 and No. 54858 issued by Bank One of Milwaukee, Wisconsin for $211,962.00. Thus, the total amount of finaricial assurance is $311,962.00, which exceeds the current cost estimates.

6. Groundwater quality records shall be maintained at the office of the site operator and shall be reviewed quarterly. A groundwater quality report shall be submitted quarterly. If the owner/operator or the Agency's Division of Land Pollution Control determines that adverse trends are developing, further investigation is to be performed. If corrective action becomes necessary, a plan is to be developed by the oeprator and submitted to the Permit Section, Division of Land Pollution Control for approval.

7. The owner and operator shall monitor gas, water and settling at the completed site for a period of 5 years after the site is closed and shall take whatever remedial action is necessary to abate any gas, water or settling problems which appear during that time. Post-closure groundwater monitoring shall be conducted and reported to the Aency on a quarterly basis for 5 years for the monitoring wells and parameters identified in Attachment A of Permit No. 1989-027-SP.

8. The operator shall notify the Agency when the site has been closed in accordance with the approved closure plan utilizing the Agency's Closure Affidavit Request Form.

9. Special wastes received at the site for recovery shall be transported to the facility utilizing the Agency's supplemental permit system and manifest system.

10. Special wastes generated at the site for disposal, storage, incineration or further treatment elsewhere shall be transported to the receiving facility utilizing the Agency's supplemental permit system and manifest system.

11. This permit is subject to review and modification by the Agency as deemed necessary to fulfill the intent and purpose of the Environmental Protection Act, and all applicable environmental rules and regulations.

12. This permit is issued with the expressed understanding that no process discharge to Waters of the State or to a sanitary sewer will occur from these facilities. If such discharge occurs, additional or alternate facilities shall be provided. The construction of such additional or alternate facilities may not be started until a permit for their construction has been issued by the Agency.

13. The Agency reserves the right to require the installation and monitoring of a ground water monitoring system, to require analyses for certain parameters and to alter parameters as necessary to fulfill the intent and purpose of the Environmental Protection Act.

14. Any modification to the facility shall be the subject of an application for supplemental permit for site modification submitted to this Agency.

15. Permittee shall notify the Agency of any changes from the information submitted to the Agency in its application for a developmental and operating permit for this site. Permittee shall notify the Agency of any changes in the names or addresses of both beneficial and legal titleholders to the herein-permitted site. Such notification shall be made in writing within fifteen (15) days of such change and shall include the name or names of any parties in interest and the address of their place of abode; or, if a corporation, the name and address of its registered agent.

16. Permittee shall notify the Agency of any changes from the information submitted to the Agency in its application for a Development and Operating permit for this site. Permittee shall notify the Agency of any changes in the names or addresses of both beneficial and legal titleholders to the herein-permitted site. Such notification shall be made in writing within fifteen (15) days of such change and shall inlcude the name or names of any parties in interest and the address of their place of abode; or, if a corporation, the name and address of its registered agent.

17. Site surface drainage, during development, during operation and after the site is closed, shall be such that no adverse effects are encountered by adjacent property owners.

18. The best available technology (mufflers, berms and other sound shielding devices) shall be employed to minimize equipment noise impacts on property adjacent to the site during both development and operation.

Except as modified in the above documents, the site shall be developed and operated in accordance with the terms and conditions of Permit No. 1972-24 April 7, 1972 and any supplemental permits issued to this facility .

The original and two (2) copies of all certifications, logs or reports and three (3) copies of groundwater monitoring chemical analysis forms which are required to be submitted to the Agency by the permittee should be mailed to the following address:

Illinois Environmental Protection Agency
Compliance Section
Technical Compliance Unit
Division of Land Pollution Control -- #24
2200 Churchill Road
Post Office Box 19276
Springfield, Illinois 62794-9276

Very truly yours,

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

LWE:CL:cec/2849k,56-59
CJL3
cc: Rockford Region
Compliance Section
Division File

STANDARD CONDITIONS FOR CONSTRUCTION/DEVELOPMENT PERMITS
ISSUED BY THE ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

July 1, 1979

The Illinois Environmental Protection Act (Illinois Revised Statutes, Chapter 111-1/2, Section 1039) grants the Environmental Protection Agency authority to impose conditions on permits which it issues.

These standard conditions shall apply to all permits which the Agency issues for construction or development projects which require permits under the Divisions of Water Pollution Control, Air Pollution Control, Public Water Supplies, and Land and Noise Pollution Control. Special conditions may also be imposed by the separate divisions in addition to these standard conditions.

1. Unless this permit has been extended or it has been voided by a newly issued permit, this permit will expire two years after date of issuance unless construction or development on this project has started on or prior to that date.

2. The construction or development of facilities covered by this permit shall be done in compliance with applicable provisions of Federal laws and regulations, the Illinois Environmental Protection Act, and Rules and Regulations adopted by the Illinois Pollution Control Board.

3. There shall be no deviations from the approved plans and specifications unless a written request for modification of the project, along with plans and specifications as required, shall have been submitted to the Agency and a supplemental written permit issued.

4. The permittee shall allow any agent duly authorized by the Agency upon the presentation of credentials:

   a. to enter at reasonable times the permittee's premises where actual or potential effluent, emission or noise sources are located or where any activity is to be conducted pursuant to this permit.

   b. to have access to and copy at reasonable times any records required to be kept under the terms and conditions of this permit.

   c. to inspect at reasonable times, including during any hours of operation of equipment constructed or operated under this permit, such equipment or monitoring methodology or equipment required to be kept, used, operated, calibrated and maintained under this permit.

d. to obtain and remove at reasonable times samples of any dischasge or emission of pollutants.

e. to enter at reasonable times and utilize any photographic, recording, testing, monitoring or other equipment for the purpose of preserving, testing, monitoring, or recording any activity, discharge, or emission authorized by this permit.

5. The issuance of this permit:

a. shall not be considered as in any manner affecting the title of the premises upon which the permitted facilities are to be located;

b. does not release the permittee from any liability for damage to person or property caused by or resulting from the construction, maintenance, or operation of the proposed facilities;

c. does not release the permittee from compliance with other applicable statutes and regulations of the United States, of the State of Illinois, or with applicable local laws, ordinances and regulations;

d. does not take into consideration or attest to the structural stability of any units or parts of the project;

e. in no manner implies or suggests that the Agency (or its officers, agents or employees) assumes any liability, directly or indirectly, for any loss due to damage, installation, maintenance, or operation of the proposed equipment or facility.

6. Unless a joint construction/operation permit has been issued, a permit for operating shall be obtained from the Agency before the facility or equipment covered by this permit is placed into operation.

7 These standard conditions shall prevail unless modified by special conditions.

8. The Agency may file a complaint with the Board for modification, suspension or revocation of a permit:

a. upon discovery that the permit application contained misrepresentations, misinformation or false statements or that all relevant facts were not disclosed; or

b. upon finding that any standard or special conditions have been violated; or

c. upon any violation of the Environmental Protection Act or any Rule or Regulation effective thereunder as a result of the construction or development authorized by this permit.

Winnebago
Reclamation
Service, Inc.

P.O. Box 2071
Loves Park, Illinois 61130
Office: 815/877-9561
Landfill: 815/874-7375

June 23, 1989

Illinois Environmental Protection Agency
Division of Land Pollution Control #24
Permit Section
2200 Churchill Road
Springfield, IL 62706

Re: Log #1989-125

Site: 208080001

Attention: Chris Liebman

Dear Chris:

I have enclosed our revision of the Closure/Post-Closure Care Cost estimate for our Pagel's Landfill site. Please include this with the permit application already submitted. If you have any further questions please feel free to call me at 815-874-4806.

Sincerely,

John D. Lichty
Manager

ATTACHMENT A

CLOSURE/POST-CLOSURE APPLICATION
NON-HAZARDOUS FACILITIES

Pagel's Landfill
Rockford
Winnebago County

Site #2018080001

1. This is a disposal unit.

   A topographic map of the site has been provided.

2. Yes, the interim formula was previously used to prepare a cost estimate and provide financial assurance.

   Copies of the documents previously submitted have been enclosed in attachment A.

3. Yes, this plan does include the entire site.

4. a. This is not a notice of closure.

   b. Yes, this is a biennial revision of the closure and post-closure cost estimates. The details of this revision are enclosed in attachment B.

   c. No

5. Yes, post-closure care will continue for 5 years after certification of closure.

6. A topographic map is enclosed which clearly shows the following areas:

   A. Areas which have had final cover applied for more than 3 years.

   B. Areas which have had final cover in place for less than 3 years.

   C. Areas currently permitted, which will require final cover.

7. A. The area which has had final cover for more than 3 years was covered and seeded prior to 1985. This area consists of approximately 13.75 acres. The average depth of refuse in this area is approximately 45 feet.

   B. The area which has had final cover for less than 3 years was covered in 1986 and 1987. This area consists of approximately 10.5 acres. The average depth of refuse in this area is 45 feet.

C. The date that the area which is currently permitted and being filled at this time cannot be determined at this time. This area consists of approximately 22.2 acres. The average depth of refuse in this area has not yet been determined.

8. A. Final cover material will be obtained from a borrow area adjacent to the site. The material used for final cover will be clay.

B. The cap will be covered with 2 feet of clay which will be placed and compacted in lifts to insure density of 80% of proctor. A nuclear density testing machine will be used to insure this density. An additional 4 inches of topsoil will be placed on top of the clay to provide a vegetative cover layer.

C. Testing of the cap will be certified by a professional engineer to insure the design specifications have been met.

D. Record keeping will be done in house.

E. 4 inches of topsoil will be placed on top of the compacted layer of final cover. Topsoil is available from sites adjacent to the landfill property.

F. The depth of the vegetative layer will be 4 inches. The topsoil used will provide adequate moisture for grass and alfalfa, prevent penetration into the compacted layer, and support the species planted without continued maintenance due to our past experience.

G. An elaborate gas extraction system has been installed as per supplemental permit for gas extraction system in 1985.

H. The entire site is higher than its' surrounding area, therefore not permitting run-on of any kind.

I. The enclosed topographic map shows the run-off.

J. In the case of premature closure we would:

a) apply a 2' compacted final cover layer to the entire area that has not been final covered;

b) place a 4" layer of vegetative supporting topsoil;

c) seed the area.

K. We would not accept wastes during closure/post-closure.

L. The entire site is presently above the surrounding natural ground level.

M. Schedule of closure activities:

1. Notify the I.E.P.A. the date the last load of waste is accepted.

2. Within 30 days of closure we would begin to:

a) cover the currently permitted area with 2' of compacted clay;

b) place a 4" layer of vegetative supporting topsoil;

c) seed the entire area.

9. This section does not apply to our site.

10. Post-closure care will be provided for 5 years.

11. The site will be monitored for subsidence, cracks, erosion, establishment of vegetation and gas migration on a frequency of no greater than every 3 months. However, employees maintaining the gas extraction system and the leachate extraction system would probably note any of the above before a quarterly inspection.

12. A qualified person will determine if any of the problems would become a violation of EPA regulations. This person will move quickly to implement the action to correct any problems.

13. The following action will be taken to correct any problems:

a) Cracks - fill with dirt, compact, and reseed;

b) Erosion - fill with dirt, compact, seed and stabilize with mulch or excelsior if necessary;

c) Vegetation - till area, fertilize and reseed;

d) Gas Migration - this site has an extensive gas extration system that is on-line 24 hours a day, 7 days a week to prevent any migration.

14. The following is the post-closure ground water monitoring program:

A. The topographic map shows the location of the monitoring points.

B. We would continue to monitor the parameters set forth in the present monitoring program.

C. Wells will be monitored quarterly.

D. Background levels would be used to determine whether the site is impacting groundwater.

E. If the site was found to be impacting groundwater we would:

Use a consultant to study the problem and make a recommendation.

15. Site inspections will be documented and kept on file at the landfill office. Date of inspection, any problems found, and corrective action taken will be included in the report.

16. The site has a cyclone fence with barbed wire, and locked gates to prevent unauthorized entry.

17. Closure Cost Estimates:

A. Cost to obtain, place, compact, and grade clay cover:

71,632 cubic yds. x $2.45 per yard = $175,499

B. Cost for Certified Professional Engineer to inspect and certify cover:

$2,000

C. Cost to obtain, move and place vegetative layer:

11,819 cubic yds. x $4.45 per yard = $52,595

D. Gas extraction and monitoring system is already installed.

No Cost

E. Run-on and run-off measures are incidental to grading costs.

F. Cost to fertilize and seed:

22.2 acres x $1,000 per acre = $22,200

G. Cost for engineer to certify closure:

$1,000

Total = $253,294

19. Post-Closure Cost Estimates:

A. Cost for inspection and record keeping for subsidence, cracks, erosion, establishment of vegetation and gas migration would be:

$200 per visit, 4 visits per year, for 5 years (20 visits)

$200 x 20 = $4,000

B. The estimated frequency and cost of repairing any problems discovered would be:

We would anticipate having to correct some problems each spring to an estimated 4,000 square feet.

4,000 sq. ft. x .25¢ per sq. ft. = $1,000
x 5 years = $5,000

C. Costs to monitor groundwater would be as follows:

Labor - $120 per quarter x 20 = $2,400
Lab Fees - $188 per quarter x 20 = $3,760

Total = $6,160

D. Cost to review groundwater data and asses impact would be:

$1,000 per year x 5 years = $5,000

E. Costs of record keeping for groundwater data would be:

$10 per year x 5 years = $50

F. Cost of annual mowing of the site would be:

$840 per year x 5 years = $4,200

H. Cost to maintain a gas control system would be:

$1,000 per year x 5 years = $5,000

Post-Closure Cost Total = $ 29,410

ATTACHMENT B

Winnebago Reclamation Service, Inc.

P.O. Box 2071
Loves Park, Illinois 61130
Office: 815/877-9561
Landfill: 815/874-7375

CLOSURE/POST-CLOSURE APPLICATION

NAME OF SITE: PAGEL PIT

STATE ID #: 1972-24

1. Facilities included in closure plan (check all which are applicable):

   Disposal Unit(s) X
   Indefinite Storage Unit(s) ___
   Treatment Unit(s) ___
   Storage Unit(s) ___

   Map Enclosed

2. Was the interim formula of Section 807.624 previously used to prepare a cost estimate and provide financial assurance?

   X yes ___ No

3. Does the submitted closure plan, post-closure care plan and cost estimates include all facilities that were previously covered by the interim formula? ___ yes X No

   We are concentrating on Pagel Pit right now.

4a. Is this a notice of closure ___ Yes X No

b. Is this a biennial revision of the closure and post-closure cost estimates as required by Section 807.623? ___ yes X No

c. Is this a revised closure/post closure plan and cost estimate?

   ___ Yes X No

5. Will any of the closed units require post-closure care?

   X Yes ___ No

   Post-Closure care will be provided for 3 years.

6. For disposal unit(s) provide a map which clearly indicates the following areas (final cover is as defined in 807.305(c)):

   A. Eight (8) acres have had final cover for more than 3 years.

B. Three (3) acres have had final cover for less than 3 years.

C. Nine (9) acres currently permitted which will require final cover.

7. For each area described under #6 above provide:

A. Estimated date that cover was/will be applied:

6a - Prior to 1982

6b - 1985

6c - 1991

B. Total Area:

6a - 8 Acres

6b - 3 Acres

6c - 9 Acres

C. The average depth is 45 feet.

CLOSURE

8. For disposal units provide a closure plan which addresses the following:

A. The source of the material to be used is on site with the type of cover to be 2 feet of clay and 4 inches of top soil.

B.&C. Design Specifications - A nuclear density testing machine will be used to insure 80% of proctor and 4 inches of top soil noncompacted during placement.

D. The record keeping and certification will be in house.

E. The source of vegetative layer will be State of Illinois approved Highway seed with crown Veg.

F. The total depth of the vegetative layer will be 4 inches, which will provide moisture for grass, prevent penetration into the cover and support the planted species without continued maintenance due to our past experience.

G. An Elaborate gas system installed (See Supplemental Permit for Gas extraction Systems - May-June 1985)

H. There is no run-on because we are on a hill site.

I. The enclosed map will show the run-off.

J. In the case of premature final closure or temporary shutdown we would immediately cover everything with 2' feet cover and use same proceedure used in final cover stage.

K. No! We would not accept waste during closure/Post Closure.

L. If premature closure occurs before fill reaches the surrounding material ground level we would fill in 12 inch lifts with clay to meet surrounding natural level.

M. Schedule of the closure activities:

1. Placement of final cover June thru August 1991.

2. Placement of vegetative layer Sept. 1991.

3. Seeding, fertilizing and mulching sept. 1991.

9. Section does not apply

POST CLOSURE

10. Post-Closure care will be provided for 3 years.

11. The inspection program will be visual inspections quarterly to monitor for subsidence, cracks, erosion, and vegetation. The gas migration will be monitored with a methane indicator quarterly.

12. If during inspection,crack, erosion or migration of gas is discovered we will move immediately to correct the problem.

13. The corrective actions that will be taken.

Crack - fill dirt and re-seed.

Erosion - replace and stabilize with excelsior

Vegetation - Re-seed

Gas Migration - Extensive gas extraction in place to eliminate migration.

14. Ground water monitoring program to be followed during post-closure.

A. Enclosed map showing location of all monitoring points.

B. Continue present program which is done quarterly.

C. Frequency - Quarterly.

D. Criteria used to determine whether site is impacting ground water. Back ground levels.

E. If site found to be impacting ground water - action that would be taken:

With our consultants studying the problem and then make a reasonable recommendation.

15. Record keeping procedure used to document site inspection, problem found, corrective action taken will be quarterly reports-a copy on file at landfill office.

16. Security measure taken is an 8 foot barbwire fence.

17. Cost Estimates:

A. Cost to obtain, move and place the cover

Material-29,000 yards x $1.50 per yard = $43,500

Based on competitive bids in the area.

B. Cost for inspection and certification of final cover:

$2,000 - Engineering firm to inspect depth and compaction

C. Cost to obtain, move and place vegetative cover (topsoil)

7200 cubic yards x $1.95 per yard = $14,040

Base on competitive bids in the area.

D. Cost to install gas control system:

Eight (8) wells for $8000.

Based on present cost to install with outside contractor, wells every 150 feet for 1200 feet around circumference.

E. Cost for run-on and run-off.

Covered in Grading

F. Cost for fertilizing, seeding, and mulching the vegetative layer - $1,000 per acre = $9,000

Based on competitive bids.

G. Engineering firm to make sure A,B,C,D,E,F are done-$1,000.

18. Financial assurance original on file (copy enclosed)

POST-CLOSURE COST ESTIMATES

19. Facilities requiring post-closure care.

A. Cost for inspection and record keeping for subsidence, cracks, erosion, establishment of vegetation and gas migration.

3 year cost -12 visit $200.00 per day
x 12
2400.00

B. Estimate frequency and cost of repairing any problems once a year.

Every Spring Expect minor problems

$1000.00 x 3 = $3000.00

C. Cost to monitor the groundwater

$300.00 per quarter
x12
$3600.00

D. Cost to review groundwater data and assess impact

1,000 per year = 3 years = $3,000.00

E. Cost to repair a problem detected by the groundwater.

$1,000 per years - 3 years = $3,000.00

F. Cost of record keeping for ground water data

$10.00 per year - 3 years = $30.00

G. Cost for annual moving

500. x 3 = $1500.00

H. Cost to maintain gas control system

$1,000 per year - 3 years = $3,000

20. Original Letter of Credit on file (copy attached)

TOTAL - $97,070.00

NAME OF OPERATOR Charles J. Howard NAME OF ENGINEER Charles J. Howard

ADDRESS OF OPERATOR 4920 ForestHills ADDRESS OF ENGINEER 4920 Forest Hills

Loves Park, IL 61111 Loves Park, IL 6111

PHONE NUMBER (815) 654-4711 PHONE NUMBER (815) 654-4711

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

SIGNATURE OF OPERATOR: SIGNATURE OF ENGINEER:

May 23, 1985 May 23, 1985

Date Date

Ill. Reg. No. 062-038377

ATTEST: ATTEST:

Winnebago
Reclamation
Service, Inc.

P.O. Box 2071
Loves Park, Illinois 61130
Office: 815/877-9561
Landfill: 815/874-7375

April 11, 1985

Bob Casteel
Illinois EPA-DLPC #24
2200 Churchill Road
Springfield, IL 62706

Dear Bob:

Enclosed please find cost estimates for the following sites and our Letter of Credit.

1.	Pagel Pit	IEPA # 1972-24
2.	Rockford Sand & Gravel/South Main #2	IEPA # 1981-220E
3.	Rockford Sand & Gravel/South Main #1	IEPA # 1973-28
4.	Nimtz Quarry	IEPA # 1973-38

This now brings us into compliance and we wish to request the Elimination of the Letter of Credit for South Main #2 where we only take dirt.

We Also wish to lower the Letter of Credit amounts for South Main #1 and Nimtz Quarry. We only take non-putrescible material at these sites.

We would like to point out that there is non-putrescible material being dumped all over the area without being permitted.

If you have any questions, please contact me.

Sincerely,

C. J. HOWARD
Winnebago Reclamation Service, Inc.

CJH/cc
enclosures

COST ESTIMATES UNDER THE RULES FOR NON-HAZARDOUS WASTE MANAGEMENT SITES USING INTERIM FORMULA

IEPA Site No. 2018080001

IEPA Permit No. 1972-24

Name of Site: Pagel Pit

Site Location: City Rockford State Illinois Zip Code 61109

Name of Operator: ROCKFORD BLACKTOP CONSTRUCTION COMPANY

Address: City LOVES PARK State ILLINOIS Zip Code 61111

Contact Name: Chuck Howard

Phone No.: (815) 654-4700

Note: An operator may temporarily utilize the formula for preparing a cost estimate to provide financial assurance for closure and post-closure care instead of using actual closure and post-closure plans. The interim formula cannot be utilized after March 1, 1985. Each operator must file an application to modify the site permit to include closure and post-closure care plans and cost estimates by March 1, 1988.

1. Attach a plot plan with dimensions to show the following:

   a. Area of landfill permitted 20 acres;
   b. Area of landfill closed and covered with a minimum 2 feet of cover as of January 1, 1985;
   c. Area of landfill which has not received final cover as of January 1, 1985;
   d. Area of landfill anticipated to be used up within the next three years.

2. The following calculations and estimates are needed to use the formula.

   a. AWR: Annual waste received at the site in cubic yards. 145,388 cubic yards

      Note: AWR can be obtained from the permit application or from the actual waste volume receipts.

   b. AD: Average depth of the landfill in feet per year. 45 feet

      Note: (i) In case of trench fill method, use the estimated actual depth to be filled-in per year. If more than one trench is to be filled-in, then take a weighted average of all the fill depths.

      (ii) In case of area fill method, use the actual depth to be filled-in per year. When filling is done at different elevations, then take a weighted average of all the fill depths.

   c. Y: Years expected to lapse between cessation of application of cover by the operator and implementation of site clean-up by the Agency. Y is assumed to be three years.

      3 years

   d. A1: Total area which has received waste but has not received final cover as of January 1, 1985. 12.48 acres.

The Agency is authorized to require, pursuant to Illinois Revised Statutes 1983, Chapter 111 1/2 Paragraphs 1021(d) and 1021.1, that this information be submitted to the Agency by any person conducting a waste disposal operation. Failure to provide this information or falsification of this information may result in a civil penalty of not to exceed $10,000 and an additional civil penalty not to exceed $1,000 per day of violation, and a fine not to exceed $1,000 and imprisonment up to one year. This form has been approved by the Forms Management Center.

e. A2: Total area which would require final cover after Y years of uncontrolled operations.

$= \frac{(Y)(AWR)}{3200(AD)} = \frac{3(AWR)}{3200(AD)} = \frac{3(\ 145,388\ )}{3200(\ 45\ )} =$ 3.02 acres.

f. A3: Area requiring final cover in acres.

= A1 + A2 = (12.48) + (3.02) = 15.50 acres.

g. A4: Total permitted area which has not received final cover as of January 1, 1985 = 12.48 acres.

h. A: Area requiring final cover is the smaller of the A(3) or A(4) = 12.48 acres.

i. CPA: Cost per acre of placing final cover, grading, seeding and venting. CPA is assumed to be $5,000/acre.

j. P: Fraction of final cover expected to require subsidence or erosion control each year. P is assumed to be 0.05.

k M: Number of monitoring wells existing or required in the permit. M cannot be less than three.

l. CE: cost estimate in dollars

= (CPA)(A) + 3(CPA)(P) + 600(M)

= 5750(A) + 1800M

= 5750(12.48) + 1800(3) = $ $77,160

m. Estimated remaining life of the permitted area of the landfill. Number of 5 years.

n. Year of closure 1991

3. Check below the type of mechanism used to provide financial assurance for the above calculated cost estimates and attach the instruments with this form.

	Amount
____ Trust Fund	_____
____ Security Bond Guaranteeing Payment into Trust Fund	_____
____ Surety Bond Guaranteeing Performance	_____
____ Letter of Credit	_____
____ Closure Insurance	_____
____ Self Insurance	_____

The undersigned hereby submits the interim closure cost estimates and financial assurance instruments and certifies that the information submitted herein is true, correct and current.

_____

Signature of Operator

_____

Name

_____

Address

ATTACHMENT 21

Clay Soil Availability Calculations

CLAY SOIL AVAILABILITY CALCULATIONS

LOW PERMEABILITY SOIL REQUIREMENTS

A sufficient amount of low permeability earthen materials is needed for use as final cover for the existing unit. This will be over and above that which will be used for construction of the previously permitted expansion area. Calculations are based on a 42.65 acre area for the existing unit.

A. Existing Unit

The existing unit is to be covered with a minimum of 1 ft of compacted earthen material prior to placement of 3 additional feet of vegetative soil. A value of 1.1 ft was used in calculations as a safety measure. Slope correction factors were applied as necessary.

1. Sideslopes (33% Slope)

Projected Plan Area = 25.97 acres = 1,131,000 ft^2

Thickness = 1.1 ft
Slope Correction = 1.06

Required Volume = (1,131,000 ft^2) (1.1 ft) (1.06)/(1 c.y./27 ft^3) = 48,800 c.y.

2. Crown (10% Slope)

Projected Plan Area = 16.68 acres = 727,000 ft^2

Thickness = 1.1 ft
Slope Correction = 1.01

Required Volume = (727,000 ft^2) (1.1 ft) (1.01)/(1 c.y./27 ft^3) = 29,900 c.y.

Summing the above quantities, the minimum amount of low permeability soils needed for final cover for the existing unit will be approximately 78,700 c.y.

B. Permitted Expansion Area

The previously permitted expansion area (Permit No. 1991-138-LF) will also require low permeability earthen materials for its bottom liner, sidewall liner, perimeter berm, and cover material. This required volume was calculated within the Application for Significant Modification to Permit for a New Expansion Unit, Winnebago Reclamation Service, Inc. Pagel Landfill Facility (April 5, 1991) to be 419,934 c.y.

VEGETATIVE SOIL REQUIREMENTS

A. Existing Unit

A 3 ft layer of vegetative soil will be placed above the low permeability layer upon closure of the existing unit. The amount of vegetative soil required is calculated below.

1. Sideslopes (33% Slope)

Projected Plan Area = 25.97 = 1,131,000 ft^2

Thickness = 3.1 ft
Slope Correction = 1.06

Required Volume = (1,131,000 ft^2) (3.1 ft) (1.06) (1 c.y./27 ft^3) = 137,600 c.y.

2. Crown (10% Slope)

Projected Plan Area = 16.68 acres = 727,000 ft^2

Thickness = 3.1 ft
Slope Correction = 1.01

Required Volume = (727,000 ft^2) (3.1 ft) (1.01) 1 c.y./27 ft^3) = 84,300 c.y.

Summing the above quantities, the minimum amount of clay needed for vegetative soils will be approximately 221,900 c.y.

B. Permitted Expansion Area

The permitted expansion area will require an additional 147,514 c.y. of vegetative soil.

AVAILABLE SOIL

A. Low Permeability Materials

Using information provided in the Application for Significant Modification to Permit for New Expansion Unit, Winnebago Reclamation Service, Inc. - Pagel Landfill Facility approximately 462,440 c.y. of low permeability earthen materials may be excavated from the permitted expansion area.

Suitable materials also exist in the borrow area west of Killbuck Creek. Soil borings B-1, B-2, B-3, and B-4, which are provided in the previously mentioned application show an average depth of clay of 19.5 ft. The area that is west of the floodplain is approximately 22 acres. If it is assumed this average is typical across the borrow area, these 22 acres could yield 692,120 c.y. of clay. If the entire area were used as a borrow source (approximately 40 acres), then 1,258,400 c.y. of clay could be obtained. However, since the total clay that may be obtained from the area south of the existing landfill and outside the floodplain of the west borrow source totals 1,154,560 c.y., this additional area probably will not be disturbed.

B. Vegetative Soils

Borings in both the permitted expansion area and in the designated borrow areas indicate that the permitted expansion area may contain an average of 2 ft of silty material and that the Borrow Area may contain an average of nearly 7 ft of suitable soil. Together, these areas can provide up to approximately 394,000 c.y. of vegetative soil.

SUMMARY

Low Permeability Soil Requirements

A.	Existing Unit		
	3H:1V Sideslopes	48,000 c.y.	
	5% Crown Slope	29,900 c.y.	
			78,700 c.y.
B.	Permitted Expansion Area		419,934 c.y.
		Overall Total:	498,634 c.y.

Vegetative Soil Requirements

A.	Existing Unit		221,900 c.y.
B.	Total Permitted Expansion Area		147,514 c.y.
		Overall Total:	369,414 c.y.

Available Materials

Available Clay:	1,154,560 c.y.
Required Clay:	498,634 c.y.
	655,926 c.y. Surplus
Available Vegetative Soil:	394,000 c.y.
Required Vegetative Soil:	369,414 c.y.
	24,586 c.y. Surplus

ATTACHMENT 22

Site Transportation Plan

SITE TRANSPORTATION PLAN

INTRODUCTION

In accordance with 35 IAC 812.108(t), the site transportation plan describes the location of all roads, descriptions of the types of roads used, and the frequency that roads will be traversed.

The transportation plan for the existing unit at the Pagel Landfill Facility will utilize existing off-site roadways including Illinois 251, U.S. 51, Mulford Road, Baxter Road, and Lindenwood Road. The impact of landfill traffic on public roads that access the facility has been analyzed by Barton-Aschman Associates, Inc. for the expansion permit application. This firm is well qualified in the analysis of traffic impact throughout northern Illinois. Their "Site Traffic Analysis" is included as Appendix 1.

ON-SITE ROADWAYS

An existing on-site all-weather roadway system provides access to the facility's existing unit. The main entry roadway intersects Lindenwood Road north of the existing unit and east of an adjoining proposed resource recovery facility. Fencing with a lockable gate restricts unauthorized access to the site. Just inside the gate is an existing gate house with a scale. The existing on-site access road then proceeds along the north and west sides of the site to facilitate access for landfilling. It continues around the south side of the unit to access an equipment storage and maintenance area and provides a service entrance off Lindenwood Road, southwest of the existing unit. This roadway is asphalt-paved from it's main entry point on Lindenwood Road to an existing temporary haul road on the west side of the existing unit that provides access to the current working face. The remainder of the roadway is gravel surfaced.

Another existing temporary roadway extends north-south across the eastern portion of the existing unit to facilitate leachate collection/transfer. The existing main roadway also provides access to NRG Technologies, Inc. and the proposed resource recovery facility.

All on-site roadways are depicted on the Site Transportation Plan Map, included in Appendix 2.

FREQUENCY OF USE

Based upon the included "Site Traffic Analysis" report, it is estimated that between 20 and 100 vehicles arrive and leave NRG and the landfill per day. It is assumed about 75 percent of the vehicles coming to the landfill may be diverted to the resource recovery facility to deposit their contents and leave. After removal of recyclables and consolidation into large vehicles, it is further assumed that on average, about 20 to 25 vehicle loads of waste will be shuttled between the recovery facility and the working face of the landfill. This will be in addition to about 25 vehicles whose loads are determined to not be appropriate for resource recovery/processing and would be directed directly to the working face by gate house personnel.

Although accessible by public roads, an on-site roadway to facilitate more convenient access to the borrow areas west of Killbuck Creek may be constructed in the future. During final cover construction, it is estimated an average of about 20 truckloads of borrow soils may be transported per hour over this roadway.

All roadway usage frequency estimates provided herein are approximate, and actual frequencies may vary widely from the values indicated.

APPENDIX 1

Site Traffic Analysis

Barton-Aschman Associates, Inc.

820 Davis Street
Evanston, Illinois 60204-1381
USA

Phone: (708) 491-1000
Fax: (708) 475-6053
Telex: 270258 EXPRSTLX CGO

MEMORANDUM TO: Gary L. Marzorati
William Charles Limited

FROM: Gerald Salzman
Cathy L. Chang
Michael A. Werthmann

DATE: June 14, 1990

SUBJECT: Site Traffic Analysis for Winnebago Reclamation Landfill
Winnebago County, Illinois

This memorandum summarizes the findings and recommendations of a site traffic analysis conducted for the proposed expansion of the Winnebago Reclamation Landfill, commonly referred to as Pagel's Landfill, located in Winnebago County, Illinois. The present site consists of a 40-acre cell (the actual landfill is referred to as the cell) including several support buildings, all located on the west side of Lindenwood Road approximately three-fourths of a mile south of Baxter Road. The construction of a new 31-acre cell, to be located directly south of the present site, is in the preliminary planning stage. The new 31-acre cell is proposed to replace the existing cell, which is rapidly nearing its capacity. The landfill operates between 7:00 A.M. and 6:00 P.M. Monday through Friday and 8:00 A.M. and 12:00 noon on Saturdays. The NRG Technology, Inc. dehydration facility, also located on the site, operates 24 hours a day, 7 days a week. NRG Technology, Inc., receives an average of 20 deliveries a day, at a rate of approximately one per hour.

The purpose of this study was to evaluate the traffic impacts the landfill expansion would have on area roadways. In order to complete a thorough evaluation of the traffic impact of the landfill operation, the following studies and analyses were undertaken:

1. Turning movements counts were conducted at the following intersections on Tuesday, May 15, 1990 from 7:00 to 10:00 A.M. and 2:00 to 6:00 P.M.

    - IL 251 and Baxter Road
    - Lindenwood Road and Baxter Road
    - U.S. 51 and Baxter Road
    - Mulford Road and Baxter Road
    - Lindenwood Road and the site access drive

At the intersections of Lindenwood Road and the site access drive, and Lindenwood Road and Baxter Road, all nonpassenger vehicles (e.g., trucks) were counted separately. Field observations of the prevailing traffic conditions were also conducted.

2. The government agencies of Rockford, Winnebago County, and the Illinois Department of Transportation were contacted to obtain current traffic volumes, accident data, and planned roadway improvements, as well as existing and future land-use plans for the vicinity of the landfill site.

3. For a one-week period during April 1990, daily truck traffic generated by the landfill was counted at the entrance drive of the Winnebago Reclamation Landfill. This information, along with the intersection traffic counts, was utilized in determining the direction of approach of truck traffic and the volume of traffic the landfill generates on an average day.

4. Based on the traffic counts, field observations, and existing and future land-use conditions, the current and future operating characteristics of the roadways were estimated.

Existing Conditions

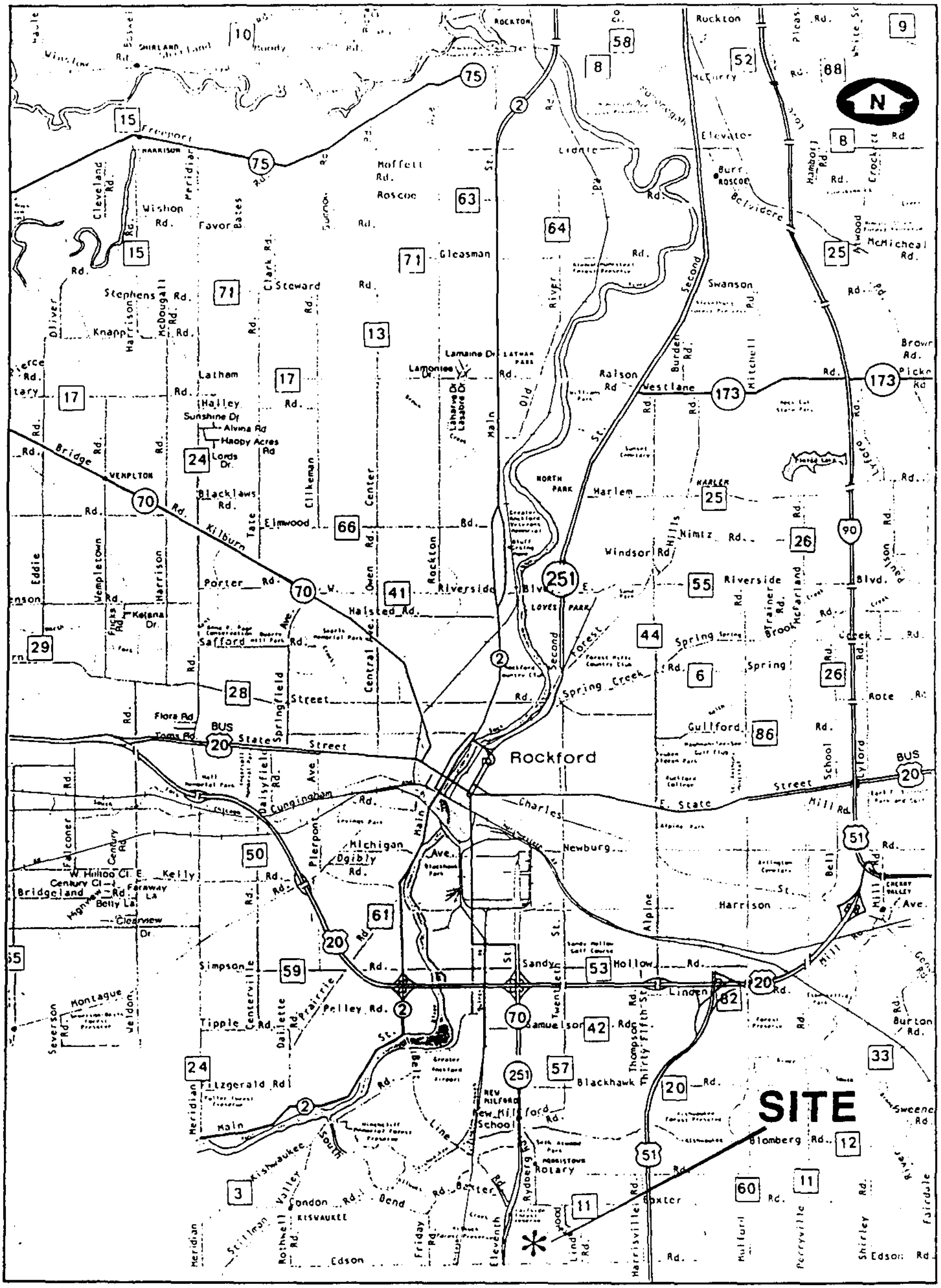
Transportation conditions in the site area were inventoried to obtain a data base for projecting future conditions. Three general components of existing conditions were considered: (1) the geographical location of the site, (2) the characteristics of the roadways in the site area, and (3) traffic operations on these roadways.

Site Location

The Winnebago Reclamation Landfill is located on the west side of Lindenwood Road approximately three-fourths of a mile south of Baxter Road in Winnebago County, Illinois. The proposed 31-acre cell expansion would be located directly south of the existing site and will employ the same access system and internal circulation that now serves the site. The land-uses in the area consist of a few residential homes along Lindenwood Road and Baxter Avenue, with the area mostly dedicated to farms and their fields. Figure 1 schematically illustrates the location of the site with respect to the area roadnet.

Site Accessibility

The site's accessibility will be governed by the characteristics of the roadways available to accommodate site-generated traffic movements and the traffic control devices controlling traffic operations on those roadways. The roadways adjacent to the site are described below.



AREA ROADNETWORK **FIGURE 1**

IL 251 is a major north-south arterial that extends from Rockford south to Peru. In the vicinity of the site, IL 251 is a four-lane divided roadway.

U.S. Route 51 is a north-south highway extending from Janesville, Wisconsin, south all the way into the state of Kentucky. At its interchange with Baxter Road, U.S. 51 has a full-diamond interchange, with its off-ramps stop-sign-controlled at Baxter Road.

Mulford Road is a north-south county road. In the vicinity of the site, Mulford Road is a two-lane roadway that is stop-sign-controlled at its intersection with Baxter Road.

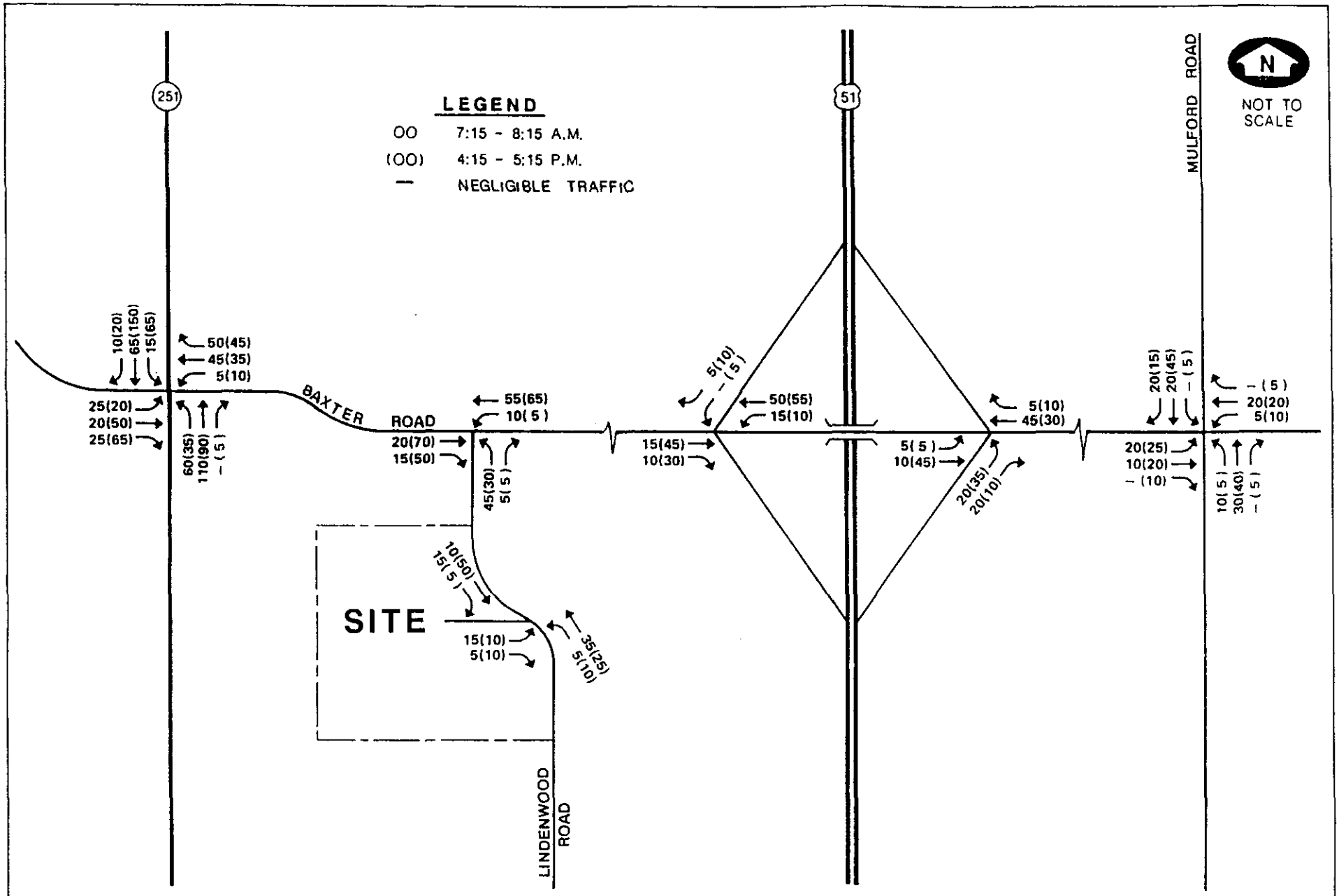
Baxter Road is an east-west county road extending from Friday Road east to Shirley Road. Baxter Road has a two-lane cross section and is stop-sign-controlled at its intersection with IL 251.

Lindenwood Road is a north-south county road. It has a two-lane cross section and is stop-sign-controlled at its intersection with Baxter Road.

The access drive to the landfill is presently provided off of Lindenwood Road approximately three-fourths of a mile south of Baxter Road. This access drive is the main entrance to the landfill and is where all patrons enter and exit the landfill. The weigh station for the landfill is located approximately 300 feet west of Lindenwood Road, which provides ample stacking area for any queuing that may occur while trucks are waiting to enter the weigh station. The access drive feeds the internal circulation system that extends along the north end of the landfill to the support buildings and the dumping area.

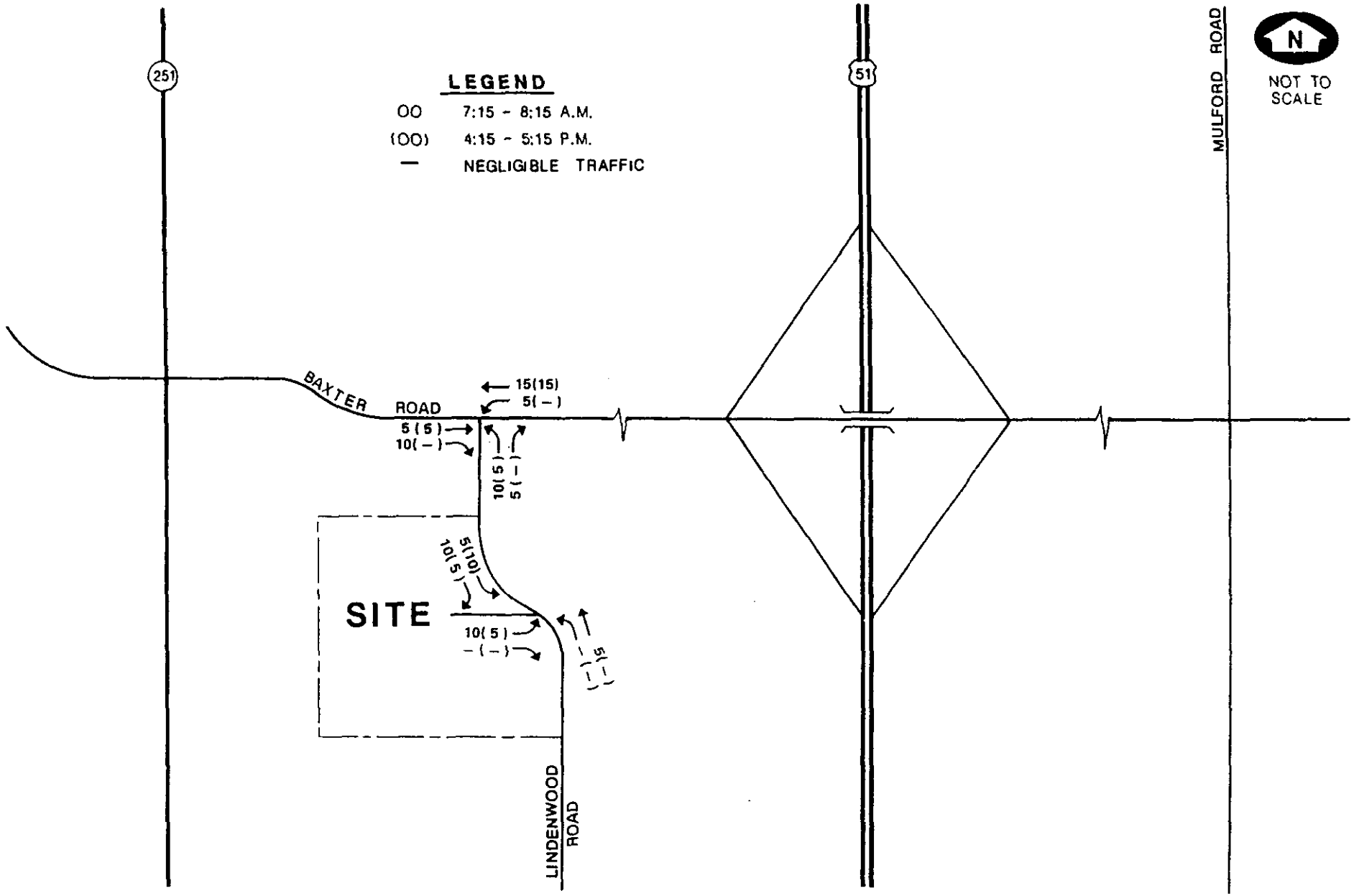
Existing Traffic Volumes

Barton-Aschman Associates, Inc., conducted traffic counts at several intersections in the site area on Tuesday, May 15, 1990. At two of the intersections, Lindenwood Road and the Winnebago Reclamation Landfill access drive and Lindenwood Road and Baxter Road, separate truck counts were also conducted. The traffic counts were conducted during the morning (7:00 to 10:00 A.M.) and evening (2:00 to 6:00 P.M.) peak periods. Summaries of the count data indicate that the morning and evening peak hours of traffic occur from 7:15 to 8:15 A.M. and 4:15 to 5:15 P.M., respectively. The existing traffic volumes are illustrated in Figures 2 and 3 and summarized in the Appendix.



EXISTING TRAFFIC

FIGURE 2



EXISTING TRUCK TRAFFIC

FIGURE 3

Capacity analyses were conducted utilizing the procedures outlined in the 1985 Highway Capacity Manual. These procedures use level of service (LOS) as a measure of intersection performance. The operating LOS for unsignalized intersections is defined in terms of the reserve capacity for a specific movement. Operation at LOS A is the most favorable, with a reserve capacity of 400 vehicles or more; while LOS F indicates that there is no reserve capacity. LOS A and B rarely occur in an urbanized setting during peak time periods. LOS C is typical of normal operating conditions. During the peak periods, intersection performance is typically at LOS D, with surges at LOS E or F.

Capacity analyses of existing conditions indicate the following intersection operating levels:

	A.M.	P.M.
IL 251/Baxter	B	B
Lindenwood/Baxter	A	A
U.S. 51/Baxter	A	A
Mulford/Baxter	A	A

Since all intersections operate at LOS A or B, there are no capacity problems under existing conditions.

Accident data was obtained from the proper agencies for all the major intersections. These agencies have indicated that these intersections experience a lower than average accident rate.

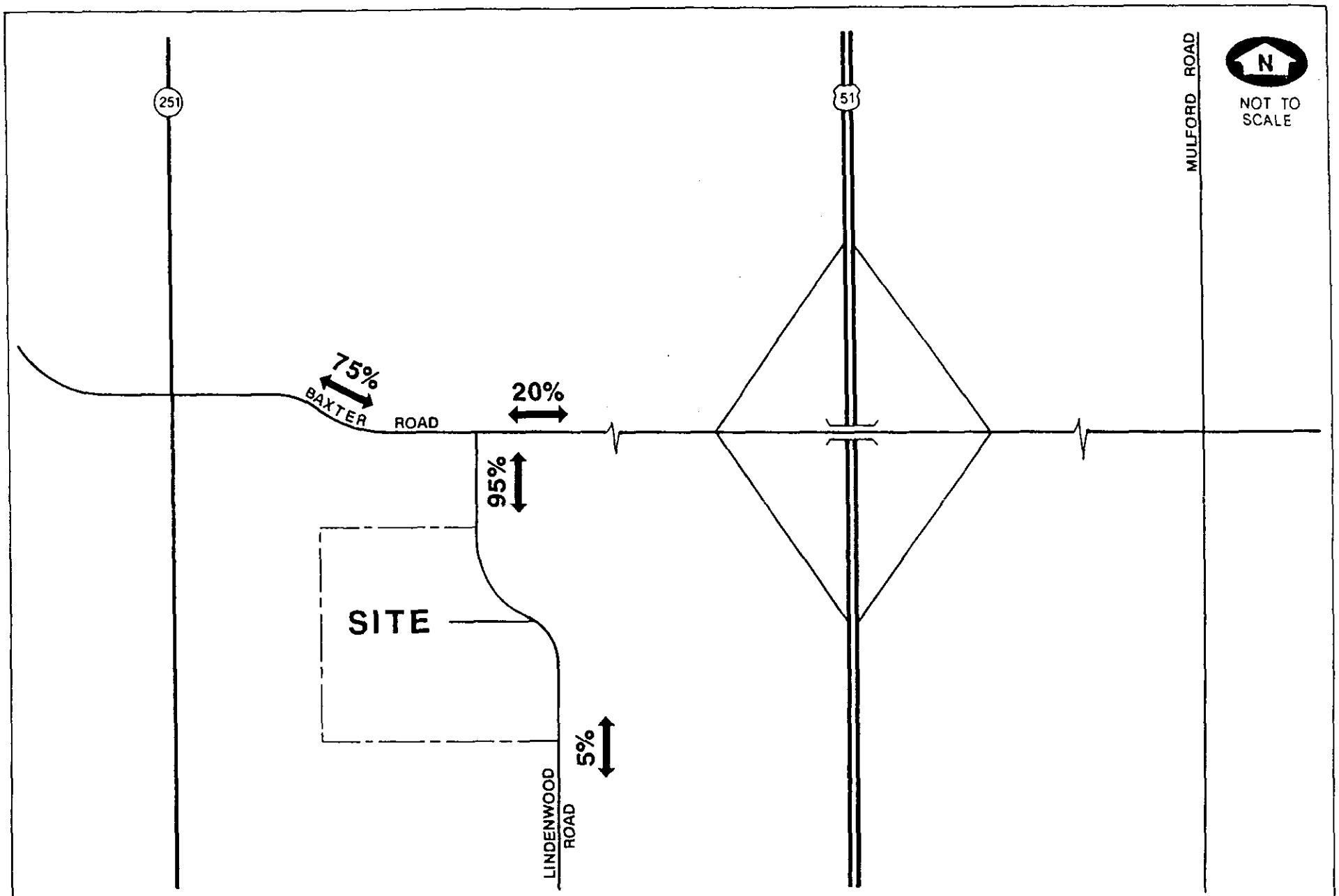
Site Traffic Characteristics

In order to properly evaluate future traffic conditions at the proposed site access drives, it was necessary to determine the traffic characteristics of the proposed site. These characteristics include the directional distribution and the volume of traffic that will be generated by the site.

Directional Distribution

The directional distribution of future site-generated trips on the external roadway is a function of several variables. These include the operational characteristics of the street system and the ease with which drivers can travel over various sections of the road system without encountering congestion.

The directional distribution of traffic generated by the Winnebago Reclamation Landfill reflects travel patterns determined from the existing traffic counts. The results of the directional distribution analysis are presented in Table 1 and illustrated in Figure 4.



DIRECTIONAL DISTRIBUTION

FIGURE 4

Table 1
DIRECTIONAL DISTRIBUTION

Direction	Percent
To and from the South on Lindenwood Road	5
To and from the East on Baxter Road	20
To and from the West on Baxter Road	75
Total	100

Site Traffic Generation

The estimate of traffic volumes that will be generated by the proposed expansion was based on the magnitude and character of its land-use. The proposed expansion consists of a new 31-acre cell to replace the existing 40-acre cell, which is nearing its capacity. The proposed new cell would simply replace the existing cell, as a depository of landfill material. Thus, instead of dumping into the existing 40-acre cell, deliveries will be routed to the new 31-acre cell utilizing the access system and internal circulation that now serves the site. This change will not affect the amount of traffic generated by the site.

In fact, records show that over the past several years the traffic generated by the facility has decreased. Records furnished by the Winnebago Reclamation Landfill indicate that during one week in March 1987 the landfill received an average of 155 deliveries per day. In comparison, the survey conducted in April of this year indicated that the landfill now receives an average of 100 deliveries a day. This means that over a three-year period the landfill traffic has decreased by more than 33 percent.

This reduction in traffic at the landfill can be directly related to the ever-increasing regulations landfills must comply with. Due to these stricter regulations, the cost of dumping at the landfill has continued to increase over the years, and this has had a strong impact on the number of patrons that use the landfill. With strict landfill regulations expected to continue in the future, it is expected that the landfill traffic will either decrease or remain stable over the years.

Evaluation and Recommendations

In order to evaluate the impact of the proposed expansion, site access facilities and adjacent intersections were analyzed. This analysis was based on the estimated volumes of through and site-generated traffic on the roadway network serving the site. From this analysis, recommendations for site access facilities and roadway improvements were developed.

Site Access

At present, access to the landfill is provided off of Lindenwood Road approximately three-fourths of a mile south of Baxter Road. Observations at the landfill site have shown that the drive is more than adequate to handle the truck traffic. The access drive's approximate 30-foot width and 50-foot curb radius are designed to handle all truck turning movements. Also, the present design has more than enough space to handle any queuing that may occur while trucks are waiting at the weigh station. Capacity analyses at the site access intersection indicate operation at LOS A.

The new 31-acre cell will utilize the same access system and internal circulation that now exists. Plans call for extending the present internal circulation road around the west end of the existing cell south to where the new 31-acre cell will be located. This access system and internal circulation will be more than adequate to handle the traffic movements to and from the facility.

Roadway Improvements

Expansion of the Winnebago Reclamation Landfill will have a negligible effect on traffic in the site vicinity. Since the expansion will consist of a new 31-acre cell, replacing an existing cell, no additional new trips are expected to be generated by the facility. Thus, the traffic conditions of the roadway serving the site will remain at existing levels.

Based on the above analyses and field observations, we have concluded that the existing landfill has a very minimal impact on the roadway system serving the site. Since the expansion of the landfill will not generate any additional trips, the existing roadway system will be more than adequate to handle the landfill traffic. Thus, no roadway improvements are recommended to accommodate the expansion of the Winnebago Reclamation Landfill.

Conclusions

The expansion of the Winnebago Reclamation Landfill will have a negligible effect on traffic in the site vicinity. The site is well-situated with respect to the surrounding area road system. The site access system will allow safe and efficient traffic movements to and from the development, with minimal interruption to through traffic on the external roadway system.

APPENDIX

ROCKFORD LANDFILL
LINDENWOOD RD/LANDFILL DRIVE
5/15/90

06/14/90
15:55:06

TURNS/TEAPAC - 15-Minute Volume Counts: Movement Totals

Begin	N-Approach			E-Approach			S-Approach			W-Approach			Int
Time	RT	TH	LT	RT	OT	LT	RT	TH	LT	RT	TH	LT	Total
700	5	1	0	0	0	0	0	8	1	1	0	2	18
715	4	1	0	0	0	0	0	10	1	1	0	4	21
730	4	4	0	0	0	0	0	14	1	1	0	4	28
745	3	1	0	0	0	0	0	12	1	1	0	1	19
800	2	2	0	0	0	0	0	2	1	1	0	4	12
815	5	3	0	0	0	0	0	6	1	1	0	2	18
830	1	4	0	0	0	0	0	5	1	1	0	3	15
845	1	2	0	0	0	0	0	5	1	1	0	5	15
900	4	3	0	0	0	0	0	5	1	1	0	2	16
915	1	2	0	0	0	0	0	4	1	1	0	2	11
930	6	3	0	0	0	0	0	4	1	1	0	1	16
945	3	6	0	0	0	0	0	3	1	1	0	6	20
1400	1	3	0	0	0	0	0	1	1	1	0	1	8
1415	4	1	0	0	0	0	0	3	1	1	0	3	13
1430	5	6	0	0	0	0	0	2	1	1	0	8	23
1445	2	4	0	0	0	0	0	7	1	1	0	2	17
1500	4	5	0	0	0	0	0	7	1	1	0	3	21
1515	5	6	0	0	0	0	0	10	1	1	0	3	26
1530	7	6	0	0	0	0	0	6	1	1	0	8	29
1545	2	14	0	0	0	0	0	2	1	1	0	9	29
1600	1	13	0	0	0	0	0	4	1	1	0	1	21
1615	1	10	0	0	0	0	0	8	1	1	0	3	24
1630	2	19	0	0	0	0	0	2	1	3	0	3	30
1645	3	12	0	0	0	0	0	4	4	2	0	3	28
1700	1	10	0	0	0	0	0	8	2	2	0	2	25
1715	0	12	0	0	0	0	0	5	1	1	0	1	20
1730	0	11	0	0	0	0	0	5	3	1	0	1	21
1745	2	7	0	0	0	0	0	56	4	1	0	1	71

ROCKFORD LANDFILL
NRG ENTRANCE/LINDENWOOD RD (TRUCKS ONLY)
05/15/90

06/14/90
15:06:38

TURNS/TEAPAC - 15-Minute Volume Counts: Movement Totals

Begin	N-Approach			E-Approach			S-Approach			W-Approach			Int
Time	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT	Total
700	3	1	0	0	0	0	0	1	0	1	0	0	6
715	3	1	0	0	0	0	0	0	0	0	0	4	8
730	2	1	0	0	0	0	0	0	0	0	0	3	6
745	1	1	0	0	0	0	0	0	0	0	0	0	2
800	2	1	0	0	0	0	0	0	0	0	0	2	5
815	4	1	0	0	0	0	0	0	0	0	0	3	8
830	1	1	0	0	0	0	0	0	0	0	0	3	5
845	1	1	0	0	0	0	0	0	0	0	0	3	5
900	2	1	0	0	0	0	0	0	0	0	0	1	4
915	2	1	0	0	0	0	0	0	0	0	0	2	5
930	2	2	0	0	0	0	0	0	0	0	0	1	5
945	3	2	0	0	0	0	0	0	0	0	0	3	8
1400	3	1	0	0	0	0	0	0	0	0	0	6	10
1415	4	1	0	0	0	0	0	0	0	0	0	4	9
1430	4	1	0	0	0	0	0	1	0	0	0	7	13
1445	1	1	0	0	0	0	0	0	0	0	0	1	3
1500	1	2	0	0	0	0	0	0	0	0	0	1	4
1515	4	2	0	0	0	0	0	0	0	0	0	2	8
1530	4	1	0	0	0	0	0	0	0	0	0	4	9
1545	3	7	0	0	0	0	0	0	0	0	0	4	14
1600	1	4	0	0	0	0	0	0	0	0	0	3	8
1615	1	3	0	0	0	0	0	0	0	0	0	0	4
1630	1	6	0	0	0	0	0	0	0	0	0	1	8
1645	1	22	0	0	0	0	0	0	0	0	0	0	23
1700	1	21	0	0	0	0	0	1	0	0	0	1	24
1715	1	20	0	0	0	0	0	0	0	0	0	0	21
1730	1	4	0	0	0	0	0	0	0	0	0	0	5
1745	1	6	0	0	0	0	0	0	0	0	0	0	7

ROCKFORD LANDFILL
BAXTER RD/LINDENWOOD RD
5/15/90

06/14/90
15:08:18

TURNS/TEAPAC - 15-Minute Volume Counts: Movement Totals

Begin	N-Approach			E-Approach			S-Approach			W-Approach			Int
Time	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT	Total
700	0	0	0	0	8	0	0	0	11	4	8	0	31
715	0	0	0	0	13	3	1	0	14	5	7	0	43
730	0	0	0	0	15	0	2	0	15	3	9	0	44
745	0	0	0	0	15	2	1	0	11	2	3	0	34
800	0	0	0	0	14	2	1	0	6	2	3	0	28
815	0	0	0	0	8	1	0	0	8	7	5	0	29
830	0	0	0	0	11	0	5	0	3	4	6	0	29
845	0	0	0	0	10	1	2	0	11	4	5	0	33
900	0	0	0	0	4	3	0	0	13	5	13	0	38
915	0	0	0	0	10	0	0	0	1	1	5	0	17
930	0	0	0	0	5	3	1	0	5	6	13	0	33
945	0	0	0	0	7	2	2	0	11	7	10	0	39
1400	0	0	0	0	4	3	2	0	11	9	6	0	35
1415	0	0	0	0	5	1	1	0	5	9	5	0	26
1430	0	0	0	0	9	1	1	0	15	4	5	0	35
1445	0	0	0	0	5	3	1	0	2	5	11	0	27
1500	0	0	0	0	11	4	2	0	7	5	5	0	34
1515	0	0	0	0	13	1	2	0	10	11	12	0	49
1530	0	0	0	0	7	1	1	0	13	12	7	0	41
1545	0	0	0	0	14	1	1	0	9	15	16	0	56
1600	0	0	0	0	7	2	0	0	6	12	5	0	32
1615	0	0	0	0	13	1	2	0	5	14	19	0	54
1630	0	0	0	0	18	1	1	0	7	18	11	0	56
1645	0	0	0	0	17	1	1	0	5	7	9	0	40
1700	0	0	0	0	19	1	0	0	12	11	25	0	68
1715	0	0	0	0	8	0	1	0	2	11	5	0	27
1730	0	0	0	0	7	2	0	0	6	8	10	0	33
1745	0	0	0	0	11	2	1	0	5	6	5	0	30

ROCKFORD LANDFILL
BAXTER/LINDWOOD (BIG TRUCKS ONLY)
5/15/90

06/14/90
15:08:45

TURNS/TEAPAC - 15-Minute Volume Counts: Movement Totals

Begin	N-Approach			E-Approach			S-Approach			W-Approach			Int
Time	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT	Total
700	0	0	0	0	2	1	0	0	0	3	2	0	8
715	0	0	0	0	2	2	1	0	3	2	0	0	10
730	0	0	0	0	5	0	2	0	2	1	2	0	12
745	0	0	0	0	3	1	0	0	1	1	1	0	7
800	0	0	0	0	4	1	0	0	2	1	0	0	8
815	0	0	0	0	4	1	0	0	2	4	3	0	14
830	0	0	0	0	0	1	3	0	2	1	3	0	10
845	0	0	0	0	2	0	1	0	2	0	2	0	7
900	0	0	0	0	1	1	0	0	1	2	3	0	8
915	0	0	0	0	3	0	0	0	2	1	0	0	6
930	0	0	0	0	1	1	1	0	1	1	5	0	10
945	0	0	0	0	0	2	1	0	0	1	4	0	8
1400	0	0	0	0	0	3	1	0	6	3	1	0	14
1415	0	0	0	0	2	0	0	0	1	8	1	0	12
1430	0	0	0	0	1	0	0	0	3	1	3	0	8
1445	0	0	0	0	1	0	0	0	5	1	3	0	10
1500	0	0	0	0	6	2	1	0	2	1	1	0	13
1515	0	0	0	0	4	1	2	0	0	5	2	0	14
1530	0	0	0	0	3	0	0	0	4	3	2	0	12
1545	0	0	0	0	2	0	0	0	5	3	1	0	11
1600	0	0	0	0	1	0	0	0	3	0	1	0	5
1615	0	0	0	0	2	0	0	0	0	2	1	0	5
1630	0	0	0	0	4	0	0	0	1	0	0	0	5
1645	0	0	0	0	3	1	0	0	0	0	0	0	4
1700	0	0	0	0	4	0	0	0	2	0	2	0	8
1715	0	0	0	0	3	0	0	0	0	1	1	0	5
1730	0	0	0	0	1	0	0	0	0	0	0	0	1
1745	0	0	0	0	6	0	0	0	0	0	0	0	6

ROCKFORD LANDFILL
BAXTER/251
5/15/90

06/14/90
15:09:58

TURNS/TEAPAC - 15-Minute Volume Counts: Movement Totals

Begin	N-Approach			E-Approach			S-Approach			W-Approach			Int
Time	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT	Total
700	1	23	6	9	10	1	3	17	15	8	7	5	105
715	3	14	2	12	9	0	0	32	25	4	8	7	116
730	1	15	6	22	15	2	0	32	13	11	9	6	132
745	3	15	3	17	12	1	0	30	15	4	2	5	107
800	3	23	3	5	8	2	0	16	9	4	1	9	83
815	6	11	6	10	9	0	2	24	13	2	7	1	91
830	1	14	3	3	10	1	0	20	9	2	3	3	69
845	2	22	3	13	2	3	1	17	8	3	4	4	82
900	2	19	8	7	4	2	1	16	2	10	6	6	83
915	4	20	4	5	8	0	1	18	8	2	9	1	80
930	2	12	14	7	4	2	1	23	9	6	6	3	89
945	2	12	13	10	6	1	0	28	7	8	4	1	92
1400	5	16	8	9	5	0	2	24	3	10	4	3	89
1415	2	28	9	8	4	1	1	24	13	6	4	4	104
1430	5	24	11	8	7	2	2	23	13	13	4	0	112
1445	2	28	5	14	3	0	0	24	9	13	4	1	103
1500	5	22	9	6	8	1	1	26	10	13	2	3	106
1515	6	33	10	15	11	2	2	28	13	7	11	3	141
1530	4	43	12	12	7	0	3	22	11	19	7	6	146
1545	5	50	16	16	9	0	0	28	14	13	11	3	165
1600	9	23	18	10	5	2	1	14	10	16	9	3	120
1615	2	36	17	6	6	2	0	16	7	12	12	2	118
1630	6	42	23	8	13	3	0	25	10	16	11	6	163
1645	6	34	13	13	8	3	2	31	10	16	15	3	154
1700	4	40	16	18	7	3	1	20	8	22	13	8	160
1715	5	46	16	7	5	2	0	26	8	20	10	2	147
1730	6	35	14	8	7	0	1	19	14	11	6	4	125
1745	4	21	5	8	8	2	1	22	6	6	7	1	91

ROCKFORD LANDFILL
BAXTER RD/SOUTH HYW. 51
5/15/90

06/14/90
15:07:02

TURNS/TEAPAC - 15-Minute Volume Counts: Movement Totals

Begin	N-Approach			E-Approach			S-Approach			W-Approach			Int
Time	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT	Total
700	1	0	1	0	9	3	0	0	0	5	3	0	22
715	0	0	0	0	12	8	0	0	0	2	5	0	27
730	0	0	1	0	12	5	0	0	0	9	4	0	31
745	2	0	0	0	13	2	0	0	0	4	3	0	24
800	1	0	0	0	13	3	0	0	0	1	4	0	22
815	3	0	0	0	9	4	0	0	0	2	3	0	21
830	3	0	2	0	11	0	0	0	0	4	4	0	24
845	2	0	0	0	4	4	0	0	0	2	4	0	16
900	1	0	0	0	5	1	0	0	0	5	3	0	15
915	0	0	0	0	12	1	0	0	0	4	9	0	26
930	0	0	1	0	6	2	0	0	0	8	3	0	20
945	1	0	1	0	9	3	0	0	0	6	10	0	30
1400	1	0	0	0	7	0	0	0	0	4	8	0	20
1415	1	0	1	0	8	5	0	0	0	4	5	0	24
1430	3	0	0	0	7	2	0	0	0	5	5	0	22
1445	0	0	1	0	11	2	0	0	0	1	5	0	20
1500	2	0	2	0	17	2	0	0	0	2	5	0	30
1515	5	0	1	0	12	2	0	0	0	0	9	0	29
1530	2	0	4	0	12	7	0	0	0	2	13	0	40
1545	3	0	1	0	7	5	0	0	0	3	7	0	26
1600	2	0	2	0	12	7	0	0	0	3	11	0	37
1615	3	0	1	0	10	1	0	0	0	9	8	0	32
1630	2	0	2	0	17	4	0	0	0	4	9	0	38
1645	3	0	1	0	14	1	0	0	0	7	8	0	34
1700	2	0	3	0	16	3	0	0	0	7	11	0	42
1715	1	0	3	0	6	5	0	0	0	1	7	0	23
1730	3	0	0	0	11	3	0	0	0	2	6	0	25
1745	0	0	0	0	12	1	0	0	0	6	6	0	25

ROCKFORD LANDFILL
BAXTER RD/NORTH HYW 51
5/16/90

06/14/90
15:07:49

TURNS/TEAPAC - 15-Minute Volume Counts: Movement Totals

Begin	N-Approach			E-Approach			S-Approach			W-Approach			Int
Time	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT	Total
700	0	0	0	0	7	0	6	0	6	0	4	1	24
715	0	0	0	1	16	0	3	0	4	0	4	3	31
730	0	0	0	1	9	0	9	0	6	0	2	1	28
745	0	0	0	1	9	0	5	0	5	0	3	1	24
800	0	0	0	1	12	0	1	0	4	0	2	2	22
815	0	0	0	2	12	0	2	0	7	0	2	4	29
830	0	0	0	1	2	0	0	0	3	0	0	1	7
845	0	0	0	2	8	0	10	0	2	0	0	4	26
900	0	0	0	0	6	0	6	0	0	0	3	0	15
915	0	0	0	0	8	0	5	0	4	0	8	1	26
930	0	0	0	1	5	0	3	0	2	0	1	3	15
945	0	0	0	0	12	0	5	0	1	0	8	2	28
1415	0	0	0	1	10	0	3	0	1	0	5	1	21
1430	0	0	0	1	7	0	2	0	2	0	4	2	18
1445	0	0	0	1	9	0	3	0	6	0	5	0	24
1500	0	0	0	0	11	0	2	0	3	0	6	3	25
1515	0	0	0	0	9	0	1	0	6	0	8	3	27
1530	0	0	0	1	8	0	5	0	4	0	8	5	31
1545	0	0	0	2	11	0	4	0	2	0	5	1	25
1600	0	0	0	2	5	0	4	0	4	0	17	0	32
1615	0	0	0	3	7	0	3	0	4	0	12	2	31
1630	0	0	0	1	1	0	2	0	10	0	12	4	30
1645	0	0	0	0	9	0	3	0	12	0	12	1	37
1700	0	0	0	0	9	0	1	0	9	0	10	0	29
1715	0	0	0	0	2	0	3	0	18	0	7	2	32
1730	0	0	0	0	6	0	5	0	7	0	13	2	33
1745	0	0	0	0	5	0	4	0	4	0	6	3	22

ROCKFORD LANDFILL
BAXTER/MULFORD
5/15/90

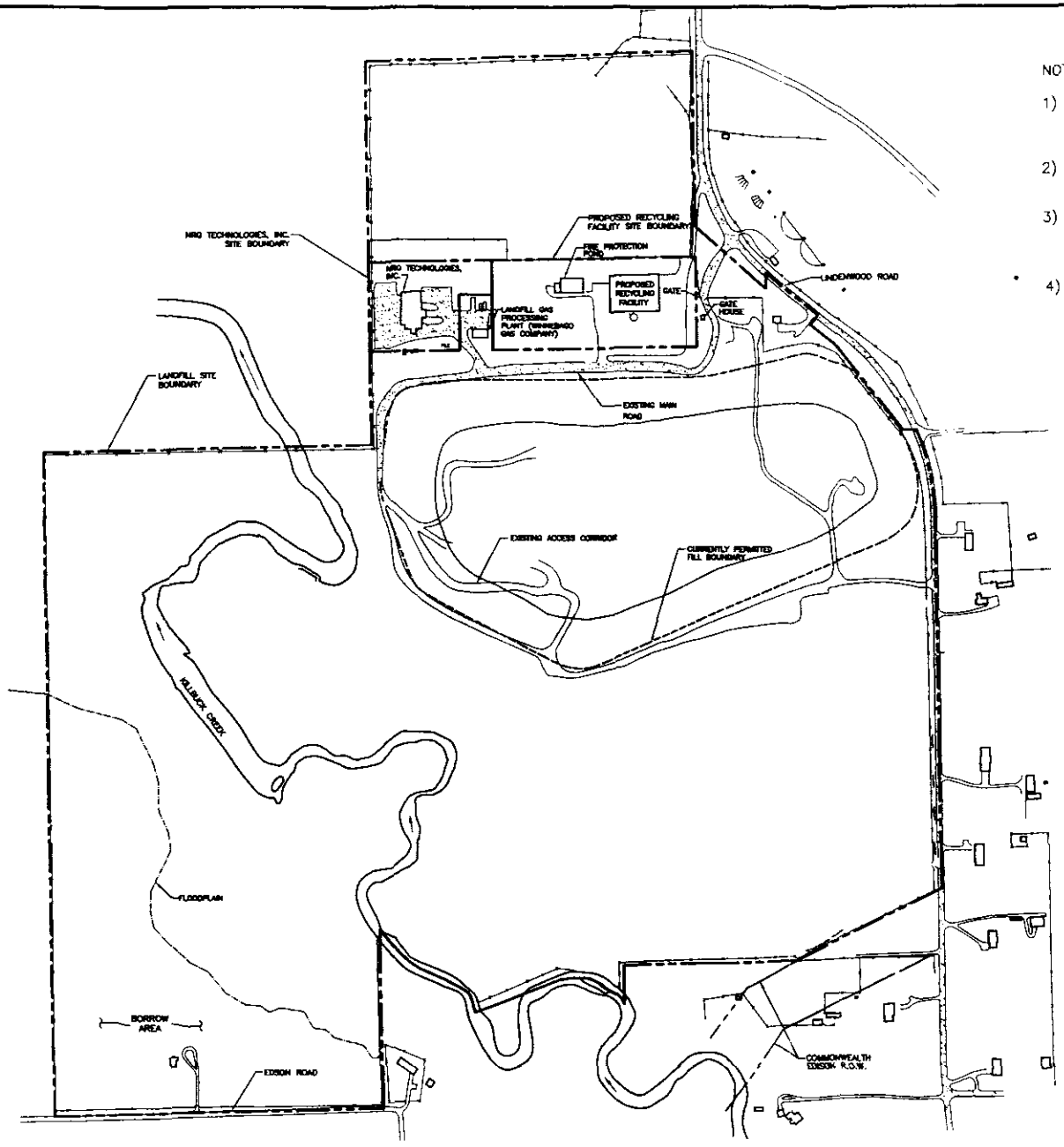
06/14/90
15:11:23

TURNS/TEAPAC - 15-Minute Volume Counts: Movement Totals

Begin	N-Approach			E-Approach			S-Approach			W-Approach			Int
Time	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT	Total
700	6	1	0	0	4	2	0	5	1	0	5	3	27
715	9	4	0	0	0	1	1	9	3	1	2	4	34
730	3	8	0	1	4	1	0	7	2	0	2	6	34
745	2	3	0	0	4	1	0	4	2	0	1	5	22
800	6	7	1	0	5	0	0	8	2	0	0	2	31
815	3	1	0	1	4	0	1	4	2	1	1	2	20
830	2	5	1	0	6	1	1	8	3	0	2	1	30
845	3	5	0	0	3	1	1	2	0	0	4	6	25
900	6	1	1	1	2	0	0	10	2	2	4	6	35
915	2	3	0	0	2	2	2	5	0	0	4	8	28
930	4	2	0	1	1	0	0	3	1	0	1	2	15
945	6	1	2	0	2	2	0	8	1	0	7	3	32
1400	3	4	0	2	3	1	1	5	1	1	2	2	25
1415	4	3	2	0	6	1	1	8	1	0	2	4	32
1430	1	7	3	1	4	2	1	2	0	2	2	2	27
1445	3	6	0	2	7	1	1	5	1	0	3	5	34
1500	6	3	1	0	5	1	1	4	1	0	3	3	28
1515	3	2	1	0	6	0	1	7	0	1	4	1	26
1530	4	8	1	0	6	2	0	6	1	1	6	5	40
1545	7	8	3	0	5	1	3	9	1	1	6	3	47
1600	5	8	0	0	6	1	1	7	2	4	3	6	43
1615	3	12	4	0	6	2	0	8	3	5	2	3	48
1630	4	9	2	0	7	1	1	6	0	4	0	8	42
1645	3	10	0	3	2	2	2	10	3	5	7	8	55
1700	7	16	1	0	4	4	1	16	1	3	9	7	69
1715	4	6	0	0	3	2	1	6	0	2	8	7	39
1730	3	12	0	1	7	2	3	5	0	1	3	7	44
1745	1	5	1	2	3	0	5	6	1	0	5	5	34

APPENDIX 2

Site Transportation Plan Map



NOTES:

1) THE MAIN SERVICE CORRIDORS, TRANSPORTATION ROUTES, AND ACCESS ROADS TO THE FACILITY ARE IL 251, US 51, MULFORD ROAD, BAXTER ROAD, AND LINDENWOOD ROAD.

2) AS NECESSARY, SIGNS WILL BE POSTED TO DIRECT DELIVERY VEHICLES TO THE APPROPRIATE FILLING AREA.

3) TO FACILITATE ACCESS ACROSS THE RUNOFF DITCHES, TEMPORARY CULVERTS WILL BE USED. THESE CULVERTS WILL NOT IMPEDE THE 25 YEAR – 24 HOUR STORM.

4) ALTHOUGH ACCESS IS AVAILABLE BY PUBLIC ROADS, TO FACILITATE MORE IMMEDIATE ACCESS TO THE BORROW AREA WEST OF KILLBUCK CREEK, A BORROW ACCESS ROAD AND CREEK CROSSING MAY BE CONSTRUCTED. THE NECESSARY ILLINOIS DEPARTMENT OF TRANSPORTATION PERMITS WILL BE OBTAINED BEFORE ANY CONSTRUCTION IN THE 100 YEAR FLOODPLAIN WOULD PROCEED.

N

APPROXIMATE SCALE (ft.)

0 220 440 880

WINNEBAGO RECLAMATION SERVICE, INC. ROCKFORD, WINNEBAGO COUNTY, ILLINOIS			
SCALE: AS SHOWN	APPROVED BY:	REVISED:	DRAWN BY: DJM
DATE: 4-94	DRF	EML	DESIGNED BY: DRF
ANDREWS ENVIRONMENTAL ENGINEERING, INC. 3535 MAYFLOWER BOULEVARD SPRINGFIELD, ILLINOIS 62707 (217) 787-2334			
SITE TRANSPORTATION PLAN MAP			DRAWING NUMBER 90-114-T1

ATTACHMENT 23

Site Capacity and Operating Life Calculations

SITE CAPACITY AND OPERATING LIFE CALCULATIONS

Given:

1. All volume calculations are based on the final grades depicted on Sheet B-3 of the site developmental drawings.

2. All volumes calculations represent total airspace. Final cover and daily/intermediate cover are not taken into account.

2. All volume calculations were performed using AutoCAD Release 13 v. C4 and Softdesk Earthworks Release 7, Average End method. The volumes reported are the average of two calculations, one using east-west sections and one using north-south sections, rounded to the nearest hundred cubic yards. The grid method was also used to verify the results.

Calculations:

Volume 1

The total increase in airspace for the final grades permitted under 35 IAC 807 to the proposed final grades depicted on Sheet B-3 was calculated. The final grades permitted under 35 IAC 807 are depicted in Figure 1.

Total Airspace:	1,629,000 c.y.

Volume 2

The total remaining airspace as of November, 1995 was calculated using the existing topography on Sheet B-1 and the proposed final grades depicted on Sheet B-3.

Total Airspace:	1,818,700 c.y.

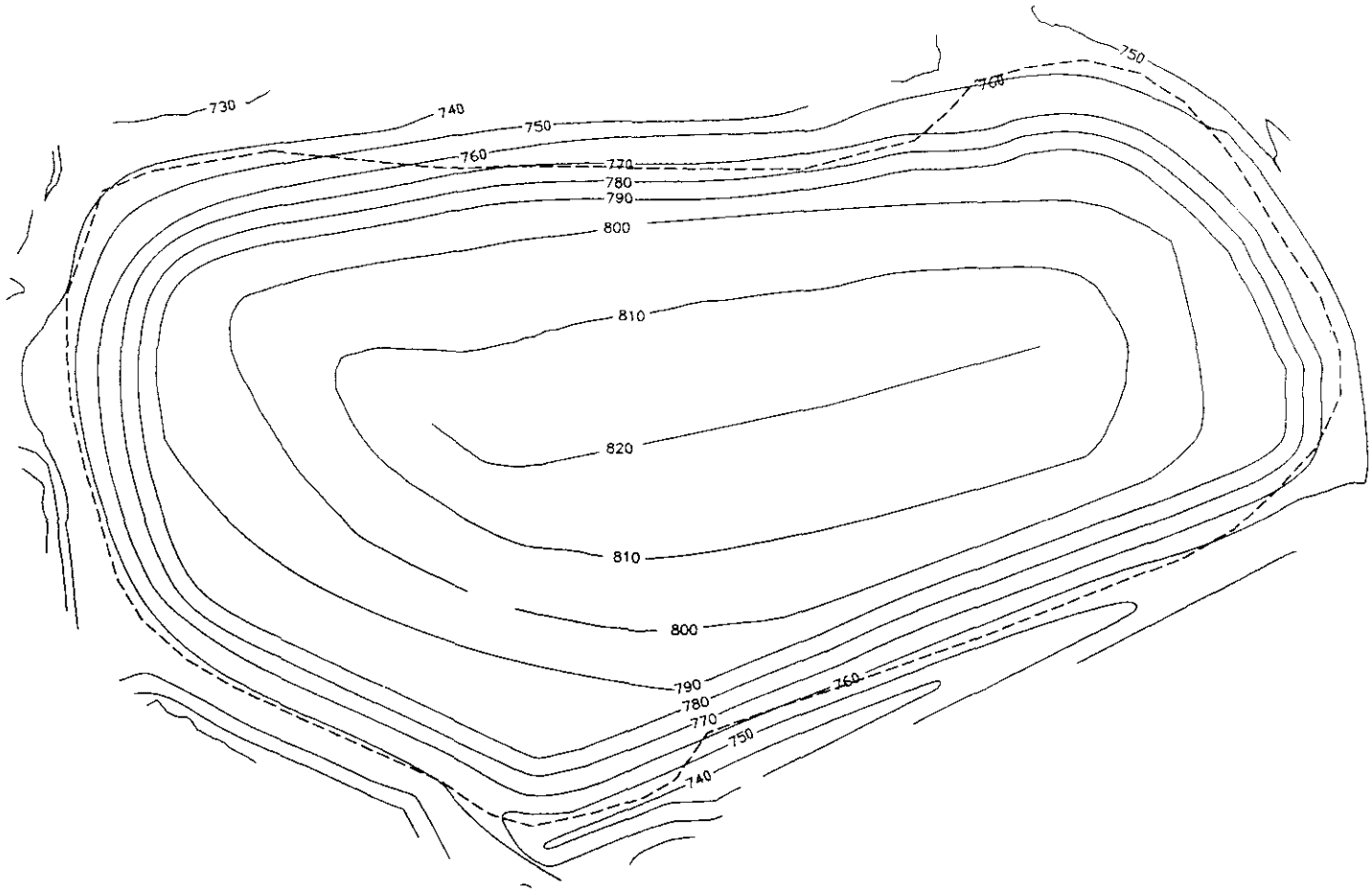
Site Life

The site life was calculated using the remaining airspace and assuming a waste acceptance rate of 575 tons per day. The average density of as-received waste was assumed to be 600 lb/c.y. The final cover volume calculations are detailed in Attachment 21 (Clay Soil Availability Calculations) and the daily/intermediate cover volume was assumed to be 5% of the remaining airspace minus the final cover volume.

Remaining Airspace (as of November, 1995):	1,818,700 c.y.
Final Cover Volume:	300,600 c.y.
Daily Cover Volume	75,900 c.y.
Total Refuse Capacity:	**1,442,200 c.y.**

Operating Days per Year		286 days
Gate Refuse Received per Day		1,917 c.y.
Gate Refuse Received per Year		548,167 c.y.
Airspace Consumed per Year (in-place, assume 2:1 compaction ratio)		**274,083 c.y.**
Site Life (as of November, 1995):	1,442,000 ÷ 274,083 =	5.3 years

Therefore, the unit has a remaining site life of less than 5.3 years and will stop accepting refuse near the early in the year 2001. Closure will continue throughout the year 2001.



1	PERMITTED 807 CONTOURS
FIG 1	SCALE: 1" = 100'

ANDREWS ENVIRONMENTAL ENGINEERING INC.
3535 MAYFLOWER BOULEVARD
SPRINGFIELD, ILLINOIS 62707
(217)787-2334 FAX (217)787-9495

PLANS PREPARED FOR
WINNEBAGO RECLAMATION SERVICE, INC.
ROCKFORD, WINNEBAGO COUNTY, ILLINOIS

35 IAC 807 FINAL COUNTOURS
USED IN VOLUME CALCULATION

DRAWN BY:	VJM	DATE:	5/96	SHEET NUMBER
DESIGNED BY:	VJM	PROJECT #	90-114	FIGURE 1
APPROVED BY:	EML	FILE #	FIGURE1	

ATTACHMENT 24

Fire Control and Safety Plan

FIRE CONTROL AND SAFETY PLAN

INTRODUCTION

The Fire Control and Safety Plan describes the measures that will be taken in terms of accident prevention, fire safety, and response to spills and operation accidents.

ACCIDENT PREVENTION PLAN

Winnebago Reclamation Service, Inc. will continue an aggressive program of Accident Prevention extending through the active site operation, closure and post-closure periods. The following outline of the plan discusses principal aspects of the program:

Accident Prevention During Active Site Operation

The active site operation period extends through the date of final closure. During this time traffic bearing waste materials, and potentially, other vehicle movements, including vehicles going to NRG Technologies, Inc. and a proposed resource recovery facility will enter and leave the site. All traffic will approach the facility along Lindenwood Road. Based upon a study performed by Barton-Aschman Associates, Inc., the site's access system will allow safe and efficient traffic movements to and from the site.

The site includes a site access road extending from the disposal area to Lindenwood Road. In excess of one-fourth mile of this road is asphalt-paved, allowing trucks exiting the disposal area to shed mud before entering the public roadway. Rumble strips will also be installed on the asphalt roadway. In addition, the site operator will maintain equipment at the site capable of cleaning mud from the roadways. This equipment will be used as necessary to maintain safe conditions on-site and at the site entrance.

No scavenging will be allowed on the landfill. Notice will be posted at the site entrance. Also, during icy conditions, traction and/or deicing agents will be used as appropriate.

Accident Prevention During Post-Closure

The site operator will maintain and monitor the site for a period of at least thirty years after closure of the landfill in accordance with 35 IAC 814.302. During this period the site will occasionally require work by endloaders, trucks, dozers and other heavy equipment. The same procedures as used during the active site life will be used during post-closure to prevent mud-tracking onto public roads.

Equipment Operating Safety

The following safety procedures will be used when operating equipment:

- Check equipment before starting
- Use steps and hand holds
- Keep steps clean
- Inspect area before moving
- Operate from driver's seat
- Wear seat belts
- Never mount moving equipment
- Authorized passengers only
- Keep bucket or blade low
- Check blind areas
- Keep enough clearance
- Avoid sidehill travel
- Avoid excessive speed
- Do not crush sealed containers
- Go carefully over bulky items
- Check work area
- Park on level ground
- Lower attachments to ground when parked
- Never jump from equipment

- Avoid leaving equipment unattended
- Always have adequate lighting
- Clean equipment before repairing
- Remain in seat during equipment adjustments
- Use of audible vehicle reverse movement warning devices
- Be aware of ground personnel

FIRE SAFETY PLAN

Several steps will be taken to minimize the threat of fire at the subject facility. These will include but not be limited to, restricting public access, checking incoming loads for igniteability, monitoring equipment for overheating, prohibiting smoking of personnel and guests of the landfill, and maintaining a gas detection system. Each of these items is discussed below.

Restricting Public Access

The means for controlling site entry will include the use of natural barriers or a minimum 4-ft high fence. The site's entrance road is controlled by a gate which is locked when unattended. An attendant is stationed in a gatehouse located just inside the gate of the facility. All individuals who enter the site are required to identify themselves and receive permission to proceed to any other portion of the facility.

These measures are adequate to prevent unauthorized access to the facility during its daily operational hours as well as closed hours. Signs identifying hours of operation, visitor information, safety policies, littering, and prohibited waste types are posted at the site entrance. Other signs will be posted to direct traffic within the facility as necessary.

Load Checking

Checking of the incoming loads in accordance with 35 IAC 811.323 is discussed in the Load Checking Program in the accompanying Operating Plan. To prevent fires, 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, fires are generally smothered. However, if a load is suspected to be on fire, it will be dumped and the fire will be extinguished in accordance with the Fire Fighting Plan.

Prohibition of Smoking

Because combustible materials will be exposed, smoking will be prohibited at the active working fill face of the landfill. Also, since the natural biodegradation process which occurs within landfills produces methane gas, smoking by any person in an area where gas may accumulate will be prohibited. Signs will be displayed around the site as appropriate.

Gas Collection System

The existing landfill unit utilizes an active collection system that will minimize the likelihood of accidental fires due to the production of methane gas.

RESPONSE TO SPILLS AND OPERATIONAL ACCIDENTS

While it is not expected that emergency situations will occur due to the preparedness and prevention methods, this plan outlines procedures for prompt and effective responses. Included with this plan are:

1. Procedures to follow in case of fire;

2. Procedures to follow in case of injury;

3. Procedures to follow in case of a spill; and

4. Responsibilities of the Emergency Coordinator

The Emergency Coordinator and an Assistant Emergency Coordinator for this site will be persons trained in fire-fighting and first aid or emergency medical treatment. The Emergency Coordinator or Assistant Emergency Coordinator will be available to the facility through two-way communications or by telephone at all operating hours.

Fire Fighting Plan

If a fire should develop, the following plan will be implemented. If a load which is on fire is received, the load should be dumped away from the landfill and the fire will be extinguished with soil, water, or fire extinguishers. Most loads will first be processed at a resource recovery facility where most ignited materials, if present, will be detected and extinguished. If a fire should develop at the recovery facility, extinguishers, water hose(s), and a sprinkler system will be available to extinguish it. If at anytime a fire cannot be safely and promptly extinguished and/or the burning incoming load cannot be safely unloaded, outside emergency assistance will be summoned.

To facilitate fire fighting, the following equipment is available for use:

1. Telephones at the facility
2. Fire extinguishers (30 dry chemical extinguishers)
3. High capacity 220 gpm industrial hydrant
4. 370,000 gallon fire protection pond

A fire of any type which occurs at the facility should be immediately reported to the Emergency Coordinator or the Assistant Emergency Coordinator. A description of the fire including the location and extent, as well as any immediate threat to life or property, should be given. The judgement as to whether the fire can be controlled by the landfill personnel or whether outside assistance is required will be made by the Coordinator.

Procedures to Follow in Case of an Injury

In case of personal injury the following steps are to be taken:

1. Immediately notify the Emergency Coordinator or the Assistant Emergency Coordinator;

2. If the injury is minor, apply first aid or emergency medical treatment and take the injured party to a hospital or other medical facility for observation, if warranted.

3. If the injury is major or indeterminate, the hospital or other medical facility will be immediately notified, an ambulance or other emergency unit will be summoned. First aid, CPR, or other procedures will be given by a person qualified to do so, if appropriate.

Procedures to Follow in Case of a Spill

If a spill occurs at, or in the vicinity of the site, it is the duty of the site operator to render any possible assistance to prevent any threat to public health or welfare, property, or to the environment. Toward that goal, the site operator will make available any equipment and personnel needed to assist in proper removal of spilled material. Also, there will be a supply of absorbent material maintained at the facility to capture any spilled liquid.

The Emergency Coordinator or Assistant Emergency Coordinator will be advised of any spill which occurs at, or in the vicinity of, the facility and will make the decisions necessary to implement any assistance.

Responsibilities of the Emergency Coordinator

The Emergency Coordinator, or the Assistant Emergency Coordinator, is responsible for organizing any emergency response measures and must be familiar with all prevention and response plans as well as all equipment, supplies, operations, and activities at the facility.

Whenever there is an imminent or actual emergency, the Emergency Coordinator must immediately:

1. Notify on-site personnel who might be affected;

2. Notify governmental agencies if assistance is needed;

3. Identify the character, source, and extent of the threat;

4. Assess possible hazards to human health, safety, or to the environment;

5. Take reasonable steps to insure that fires, spills, or other accidents do not occur, or that proper responses are taken if they do occur; and

6. Report any fires, accidents, spills, or other occurrences which threaten health, safety, or the environment to the appropriate governmental agencies.

Emergency Contacts

The telephone numbers of the Emergency Coordinator, Assistant Emergency Coordinator, appropriate fire, police and rescue squads will be posted at all telephones at the facility and updated regularly.

Response Agencies Notification

Organization	Telephone
New Milford Fire Department	(815) 874-2456
Winnebago County Sheriffs Department	(815) 987-5800
Winnebago County ESDA	(815) 987-5990
State ESDA	(217) 782-7860
National Response Center	(800) 424-8802

Chemtrec	(800) 424-9300
Ambulance (New Milford)	(815) 874-2456
Hospital (Swedish American Hospital)	(815) 968-4400
Doctor (Southridge Immediate Care Clinic)	(815) 226-0966

ATTACHMENT 25

Maintenance Plan

MAINTENANCE PLAN

INTRODUCTION

Maintenance will be provided on the equipment and various systems to be used at the site. This will include, but not necessarily be limited to, the following:

Heavy Equipment
Pump Equipment
Safety Equipment
Fire Control and Fighting Equipment
Communications Equipment
Leachate Collection, Transfer and Storage Systems
Gas Monitoring and Detection Systems
Groundwater Monitoring System
Daily, Intermediate and Final Cover Systems
Drainage and Erosion Control Systems
Fencing and Gates
Roads

In addition to this Plan, please refer to the Post Closure Care Plan in accompanying Attachment 20 for details regarding long-term maintenance activities.

EQUIPMENT

All equipment will be inspected and maintained in accordance with the manufacturer's recommendations. A schedule will be established and followed for conducting recommended routine preventative maintenance such as changing filters, changing and/or adding lubricants, introducing antifreeze, etc. Standby equipment will be cleaned, recharged etc. as appropriate as soon as practical after each use to maintain its ready standby capability. Equipment and associated appurtenances will be repaired or replaced as soon as practical after found to be faulty or worn out.

LEACHATE SYSTEMS

The leachate collection, transfer, and storage systems will be inspected at least quarterly. Any observed damage or deficiencies will be repaired as appropriate and practical after detection. At least on an annual basis, the leachate collection and piping system will be inspected for evidence of clogging. On an as needed frequency, the drainage piping will be cleaned. For additional information regarding leachate management system maintenance, see the Leachate Management Plan provided in accompanying Attachment 13.

MONITORING SYSTEMS

The gas monitoring probes and groundwater monitoring wells will typically be sampled annually and quarterly, respectively. If during any sampling event it is discovered the probe/well has been damaged such that sample collection is prevented or impaired, it will be repaired or replaced as soon as practical. The continuous methane detection devices in buildings and outdoor ambient air methane monitoring devices are considered equipment and will be maintained as such.

COVER SYSTEMS

Daily and intermediate cover soils are to be tightly compacted to minimize erosion. Also, to the extent practical, drainage should be diverted away from areas of daily/intermediate cover. If daily cover is damaged during the night due to excessive direct precipitation from a major storm, additional filling with daily cover and/or daily cover restoration will occur during the next day's operation. The integrity of intermediate cover should also be checked occasionally and especially following major storms and prolonged or rapid snow melt. Any intermediate cover that becomes excessively eroded or damaged should be regraded and compacted, as necessary, as soon as practicable to ensure that waste is covered at all times.

The clay low permeability layer of the final cover will resist erosion because of it's compaction. In addition, the compacted final cover will receive a protective soil layer and vegetative cover. Furthermore, cross-plowing or use of an excelsior blanket in conjunction with seeding will be provided on the finished surface to control erosion. The integrity of the final cover should be

checked on at least a quarterly basis. Any eroded or damaged area in the final cover should be promptly repaired. The erosion of cover from the surfaces of the landfill where vegetation has not yet been established will be controlled by mulching, placement of straw bales, and/or other appropriate erosion control techniques.

As part of the normal maintenance activities, the site will be monitored for settlement. If areas of differential settling are observed which could cause ponding of water on the cover, additional soil cover will be applied to eliminate the depression. Alternatively, if the site is still active, the cover soil may be removed, additional waste placed and the cover re-applied.

DRAINAGE/EROSION CONTROL SYSTEMS

All runoff collection and diversion ditches, and culverts will be inspected at least quarterly for siltation and erosion. As necessary, these structures will be cleaned, regraded, relined, riprapped, etc. to restore design capacities and correct problem areas as soon as practicable.

Following each major rainfall or rapid snowmelt, all erosion control devices such as straw bale dikes, silt fences, etc. will be inspected. As necessary, silt accumulations will be removed and the devices repaired, expanded, etc. to maintain adequate erosion/siltation control and runoff water quality.

FENCING AND GATES

Fencing and gates used to restrict access to the site will be inspected on each day of operation to ensure their continued integrity. Any evidence of collapse or damage will be repaired as soon as practical, and as necessary, temporary fencing, security services etc. utilized to ensure prevention of unauthorized access to the site and open fill face at all times.

ROADS

On-site roadways used for waste deliveries will be kept in as safe as practical operating condition at all times. Mud accumulations should be cleaned off daily, if necessary. Roads will be graded and/or potholes filled as necessary to keep the surface free from abrupt irregularities. Any debris that falls from incoming vehicles will be promptly removed and disposed of in the working face. Snow removal will be employed during and/or following heavy snowfalls as necessary and practical. Also, during icy conditions, traction and/or deicing agents will be used as appropriate.