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ERP - E
VCP - V
BCP - C

932039

VAN-1982-5-41

CLOSURE PLAN
FOR
SOLID WASTE MANAGEMENT FACILITY
VANDEMARK CHEMICAL CO. INC.
LOCKPORT, N.Y.

JULY 1, 1982

Prepared By:

William W. Whitmore III, P.E. P.C.
CONSULTING ENGINEERS
LOCKPORT, N.Y.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION II
26 FEDERAL PLAZA
NEW YORK, NEW YORK 10278

AUG 5 1982

Mr. John S. Tygert, P.E.
Senior Sanitary Engineer
New York State Department of
Environmental Conservation
600 Delaware Avenue
Buffalo, New York 14202

Dear Mr. Tygert:

As agreed in our telephone conversations of August 4, I am forwarding comments on the closure plan for the the Van De Mark Chemical Company landfill (EPA I.D. Number NYT370011249), so that you can consolidate them with your own comments and those from your Albany office into one letter to Van De Mark. This will enable Van De Mark to address the concerns of both New York State Department of Environmental Conservation (DEC) and Environmental Protection Agency (EPA) at the same time by sending both Agencies a copy of the response to your letter. EPA's concerns which should be addressed in your letter are as follows:

1. The closure plan is based on the assumption that the only hazard from the landfill results from the reactivity of the waste. However, no data has been presented to support this assumption. The elevated Total Organic Carbon concentrations in some groundwater samples suggest that there may be organic chemical constituents in the landfilled waste. Therefore, the company should submit documentation that there are no toxic constituents of the waste by presenting waste analyses or by showing that the manufacturing process chemistry would not result in toxic constituents (e.g., organic chemicals, heavy metals) in the waste.

2. The closure plan neglects to discuss the uses of Eighteen Mile Creek and the surrounding land which could be impacted in the event that there is a release of acidic leachate from the site. The company should provide a description of the resources which could be impacted by the landfill.

3. Since there is little data presently available to document that the waste neutralization by the landfilled lime is controlling the release of acidity, more intensive pH monitoring of the groundwater monitoring wells and Eighteen Mile Creek (upstream and downstream) is needed initially.

The quarterly monitoring proposed in the groundwater monitoring plan is insufficient. Weekly monitoring for pH would be appropriate for the first quarter to demonstrate that the neutralization of the waste is occurring. If no problems are discovered, the monitoring frequency can then be reduced.

Please contact me at (212) 264-0546 if you wish to discuss this matter further.

Sincerely yours,

Jonathan Josephs

Jonathan Josephs
Chemical Engineer
New York Hazardous Waste Section
Solid Waste Branch

New York State Department of Environmental Conservation

600 Delaware Avenue, Buffalo, New York 14202-1073

Robert F. Flacke
Commissioner

September 1, 1982

Mr. Alan Van De Mark
Van De Mark Chemical Company, Inc.
1 North Transit Road
Lockport, NY 14094

Re: Closure Plan Van De Mark Chemical Company, Inc., E.P.A. ID NYT370011249
New York Facility 32S29

Dear Mr. Van De Mark:

The closure plan for the above facility has been reviewed by this office, our Albany office, and by the Region II office of the U.S. Environmental Protection Agency. The following is a summary of the comments that have been made by the various parties:

1. The closure plan is based upon an assumption that the only hazard involved in the previous operation of the landfill has been the reactivity of the material deposited. Analysis, which have been conducted on the ground waters in the area, indicate elevated values have Total Organic Carbon. Consequently, other organic materials may have been present in the waste which was landfilled. Documentation should be submitted indicating that no other contaminants present in the waste would result in the discharge of toxic materials into the ground water, specifically, heavy metals and other organic chemicals.

2. The plan discusses the possible contamination of surface water in the existing drainage ditch on the east side of the landfill. It does not indicate, however, the origin of the contamination.

3. The compellation of data referred to in section 3.2H indicates that projections will be made to indicate secure nature of the landfill. The data referred to in this section should be presently available and should be discussed in the report.

4. Ground water monitoring should commence on the existing wells as soon as practicable and on projected wells as soon as they are completed.

5. The regulations require that a facility be closed within 6 months after receiving the final wastes. The proposal in the report anticipates completion of closure activities approximately 1 1/2 years after receiving the final volume of wastes. In order to consider approving a plan which will entail approximately three times that set forth in the regulations, it will be necessary that Van De Mark can demonstrate:

a. That the closure activities will require more than 6 months to complete.

b. That no significant threats to human health and the environment will result from the longer time period.

In addition, a closure schedule for each phase of the closure program should be submitted.

6. A post closure maintenance, monitoring, and contingency plan should be submitted with the closure plan.

7. The following comments refer to the report prepared by Thompson Associates, dated June, 1982, entitled "Ground Water Monitoring Program, Van De Mark Landfill".

a. The protocol for ground water sampling and analysis have not been included in the plan. It is noted that this material will be furnished by Advanced Environmental Systems. This should be included as an adenda to the ground water plan to permit review and analysis by the agencies involved.

b. The present requirements call for a minimum of three down gradiant monitoring wells. Consequently, it is recommended that an additional well be installed along the western edge of the landfill equal distance between VDM 1 and proposed VDM 12.

c. Page 3 section 2.0 indicated in the first paragraph that the ground water elevations decrease from west to east, however, the elevations in figure 2 indicate an increase from west to east. Further, the reference to well B-55 should be changed to D-55.

d. Page 3 section 2 discusses problems with analysis from wells VDM 3 and VDM 4, and indicates that the wells should be sealed around the annular space with a cement bentomite slurry. It is not explained how leakage down the annular space has been targeted for the depressed pH in the Queenston aquifer in the vicinity of these wells. Since these wells are projected to be re-worked, new ground water sampling and analysis should be conducted on an intensive schedule and be submitted to the department.

e. Section 3 of the report indicates that a number of analysis required by Part 360 will not be conducted. Initial ground water samples should be conducted by all of the parameter for future reference in the event that a ground water quality assessment is required.

f. In section 4.2 there appears to be confusion with respect to the up gradiant and down gradiant wells.

g. Section 4.3 indicates that well D-55 is a down gradiant well, which is not the case.

7 h. In figures 2 and 3 of the report, VDM 12 is shown at different locations.

8. The closure plan neglects to discuss the uses of 18-Mile Creek and the surrounding land which could be impacted in the event that there is a release of acidic leachate from the site. A description of the resources which could possibly be impacted by the landfill should be provided.

9. We currently have very limited documentation on the rate of waste neutralization by the landfilled waste and lime. Consequently, more intensive pH monitoring of the ground water monitoring wells and 18-Mile Creek for pH is initially requested. Weekly monitoring for pH should be appropriate for at least the first quarter. If the results indicate no problems, the monitoring frequency could subsequently be decreased.

After you have had an opportunity to review the foregoing material and to discuss it with your consultants, and they have had an opportunity to modify their reports in accordance with the items which require modification, please contact this office, and we will arrange for a meeting of the concerned parties. We would suggest that such a meeting be scheduled not later than October 15, 1982.

In the interim, if you have any questions please do not hesitate to contact the writer of this letter at 847-4585.

Very truly yours,

John S. Tygert, P.E.
Senior Sanitary Engineer

vs

cc: Mr. Jonathan Josephs
Mr. Ed Horn
Mr. M. Vaughn

15 (12[illegible]3)

New York State Department of Environmental Conservation

MEMORANDUM

TO: John S. Tygert, Senior Sanitary Engineer, Region 9

FROM: Edward L. Horn, Senior Sanitary Engineer, Bureau of Hazardous Waste Technology

SUBJECT: Closure Plan for Solid Waste Management Facility Van De Mark Chemical Company, Lockport (C), Niagara County

DATE: August 3, 1982

I have reviewed the subject closure plan, dated July 1, 1982 and my comments are as follows:

1. Page 3, item e) - Continued monitoring of the existing drainage ditch along the east side of the landfill and the addition of limestone to assure control of pollution of surface run-off is discussed. What provides the potential for such pollution? The closure plan should address the elimination of this problem.

2. Pages 3 and 4, item h) - The compilation of data concerning the rate of waste decomposition, remaining active waste life, and soil testing to establish the secure nature of the site in accordance with Part 360.8(c)(vi)(d) is discussed. It is implied that this data, if favorable, will be used to petition the Commissioner to relax the post-closure monitoring and maintenance requirements. This data should be required for consideration in the development of the closure plan due to the unique design and operation techniques utilized at this landfill.

3. Page 4, item i) The proposed first year groundwater monitoring schedule does not include sampling on July 15 as recommended in your May 25, 1982 letter to Mr. Van De Mark.

4. Page 6, Section 5.2 - It is indicated that the proposed date to begin closure is July 31, 1982 (Per 360.8(c)(6)(ii)(c)). Part 360.8(c)(6)(ii)(c) requires Van De Mark to submit his closure plan to the Commissioner at least 180 days prior to the proposed initiation of closure activities or

on the effective date of these regulations. The subject plan was submitted 29 days before the proposed date to begin closure. Additionally, Part 360.8 (c)(6)(ii)(c) requires the Commissioner to modify, approve, or disapprove the closure plan within 90 days of receipt and after providing Van De Mark and the affected public the opportunity to submit written comments. Region 9 should therefore consider noticing this closure plan in the Environmental Notice Bulletin after Van De Mark addresses the Departments' comments in writing.

5. Page 6, Section 5.3 - It is indicated that the proposed date to complete closure is July 1, 1983 (Per 360.8(c)(6)(iii)(a)). The correct reference is Part 360.8(c)(6)(iii)(b) which requires the completion of closure activities within six (6) months after receiving the final volume of waste. Van De Mark is proposing to complete closure activities within 16.5 months after receiving the final volume of waste. The Commissioner could approve the proposed longer closure period, in accordance with Part 360.8(c)(6)(ii)(c), if Van De Mark can demonstrate that the proposed closure activities will take longer than six months to complete and that all steps have been taken to eliminate significant threats to human health and the environment. Has the longer closure period been requested due to possible effects of the Somerset Railroad construction? Van De Mark should submit a closure schedule that specifies anticipated start and finish dates for each particular closure activity.

6. Page 7, Section 6.6 - It is indicated that a post-closure plan will be prepared and submitted by Van De Mark in accordance with Part 360.8(c)(6)(vi)(b). The correct reference is Part 360.8(c)(6)(vii)(c) which required Van De Mark to submit a post-closure plan on the effective date of Part 360 (March 2, 1982) since closure activities were proposed to begin within 180 days of the effective date of the regulation. The post-closure plan should

be submitted with the closure plan.

7. Reference 6, Groundwater Monitoring Program, Van De Mark Landfill, prepared by Thomson Associates, dated June 1982.

a. Page 1, Section 1.1 - It is indicated that the procedures and techniques for sample collection, sample preservation and shipment, analytical procedures, and chain of custody control are not included in the groundwater monitoring program and that these procedures and techniques will be furnished by Advanced Environmental Systems. The groundwater sampling and analysis protocol should be prepared and submitted for review with the groundwater monitoring program.

b. Page 2, Section 1.2 - The last paragraph on this page indicates that Part 360.8(c)(5) requires three (3) downgradient and one (1) upgradient monitoring wells in the uppermost aquifer. Three (3) new downgradient wells will be installed along the northeast edge of the landfill (figure 2) and existing well B-55 will be used as the upgradient well. However, Part 360.8(c)(5) requires a minimum of three downgradient wells and it is recommended that an additional well be installed along the western edge of the landfill approximately equidistant between VDM1 and proposed VDM 12. The proposed downgradient wells will not be installed along the northeast edge of the landfill as described. They will be installed along the southwestern or western edge of the landfill. Well D-55, as depicted on Figure 2, will be used as the upgradient well, not well B-55.

c. Page 3, Section 2.0 - In the first paragraph references to well B-55 should be changed to D-55. In this same paragraph it is stated that groundwater elevations decrease from west to east, however, the groundwater elevations on Figure 2 depict an increase from west to east.

d. Page 3, Section 2.0 - It is stated in the second paragraph on this page that, "Previous analyses of groundwater samples from VDM3 and VDM4(Bechtel, 1982) indicate leachate from the landfill is leaking down the annular space of these wells into the Queenston aquifer and possibly into the upper aquifers as well.

To prevent further leakage down the annular space a cement/bentonite slurry will be placed down the annular space of these wells." How is it known that leakage down the annular space of these wells is responsible for the low pH in the Queenston aquifer in the vicinity of wells VDM3 and VDM4? Since it is proposed to rework wells VDM3 and VDM4, it is recommended that new groundwater sampling and analysis data for these wells be submitted to the Department.

e. Pages 4 and 5, Section 3.0 - Throughout this entire section it is indicated that the analysis of groundwater for several of the required parameters in Part 360 will not be conducted. Initial background concentrations of all parameters specified in Part 360.8(c)(5)(iii)(b) should be established and used as a basis for comparison in the event a groundwater quality assessment is required under Part 360.8(c)(5)(iv)(d).

f. Pages 8 and 9, Section 4.2 - Upgradient is confused with downgradient throughout this entire section.

g. Page 9, Section 4.3 - It is indicated that additional analyses will be performed on four (4) downgradient wells, VDM9, VDM10, VDM11, D-55, and on one background well, either D-61 or VDM. However, D-55 is not a downgradient well.

h. Figures 2 and 3 - VDM12 is depicted at a different location on both of these figures.

The Thomson Associates report should be rewritten to reflect the comments in item 7, above, since this report is very confusing as written. As a minimum, the data described in items 2 and 7.d, above, should be submitted prior to our final determination on the acceptability of the subject closure plan.

ELH:cd

cc: Paul R. Counterman

Roger D. Murphy

Darshan Singh

50 West Genesee Street
P.O. Drawer J
Lockport, New York 14094
(716) 434-0242 - 5549

William W. Whitmore III, P.E. P.C.
Consulting Engineers

William W. Whitmore III, P.E.
Hal G. Rogers, P.E.

INDUSTRIAL • COMMERCIAL • MUNICIPAL • INSTITUTIONAL CIVIL • STRUCTURAL • MECHANICAL • ELECTRICAL

July 1, 1982

New York State Department of
Environmental Conservation
600 Delaware Ave.
Buffalo, NY 14202

Attention: John S. Tigert, P.E.
Senior Sanitary Engineer

Reference: Closure Plan for Solid Waste Management Facility
VanDeMark Chemical Co. 32S29
Lockport (C), Niagara County, NY

Gentlemen:

Enclosed please find three copies of Closure Plan Proposal for Waste Management Facility at the VanDeMark Chemical Co., Lockport, NY, landfill site.

This has been prepared in accordance with your letter of May 25, 1982 and using 6NYCRR Part 360.8 as a guide.

Following your review, please advise if you will require further for approval to proceed to augment the Closure Plan as outlined.

Very truly yours,
WILLIAM W. WHITMORE III, P.E. P.C.

Consulting Engineers

cc: Allan B. VanDeMark, VanDeMark Chemical Co.
Niagara County Health Dept.

encl: Closure Plan
Dwgs. VDM-2246, -1965, -1967 Rev. 6/30/82

WWW/rb

CLOSURE PLAN FOR VANDEMARK CHEMICAL CO.
CHEMICAL WASTE LANDFILL
LOCKPORT, NEW YORK

1.0 INTRODUCTION

1.1 The existing landfill was started approximately 1957 for the disposal of drums of silicon tetra chloride ($SiCl_4$) and chlorodisiloxane, by-products from the production of commercial phosgene. In June 1977 the company submitted an engineering report and application for permit to upgrade the condition of the landfill and proposed the installatin of approximately 5-7 ft. depth of suitable earth fill regrading and fencing site for disposal of waste material in dug trenches. The method used consisted of placing a bed and backfill of crushed limestone with a cover of bags of finish lime and agricultural lime with final earth cap. Perforation of the drums through the fill cover was accomplished to accelerate lime neutralizing contact with the waste. After a number of tests and variations of procedure, a practical method was determined and permit No. 2111 was issued February 9, 1979 for operation of the landfill. This permit expired in February 1982.

1.2 Bechtel [8] and Woodward-Clyde 1982 [9] Hydrogeologic Investigations determined that ground water affected by this landfill lies at the bottom of the Grimsby formation and over Power Glen formation with migration of ground water east to west on the site and probably to northwest north of the site. (Refer figures 1 and 2 in Thomsen report - Exhibit 1)

1.3 The imminent construction of the Somerset Railroad east and north of the landfill will affect surface drainage patterns and ground water migration as presently determined. (Refer figure 3, Exhibit 1).

2.0 DETERMINED ACTIONS

2.1 VanDeMark Chemical Co., after further discussion with NYSDEC, Region 9, determined that they would close the landfill in accordance with 6NYCRR Part 360.8 (c)(6) - Solid Waste Management Facilities, per letter May 20, 1982 [1].

2.2 This decision was based on successful test development of new process for on-site pre-treatment of the waste and discharge to the City of Lockport Waste Water Treatment Facility. The acceptability of this disposal method is evidenced by the City of Lockport letter May 17, 1982 [2] accepting the final effluent and successful final treatment.

2.3 The Closure Plan is formulated to meet the requirements of NYSDEC Region 9 outlined in May 7, 1982 letter [3] and May 25, 1982 [4]. The U.S. Environmental Protection Agency, by letter dated May 27, 1982 [5] indicates that conformance with NYSDEC requirements will indicate substantial conformance to the Federal Hazardous Waste Program. The Closure Plan will be submitted to both agencies for consideration and approval.

2.4 Subsequent to approval of the proposed Closure Plan, a Post-Closure Plan will be prepared and submitted in accordance with 6 NYCRR Part 360 (c)(6)(vi).

3.0 CLOSURE PLAN

3.1 SCOPE

1) Present the steps to be taken to properly prepare the site to meet objective of minimizing or eliminate future hazards to contamination of ground water, pollution of the atmosphere and to return the site to open land status.

2) Provide controls to site access for a period of time sufficient to accomplish complete decomposition of the waste with no further hazard to the public.

3) Provide necessary facilities for monitoring the decomposition of the waste through sampling of ground water and observe any changes in ground water movement under the site and effect on surface run-off to Eighteenmile Creek.

4) Propose a regrading plan to minimize eroding effect of surface water, maintain existing upland and surface drainage on the site.

5) Initiate a landscaping and planting plan to provide final erosion control on the surface of the landfill.

6) Prepare a management plan to be basis of post-closure activities.

3.2 EXECUTION

1) Institute a ground water monitoring plan as proposed in the attached June 1982 [6] Thomsen Associates Report. This Report was prepared by the consulting hydrogeologist based on NYSDEC/EPA Regulations and presents the following program:

   a) Use of wells No. D-58 and D-61 located upland from the site as previously drilled and tested by Bechtel Associates for Somerset Railroad Corp. proposed construction.

      NOTE: Approval for use of reports and wells was given to VanDeMark Chemical Co. by Somerset Railroad Corp. per letter May 3, 1982 [7].

      These wells are to be monitored for changes in ground water quality due to decomposition of the waste and an indicator of direction of ground water migration.

b) Well No's. VDM 1 and VDM 2 on-site together with proposed No's. VDM 10, 11 and 12 reaching to ground water level of Grimsby/Power Glen formations will be drilled and/or reworked for monitoring use.

NOTE: Bechtel Hydrogeologist Study [8] of February 1982 and Woodword-Clyde Hydrogeologist Investigation [9] dated January 15, 1982, provides the required background of site geology and ground water quality, migration and location for purposes of this program.

Details of drilling and completing wells, rehabilitation of existing wells VDM-1, -2, -3, -4 are contained in Exhibit A.

c) Regrading of existing earth cover material to provide a 2%± surface drainage from west (brow of bank) to east surface drainage ditch including regrading upland of site to divert surface run-off to west around north side of site is proposed. Installation of a impervious clay cap is not considered necessary since the penetration of moisture to aid in decomposition is necessary for continuing the chemical reaction. No release of acid mist occurs at present.

d) Following regrading work a replanting procedure as recommended by Dr. E. A. Randall's Floristic Survey dated June 1977 [10] would be instituted with evaluation of degree of plant growth formation and necessary additional procedures instituted to assure proper growth.

e) Monitoring of existing drainage ditch at east side of landfill will continue and necessary additions of limestone made, based on testing, to assure control of pollution of surface run-off.

f) Provide new controlled access to the site from Plank Road as shown on attached drawing VDM-2246 to replace existing Mill St. access being permanently cut-off by Somerset Railroad construction.

g) Engagement of Advanced Environmental Systems Inc., Niagara Falls, NY, to prepare and carryout a sampling and testing program as required by 6NYCRR Part 360.8 (c) (6)(vi)(a)(2). Results of these tests to be reviewed by Thomsen Associates. Hydrogeologist will review, analyze and determine significant increases or decreases of ground water quality for further recommendations to the Owner.

h) Compile testing information and prepare rate of decomposition chart with forecast as to remaining active life of waste in the landfill. This data, with subsequent soil testing on the site, would be used to establish the secure nature of the

site per 360.8(c)(6)(vi)(d) 2.

i) Comply with monitoring and reporting schedule proposed by NYSDEC letter, May 25, 1982 [4], item 3, as follows:

1st. year - five samples on 15th. of March, May, September, and November.
2nd. year - Minimum Semi-Annually in May and November, subject to results of 1st. year sampling analysis.

j) Institute a reporting and response program as outlined in attached Exhibit A with re-evaluation of the program when necessary to effectively execute the Closure Plan.

k) A final survey map with as-built elevations, bench marks, well locations and elevations, ground water elevations will be prepared and filed upon completion of Closure per 6NYCRR 360.8(c)(6)(vii). Notation of closed landfill will be prepared and filed with map and added to deed as required by 360.8(c)(6)(ix) and state law.

l) A cost estimate showing all closure costs will be prepared and filed by VanDeMark Chemical following approval of Closure Plan. This will be adjusted periodically during Closure and Post-Closure. Such estimate will reflect present costs updated by published inflation factors of U.S. Department of Commerce.

The following Preliminary Estimate presents expected Closure Costs based on July 1982 Construction Costs:

1.	Regrading and Site Preparation	$5,000
2.	Drilling monitoring wells, completion and rehabilitating existing wells	6,500
3.	Improvements to site access, topsoil and seeding	6,000
4.	Hydrogeology Consulting services and reports	5,000
5.	Chemical Analysis and reports	2,000
6.	Survey of site, set bench marks	1,800
7.	Engineering services for Closure and Post-Closure Plan	3,500
8.	Owner's filing and management costs	2,000
	Total	$31,800
	10% Contingency	3,200
	Total Estimated Closure Cost	$35,000

4.0 DATA

4.1 Physical data on landfill taken from VanDeMark Chemical Co. reports to NYSDEC under Permit No. 2111. Excerpts from Bechtel[8] and Woodward-Clyde[9] reports pertaining to VanDeMark landfill are exhibited to establish hydrogeological data for conformance to 360.8(c)(i)(6).

1) Classification of Waste - D-003, Reactive

2) Total Waste Volume Placed in Landfill:

Sector 1 - Period 4/23/79 thru 2/19/82 per disposal reports of permit #2111	1307	drums
Sector 2 - Owner estimate of waste buried for 20± year period (1959-1979)	2000±	drums
Total Waste Buried	3307±	drums

This represents a total weight of approximately:
3307 @ 618 lb. = 2,043,726 lbs.

3) Existing Monitoring Wells:

Bechtel[8] Table 1
Table 2

4) Stratigraphic Column of VanDeMark Chemical:

Landfill area: Medina - Queenston
Bechtel Tables 3, 4

5) Upland Monitoring Wells

Per Table 5

6) Elevation of Grimsby Power Glen Interface:

(per Bechtel[8] and Woodward-Clyde [9] - Figure 7, 1 of 5 [8])
East of Site - 432 USGS
Under Landfill - 431 East
429 West
Per Bechtel[8] Fig. 7 - 2 of 5.
(Refer Figure 6 for Section locations)

7) Permeability of Subsurface Formations

Refer Tables Bechtel[8], Table 5, 6

8) Analysis of Well Samples:

Advanced Environmental Systems - Table 9, VDM wells
Upland Wells - Recra - Table 8-A, -B, -C
Bechtel[8] - on-site wells, Tables 9, 10

9) Ground Water Analysis - Woodward-Clyde[9]

Executive Summary, pg. 1, 2
Water level contours, page 17, Fig. 6
4.2 Future Conditions, pg. 19
AES - Table 1 - Metals Analysis - D-55, pg. 15 A-4
AES - Table 2 - Volatile Organics - D-55 A-5

5.0 SCHEDULE OF CLOSURE

5.1 Last date of Burial - Feb. 19, 1982 (Refer Exh. C-Waste Monitoring Reports.)

5.2 Proposed date to begin closure - July 31, 1982 [Per 360.8(c)(6)(ii)(c)]

5.3 Proposed date to complete closure - July 1, 1983 [Per 360.8 (c)(6)(iii)(a)].

Note: Modified due to possible effects of Somerset Railroad Construction adjacent to site with disruption of upland drainage patterns.

5.4 Issuance of Certificate of Closure - July 30, 1983.

6.0 SUMMARY

6.1 Based on the determinations made by Bechtel Associates [8] and Woodward-Clyde [9], vertical movement of water through fill to ground water can be expected to be limited to ground water elevation at bottom of Grimsby formation 432 to 439±. Permeability of rock formations has been demonstrated to be very low. Ground water migration under landfill is expected to be east to west with very low external flow from east of site due to Railroad cut construction. Upland from landfill, ground water flow similarly is low with movement toward north and west. The landfill exists entirely within the Grimsby formation.

6.2 Based on these findings, the monitoring plan for post-closure will be confined to five wells on site in landfill to sample ground water at bottom of Grimsby formation. Two existing wells, VDM-1 and 2 will be reworked, properly completed and sealed to assure accurate sampling results. Three new wells, VDM 9, 10, 12 will be installed at west and south edge of landfill, properly completed to sample seepage points to face of escarpment. Existing deep wells VDM 3 and 4 will be reworked to seal sampling tubes for more accurate sampling at ground water levels in Queenston formation. Upland wells D-58 and D-61 will also be sampled for quality and migration analysis of Grimsby/Power Glen ground water. A history of changes in quality and movement of ground water will be maintained to establish rate of waste decomposition. Lower wells VDM 5 and 6 will also be indicators of vertical movement of ground water and/or pollutants.

6.3 Site grading, floristic planting, reconstruction of controlled access roads from Plank Road will be accomplished in the Closure Plan. Monitoring of exposed bank areas on west, south and east side at Railroad cut will be part of Post-Closure Plan.

6.4 All reports of completion of closure actions and water quality analyses of completed wells for post-closure management will be reported to the Commissioner and EPA with certification of closure.

6.5 VanDeMark Chemical Co. will submit a letter of committment to complete closure following approval of this plan and schedule. Contracts with Advanced Environmental Systems Inc. for sampling and analysis with reports as per approved schedule will be confirmed. Report of hydrogeologist will be submitted to confirm test well completion and testing with preliminary ground water analysis report to be used for implementing monitoring program of post-closure.

6.6 A Post-Closure Plan will be prepared and submitted by VanDeMark Chemical Co. in accordance with 6NYCRR 360.8(c)(6)(vi)(b). Notice to Niagara County Clerk will be filed following certification of closure with required survey maps and deed amendment.. Closure cost estimate will be updated following completion of closure operations and maintained by Owner.

REFERENCES

1) VanDeMark Chemical Co. Inc. letter May 20, 1982
Closure Determination

2) City of Lockport Wastewater Treatment Plant
Letter May 17, 1982 with U.R.S. Co. Inc. Report May 7, 1982
Agreement to Accept $SiCl_4$ Effluent

3) NYSDEC Letter May 7, 1982, J. J. Tygert P.E.
Report of 4/30/82 Meeting - Closure Proposal

4) NYSDEC Letter May 25, 1982 - J. J. Tygert P.E.
Closure Plan, Wells, Monitoring, EPA Review

5) U.S. Environmental Protection Agency Letter May 27, 1982
EPA Closure and Post-Closure Requirements

6) Thomsen Associates - June 1982, Ground Water Monitoring Program, VanDeMark Landfill

7) Somerset Railroad Corporation letter May 3, 1982
Permission to Utilize Bechtel, Woodward-Clyde Hydrogeological Studies, On-Site Wells

8) Bechtel Associates, Hydrogeological Study, February 1982
Pertinent Data on Wells, Geology, Ground Water Chemical Analysis, Maps

9) Woodward-Clyde Consultants - Results of Hydrogeological Investigation, Jan. 15, 1982
Pertinent Data, Summary of Study, Grimsby Water Level Contours, Test Data Metals and Volatile Organics - Wells D-51 - D-70.

10) Randall, E.A., S.U.C.B., June 1977, Preliminary Floristic Study, VanDeMark Chemical Co.
Waste Disposal Site, Recommendations Concerning Landscape Reseeding and Maintenance

EXHIBITS

A - VanDeMark Chemicals Groundwater Monitoring Program

VDM-2246 Site Plan with revised access and location (Danielewicz)
Somerset Railroad R.O.W.

Van De Mark Chemical Co., Inc.

1 N. Transit Road • Lockport, New York 14094 • 716 - 433-6764

May 20, 1982

Mr. John S. Tygert, P.E.
N.Y.S. Department of Environmental Conservation
600 Delaware Avenue
Buffalo, New York 14202

Dear Mr. Tygert:

This letter serves as written notice that we will be closing our industrial landfill and have received permission to dispose of our still residue to the Lockport Wastewater Treatment Plant, as shown by the enclosures. A formal closure plan will be submitted by July 1, 1982, and will be prepared by William W. Whitmore, P.E.

We have received permission, as indicated on the enclosure, to utilize any or all wells that were bored in the survey work done for Somerset Railroad Corporation and Mr. Whitmore will contact Woodward-Clyde to determine the most suitable wells to use for a groundwater reading.

We have already discharged several thousand pounds of pretreated effluent to the wastewater treatment plant without any detrimental effluent discharges and so are confident that this procedure will serve us permanently.

Please let us know if this timetable and procedure meet with your approval.

Sincerely

Allan B. Van De Mark
President

mad
Enclosures
xc: Paul Counterman - NYSDEC - Albany - Solid Waste
Dennis Wolterding - NYSDEC - Albany - Solid Waste
Jack Kehoe - Niagara County Health Department
Jonathan Joseph, P.E. - EPA - New York

WASTEWATER TREATMENT PLANT

CITY OF LOCKPORT

PLANK ROAD

LOCKPORT, NEW YORK 14094

DAVID R. HALEY, SUPERINTENDENT

439-6037
439-6038

May 17, 1982

Mr. Allan Van De Mark
Van De Mark Chemical Company
Lockport, NY 14094

Dear Mr. Van De Mark,

Upon the completion of the tank necessary for the silicon tetrachloride effluent process, as designed by Norm Matthews, and the necessary hookups are made, the City of Lockport agrees to accept the final effluent from that process as long as it continues to show no detrimental affects upon the Lockport Wastewater Treatment Plant.

We will require a sample of the final effluent to test and this acceptance is based upon the fact that the City of Lockport will not accept, at any time, slug flows of silicon tetrachloride.

Having viewed this as a pretreatment program with Dick Baker of URS, it is my opinion that we are in concurrence as far as this arrangement between Van De Mark Chemical Company and the City of Lockport is concerned.

Sincerely,

David R. Haley

David R. Haley
Superintendent

DRH:ba

URS

AN INTERNATIONAL PROFESSIONAL SERVICES ORGANIZATION

URS COMPANY, INC.
625 DELAWARE AVE.
BUFFALO, NEW YORK 14202
TEL: (716) 883-5525

NEW YORK
MONTVALE NJ
BUFFALO
SAN FRANCISCO
WASHINGTON DC
DALLAS
SEATTLE
DENVER
KANSAS CITY
HONOLULU
NEW ORLEANS
SAN MATEO
PUERTO RICO

May 7, 1982

Mr. David R. Haley
Superintendent
Lockport Wastewater Treatment Plant
Plank Road
Lockport, New York 14094

RE: VAN DE MARK CHEMICAL COMPANY, INC.
$SiCl_4$ DISCHARGES TO LOCKPORT WASTEWATER TREATMENT PLANT

Dear Mr. Haley:

I have reviewed all the information sent to me by Mr. Norman Matthews of Van De Mark Chemical Company, Inc. relative to the increased chloride discharges to the Lockport Wastewater Treatment Plant due to the production of silicon tetrachloride ($SiCl_4$). The results are summarized below.

Although the final discharge concentration of total chlorides could possibly double, the combined chloride concentration from the present operation and that expected from the $SiCl_4$ operation will be well below the minimum chloride concentration that might inhibit secondary treatment plant operations. At about 8000 mg/l, chlorides cause a temporary (2 - 3 day duration) reduction of biological activity. Available literature reports that nearly 20,000 mg/l of chlorides would be necessary to cause sustained reductions in biological activity. The "worse case" chlorides discharges from Van De Mark Chemical Company, Inc. are anticipated to be about 3000 mg/l.

Slug flows of $SiCl_4$ could cause temporary reduction in biological activity only when the slug loading results in chlorides concentrations greater than 8000 mg/l. This roughly equates to a slug loading of 2200 # $SiCl_4$ in a wastewater discharge of 33,000 GPD.

It is our recommendation that Van De Mark Chemical Company, Inc. be permitted to discharge the pretreated $SiCl_4$ wastewaters to the Locport Wastewater Treatment Plant. Any untreated discharges of $SiCl_4$ should be restricted until an analysis for total chloride and pH is completed.

If you have any questions on this matter, please do not hesitate to call me.

Very truly yours,

URS COMPANY, INC.

Richard J. Baker

Richard J. Baker, P.E.
Project Manager

New York State Department of Environmental Conservation
600 Delaware Avenue, Buffalo, New York 14202 - 1073

Robert F. Flacke
Commissioner

May 7, 1982

Van de Mark Chemical Company
1 North Transit Street
Lockport, NY 14094

Attn: Mr. Allen Van de Mark

Re: Disposal of Industrial Wastes
Van de Mark Company
Lockport (C), Niagara County

Dear Mr. Van de Mark:

This will confirm conference in our office on April 30, 1982. Present in addition to yourself were Mr. Norman Mathews of Van de Mark and Mr. John Beecher, Robert Mitrey, Steve Doleski, and the writer from this department.

1. It was indicated by you that the use of the landfill, for which the permit has expired, has ceased and will not be utilized for further disposal of solid or other wastes.

2. You indicated that you intend to react the still bottoms from your silicon tetrachloride production in a fiber glass tank equipped with a mixing device and have a discharge below the liquid surface to prevent hydrochloric acid fumes from escaping to the atmosphere.

3. After mixing the still bottoms with water the effluent will flow through two limestone beds in series where the pH will be raised to a level acceptable for discharge into the sewer system tributary to the Lockport City Waste Water Treatment Plant.

4. It was indicated that you would provide this office with a letter from Mr. Haley, Chief Operator of the Waste Water Treatment Plant, of his willingness to accept, and the limitations upon which he would accept, the effluent from your still bottom treatment facilities.

5. You further indicated that your consultant, Mr. William W. Whitmore, III, would be providing this office with a closure plan for the previously used landfill; both the portions which have been considered most recently to be active as well the inactive area.

6. With respect to groundwater monitoring, the Somerset rail line has placed a number of wells west of their rock cut which will not be disturbed during the construction of their right of way. You indicated that you would contact either Bechtel or their consultants, Woodward Clyde to determine:

a - which series of wells would be most likely to be representative of up-stream groundwater flow which would flow through the landfill and

b - if the wells could be grouted and subsequently perforated at the bottom of the Grimsby formation, which is the formation in which the landfill is located.

7. Present requirements for three downstream monitoring wells do exist. However, in view of the steep decline of the topography west of the landfill area, the two wells currently installed in the base of the hill near 18-Mile Creek are in a different rock formation and most probably will not represent downstream water quality in the acquifer which is affected by the landfill.

8. Discussions with staff geologists within the Department have indicated that if the interface between Grimsby and Whirlpool formations can be located on the slope west of the landfill, the insertion of relatively shallow collectors for determining downstream water quality can be accomplished.

It was indicated that you would confirm the above discussion within two weeks.

If you have any questions, please do not hesitate to contact the writer at 847-4585.

Very truly yours,

John S. Tygert, P.E.
Senior Sanitary Engineer

JST:sk

cc: Mr. Paul Counterman (NYSDEC/Albany/Solid Waste)
Mr. Dennis Wolterding (NYSDEC/Albany/Solid Waste)
Mr. Jack Kehoe (Niagara County Health Department)

New York State Department of Environmental Conservation
600 Delaware Avenue, Buffalo, New York 14202 - 1073

Robert F. Flacke
Commissioner

May 25, 1982

Mr. Allan B. Van De Mark, President
Van De Mark Chemical Company, Inc.
1 N. Transit Road
Lockport, NY 14094

Re: Closure Plan for Solid Waste
Management Facility
Van De Mark Chemical Company
32S29
Lockport (C), Niagara County

Dear Mr. Van De Mark:

This will acknowledge your letter of May 20, 1982 accompanied by letters from Somerset Railroad Corporation, URS and the Wastewater Treatment Plant, City of Lockport.

You have indicated that a formal closure plan will be submitted by or before July 1, 1982 and is to be prepared by Mr. William W. Whitmore, III, P.E. This date is satisfactory to this Department.

The following items should be given consideration:

1. Sampling upstream from the Somerset Railroad Corporation wells to obtain background groundwater quality levels.

2. Sampling downstream (at three locations) at the interface between the Grimsby formation in the underlying strata as indicated to you verbally. This may be accomplished by the insertion of a well screen into the obvious seeps at or slightly above the contour or by installation of perforated pipes parallel to the contours at or above the contours between the two strata and installation of a pipe out of the side hill to permit collection of samples.

3. Initially a minimum of four annual samples should be collected. Due to climalogical reasons it may be necessary that samples during the months of December, January and February cannot be collected. In this event bi-monthly samples should be collected during the remainder of the year and the results submitted within 30 days of the sampling. The times of sampling should be March 15, May 15, July 15, and September 15. If possible, a November 15 sample should be collected.

4. Please be advised that although New York State currently is operating under a memorandum of understanding with the Environmental Protection Agency, we do not yet have authorization to act in their behalf. Consequently, your closure plan will be reviewed concurrently by this Department and by the Environmental Protection Agency-Region 2 Office.

5. We have taken the liberty of sending a copy of your cover letter and attached letters to our local Division of Pure Waters to assure that they are kept advised of any discharge of pretreatment industrial wastes into the City of Lockport sewerage system.

If you or your consultants should have any questions concerning the closure plan, pretreatment or other items, please do not hesitate to contact the writer at 847-4585.

Very truly yours,

John S. Tygert, P.E.
Senior Sanitary Engineer

JST:sk

cc: Mr. Vaughn (Niagara County Health Dept.)
Mr. Counterman (NYSDEC/Albany/Solid Waste)
Mr. Wolterding (NYSDEC/Albany/Solid Waste)
Mr. Josephs (Environmental Protection Agency-Region 2)

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION II
26 FEDERAL PLAZA
NEW YORK, NEW YORK 10278

MAY 27 1982

Mr. Allan B. Van De Mark
President
Van De Mark Chemical Co., Inc.
1 North Transit Road
Lockport, New York 14094

Dear Mr. Van De Mark:

It is my understanding from your May 20, 1982 letter to Mr. John S. Tygert, P.E., New York State Department of Environmental Conservation (DEC) that a formal closure plan for the Van De Mark Chemical Company industrial landfill (EPA I.D. No. NYT370011249) will be prepared and submitted to DEC by July 1, 1982. The U.S. Environmental Protection Agency (EPA) and DEC have substantially equivalent regulations concerning the closure of hazardous waste management facilities (40 CFR Part 265, Subpart G and 6 NYCRR Part 360.8(c)(6), respectively). Therefore, a closure plan which complies with the DEC regulations for closure is also likely to comply with the EPA regulations for closure. However, until EPA formally delegates the Federal hazardous waste program to DEC, your closure plan must be submitted to both EPA and DEC. Approval of the closure plan by both Agencies may also be necessary.

Although you undoubtedly have an understanding of the requirements for closure from your discussions with DEC, I am enclosing a copy of the applicable EPA regulations concerning closure and post-closure (40 CFR Part 265, Subpart G) for your reference. You should note that, for landfills, the portions of this regulation dealing with post-closure care are applicable. I am also enclosing a copy of the closure and post-closure requirements specific to landfills (40 CFR §265.310) and the EPA requirements for groundwater monitoring (40 CFR Part 265, Subpart F), which extend into the post-closure period. While I understand that a groundwater monitoring program meeting EPA requirements has not yet been fully implemented, your May 20, 1982 letter indicates that your consultant is investigating the selection of the most suitable monitoring wells. Since one of the requirements for an acceptable post-closure plan is a description of the planned groundwater monitoring activities (see 40 CFR §265.118(a)(1)), it will be necessary to finalize the groundwater monitoring program and incorporate its description in your closure/post-closure plan(s).

Please be advised that nothing in this letter should be construed to mean that EPA will not take enforcement action, if appropriate, for any violations of EPA's requirements for hazardous waste management. If there are any questions concerning this matter, I may be contacted at (212) 264-0546. I will appreciate your sending any future correspondence concerning the landfill closure, including a copy of the closure/post-closure plan(s) (when completed), to my attention.

Sincerely yours,

Jonathan Josephs

Jonathan Josephs
Chemical Engineer
Solid Waste Branch

Enclosure

cc: Mr. John S. Tygert, P.E.
New York State Department of
Environmental Conservation (w/encl.)

THOMSEN ASSOCIATES

GROUNDWATER MONITORING PROGRAM
VANDEMARK LANDFILL
LOCKPORT, NEW YORK

FOR

W. W. Whitmore, III

Lockport, New York

Job No. BTA-82-20

June 1982

Geotechnical & Materials Engineering, Geologic & Environmental Geoscience Services

S-3853 SHELDON ROAD, P. O. BOX 229, ORCHARD PARK, NY 14127, 716-649-8110

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THOMSEN ASSOCIATES

Marjorie Rinaldo-Lee
Hydrogeologist

GROUNDWATER MONITORING PROGRAM
VANDEMARK LANDFILL
LOCKPORT, NEW YORK

1.0 INTRODUCTION

1.1 Purpose and Scope

Thomsen Associates and Empire Soils Investigations, Inc. were retained by William W. Whitmore, II Consulting Engineers to prepare a written report addressing hydrologic conditions concerning the closure plan to be developed for the VanDeMark Landfill. The purpose of the report is to provide the required Groundwater Monitoring Program for the closure plan. This Groundwater Monitoring Program complies with 360.8 (c) (5) of 6 NYCRR Part 360 except for 360.8 (c) (5) (iii). The procedures and techniques for sample collection, sample preservation and shipment, analytical procedures, and chain of custody control are not included in this plan. These procedures and techniques will be furnished by Advanced Environmental Systems.

The groundwater monitoring program was based on information obtained from:

1) Woodward-Clyde Consultants report of January 15, 1982 "Results of Hydrogeologic Investigation of Danielewicz Route Landfills",
2) Bechtel Associates Professional Corporation report of February 1982 "Hydrogeologic Study Danielewicz Route Station 51+810 to 52+330" and
3) Empire Soils Report of June 1977 "Site Investigation Report, Lockport Stone Quarry, Lockport, New York".

1.2 Summary of Background Hydrogeologic Conditions

The uppermost aquifer beneath the Van De Mark Landfill is at the base of the Grimsby formation. Vertical movement from this aquifer to the lower aquifers at the Power Glen-Whirlpool and Whirlpool Queenston content is practically negligible (Bechtel, 1982). Therefore, the proposed groundwater monitoring program will monitor the upper aquifer at the Grimsby-Power Glen interface.

The direction of groundwater flow beneath the landfill in the upper aquifer (Grimsby-Power Glen interface) is westward, away from the Somerset Railroad project. (Bechtel, 1982, Figure 1) Although the cut for the railroad will intercept groundwater flow in the Grimsby Formation northeast of the landfill, groundwater elevations along the proposed cut east of the southern half of the landfill are below the base of the proposed cut. Thus, even though groundwater elevations may decline due to interception of some of the groundwater flow northeast of the landfill, the general direction of flow beneath the landfill is expected to remain westward toward Eighteen Mile Creek. (Woodward Clyde, 1982)

Part 360.8(c)(5) requires three downgradient monitoring wells at the edge of the landfill in the uppermost aquifer and one upgradient monitoring well in the uppermost aquifer. Since there are no downgradient wells in the upper aquifer three new wells will be placed at the landfill boundary along the northeast edge of the landfill (Figure 2). Well B-55 will be used as the upgradient well.

2.0 GROUNDWATER MONITORING SYSTEM

The groundwater monitoring program for the VanDeMark landfill will monitor the landfill's impact on the quality of groundwater in the uppermost aquifer beneath the landfill (Grimsby-Power Glen interface) after the facility is closed. The groundwater monitoring system will include B-55 from the Bechtel investigation, and 3 new wells (Figure 2). Appendix A contains the well construction details for B-55 and the proposed construction details from the three new wells. All new wells will be placed at the Grimsby-Power Glen interface. Since groundwater elevations decrease from west to east, the bottom of the new wells will be placed at about elevation 415 ft. The new wells will be constructed using 2" i.d. PVC pipe with 10' of well screen. The annular space around the well screen will be sand packed to 1 ft. above the well screen. To prevent surface contamination of the wells the annular space above the sand pack will be grouted with a cement/bentonite slurry.

Previous analyses of groundwater samples from VDM3 and VDM4 (Bechtel, 1982) indicate leachate from the landfill is leaking down the annular space of these wells into the Queenston aquifer and possibly into the upper aquifers as well. To prevent further leakage down the annular space a cement/bentonite slurry will be placed down the annular space of these wells.

In addition to the wells which will be monitored for groundwater quality, in the Grimsby Power Glen interface, water elevations in wells VDM1, VDM2, D-58 and D-61 will be measured at the time water samples are withdrawn for analyses. (Figure 2) These nine wells will be used to measure direction of groundwater flow in the Grimsby-Power

Glen interface. These elevations will be reported to the Commissioner along with results from the Water Quality analyses, according to the reporting requirements of B60.8(c) (5) (U). The water elevations from these wells will be analyzed annually to ensure that D-55 remains upgradient and unaffected by the landfill and monitoring wells VDM9, VDM10 and VDM11 are downgradient of the landfill. If the groundwater table changes substantially after the proposed railroad is installed, new monitoring wells will be installed if necessary to comply with 360.8 (c) (5) (ii) (a).

Records of all water table elevations will be kept by VanDeMark Landfill throughout the post-closure period.

3.0 SAMPLING AND ANALYSIS

Since the waste deposited in the landfill is classified as hazardous based on its reactivity rather than its potential to leach hazardous constituents, and the landfill is being closed, the proposed sampling schedule is different than that specified in 360.8 (c) (5) (iii). (Table I).

The parameters to establish the suitability of groundwater as a drinking water supply have been eliminated based on the waste type. No pesticides, radioactive substances, heavy metals or sewage sludge have been placed in the landfill. The only substance placed in the landfill is silicon tetrachloride which produces an acidic leachate high in chlorides. Since the waste was deposited in barrels and produces an acidic leachate, iron will also be monitored in the wells. Therefore, iron and chlorides are the only parameters which will be monitored for groundwater quality. Specific conductance, total organic carbon and pH will be used as

indicators of groundwater contamination. Total organic halogen will not be used as an indicator parameter because the waste will not leach substances containing organic halogens.

All records of the analyses will be kept by VanDeMark Chemicals. During the final year, results of the analyses will be reported within 15 days of the semiannual sampling. Thereafter, an annual report will be furnished to the Commissioner.

Since the landfill is an existing landfill, the comparison of water quality in the wells specified in 360.8 (c) (5) (iv) (b)-(d) will be modified. After the first year, VanDeMark Chemicals will calculate arithmetic mean and variance for TOC, Specific Conductance and pH for each well based on four replicate samples for each well taken during the first two semi-annual sampling periods. The results from the three downgradient wells will be compared with results from the upgradient well (D-55). The comparison will consider individually each of the downgradient wells and use the Student's t-test at the 0.01 level of significance to determine statistically significant increases (and decreases, in the case of pH) over the background well.

Results from the second year of analysis will be compared as specified in 360.8 (c) (5) (iv) (b) using results from the first year for background concentrations.

If after the second and succeeding years analyses comparisons made for the upgradient wells show a significant increase (or pH decrease), VanDeMark Chemicals will submit this information in accordance with Item 360.8 (c) (5) (v) (a) (2) (ii).

TABLE I

PROPOSED WATER SAMPLE ANALYSIS

Parameter	Frequency of Analysis
Chloride	annual*
Iron	annual*
pH**	semi-annual
Specific Conductance**	semi-annual
Total Organic Carbon**	semi-annual

*semi-annual during first year

**Four replicates will be taken from each well for calculation of arithmetic mean and variance

Since the landfill is 20 years old, monitoring during the first two years should detect whether any leachate is contaminating groundwater. If monitoring during the first two years does not detect any contamination, the monitoring frequency for all parameters will be decreased to annually.

4.0 GROUNDWATER QUALITY ASSESSMENT PROGRAM OUTLINE

4.1 Introduction

The purpose of the groundwater quality assessment program is to provide a program capable of determining:

1) Whether hazardous waste or hazardous waste constituents have entered groundwater
2) The rate and extent of migration of hazardous waste or hazardous waste constituents in groundwater
3) The concentrations of hazardous waste or hazardous waste constituents in the groundwater

This program will be implemented if analyses indicate that the landfill may be affecting groundwater quality.

As explained above in Section 3.0, the comparisons of water quality in the wells specified in 360.8 (c)(5)(iv) (b)-(d) to determine if contamination has occurred will be modified. If the comparisons between downgradient wells and the upgradient wells after the first year of sampling or comparisons for downgradient wells made according to 360.8 (c) (5) (iv) (b) after the second and succeeding years show a significant increase (or pH decrease), VanDeMark Chemicals will then immediately obtain additional groundwater samples from those downgradient wells where a significant difference was detected,

split the samples in two, and obtain analyses of all additional samples to determine whether the significant difference was a result of laboratory error.

If the analyses performed on the additional split groundwater samples confirm the significant increase (or pH decrease), VanDeMark Chemicals will provide written notice to the Commissioner within seven days of the date of such confirmation that the facility may be affecting groundwater quality.

Within 15 days after notification of the Commissioner that the landfill may be affecting groundwater quality, VanDeMark Chemicals will develop and submit to the Commissioner a specific plan, based on the outline described below and certified by a qualified geologist or geotechnical engineer, for a groundwater quality assessment program at the facility.

VanDeMark Chemicals will initiate the groundwater quality assessment program immediately and as soon as technically feasible determine the results of the program. Their results will be submitted to the Commissioner within 15 days of the determination.

Since the landfill is being closed, if any water quality assessment program is required it will be undertaken after final closure of the landfill. Thus, after reporting the results of the water quality assessment program, the indicator evaluation program will be reinstated, in accordance with 360.8 (c) (5).

4.2 Determination of Rate and Extent of Migration of Hazardous Waste Constituents in Groundwater

Following notification of the Commissioner that groundwater quality may be affected by the landfill, additional analyses will be immediately performed to determine the rate and extent of migration of hazarous wastes. The extent of migration of hazardous waste constituents will be determined by sampling wells finished in the two aquifers below the Grimsby-Power Glen interface, the Power Glen-Whirpool interface and the Whirlpool-Queenston interface. The wells to be used for this analysis are shown in Figure 3. Downgradient water quality in the Power Glen-Whirlpool interface, the aquifer immediately below the Grimsby-Power Glen interface, will be sampled in wells D-57 and D-60. Wells D-56 and D-59 will be used to sample downgradient water quality in the Whirlpool-Queenston interface the lowest aquifer. A new upgradient well in the Power Glen-Whirlpool will be placed close to VDM9 for background analyses (VDM12). Well VDM5 will be used for upgradient analysis of the Queenston aquifer. Water samples from wells D56, D57, D59, D60, VDM5 and VDM12 will be analyzed for total organic carbon, pH, Specific Conductance, Iron and Chloride. Results from these analyses will be compared to determine the extent of contamination from the landfill.

The rate of contamination will be estimated using Darcy's Law. Water elevations from the wells used for analyses as well as the additional wells indicated in

Figure 3 will be used to determine the hydraulic gradient. Hydraulic conductivity will be estimated using results from the pressure packer tests on the various geologic units (Bechtel, 1982).

4.3 Determination of Concentration of Hazardous Waste Constituents in Groundwater

To determine the concentrations of hazardous waste constituents in the Grimsby-Power Glen interface, additional analyses will be performed on four downgradient wells, VDM9, VDM10, VDM11, D55, and on one background well, either D-61 or VDM1. Samples from these wells will be analyzed for applicable indicator, groundwater quality and drinking water parameters. (Table II). Results from these analyses, will be compared to determine the concentrations of hazardous waste constituents in the Grimsby-Power Glen interface.

If the results from analyses of water samples taken in the deeper aquifers (see Section 4.2) indicate contamination, additional groundwater samples from these wells will be analyzed for parameters listed in Table II.

Respectfully submitted,

THOMSEN ASSOCIATES

Marjory B. Rinaldo-Lee

Marjory Rinaldo-Lee,
Hydrogeologist

TABLE II

PROPOSED PARAMETERS FOR GROUNDWATER QUALITY ASSESSMENT

	Parameters
Groundwater Quality Parameters	Chloride
	Iron
	Manganese
	Sodium
	Sulfate
Indicators of Groundwater Contamination	pH
	Specific Conductance
	Total Organic Carbon
Drinking Water Supply Parameters	Arsenic
	Barium
	Cadmium
	Fluoride
	Lead
	Mercury
	Nitrate
	Selenium
	Silver

5.0 REFERENCES

1. Bechtel Associates, 1982, Hydrogeologic Study, Danielewicz Route, Station 51+810 to 52+330.

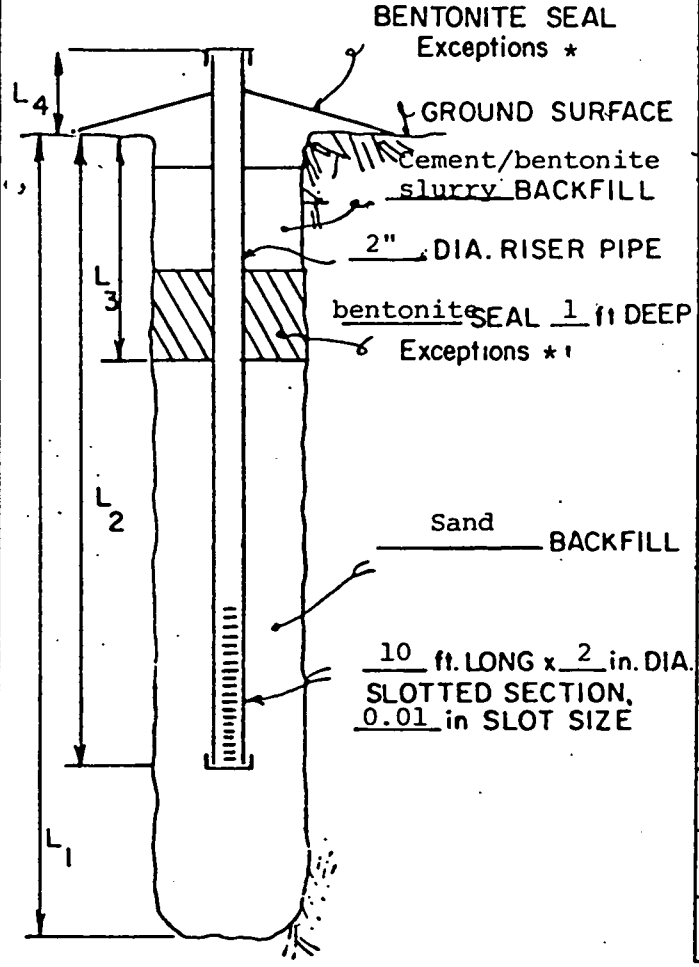
2. Empire Soils Investigations, Inc., 1978, Site Investigation Report, Lockport Stone Quarry, Lockport, New York.

3. New York Department of Environmental Conservation, 1982, 6 NYCRR Part 360 Solid Waste Management Facilities.

4. Woodward-Clyde Consultants, 1982, Results of Hydrogeologic Investigation of Danielewicz Route Landfills.

APPENDIX A

WELL CONSTRUCTION DETAILS



WELL NO.	L_1	L_2	L_3	L_4	Water Level
VDM9	25'	25'	14'	3'	
VDM10	25'	25'	14'	3'	
VDM11	25'	25'	14'	3'	

EMPIRE SOILS INVESTIGATIONS, INC.

OBSERVATION WELL DETAILS

PROPOSED WELL CONSTRUCTION
VAN DE MARK LANDFILL

DR.BY:	SCALE:	PROJ. NO.
CK'D.BY:	DATE:	DRWG.NO.

GROUND WATER OBSERVATION WELL REPORT

PROJECT Somerset Railroad - Van De Mark

LOCATION N1,160,756 E468,241

Date Completed 10/19/81 Original Depth 46.7 (cored)

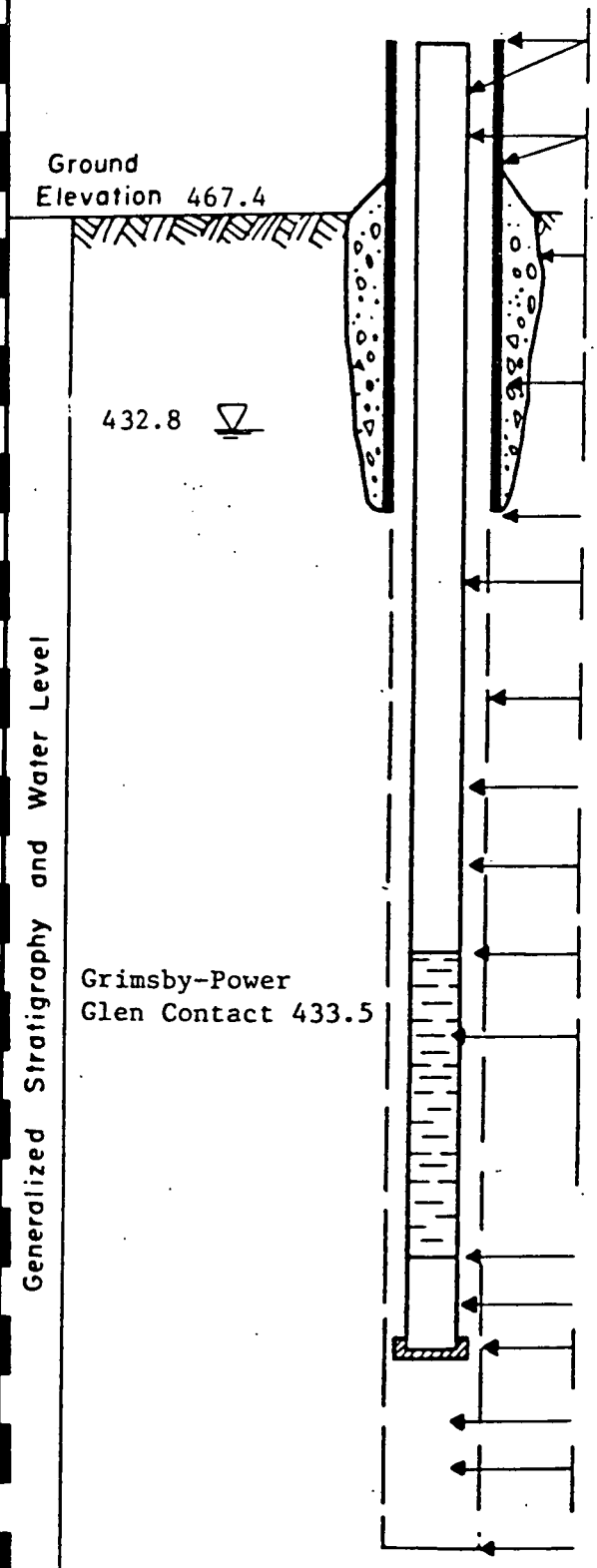
Inspected By J. C. Isham Date 10/19/81

Checked By _____ Date _____

Well No. D-55

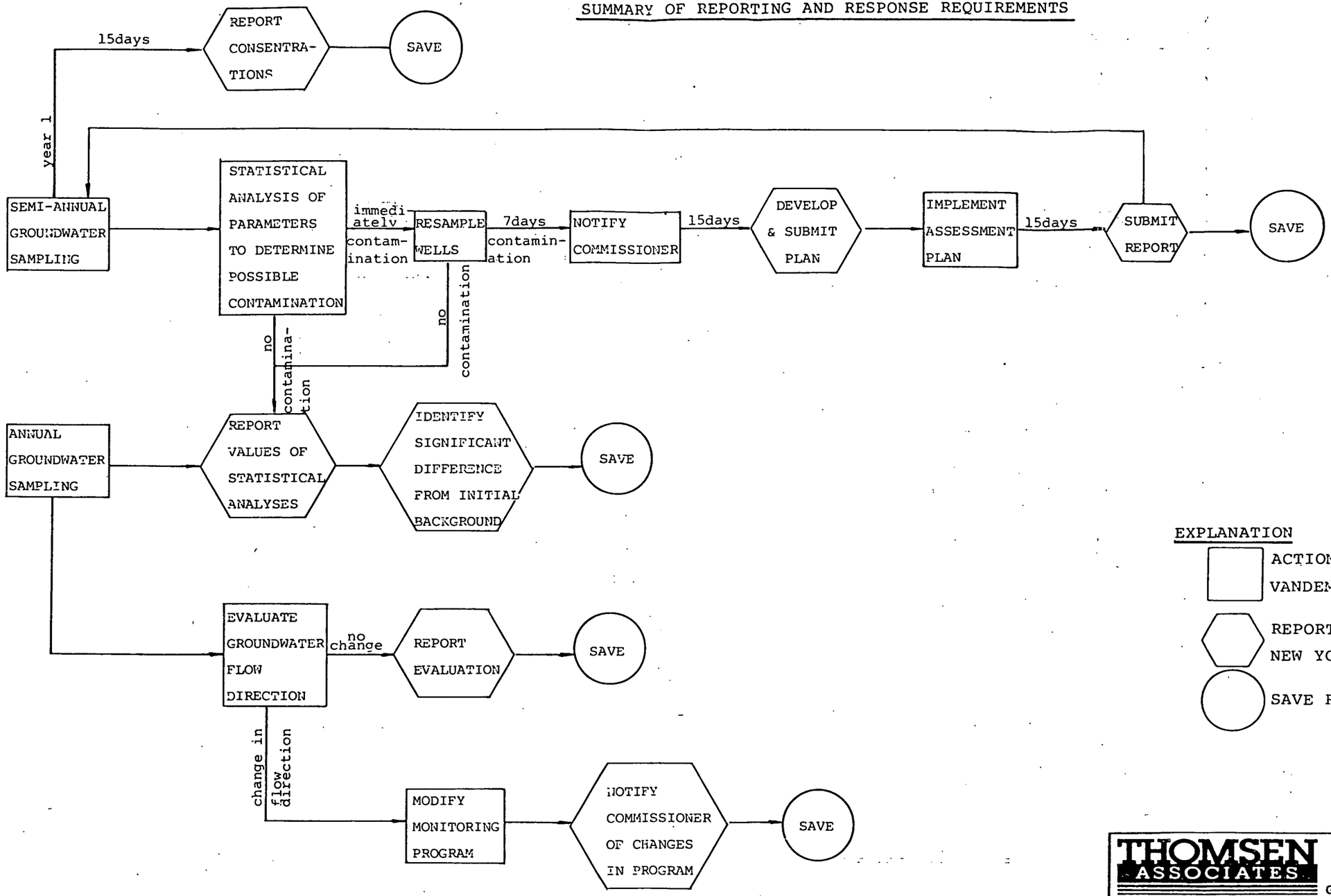
Aquifer Grimsby-Power Glen Contact

Elev. Interval 420.7-439.4'



Elevation of top of surface casing / riser pipe.	469.36/469.36'
Heigth of top of surface casing / riser pipe above ground surface.	2.0/2.0'
Depth of surface seal below ground surface	3.0'
Type of surface seal: Cement	
I.D. of surface casing.	4"
Type of surface casing: Cast iron with lock cap	
Depth of surface casing below ground	3.0'
I.D. of riser pipe.	2"
Type of riser pipe: Sch 80 PVC	
Diameter of borehole	0.5'
Depth of borehole (reamed)	45.0'
Type of backfill: Cement	
Elev./depth top of seal.	442.3/25.1'
Type of seal: Bentonite	
Elev./depth bottom of seal.	439.4/28.0'
Type of sand pack. Q-02 (fine to med. sand)	
Depth of top of sand pack.	439.4/28.0'
Elev./depth top of screened section.	432.9/34.5'
Type of screened section: Sch 80 PVC	
Describe openings 0.010" machine slot - horizontal slot	
I.D. of screened section.	2.0"
Elev./depth bottom of screened section.	423.3/44.1'
Length of blank section.	0.9'
Elev./depth bottom of plugged blank section.	422.4/45.0'
Elev./depth bottom of sand column.	422.4/45.0'
Type of backfill below observation pipe. Cuttings	
Elev./depth of hole.	420.7/46.7'

SUMMARY OF REPORTING AND RESPONSE REQUIREMENTS



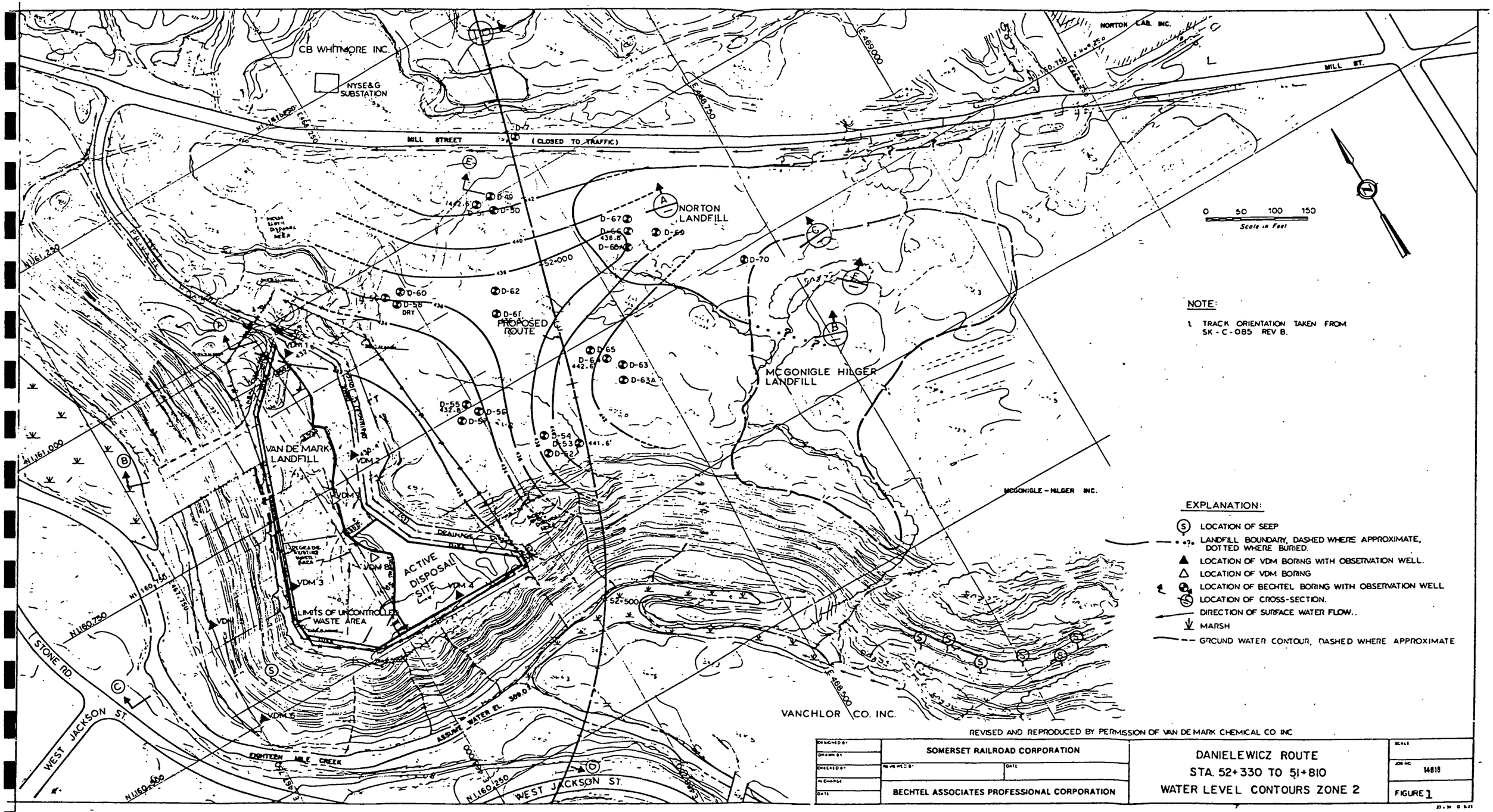
EXPLANATION

- ACTION REQUIRED OF VANDEMARK CHEMICALS
- REPORT REQUIRED TO NEW YORK DEC/USEPA
- SAVE RESULTS

THOMSEN ASSOCIATES
CONSULTING GEOTECHNICAL ENGINEERS & GEOLOGISTS
Groton • Buffalo • Rochester • Syracuse • Albany
New York • Woodbridge • Harrisburg • Washington

VANDEMARK CHEMICALS GROUNDWATER MONITORING PLAN

DR.BY: SC	SCALE:	PROJ. NO. BTA-82-20
CK'D.BY: MR-L	DATE: 6-23-82	DRWG.NO.



REVISED AND REPRODUCED BY PERMISSION OF VAN DE MARK CHEMICAL CO INC

DESIGNED BY	SOMERSET RAILROAD CORPORATION	SCALE
DRAWN BY		
CHECKED BY	DATE	JOB NO. 14818
APPROVED	BECHTEL ASSOCIATES PROFESSIONAL CORPORATION	FIGURE 1
DATE		

DANIELEWICZ ROUTE
STA. 52+330 TO 51+810
WATER LEVEL CONTOURS ZONE 2

CB WHITMORE INC.

NYSE&G SUBSTATION

NORTON LAB. INC.

MILL ST.

MILL STREET (CLOSED TO TRAFFIC)

E 469,000

E 468,750

N 1160.750

E 469,250

NORTON LANDFILL

D-40 442.6'

D-51

D-50

D-67

D-66 438.8

D-66A

D-69

D-70

0 50 100 150

Scale in Feet

N

NOTE

1 TRACK ORIENTATION TAKEN FROM SK-C-085 REV B.

D-60

D-58 DRY

D-62

D-61

PROPOSED ROUTE

D-64

D-6 442.6'

D-63

D-63A

MCGONIGLE HILGER LANDFILL

D-55 432.8'

D-56

D-57

D-54

D-53 441.6'

D-52

VAN DE MARK LANDFILL

VDM 1

VDM 2

VDM 7

VDM 8

VDM 3

VDM 4

VDM 5

VDM 6

VDM 9

VDM 10

VDM 12

DRAINAGE DITCH

ACTIVE DISPOSAL SITE

LIMITS OF UNCONTROLLED WASTE AREA

52+500

N 1161,000

N 1160.750

N 1160.500

N 1160.250

STONE RD.

WEST JACKSON ST.

ASSUME WATER EL. 389.0

EASTERN MILL CREEK

MCGONIGLE - HILGER INC.

VANCHLOR CO. INC.

EXPLANATION:

- (S) LOCATION OF SEEP
- LANDFILL BOUNDARY, DASHED WHERE APPROXIMATE, DOTTED WHERE BURIED.
- ▲ LOCATION OF VDM BORING WITH OBSERVATION WELL.
- △ LOCATION OF VDM BORING.
- LOCATION OF BECHTEL BORING WITH OBSERVATION WELL
- LOCATION OF CROSS-SECTION.
- DIRECTION OF SURFACE WATER FLOW.
- MARSH
- GROUND WATER CONTOUR, DASHED WHERE APPROXIMATE
- ⬡ Water Sampling Well
- ◯ Well Used for Monitoring Groundwater Elevation

GROUNDWATER MONITORING SYSTEM

REVISED AND REPRODUCED BY PERMISSION OF VAN DE MARK CHEMICAL CO INC.

DESIGNED BY	SOMERSET RAILROAD CORPORATION	SCALE
DRAWN BY		
CHECKED BY	REVIEWED BY: DATE:	JOB NO. 14818
IN CHARGE	BECHTEL ASSOCIATES PROFESSIONAL CORPORATION	FIGURE 2
DATE		

DANIELEWICZ ROUTE
STA. 52+330 TO 51+810
WATER LEVEL CONTOURS ZONE 2

CB WHITMORE INC.

NYSE&G SUBSTATION

NORTON CAB. INC.

MILL ST.

MILL STREET (CLOSED TO TRAFFIC)

E 469,000

E 469,750

D-7

422.0'

D-49

D-51

D-50

NORTON LANDFILL

D-67

D-66

D-68

D-69

416'

417.8'

D-70

52+000

411'

D-55

D-60

D-58

D-62

417.6'

D-61

PROPOSED ROUTE

416.6

D-65

D-64

D-63

412'

MCGONIGLE HILGER LANDFILL

D-55

D-56

412.3'

412.4'

D-54

D-53

D-52

VAN DE MARK LANDFILL

VDM 1

VDM 2

VDM 7

VDM11

VDM 8

ACTIVE DISPOSAL SITE

VDM 3

VDM 4

LIMITS OF UNCONTROLLED WASTE AREA

VDM 5

VDM12

VDM10

VDM 9

VDM 6

52+500

N 1,161,000

N 1,160,750

N 1,160,500

N 1,160,250

N 1,160,000

E 468,500

E 469,000

STONE RD.

WEST JACKSON ST.

ASSUME WATER EL. 398.0'

EIGHTEEN MILE CREEK

MCGONIGLE - HILGER INC.

VANCHLOR CO. INC.

0 50 100 150

Scale in Feet

NOTE:

1. TRACK ORIENTATION TAKEN FROM SK-C-085 REV B.

EXPLANATION:

- (S) LOCATION OF SEEP
- LANDFILL BOUNDARY, DASHED WHERE APPROXIMATE, DOTTED WHERE BURIED.
- ▲ LOCATION OF VDM BORING WITH OBSERVATION WELL.
- △ LOCATION OF VDM BORING.
- LOCATION OF BECHTEL BORING WITH OBSERVATION WELL
- LOCATION OF CROSS-SECTION.
- DIRECTION OF SURFACE WATER FLOW.
- MARSH
- GROUND WATER CONTOUR, DASHED WHERE APPROXIMATE.
- ⬡ Groundwater Monitoring System Well
- □ Groundwater Quality Assessment Well

Groundwater Assessment Program

DESIGNED BY / DRAWN BY / CHECKED BY / IN CHARGE / DATE	SOMERSET RAILROAD CORPORATION REVISED BY / DATE BECHTEL ASSOCIATES PROFESSIONAL CORPORATION	DANIELEWICZ ROUTE STA 52+330 TO 51+810 WATER LEVEL CONTOURS ZONE 3
		SCALE JOB NO. 14818 FIGURE 3

Somerset Railroad Corporation

Subsidiary of
New York State Electric & Gas Corporation
4500 Vestal Parkway East, Binghamton, New York 13902 (607) 729-2551

May 3, 1982
1185.001
SRCV-82-29

Mr. Allen VanDeMark
VanDeMark Chemical Company
1 North Transit Street
Lockport, New York 14094

Subject: Somerset Railroad Corporation
Hydrogeologic Study

Dear Mr. VanDeMark:

Recently Mr. William Whitmore III requested that Somerset Railroad Corporation (SRC) authorize you to utilize the data in the Hydrogeologic Study Danielewicz Route Station 51 + 810 to 52 + 330 dated February 1982, prepared by Bechtel Associates Professional Corporation and the results of Hydrogeologic Investigation of Danielewicz Route Landfills dated January 15, 1982 prepared by Woodward-Clyde Consultants in preparation for your DEC Permit.

It was also requested that you be permitted to use the existing wells (D-55, 56, 57, 58, 59, 60) for future sampling in your landfill program, providing that the wells are not disturbed during the construction of the railroad.

Please consider this letter authorization to utilize the above studies and monitoring wells in preparation for your program. Mr. Whitmore also requested copies of the design drawings for the drainage of the railroad in the area of your landfill (Mill Street to the Gulf). These drawings will be forthcoming as soon as they are available.

If you have any questions, please contact either myself or Mr. R. D. Landis.

Very truly yours,

Peter G. Carney
Project Manager
Somerset Railroad Corporation

PGC/db
cc: GP Edwards
JG Erikson
AE Kintigh
W MacCallum
MJ Ray
RE Rude
DB Smith
H Wanaselja
W Whitmore

SOMERSET RAILROAD PROJECT

HYDROGEOLOGIC STUDY
DANIELEWICZ ROUTE
STATION 51 + 810 TO 52 + 330

FEBRUARY 1982

BECHTEL ASSOCIATES PROFESSIONAL CORPORATION

TABLE 1

SUMMARY OF DATA ON VAN DE MARK
OBSERVATION WELLS

WELL NO.	SOUNDED DEPTH (FT)	DRILLED DEPTH (FT)	GROUND ELEVETATION AT WELL (FT. MSL)	ELEVATION BOTTOM OF OPEN AREAS (MSL)	FORMATION WELL COMPLETED IN	REMARKS
1	18.8	22	442.2	420.2	Power Glen	Response test calculations show permeability of 2.48 x 10^{-6} cm/sec. Water level elevations range from 434.5 ft. to 430.2 ft. from 4-12-81 to 11-20-81.
2	23.0	23.0	441.7	418.7	Power Glen	No response test performed, blockage in casing. Since 4-13-81 water levels have fluctuated from 427.8 to 430.4.
3	84.0	90.0	442.18	352.18	Queenston	Well responded to test, recovery levels too slow to calculate permeability. Assume permeability is very low. Since 4-13-81 water levels have fluctuated between 373.7 and 362.1 ft. msl.
4	71.4	90.0	437.66	347.66	Queenston	Well responded to test, no calculation of permeability done. Well responded too quickly to take measurements. Water level elevations consistently recorded between 405.5 and 406.4 ft. msl.
5	18.7	20	365.6	345.6	Queenston	Well responded to test, no calculations done. Response of well too slow. Since 9-1-81 water levels have fluctuated from 347 ft. to 352 ft. msl.
6	16.9	20	365.6	345.6	Queenston	No response test performed, not enough water to bail. Since 9-1-81 water levels have fluctuated from 349 ft. to 353 ft. msl.

For location of wells see Figure 3

TABLE 2

SOMERSET RAILROAD
VAN DE MARK/NORTON McGONIGLE HILGER LANDFILL
OBSERVATION WELL DATA

BORING NO.	WELL NEST NO.	GROUND SURFACE ELEVATION	ELEV. OF BOTTOM WELL	RISER ELEV.	SCREEN INTERVAL (EL.)	FORMATION SCREENED
D-49	1	459.8	408.5	461.90	409.5 - 418.8	Power Glen/Whirlpool
D-50	1	460.8	369.8	462.69	373.2 - 410.3	Whirlpool/Queenston
D-51	1	459.5	418.5	461.77	419.5 - 444.8	Grimsby/Power Glen
D-52	2	466.5	380.5	468.69	381.5 - 405.5	Whirlpool/Queenston
D-53	2	467.4	421.8	469.18	422.8 - 442.3	Grimsby/Power Glen
D-54	2	466.4	408.4	468.46	409.4 - 424.3	Power Glen/Whirlpool
D-55	3	467.4	422.4	469.36	423.3 - 439.4	Grimsby/Power Glen
D-56	3	467.3	360.3	469.44	362.3 - 407.5	Whirlpool/Queenston
D-57	3	467.0	407.5	469.27	408.5 - 426.2	Power Glen/Whirlpool
D-58	4	465.7	414.5	467.68	415.6 - 440.7	Grimsby/Power Glen
D-59	4	465.0	365.0	467.25	366.0 - 409.1	Whirlpool/Queenston
D-60	4	465.7	407.7	467.75	408.9 - 422.7	Power Glen/Whirlpool
D-61	5	467.4	421.5	469.31	422.5 - 441.4	Grimsby/Power Glen
D-62	5	469.0	409.9	471.04	410.9 - 422.7	Power Glen/Whirlpool
D-63A	6	469.6	368.6	471.63	369.4 - 404.6	Whirlpool/Queenston

TABLE 2 (Continued)

BORING NO.	WELL NEST NO.	GROUND SURFACE ELEVATION	ELEV. OF BOTTOM WELL	RISER ELEV.	SCREEN INTERVAL (EL.)	FORMATION SCREENED
D-64	6	469.1	421.4	471.37	422.4 - 437.1	Grimsby/Power Glen
D-65	6	469.1	406.1	471.33	407.1 - 422.1	Power Glen/Whirlpool
D-66	7	464.4	426.4	466.33	427.4 - 440.4	Grimsby/Power Glen
D-67	7	462.9	362.9	465.91	363.9 - 408.9	Whirlpool/Queenston
D-68A	7	465.2	407.2	467.55	408.2 - 421.2	Power Glen/Whirlpool
D-69		464.4	447.0	466.11	447.2 - 458.4	Grimsby/Soil Landfill
D-70		466.3	446.9	468.10	447.2 - 458.3	Grimsby/Soil Landfill

TABLE 3 (Continued)

SYSTEM	SERIES	GROUP	FORMATION	MEMBER	THICKNESS	DESCRIPTION
Silurian	Niagaran	Clinton	Irondequoit	Rockaway	9.0'+	Limestone: Dark gray, hard, fine to coarsely crystalline, occasional shale partings. Fresh to severely weathered at shale partings.
			Reynales		1.0'	Lime Dolomite: Medium to dark gray, thin to medium-bedded, medium hard to hard, very fine to coarsely crystalline, slightly to severely weathered, contorted beds and occasional clay filled solution cavities.
			Neahga		1.0'-1.5'	Shale: Dark gray, thin-bedded, very soft, fresh.
		Medina	Thorold		2.0'	Mudstone: Light green, medium soft, calcareous, fresh.
			Grimsby	Zone B	15.0'	Sandstone: Red to green, medium-bedded to massive, medium hard, fine grained, fresh to severely weathered. Occasional shale partings and siltstone and claystone interbeds.
				Zone A	~60'	Sandstone, Siltstone with interbedded Shale: Dark red brown to light green to white sandstone and siltstone with red and green shale interbeds. Sandstone/Siltstone: Thin to medium-bedded, very fine to medium grained, medium hard to very hard, fresh, occasional green mottling, fossiliferous. Shale: Thin bedded to fissile, medium soft, moderately to severely weathered.

TABLE 3 (Continued)

SYSTEM	SERIES	GROUP	FORMATION	MEMBER	THICKNESS	DESCRIPTION
Silurian	Niagaran	Medina	Power Glen		27.0'	Shale: With interbedded Dolomite and calcareous Sandstone: 60% shale, 40% dolomite and sandstone. Shale: dark gray to green, thin-bedded to fissile, medium soft to soft, microcrystalline, severely weathered. Dolomite and Sandstone: dark gray to green thin-bedded, medium hard, fine-grained, fresh to moderately weathered. Sandstone is cross-bedded.
			Whirlpool		12.0'	Sandstone: White with black speckling (quartz and unknown black mineral), thin-bedded in upper 2', medium-bedded to massive in remainder, fine-grained, hard to very hard, fresh. Cross-bedded, ripple marks.
Ordovician	Cincinnatian	Richmond	Queenston		1200'+	Claystone: Dark reddish-brown with pale green mottling and occasional thin pale green claystone interbeds, medium soft to very soft, calcareous, fresh to completely weathered.

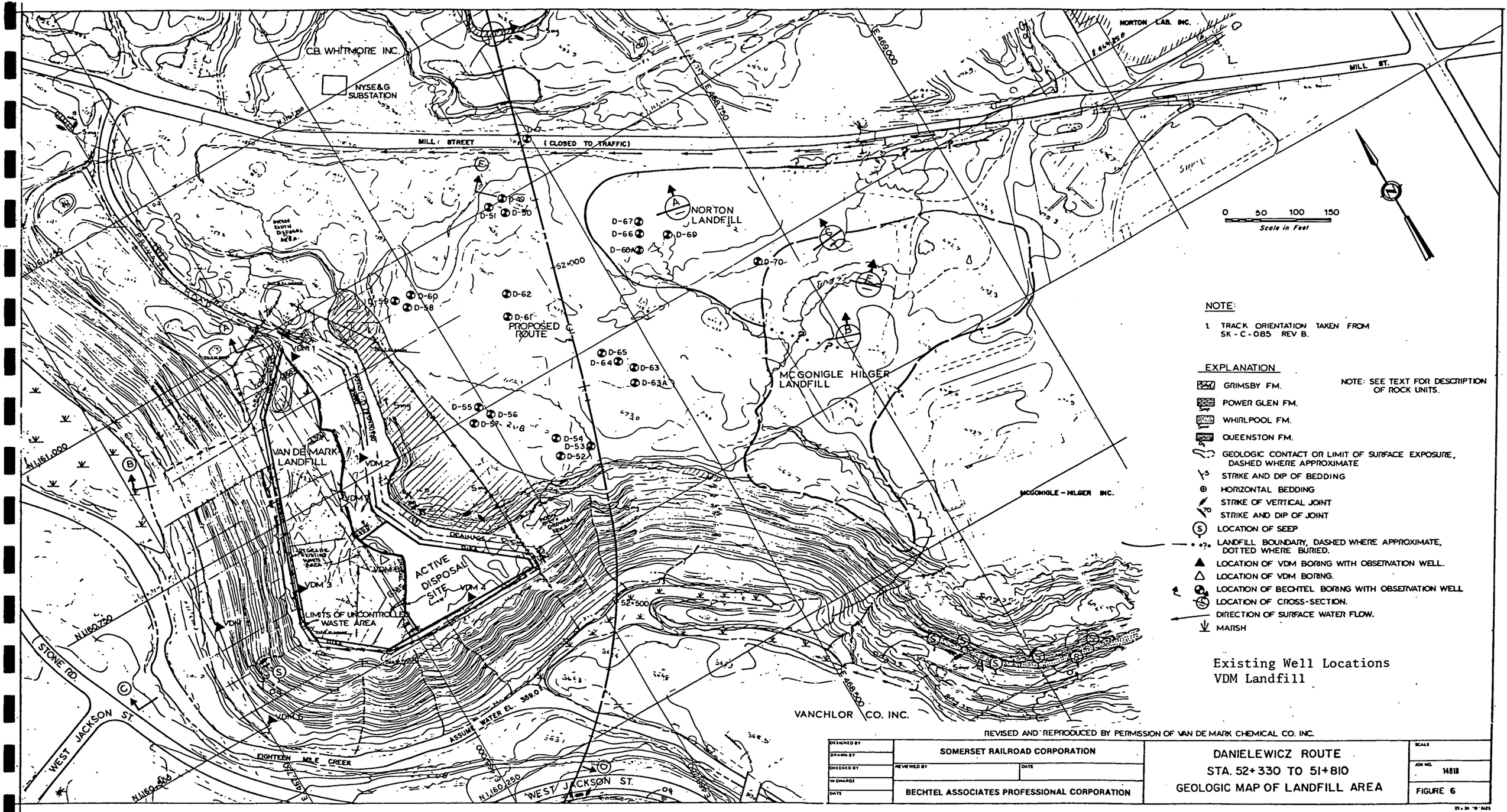
TABLE 4

JOINTING CHARACTERISTICS OF ROCKS
IN VDM LANDFILL AREA

FORMATION/ROCK TYPE	PREDOMINANT JOINT ORIENTATION OPEN SPACE (IN.)/SPACING		
Grimsby/Sandstone, Siltstone, Shale	N60W to E-W Closed* to 2"/3"-30"	N60 to 70E Closed to ¼"/6"-30"	N20 to 30E Closed to 2"/18"-24"
Power Glen/Sandstone, Siltstone, Shale, Limestone, Dolomite	N45 to 70W Tight**/3'-6'	N65 to 70W Tight/2'-6'	
Whirlpool/Sandstone, Ortho-quartzite	N55 to 70W Closed to 2"/2'	N70E Closed to 1"/2'-4'	
Queenston/Siltstone, Shale	N70W Closed /2'-6'	N55 to 75E Closed/2'-6'	N10 to 30E Closed/2'-4'

Note: Dip of joints consistently 85° to vertical measured from the horizontal.

* "Closed" describes open space ≤0.1 mm.
**"Tight" describes open space 0.1 mm to 1 mm.



NOTE:

1. TRACK ORIENTATION TAKEN FROM SK-C-085 REV B.

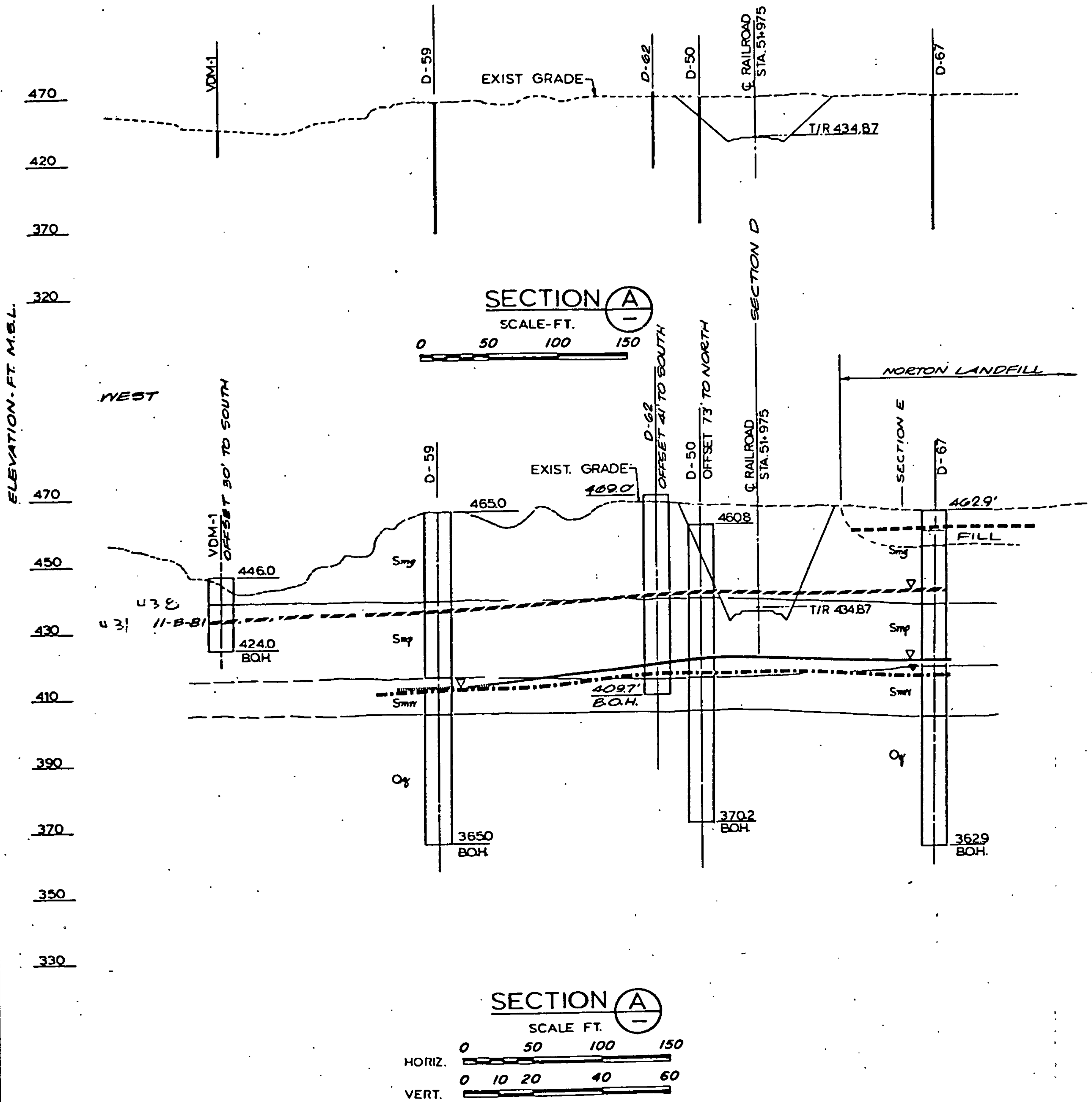
EXPLANATION

NOTE: SEE TEXT FOR DESCRIPTION OF ROCK UNITS.

- GRIMSBY FM.
- POWER GLEN FM.
- WHIRLPOOL FM.
- QUEENSTON FM.
- GEOLOGIC CONTACT OR LIMIT OF SURFACE EXPOSURE, DASHED WHERE APPROXIMATE
- STRIKE AND DIP OF BEDDING
- HORIZONTAL BEDDING
- STRIKE OF VERTICAL JOINT
- STRIKE AND DIP OF JOINT
- LOCATION OF SEEP
- LANDFILL BOUNDARY, DASHED WHERE APPROXIMATE, DOTTED WHERE BURIED.
- LOCATION OF VDM BORING WITH OBSERVATION WELL.
- LOCATION OF VDM BORING.
- LOCATION OF BECHTEL BORING WITH OBSERVATION WELL
- LOCATION OF CROSS-SECTION.
- DIRECTION OF SURFACE WATER FLOW.
- MARSH

Existing Well Locations
VDM Landfill

DESIGNED BY	SOMERSET RAILROAD CORPORATION	DANIELEWICZ ROUTE STA. 52+330 TO 51+810 GEOLOGIC MAP OF LANDFILL AREA	SCALE
DRAWN BY			JOB NO. 14818
CHECKED BY	REVIEWED BY / DATE		
IN CHARGE	BECHTEL ASSOCIATES PROFESSIONAL CORPORATION		FIGURE 6
DATE			



EAST

EXPLANATION

D-59

- 465.0' GROUND ELEVATION AT WELL
- GEOLOGIC FORMATION CONTACT, DASHED WHERE APPROXIMATE
- 365.0' BOH BOTTOM OF HOLE
- T/R TOP OF RAIL
- ▼ WATER LEVEL FROM WELL SHOWN IN SECTION
- ▽ WATER LEVEL FROM ADJACENT WELL IN NEST NOT SHOWN IN SECTION
- Smg GRIMSBY FM.
- Smp POWER GLEN FM.
- Smw WHIRLPOOL FM.
- Og QUEENSTON FM.
- ZONE 1 WATER LEVEL
- ZONE 2 WATER LEVEL
- ZONE 3 WATER LEVEL
- ZONE 4 WATER LEVEL

NOTES

1. WATER LEVELS MEASURED ON 11-4-81, UNLESS OTHERWISE INDICATED.
2. FOR LOCATION OF GEOLOGICAL SECTIONS, SEE FIGURE. 3
3. SEE TEXT FOR DESCRIPTION OF GEOLOGICAL FORMATIONS.

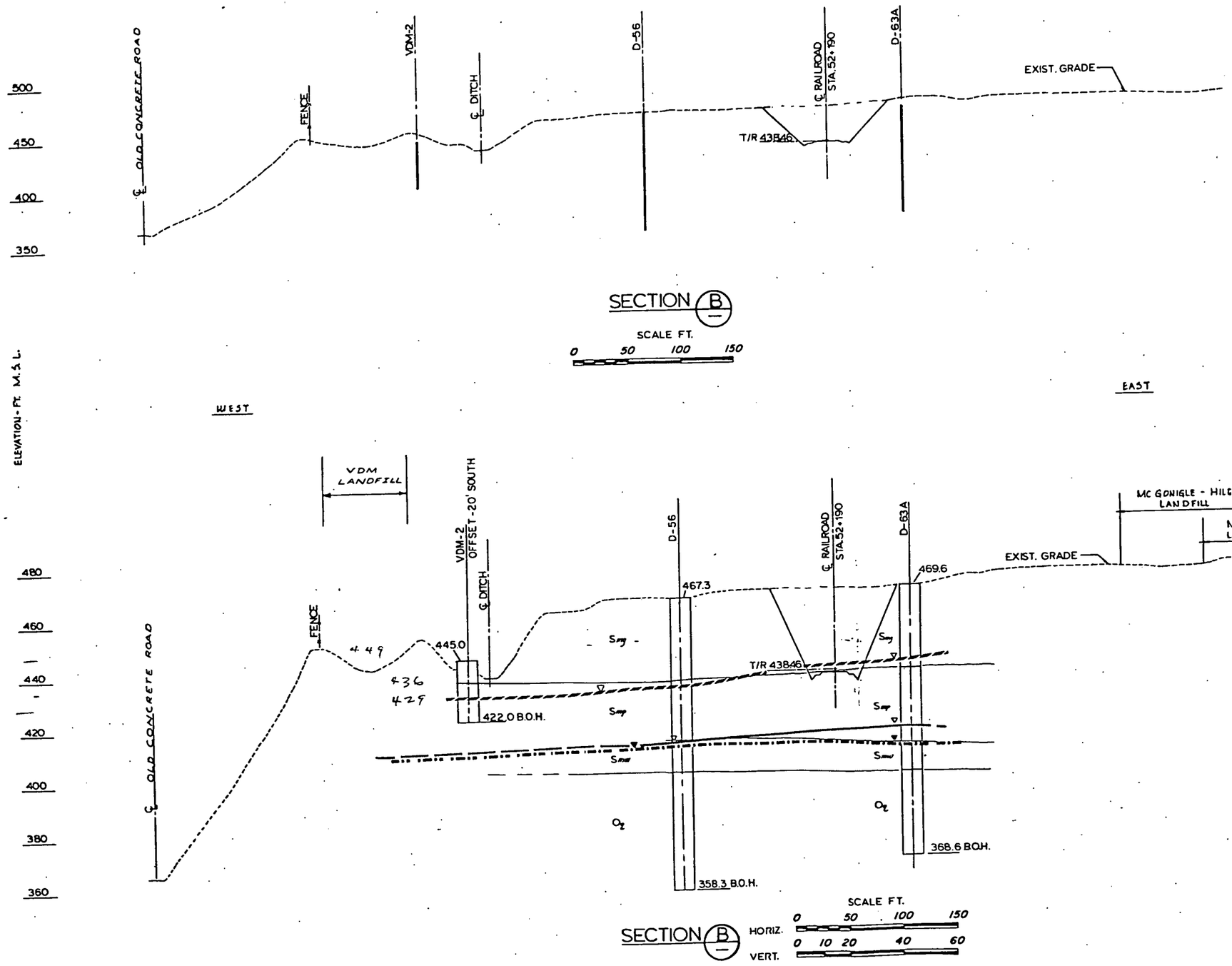
Section $\frac{A}{6}$

Location
Ground Water
VDM Landfill

DESIGNED BY / DRAWN BY / CHECKED BY / IN CHARGE / DATE	SOMERSET RAILROAD CORPORATION REVIEWED BY / DATE BECHTEL ASSOCIATES PROFESSIONAL CORPORATION	DANIELEWICZ ROUTE STA. 52+330 TO 51+810 CROSS SECTION A
SCALE	JOB NO. 14818	FIGURE 7 — SHEET NO. 1 OF 5

REVISIONS | BY | CHK | PROJ. ENG | NO. | DATE | REVISIONS | BY | CHK | PROJ. ENG

22 x 34 "D" SIZE



NOTE:

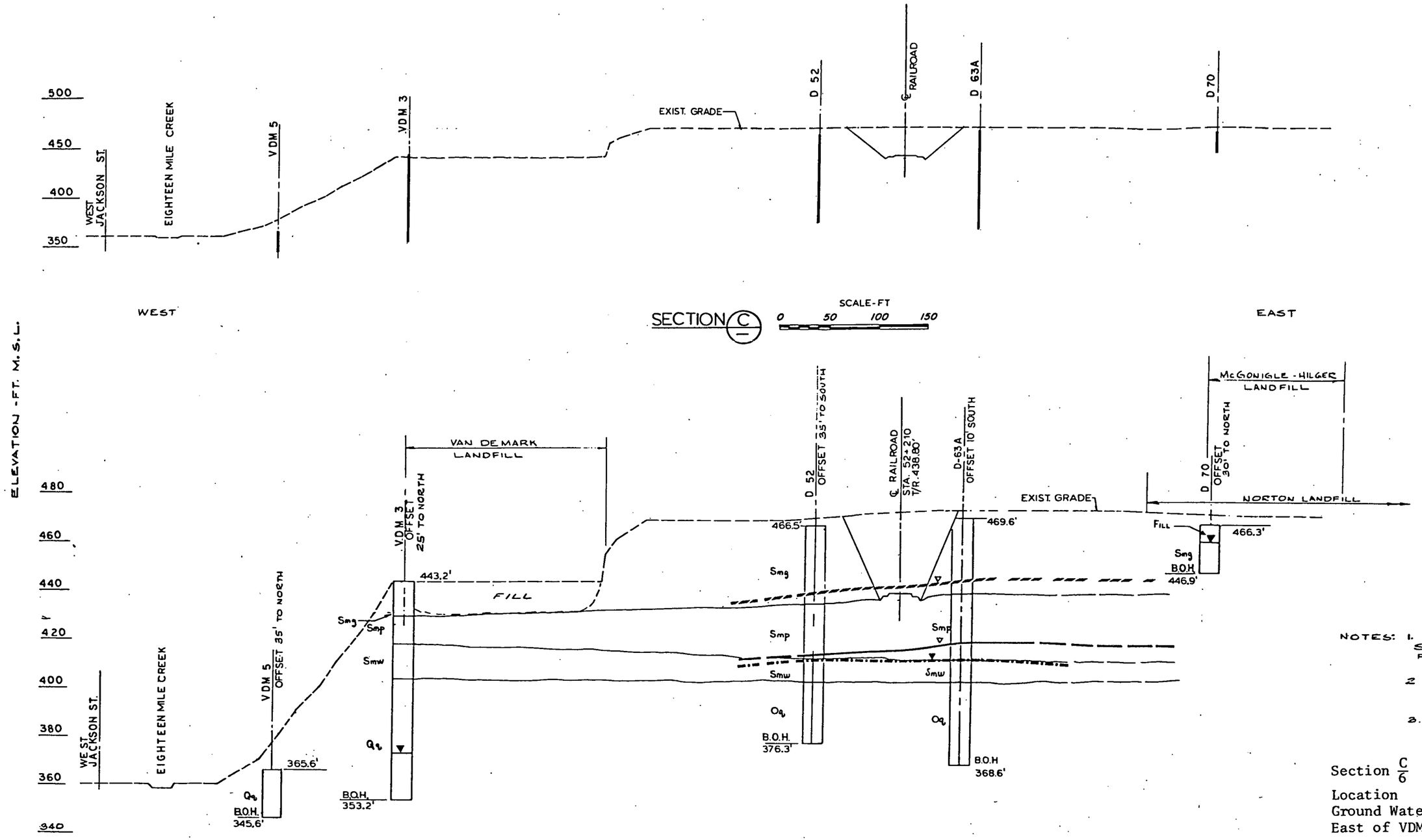
1. FOR EXPLANATION OF SYMBOLS SEE FIGURE 7 SHEET 1
2. FOR LOCATION OF SECTION SEE FIGURE 3
3. SEE TEXT FOR DESCRIPTION OF GEOLOGIC FORMATIONS.
4. WATER LEVELS MEASURED ON 11-4-81 UNLESS OTHERWISE INDICATED.

Section $\frac{B}{6}$

Location
Ground Water
East of VDM Landfill

DESIGNED BY	SOMERSET RAILROAD CORPORATION	SCALE
DRAWN BY	REVIEWED BY / DATE	JOB NO. 14818
CHECKED BY	BECHTEL ASSOCIATES PROFESSIONAL CORPORATION	FIGURE 7 / SHEET NO. 2 OF 5
IN CHARGE	DANIELEWICZ ROUTE STA. 52+330 TO 51+810 CROSS SECTION B	
DATE		
PROJ.		

22 x 34 "D" SIZE



NOTES: 1. FOR LOCATION OF SECTION SEE FIGURE 3.

2 FOR EXPLANATION OF SYMBOLS SEE FIGURE 7 SHEET1

3. SEE TEXT FOR DESCRIPTION OF GEOLOGICAL FORMATIONS.

Section C/6

Location
Ground Water
East of VDM Landfill

SCALE-FT.
VERT. 0 10 20 40 60
HORIZ. 0 50 100 150

NO.	DATE	REVISIONS	BY	CHK	PROJ. ENG.	NO.	DATE	REVISIONS	BY	CHK	PROJ. ENG.

DESIGNED BY
DRAWN BY
CHECKED BY
IN CHARGE
DATE

SOMERSET RAILROAD CORPORATION

REVIEWED BY | DATE

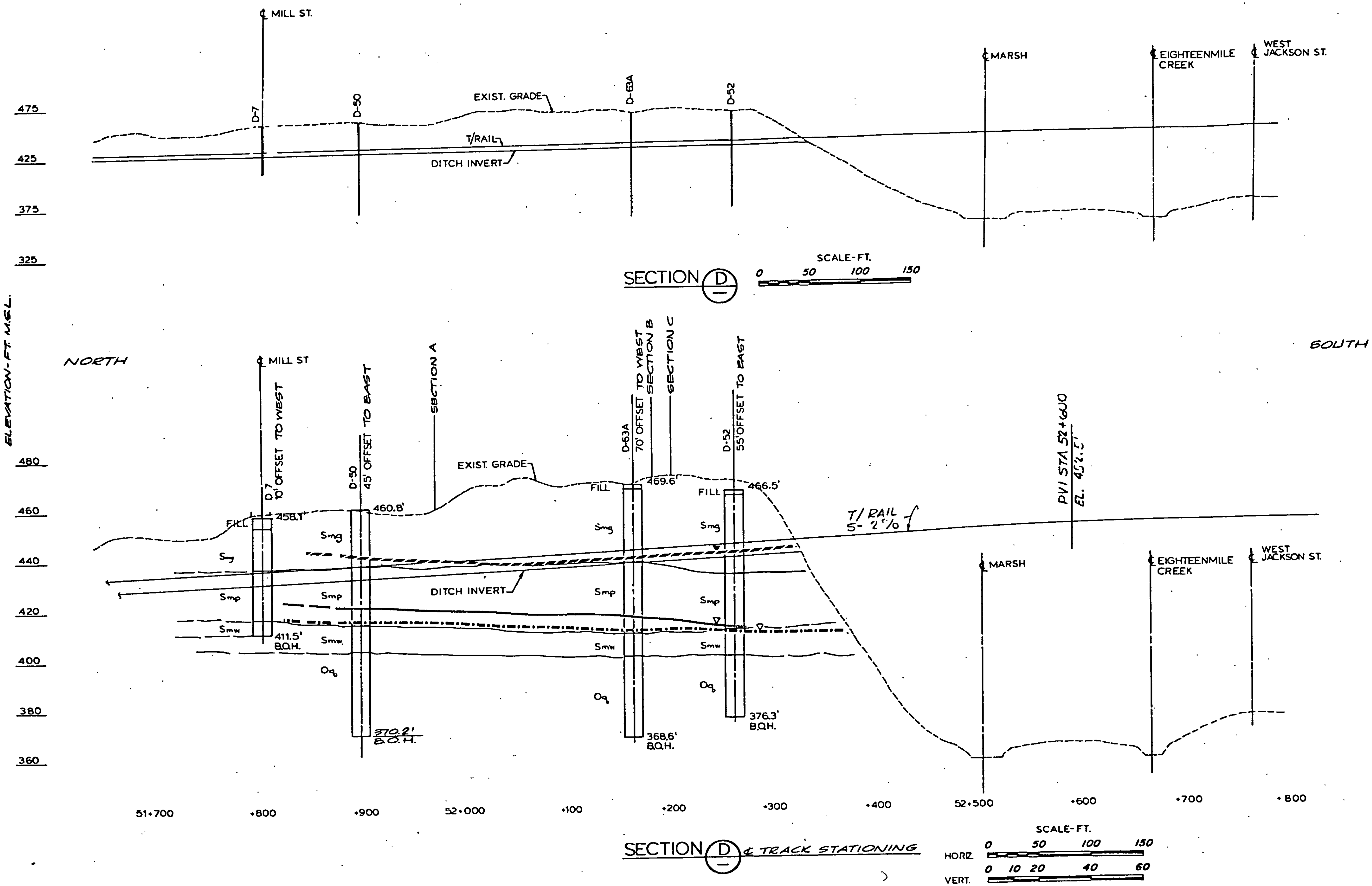
BECHTEL ASSOCIATES PROFESSIONAL CORPORATION

DANIELEWICZ ROUTE
STA. 52+330 TO 51+810
CROSS SECTION C

SCALE

JOB NO. 14818

FIGURE 7 | SHEET NO. 3 OF 5



NOTE
1. FOR LOCATION OF SECTION, SEE FIGURE 3.
2. FOR EXPLANATION OF SYMBOLS, SEE FIGURE 7 SHEET 1.
3. SEE TEXT FOR DESCRIPTION OF GEOLOGICAL FORMATIONS.
4. TRACK CURVE AND ELEVATION DATA FROM SK-C-085, REV. B.

Section $\frac{D}{6}$

Location
Ground Water
VDM Landfill

DESIGNED BY / DRAWN BY / CHECKED BY / IN CHARGE / DATE	SOMERSET RAILROAD CORPORATION	DANIELEWICZ ROUTE	SCALE
	REVIEWED BY / DATE	STA. 52+330 TO 51+810	JOB NO. 14818
	BECHTEL ASSOCIATES PROFESSIONAL CORPORATION	CROSS SECTION D	FIGURE 7 / SHEET NO. 4 OF 5

PROJ. REVISIONS BY CHK PROJ. ENG.

TABLE 5

SOMERSET RAILROAD
PRESSURE TEST RESULTS

BORING NO.	ELEVATION INTERVAL TESTED (MSL)	PERMEABILITY CM/SEC	FORMATION
D-50	372.6 - 383.4	No Water Take*	Queenston
	382.9 - 393.4	No Water Take**	Queenston
	392.9 - 403.4	No Water Take**	Queenston
	402.9 - 413.4	No Water Take*	Whirlpool
	412.9 - 423.4	5.2×10^{-4}	Power Glen
	422.9 - 433.4	4.8×10^{-4}	Power Glen
	437.9 - 443.4	7.7×10^{-6}	Grimsby
D-52	379.0 - 389.5	No Water Take*	Queenston
	386.0 - 396.5	No Water Take*	Queenston
	396.0 - 406.5	2.0×10^{-5}	Queenston
	406.0 - 416.5	1.5×10^{-4}	Whirlpool
	416.0 - 426.5	2.1×10^{-6}	Power Glen
D-53	421.5 - 432.27	2.74×10^{-6}	Power Glen
	434.9 - 445.4	1.3×10^{-3}	Grimsby
D-55	423.4 - 433.9	1.7×10^{-4}	Power Glen
	436.2 - 441.2	2.1×10^{-3}	Grimsby
D-56	359.8 - 370.3	No Water Take*	Queenston
	366.8 - 377.3	4.8×10^{-7}	Queenston
	376.8 - 387.3	Test Invalid	Queenston
	386.8 - 397.3	1.0×10^{-2}	Queenston
	396.8 - 407.3	2.1×10^{-6}	Queenston
	406.8 - 417.3	1.5×10^{-4}	Whirlpool
	416.8 - 427.3	Test Invalid	Power Glen
	426.8 - 437.3	Test Invalid	Power Glen
D-59	368.6 - 379.1	1.8×10^{-4}	Queenston
	378.6 - 389.1	7.9×10^{-7}	Queenston
	388.6 - 399.1	No Water Take†	Queenston
	398.6 - 409.1	3.5×10^{-6}	Queenston
	408.6 - 419.1	4.4×10^{-6}	Whirlpool
	418.6 - 429.1	3.4×10^{-6}	Power Glen
	428.6 - 439.1	7.0×10^{-7}	Power Glen

TABLE 6

RESPONSE TEST RESULTS FROM WELL PURGING

BORING NO.	TEST INTERVAL	PERMEABILITY CM/SEC	REMARKS
D-49	409.5 - 420.1	2.07×10^{-5}	
D-50	373.2 - 410.3	1.21×10^{-5}	
D-51	419.5 - 440.3	9.1×10^{-6}	
D-52	381.5 - 405.5	5.8×10^{-6}	
D-53	422.8 - 441.6	2.4×10^{-4}	
D-54			insufficient recovery
D-55			insufficient recovery
D-56	362.2 - 407.5	2.9×10^{-7}	
D-57	408.5 - 412.1	1.4×10^{-4}	
D-58			dry
D-59	366.0 - 409.1	1.4×10^{-5}	
D-60			insufficient recovery
D-61	422.5 - 436.4	4.0×10^{-5}	
D-62	410.9 - 419.0	4.2×10^{-5}	
D-63	369.4 - 404.6	1.3×10^{-6}	
D-64	422.4 - 437.1	2.8×10^{-5}	
D-65			insufficient recovery
D-66	427.4 - 439.2	2.2×10^{-5}	
D-67	363.9 - 408.9	2.1×10^{-6}	
D-68	408.2 - 412.6	2.4×10^{-5}	
D-69	447.2 - 458.4	1.5×10^{-4}	
D-70	447.2 - 458.3	1.6×10^{-4}	

TABLE 8-A

RESULTS OF CHEMICAL ANALYSES PERFORMED BY RECRA RESEARCH, INC.

ZONE 2	GRIMSBY/POWER GLEN CONTACT ELEV. 419 - 437.2							
Well No.	Temp. (C)	pH	Specific Conductance µmhos/cm	TOC mg/l	TDS mg/l	CL mg/l	Oil & Grease mg/l	T Fe mg/l
D51	12.5	6.90	295	2.4	260	28	<5	6.1
	12	7.15	295	5.2	260	27	<5	14
D53	12	6.65	353	8.1	280	32	<5	3.8
	12	6.75	360	4.2	340	32	<5	2.5
D55	12	6.55	430	4.8	370	37	<5	7.1
	11.5	6.80	430	4.7	360	37	<5	4.8
D58	DRY HOLE							DRY HOLE
D61	10	6.65	420	6.0	410	36	26	2.0
	10	6.75	510	10	390	36	<5	11
D64	11.5	8.20	244	5.7	180	24	8	1.8
	13.0	8.45	242	6.8	170	23	<5	21
D66	13	7.50	1,040	4.0	860	200	<5	8.0
	12.5	7.45	1,000	4.4	830	190	<5	1.6

TABLE 8-B

RESULTS OF CHEMICAL ANALYSES PERFORMED BY RECRA RESEARCH, INC.

ZONE 3	POWER GLEN - WHIRLPOOL CONTACT ELEV. 407.1 - 420.2							
Well No.	Temp. (C)	pH	Specific Conductance µmhos/cm	TOC mg/l	TDS mg/l	CL mg/l	Oil & Grease mg/l	T Fe mg/l
D49	11.5	8.85	283	1.1	290	20	<5	16
	12	9.00	305	1.3	290	20	<5	8.8
D54	11	9.50	1,480	2.4	1,400	290	<5	22
	11	9.65	1,480	6.4	1,400	270	<5	49
D57	10	8.10	483	3.8	540	39	<5	9.8
	10	8.15	415	3.7	660	40	<5	11
D62	10	9.95	510	3.3	550	19	6	17
	10	10.25	505	1.5	520	19	<5	18
D65	11.5	7.85	1,290	4.5	1,200	37	<5	4.8
	11.5	8.30	1,290	9.5	1,100	37	<5	3.3
D68-A	12	8.75	255	1.8	230	19	<5	8.4
	12	8.95	258	2.5	240	20	<5	6.7
D60	10.5	7.35	1,680	8.1	1,700	36	<5	16
	10.5	7.55	1,700	7.3	1,800	30	<5	2.9

TABLE 8-C

RESULTS OF CHEMICAL ANALYSES PERFORMED BY RECRA RESEARCH, INC.

ZONE 4	WHIRLPOOL - QUEENSTON ELEV. 362.3 - 405.9							
Well No.	Temp. (C)	pH	Specific Conductance µmhos/cm	TOC mg/l	TDS mg/l	CL mg/l	Oil & Grease mg/l	T Fe mg/l
D50	12	11.90	1,830	4.5	790	33	<5	0.91
	11.5	11.90	1,830	5.7	750	33	<5	0.90
D52	12.5	6.35	3,000	8.8	2,700	1,100	30	1.4
	12	7.15	2,690	9.6	2,300	910	6	0.70
D56	11	10.45	500	6.4	460	79	<5	5.6
	11	10.70	600	5.0	480	79	<5	7.2
D59	10.5	8.30	249	4.5	220	22	<5	2.6
	10.5	8.25	251	7.9	220	22	<5	2.8
D63-A	12	9.65	255	5.6	270	23	<5	4.7
	11	9.80	275	5.8	270	24	<5	3.0
D67	13	10.65	540	3.2	410	33	<5	3.1
	12.5	10.75	530	2.0	410	33	15	3.5

TABLE 9

ANALYSIS OF VAN DE MARK SAMPLES
BY
ADVANCED ENVIRONMENTAL SYSTEMS, INC.

Sample Date April 1981

Sample Site	pH	TDS mg//1	TOC mg/1	DO mg/1	CL mg/1	Specific Conductance µmhos/cm
Eighteenmile Creek Site No. 1	8.27	411	11.5	10.1	53.2	609
Eighteenmile Creek Site No. 2	8.26	429	12.8	10.0	52.1	619
Eighteenmile Creek Site No. 3	8.39	439	15.6	8.90	48.9	612
Landfill Well No. 1 (22' Deep)	8.27	1,820	30.9	7.65	1,010.	2,540
Landfill Well No. 2 (23' Deep)	10.2	1,710	50.0	6.90	417.	2,350
Landfill Well No. 3 (90' Deep)*	7.08	21,200	374.	4.40	4,470.	19,400
Landfill Well No. 4 (90' Deep)*	4.71	19,930	90.2	0.90	12,300.	24,300
Landfill Swale	7.05	784	18.1	9.05	245.	1,250

*Wells 3 & 4 are transposed on Figures 2 and 3.

TABLE 10

ANALYSIS OF VAN DE MARK SAMPLES
BY
ADVANCED ENVIRONMENTAL SYSTEMS, INC.

Sample Site	pH	TDS mg/1	TOC mg/1	DO mg/1	CL mg/1	Specific Conductance µmhos/cm
	Sample Date October 1981					
Eighteenmile Creek Site No. 1	7.56	38.3	5.1	9.3	39	520
Eighteenmile Creek Site No. 2	6.97	561.2	11.0	7.9	138	830
Eighteenmile Creek Site No. 3	7.08	540.1	7.87	7.1	131	791
Landfill Well No. 1 (22' Deep)	7.63	1,938.2	29.7	1.8	856	3,270
Landfill Well No. 2 (23' Deep)	9.55	776.4	19.5	6.1	236	1,300
Landfill Well No. 3 (90' Deep)*	2.56	36,898.	64.6	15.3	13,895	32,800
Landfill Well No. 4 (90' Deep)*	4.12	30,356.4	97.3	--	11,996	28,800
Landfill Swale	4.72	9,121.	7.2	0.1	3,498	10,360

*Wells 3 and 4 are transposed on Figures 2 and 3.

RESULTS OF HYDROGEOLOGIC INVESTIGATION

OF

DANIELEWICZ ROUTE LANDFILLS

January 15, 1982

WOODWARD-CLYDE CONSULTANTS
Consulting Engineers, Geologists, and Environmental Scientists
201 Willowbrook Boulevard/P.O. Box 290
Wayne, New Jersey 07470

EXECUTIVE SUMMARY

Woodward-Clyde Consultants conducted a hydrogeologic investigation of the Norton/McGonigle Hilger Landfill complex which is located in close proximity to a segment of the proposed Danielewicz Route in Lockport, New York. Utilizing data previously collected by Bechtel, Woodward-Clyde Consultants reviewed the known hydrogeology of the area, conducted a terrain conductivity survey, and collected sample of groundwater from wells installed by Bechtel for analysis of parameters indicative of chemical groundwater pollution. These data were used to evaluate the effect that a proposed railroad cut in the vicinity of the landfills would have on groundwater.

The results of the analysis show that the proposed cut may affect groundwater in two zones. The upper zone is located in landfill materials in the Norton/McGonigle Hilger Landfills and the lower zone occurs in bedrock that will be excavated during construction of the cut. The results of the hydrogeologic analysis indicate that groundwater in the unconsolidated upper zone materials and in the landfill is separate from the groundwater that occurs in bedrock. Further, the probable flow directions of groundwater in the upper zone is northward toward Mill Street. Flow in the bedrock is westward from the area underlying the Norton/McGonigle Hilger Landfill towards the area of the proposed cut.

The samples were analyzed for those heavy metals and volatile organic chemical that are on the U.S. EPA priority pollutant list. Groundwater quality as tested in samples collected from wells in the surficial landfill materials and in the becrock show that it is unlikely that groundwater has been significantly contaminated by landfill operations. No detectable levels of volatile organic

chemicals were identified. Detectable levels of arsenic, barium, and zinc were identified in a few levels of low concentrations.

The construction of the railroad cut in the study area will locally affect groundwater flow. Some seepage of groundwater will enter the cut and flow in ditches toward nearby surface streams. The quality of the seepage is expected to be similar to the existing quality of groundwater. Based on the chemical analyses performed for this study, the seepage is projected not to adversely affect surface water quality.

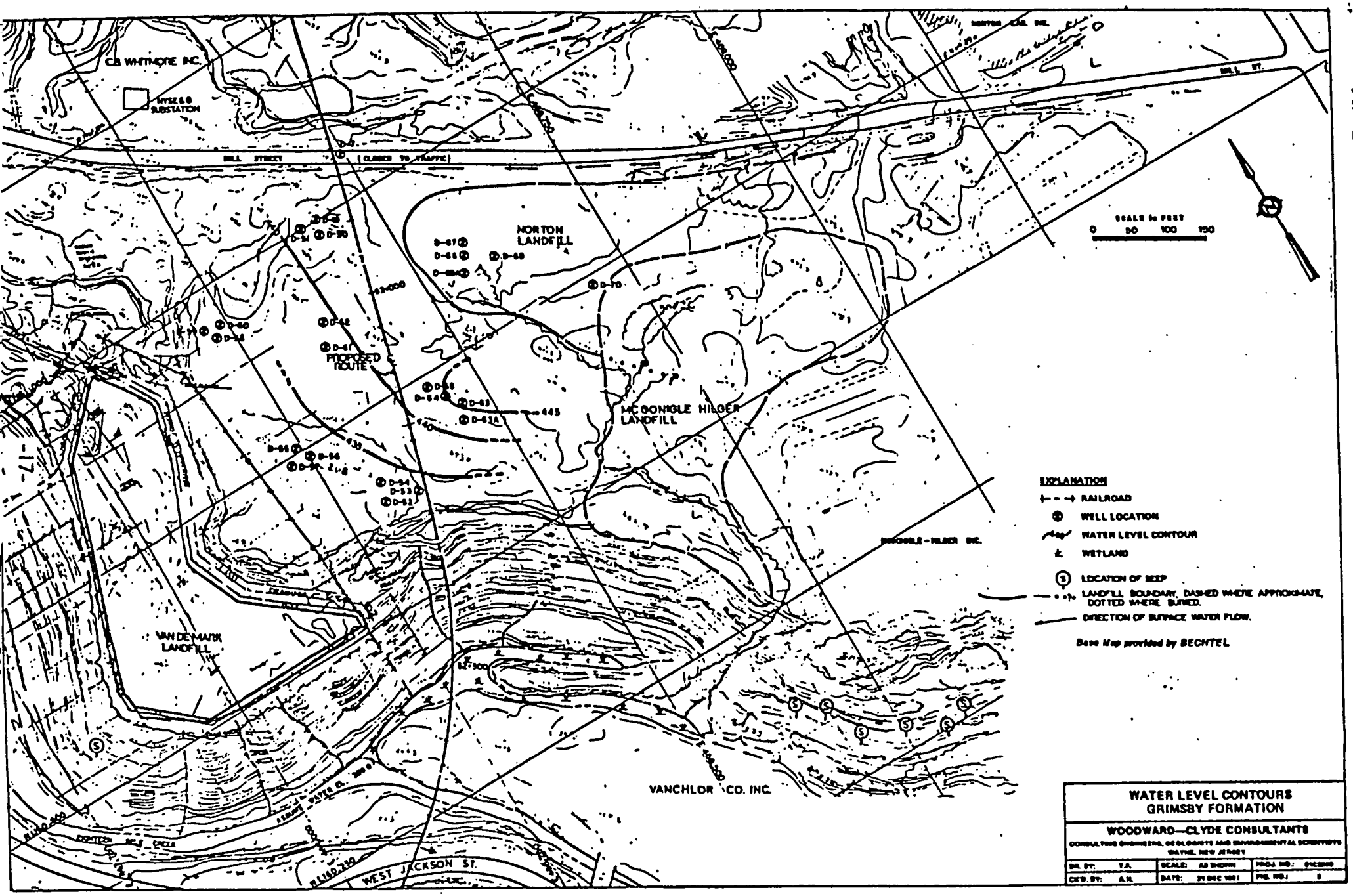

C.B. WHITMORE INC.
NYSEG SUBSTATION
MILL STREET
(CLOSED TO TRAFFIC)
NORTON LANDFILL
PROPOSED ROUTE
MC GONIGLE HILGER LANDFILL
VAN DEMARK LANDFILL
VANCHLOR CO. INC.
WEST JACKSON ST.
SCALE IN FEET
0 50 100 150
EXPLANATION
RAILROAD
WELL LOCATION
WATER LEVEL CONTOUR
WETLAND
LOCATION OF SEEP
LANDFILL BOUNDARY, DASHED WHERE APPROXIMATE, DOTTED WHERE BURIED.
DIRECTION OF SURFACE WATER FLOW.
Base Map provided by BECHTEL
WATER LEVEL CONTOURS
GRIMSBY FORMATION
WOODWARD—CLYDE CONSULTANTS

Table 2. ANALYTICAL RESULTS OF METAL ANALYSIS FOR THOSE EXCEEDING DETECTABLE CONCENTRATION (Expressed in mg/l or ppm).

Well Number	Arsenic[1]	Metal Barium[2]	Zinc[3]
D-51	< 0.010[4]	< 0.200	< 0.020
D-53	< 0.010	< 0.200	0.165
D-55	< 0.010	< 0.200	< 0.020
D-61	< 0.010	< 0.200	0.038
D-64	< 0.010	0.650	0.035
D-66	< 0.010	1.800	< 0.020
D-68	0.068	0.200	0.023
D-69	< 0.010	0.200	0.375
D-70	< 0.010	0.200	0.400
Str-1	< 0.010	0.200	0.035

[1]Primary drinking water standard 0.05 mg/l. Federal Register Aug. 27, 1980.

[2]Primary drinking water standard 1.0 mg/l. Federal Register Aug. 27, 1980.

[3]Organoleptic ambient water criteria 5.0 mg/l. Federal Register Nov. 29, 1980.

[4]Less than equals the detection limit.

4.2 (Continued)

Drawing SK-C-085, Rev. C, 12/11/81). Based on existing information, the cut will be constructed through the Grimsby Formation and the base of the cut will be approximately at the base of the Grimsby Formation in this area (Figure 6). Landfill materials apparently will not be disturbed during the construction of the cut.

Should the cut be constructed as currently described, groundwater flow will be affected locally. Some groundwater in the vicinity of the cut, which will act as a linear drain in the area, will flow toward the cut and seep into it. The existing information on groundwater elevations in the Study Area suggests that the groundwater table in the Grimsby Formation will be intercepted. Thus, groundwater at the base of the Grimsby Formation (bedrock equivalent to zone 2 groundwater of Bechtel 1981) will flow westward from the area of the Norton and McGonigle Hilger Landfills toward the cut. Bechtel (1981) estimates that the total flow into the cut will be low.

Groundwater in the Norton Landfill materials (equivalent to zone 1 groundwater of Bechtel 1981) is expected to continue to flow northward toward Mill Street. The rate of vertical percolation from the landfill materials to groundwater in the Grimsby Formation is not expected to increase unless construction activities actually induces fractures in the Grimsby Formation to increase vertical percolation rates or the bedrock that will divide the cut from the landfill is breached.

Groundwater flow from the VanDeMark Landfill toward the proposed cut is improbable unless average existing conditions are substantially different from the data collected by Bechtel during 1981. Groundwater elevations measured in the Grimsby Formation west of the center line of the railroad cut were equal or lower than the elevation of the center line of the cut. Because the cut will intercept groundwater flow in the Grimsby Formation, groundwater elevations are expected to decline west of the cut after construction.

RESULTS

Table 1. Metals Analysis of Eleven Water Samples
(Expressed as micrograms per liter, or ppb)

Metal	Well D-51	Well D-53	Well D-55	Well D-61	Well D-64	Well D-66	Well D-68	Well D-69	Well D-70	STR-1	Trip Blank	Field Blank
Arsenic	<10.	<10.	<10.	<10.	<10.	<10.	68.	<10.	<10.	<10.	<10.	<10.
Barium	<200.	<200.	<200.	<200.	650.	1800.	<200.	<200.	<200.	<200.	<200.	<200.
Cadmium	<25.	<25.	<25.	<25.	<25.	<25.	<25.	<25.	<25.	<25.	<25.	<25.
Chromium	<100.	<100.	<100.	<100.	<100.	<100.	<100.	<100.	<100.	<100.	<100.	<100.
Lead	<250.	<250.	<250.	<250.	<250.	<250.	<250.	<250.	<250.	<250.	<250.	<250.
Nickel	<100.	<100.	<100.	<100.	<100.	<100.	<100.	<100.	<100.	<100.	<100.	<100.
Zinc	<20.	165.	<20.	38.	35.	<20.	23.	375.	400.	35.	<20.	<20.
Copper	<50.	<50.	<50.	<50.	<50.	<50.	<50.	<50.	<50.	<50.	<50.	<50.
Mercury	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Beryllium	<50.	<50.	<50.	<50.	<50.	<50.	<50.	<50.	<50.	<50.	<50.	<50.

[1] (<) Less than equals the limits of detection.

Table 2.

VOLATILE ORGANICS

(EXPRESSED AS MICROGRAMS PER LITER, OR ppb)

Parameter	Well D-51	Well D-53	Well D-55	Well D-61	Well D-64	Well D-66	Detection Limit
ACROLEIN	BDL[1]	BDL	BDL	BDL	BDL	BDL	100
ACRYLONITRILE	BDL	BDL	BDL	BDL	BDL	BDL	100
BENZENE	BDL	BDL	BDL	BDL	BDL	BDL	10
BIS (CHLOROMETHYL) ETHER	BDL	BDL	BDL	BDL	BDL	BDL	10
BROMOFORM	BDL	BDL	BDL	BDL	BDL	BDL	10
CARBON TETRACHLORIDE	BDL	BDL	BDL	BDL	BDL	BDL	10
CHLOROBENZENE	BDL	BDL	BDL	BDL	BDL	BDL	10
CHLORODIBROMOMETHANE	BDL	BDL	BDL	BDL	BDL	BDL	10
CHLOROETHANE	BDL	BDL	BDL	BDL	BDL	BDL	10
2-CHLOROETHYLVINYL ETHER	BDL	BDL	BDL	BDL	BDL	BDL	10
CHLOROFORM	BDL	BDL	BDL	BDL	BDL	BDL	10
DICHLOROBROMOMETHANE	BDL	BDL	BDL	BDL	BDL	BDL	10
DICHLORODIFLUOROMETHANE	BDL	BDL	BDL	BDL	BDL	BDL	10
1,1-DICHLOROETHANE	BDL	BDL	BDL	BDL	BDL	BDL	10
1,2-DICHLOROETHANE	BDL	BDL	BDL	BDL	BDL	BDL	10
1,1-DICHLOROETHYLENE	BDL	BDL	BDL	BDL	BDL	BDL	10
1,2-DICHLOROPROPANE	BDL	BDL	BDL	BDL	BDL	BDL	10
1,3-DICHLOROPROPYLENE	BDL	BDL	BDL	BDL	BDL	BDL	10
ETHYLBENZENE	BDL	BDL	BDL	BDL	BDL	BDL	10
METHYL BROMIDE	BDL	BDL	BDL	BDL	BDL	BDL	10
METHYL CHLORIDE	BDL	BDL	BDL	BDL	BDL	BDL	10
METHYLENE CHLORIDE[2]	119.0	880.0	93.0	16.0	120.0	99.0	10
1,1,2,2-TETRACHLOROETHANE	BDL	BDL	BDL	BDL	BDL	BDL	10
TETRACHLOROETHYLENE	BDL	BDL	BDL	BDL	BDL	BDL	10
TOLUENE	BDL	BDL	BDL	BDL	BDL	BDL	10
1,2-TRANS-DICHLOROETHYLENE	BDL	BDL	BDL	BDL	BDL	BDL	10
1,1,1-TRICHLOROETHANE	BDL	BDL	BDL	BDL	BDL	BDL	10
1,1,2-TRICHLOROETHANE	BDL	BDL	BDL	BDL	BDL	BDL	10
TRICHLOROETHYLENE	BDL	BDL	BDL	BDL	BDL	BDL	10
TRICHLOROFLUOROMETHANE	BDL	BDL	BDL	BDL	BDL	BDL	10
VINYL CHLORIDE	BDL	BDL	BDL	BDL	BDL	BDL	10

[1] (BDL) Below Detection Limits
[2] See DISCUSSION

STATE UNIVERSITY COLLEGE AT BUFFALO
1300 ELMWOOD AVENUE BUFFALO, NEW YORK 14222

Preliminary floristic survey of the Lockport Stone Quarry - Van DeMark Chemical Co. Waste disposal site and recommendations concerning landscape reseeding and maintenance.

For

WWW Consulting Engineers
50 West Genesee Street
Lockport, New York 14094

by

Dr. Eric A. Randall
Assistant Professor
Department of Biology
State University College at Buffalo
Buffalo, New York 14222

June 1977

During early spring (22 April, 1977) the plants listed herein were collected from the study site. Plants were collected, identified and prepared for storage as herbarium vouchers according to standard herbarium procedure. In all cases Fernald, (1950) was used as a nomenclatural reference. Voucher specimens will be kept on file and housed as part of the permanent collection within the Herbarium, Department of Biology, State University College at Buffalo.

Floristically, the landfill site and directly adjacent areas could be classified as a slightly basic (pH) waste area - with a recently disturbed surface soil. Organic material within the soil appears minimal and is apparently one of the greater factors providing for the notable floristic sterility of the site.

By using the native floristic elements, found on site, as indicators of growing conditions, it is proposed that the following landscape reseeding cultural practices be employed:

First, nothing should be done to the steep rocky areas between the landfill and the Eighteen Mile Creek. Natural vegetation now exists in this area and will suffice as a ground cover.

Secondly, the landfill surface should be leveled, with the exception of the 2 m x 1 m soil dikes on the periphery. In order to better insure seed germination the site should be disked, harrowed or roughed up with a york rake. Loosening of the soil surface is highly recommended but not absolutely essential. Failure to properly prepare the seedbed could result in seed germination failure as high as 50%. Prior to seeding, 500 lbs./acre of 15-15-15 (N,P,K) fertilizer should be incorporated in the soil or, if no harrowing is done, the fertilizer should be broadcast. A single seeding application with a Cyclone (TM) or Gandy (TM) type broadcast seeder should be made using the following seed mixture:

a) Crownvetch - var. "Penngift" - 10 lbs./acre

and b) Birdsfoot trefoil - var. "Empire" - 6 lbs./acre (preferred)
or var. "Viking" - 6 lbs./acre

and c) Perennial rye grass - 10 lbs./acre (preferred)
or Reed canary grass - 10 lbs./acre

Following seed application, the seedbed should be lightly raked (york rake), rolled or meekered to assure proper seed-soil contact for maximum germination.

A broad spectrum of soil and growing conditions exist within the study site but this perennial grass-legume seed mixture should provide continuous soil cover following establishment. Landscape maintenance will be minimal with this established cover due to the extensive self seeding and rhizome cloning capabilities of all these organisms. The drier dike and raised areas will eventually be heavily covered with the crownvetch while the trefoil will become well established in any wet or seepage area of the site. Perennial rye grass will provide immediate cover and will slowly be replaced by the legumes after a period of years. Perennial rye grass is preferred because it is a smaller more compact plant and will not present the gross ragged appearance of canary grass and also will not tend to choke out the slower growing legumes.

The proposed combination of organisms will adapt rather well to the sod removal-sod replacement method of landfill maintenance outlined elsewhere in this narrative. Additionally, these legumes do not and probably should not be clipped or mowed annually, a cultural practice necessary with other seeding mixtures such as orchard grass, bromegrass, alfalfa and Maitland trefoils.

All material needed for the establishment of ground cover are locally available through a number of vendors:

- The fertilizer can be purchased from any farm supply dealer at a cost of about $150.00/Ton (Agway, Inc.)
- Crownvetch* is available from growers such as W. Mehlenbacher, Seedsman, Castile, N.Y. or Stanford Seed Co., 560 Fulton St., Buffalo, N.Y. at a cost of ca. $5.50/lb. w/innoculant.

  (*hard seed crownvetch should be specified and purchased, if available over the soft seeded types.)
- Birdsfoot Trefoil is available from Agway, Inc. or Stanford Seed Co. at a cost of:

  var. "Empire" - $2.95-$3.00/lb.
  var. "Viking" - $3.95-$4.25/lb.
- Perennial rye grass and reed canary grass is available from Agway, Inc. at a cost of $2.30-$3.00/lb.

I shall be happy to provide additional information if further questions arise concerning the floristics, or the landscaping.

Respectfully,

Eric A. [illegible]
Assistant Professor, Biology

EAR:vm
Inc.
Herb plant list
Tree, shrub & vine plant list

HERBS:

Monarda didyma L.

Prunella vulgaris L.

Nepeta cataria L.

Solanum dulcamara L.

Rumex acetosella L.

R. crispus L.

Carex umbellata Schkuhr

C. abdita Bicknell

Verbascum thaspus L.

Plantago major L.

P. lanceolata L.

Galium sp.

Dipsacus sylvestris Huds.

Phytolacca americana L.

Chenopodium album L.

Lychnis alba Mill.

Typha latifolia L.

T. angustifolia L.

Melilotus officinalis (L.) Lam.

Impatiens pallida Nutt.

Dactylis glomerata L.

Poa annua L.

Agropyron repens (L.) Beauv.

Panicum capillare L.

Tussilago farfara L.

Carduus arvense (L.) Scop.

Taraxacum officinale Weber

Arctium lappa L.

Chrysanthemum leucanthemum L.

Solidago sp.

Rubus sp.

TREES, SHRUBS, VINES:

Ulmus rubra Muhl.

Populus tremuloides Michx.

Alnus serrulata (Ait.) Willd.

Salix sp.

Acer rubrum L.

Prunus pensylvanica L.f.

Tilia americana L.

Vitis sp.

Rhus typhina L.

Fraxinis americana L.

Sambucus pubens Michx.