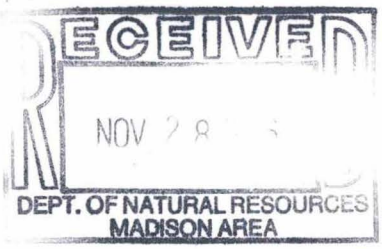
CREATIVE RESOURCE VENTURES LTD.
Suite 124
1406 East Washington Ave.
Madison, WI 53703
Phone: 608-255-3133

November 21, 1986



Mr. Rick Schuff, P. E. Chief
Residuals Management and Land Disposal Section
State of Wisconsin, DNR
P. O. Box 7321
Madison, WI 53707

Dear Rick:

Enclosed is the additional information on the Refuse Hideaway Landfill we indicated we would send you in the October 31, 1986 letter. This submittal addresses drainage, a revised ground water and methane monitoring program, leachate head monitoring, and a schedule for site investigation and closure. Since you have not yet issued your final letter (based on our comments on your draft October 31, 1986 letter we submitted October 31, 1986), please consider this submittal prior to issuing that letter. There is likely no need to do so as I believe this addresses how we will handle each of your concerns.

Refuse Hideaway is implementing many changes in site operations including:

- Completing the west slope
- Filling in the leachate trench
- Cleaning and fixing drainage ditches
- Rerouting site access
- Cleaning/removing stored materials from the site,

and overall is implementing the revised final grade and sequence plan submitted October 31, 1986 and approved by DNR November 10, 1986.

Refuse Hideaway is prepared to implement the enclosed plan of action to reinvestigate the site (ground water, gas, leachate, etc.) upon your approval of the plan. RMT, Inc., working with CRV, Ltd., has prepared this plan along with the basis for the plan so your staff may quickly review what and why this plan has been chosen. After installation of the wells and monitoring; an infield conditions analysis will be prepared and submitted to DNR in early 1987. At that time after data analysis, final plans for gas or leachate control, or additional monitoring will be made.

In summary, we feel that the remaining work required to complete filling and successfully close the Refuse Hideaway Landfill has been organized and scheduled for completion in a timely manner, based on remaining site life and

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the construction season. We request that this submittal be reviewed and that we receive the DNR comments no later than December 5, 1986, so that work can proceed as scheduled.

If you have any questions, please call me.

Sincerely,

CREATIVE RESOURCE VENTURES, LTD.

By: Robert T. Glebs, P. E.
President

sah

cc: John DeBeck
Tom DeBeck
Attorney Peter Rudd
Marie Stewart, DNR

1169.01 137:CRV:schuff

RMT INC.

RMT, Inc.
Suite 124
1406 East Washington Ave.
Madison, WI 53703-3009
Phone: 608-255-2134

ADDITIONAL INFORMATION
FOR THE
CLOSURE OF THE
REFUSE HIDEAWAY LANDFILL

NOVEMBER 21, 1986

Bernd W. Rehm
Hydrogeologist

Ted Juszczyk, P.E.
Senior Project Engineer

1181.02 410:KAR:refusel121

Purpose

This document is a proposed schedule and summary of future investigation and construction activities at the Refuse Hideaway Landfill, prepared by RMT, Inc., on behalf of Creative Resource Ventures, Ltd. This document and attachments contain a drainage plan and details, and a revised ground water and methane monitoring program for the Refuse Hideaway Landfill, designed to address the concerns outlined by the DNR. Anticipated sequencing of this work, follow-up activities, and the remainder site development is shown on the attached project schedule. An in-field conditions report will be submitted to the DNR in early 1987, after the additional monitoring work described below is completed.

Drainage Plan

Based on available in-field information, a drainage plan was developed as shown on Plan Sheets 1 and 2. The plan was developed based on a 10-year, 24-hour storm. Because of ongoing construction activities at the site, current topographic information is not available along the perimeter of the site. Therefore, final construction of the perimeter drainage features will be adjusted in the field as necessary, based on in-field conditions.

Revised Ground Water Monitoring Program

The ground water monitoring program at Refuse Hideaway was reviewed and a revised program was developed. In developing this program, particular attention was paid to the WDNR concerns. This submittal contains:

- A review of ground water flow system information.
- A review of existing ground water quality information.
- A proposal for revised ground water monitoring.

. **Review of Ground Water Flow Data**

The current ground water monitoring system consists of 8 wells, including:

- 4 galvanized piezometers.
- 2 PVC water table wells.
- 2 PVC leachate head wells.

All of the monitoring wells are located on the southern side of the landfill and these wells are concentrated in the southeastern corner of the landfill (see Plan Sheet 1). Water levels from the June 1986 round of ground water sampling, presented in Table 1, ranged from 920 to 927 feet (msl). These water levels indicate that ground water flows to the southeast away from the landfill. Furthermore, water levels at well nest P-1 indicate that there are upward gradients in this area. These upward gradients indicate that the swampy area to the south of the landfill is a ground water discharge area.

While the current ground water monitoring system defines the shallow ground water flow system south of the landfill, there is some uncertainty in flow system north of the landfill due to the lack of monitoring wells north of the site. The topographically high area to the north of the landfill is probably a ground water recharge area. Furthermore, the area to the south of the landfill is a ground water discharge area. Therefore, it is likely that ground water in the regional bedrock flow system flows south.

Water levels north of the site were taken from borings installed as part of the 1974 Environmental Impact Statement (EIS). During this investigation, water levels north of the site were found to be between 920 and 930 feet (msl). Current leachate head levels are between 946 and 949 (msl) in the landfill. The leachate heads are on the order of 25 feet higher than the

current or historical ground water levels. The possibility exists for northward flow away from the landfill.

It should be noted that, although ground water may currently be flowing radially away from the site, flow patterns may change. The leachate head levels have decreased 4-6 feet since the wells were installed in February 1986. Continuing declines will minimize the possibility of any northward components of flow in the future. The proposed investigation program below will allow us to address what is happening with leachate/ground water flow interrelationships.

. **Review of Monitoring Well Construction**

Monitoring wells P-1S, P-1D, P-3, and P-4 were installed in 1973. The annular space between the well casing and the borehole was filled with sand and 2-foot thick bentonite seals were placed above the well intakes in wells P-1S, P-3, and P-4. The well construction is such that these wells are neither good piezometers or water table wells. The hydrogeologic setting (discharge area) and geology (fine textured sediments over sand) however, minimize these short comings by maintaining strong upward gradients that prevent downward migration of ground water through the borehole backfill. The deeper monitoring wells therefore serve as adequate piezometers and the shallow wells provide approximate water table elevations and shallow flow system water samples.

Monitoring wells P-8 and P-9 were installed in 1976 as water table wells. The well intake zones (screen and sand pack) extend from 2 to 17 feet below ground with a bentonite seal at the ground surface. These wells serve as water table wells with ground water levels 5 to 10 feet below ground.

. **Review of Existing Ground Water Quality**

Ground water quality samples have been collected at Refuse Hideaway since 1974. Since that time, the samples have been analyzed for:

- Alkalinity
- Chloride
- Chemical Oxygen Demand (COD)
- Hardness
- Iron
- pH
- Specific Conductance

The purpose of this examination of ground water quality is to:

- determine the validity of the water quality data; and
- determine if there is any indication of ground water contamination at the site.

The WDNR has questioned the validity of the water quality data collected from the galvanized iron wells at Refuse Hideaway. In order to determine if water quality has been affected by the iron wells, RMT compared water quality from the four iron wells at the site (P-1S, P-1D, P-3, and P-4) to water quality from the two PVC wells at the site (P-8 and P-9). This data is presented in Table 1. Examination of the data indicates that with the exception of iron, there are no marked differences in between the samples collected from PVC wells and those collected from iron wells. The iron wells, however, have much higher concentrations of iron than the PVC wells. Because the PVC wells are closer to the landfill, any water migrating from the landfill should have the highest concentration of contaminants near the landfill, the PVC wells should have a higher concentration of iron. Because the iron wells are further from the landfill, but still have a higher

concentration of iron, the high concentration of iron is probably related to the well construction materials. No other parameter appears to have been affected by well construction materials. For this reason, all other parameters can be used to assess the effect that the landfill has had on water quality.

The absence of a background well at the site makes it difficult to assess the degree of contamination that may have occurred. While there is no background well at the site, there are two indicators of background water quality that can be used for comparison. They are as follows:

- Water quality results taken from P-1S, P-1D, P-3, and P-4 prior to waste disposal.
- Water quality from 6 nearby wells presented in an October 16, 1978, letter from Mike Netzer of the DNR to State Assemblyman, Thomas Loftus.

These water quality results as well as averages and ranges of water quality for the monitoring wells are presented in Table 1. Comparison of water quality from the monitoring wells with these sources of background water quality suggests that the landfill has had no marked impact on water quality in the area for the parameters examined. Though the average values for pH are generally lower than the predisposal values and the average values for hardness are generally higher than predisposal values, in all but one case the predisposal value fell within the range of values detected since disposal. Furthermore, though iron in all wells (including the PVC wells) has exceeded the NR 140 Enforcement Standard for iron, local wells not impacted by the landfill have also exceeded this standard suggesting that background water contains high concentrations of iron.

. **Proposed Additions to Monitoring Well Network**

There are three primary areas requiring additional data gathering. These tasks are as follows:

- Establishing the ground water flow patterns north and west of the site.
- Establishing background water quality.
- Determining the potential contaminants at the site.

To better characterize the ground water flow system in the immediate vicinity of the landfill, RMT will install 6 additional wells at the site, as shown on Plan Sheet 1. Two water table wells (P-17 and P-18) will be placed in the bedrock north of the landfill to assess flow directions and water quality. A third water table well (P-19) will be placed between P-18 and the landfill to assist in assessing the impact (if any) of the leachate mound. A piezometer (P-9D) will be placed at the south edge of the landfill to confirm the upward flow components shown by nest P-1D and P-1S. A new water table well will also be placed in the southwest corner of the property to determine whether there has been any migration of leachate constituents from the areas of greatest leachate heads.

During well installation, the geology of the site will be further characterized by collecting 8 soil samples for particle size analysis and establishing Atterberg limits and 3 undisturbed soil samples for laboratory vertical single-well response tests will also be performed to assess horizontal hydraulic conductivity of bedrock and soils.

A water table well (P-20) will be established to the east or west of the landfill property in the sediment that fills the valley. Ground water samples from this well will be representative of background ground water quality for use in assessing possible migration of leachate constituents in the shallow flow system immediately south of the landfill.

No additional leachate head wells are proposed at this time for two reasons. LH-1 was improperly located on previous maps, and is located farther west than previously shown. LH-1 is also located very near the lowest point in the landfill and measurements made here should reflect the highest leachate heads in the landfill. Head measurements made to date also indicate that the leachate levels are declining. It is therefore proposed that only LH-1 and LH-2 be monitored as long as heads continue to decline.

. **Proposed Ground Water Monitoring Program**

In order to determine if ground water has been affected at the site, both inorganic and organic parameters will be monitored. The parameters used for long-term monitoring will be established by:

- Collecting two rounds of samples from all monitoring and leachate head wells (P-1S, P-1D, P-3, P-4, P-8, P-9S, P-9D, P-16, P-17, P-18, P-19, P-20, LH-1, and LH-2) and from the surface water discharge of the marsh south of the landfill.
- Analyzing for an extended list of parameters.
- Reviewing the results of the first two rounds of sampling and selecting parameters that are indicative of the source (leachate samples) and of mobility in the flow system (ground water samples).

Two rounds of samples will be collected within one month of the completion of the proposed monitoring wells. The analyses of samples will include:

- pH
- Specific Conductivity
- Iron (dissolved and total)
- Manganese (dissolved and total)
- Calcium
- Magnesium

- Sodium
- Sulfate
- Alkalinity
- Chloride
- Total Dissolved Solids (TDS)
- Total Organic Carbon
- Total Organic Halogens
- Volatile Organic Compounds

Two rounds of samples will be collected from all wells one month apart. Based on these results, a long-term monitoring plan will be developed which will include collecting samples from the swamp to the south of the site.

Methane Monitoring Program

Methane gas monitoring probes will be installed at three locations as shown on Plan Sheets 1 and 2. Probe locations were selected based on the most probably areas for migration. No probes were installed directly south of the site due to the high ground water table in this area. Each location will consist of 1 to 2 probes at elevations to be determined in the field based on geologic information from the new ground water monitoring well installations nearby. The gas probes, as well as existing on-site structures will be monitored at the same time ground water samples are obtained. Spot locations on the landfill, such as the stressed vegetation on the southern slope, will also be monitored. Gas monitoring data will be submitted to the DNR along with ground water monitoring results, and will be used to develop a long-term gas management plan as discussed below.

Methane Control Alternatives

In order to provide long-term methane gas control at the facility, several gas control alternatives are currently being investigated. These include, but are not limited to the following:

1. Passive venting.
2. Active extraction and flare system.
3. Active extraction and electric power generation system.

RMT has been in contact with Eldredge Engineering, Inc., of Naperville, Illinois and the engineering department of Madison Gas and Electric, to identify the feasibility of establishing a gas extraction and electric power generation system at the site. The Eldredge system consists of modular generators which have particular applicability for small disposal facilities. RMT is currently reviewing this and other gas control alternatives for the facility and will be submitted a proposed gas control plan to the DNR as part of the in-field conditions report, after field data from the methane monitoring program is gathered and analyzed.

RMT INC.
PROJECT SCHEDULE CHART
(SCHEDULE)

PROJECT NAME: OVERALL REFUSE HIDEAWAY LANDFILL PROJECT SCHEDULE
PROJECT #: 1181.02
WORK CODE(S): 410_

TEMPLATE: REFHIDE
BY: TJ
DATE: 20-Nov-86
REVISIONS

>>> TIME LINE <<

ITEM NUMBER	ITEM DESCRIPTION	1986 NOV	1986 DEC	1987 JAN	1987 FEB	1987 MAR	1987 APR	1987 MAY	1987 JUNE	1987 JULY	1987 AUG	1987 SEPT	1987 OCT	1987 NOV	1987 DEC	1988 JAN	1988 FEB	1988 MAR	1988 APR	1988 MAY	COMMENTS
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**********	> ANTICIPATED MONTHS SITE OPEN <	>>>>>>>	>>>>>>>	>>>>>>>	>>>>>>>	>>>>>>>	>>>>>>>	>>>>>>>	>>>>>>>	>>>>>>>	>>>>>>>	>>>>>>>	>>>>>>>	???????							
1.0000																					
1.0000	DEVELOP PROJECT SCOPE/SCHEDULE	====																			
1.1000	- Submit to DNR	=																			
1.2000	- DNR review/comment	=\=																			
2.0000																					
2.0000	GATHER ADDITONAL INFORMATION																				
2.1000	- Field work																				
2.1010	* install gw monitoring wells		====	=======																	
2.1020	* install gas probes		====	=======																	
2.1030	* gw/gas sampling & head monitor				=	=															
3.0000																					
3.0000	DATA ANALYSIS																				
3.1000	- Drainage plan	====																			
3.1010	* surface water routing																				
3.1020	* erosion control																				
3.1030	* sedimentation control																				
3.2000	- Ground water impact						=======	===													
3.2010	* existing																				
3.2020	* potential																				
3.3000	- Gas management alternatives	=======	=======	=======			=======	===													
4.0000																					
4.0000	SUBMIT INFORMATION TO DNR																				
4.1000	- Submit drainage/erosion plan	=																			
4.2000	- Submit in-field conditions & gas							=													
4.2000	management plan																				
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5.0000	ON-SITE CONSTRUCTION																				
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5.2000	- gas management											=======	=======								
5.3000	- Anticipated site closure																				
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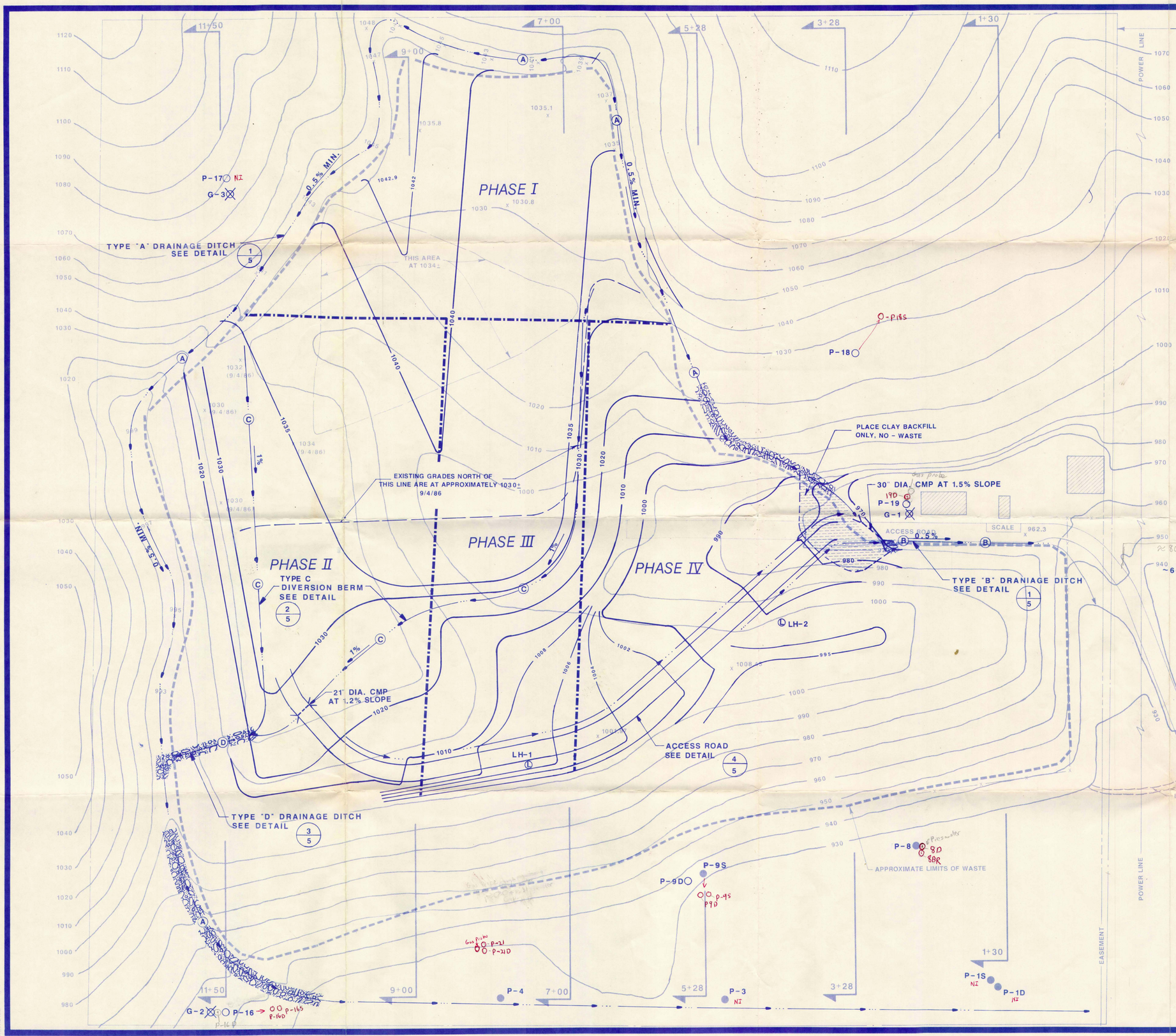
TABLE 1

WATER ELEVATIONS AND SELECTED GROUND WATER QUALITY RESULTS

Well #	June 1986 Water Level		Ground Water Quality Data: Iron (mg/l) Predisposal[1]	Iron (mg/l) After Disposal[2]	Specific Conductivity Predisposal[1]	Specific Conductivity After Disposal[2]	pH (pH Units) Predisposal[1]	pH (pH Units) After Disposal[2]	Hardness Predisposal[1]	Hardness After Disposal[2]
P-1S	920.92	Average	6.1	4.14	1070	1085	7.7	7.09	564	642
		Range		.15-13.7		1550-770		6.6-8.1		394-885
P-1D	925.37	Average	1.5	2.91	450	617	7.5	7.19	208	342
		Range		<.05-5.9		1380-490		6.0-7.7		198-400
P-3	924.97	Average	5.0	0.05	980	632	7.1	7.37	380	37.2
		Range		<.01-.17		930-530		6.9-8.3		206-430
P-4	924.82	Average	1.5	19.58	570	983	8.6	7.15	244	531
		Range		.14-39.7		1160-700		8.6-6.9		280-620
P-8	924.28	Average	--	.60	--	845	--	7.02	--	530
		Range		<.03-9.3		1240-520		6.8-7.9		56-1380
P-9	926.24	Average	--	.32	--	989	--	6.93	--	627
		Range		<.03-5.69		1380-1170		6.2-8.1		288-800
LH1	946.13		--	--	--	--	--	--	--	--
LH2	949.73		--	--	--	--	--	--	--	--
Background Water Quality[3]		Average	--	.18	--	--	--	7.67	--	306
		Range		.1-.6				7.5-7.8		256-368

[1]Results from a round of samples collected July 12, 1974.
[2]Results of analysis performed at RMT labs between 1979-1986.
[3]Background ground water quality data from six local wells presented in an October 16, 1978, letter from Mike Netzer of the WDNR to Thomas Loftus.



LEGEND

- 930 — EXISTING CONTOURS (6/85)
- P-1S ● — EXISTING MONITORING WELLS S-SHALLOW D-DEEP
- DRAINAGE SWALE & DIRECTION OF FLOW
- 991 x — EXISTING DITCH ELEVATION
- FENCE
- EXISTING BUILDING
- APPROXIMATE PROPERTY LINE
- LAND FILL LIMITS (1986)
- x 1030.8 — EXISTING GROUND ELEVATION (6/85)
- x 1031.8 (9/4/86) — EXISTING GROUND ELEVATION (9/86)
- 930 — 1986 PROPOSED GRADES
- (D) — 1986 PROPOSED DRAINAGE DITCH, TYPE "D"
- G-1 — PROPOSED GAS PROBE DETAIL 3/5
- P-19 — PROPOSED MONITORING WELL
- RIPRAP
- CMP – CORRUGATED METAL PIPE
- (L) — LEACHATE HEAD WELL

O - well locations as determined by 7-28-87 survey map
NI = well location not included in survey
SWJ 7-27-87

Surveyed Locations 7-28-87

NOTES

1. ELEVATIONS ARE REFERENCED TO U.S.G.S. MEAN SEA LEVEL (1929).
2. CONTOUR MAP REVISED 10/86 BASED ON DATA PROVIDED BY OWNER AND ARNOLD & O'SHERIDAN DRAWING DATED JUNE 6, 1985.
3. THE LOCATIONS OF THE PROPOSED GROUND WATER MONITORING WELLS AND METHANE GAS PROBES ARE APPROXIMATE, AND WILL BE ADJUSTED IN THE FIELD BASED ON ACCESS.
4. DRAINAGE FEATURES HAVE BEEN DESIGNED FOR A 10 YEAR, 24 HOUR STORM.
5. TOPSOIL, SEED, FERTILIZE, AND MULCH DISTURBED AREAS OF DRAINAGE FEATURES.
6. ADJUST THE HORIZONTAL AND VERTICAL LOCATION OF THE PERIMETER DRAINAGE DITCHES WITH RECENT GRADING TO MAINTAIN A MINIMUM 0.5% SLOPE.
7. PLACE AND MAINTAIN RIPRAP CHECK DAMS OR EROSION BALES IN THE PERIMETER DITCHES AT 200-300 FOOT INTERVALS, UNTIL SEEDED AREAS HAVE STABILIZED.

SCALE 1" = 60'

THESE DOCUMENTS ARE INTENDED TO BE USED FOR REGULATORY PURPOSES ONLY

NOT FOR CONSTRUCTION

NO.	BY	DATE	REVISION	APP'D.
3.				
2.				
1.				

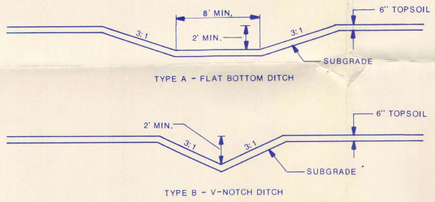
PROJECT : **REFUSE HIDEAWAY**

SHEET TITLE : **DRAINAGE PLAN AND MONITORING WELL LOCATIONS**

DRAWN BY: MCS	SCALE: 1" = 60'	PROJ. NO. 1181.02
CHECKED BY: TJ		DRWG. NO.
APPROVED BY:	DATE PRINTED: NOV 21 1986	SHEET 1 OF 2
DATE: 10/29/86		

RMT INC
Suite 124
1406 East Washington Ave.
Madison, WI 53703
Phone: 608-255-2134

map 5



1/5 **DRAINAGE DITCH DETAILS**

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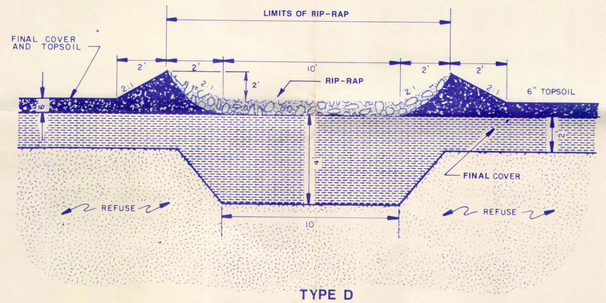

TYPE D

3/5 SPILLWAY DETAIL

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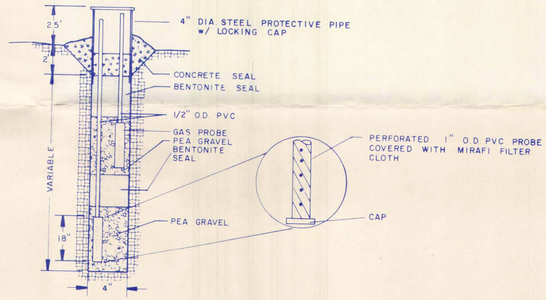

5/5 MULTI LEVEL GAS MONITORING PROBE DETAIL

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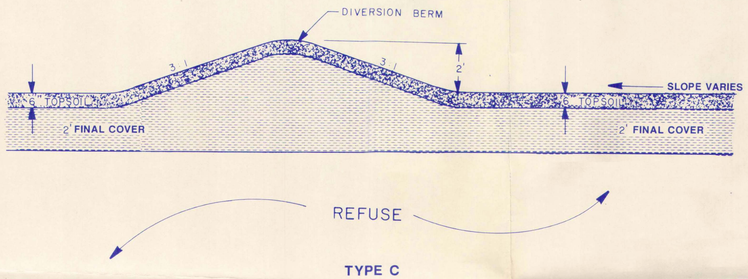

TYPE C

2/5 SURFACE WATER DIVERSION BERM DETAIL

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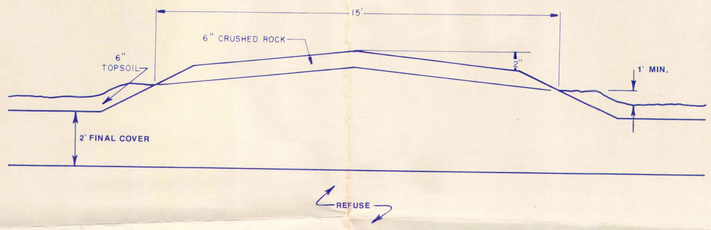

4/5 **ACCESS ROAD DETAIL**

(NOT TO SCALE)

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NO.	BY	DATE	REVISION	APP'D.
3.				
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PROJECT :

REFUSE HIDEAWAY

SHEET TITLE :

DETAILS

DRAWN BY: JM	SCALE : NONE	PROJ . NO . 1181.02
CHECKED BY: TJ		DRWG . NO .
APPROVED BY:	DATE PRINTED : NOV 21 1986	SHEET 2 OF 2
DATE : 11/21/86		

RMT INC.
Suite 124
1406 East Washington Ave.
Madison, WI 53703
Phone: 608-255-2134

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TELEPHONE POST N.P.M.1