SOMERSET RAILROAD PROJECT≣

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

FEBRUARY 1982

SOMERSET RAILROAD CORPORATION

HYDROGEOLOGIC STUDY

DANIELEWICZ ROUTE
Station 51+810 to 52+330

BECHTEL CIVIL & MINERALS, INC.

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EXECUTIVE SUMMARY

The hydrogeologic study of the Danielewicz Route from Station 51+810 to 52+330 authorized September 15, 1981, in letter BNE-142, has as its objectives the determination of ground water flow direction relative to the proposed railroad cut through this area, and, based upon chemical indicators, the possibility of movement of known landfill constituents into the ground water intercepted by the proposed railroad cut. The study utilized ground water monitoring wells in concert with the analysis of selected chemical parameters to fulfill these objectives.

Analysis of ground water level data indicate that flows are generally east to west within the rock strata intercepted by the railroad cut. Due to the direction of ground water flow and the relative elevations of the Van De Mark Landfill and the railroad, the proposed cut should not receive any ground water from the Van De Mark Landfill which lies to the west. Chemical analyses of ground water samples from the response tested and bailed wells utilizing parameters indicative of inputs from the Van De Mark Landfill confirm this conclusion.

The study area was explored to a maximum depth of 109 feet, the approximate elevation of Eighteenmile Creek. Four relatively isolated zones of ground water were found, each occurring at different depths. The upper two zones consist of a shallow ground water zone (Zone 1) found in the area of the Norton Landfill to the east of the railroad cut, and a somewhat deeper zone (Zone 2) which occurs along the contact between the Grimsby and Power Glen Formations. The two lower zones found along the contacts between the Power Glen and Whirlpool Formations (Zone 3) and the Whirlpool and Queenston Formations (Zone 4) will not be intercepted by the cut.

The railroad cut will occur within Zone 2 rock strata near the Grimsby-Power Glen Formation contact. However, since this rock has a low to negligible permeability, the quantity of Zone 2 ground water reaching the

cut should be very small. Zone 1 water may not reach the cut due to the intervening Zone 2 rock. Initial chemical analyses of Zone 1 ground water from the unpurged wells indicated levels of iron, grease, and oil which, for reference purposes only, would exceed United States Environmental Protection Agency (EPA) industrial discharge regulations. Subsequent chemical analyses and samples following purging of the wells indicated that grease and oil levels were within the recommended limits.

Bechtel purged the observation wells in early November in preparation for a more detailed round of chemical analyses conducted after November 15 by Bechtel and others. The resampling and reanalysis conducted for Bechtel by RECRA Research, Inc. showed a substantial reduction in the oil and grease levels from the Zone 1 wells to below the EPA industrial discharge regulations.

SOMERSET RAILROAD CORPORATION HYDROGEOLOGIC STUDY IN THE VICINITY OF THE VAN DE MARK LANDFILL

1.0 INTRODUCTION

This report presents the results of the hydrogeologic investigation performed for the Somerset Railroad Corporation along the proposed Danielewicz Route from (approximately) Station 51+810 to 52+330 in the city of Lockport, New York (Figure 1). In this vicinity, the railroad grade descends to the north at a grade of approximately 1.6 percent. The descent from a bridge section crossing West Jackson Street and the Gulf requires a cut section between two landfills: the Van De Mark Landfill (VDM) on the west, and the Norton/McGonigle & Hilger (N/MH) Landfill on the east. The study was authorized pursuant to letter BNE-142 dated September 15, 1981, from Bechtel to New York State Electric and Gas Corporation.

Preliminary investigations performed during the Somerset Railroad alternative route selection analyses involved geologic field mapping and areal reconnaissance of the landfills and surrounding area. Concurrent with the field work was a search for existing data on the landfills from the files of owners and various public agencies.

The results of the preliminary investigation indicated that ground water levels in the area of the landfills could be at an elevation high enough to be intercepted by the cut between the two landfills (Figure 2).

Sufficient data was not available, however, to determine the ground water flow direction nor the quality of the water which may be emanating from the landfills. To provide data necessary to evaluate the ground water levels, flow direction, and chemistry, 22 observation wells were installed. In-hole permeability testing was performed, water levels obtained and samples collected for chemical analysis. On the basis of these studies, an evaluation of the local ground water regime and a prediction of its interaction with the proposed railroad cut are presented.

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2.0 CONCLUSIONS

Based upon data obtained through November 1981 the following observations are made:

- a. The permeability of the rock that will be exposed in the proposed cut is low to negligible (Section 7.0).
- b. Ground water occurs in relatively isolated zones in the rock and there is little to no vertical movement between zones. Only the upper two zones encountered may be affected by the proposed cut. The first zone is ground water encountered in the Norton Landfill, and the second zone is ground water present along the contact between the Grimsby and Power Glen Formations.
- c. Ground water in Zone 2 moves westerly, derived from the east.

 The proposed cut for the railroad will intercept that flow but the quantity discharging to the cut will be small.
- d. The potential for ground water in Zone 2 to move from the vicinity of the Van De Mark Landfill into the railroad cut, a reversal of present flow direction, is determined to be negligible.
- e. Ground water encountered in the Norton Landfill is identified as Zone 1 and may or may not reach the cut.
- f. Comparison of the chloride concentrations measured in ground water from the Zone 2 wells with similar chemical analyses conducted by the Van De Mark Chemical Corporation at its own landfill monitoring wells provides further indication that ground water from the Van De Mark Landfill is not moving in the direction of the proposed railroad right-of-way (Section 8.2.1).
- g. Ground water that may move into the railroad cut from the east is expected to have a chemical quality similar to that found in the Zone 1 and 2 wells (Section 8.2.2).

h. Initial sampling of one of the Zone 1 wells (D-70) installed in the Norton Landfill had grease and oil levels which exceeded United States Environmental Protection Agency (EPA) regulations for industrial discharges (30 ppm). The initial high reading is believed to be derived from drilling activities. Subsequent sampling and analyses of the Zone 1 and 2 wells in mid-November, following well development and purging, revealed that the oil and grease levels in the Zone 1 wells were substantially below the EPA industrial discharge regulations. Well D-69, which is 75 feet westerly from well D-70, did not show significant levels of these two chemical parameters with regard to the EPA regulations in either round of sampling. Water moving from Zone 1 into the railroad cut may in time demonstrate a quality approaching that of well D-70 (Section 8.2.2).

3.0 LANDFILL DESCRIPTION

The following descriptions of the two landfills and general methods of the disposal operations are based on information contained in the files of the New York State Department of Environmental Conservation (DEC) and the Niagara County Department of Health, and from results of Bechtel field investigations.

3.1 Van De Mark Landfill

The VDM Landfill (Figure 2) contains chemical waste by-products from the Van De Mark Chemical Company of Lockport, New York. The landfill is in a former open pit quarry excavated in sandstone and limestone; the area is approximately two acres. It is located on a plateau bounded on the west and south sides by slopes descending to Eighteenmile Creek. Relief in the area is about 80 feet from Eighteenmile Creek to the relatively level area of the landfill. Access to the landfill is gained from the east along Mill Street located to the north of the landfill. Site access is controlled by a locked gate at Mill Street and another locked gate at the entrance to the landfill.

At its closest point, the landfill is approximately 125 feet west of the centerline of the proposed cut section. The elevation of the landfill is approximately 440 feet msl.

According to the Van De Mark Chemical Company's landfill application to DEC (1977), the method of disposal of wastes within the landfill consists of the excavation of a 7-foot-deep by 12-foot-wide trench. The trench bottom is then lined with fine crushed limestone for the treatment of waste and 55 gallon drums of waste are placed on top of the limestone. The space between the drums is backfilled with fine crushed limestone, the drums are punctured, sacks of limestone are placed on top of the drums, and the trench is backfilled to the original grade.

According to reports in the files of DEC, the waste material consists of 30 to 70 percent hexachlorodisiloxane, 10 to 50 percent silicon tetrachloride, and 5 to 30 percent carbon and silicon carbide. The hexachlorodisiloxane and silicon tetrachloride decompose into sand (silicon dioxide) and hydrochloric acid. Carbon and silicon carbide remain unchanged. The hydrochloric acid reacts with the limestone forming a neutral chloride salt. The residue is buried in drums; the owner reports that in 4 to 8 months the only visible remains are part of the drum rings used to seal the open head drum tops. According to the Van De Mark Chemical Company's landfill application to DEC, the entire waste mass will eventually become a sand pile with some salt content.

Presently, the active sections of the waste area are located within the southern one-third of the landfill (Figure 2). Prior to 1977, untreated waste was placed on the western portion of the landfill and allowed to decompose without the addition of limestone. DEC has given this landfill a code identification of "E" which indicates a closed controlled landfill in which monitoring is required.

3.2 Norton/McGonigle & Hilger Landfill

The Norton Landfill is situated approximately 400 feet east of the VDM Landfill, as shown on Figure 2. It is overlain in part by the McGonigle & Hilger Landfill. The areal extent of the Norton Landfill is unknown. The composite of these two landfills occupies about 4 to 5 acres. The area of the landfills is bounded on the north by Mill Street and on the south by a cliff leading down to Eighteenmile Creek. The east and southeast boundaries are formed by various manufacturing buildings. The landfill is about 110 feet above Eighteenmile Creek. Access to the landfill is gained from the east along Mill Street. The western boundary of this landfill extends to within approximately 60 feet of the centerline of the proposed railroad cut. The elevation of the landfill is about 473 feet msl. Depending on the final configuration of the cut in this vicinity, the western boundary of the Norton Landfill could extend to within 10 feet of the upper portions of the proposed railroad cut.

The Norton Landfill was used for the storage and recycling of thermoset plastic castings manufactured by Norton Laboratories, Inc., a facility located at the northwest intersection of North Transit Road and Mill Street but which is no longer in operation. Pieces of castings were noted in samples obtained from exploration holes, and during a reconnaissance of the area.

According to the DEC reports, waste lubricating oil in the amount of about 250 gallons/year was also stored there for recycling. Some documented spillage of the waste oil was reported. The period in which this occurred is unknown.

A portion of the site is now used by the McGonigle & Hilger Roofing Company for the disposal of roofing and general construction debris resulting from structural demolition. Asphalt, insulating material, tar paper, and general construction rubble are scattered over the site and a portion of the slope leading down to Eighteenmile Creek. Waste materials from the McGonigle & Hilger operations are deposited on the ground surface and spread periodically, probably by loader or bulldozer. A cover of natural soil material has been placed on top of some of the waste deposits. In the northern part of the area this waste is being spread over the Norton Landfill to a depth of about 6 to 8 feet. The western boundary of the McGonigle & Hilger Landfill is located 200 to 270 feet from the centerline of the proposed railroad cut.

DEC has given the Norton/McGonigle & Hilger Landfill a code identification of "F" which indicates that there is no toxic hazard.

4.0 EXISTING LANDFILL MONITORING

The only site investigation of the Norton Landfill complex is cited in the brief report from the DEC dated April 16, 1980. The coding assigned by DEC does not require the monitoring of ground water.

The Van De Mark Chemical Company documents the construction of four observation wells within the landfill boundary in their application to the DEC (1977). The wells were constructed in 1977 and are located within the disposal area of the landfill. Two additional wells were constructed in 1980 and are located at the foot of the escarpment adjacent to Eighteenmile Creek. Well locations are shown on Figures 2 and 3 and tabulated data regarding the wells is presented in Table 1.

Construction of each well is similar. On completion of drilling to the prescribed depth, an assembly of 2 to 5 feet of 1-inch-diameter well screen and 1-inch-diameter PVC riser casing was placed in the hole. The wells were sand-packed above the screen and a bentonite seal installed. However, the location of the seal is reported only for wells VDM-5 and 6. A steel protective pipe and a locking cap complete the surface installation.

Wells VDM-5 and 6 were sand-packed to within 1 foot of the top of rock surface, 4.4 feet and 5 feet below ground surface, respectively, and a 6-inch bentonite seal was placed prior to grouting to ground surface. Wells VDM-1 and 2 are shallow (less than 25 feet deep), penetrating about 14 feet into the Power Glen Formation to an elevation of about 422 feet msl. Wells VDM-3 and 4 are within the landfill and are 90 feet deep. They are completed in the Queenston Formation (see geology discussion, Section 6.0) to about elevation 350 feet msl.

Wells VDM-5 and 6 near Eighteenmile Creek were drilled to elevations of about 345 feet msl, and are also within the Queenston Formation.

5.0 SUBSURFACE INVESTIGATION AND OBSERVATION WELL INSTALLATION PROGRAM

The subsurface investigation began with the arrival of the first drilling rig at the site on October 13, 1981, and was completed on October 31, 1981. Eventually five drilling rigs were moved on site and work was performed 24 hours a day from October 23 through October 30, 1981. All drilling and well installation was performed by Empire Soils Investigations, Inc., Orchard Park, New York, under the technical direction of Bechtel geologists.

The investigation consisted of drilling 22 borings at the locations shown on Figure 3. Boring locations were chosen in order to provide a sufficient number of monitoring points to establish ground water elevation(s) and gradient(s). From this information the component of ground water flow into the proposed railroad cut from the east and west could be established. The holes were drilled to selected depths and completed as ground water observation wells. Borings were advanced by rotary coring with either standard or wire-line split inner-tube core barrels. Coring of the rock was performed in order to adequately determine the rock characteristics of the formations penetrated and to assist in the determination of the placement of the well screen and sand pack intervals. All holes were cored with NX and NQ side discharge diamond impregnated core bits. Water from the City of Lockport water system was used as drilling fluid in all holes to minimize and control the amount of unknown substances introduced into the hydrogeologic system.

At each of six locations between the two landfill areas, nests of three holes were drilled to shallow, intermediate, and deep levels, at which ground water observation wells were installed. A nest of two holes, intermediate and shallow, was drilled at a seventh location. In addition, two shallow holes were drilled within the Norton Landfill. The deepest hole at each location was pressure tested to determine the permeability of the fractures in the vicinity. Data on the well nests are summarized in Table 1 and locations are shown on Figure 3. Boring logs of the drill holes are presented in Appendix A.

After coring, each hole was reamed with a rock roller bit to a nominal diameter of 6 inches. This was done to facilitate the installation of a sand pack around the screen and riser pipe for the ground water observation wells.

Ground water observation wells are constructed of 2-inch flush coupled PVC pipe. Each well is completed with 10 to 40 feet of screen having machined horizontal slots measuring 0.010 inch in width. Riser pipe made of Schedule 40 or Schedule 80 PVC pipe is attached to the screen and extended about 2 feet above ground surface. A fine to medium sand designated as 2Q by the supplier, Pennsylvania Glass Sand, Inc., is placed around the screen and a minimum of 2 feet above the screen. The grain size analysis of the sand is presented in Figure 4. A minimum of 2 feet of bentonite pellets is placed on top of the sand to ensure that the appropriate zone is sealed. The annular space above the seal is grouted to the surface with portland cement grout and a steel protective casing with locking cap is installed. After installation, each well is response tested to ensure that the screen and sand pack are not cloqqed and allow the free passage of ground water. A typical well installation is presented in Figure 5. The selection of the monitored intervals has as its basis the geologic reconnaissance of the area which suggested that ground water movement occurs at or near the formation contacts. In general, the intervals screened and sampled are the fractured and more permeable zones in the following intervals: (1) from 15 feet below the base of the proposed cut section to approximately 5 feet above the Grimsby/Power Glen contact, Zone 2; (2) the contact between the Power Glen and Whirlpool Formations, Zone 3; (3) the contact between the Whirlpool and Queenston Formations, Zone 4. The placement of screen within definite zones allows the determination of interconnection between the various ground water zones and the amount of artesian confinement, if any, which may exist within the upper portions of the Queenston Formation.

Two additional observation wells were constructed to monitor a fourth interval (Zone 1) to determine water levels in the Norton Landfill. This

interval was added to the program because ground water was encountered while placing surface casing for nest 7. Data for these wells are also summarized in Table 2. Ground Water Observation Well Reports for each well are presented in Appendix B.

5.1 Permeability Tests

The deepest hole at each location was pressure tested to determine permeability. Pressure testing was performed in other holes at preselected intervals as directed by the geologist. Constant-head, in-situ permeability tests were performed in selected drilled holes in accordance with Designation E-18 of the U.S.B.R. Earth Manual (Ref. 7).

Pneumatic packers were used to seal off intervals of the borehole for testing. The test was begun by adding water through a metering system to maintain a constant pressure head. From recorded pressure, rate of flow, and time data, a permeability was calculated for the interval tested. Prior to testing and lowering of the test equipment, the borehole was surged and washed with clear water to remove cuttings from pores and joints of the rock. Table 5 summarizes the results of the tests.

5.2 Well Purging

Purging of the monitoring wells was conducted from November 9, 1981, through November 17, 1981, to acquire a representative sample of ground water for chemical analysis, and to reduce the amount of water that may have been affected by drilling and well construction. Secondary to purging, recovery rates for the purged wells were recorded and values of permeability were calculated from the data. The two methods used for well purging were nitrogen gas airlifting and hand bailing. Tables 6 and 7 summarize the well purging results.

5.2.1 Nitrogen Purging

The majority of the observation wells were purged using an air lift type apparatus utilizing bottled nitrogen gas rather than compressed air. Dry

nitrogen gas was used for purging due to its essentially inert properties and lack of volatiles, such as water vapor, which could alter the well water chemistry. The nitrogen gas was contained in 224 cubic feet capacity bottles, purchased from a local Airco distributor.

The apparatus consisted of 1/4- to 3/8-inch-diameter gas line with one end connected to the nitrogen bottle through a two-stage pressure regulator. The gas line extended along the outside of the water discharge hose with the other end inserted approximately 1 foot up inside the bottom of the discharge hose. The discharge hose was 1/2 or 3/4-inch black polyethylene pipe. The discharge and gas lines were taped together and inserted down the 2-inch PVC pipe of the observation well, keeping the lower end of the lines about 1 foot off the bottom of the well. The water was discharged into either calibrated 5-gallon plastic buckets or 20-gallon galvanized garbage containers.

5.2.2 Bailing

Hand bailing of six observation wells was required (D54, 55, 57, 60, 62, 68A). These wells contained less than 10 feet of water, which made the air lifting apparatus ineffective and inefficient due to lack of submergence.

Bailing was performed using a PVC bailer attached to a polypropylene rope. The wells could generally be bailed dry within a few minutes of bailing, therefore, the wells were allowed to recover and then rebailed in order to retrieve a sufficient well volume.

5.2.3 Volumes Purged

A minimum of two well volumes of water was purged from all wells. The majority of the wells were purged to over 4 well volumes. Calculation of well volume was based on adding the water volume within the PVC pipe and the pore volume in the sand pack between the outside of the PVC and the

wall of the drill hole. In calculating the exterior water volume, a 25-percent porosity of the sand pack was assumed. If the water level was below the bentonite seal capping the sand pack, then the calculated volume was only for the saturated column.

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Observation wells D51, 52, 53, 55, 57, 69, and 70 were designated as priority holes requiring a minimum of 2 well volumes from purging. Wells which could be bailed dry were also purged to a minimum of 2 well volumes. Two well volumes for this condition are twice the requirement specified by the Environmental Protection Agency (EPA, 1977). The remainder of the observation wells were purged at a minimum of 4 well volumes as specified by the EPA (EPA, 1977). Observation wells D54, 55, 64, 66, 68A, 69, and 70 had approximately 10 additional gallons of water purged from them by Woodward-Clyde Consultants while in the process of obtaining water samples. These additional volumes have been considered in the calculation of well volumes purged.

6.0 GEOLOGY

The bluff on which the study area is situated is near the base of the Niagara escarpment, a major geomorphic feature that extends in an eastwest direction across northern Niagara County.

The bedrock consists of nearly flat-lying (horizontal) sedimentary beds with a thin cover of unconsolidated glacial deposits, soil, and talus. The glacial deposits consist of unsorted fine to coarse sand with some traces of fine gravel, silt, and clay. The materials are commonly stiff and very compact.

The formations underlying the bluff are well-exposed in the road cut along West Jackson Street directly south of the landfills. These formations include, from oldest to youngest, the Queenston Formation of Ordovician age, and the Whirlpool, Power Glen, and Grimsby Formations of Silurian age. A stratigraphic column outlining the characteristics of all formations of the Niagara escarpment in the vicinity is presented in Table 3.

Bedding generally strikes N65W to east/west and dips less than one degree to the south. Considerable variation in orientation of bedding was observed in the cross-bedded sandstones of the Silurian formations. A geologic map prepared from field investigations and boring logs is presented in Figure 6. Geologic cross sections representing interpretation of drill hole data are presented in Figure 7, sheets 1 through 5.

The Queenston Formation, the lowermost formation exposed in the area, consists of reddish-brown shale with thin interbeds of greenish-gray shale and siltstone. Approximately 23 feet of the Queenston Formation is exposed in the West Jackson Street roadcut and 43.9 feet of the Formation was penetrated in drill hole D-56. Total thickness of the formation is reported to be 1200 feet. The elevation of the top of the Queenston is 397 feet msl at West Jackson Street and 404 feet msl in the vicinity of Mill Street.

The Whirlpool Formation is a gray to white sandstone. This unit is very hard and fine to medium grained with thin bands of gray shale. In the study area, the Whirlpool Formation outcrops are approximately 11 feet thick and the top of the unit at the West Jackson Street roadcut is at elevation 408 feet. Within the study area total thickness of the Whirlpool Formation as determined from rock cores ranged from 9.4 feet in D-63A to 14.6 feet in D-67.

The Power Glen Formation is a greenish-gray shale and siltstone interbedded with limestone, dolomite, and calcareous sandstone. Total thickness at West Jackson Street is not known due to a talus covering on the slope. Total thickness of the formation penetrated in the core holes ranged from 18.5 feet in D-67 to 28.6 feet in D-63A.

The Grimsby Formation includes a lower white to pale-green fine-grained sandstone and an upper reddish-brown sandstone with interbedded siltstone and shale.

The jointing characteristics of the various formations are shown in Table 4. Jointing in exposures of bedrock is uniform in orientation and character. Observations from rock core indicate the joints tend to be more open to the east near the bluff. The frequency of jointing ranges from 3 to 6 foot spacing. Three near-vertical joint sets present have orientations of N45W to N70W, N55E to N75E, and N10E to N30E. In addition, horizontal bedding joints are present. The near-vertical joints dip predominantly from 85° to vertically. Joint openings measured at outcrops near the Van De Mark Landfill ranged from closed to as much as 2 inches.

7.0 GROUND WATER OCCURRENCE

The rocks underlying the study area appear to have little to no primary (porous) permeability. The occurrence and movement of ground water is in the fractures and joints of the rocks. The core from the exploratory holes and the permeability testing indicate that more open jointing tends to occur near the contacts between formations. However, none of the zones tested are even of moderate permeability (Table 5). More open and frequent jointing appears to be present within the Whirlpool and Power Glen Formations near the cliff adjacent to West Jackson Street, which indicates that stress relief has occurred adjacent to this feature.

Water levels have been measured in the observation wells constructed during this program and the existing Van De Mark Landfill wells. They show that large differences in levels are present between ground water zones. To illustrate those relationships, water level contour maps shown on Figures 8 through 10, hydrographs shown on Figure 11 (sheets 1 through 8), and sections shown on Figure 7 (sheets 1 through 5) have been prepared. In addition, water levels recorded in the Van De Mark wells are shown on Figure 12. These data show that at least four zones of ground water are present between the ground surface and the Queenston Formation.

The first zone monitored (Zone 1) is ground water present in the area of the Norton Landfill. Only observation wells D-69 and D-70 are monitoring this zone. As illustrated by the section shown on Figure 7, sheet 5, the water level in Zone 1 is more than 20 feet higher than the level in Zone 2, the Grimsby/Power Glen contact. Considering the large difference in head and the low permeability of the formations underlying the landfill, this indicates little to no vertical movement of ground water. It can be seen on the section that ground water in this zone may extend to the cut. The upper portions of the cut will be within 10 feet of the backfill contained in the Norton Landfill.

The second zone monitored (Zone 2) is ground water at the Grimsby/Power Glen contact. Section D-D' (Figure 7, sheet 4) has been constructed along the proposed cut alignment. It can be seen on the section that

ground water of Zone 2 will be intercepted by the cut and that ground water zones below Zone 2 will not be encountered by the cut. Further evidence is given by Sections A-A', B-B', C-C' (Figure 7, sheets 1 through 3).

The apparent direction of ground water movement in Zone 2 is to the west. Thus, the proposed cut would intercept flow in Zone 2 moving from the east or in the vicinity of the Norton Landfill and prevent it from continuing beneath the Van De Mark Landfill. Because of this interception there will be a small reversal of gradient along the western embankment between the cut and the Van De Mark Landfill. Because of the lack of recharge that would be available west of the cut and the small gradient that would develop, flow in Zone 2 from beneath the Van De Mark Landfill to the cut should not occur.

The third and fourth zones monitored (Zone 3 and Zone 4) are the ground waters at the Power Glen/Whirlpool and Whirlpool/Queenston contacts, respectively. The apparent direction of ground water movement in these zones is to the south. Water in these zones is below the base of the cut, therefore, Zones 3 and 4 will not be encountered by the cut.

The permeability measurements made in the Grimsby and Power Glen Formations range from 2.1×10^{-3} to 1.27×10^{-6} cm/sec., and the four measurements beneath the Norton Landfill taken in D-67 were less than 5.1×10^{-5} cm/sec. These measurements are supported by the permeability measurements made from the well purging data. The higher permeabilities measured were from drill holes close to the bluff, for example, D-53 and D-55. This probably reflects the condition of the jointing. Near the bluff, the rock is more jointed and permeable. Away from the bluff and with depth, joints become less frequent and tight. It is probable that the effective permeability of Zone 2 along the shortest path between the Norton Landfill and the proposed cut is less than 10^{-5} cm/sec. Along other possible paths closer to the bluff, the effective permeability may

be as high as 10^{-4} cm/sec. Considering this range of permeability and the available hydraulic gradient indicated by the water level contours of Figure 8, the rate of discharge to the proposed cut that can be expected will be very small.

The potential for inflow to the proposed cut from Zone 1 cannot be estimated with the available data. The extent of Zone 1 and the permeability of the materials are not well-defined.

8.0 GROUND WATER QUALITY

The centerline of the proposed Danielewicz right-of-way passes through a cut approximately 125 feet (at its closest point) east of the Van De Mark Chemical Company Landfill and approximately 60 feet (at its closest point) west of the Norton Landfill. A description of these landfills is presented in Section 3.0.

The base of the cut is below existing water table elevations. For this reason, a ground water quality program was initiated to provide additional indicators of the movement of ground water into the railroad cut from the landfill areas to the east and west.

8.1 Sampling and Analytical Procedures

Based on an investigation of the existing New York State Department of Environmental Conservation records, Niagara County Health Department files, and other investigations of the history of the two landfills, a list of chemical parameters to be determined in the ground water was established. The list consisted of eight chemical parameters (Tables 8 through 10) of which chloride was expected to be the prime indicator of chemical contribution to ground water from the Van De Mark Landfill and oil and grease from the Norton Landfill. Twenty-two wells were installed at the locations and depths shown in Figure 3. The details of well construction are given in Figure 5 and Section 5.0.

Sampling and chemical analyses were performed by RECRA Research Incorporated of Tonawanda, New York. Two rounds of sampling and analyses were undertaken in November, 1981. The first round of sampling occurred on November 2 and 3, following completion of drilling and response testing of the wells. Each of the Zone 1, 2, 3, and 4 wells was sampled at that time, with samples split in the field to facilitate duplicate analyses. Following receipt of the first round analytical results, it was determined that the Zone 1 and 2 wells would be resampled. These wells were then purged according to EPA guidelines in preparation for the second round of sampling and analyses (Section 5.2).

The second round samples were withdrawn from the purged Zone 1 and 2 wells in mid-November. All sampling was accomplished using a steel pipe bailer, with a new bailer utilized to sample each well. Conductivity, pH, and temperature determinations were made in the field at the time of sampling. All other analyses were performed in RECRA Research, Incorporated's laboratory facilities in Tonawanda, New York. All laboratory analyses were performed in accordance with EPA methodologies. The results of the first round analyses are shown in Tables 8A, B, C, and D. Appendices C-1 and C-2 contain the laboratory data sheets from both the first and second round of analyses. The second round analyses included additional chemical parameters at the direction of Somerset Railroad Corporation.

8.2 Discussion of Results

8.2.1 Van De Mark Landfill

Tables 9 and 10 contain the most recent quarterly analyses of ground water samples taken from Van De Mark Chemical Company monitoring wells installed at that company's landfill as part of their routine landfill monitoring program. Locations of the wells are shown on Figures 2 and 3 and marked VDM 1, 2, 3, and 4. They are presented here for comparison with analyses taken in the area of the proposed railroad right-of-way, to the east of the landfill.

Tables 8A, B, C, and D show results of the first round analyses from the 22 unpurged wells installed at the different elevations necessary to allow sampling of each of the water bearing zones in the area independently.

- o Table 8-A shows results from the Grimsby-Power Glen interval (Zone 2).
- o Table 8-B shows results from the Power Glen-Whirlpool interval (Zone 3).

- o Table 8-C shows results from the Whirlpool-Queenston interval (Zone 4).
- o Table 8-D shows results from shallow wells at the topsoil -Grimsby (Zone 1).

The laboratory data sheets for the first round analyses are found in Appendix C-1, with the second round analyses in Appendix C-2. The base of the railroad cut as it passes near the Van De Mark Landfill varies from approximately elevations 436 feet msl to 442 feet msl. If ground water is intercepted in this area, it is expected to be of a quality similar to that of Zone 2.

A comparison of the Zone 2 chloride concentrations from the first and second rounds of sampling (Table 8A and Appendices C-1 and C-2) with those taken from the Van De Mark monitoring wells shown in Tables 7 and 8 provides further indication that no movement of ground water from the Van De Mark Landfill towards the railroad right-of-way occurs, consequently, no encroachment of ground water into the cut from this landfill is expected.

8.2.2 Norton Landfill

The Norton Landfill is described in Section 3.2 of this report. The edge of the proposed cut passes approximately 10 feet to the west of the landfill at its closest point. The elevation of the centerline at the base of the cut varies from approximately 431 feet msl at Mill Street to 442 feet msl at the bridge transition on the north side of the Gulf. Due to the proximity of the proposed railroad cut to Zones 1 and 2, illustrated in Figure 7, sheet 5, ground water intercepted by the cut in this area is expected to be of a chemical quality similar to that found in Zones 1 and 2. Wells D-69 and D-70 were installed in the landfill with screening at the overburden/Grimsby interface (Zone 1). The first round of chemical analyses (Table 8D) showed recoverable oil and grease concentrations (73

and 31 mg/1) from well D-70 which, as a means of comparison, exceeded EPA industrial discharge regulations (30 mg/1). Well D-69, 75 feet to the west of D-70, did not show similar levels of oil and grease. The second round of analyses following purging of the wells (Appendix C-2) showed a recoverable oil and grease concentration in the D-70 sample (7 mg/1) which was substantially less than the first round results, and below the EPA industrial discharge regulation. It is suspected that well D-70 may have been contaminated by the drill rig or other activity prior to initial sampling.

Following purging, an expanded program was undertaken by others to further define the quality of the Zone 1 and 2 ground water that may be intercepted by the railroad cut.

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- 7. U.S. Department of the Interior. <u>Earth Manual</u>, United States Government Printing Office, Washington, D.C., pp. 573-592. 1974.

TABLE 1
SUMMARY OF DATA ON VAN DE MARK
OBSERVATION WELLS

WELL NO.	SOUNDED DEPTH (FT)	ORILLED 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.
	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

STRATIGRAPHIC COLUMN OF THE NIAGARA ESCARPMENT ALONG THE DANIELEWICZ ROUTE

SYSTEM	SERIES	GROUP	FORMATION	MEMBER	THICKNESS	DESCRIPTION		
				Goat Island	8'+	<u>Limestone</u> : Medium to dark gray, thin to medium-bedded, medium hard, coarsely crystalline, fresh to slightly weathered. Abundant fossils. Occasional thin dolomite interbeds. Frequent irregular wavy bedding planes.		
		Lockport	Lockport	Gasport	5'	Dolomite: Medium brown to medium gray, medium-bedded to massive, hard, fine to very fine crystalline, fresh to slightly weathered.		
Silurian	Niagaran			Decew	4-5'	<u>Dolomite</u> : Medium brown to dark gray, thin- bedded, medium hard, very fine crystalline, slightly to moderately weathered. Occasional shell lenses, faint lamination and pitted surfaces. Gradational contact with Rochester formation.		
The modifying Social (III) on an addition on the III) on an addition on the III					Rochester		~70'	Shale: Dolomitic, dark gray, thin-bedded fissile, medium hard, microcrystalline, severely weathered. Occasional thin dolomite and limestone interbeds. Seldom more than 5' exposed before completely weathered to clay. Clay minerals: illite, chlorite, kaolinite, occasional montmorillonite.
ر ا		Clinton	Irondequoit	Unnamed	12'.	Limestone: Medium brown to medium gray with pinkish tint, thin to medium-bedded, hard, coarsely crystalline, fresh to slightly weathered, fossiliferous. Pink crystals: Rhodochrosite?		

TABLE 3 (Continued)

SYSTEM	SERIES	GROUP	FORMATION	MEMBER	THICKNESS	DESCRIPTION
	·		Irondequoit	Rockaway	9.0'+	Limestone: Dark gray, hard, fine to coarsely crystalline, occasional shale partings. Fresh to severely weathered at shale partings.
		Clinton	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.
Silurian	Niagaran		Thorold		2.0'	Mudstone: Light green, medium soft, calcareous, fresh.
		Medina		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.
	1 (11.2)		Grimsby	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 뇧"/6"-30"	N2O 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, Orthoquartzite	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.

^{* &}quot;Closed" describes open space ≤0.1 mm.
**"Tight" describes open space 0.1 mm to 1 mm.

TABLE 5

SOMERSET RAILROAD PRESSURE TEST RESULTS

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

TABLE 5 (Continued)

BORING NO.	ELEVATION INTERVAL TESTED (MSL)	PERMEABILITY CM/SEC	FORMATION
D-63A	372.25 - 381.75 379.5 - 390.0 389.5 - 400.0 399.5 - 410.0 409.5 - 420.0 419.5 - 430.0 429.5 - 440.0 439.5 - 450.0 449.5 - 460.0	No Water Take* No Water Take* No Water Take* 1.3 x 10-6 7.3 x 10-5 1.3 x 10-6 1.3 x 10-5 4.3 x 10-4 2.3 x 10-4	Queenston Queenston Queenston Whirlpool Power Glen Power Glen Power Glen Grimsby Grimsby
D-67	368.03 - 378.52 378.02 - 388.52 388.02 - 398.52 398.02 - 408.52 408.02 - 418.52 418.02 - 428.52 428.02 - 438.52 438.02 - 448.52	3.7×10^{-6} 3.7×10^{-6} 3.7×10^{-6} 3.7×10^{-6} 3.7×10^{-5} 5.1×10^{-5} 3.7×10^{-6} 1.27×10^{-6}	Queenston Queenston Queenston Whirlpool Whirlpool Power Glen Power Glen Grimsby

^{*}Test performed at 10, 15, and 20 psi.

^{**}Test performed at 10 and 15 psi.

Test performed at 15, 20, and 25 psi.

TABLE 6
RESPONSE TEST RESULTS FROM WELL PURGING .

BORING NO.	TEST INTERVAL	PERMEABILITY CM/SEC	REMARKS
D-49	409.5 - 420.1	2.07 x 10 ⁻⁵	
D-50	373.2 - 410.3	1.21 x 10 ⁻⁵	
D-51	419.5 - 440.3	9.1 x 10 ⁻⁶	
D-52	381.5 - 405.5	5.8 x 10 ⁻⁶	
D-53	422.8 - 441.6	2.4 x 10-4	
D-54			insufficient recovery
D-55			insufficient recovery
D-56	362.2 - 407.5	2.9 x 10 ⁻⁷	
D-57	408.5 - 412.1	1.4 × 10-4	·
D-58			dry
D-59	366.0 - 409.1	1.4 x 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 7
WELL PURGING SUMMARY SHEET

BORING NO.	AMOUNT CALCULATED TO BE PURGED	AMOUNT ACTUALLY PURGED	WELL VOLUMES PURGED	DATE COMPLETED
D-49	25.4	27.4	4.3	11/16
D-50	74.2	73.0	4.0	11/18
D-51	19.8	35.0	3.6	11/11
D-52	24.8	38.5	3.1	11/11
D-53	18.3	32.5	3.3	11/11
D-54	3.9	4.75 +10	7.5	11/18
D-55	9.7	5 +10	3.1	11/12
D-56	90.1	86.1	3.95	11/17
D-57	4.05	4	2.0	11/14
D-58				
D-59	83.5	88.3	4.2	11/18
D-60	4.3	10.0	5.0	11/17
D-61	28.1	33.5	4.8	11/13
D-62	14.4	10.25	2.9	11/17
D-63A	70.9	90	5.1	11/13
D-64	32.6	42 +10	6.3	11/13
D-65	22.1			
D-66	23.0	23 +10	5.7	11/16
D-67	85.6	89.3	4.2	11/16
D-68	9.9	4.5 +10	2.9	11/18
D-69	21.2	25 +10	3.3	11/12
D-70	22.1	28 +10	3.4	11/12

TABLE 8-A
RESULTS OF CHEMICAL ANALYSES PERFORMED BY RECRA RESEARCH, INC.

	ZONE 2		GRIMSBY/POWER	GLEN CONTACT	T ELEV. 419	- 437.2		
Well No.	Temp. (C)	рН	Specific Conductance µmhos/cm	TOC mg/l	TDS mg/l	CL mg/l	Oil & Grease mg/l	T Fe
D51	12.5 12	6.90 7.15	295 295	2.4 5.2	260 260	28 27	< 5 < 5	6.1
D53	12	6.65	353	8.1	280	32	<5	3.8
	12	6.75	360	4.2	340	32	<5	2.5
055	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
061	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

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TABLE 8-B
RESULTS OF CHEMICAL ANALYSES PERFORMED BY RECRA RESEARCH, INC.

	ZONE 3		POWER GLEN - W	HIRLPOOL CO	NTACT ELEV.	407.1 - 42	0.2	
Well No.	Temp. (C)	рН	Specific Conductance µmhos/cm	TOC mg/l	TDS mg/l	CL mg/l	Oil & Grease mg/l	T Fe mg/l
D49	11.5 12	8.85 9.00	283 305	1.1 1.3	290 290	20 20	<5 <5	16
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 - QU	EENSTON ELE	V. 362.3 - A			
Well No.	Temp. (C)	pH	Specific Conductance µmhos/cm	TOC mg/l	TDS mg/1	CL mg/l	Oil & Grease mg/l	T Fe
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 12	6.35 7.15	3,000 2,690	8.8 9.6	2,700 2,300	1,100 910	30	1.4
D56	11	10.45	500	6.4	460	79 [~]	<5	0.70
	11	10.70	600	5.0	480	79	<5	5.6
D59	10.5	8.30	249	4.5	220	22	<5	7.2
	10.5	8.25	251	7.9	220	22	<5	2.6
D63-A	12	9.65	255	5.6	270	23	√5	2.8
	11	9.80	275	5.8	270	24	√5	4.7
) 67	13 12.5	10.65 10.75	540 530	3.2 2.0	410 410	33 33	<5 <5 15	3.0 3.1 3.5

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TABLE 8-D
RESULTS OF CHEMICAL ANALYSES PERFORMED BY RECRA RESEARCH, INC.

	ZONE 1		MISC. SOIL - E	LEV. 447.2	- 456.6			,
Well No.	Temp. (C)	рН	Specific Conductance µmhos/cm	TOC mg/l	TDS mg/1	CL mg/1	Oil & Grease mg/l	T Fe mg/l
D69	14	6.7	800	6.8	670	29	14	7.4
	14	6.8	780	8.7	730	29	<5	89
070	14.5	6.85	640	24	570	31	73	120
	13	6.80	540	33	590	32	31	260

a , they would not be the best of the best

TABLE 9

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

Sample Date April 1981 Specific **TDS** DO CL TOC Conductance рΗ mg//1mg/1umhos/cm Sample Site mg/1mg/18.27 411 11.5 10.1 53.2 609 Eighteenmile Creek Site No. 1 8.26 429 12.8 10.0 52.1 619 Eighteenmile Creek Site No. 2 612 -15.6 8.90 48.9 8.39 439 Eighteenmile Creek Site No. 3 2,540 7.65 1,010. 30.9 Landfill Well 8.27 1,820 No. 1 (22' Deep) 6.90 417. 2,350 10.2 1,710 50.0 Landfill Well No. 2 (23' Deep) 4,470. 19,400 4.40 374. 7.08 21,200 Landfill Well No. 3 (90' Deep) 0.90 12,300. 24,300 90.2 19,930 Landfill Well 4.71 No. 4 (90' Deep) 9.05 245. 1,250 Landfill Swale 7.05 784 18.1

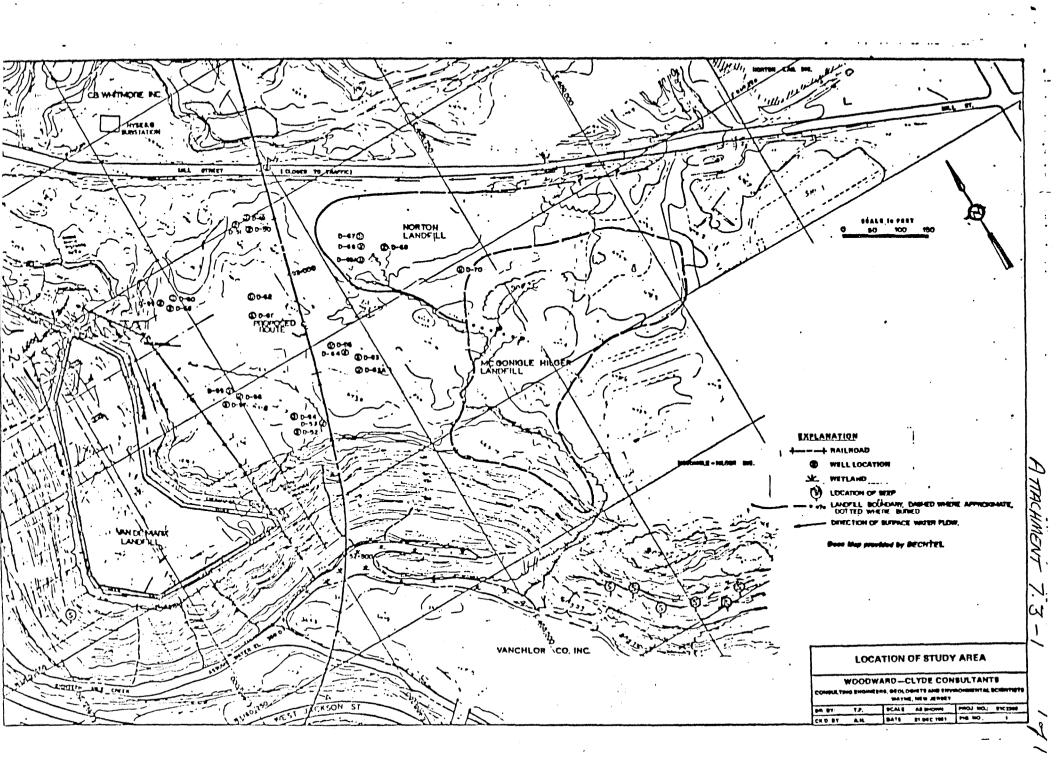
^{*}Wells 3 & 4 are transposed on Figures 2 and 3.

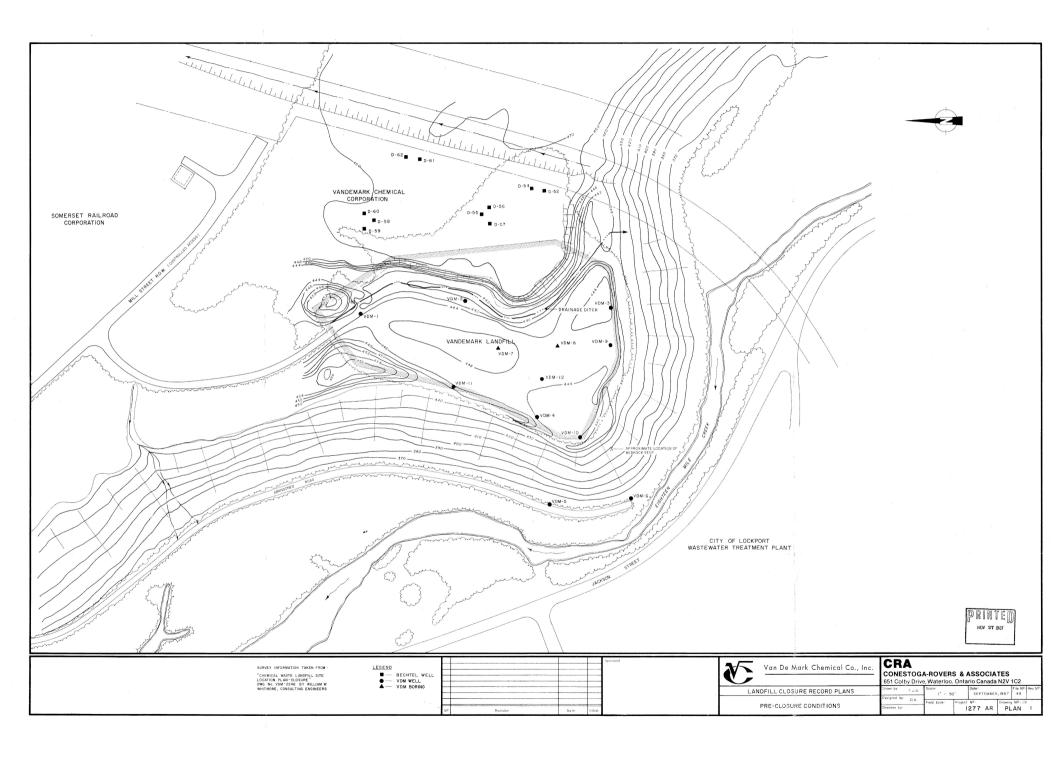
TABLE 10

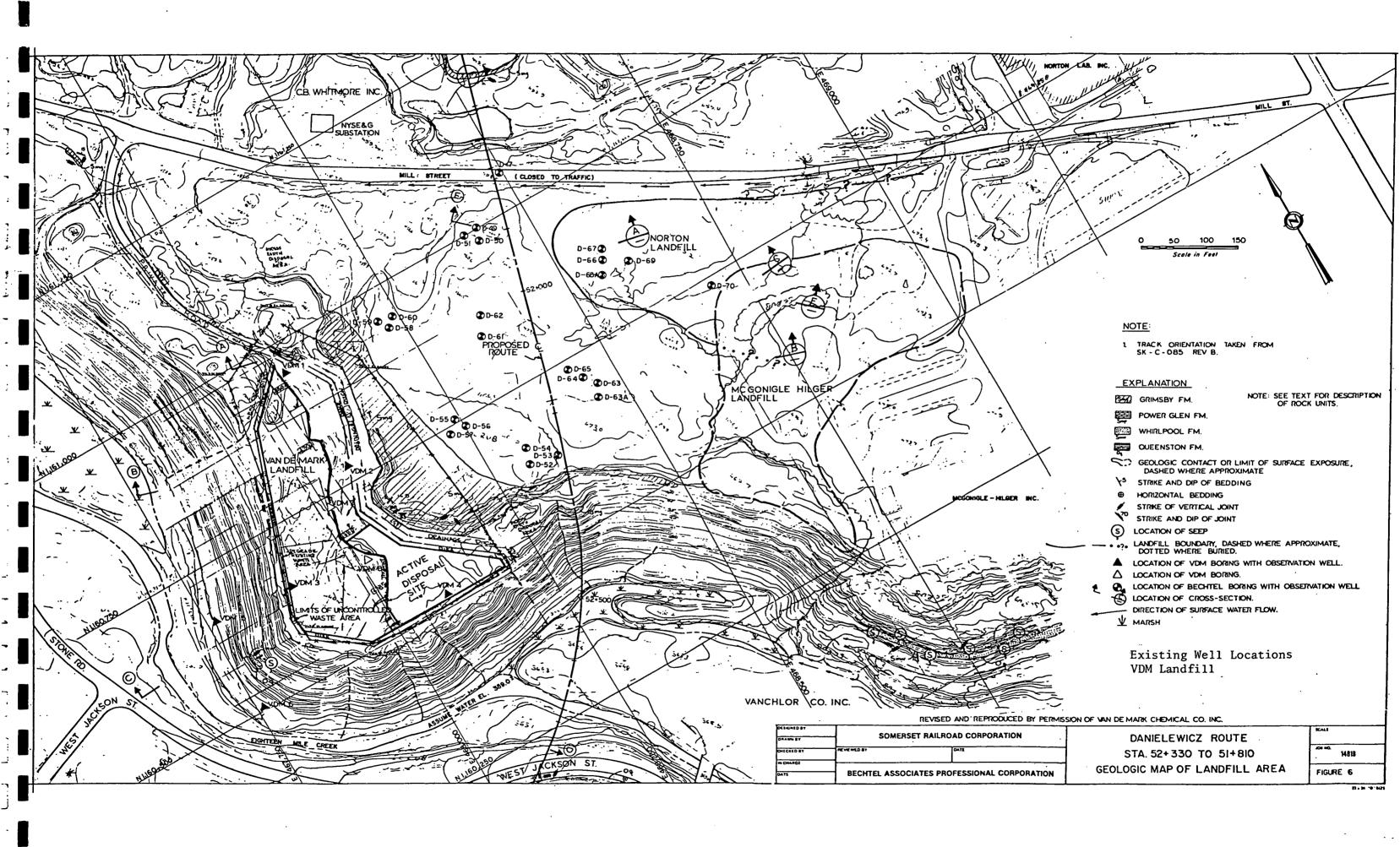
ANALYSIS OF VAN DE MARK SAMPLES
BY
ADVANCED ENVIRONMENTAL SYSTEMS, INC.

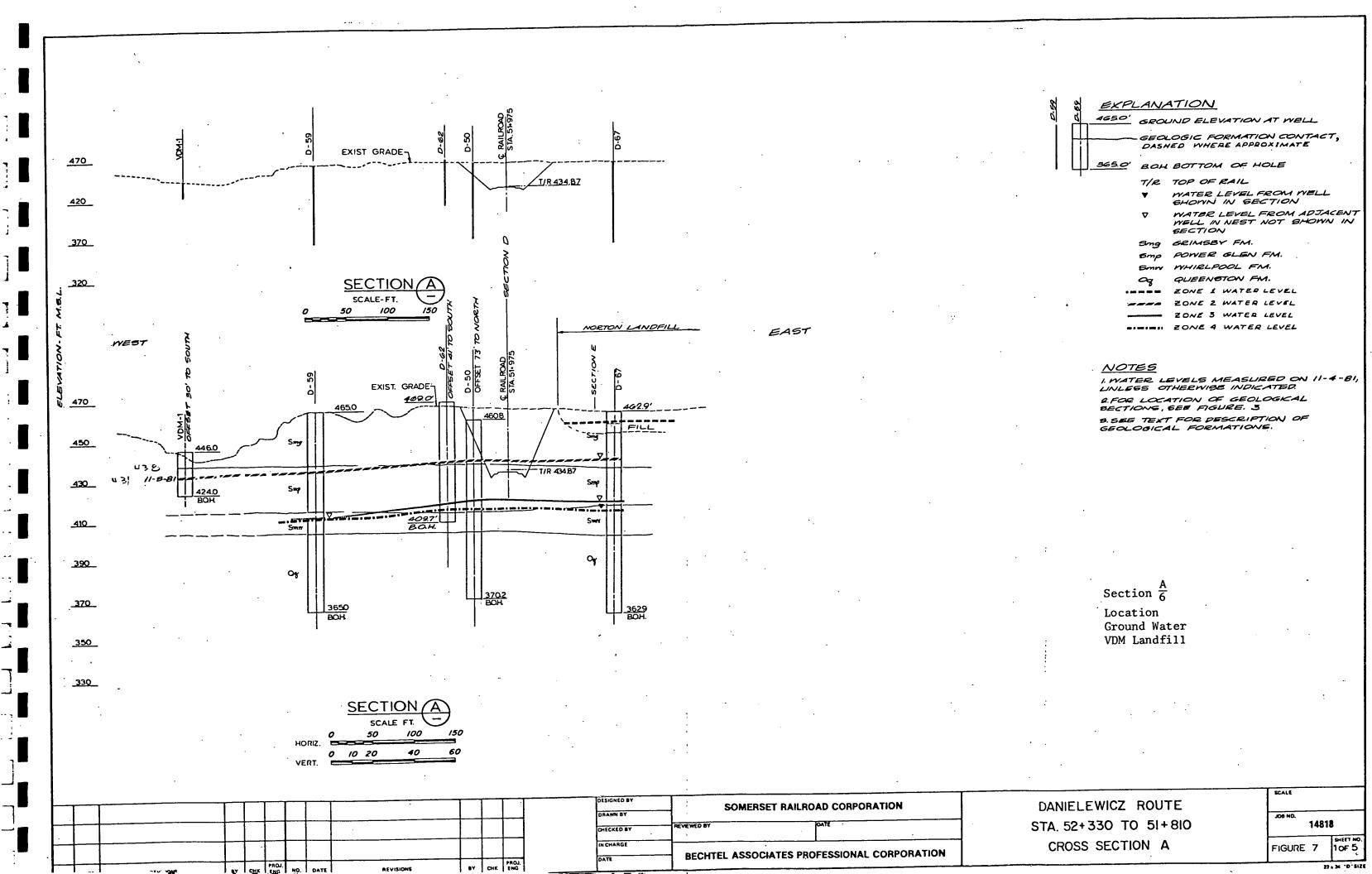
		Sample Dat	e October	1981		
Sample Site	рН	TDS mg/l	TOC mg/l	DO mg/1	CL mg/1	Specific Conductance µmhos/cm
Eighteenmile Creek Site No. 1	7.56	38.3	5.1	9.3	39	520
Eighteenmile Creek Site No. 2	6.97	561.2	11.0	7.9	138	830
Eighteenmile Creek Site No. 3	7.08	540.1	7.87	7.1	131	791
Landfill Well No. 1 (22' 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	<u></u> -	11,996	28,800
Landfill Swale	4.72	9,121.	7.2	0.1	3,498	10,360

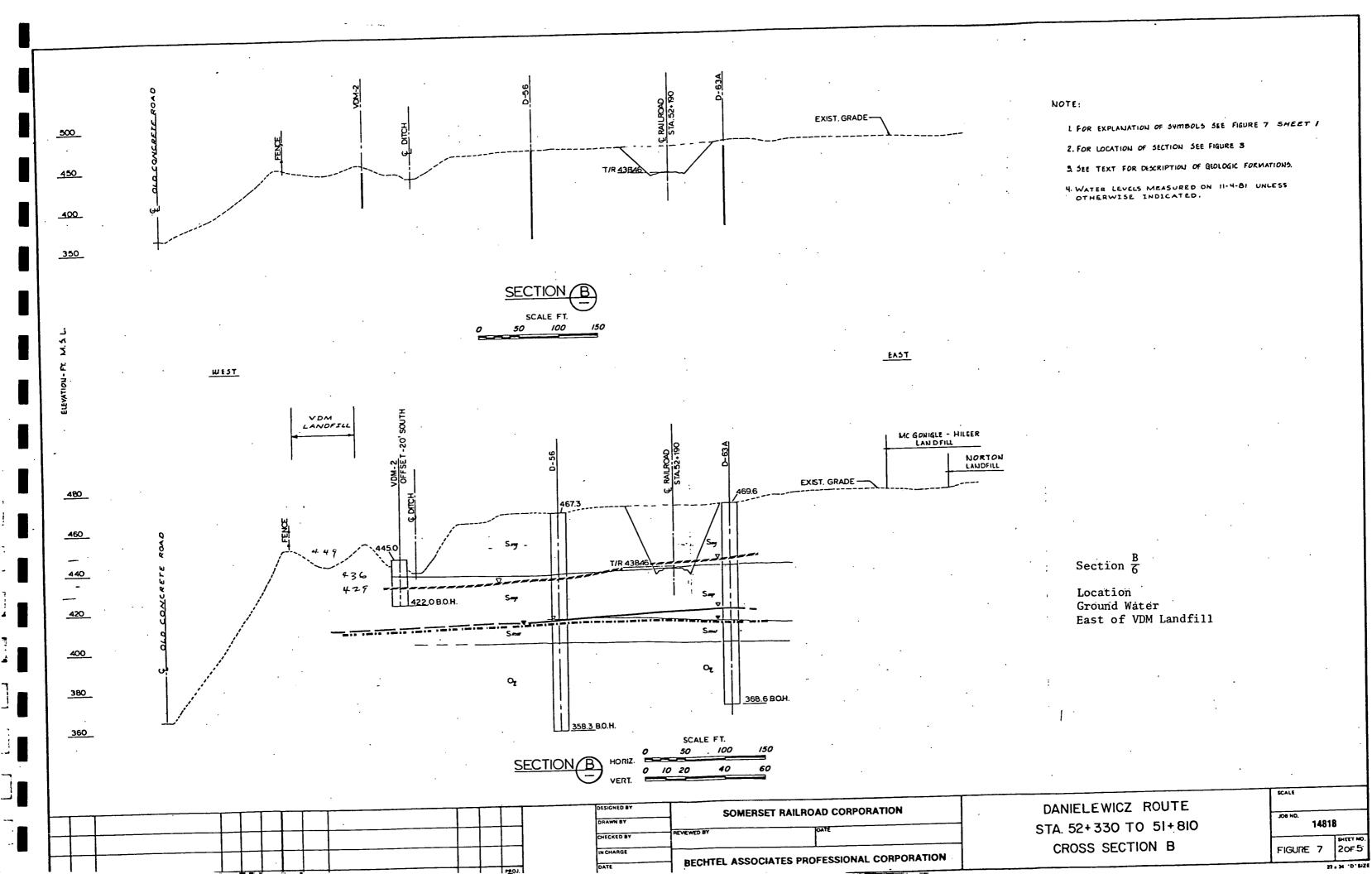
^{*}Wells 3 and 4 are transposed on Figures 2 and 3.

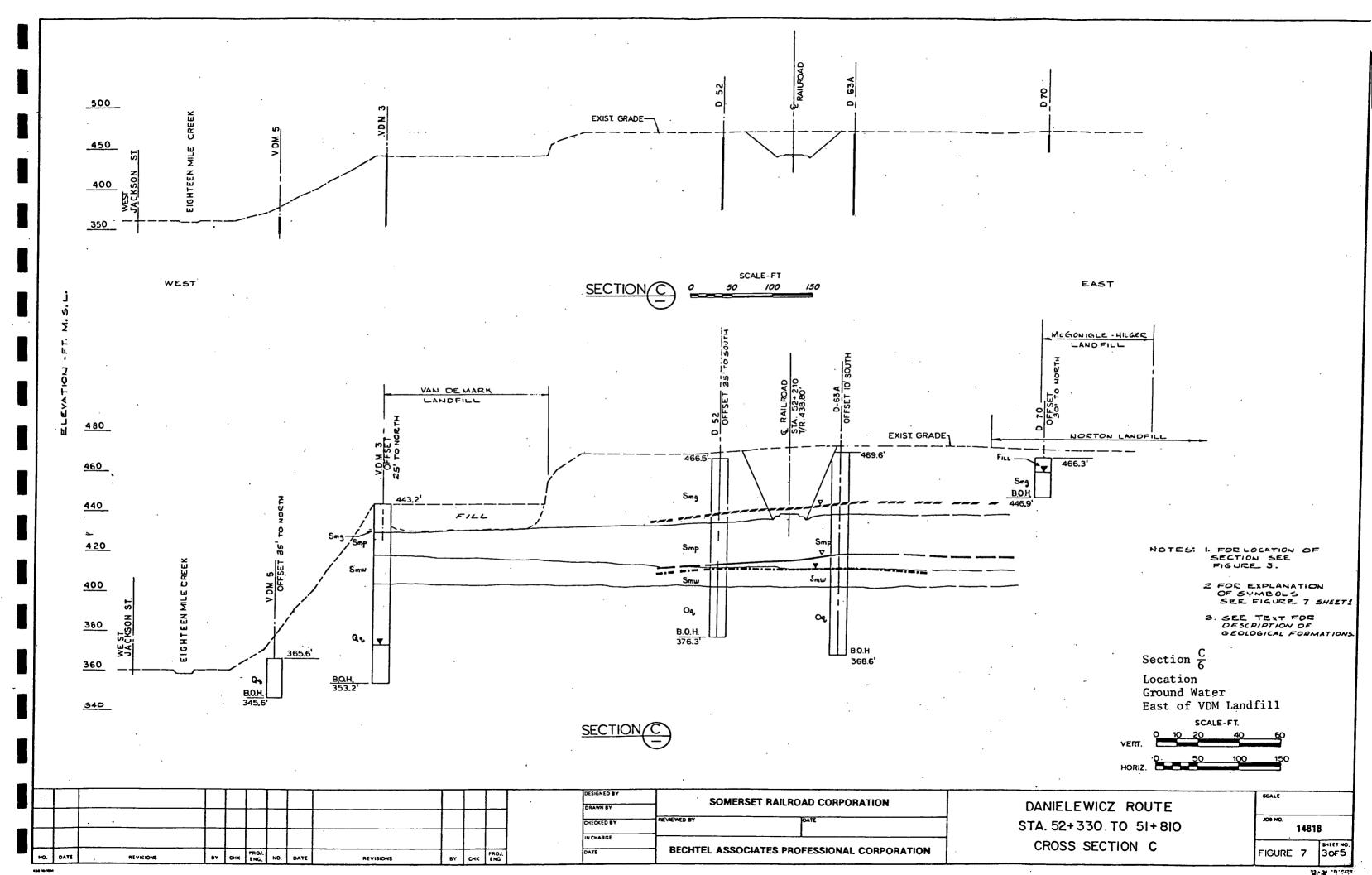


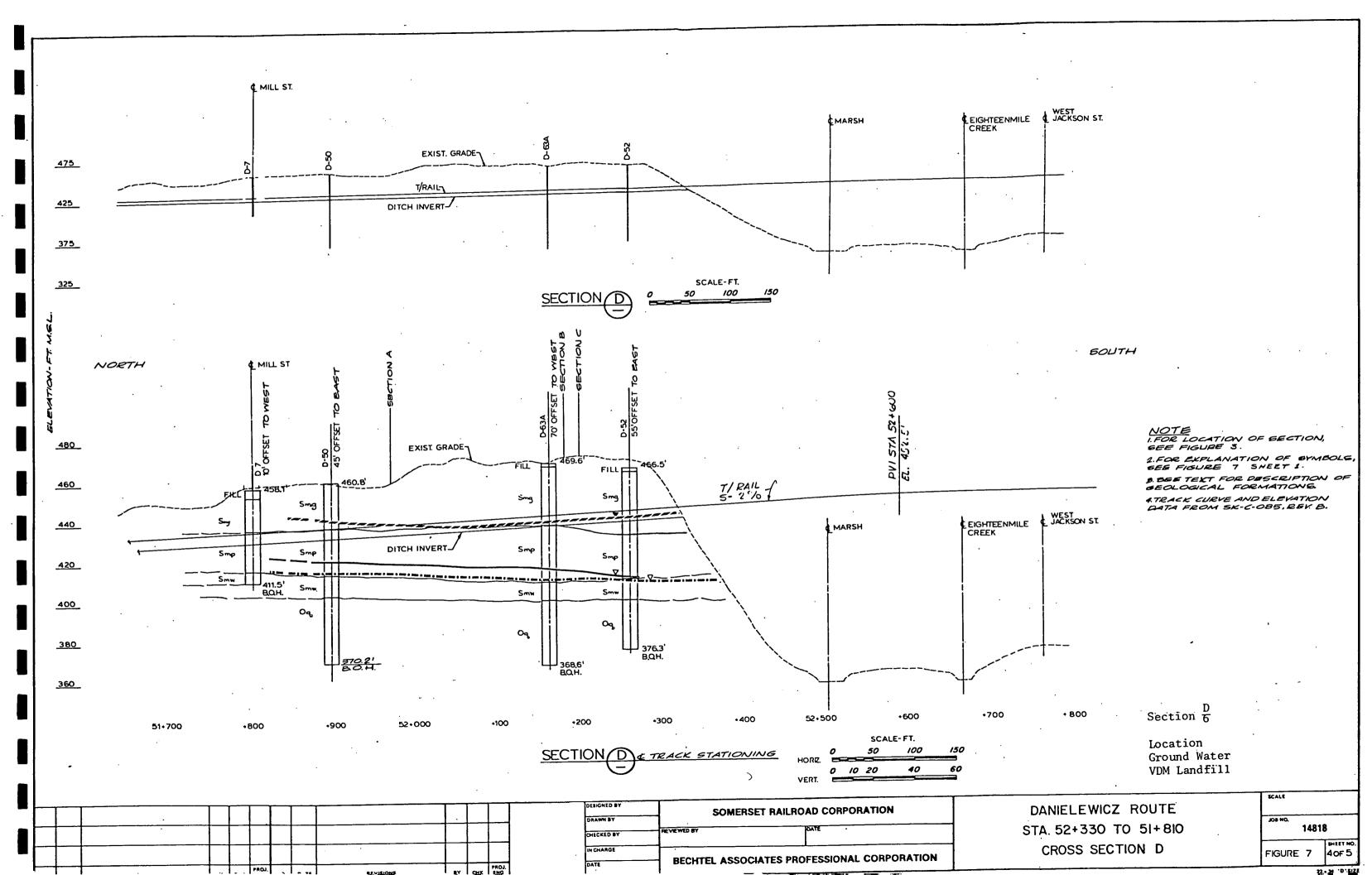


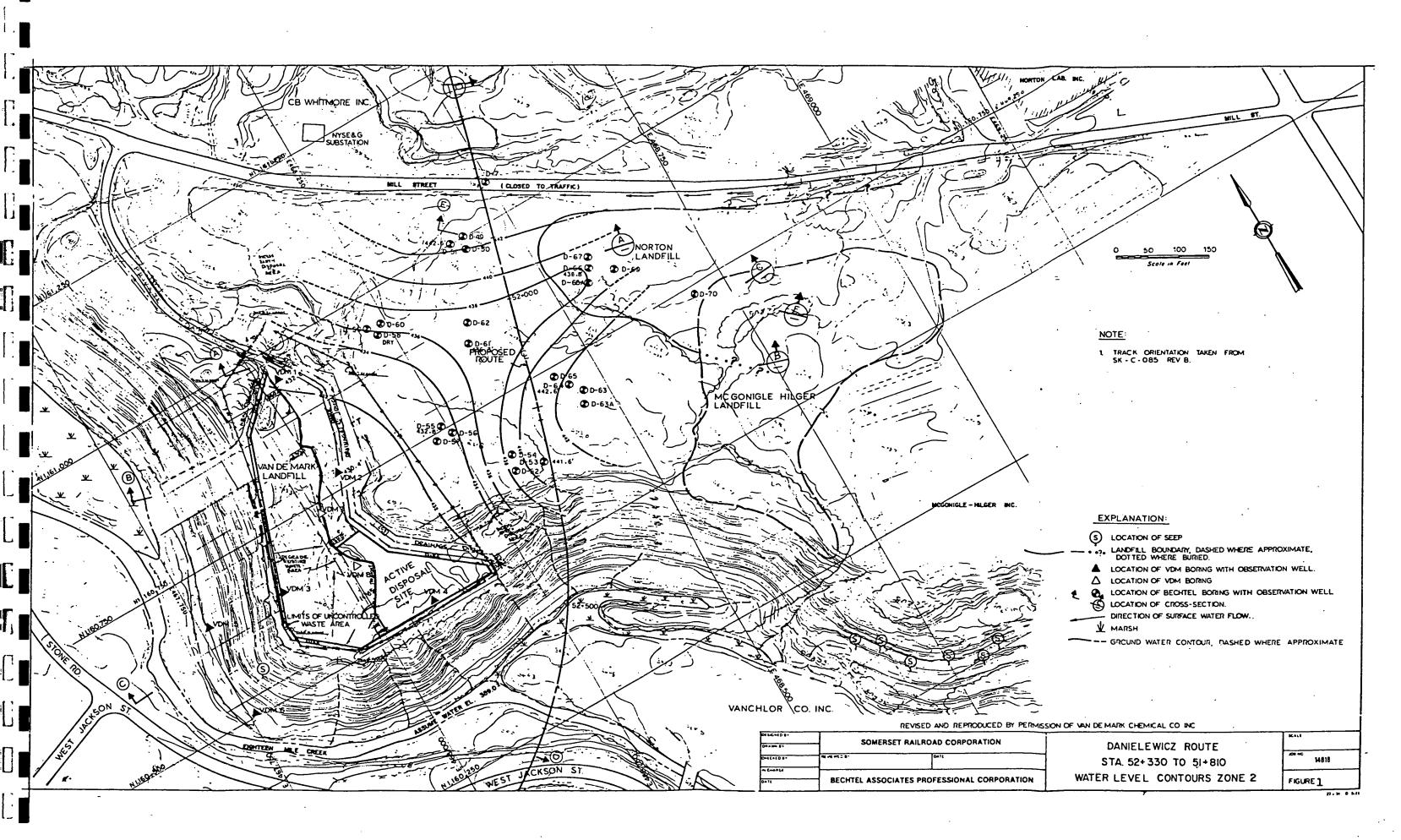


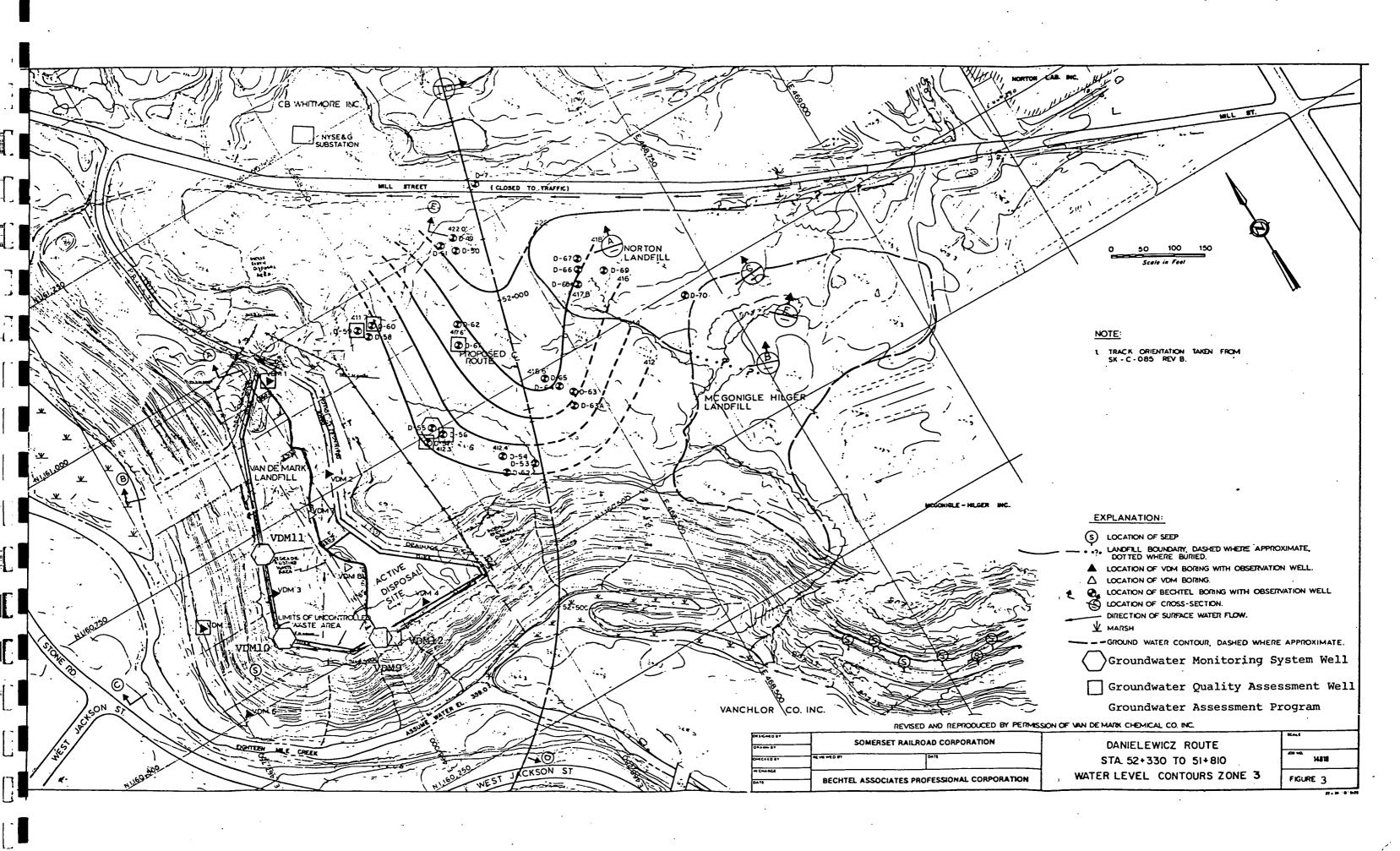


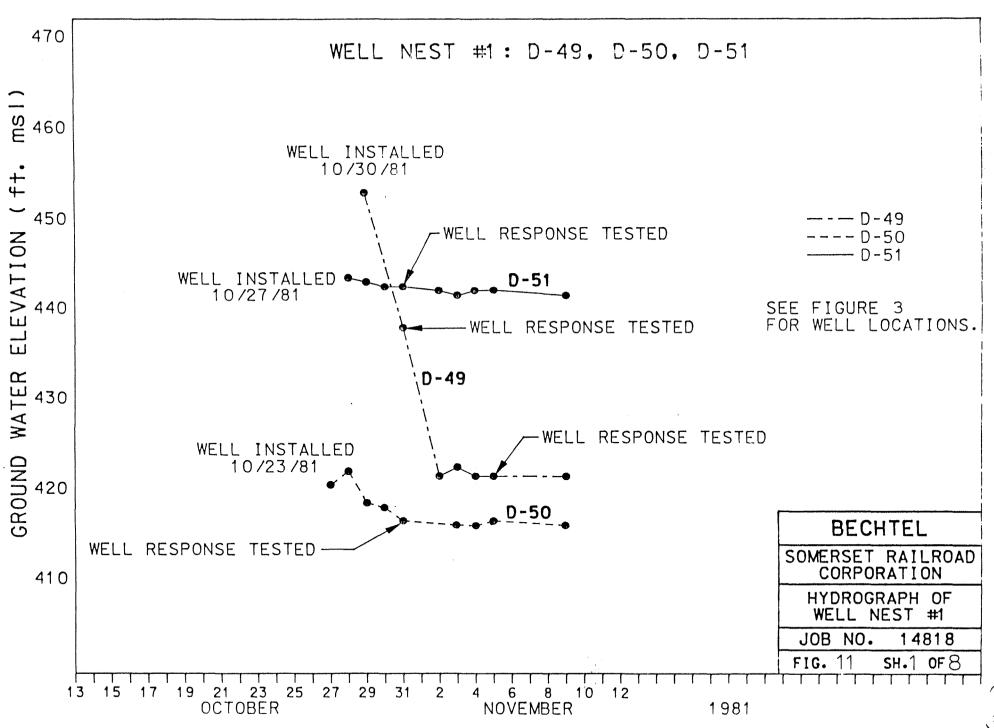




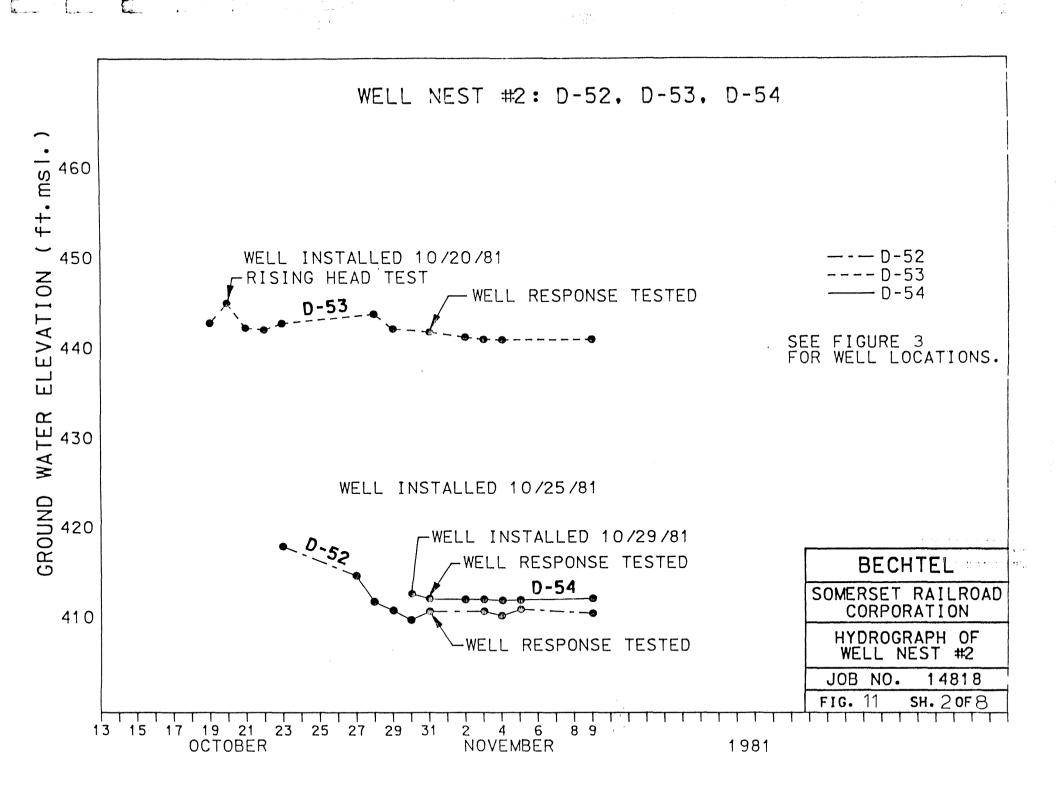


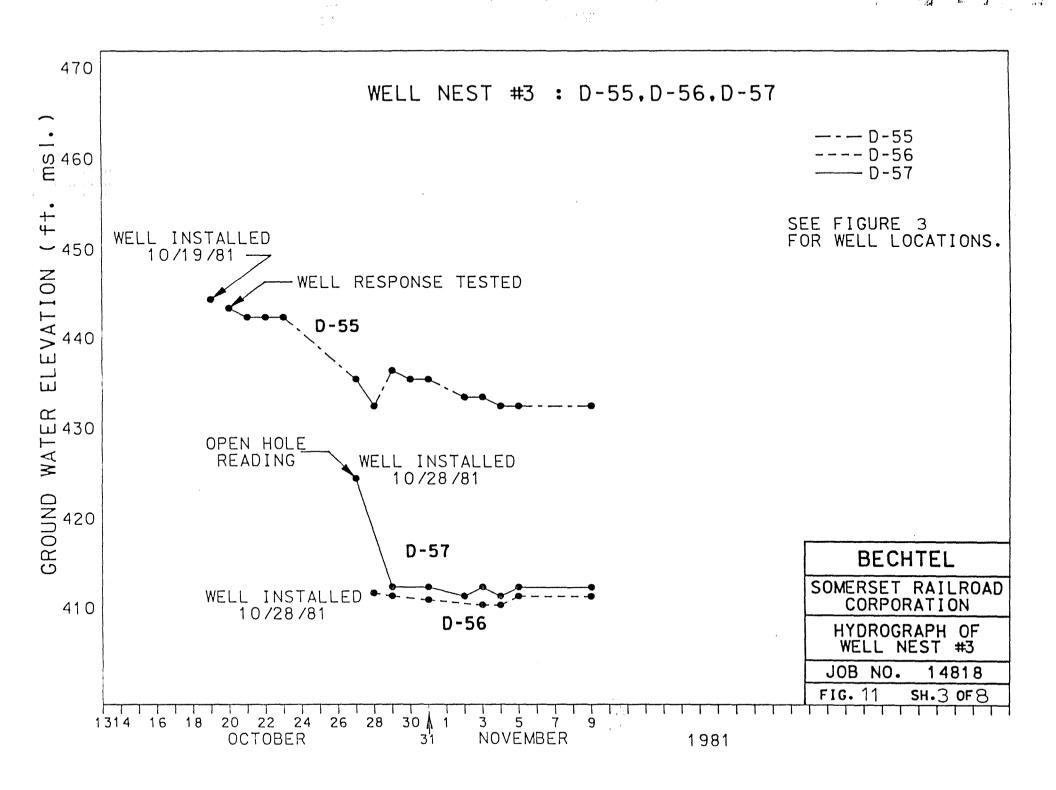


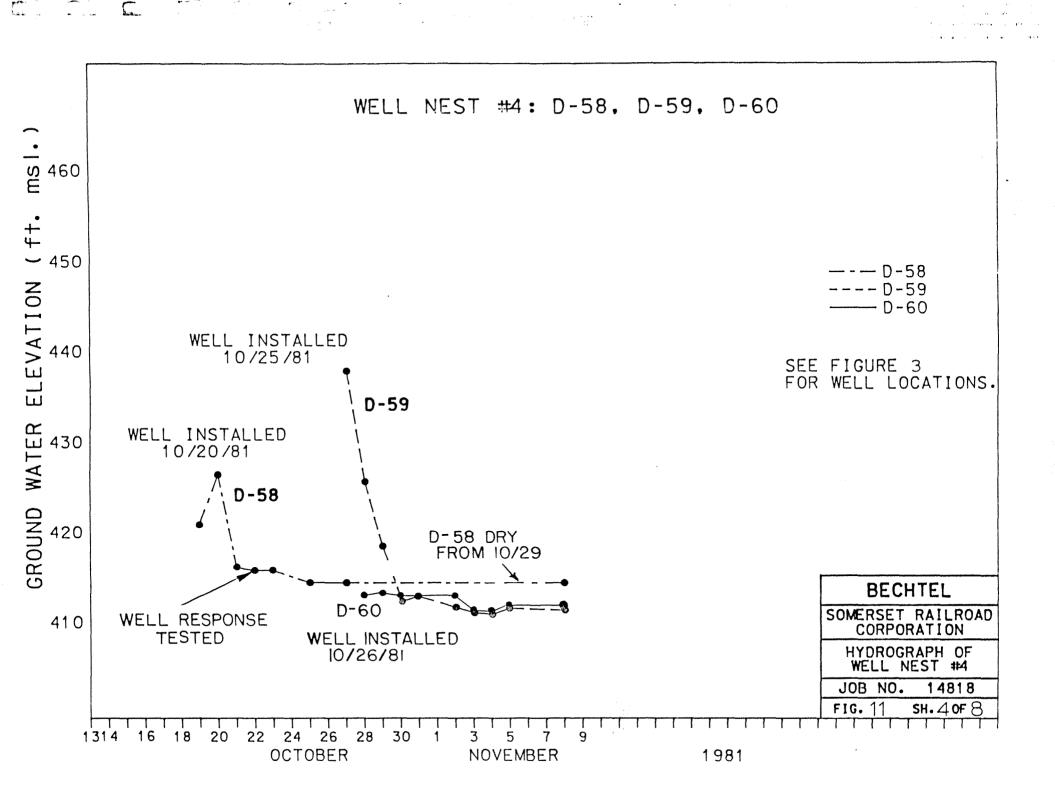


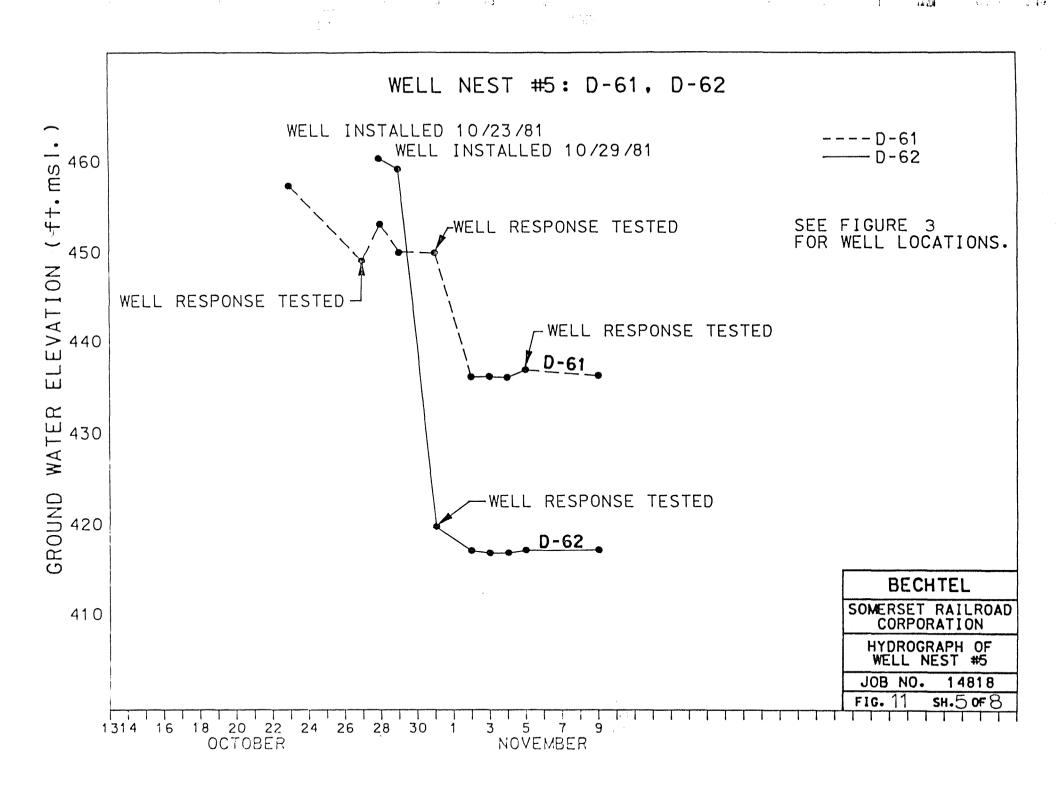


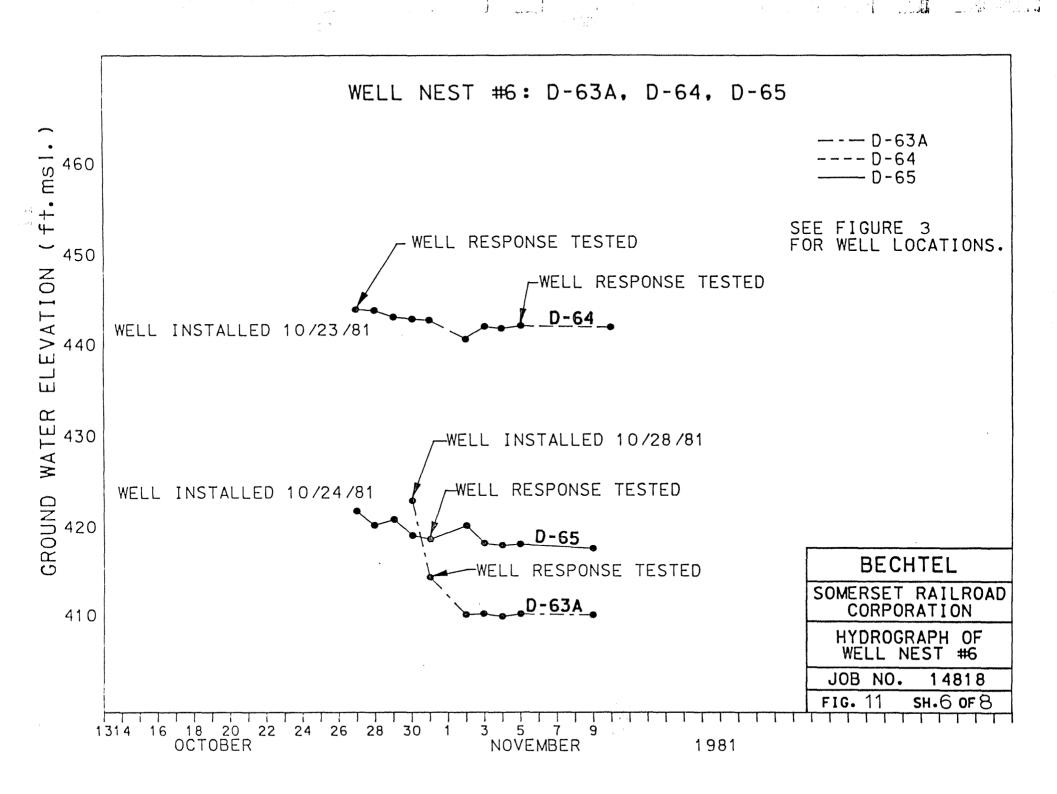
Attachment 7.1-2 (cont.)

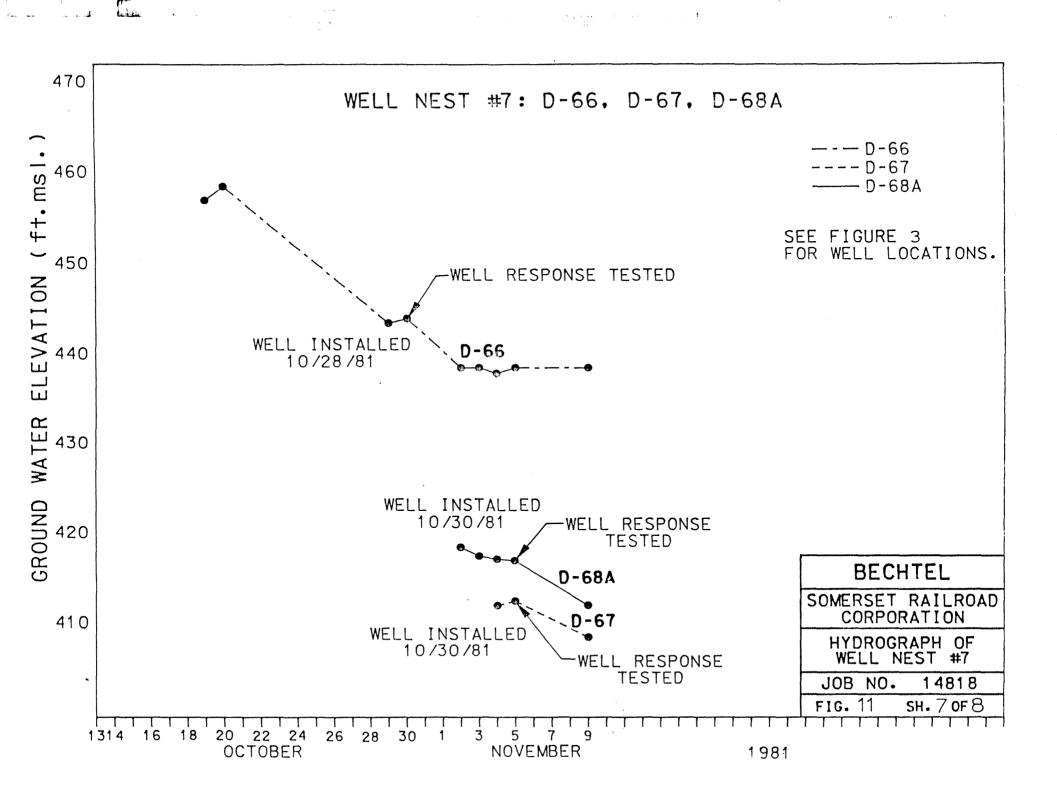


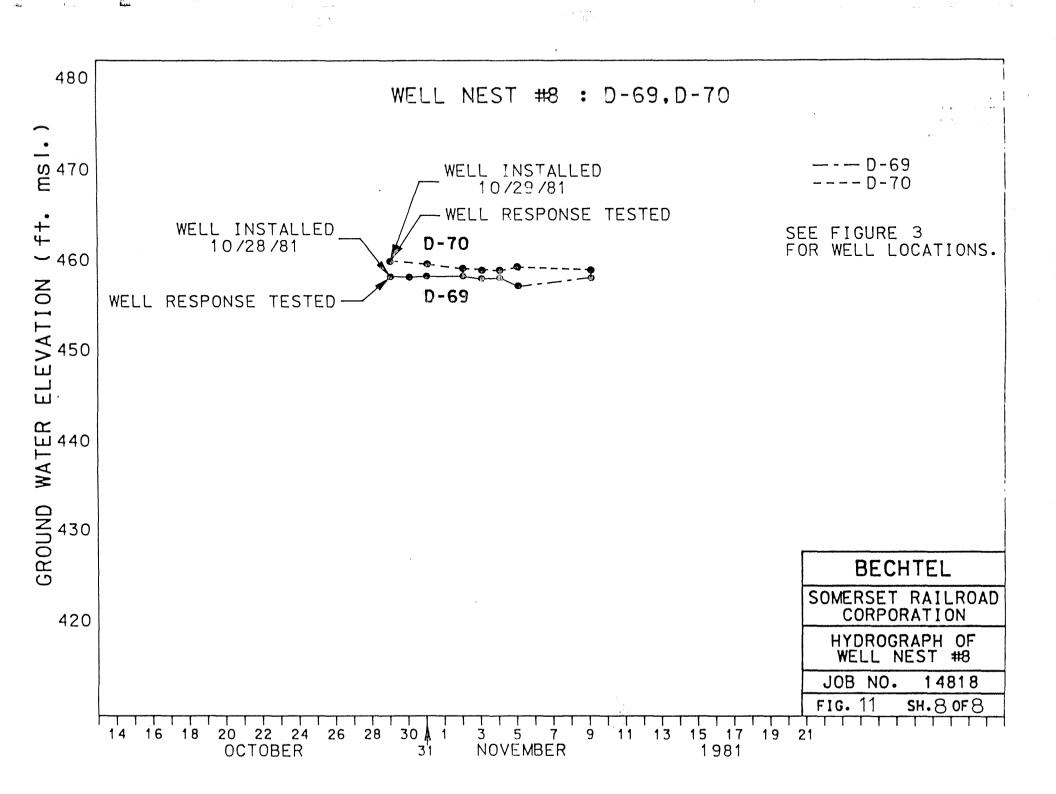


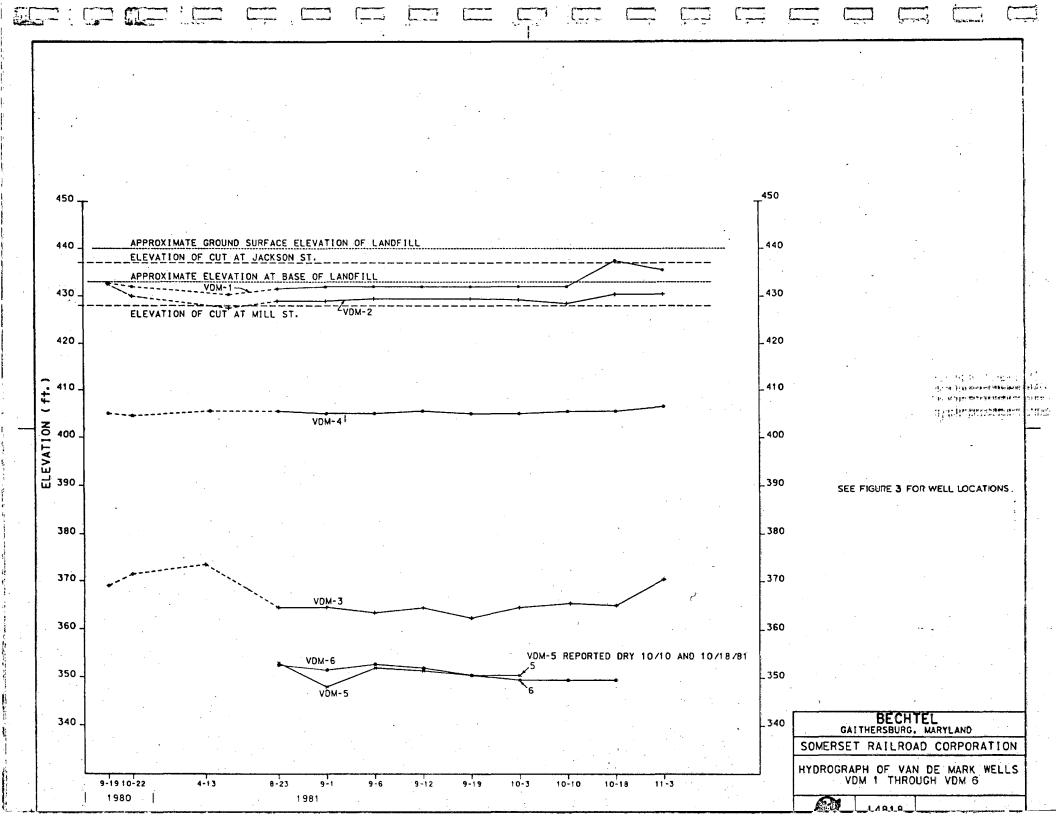












APPENDICES

TO

'SOMERSET RAILROAD CORPORATION
HYDROGEOLOGIC STUDY
DANIELEWICZ ROUTE

STATION 51+810 to 52+330
BECHTEL CIVIL & MINERALS, INC.

Job No. 14818

February 1982'

(To be read in conjunction with report prepared for Van DeMark Chemical Co. entitled "Closure Plan - Former Landfill Site")

APPENDIX A

LOGS OF BORINGS

WELLS D-7 AND D-49 THROUGH D-70



**************************************	-x::	D	ORI	NC	17	<u> </u>		****		ra	8		108 80	ì	KET NO.	HOLE NO.
A)TK		D	UNI	ITG	<u> </u>	<i>7</i> G	COGROINA	Y#\$	***************************************	30	merset Railroad		148		Lor 2	D-7
D			icz Rout				N 1,161	,058			-	<u>-</u>		90 *		***
9/2	3/83	1	0 m PLETED 9/25/81			n/Empi	Te	ic.	CME		HE AND MODEL	HOLE SIZE (INCHES)	4.6	N(F7.) 50C	ж (Р т.) 42	46.6
************			¥ (*1./%)	i i			EE EL TOP O	F CASI			Y DUNG St. (FT.) DEPTM/			J SEPT		#0.0 F#QCH (FT.)
	8/99				3	3	_	-			58,1	Dry			4,6/453,	5
	₩ M/ H#/30			/FALL	CA	SING LE	Y IM MOLE:	DIA./	KHGTI	*	LOGGED BY:	11				
······	w Z		4 16	PEN	ETRA	TION	none		z		C. F. Wa	¥.1		•		
OLAN TYPE OLANGEER	E S m 2 5 6 62 BLOWS						W WYATION	ţ	SOFE		DESCRIPTION	N AND CL 65	MELPATION			ER LEVELS,
**************************************	0 145481	E E E E E E E E E E E E E E E E E E E											ACTER OF LING, STC.			
* 4		10	* '	2	*	2 2	458,1		ű							
SS	2	0.9	38	40	26	12				1	0'-4.6' Black to yellow- coarse SAND, som moist, fill.	brown, l e fine g	oose, fin ravel (CO	e to AL),		ng with ollow-stem
ss	2	p.1	10	9	3	7		-	man of mar we form	2	Dk brown, loose, SAND &silty CLAY vet.	med.sti; ,tr. grav	f, fine vel & orga	co coars unics,	e	refusal at
SS		0.7		28	100/0		167 5	5		3	4.6'-19.3' CP	IMSBY FM	•		4.6*-	
NX	2.5	2,5	100	ROD Z 0.4/ 16	FT 1 2 ⁵ 1	MIN 3 3 ¹ 2	453.5	(c		ņ	Ok reddish brown v.soft slightly fine grained to	to pale to comp: microcry	green, hi letely we stalline	ithered, inter-	water.	
**********					1	21/2				R	bedded SANDSTONE weathered to cla	& SHALE.	shale co	ompletel	ally d	occasion- ecreasing
ХИ	5.0	5.0	100	0	2	2½ 3-1/6				U	norizontal with separations, 6.0	occasiona	l bedding	plane	at fra	ctures.
	- "				4	41/2	446.9	10-		2	rough, no coatin	g	ref]	~ 1.8.1.1.23 g		
						72	ਜਾਬ≱ ਤੋਂ				·····					
						4				-	Dala sysanish	tira		h ra		
					2	6		-		Ü	Pale greenish wi slightly weather	ed, fine	grained	SANDSTOR	vk,	¥
NX	>.0	4.5	98	3.0/	3	414 414		15	Ì	3	horizontally bed (yellow-brown)					
		-	W-100 AND AND MINORAND	***	5	4		*** ئىرىد ***								
		***************************************	***************************************			<u> ,, </u>				-					on Boundary	
NX	4,9	4.8	98	2.9/	2	434 534		## ##		R U						
			Authorite	59	4	35; 35;				N 4	19.3'-41.3' P					
					0.9	3-3/4		20 -			Dk, reddish brov green to white t	o med. t	o dk. gra	y, v.	1	
		<u> </u>	·	ļ		<u> </u>		-		\vdash	soft to v. hard, weathered, v. fi	ne grain	ed to mic	rocrys-		
					1 2	415		-			talline, interbe DOLOMITE, & calc				r8	
NX	5.0	4.9	98	3.0/	3	41 ₄ 5		-		N	is thin, horizon	tal, irr	egular wi	th		
					5	4		25 -		5	occasional beddi			- •		
		!		44.				-	İ		20.0-20.3 Vert					
					1 2	4 3-1/6		***		R	21.5-21.8 irre	gurat, D	o coaring	™ *		
ξX	5.0	4.7	94	3.7/	3	3≒₂			j	N N						
			-Machanden dan	74	4 5	3-3/4 3-3		30 -		6						
			000 000 mm 000 000 mm	We will be the second		awww.martha		-	A. A. C.						1	
			,	*	4					H						
TX	5.0	4.9	98	4.8/	3	3	8			8					*	
2			A and a second	96	3	3⅓				N 7						
			LPOON; ST De; F = Pi				rę Dan	1A1		<u></u>					HOLE NO.	
			1/82 (For				าสุก	ielev	*TCZ	r.0	· · · · · ·			***********		D-7



		E	3()F	31	NG	L	0	G	-	*&>#C		ner	set Railroad	14818	Zorz	MOLE NO.
1444	MUNAVO		····	LUNCTON			ETR BLO	ATI			t	O.F. ATION			<u>.</u>	NOT	j (* G #:
医甲基甲甲基苯甲甲甲甲甲甲甲甲甲甲甲甲甲甲甲甲甲甲甲甲甲甲甲甲甲甲甲甲甲甲甲甲	MANAGER ADVANCE	# WINTER COVER	大学 大学 ない	SACIE BILLIONS	が呼吸の表別で のり B の 事業 新食の 2 8 8 2 2 3 2 3 2 3 3 3 3 3 3 3 3 3 3 3					ÆL≅VATION (FΥ.)	DEPTH. FT	UNIFIED SOIL.	SAMPLE	DESCRIPTION AND CLASS	HIPICATION	WAT CHA	KR LEVELS, KR RETURN, NACTER OF LING, KTC.
				w		RQD ;	FT	1	MIN		_		7	19.3'-41.3' POWER GLEN F	K. (cont.)	-	
ΝX	44	\$.0	10	5	3.5/	1 2 3 4 0.		3.5 5 5 5 5	417.1	40		R U B	41.3'-46.6' WHIRLPOOL FM.		with 3-	ole reamed -3/4" roller t to 45.5.
NX	5.6	The section of the final section of the section of	***	10:	2	3.5/ 7G	12345		4 4 4 4 4 4 4 4	411.5	45		R U N	Grayish white, hard to v. slightly weathered, fine grained SANDSTONE, slight bedding massive with band 43.3-44.6 Vertical joints no coating. 45.3-45.7 Joint at 66°, v. rough, no coating.	hard, fresh ito medium ly calcareous, s of shale, , rough, ertical joints		
														Boring completed as observ See observation well compl for construction details.	ation well.		d interval
						SHELE			!	ite Dani	elevi	cz l	Rou	te	. 	HOLE NO.	D-7



		В	ORII	NG	LC)G	tribulation (ምቶ ር ት 3 ሞ		er	set Railroad		JOE №0 14	818	HEET NO.	D-49
17K			; * H				COORDINA	7 11 1	Will						**************************************	******
		Mark					N 1,16				468,422			90		* *
	™ 8/8:	1	0/28/81	B.S		/Empir	æ				c Skid	(INCHES) NX/6	0.9	MT.] #6	жеж (FY.) 49.6	50.5
. o e e			¥ [FT.[%]	COM			#1 KL TOP 0		spa (\$		OUND EL,(FT.) DEPTH/		WATER (FT	.) DEF		PROCE (PT.)
	-	2/97	# WEIGHT		4	1	461.		.evar		459.8 37.	5/422.2			1.4/458.3	5
200 440 7								• (2)				Stone/D.	Middleto	n		
11	2 2	* *	* *		ETRA'				30						- P	
F. T. Y.	A D C A	GONE MACOVER	SOU ASSOURANTE SOU AS	ļ	BLOW:	>	ELEVATION	DEPTH FT	UNIFIEG SOIL	****	DESCRIPTIO	N AND CLASS	HFICATION		HOY WAY	集集 公刊。 "推荐 上张父称仁'》。 "张祥 将张子位司托。
TE OSAN	LENGTH	2	NAME OF STREET O	·		i.	(FT.)	OE T	ASSIF	*					20 M 14	HACTER OF LLING, RTC.
ž ž	MAN.	SAMPLE CORE	1	181	2	<u>\$</u>	459.8		29							
		1		RQD			458.4		1		Top of Rock	IMSBY FM.	PUAT D.			
							430.4		-	R	SANDSTONE, SI interbedded 60- SANDSTONE & SII			aun ta		
NX	5.0	5.0	100]	N N	pale green to	t. gray,	fine to	v. fine		
										1	grained, thin-b medium hard to	hard, fr	esh to mo	derate.	ly 10" hol	low stem
								5 -		-	weathered, cros green blotchy p				auger t	used to a of 1.4', 8"
								,	1	R	gradational cha	inge betw	een sands	tone	PVC sur	face casin
NX	5.0	4.7	94	0					1	Ú	SHALE: dk_red				cemente	ed in place
									}	N.	soft, moderate	y to com	pletely w	eather	SVI I	used as ng fluid.
	A sales and a sale		A + 101 - 10					10	4	2	to clay. Beddi stained w/clay					
		<u> </u>	n						1		9.7-10.0, 12.1, 14.2-14.3, 14.6				9.	
NX	2.4	2.2	91	17					1	EK TJ	16.1-16.5, 22.5 Vertical joints			-7.9.		
		***************************************	#### W	WWW.						3	8.1-8.7.	(3- 2		,		
	<u> </u>		and the same of th						4							
NX END	4.0	3,6	90	22				15		R U						
BOX			**************************************						1	N						
1	<u> </u>	-		ļ]	4			•			
NX	4.2	5.0	119	98			* .			R						•
								20 -		И						
							122 0			5						
***							437.8]	R]22.0'-45.1' PO SHALE, DOLOMITI	:		ι		
ΝX	5.0	4.5	92	56						U N	calcareous SANI SHALE: med,-dk,	gray, ti	hin-bedde	d to		
								25	1	k	fissile, med. } completely weat			fresh	tq	
								23 .		Ϊl	Fossiliferous, DOLOMITE/calcar	burrows,	clay inc	lusion	8,	
								:			1t-med. gray, i	ine grai	ned, thin		i,	
NX	 e ^	2 0	98	44				-	- The same of the	R	hard, fresh, fo bedded, clay in			E-		
ND	4, د	**, 7	70	44] :	1	N					We man was to be a second	
OX 2		**************************************	<u>}</u>					30	-	7					**************************************	
· · · · · · · · · · · · · · · · · · ·		}							*	-						
NX	5.0	4.8	96	52					Annie	R U						
		***								N					ļ	
							424.8			8						
			PDON; ST			-, ,	TE	ı De	Manale	i			***************************************		HOLENO	D-49
·	- 50		**************************************	n 10070			. var	. 1765	ist IK	****						N-43



		В	ORII	NG	LC	G		#DIEC		rs	et Railroad	14818	1	TNO.	наык мо. D-49
AND DIAMETER	TAMPLER ADVANCE	SAWPLE RECOVERY	HADO INSTRUMENTAL PROPERTY.		ETRAT		#LEVATION (FT.)	DILETH: FT	UNIT IED SOIL. CLASSIFICATION	B. 12.7. 8	DESCRIPTION AND GLAS	MFICATION		WA: WA:	PRS GN: PRR LEVELS. PRR METURM, SEACTER OF GLING, STC.
NX.		5.0	100	70		•		40		RUN 9	24.9, 25.0, 25.2, 25.5, 32	tained &/w 23.9-24.3, .2, 32.4, 33 5-42.2, .2-45.5.			7_
NX END BOX 3	5.0	3.9	78	38			414.7	45		U N LO	45.1'-50.5' WHIRLFOOL FR SANDSTONE: lt. gray, fir thin-bedded to massive.	ne grained, hard, fresh	•		
NX END BOX 4	4.0	4,5	112	10			409.3	50		N LI	unknown black mineral gilook. Cross-bedded, occings. No joints or fracesection. Ecttom of hole @ 50.5%. Boring completed as observell.	c. shale par ctures in th	t- is	Diam. 1 Obsv. 1	reamed 6" to 58.0'. well led to 51.3'
											See observation well correport for construction				
			OON: ST -			1	SITE V	an De	Mar	k				HOLE NO	D-49



				ייםי	\ <u>\</u>	1	$\overline{}$		PROJE	c 7			,	JOB NO.		SHEET		HOLE NO.		
		E	5(RII	1 G	L	JĠ	T-=		Som	er	set Railroad		148			9 3	D-50		
Van De Mark							N 1,160,983 E 468,415							90°	AURIZ.					
V.				RPLETED	DRILLI		-		-			HE AND MODEL	HOLE SIZE	OVERBURGE	H (PT.)	ROCK	/- T.)	TOTAL DEFTH		
	13/8	i		0/16/81		Empi				CME			NX/6	2.8			7.8	90.6		
			RY	(FT./%)	6	BOXE	S SAMPL	462.		NG		460.8 44.2	#L. &ROUN /416.6	D WATER (FT.	, (458.0	F #OCH (FT.)		
	65/9		164	WEIGHT/	i -	CA		FT IN HOLE:		ENGTI		LOGGED BY:	7410.0			2.07.	*20.0	<u> </u>		
14	0#/3	30 "										J. C.	Isham							
w E	RUN	È	¥ .	, W 3 E	PENI	ETRA				_z										
DIAMFTER	COMERU	RECOVER		SAMPLE BLOWS PERCENT CON	-	LOWS		ELEVATION	F #	UNIFIED SOIL	1	DESCRIPTIO	N AND CLAS	SIFICATION		-	NOTES ON WATER LEVELS,			
700	E .			PERCEN		•	<u>.</u>	{ ₽ T. <u>1</u>	DEPTH . FT	SSIF	SAMPLE	<u> </u>				i	DRIL	RACTER OF LING, ETC.		
AND	SAMPLER A	SAMPLE	ě O	{ } *	151	Q.	<u>2</u> 74€	h 460.8	Ĭ.	2 g										
ss/	2.0		5	17	25	13	4/3		-	1	1	0.0'-2.8' reddi	sh brown	weathered	&		5" holl	ow stem		
2"			-	REF.	25	13	4/3		-		ľ	fractured shale & sandstone. Top of rock.					sed to a of 2.8 ft.			
	• -	Ľ						458.0	-	}	2									
		-			RQD Z]								ing install of 2.8		
NY	NX 5.0	3	- 7	74	13	13	-		5.]	R	2.8'-22.8' GRIM	SBY FM.:	reddish	brov	WTL 1	ft.			
.,4	٠.٠			, ,						}	N	sandstone, inte	led reddish brown & pale green e, interbedded with reddish		7	Water used as a				
											1	brown shale, sa to thinly bedde					irillin	ng fluid.		
		+	+		-				-		\vdash	with cross-bedd				oma i		llow stem		
									-	}		horizontal. Shale, weathere	d to fir	m.			iepth c	of 2.8 ft 8		
NX	5.0	5.	۰0	100	64				10	}							8" PVC surface casing cemented			
										}	R U					:	in plac	e after		
										-	N						√X cori	.ng.		
			\downarrow						:	}	2							level: 7.45		
										1							at 22.8	31, 18.45		
NX	NX 5.0	5	.0	100	58	58			15-	1	R					10-16-8 at 85.6	31 boring			
									13.	1	ע						- •			
										<u> </u> .	N	16.3'-22.8' Bas	al unit	of GRIMSBY	FM.	.				
		╁	\dashv					T	-	1	3				•					
							cker		:	1										
NX	5.0	4.	85	97	56	#7 7.7	Bt		20-	1	R									
							7 × 10	- 6		1	U									
						cm	sec		:	†	4									
		+-	+					<u> 438.0</u>	:	†	-	22.8'-45.95' PO	WER GLEN	FM. •						
YL62	5.0		ا ا	100	54				-	1		Dark reddish br	own to p	ale green						
ΝX	o,0 		٠	100	ا بەر 		;		25-	1	R	grayish green, slightly weather								
		1	- 1						-		N	microcrystalling sandstone, shale	e interb	edded calc						
			[-	1	5	horizontal bedd:	ing with	slump str						
			i					T	-	1		& cross-bedding some joints, ver			ing	on				
NX	5.0	5	.0	100	78		cker		-	1		22.5-22.8, 25.2								
						Te #6			30_	1	R U									
		!				4.	8 x 10	-4 	:	1	N	Horizontal frac 23.1'-23.45', 2								
		į	-			C	n/sec		:	•	6	, _ , _	- · · ·	-						
NX	2.8	2	.8	100	14		<u>; </u>		-	1	R U									
								']	:	1	И									
		<u> </u>					l le	425.8	3 <u>5</u>	1	7						<u> </u>			
31 5	- DE	PLIT	SON	00N; ST	- SMÆLB - CHER;	Y TUB	E; SI Her	TE V:	an De	Mari	k					'	HOLE NO. TI	-50		



BORING LOG																	er No. House No. or 3 D-50		
PER CIPERTER	PENETRATION BLOWS RELEVATION BLOWS RELEVATION BLOWS RELEVATION FOR BRIDE STREET RELEVATION FOR BRIDE FOR B						t	PT.)	DEVIK.FT	UNIFIED SOIL CLASSIFICATION	EAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, EYC						
NХ	5.	.0	5.0	1	00		90 Z							R U N	22.8'-45.95' POWER GLEN FM. (cont.)				
nx	5.	, a	5.0		00		71	Tes #5 5.2	x 10	4		40		8 R U N			 7		
NX	5.	.0	5.0		00		90	Annual Accounts and the second		41	4.85	45		R U N		The state of the s	<u> </u>		
nx	5.	, Cal	5.0	***************************************	00	A A A A A A A A A A A A A A A A A A A	94	Paz Tes #4 Zei	o.			50-		R	45.95'-56.5' WHIRLPOOL FM.: Gray to lt. gray, v. hard sandstone, massive to thin bedding, iron oxide staining at some joints with black shale partings.				
NX	5.	0	4.7	MININGONOM THE TOTAL TAX TO THE TIME TH	94		56			4	04.3	55		N 12	56.5'-90.6' QUEENSTON FM.: Dark reddish brown, firm shale, banded and mottled with blue-green shale, calcareous, fresh, massive, some open and calcire filled vugs. Core breaks along a preferential plane of weakness at an				
XX	5.	.0	5.0	3,444	00	A CAL MAN AND ANALYSIS AND ANAL	68	Pac Tes #3 Zes Flo	ro	and the state of t		65		R	a preserving plane of weakness at an angle of 20° to 30° from horizontal. 56.5-57.3 soft weathered blue-green shale				
NX	5.	O THE PARTY OF THE	5.0		00	A CONTRACTOR OF THE PARTY OF TH	86							R U N					
NX	5.	0	4,8	Model Made - Syconomic Policy - Non-Sprenser	96	A MANUSAN SANDAN AND AND AND AND AND AND AND AND AN	45	Pac Tes #2 Zes Flo	o			70-		R V N					
##	- 81 D:16	#£1	T 850) () () ()			(##) O			ITE	85.8	75 Tan	De 1	Mar	k	HOLE NO.	D-50		



BORING LOG		2 #1 C #4			et Railroad	14818	3 DF	
PENETRATION STATE OF	L	- -	_ <u>₹</u>	***************************************				NOTES GN: WATER LEVELS、 WATER 研究では同い。 CMAPACTER GF
SAMPLES AND ST. PRECENT PRECEN	385.8	ă	CLAS	ě		(cont.):	Washington A. A. A.	DAILLING, ETC.
NX 5.0 4.9 98 89		80-		R N N	/5.7-/5.85, /6.1-/5.3, 90. Mottled zones of dark red- green shale:	3-69.8. 3-90.6. brown & blue		
NX 5.0 4.9 98 60 Flow		85-		R U N				
NX 5.0 5.0 100 74		90		R U N				
	370.2				Bottom of Boring: 90.6 ft. Boring completed as observable seems of the	vation well.		ring reamed to Diam. to 91.0
SE = SPLIT SPOON; ST = SHELBY TUES; D = REMNISON; P = PITCHEN; O = QYHER	SITE Van	De Ma	rk	.		речения положения по	** 0£	E NO. D-50



			B(ORII	YG	L)G	*			TS:	t Railroad		14818	1 CH		##\$ LE NO. D=\$1
ITE	1	Vai	n De	Mark				N 1,1		1]	468,399		# · · · ·	90°	HØ#12.	SEAGINS
	2/8		1	WFLETED 0/21/81	J.	Lamb/	Empire				Cì	DE 45 NX	₹/6	1.0	42.	. 3	43.3
	9.8			(FT./%)	3		# 2AMPLI	461.		ING	4	459.5 16.9/4		WATER (FT.)	1.0/45		P ROCK (FT.)
₩ 7			/30"	WEIGHT/	** 4 4.6	Ç.	**** C#*	T IN HOLE;	0+A./L	E NG T	H	LOGGED BY: D. Mid	idletor	1			***
***	ABVANCE		COVERY	**************************************		TRA		ELEVATION	t.	CATION	274	DESCRIPTION AND	D CLASS	ification		₩07 ₩47	Es ON: Es Levels,
MELENCIS COLC	SAMPLES		COME MECOVER	ON AND ONE	157 4	, s gaz	7# Q #1	(FT.) 459.5	DEFTH-FT	UNIFIED SOLL CLASSIFICATION	# * * * * *				The second secon	-	BE TETUTH, BACTER OF LLING, ETC.
2		-	j					458.5		1	R	0'-1.0' Reddish brown, we: SHALE & SANDSTONE 1.0'-21.7' GRIMSE	athere	ed & fracture of rock.			amond core
NX_	_2.	الة	2.0	61	RQD 2 30	· · ·			•		1	1.0'-21.7' GRIMSE Dk.red-brown to pai grey, fresh to seve to med, hard, fine	te greers	en to green t weathered, so	oft !	Water drill: 10" he	used as ing fluid. ollow stem
¥Χ	5.	0	5	100	0.8 16	and an analysis of the state of			5.		U	crystalline interbe SILTSTONE, SHALE, s completely weathere cross-bedding & ban vertically jointed, present, 15.5'.	shale : ed to : nding.	friable to clay occasion horizontally	nal 7 & 1 ings	depth PVC si ceweni Lost a	used to a of 1' & 8" urface casived in place
X	5.	0	4.8	96	2.4 48				10		2 R U N	7.6'-8.2' vertics yellow brown cost		cture with	1	10-22-	level: 6.2 -81 am g logged fr
ĬΧ	5.	0	5	100	3.6 72	•	W	444 _* 0	15.		RUN 4	15.5'-21.7' GRIMS Pale green to gra		•	4.		
۷X	5.	0	4.9	98	2.7 54		The state of the s		20		R U N	fine grained, SAN joints, zone of g vertical joints a 22.2.	NDSTONI STEED (E few horizon clay at 20.2,	ital		_
					many w			437.8				21.7'-43.3'POWER Dk. red-brown to to gray, fresh to	brown	to pale gree			
ΝX	5.	D	¥3	100	0.85 17				25	Landing Comments of the Base	R U N 6	soft to med. hard microcrystalline LIMESTONE, calcar DOLOMITE, siltsto banding & slump f zontal & vertical occasional yellow	i, find interl recus l one, co feature l joins w brows	e grained to bedded SHALE, SANDSTONE, ccasional es, hori- ts present, n coating on	. !		
VX.	5.	0	3.5	70	0.8 16				30		R U N	joints, few vugs. SANDSTONE. Vertical joint, s sandstone at 23.4 and occasional vu vertical joint to clay zone at 24.4	staine 4'-23. ugs. 2 o weat	d, in cale. 55', 23.8'-24 4.0'-24.4'	- 1		
			- 4					424.5	~-	1							,
<u>*</u>	* -	2F1	.iV SI	*************	= 90EL# 50M##;	Y 7U#	• 1-	TE	کڌ			Van De Mark			н	OLE NO	



	B	ORI	NG	LC	G		BOJE¢		rse	t Railroad	14818	2 05		D-51
AND DIAMETER SAMPLER ADVANCE LENGTH CORE RUN	COMPLE RECOVERY	SAMPLE BLOWS	PEN	ETRAT BLOWS		SURVATION (FT.)	TH. H.L.	UNIFIED SOIL CLASSIFICATION	*****	DESCRIPTION AND CLASS	IPICATION		WATE WATE CHAR	S ON: P LEVELS, P RETURN, ACTER OF LING, EYC.
NX 5.0	4.8		RQD X				40-		R B R U	21.7'-43.3' POWER GLEN F Vertical fracture from h joints at 23.2'-23.6'.		to	Boring 0 6" di 0 43.3'	reamed ameter
NX 5.0	4.8	, 40	0.6			416.2	-		9	Boring completed to 43.3	*			
							45	And the second s		Boring completed as obse See observation well com for construction details	pletion repo	1		
								ber der der der der der der der der der d						
			Woman Bir An Jahr An San Land An San Land Anna Cana and Anna Anna Anna Anna Anna Anna An					where the same three thr				**************************************		
				Salahan Amerikan ka										
11 - 17L						i TE		Compared among former former flowers flowers and the second flowers fl	The state of the s	Van De Mark		HO	NE NO.	D-51



		B	ORII	YG	L()G		PROJEC S		:50	t Railroad		14818	1 "	et Na. of 3	D-52
11 T CC				- Manue	#IIII		COURDINA						ANG		M MORIZ.	*EARING
26		co	Mark Mark	DAILL	.		N 1,16				E 468,308	OLE SIZE	OVER602084(F)	90°	(FT.)	TOTAL DEFTA
	/14/		10/23/8	į		en/Em	ire	# CAB	CME			NX/6	1,5		88.7	90,2
	0.8/9		,		é	1		T.)					12/15/81)		/465.0	
			WEIGHT/		CA	-	TTIN HOLE:	DIA,/L	ENGT	H	LOGGED BY:				***************************************	n. 40 1000-12-2
	140#								ľ		J, C, I	sham/D.	Middleton	.,,		
	SOLANCE ORERU	COVER	T CORE		ETRA		ELEVATION	. Fr.	SOIL	71.15	DESCRIPTION :	ANS CLASS	ileira TiAbi		HOTE	BE ON. Be LEVELS,
AND DIAMETER	MANALER ADVANCE	日本日本の日本の日本の日本の日本の日本の日本の日本の日本の日本の日本の日本の日本	HAMPLE BLOWS "E." FRACENT CORE RECOVERY	1\$T #**	ONX	- 045	(FT.) 466.5	DEPTH-FT	UMIFIED SOIL CLASSIFICATION	MANUEL E					サスド! ∈以み! 日本!モ	KM 有限外验税处。 作品之下部件 口炉 上5种条。 张下也,
SS 2	18	8	105	5	5	100	465.0			1	0'-1.5' Red brown, fine t trace clay & pebb	o coars	e grained SA	ND,		sed as dril
ıχ	5.0	5.0	100	RQ02 17				_		R U					ing flu	
3								•		N	1.5'-32.6' GRIMSI mottled reddish b	rown a	nd pale gree	n n	Lost 50 at 2'.	% of water
								5 ~)	sandstone interbe brown shale. San	dstone	is hard, mas			low stem
						j		-		П	to thinly bedded, with cross-beddin	g at ap	prox. 20° fr	om		sed to a f 1.5' & 8'
	1.0		100	0					ľ	2	horizontal. Shal some alump struct	ures fr	athered to f acture	irm	surface install	casing ed &
X	1.3	1.2		0				-		3,	spacings .1' to . Vertical fracture	s at: 6	.0-6.5, 8.0-	9.0,	cemente	d.
IX_	.2	. 2	100					10 -		ĸ	13.0-13.3, 16.5-1	7.0, 17	.6-31.0			
X.	2.0	1.6	80	0		A		10 -		7						
								-		MOSC MAS						
X.	2.0	2.0	100	0				-		6 R						
ſΧ	4.0	3.7	93	35						U N						
								15 -		7						
								-		R-						
				*				•		D N	•	•				•
IX.	2.9	2.9	100	39						8				i		
								20 -	1	S F				•		
ľΧ	4.1	4.1	100	73				-		N						
								-	1	9						
	 _	<u> </u>	<u> </u>						1	ĸ						
ΥX	5.0	4.8	96	50				25 -		D N	25.0'-32.6' GRI	MSBY PM	. hasal outr	_		
									1	10			a commentation lebels in the	-		
] -	1						<u> </u>	
		-						-	1	84. U						
X	4.9	4.9	100	29				30 -	1	U N						
	A CONTRACTOR OF THE PARTY OF TH	!								n						
		Woodanger				1	433.9		-		32.6'-54.6' POW			oren		
				·					1		pale green & bl.	ue-gree	n, interbedd			
							431.5	35 ·			satthernia and s	THE LE				
*	* - 51		POON; ST			-,	TE V	en De	Mer	-					HOLE NO	D-52



		E	3(ORII	٧G	LO	G	•	-401EC	r		Somerset Railroad	14818		et no. of 3	not# ≈o. D-52
AND DIAMETER	PANFLES ADVANCE	SAMPLE RECOVERY	トの報子なり まま 単独のり	WANTE BLOOME WAS A STREET CO. L. C.		LOWS		ELEVATION (FT.)	OFFT4-PT	UNIFIED SOIL CLASSIFICATION	W.A.Z.C.F	DESCRIPTION AND GLAS	ŠIF IČATION	A TAY TO THE PARTY OF THE PARTY	WA1 WA1 CM3	TS DH: ER LEVELS, ER RETURN RACYER DF LLING, ETC.
	4.8			98	RQD Z			431.5	And Anderson Andread A		R U N	bedding horizontal fractu .2'5' spacings. 34.3-36.0 blue-green-sands 36.0-37.5 dark red-brown s 37.5-38.1 mortled green &	s & cross- res of appro tone. hale.			
XX	4.4	4	.4	100	69	1			40		R U N		etone.			
4X	ro.(0.0	100	76				45		R U N					
		ALLA LA ALLA LA ALLA LA ALLA LA ALLA LA	AAVAAVAA AAVAA				1."		50					MAY AND COMMISSION OF THE PARTY		
1X	10.	9	40	98	The state of the s			411.9	55		15	54.6'-65.6' WHIRLPOOL FM.: hard to v. hard fresh sand to thinly bedded horizonta stained with FeO, 55.3. Vertical fractures: 55.3-5 56.0-57.1, 58.3-59.1.	atone, mass: l joint	ive	pH of fluid	drilling is 9.5.
		MANON AND AND AND AND AND AND AND AND AND AN	The second section of the property of the second section of the section		The state of the s		3			The state of the s	RU					
IX :	10.(\$.6	96	24		and an arranged to the contract of the contrac	400.9	65	And the second s		65.6'-90.2' QUEENSTON FM: brown with blue-green moto massive shale, horizontal spacings, some joints at 2 65.6-66.1 blue-green 66.1-68.2 dk. red-brown	ling, soft joints on . 10*-30°.			
		A SHIPPING TO THE PROPERTY OF	And the second s		and the state of t	Pack Test #2 Zero Flow		391.5	70		Ì	68.2-68.5 mortled green & 168.5-74.4 dk. red-brown 74.4-75.7 banded green & re				
35 :				ON; ST =				itte	Van De	e Mo	<u> </u>				MOLE NO	D-52



Penetration Blows Penetration Blows Somewhat failtened 14918 3 ° 3 D-52	BORING	LOG	PROJECT	108 MG.	SHRET NO. HOLE NO.
RX 10.010.0 100 70 Packer Test #1 2erc Flow 1 80 376.3 90 Section of boring 90.2 ft. Soring reamed to 6' 3oring completed as observation well completion report for construction details.			Somerset Railroad	14818	3 ° 3 D-52
RX 10.010.0 100 70 Packer Test #1 2erc Flow 1 85 18 18 18 376.3 90 2 85 2 85 2 85 2 85 2 85 2 85 2 85 2 8	AND DAME TER AND DAME TER AND TER SECOVER TO THE RECOVER TO THE SAMELE RECOVER TO THE SAMELE THE THE THE THE THE THE THE THE THE TH	BLOWS LEVATION G. G. G. G. T. J.	ONA LITER OF SCHIPTION AND A	CLASSIFICATION	WATER LEVELS, WATER AETURN, CHARACTER DF
376.3 90 Bottom of boring 90.2 ft. Boring completed as observation well. See observation well completion report for construction details.	RQD ;	Packer Test #1 Zero	U 77.1-77.5 green N 77.5-78.6 dk.red-brown 78.0-79.15 green 1779.15-79.55 dark red-br 79.55-79.8 green 79.8-90.2 dayk rod-brown	· own	
Bottom of boring 90.2 ft. Boring completed as observation well. See observation well completion report for construction details.	NX 6.9 6.9 100 75		85 - N		
		376.3	Bottom of boring 90.2 f Boring completed as obs See observation well co for construction detail	mpletion report	Boring reamed to 6 diameter to 90.2.



Constraint Con		8	3 (RII	٧G	LC)G		学典众 多聚。		œT:	set Railroad		14818	, "	et no. o≠ 2	D=53
10/15/81 10/17/81 J. Genever/Impire CGE 458 SETHING TO THE CONTROL OF THE CONTROL	ive Va	an	De	Mark						26		E 468,353		A%4		₩ MORIZ,	BEASING
1.0.91 3 2 469.18		81	10	/17/81			es/Emp	ire		CME	4:	5B	NX/NQ*	2,6	4	3, 3	45.9
D. L. Middleton D. L. Middleton Description and Classification Description De			RY	[= =./ %]				1 6	FY.;	36							严用吸血性(护工)
Section Sect			£*	WEIGHT/	FALL	¢#	HNG LE	FT IN HOLE:	DIA./L	EHATE	4	-	ldleton				
10'-2' Reddish brown, Fine to coarse 100 100 10 100 10 100 10 100 10 100 10 100 10 100 10 10 100 10 100 10 100 10 100 10 100 10 100 10 100		NECOVERY	FECOVE*Y	NA COAR	•	BL OW:	5		12.11	IED SOIL	SAPLE.	DESCRIPTIO	N AND CLAS	SIFICATION		ТОИ Таф Таф Таф	服金 GM, 教件 LWVを155。 教件 用水下UMN, 産品の実件内 むき
10 2 2 2 3 4 2 3 5 4 2 3 5 4 2 5 5 5 5 5 5 5 5 5	A		# OU	A SE		S GNE		A67 A	"	CLASS	*					D#(L	LIMG, KTC.
Sociation Soci			.7	49	20	35	14	407.4		1	1				<u></u>		
NX 5.0 4.7 94 7 R	ss 0.6	6 Q.	. 2		ļ			464.9		4	2		***************************************			2.6 ft	to contain
fresh to severely weathered, soft to medial Lost 107-15% of water at 26.6. AND STONE, SHALE, horizontal cost and shall be bedding plane separations, yellow-brown coatings present in some joints, joint spacing range 0.05'- 0.8', yellow-brown stains in horizontal joint sate first part space of redshire to a constitution of the part of the pa		-		•	RQD X						R U	moderate amount	of fine		•	10" ho	
NO S. 7 5.7 100 47 R Cocasional shale 5 bedding plane separations, yellow-brown coatings present in some joints, joint spacing range 0.05'- 0.8', yellow-brown stains in horizontal joints at 6.6', 15.9', 16.3'-16.6', 26.3', 30.9'. R U N S. 7 100 47	NX 5.0	4	. 7	94	7				5-		1	Dk, red brown to fresh to severe hard, fine graf SANDSTONE, SILI	o pale grally weath ned to mu STONE. S	ered, soft to icrocrystælli MALE. horizen	med. ne tal	Lost a	at 26.6.
Packer Test 10 9.3 8.8 95 17 Packer Test 10 10.0 10.0 10.0 100 29 Packer Test 10 10 10.0 10.0 100 29 Packer Test 10 10 10 10 10 29 Packer Test 10 10 10 10 10 10 29 Packer Test 10 10 10 10 10 10 29 Packer Test 10 10 10 10 10 10 10 29 Packer Test 10 10 10 10 10 10 10 10 10 10 10 10 10 1	NQ 8.7	8	7	100	47				10	and the second s	R U N	Occasional shall tions, yellow-b some joints, jo 0.8', yellow-br joints at 6.6',	e & bedd frown coa fint spac fown stail	ing plane sep rings present ing range 0.0 as in horizon	in 95'-	Water	
Packer Test 92 1.3 x 10 1.41.4 1.41.4 1.52 1.53 x 10 1.53 x 10 1.54 1.54 1.54 1.55 1.5	ND GX 1 NQ 9.3	3.	6	95	17				***		U N			,			
R 25.3"-27.0", vertical joint w/rust colored to red-brown to black coating, 28.3'-29.2' dk. brown to black stains, presence of reddish-brown dots about the size of a pin head. 29.4 - rust color dots. 30.0 - thin zone of black dots about size of straight pin head. 30.9 Horizontal joint w/yellow-brown stains. 434.3 33.1'-45.9' POWER GLEN FM.		**************************************				Te #2 1.	st 3 x 10	-3	25-	And the state of t	3	Mottled pale brown, v. han weathered, f: horizontal & w/yellow_brow	green to rd, fresh ine grain vertical vn coatin	white to rec to slightly ed, SANDSTONI jointing gs.	E		
33.1'-45.9' POWER GLEN FM. SS - SPLIT SPOON: ST - SHELBY TUBE: O - SENNISON: F- PITCHER: U- OTHER	10.0	The property of the control of the c) *	100	29	c	1/sec				u	colored to reing, 28.3'-25 stains, presedots about the 29.4 - rust of 30.0 - thin a size of straing 30.9 Horizont	ed-brown 2.2' dk. mice of r mice size o color dot one of b ght pin	to black coat brown to blac eddish-brown f a pin head. s. lack dots abo head.	t- ck. out		<u></u>
SS = SPLIT SPOON; ST = SHELBY TUBE; SITE HOLE NO		-	***************************************			W. W	MANAGEMENT A 1 Phone Street			The same of the sa		33.1'-45.9' P	ower glen	FM.			
NOW NAMED							• 1	TE	YFa *	. tr-	<u></u>	***************************************				HOLE NO	



			Е	()F	?	NG	LC)G		3≥.0 **	T omer	se:	[ET NO. HOLE NO. of 2 D-53
	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	LENGTH CORE RUN	SAMPLE RECOVERY	CORR BECOVERY	SMOUTH MILESON	PRECENT CORR	PENI	ETRA1		FINUATION (FT.)		UNIFIED SOIL CLASSIFICATION	2×2×4	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, STC.
NQ		•		The state of the s	10	0	RQD X	Pac Tes #1	ker t 4 x 1 /sec		40 -		RUN	33.1'-45.9' POWER GLEN FM. (cont.): Dk. red-brown to white to green, v. sof to med. hard, fine grained to micro- crystalline, SHALE, LIMESTONE, cal- careous SANDSTONE, DOLOMITE, SILTSTONE, occasional separation along bedding planes. Vuggy zone at 35.0-35.6 dk. red ppt. in vugs. Minor amount of vugs at 39.6. Yellow-brown stains in horizontal joints at 36.0, 38.3, 39.6.	
Send 3										421,5				Boring completed at 45.9 ft. Boring completed as observation well. See well completion report for construction details.	Boring reamed to 6" diameter following coring. Reamed to 45.6'.
11 D							SHELBY CHER: Q		• 1	HTE Van	De M	lark	11		MOLE NO. D-53



		B	0	RII	٧G)G	a.m. 10 1000	7# O J K.	.,	c	omerset Railroad		1481		1 0 = 2	D=54
T R			_		7 74	· •	_ \	CODSOINA	781		٠	omerose seriidan		1 7407		FROM HOR12.	
V.	an I	e M	ar	k				N 1,16	0,66	0		E 468,316			Mark Control of the C	90°	
ایده		Î		#1#Y#D	1							KE AND MODEL	HOLE SIZE (INCHES)	CVERBURDE	94 (844.)	FOCK (FT.)	TOTAL BEPTE
		1		/29/81			sen/Em			CME			NX/6	0.7	<u>, , , , , , , , , , , , , , , , , , , </u>	57.1	57.8
	**co 2/94		* (r†J‰}		ik boki 4	E 8 %AA4*2.	468		NG	Ì	66.4 54.4		12-15-81)	1	ети;я⊾, тое «).7/465.7	PF WOCH (FT.)
			E 19 1	WEIGHT!		-	SING LE	FT IN HOLE		ENGT		LOGGED BY:	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		L`		
						· · · · · · · · · · · · · · · · · · ·		****				C. F.	Wall				
æ	2 2				PEN	ETRA				3							
	A 50 4 60 50 50 50 50 50 50 50 50 50 50 50 50 50	# A O O U		00		BLOW	S	*LEVATION	ŀ.	UNIFIED SOIL	¥					HOT	ES ON. Es levals.
₹	z 📮			1 2 0	:	1 .		(FT.)	DEPTH FT	FEE	# 14 P. F.	descaiptio)	1 ARU ULAS	PILICY ! 10M		CHA	TER STURM,
Ž K	SAMPLE LESSOT	***			78T	2	9		ā	35							LLING, RIC.
	,	<u>: 🏚 ' 🔭</u>	-		RQD	*	<u> </u>	466.4			1	0'-0.7'			*****		
X	1.1	1.0)	91	0			465.7] Ri	1	\ <u>Residual Soil</u> 0.7'-35.3' GRIN	(SBY FM.		,	split-	ing with NX -tube core
v	3 ^			E#					.	1	R U	SANDSTONE with reddish brown to	interbed				l to 57.6 f l with 5-7/
٨	3.0	1.5		50	40		voor vojaman	Action and the second	. ا	1	N	green, v. hard	to med.	soft (san	dscone	e) roller	-rock bit
4		<u> </u>	A	1		<u> </u>	<u> </u>	- An annual annual and a second			2	and med, soft to to completely w					t.
			4						5 -		4	fine grained, o	ross-bed	ded and			
AAA		1				AV-VANCOURING VALVAN]	1	R	rocertifeing:					
X	8.0	6.9)	86	30	WWw.					N	Bedding separat	ions@1.	4, 4.7-5.	8		
		***************************************				A second				_	3	(com. weath. &	broken),	9.8, 10.	0 (sl.		
ĺ			A					Andrea]		staining), 12.4 20.8, 21.1, 21.					
-			***************************************					A	10	1		32.1, 32.3, 34. staining).					
	İ		1							1		Vertical joints				şh	
		_	4								\vdash	surface, no sta surface, no sta				-	
m. m.em.e						W#####################################					R	rough surface,	sl. stai	ning, occ	asion		
-			***************************************							}	U N	rehealed), 16.2 surface, stains	d), 18.0	-18.2 (re	healed	1),	
:			anni voccomen						1.5	Sanora Maria	,	23.0-24.1 (unev partially rehea	en, roug	h surface	*		
			W-W-W]				1	4			_	mr mr	and the same of th	
X.	10.0	9.	7	97	65					1						A . shm. neededda	
7							}		:	1		A.					
X		#															
-						1		446.4	20 -	4							
i							1			4							
			-						:	}	Ц					*	
İ	i									1	Ì						
A		ŧ	1			MANUFACTURE VALUE				1							
NAM ANA	1	1	i						25 -	1	R						
,	•					Manifest Ann	I. Harris			4	Ü					and the state of t	
X	10.0	9.	d.	99	95		Par address Par				5						
-			4				1				-						
			1	1		ĺ											
A 1000 MORNING						****			30 -	1							
		í	,			A]							
ļ.,			-	: [Luckus As As As As			1							
ار	}						V) 400		,		П						
3	1		WWW # 1999				VARIABLE			Ì							
				ON: ST				TE	<u> </u>	1				····		HOLE NO	
		*** T F		wer i ST	- ****	BY TUM	- 1 m	. –								. HEILF NO	



			E	3()	R		NG	LC)G		ROJEC Sc		s = t		or 2	D-54
***	3024	COM # CO	*****	* * * * * * * * * * * * * * * * * * * *	BLOWS.		C04#	PEN	ETRA BLOW				TION TION	Γ			
SAMPLER TVE	1 1	LENGTH COM	SAMPLE REC	かい こうりゅう さんじつ はんしょう はんしゅう はんしゅう はんしゅう しゅうしゅう しゅう	THE MILE WAY	A AVALANCE AND A SECOND	NEW CREAT	12.5	2MD 6"	3.50 £''	SLEVATION (FT)	DEPTH. FT	UNIFIED SOIL CLASSIFICATION	#######	DESCRIPTION AND CLASSIFICATION	W.	PTES ON: ktem Levels, ktem Hetumn, iamactem of Hilling, Etc.
NХ	**************************************					95		RQD 2			431.1	40		R U N	35.3'-54.5' FOWER GLEN FM. SHALE, calcareous sandstone, limestone: dk. reddish brown to pale red to pale green to grayish green to med. to dk. gray to white, v. hard to med. herd, fresh to mod. weathered, fine grained to microcrystalline, banded, thin to med. bedded.		
NX SOX 3		Annual months in a control of the co	10			10:	1	99				45		R U N	Bedding separations @ 36.0, 36.2 (stains 51.8, 54.3 (orange & bl. staining) Vertical joints @ 36.0-36.7 (rough surface, tr. staining), 38.3-38.7 (rough surface, no staining), 35.0-35.3 (uneven, rough surface, bl. staining), 53.2-53.6 (rehealed).	d)	
NX	A 23	O	4.	б	9.	2		80		The state of the s	411.9 -	55_			54.5'-57.8' WHIRLFOOL FM. SANDSTONE: white, v. hard, fresh to sl. weathered, fine grained, cross-bedded, with shale partings. Bed. Sep. @ 54.6, 55.6 (orange & black staining) Vertical joint @ 53.2-53.6 (rehealed).		<u> </u>
END BOX 4	*** W. Y. I. I. I. I. I. I. I. I. I. I. I. I. I.	The second secon		The second secon								60			Boring completed at 57.8 ft, Observation well installed. See observation well completion report for construction details.		
								*****		:	}7 %	an De	Ma	rk		MOLE M	o. D-54



		B	ORII	NG	L	OG		PROJE		Sc	omerset Rail	road		148		1 of 2	D-55
SITI		200					COORDINA					LUAU			Anne ser mask och	ROM HORIZ.	BEARING
BEC	UN		n De Ma		ER		N 1,1	A TOTAL OF			468,241		HOLE SIZE	OVERBURD	90		TOTAL DEPTH
	/14/		.0/16/81 * (FT./%)	40000		n/Empi				-	55		NX	2.7		44	(FT.) 46.7
	4/96		. 1- 1.7-1		3	2	469		ING	G K	467.4		/432.8	WATER (F		.7/464.7	PF ROCK (FT.)
117	PLE H	NOW THE OWNER OF THE	R WEIGHT/	FALL	CA	SING LE	T IN HOLE:	DIA./	ENGT	н	LOGGED		. Middle			7	
			N N	PENE	TRA	TION		1 0	T .	T		D. 1	. Middle	LOII		1	
METER	NDVAN	RECOVERY	COR	1.5 1.5 1.5 1.5 1.5 1.5	LOW		ELEVATION	Ė	SOIL	LE	Desc	nimie.	N AND CLAS			90.000	ES ON: ER LEVELS,
SAMPLER TYPE AND DIAMETER	SAMPLER ADVANCE	SAMPLE RE	SAMPLE BLOW "N" PERCENT COR	1ST 6"	2ND 6"	3RD 6"	(FT.) 467.4	DEPTH-FT	UNIFIED SOIL CLASSIFICATION	SAMPLE	DESC	.KIPI IO	N AND CLAS	SIFICATION		CHA	ER RETURN, RACTER OF LING, ETC.
SS SS	2	0.7	17	5 100/ ₂	7	10	407.4			1	0'-2.7' Re dense SANI fine grave Red-brown	L. SC	me angul	ar cobble	S.	casing	surface cemented epth of 3
_				RQD %			464.7		-	R U	SAND, two 2.7'-31.9'	angul GRIM	ar cobbl	es.		Water	used as
X	5.0	5.0	100	· 19		· ·		5		N 1	Dk. red br to v. soft fine grain bedded SAN	own to, freed to	o pale g sh to hi microcr E, SILTS	ghly weat ystalline TONE & SH	hered, inter- ALE.		0% of water
VX	2.0	2.0	100	32				-			shale weat horizontal separation	with s. H	few bed	ding plan	e rizonta	28.2. 1 in high	
					•	- 2 2		10		2 R	to 30° in in some jo	ints.	on oxide	stains p	resent	fractur zone.	red vuggy
XX	2.0	1.6	80	0						N	Yellow-broat 13.1, 1	wn st. 8.2,	ains in 1 23.1, 23.	orizonta 3, 25.0.	l joint:	at end Metal	d core bits of Run 4. from auger at bottom
ΝX	5.0	4.7	94	16				15 -		R U N						hole. diamond at end used of	Lost I core bit of run 4, Id bit to ished out
END BOX 1	5.0	4.4	88	57				20 -		R U N				4		plenty shaving	
x	5.0	4.9	98	88			447.1			и м 6	J20.3'-31.9 Mottled pa v. hard, f fine grain bedding, s zontal & v joint space	le gr resh ed SA ome b ertic ing .	een to w to sligh NDSTONE, eds angl al joint 2'9' y	hite, red tly weath horizont e at 30°, s. Horiz ellow-bro	ered, al hori- ontal wn	- 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1	
x	5.0	4.9	98	46	Te: #2 2.1	ker st x 10	-3	25		U	staining of fracture to 28.15-29.0 horizontal vertical jo to black st See page 2	o 28. verti joint joint f	O yellow cal join at 28.1 ades out present.	-brown st t extends 5, at 29. Dk. re 29.65-3	ains. from 0 d brown		
	5.0	5	100	18			435.5 -			8 ZZ	31.9'-46.7' brown to pa v. soft to weathered, crystalline	v. ha	een to g rd, slig ne grain	reen to w ht to sev ed to mid	hite, erely		$\overline{\nabla}$
			OON; ST =					De Ma								HOLE NO.	



		B	ORII	NG	LO	G	P	ROJECT		me	rset Railroad	14818	1	of 2	D-55
SAMPLER TYPE AND DIAMETER	SAMPLER ADVANCE	SAMPLE RECOVERY	SAMPLE BLOWS "N" PERCENT CORE RECOVERY	-015 N. S. F. C. S.	TRAT LOWS		ELEVATION (FT.)	ОЕРТН- FT	UNIFIED SOIL CLASSIFICATION	SAMPLE	DESCRIPTION AND CLASS	SIFICATION		WAT WAT CHA	ES ON: ER LEVELS, ER RETURN RACTER OF LING, ETC.
ΝX	5.0		98	RQD %	Te #1 1.	cker st 7 x 1 /sec		40		8 R U N	31.9'-46.7' POWER GLEN FM. SANDSTONE, LIMESTONE, DOLO occasional slump features. thin & horizontal. Occasi joints. 31.7-31.9 vertica 31.9-32.1 severely weather weathered to clay, rock fr present.	MITE, SILT Bedding in onal beddin l joints. ed zone,	s	9	
X	5.0	5	100	16			420.7	45		R U N					
END BOX 3								50			Boring completed at 46.7 f Boring completed as observ See observation well compl for construction details. Horizontal bedding joints out the rock. Vertical joints 27.8-28.0 coating 28.15-30.3 coating 38.9-39.0 coating 39.1-39.2 coating 46.7-47.2 no coating 29.65-30.3 severely weather v. vuggy, looks eaten away coatings in vugs. joint sp. 28.1-30.3 connected by vertical services.	etion well, etion report exist through red zone, , no visiblacing 2 cm,	rt ugh-	nom. di	reamed to am, to 45°.
			ON; ST =			-	TE Van	De Ma	rk					HOLE NO.	



			B	ORI	٧G	LC)G		-majec 4		Sa	merset Rai	lroad		148.	į.	L of 3	D-56
k) T#				Hark		36M 1		COOMDINA N 1,16		}		E 468,2	51	· · · · · · · · · · · · · · · · · · ·		#NGLE F	RÓM HSRIZ. G	REARING
€G.) R¢		co	MPLETED	1				•	*****************		ME AND MOSK	_	(#XCHEX)	CAEMBUND#			TOYAL DEPTH
			ļ	/25/81	M. F				* ***			SC (Skid)	DEFTH	6	2.6	1	107.45	110.05
			00,1			8	1	469.4				467.3		.1/411.2			6/464.7	
- w#	LE	HAS	4 M E F	WEIGHT!	ALL	€A1	HA LE	FT IN HOLE:	BIA./L	enst;	4	LOGGED		leton/C.	F. Wall/J	. c. I	sham	
<u> </u>	1 C		, , , , , , , , , , , , , , , , , , ,	, ii		TRA				_ č								
AND DIRECT	DE ABVARCE	# C C C F	大学を下に 主義のひと見る 合うな おまのり 本義のひと所な	ANDU ASKUBBB BROU ASKUBBB SS: SCIENTIFICATION	â	LOW	i.	ELEVATION (FT.)	DEPTH - FT	UMIFIED SOIL	BAMPLE	OKS	CRIFTIO	IN AND CLASS	HEICATION		WA!	TES ON. TES LEVELS, TES SETURN, IMAGTES OF
1 2 X	***	LAN.	COBE	* * *	2	0	Š	467.3	ā	SKID							, AA document	LLING, ETC.
3					rọd Z				-			O'-2.6' grained Sagravel, To	AND, t	trace orga			to a	surface cemented lepth of
NΧ	2	. 7	3.1	114				464.7 -			R U N	2.6-4.1 g 4.1'-5.2' completel:	grout	, SHALE	intermixed	l	stem	10" hollow sugers used.
									5 -		1	of pale g				. CHUD	water	used as ing fluid.
NX	5	.0,	5.0	100	30	and the designation			-		U N	SANDSTONE Dk. red-by grained to	cown t	o red-bro	wn to gre	er fin	Lost (all water at
									-		2	moderatel weathered		l, fresh t	o moderat	ely	1	
									10		R	Bedding jo					ļ	
NX	4.	75	4.7	100					-		. Z.	residue): 18.3', 24. 27.6'. Ver	7', 2 rical	4.8°, 26.	.41,26,71, 8.51-6.81	27.0	*	
				•••					-			11.1*-12.	15', 2	0.6'-21.1	L*.			
END BOX 1	-								15 -		R						######################################	
*				٠	•				-		U							د
i w	7.0		a 9	98	70				20 -		4	Horiz, joi	ntsi	27.8. 30.	0. 30.9.	30.95.		
		* **	, , , , , , , , , , , , , , , , , , ,	30	, ,							31.55. Vert. joir 28.05', 28 Grimsby Pn	ıts: .6-29	25.5'-26.				
				A 0000								•						
								- Andrews	25 -		- R							
				II III II					-		A REC						***************************************	
X	10	, o	10.0	100	49				30 -									
OX 2		**************************************		99		Pack Test #8		435.3 .				32.0*: 2 c	m red	-brn. pla	stic CLAY			
				a, dhona		Inva	11d					32.0'-54.0	' POW	ER GLEN P	M.			
				FGGN; 47			**	432.3	-								HOLE NO	
		0 #1	MISO	(M; F = #17	CHEN;	0 = 07	ME4	V.	in De	Mari	κ						D-5	6



			n	Ď		NG	10	10		PROJEC	Ŧ			10 m NO.	SHEET NO.	HOLE NO.
Īω		ر <u>ط</u> ارط	∵	7		1 U	L	טי		-	T	_	Somerset Railroad	14818	2 0+ 3	D-56
SAMPLEN TVPE AND DIAMETER SAMPLER ADVANCE	LENGTH CORE BUN	CONE NECOVERY	MANA BLOWS	2	MECONERY	\$ 151 f	LOWS		KLKYATION (FT.)	DETT: 71	UNIFIED SOIL CLASSIFICATION	****	DESCRIPTION AND CLAS	HFICATION	MG WA WA CH	TEE ON. TEM LEVELS, TEM METUMN, AMACTEM OF LLEIMG, ETC.
NX 110				.00		RQD %	Te: #8 To Pa: Te: #7	alid		40		N	32.0'-54.0' POWER GLEN FM. SHALE, LS, calcareous SAN to dark red-brown to dark to sli. weath., soft to me banding, slump structures. 33.6-34.0 - vertical joint 36.2-36.4 - vertical joint Horiz. joints: 34.1, 34.35 34.65, 35.5, 35.8-35.95 (8) 36.2, 36.4, 36.75, 37.2, 38.25, 38.3, 38.45, 38.7, 40.2, 41.1, 42.3, 42.5, 42.43.5, 44.6, 45.35, 45.37, 52.05, 52.65.	green, freshed. hard, occ. (20°), (2	98.0	
ND OX 3	.0	10.0		100)	74	Te: #6 1.			50-		R U N	37.25'-54.0': light gray tinterbedded SHALE, LS, and fresh, soft to med. hard, to microcrystalline.	calc. SS, f. grained		
VX 10.		9.6		б		74	Tes #5 2.1		413.3 	55_			SANDSTONE: white to gray, f. grained, massive. Lor 54.05, 54.2, 54.3, 54.7,	fresh, v. h	nard.	₹.
1x 10.	.0	10.1		101		75	Tes #4 1.0		401.2	70	millimish and design and the control of the control	R U 9	66.1'-110.05' QUEENSTON F MUDSTONE: dk. red brown w mottling, mod. soft, fres weathered. Bedding separations: 67.1 68.8, 69.1, 69.4, 71.1, 7 72.6, 72.7, 74.5, 74.6.	/pale green th to mod.	5,	
								5	392.3 TE		1	Ш			HOLE NO	······································
11 = 1 0 = 01	EMN	1330K		* *		**** 0	* QTH	**		Van D	е Ма	rk			D-56	



			B	ORI	NG	LO	G	- 1.0 m	*#0} E C		YERE	rset Railroad	14818	seet no.	MOLE #0.
AAMPLER TYPE AND GIAMETER	サンスペンのよ かいしませる	y i	おおがない おおのつとなる	PERCENT CONE		TRAT	NOI	ELEVATION (FT.)	CEPTH-FT	UNIFIED SOIL	"AMPLE	DESCRIPTION AND CLA	SEPICATION		NOTES ON: MATER LEVELS, MATER HETURN, INARSCIEN OF IRILLING, ETC.
END BOX 5			10.:	102	RQD 7	Te #4 1 C Pa Te) x 10 m/sec cker		80		RUN	66.1'-110.05' WHIRLPOOL E Bedding separations: 77.7' zone), 78.2', 80.1, 80.4, 84.8, Vertical joint (edg (no stain, rough). 80.5-83.5 severely weath. 87.0': joint @ 75°. Horiz. joints: 87.4, 89.2 (w/calcite), 92.3, 94.3. Joints: 91.75 (20°), 91.9 92.4 (10°), 92.7 (20°),93 93.9 (20°) w/calcite, 94 calcite.	e) 0 84.7-84 Bedding 0 3 2, 90.4 25 (20*),	.9	
end sox 6 nx	<u> </u>	. 0	9.7	97	92	to Pa Te #2 4.	9 x 10	7	90_		N III	Caicite.			
ΙX	•	.0	9.9	99	96	Pa Te #1 Ze			100-		12	Bedding seperations: 95.2	, 96.6.		
ND OX 7	5.	,0	5.4	108	54				105		808	Bedding separation: 106.7	no stain.		
2ND 3OX 8	V)							357.25	110			Hole completed at 110.05. as observation well. See report for construction de	well complet	-124 HTG T 4	reassed to 6", to 109',
**	w g				· twiley)TE	Van I	e Ma	rk			MOLE D-	



منزا	"K _¥							 PROJEC	 : T	•••		,	JOB NO.	5 H	EET NO.	HOLE HO.
		B	ORII	٧G	L()G					Somerset Railros	ıd	14818	5 3	a≠ 2	D-57
\$17# T	/an	De M	ark				COGRDINA N 1.1		39		E 468,229				IOM HORIZ. IO	BEARING
***			PMPLETED	D#ILL1	E 4	**************************************	,				HE AND MODEL	HOLE SIZE	DVERBURDE	V(PT.) MOC	ж (Р Т.)	TOTAL DEPTH
	/25/	1	10/27/81				enevese/Ea				45B	6	1.2	5	8.1	59.3
	c .3/9		Y (FT./%)		ε φαπ# 4	** **********************************	469.		***	4	467.0 54.6	#6. ##GUN	D WATER (FT.	1	*/*L. TOP 0 .2/465.8	Р́ ВОСК (FT,}
			* WEIGHT!	FACE	C4	#1 20 LE	FT IN HOLE:	DIA./L	K M D Y	H	LOGGED BY				~- <u></u>	
	<u></u>	7.	·					*	1	ī	S. Balone/	J. C. Is	ham/ C. F.	Wall		
1 H	# # W	COVERY	ELDWS T COME	PENI	ETRA' ILOW		annero A Autoritario de Caracia d		15 10N		4				HOT	ES ON.
LER	M ABVA		H Z Z 6				ELEVATION (FT.)	DE FTH.FT	FO S	BAMPL*	DESCRIPTION	N AND CLAS	SIFICATION		WAT WAT	RR LEVELS. ER RETURN BACTER OF
SAMPLES TVP	SAMPLER LENGTH	SAMPLE S	HAMPIE BLOWS	- H	TWD 6	3 9 6		ă	UNIFIED SOIL	ľ					p#II	illino, ETC.
	315	2 0					467.0	_	Ľ	+	0'-1.2' Residual Scil				No. 111	
NX	,	, , ,	88	RQD	7		465.8.			R	Residual Soil 1.2'-35.2' GRI	MSBY FM.			- split-	ng with NX tube core
NA	3,4	3.0	36	0.4	12			-	1	N 1	SANDSTONE: Dk. greenish gray,					to 59.0 ft.
		-					Mr.A.zebiimbizi Azeb		}	Γ	to med. soft, weathered, wit	mod. to	severely			roller-rock
							Week all a company of the company of	- • 5	1	R	ings, sandston grained and sl	e v. fin	e to fine		bit to	58.0 ft.
						OCCUPATION AND ADDRESS OF THE PROPERTY OF THE	VOIL-SEE AND AND SEE A	-	1	N	Service service service service	5212,			A-111-100000000000000000000000000000000	
NX	8.2	2 6.7	82	2.0	24	W. M	A control of the second		}	2						
	- " -			_*-				:	1							
								:	1		Numerous beddin					
								10	1		essentially hor staining and cl	ay coati	ngs occur	from		
ХN	0.3	5D.46	92	٥	Ø				}	3	1.2' to 7.0'. F					
							Andhana	-	1	PIR D						
NX	2.2	2.1	95	1.6	71	ļ	Agglin-An i Anchruin An	-	1	N						
						O	AVAC	15 -	}	R	Vertical joints continuous), 6.	0 1.2-2 5-7.5(we	·4 (weathe	red not		
NX	5.(0 4.9	9.8	2.6	52		AA AA amaa AA AA a	:	1	N	clay coating), tight), 32.4-32	14.3-14.	5 (weathere	đ,		
								-	1	5	scaining), 33.3	–33.6 (un				
	-						***************************************]			•				
								20-	1		Broken zones @	/+0-9-0,	13.9-14.3	•		
								:	1	R	14 bedding plan					
NX	5.4	0 4.5	98	4.03	81		7	-	}	N	24.2', horiz., 1/8" and severe	ly weath	ered.	•		
			****	!	***************************************		***************************************	[;	1	6	24.2': horiz. j & severely west			w/clay		
	\vdash	+			Waller Wall	 	And the same of th	25 -]		7 bedding plane				,	
		A0000	**************************************	•	W. C. C. C. C. C. C. C. C. C. C. C. C. C.		WILLIAM AND AND AND AND AND AND AND AND AND AND		}	Ķ	0° to 20° fr. h weath. to weath	oriz., t				
			NO SERVICIO DE LA CALLA		NV SALE SALE SALE SALE SALE SALE SALE SALE		- Photography i Avendus	APPLIPE	1	N	27.45'-28.7': V	· ·	nt, tiphr	to		
NX	5.0	4.83	97	3.95	79		A			7	closed, sli. we				ŧ.	
				-	<u> </u>	ļ	-]	_						
								30 -	+	R						
4.00.0					-,			:	1	N						
ΝX	5.0	5.0	100	3,5	70			-	=	а						
			-	*			11 Photogram		-		Average and a second a second and a second and a second and a second and a second a					
							432.0	35	1	1	VV-mar-vV-V				HOLE NO	
	* * * *		POON; 37 DN; # # P1		0 + 0	:		Va	ın De	: M	ark					-57



			E	}(IC	?	NO	ì	LO)G		*OJEC	T	r.u	Somerset Railroad 14818	2 OF 2	
	RONANCE	** ** C>	RECOVERY	MECOVERY	***	NA CONTR	_		TRAT			t	SOIL	¥			WOTES ON: WATER LEVELS,
AND DIAMETER	SAMPLER &	Ψ,	BAMPLE RE	CORREGO	*****	THE POST OF THE PO	3 1.51		7. OV.	and s	RLEVATION (FT.)	DEPTH. F	UNIFIED SOIL	8.4.M.F.L.#.	DESCRIPTION AND CLASSIFICATION	Mary and Address of the Part o	WATER RETURN, MHARASTER OF DRIGGING, ETC.
							RQI	D	Z		431.8			R	35.2'-54.2' POWER GLEN FM. SHALE with interbedded limestone an calcareous sandstone: reddish brown	d	***************************************
NX	5.	0	5.	٥	1.0	10	0.	.75	15			-		ō N	to grayish green to lt. gray to med gray, v. hard to med. soft, fresh t mod. weathered.	*	
nk :	5.,	0	5.	0	1(10	Jack	1	22			40-		R U N	Bedding separations with slight staining are numerous from 35.2 to 44.0. Vertical joints @ 35.6-36.0 (rough	- Chillian - Control of the Control	
							-	-			,		1		surface, no staining), 41.1-41.6 (no staining), 52.4-53.9 (rough surface, no staining).	America Marine	•
NX.			4	,		86	3.	,	64			45		R U N	Bedding separation @ 52.5 w/orange staining.	Seminary Michigan is a seminary	
**************************************		0	**	3		υ		_	04					11	Completely weathered & broken 6 53.0-54.0.	Herrich Alexander (1876) (1972) (1972)	
NX	5.	0	5.	1	11)2	2.	4	48			50		R U N			
NX.	5.	0	5.	.0	I	00	0.	ý	18	The state of the s	412.8	55		R U N	55.4, 55.9, 56.1 (no staining), 58. 58.8 (orange & black staining).	}	₹.
						·			-Ann	The state of the s	407.7	60			Weathered zone w/banded shale parti @ 56.7-57.2. Vertical joints @ 54.6 55.1, 55.7-55.8 (rehealed, stained) 56.1-57.0 (rough surface, uneven, stained), 57.2-57.8 (rough surface, stained) 58.8-58.9 (rough surface, brilliant green mineralization).	•	
												-			Bottom of boring @ 59.3 ft. Boring completed as observation well. See well completion report for constructidetails.	nom	med to 6^{π} diam, to 58 .
**************************************				***************************************								-		The second secon		- 1000 TO THE THE THE THE THE THE THE THE THE THE	
and the second s				***************************************			Hitorus as Avenue & March					- - - - - -				. A	
									TUBE;		Brt	n De	1			HOLI	I NO. D-57



		D	<u>ndl</u>	NI	\sim	1 6	<u> </u>		PAGJ#	εr						# # Dt	Φ.	\$14 K	ET NO.	HOLE HO.
SIVE		D	ORI	N	u	LL	<u>/\</u>	(COO#0(NA	78 L	Sc	me	rset	Railro	oad		1.	4818		. DF 2 DM HOMIS,	D-58
V.	an D	e Mar	k						160,9	948			E 468	241			A 144	90*		
20/			0/17/8							DRILL	MA		No Mone	L		1.5	Ke F7			TOTAL BEATH
		•	(FT./%)	1		ire ****			ECAT	i NG	G#			DEFTH	NX		T.)			S1.5
		25/98				4	1	i. 467.				65.7		50	.7/415(D	ry)			5/464.3	
** m	LE W		WEIGHT	?FA	LL	CAS	ING LE	PT (# NOLE:	014./L	& HGT	**		LOGGED		C. Isham				, <u></u>	THE STATE OF THE S
w E	0 5	212			PENE	TRAT	ION				W 1887 1887									
SAMPLER TYPE	SAMPLER ADVANC	HARTER FROCES	MEGUL WINDERS		8	LOWS	•	ELEVATION	ţ	LINIFIED SOIL	#								MOT	ES OF.
#10 c	N N	# # # # # # # # # # # # # # # # # # #	NAC SAN		<u>.</u>		i,	(FT.)	DEPTH	FEED	日本国土の日		UES	EMS#110	m and clas	MFICATION			WAY CMA	THE RETURN, HACTER OF LURG, WTC.
Šŧ	E HO	F 100	1 15		<u> </u>	ON.	ř	465.7		25.2										
10"	Aug	+					·····			-	T				-brown, w				OH DU	surface
		 		KI	ग्रह्म		***************************************	464.2	,		-	-		***************************************	& Sands		pof	rock.	casing	cemented to
NX	5.0	5.0	100	()						R. U	Dar	k redd:	ish br	IMSBY FM	mottled :	reddi	sh	,	h of 1.5 ft.
										1	N	bro	rwn & pa	ale gr	een to w h dark r	hite sam	dator	Æ		used as a ng fluid.
									5	-	1	sha	le. Sa	andsto	ne is v.	hard to	hard	,	Drille	r indicates
				-								joi	nts are	hori	zontal t sive to	o 20°-30'	° fro	111		ll return at 15.0'
NΧ	5.0	4.7	94	3	38						U	Sha	le is v	, sof	t to sof	t, highly	y	•	probab	ly lost wate
											N	joi	nts at	.21	athered 3 spaci	horizont: ngs.	al		highly	weathered o v. soft
						2			10	4	2	Sou	e FeO s	taini	ng in jo 3.7'-4.	ints.			fractu	red inter-
						A William W				4		445E	CICAL J	OLHES	3,7.44.	r. e a*D.	~~#./	*	shale	sandstone & from 11.5'
NY	รก	5.0	100	,	.5					1	R								to 14.	5'.
MA.	7.9	J. U	100	*	••						N								**************************************	
	••••••••••••••••••••••••••••••••••••••				ar www.marwew.wa	nanooo marao oo				1	3								ar war against war a	
	W W W W				W-M-M West	A sefferiffe A sefferiffe			15 -		A LANGE AND THE PARTY OF THE PA									
END	Walling			╁-		Abuda				1	R									
BOX 1						<			. :	‡ _	R L									
NX	5.0	4.7	94	7	77						4									
									20]										
	<u> </u>	ļ		-	_				-		_				Basal um					
NY	5.0	5.n	100	ء	38]	R		ı, raie	green	-blue sa	ndstone.			Note:	
										-	N									31 the water ion measured
									25	4	5								is that	which is
						****			,	1										* "
***************************************						Ī		437.85				***************************************								
NX	5.0	5.0	100	5	56	AN THE PART AND AND AND AND AND AND AND AND AND AND				1	R				POWER GL					
	VIII ALIAN AND AND AND AND AND AND AND AND AND A	**		WARRING IN .		ALL COMPTENDED AND ADDRESS OF THE PARTY AND AD			10	1	N	gre	en 6 gr	ayish	green,	, bard t				
		- NA Francisco Maria		vano me v	de hEPhaboneson	***************************************			30		6	int	erbedde	d fin	ly weather grained	l calcare	euc	•		
END BOX				*	-	-		•		4	R	bed	ded wit	h slu	hale, bar mp struct	tures. Fe	Ost	ainin,	8	
2 NX	5.0	5.0	100	4	46	00° mm 000 000° mm 00		Special Control of the Control of th	-	7	u n	on ,2*	some jo 5° sp	ints,	joints :	range fro	מודק			
	· · · · · · · · · · · · · · · · · · ·		•	***************************************		And the state of t]	7			_						
			POON: \$1				• •	430.7		1	Ľ								HOLE NO	
			: P = P									Van	De Mar	k					D-	-58



			B()	RI	NG	LC)G	ľ	# OJEC		er	set Railroad	14818	1	#7 NO. ⇔≠ 2	нос ≡ но. D=58	1
2442	V A 44 CE	7					ETRAT	TION		<u> </u>	T	Ī				NOT	ES DM.) (
SAMPLER TVPE AND DIAMETER	TABLES ADVACES	D tion	COMPLETE COVER	NACTE BLONE	MESON NEWS PROPERTY OF THE PRO	**************************************	MAD E.	OR	#s#yarion (FT.)	DEPTH-FT	UNIFIED SOIL CLASSIFICATION	AAMALE.	DESCRIPTION AND CLASS	BFICATION		WAT CHA	EN LEVELS ER BETURN PACTER OF LLING, STC.	¥,
A						rod 2				,			27.85'-51.5' POWER GLEN	PM. (cont.)				
ΝX	5.0		85		97	75	Market and the second s			40	All the second s	RUN				**************************************		
NX	5.0	0 !	5.0		100	94				45		R U N				To the control of the		
END BOX 3 NX	5.0)	5.0		100	66	A Marie Control of th			50		R U N				1 delimino 1 del	. \tag{7}	
END BOX 4									414.2				Bottom of Boring: 51.5 ft. Boring completed as observ See well completion report construction details.	ation well.		Boring 6" diam ing conto 51.1	reamed to meter foli	Low-
						**************************************		: 1	SITE	/an D	e Ma	rk	Laurent Lauren			HOLE NO		



	_	B	ORII	NG	LO	G		PROJE (Som	erset Railroad		148	1	1 0F 3	D-59
IT E		Van	De Mark				COORDINA	1,160	1 05	1	E 468,216				FROM HORIZ.	BEARING
10/	 23/8	-	10/25/81	DAILLE	Gaudy/1	Empir	1		MILL	MA	KE AND MODEL	HOLE SIZE	2.4			TOTAL DEPTH (FT.) 100.0
0#4	PEC	OVERY	(FT/S)	1	-	•	EL 100 0	F CASI			OUND EL.(FT.) DEPTH/	EL, GROUNI		.] ber		F ROCH (FT)
_	0/98 == #2		WEIGHT/	!	7		467.6	8	- 1		LOGGED BY:	6/411.4 	. Isham/S	Balo	2.4/462.7	
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	ADVANCE CORE AUN) VE B V	COME	. e	TRATI	ON		Į.	OIL TION		D. MINGI		- Isliam, 5	- DATO	NOT:	Es ON.
AND DIAMETER	SAMPLER ADVA	SAMPLE RECOVERY	PERCENT CON	157 4"	ZND 6.	380 6"	(FT.)	OEPTH	UNIFIED SOIL	SAMPLE	DESCR <i>if</i> Tio	N AND CLAS	SIFICATION		WAT WAT CHA DRIE	ER LEVELS, ER RETURN, RACTER OF LING, ETC.
	, -			RQD7		-	465.0	-		H	0'-2.4' Residual soil	& grout.			Drille	ed w/NW 80
w	3.2	3.0	94	o			462.6			R U N	2.4'-27.3' GRI SANDSTONE & SH fresh to sever	MSBY FM. ALE: dark	ı., soft t	o med.	split core t	inner-tube parrel, 10'
w	5.0	4.4	88	0				5-		R U N	hard, f. grain Joints horiz. Vert. joint 2. Clay seams 2.5 Color varies t 10.6'-11.0': v	to 3.4'; 5'-3.05', '-2.7', 2 o pale gi	30° to 3. , ylw-or. 2.8-2.9', reen.	8'. coatin	11.0': water 8" PVC	lost all return.
īw	3.0	3.0	100	57			•	10-		R U N	11.8'-12.0': v coating. 12.0'-12.2': v 14.25'-15.5': fresh, massive 18.0'-19.7': f	ert. join red-brn, t	nt w/red-b to pale gr in SS, ban	rn.coa	n. a depi	g cemented th of 2.1 f
₩	3.5	3.5	100	26		-		15		R U N	2010 2017 1 2					
END SOX 1	9.1	9.0	99	86			,	20 -		R U N 5	v, hard, fine fresh, massive		SS, pale	green,		
						_		25 -		R U	25.3'-25.9': ve	rtical f	ractures.			
W] OX 2	0.0	10.0	100	93			437 . 7 -7	30-		6	27.3'-49.5' PO brown to dark LS, SS, DOL., slightly weath slump structur 28.95: vuggy z	green to SLT ST., ., soft es, loca	pale gree fresh to to med. ha	en SHAL	ec.	
							430.0									
9 D	5 - 5F	PLIT S	POON; \$7 PN; P = PI1	- SHELD	Y TUBE;	517 ER	rE	De M	l (ark						HOLE NO	



### 10.0 9.9 99 88 Pocker Test	т на. наце но. от 3 D=59		t Railroad	se		******C	G	LO	٧G	RII	0	В		
NW 10.0 9.9 99 88 Parker Test 46	HOTES ON: Water Levels, Water Return, Character the	TION AND CLASSIFICATION	O E SC# IPT/O	*:42	ED SOIL FICATION	LTIOM É	ŽLE VATIO	LOWS	8.	N. T. CORR.	* BLOW	RECOVERY	272 ##0U	LEA TTE
NW 10.0 9.9 99 88 Parker Test 66 3.k x 10 5 ch/sec 2 40.0 10.0 10.0 10.0 10.0 69 85 415.5 4.5 20 cm/sec 2 45.5 2 50 2 30 cm/sec	DAILLING, ETC.			3	CLASS	ă	•			# # W	**	CONE N	LENGTH	****
NW 10.0 9.9 99 88 Packer Test		POWER GLEN FM. (cont.):	27.3'-49.5' PO	ŭ					RQD ‡			. .	ATTENDED TO A TOTAL OF THE ATTENDED TO A TOTAL O	A CONTRACTOR OF THE PARTY OF TH
Packer Test 45 - 8		_	Horizontal jo	***************************************		40-	x 10-6	Te #6	88	19	9	9.9	ro.0	NW
Test Test				U		-						***************************************		XOX
coating. 55.74-60.6': weath. zone. LS & shale. Horizontal joints 52.9', 53.45', 54.0', 54.4', 55.69', 57.2', 57.9', 58.37', 59.13', 59.51', 59.74', 60.2', 60.53. thin calcize coatings 59.74'-60.6': weath. zone in SS Packer Test #4 NW 10.0 9.95 99 3.5 x 10-6 cm/sec 404.4 60.6'-100' QUEENSTON FM. Lt. greenish-red SANDSTONE and MUD- STONE, mod. fractured, SS is hard. Horiz. fractures: 60.65, 60.97, 61.6, 61.78-61.88, 62.00, 62.50, 63.03. R U N Red-brown SS, SLTST, SH, w/green lenses, scratched w/fingernail. Joints: 65.05 @ 30', open, 65.7' horiz. & jagged, 65.82' 30', 65.9' & 66.0' conjugate @ 30' & 45',	48': lost all return water.	fresh to si. weath., well gr. SANDSTONE, hard to	Light gray, f cemented f. g v. hard.	0			415.5 x 10 ⁻⁶	Te: #5	69	100		10.0	0.0	¥
Cm/sec 404.4 60.6'-100' QUEENSTON FM. Lt. greenish-red SANDSTONE and MUD- STONE, mod. fractured, SS is hard. Horiz. fractures: 60.65, 60.97, 61.6, 61.78-61.88, 62.00, 62.50, 63.03. R U N Red-brown SS, SLTST, SH, w/green lenses, scratched w/fingernail. Joints: 65.05 @ 30°, open, 65.7' horiz. & jagged, 65.82' 30°, 65.9' & 66.0' conjugate @ 30° & 45°.		: weath. zone. LS & shale. joints 52.9', 53.45', ', 55.69', 57.2', 57.9', 13',59.51', 59.74', 60.2', thin calcite coatings	coating. 59.74-60.61: Horizontal jo 54.0', 54.4', 58.37', 59.13 60.53.	U N		-	st	Te #4				0.5		OX 4
Red-brown SS, SLTST, SH, w/green lenses, scratched w/fingernail. Joints: 65.05 @ 30°, open, 65.7' horiz. & jagged, 65.82' 30°, lenses, scratched w/fingernail. Joints: 65.9' & 66.0' conjugate @ 30° & 45°.		h-red SANDSTONE and MUD- fractured, SS is hard. tures: 60.65, 60.97, 61.6,	Lt. greenish- STONE, mod. f Horiz, fractu			-4			A CALLED TO SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF T	***	A. A. A. A. A. A. A. A. A. A. A. A. A. A	9.9.	.0.0	nw.
Zero Flow State	90% water return.	atched w/fingernail. 05 @ 30°, open, 65.7' gged, 65.82' 30°, 0' conjugate @ 30° & 45°, z., 66.25 @ 20°, 66.32 @ 30°, , 66.75 horiz., 66.85 @ 30°,	lenses, scrat Joints: 65.05 horiz. & jagg 65.9' & 66.0' 66.12' horiz. 66.42 @ 30°,	U		-	ro	Te #3 Zea		99		9.92	.0.0	NW



RORIN	NG LOG	PROJECT		708 NG.	SHEET NO.	MÖŞÜ NÖ.
		Some	rset Railroad	14818	3 0 3	D-59
AND DIAMETER AND DIAMETER SAMPLE RECOVERY CORE NECOVERY SAMPLE BLOWS "N" PERCENT CORE PERCENT CORE PERCENT CORE	PENETRATION BLOWS L L L (PT.) C R R	DEFTH. FT UNIFIED SOIL CLASSIFICATION	DESCRIPTION AND CLAS	isification	WA1	TEE OM. FER LEVELS, FER RETURN. LRACTER OF LLING, ETC
NW 9.6 9.33 97	Packer Test #2 7.9 x 10-7 cm/sec		60.6'-100' QUEENSTON FM 74.8'-74.9': Pale green 74.9'-80.7': mottled de green 80.7'-81.6': dk. reddis 81.6'-81.9': green. 82.9'-83.6': fracture 2 81.9'-86.1': dark red-t 86.1'-86.7': mortled gr	sh-brown. zone. prown.	To all Assessment of the Control of	
NW END BOX 10.0 10.0 100	Packer Test #1 1.3 x 10 50 cm/sec		86.7-94.0': dark red-bi	· Own •		
NW 5.9 4.96 84	67	1	R Red-brown siltstone, me scratched by screw), he bedding, fractured parabedding, HC1 test negated thange to wht-gray 95.2 to 97.3'.	orizontal allel to tive, Color	ı be	
END BOX 7	100.0	105-	96.8': 5°, tight, fresh	sh, smooth, esh, esh, 1/4" fra h to sl. weat wn clay coati h to sii. wea wn clay coati O'. servation wel	ag's boring 6" die follow ath. ing. Reame	er reports of core left ttom of hole. g reamed to ameter wing coring. d to 100'.
SS = SPLIT SPOOM) ST = D = DERNISON; F = FITCI	***	m De Mark			MOLE NO	-59



			D) DI	NG	11	<u>)</u>		PROJEC						109 40.		SHEET		HOLE NO.
ITE			D	JNI	110	_ <u>L\</u>	JG	COGRDINA	77.	Some	rs	et Railroad			148:		I C		D-60
		V.		e Mark					,160,			E 468, 227					90°		
EG.		/21	- 1 '	/26/81		pire				M+LL		e and model		(INCHES) NX/6	0ve#eu#DE 1.4	№ (FT.)	95.6		70TAL DEPTH (FT.) 57.05
				(FT/%)		-	E & SAMPI	ES EL TOPO	F CASI	NG		UND EL.(FT.) DE	PT W/			.) 0			PROCK (FT.)
						4	1	467.	75			465.7		1/411.6		נ	L.4/45	6.4	.
MP	LÆ	HA	-	- WEIGH	T/FALL	C.A		FT IN HOLE:	DIA./L	ENGT	•	J. C.		ham/B. B	lodnikar				
F 3	N CR	2 5 E		8 H	PEN	IETRA BLOW				Ĭ.		•						NOT	** ^"
AND DIAMETE	ER ADVAN	LENGTH CORE	CORE NECOVERY	SAMPLE BLOWS				ELEVATION (FT.)	DEPTH-FT	UNIFIED SOIL	SAMPLE	DESCRI	PTIOI	N AND CLAS	BIFICATION			WAT WAT CHA	ER LEVELS. ER RETURN, RACTER OF LING, ETC.
	SAMPLEM	PENC	CORE	1	<u> </u>	Q X	G K	465.7	ů	충									
5" FA					RQD 2	:		464.3	-			w/4" bloc	cks	of shale	red-brown & siltst		red		surface
ХX	3.	.6	2.65	74	0				-		R	1.4'-28. Banded a			ark reddi	sh b	rown	in pl	ace to a of 1.4'.
		-				.			:		U N	& pale gr shale.	reen	interbe	dded sand	stone	e &	•	
									5 -	1	1	1.4 to 1			ed, fract		to		used as ing fluid
ΙX	5		4.7	94	16]	ıŘ	Some Fe0	sta	ining on	rd to sof fracture	s.			
	J.	ا ان	7.7)) •	. 10		-		-	1	U	vertical 12.9-13.		ctures:	11.7-12.3	ě.			
		!							-	1									
									:	1	2								
		+				1			10	}	R								
NX	5.	.0	5.0	100	0				-	}	υ								
									:		N								
									:	1	3								
									15	1		15 21 20	21						
			_						13 =		R	massive 1	to t	hinly be	red fresh dded, som		oss-		
NX	5.	.0	5.0	100	76				=	1	U N	bedding l 15.85 wit			ractures. ing.				
END	l								:		4	16.4 with 16.9-17.2							
BOX 1									:	1		18.05-18.	.1 g	reen cla		or -			
	_	+			+	1			20 -	1	H	partings.		~~~, à	∠u.o gre	en C.	ray		
VX.	4	5	3.05	68	64				=]	R U								
	•	ا ^ر •	J & UJ	J 0					=		N	21.65'-2	8.2	Basal GF	IMSBY gra	y, v	erv		
									-		5	hard san	dsto	one.	ay seam h		1		
		-				<u> </u>	_			1	9	zontal f				.∪£1 -			
ıγ	,	R	1 A	100	100				25 -]	R U Z G								
· · ·	-	. 3	**0	100	100	+~-			-										
NΧ	5	, d	4.9	98	70			437.5 -	_		R U								
	-	- 1	.,,					73/43	-		N	28.2-50' Dark redo			FM.: white & g	reen			
								ļ	30 -		7	interbedo	ded	SANDSTON	E & SHALE	, th	inly		
		\dashv			+						Ц	joints at	. 2	- 4 spac	norizont ings, som		ay		
END BOX		}			1				-		R U	filled jo	oint	5.					
2									-		N								
	_							430.7	-		8								
					F = SHEL		-, ,	ITE	V '	٠							ŀ	OLE NO.	
					rm 10070				Van I	Je Ma	ırk							D-	·60



		Mrc	В	()[?	N	G	LC)G		#O/EC		ner:		or 2 D-60
SAMPLER TYPE AND COMMETER	AMPLER ADVANCE	NOW HEGO TROVER	\$	***	WANTER BEGREE			PENE	LOW	rion	ELEVATION (FT.)	OKTHYFF	UNIFIED SOIL	*******	OETCHIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF ORILLING, ETC.
NX					10	02	R		CORE 5 mir			40		R N 8	28.2'-50' POWER GLEN FN. (cont.) Occ. LS layers, foss. siltstone & calc. cemented SS. Horiz. fractures: 31.4, 31.8, 32.75, 31.7-31.74 (thin crushed zone), 33.05, 33.66, 34.0, 34.6, 36.02, 36.94, 37.3, 37.97 (20°), 38.08, 38.45, 38.58 @ 45° 39.32, 40.14, 40.9, 41.99, 42.56, 42.6 43.38, 47.7'-48.3' vertical, 43.42' (30°), 43.99, 46.24, 46.78, 47.62(1/4" clay), 49.3', 49.4', 49.97'.	
END BOX 3	0	. 0	10.		10	0%			5 mis	/ft	415.7 -	45-11-11-11-11-11-11-11-11-11-11-11-11-11		X 9	50'-57.05' Light gray hard SANDSTONE, thin bedded upper 1.2' is weathered, f. to med.	
NX END BOX	The second secon				.05	ì					407. 7	55		A U R	grained, locally calc. cemented, WHIRLPOOL FM. Fractures: horizontal except as noted. 50.22', 50.22'-50.68'(90"), 51.08, 51.18, 52.22 (30"), 53.2 (30"), 53.27 (30"), 54.9, 54.9-56.5 (arcuate near-vertical), 55.1, 55.3, 55.4, 55.6, 56.04, 56.16, 56.8. Boring completed to 57.05'. Boring completed as observation well after reaming.	After coring, boring reamed to 6" nom, diam, to 58.0".
	HARMONICAN MANAGEMENT AND AND AND AND AND AND AND AND AND AND			HIII AMA AHII								65			See well completion report for construction details,	
									7406	:]	i ve	Van I)e M	ark		HOLE NO. D-60



		E	30	RIN	1G	LC)G	e Assibus Ass Assibus As	PROJE		rse	r Railroad			148 1 8	1	DF 2	D-61
947#E	10° 44							CDOMBINA			F:	160 3/3			ANG	90°	M 40212.	MEARING
1 4 10 1				De Mark	DHILL			N 1,	-		_	468,343		HOLE SIXE	OVERBURGEN(F		[FT.]	TOTAL DEFTH
	21/8			/21/81			ese/E				E 4			NX/NQ/6	2.8	43	3.3	46.1
0 # K	95.		K PT Y	[**./ *]	CO 114	3	2	# # TOP G	۳.۵۰ 9.31	IMG		467.4		.1/436.3	D WATEN (FT.)	1	/464,6	PP ROCH (FT.)
A M F			w##	W#16 HT/	ALL	CAI	-	FT IN HOLE:		.ENGT		LOGGED	BY :				***************************************	THE PERSON AS THE PERSON
1.	40#/	30	*:						1	T	T 1	D. L	. Mid	dleton				
	ADVRHCE CORE BUT		******	T CD#		ETRA	–	ELEVATION	1-5-1	UNIFIED SOIL	114	DES	CRIPTIO	N AHD ČLÁŠ	SIFICATION			·成务 为便工心器上年, ·唯章 口张小器上年, ·唯章 四名。
NO SAMPLES SYPE	SAMPLER.	TAMPLE R	COREAC	PERCENT COS	157 6"	TWD C.	JAD K	(FT.) 467.4	D£#7H-FT	UNIFIET CLASSIF	11.48.48							MACTER OF LLIMG, RTC.
SS	2	C	1.4	24	б	4	20			1	1	0'-2.8' Reddish grained	krow	n to whi	te, fine to o , shale weath ellow-brown o	coarse nered		NQ ond core el split
<u>55</u>	8.0	C	.2		100/.2 RQD 2	FT	MIN	464.6		+ 	2 R	- 2.81-30	.1' 6	RIMSBY F	M. / le green to		inne	r tube. r used as
	5.0	4	.,9	98	14				5 .	1	U	fresh t medium,	o sev	erely we	athered, soft rained to terbedded.		dril	ling fluid
- <u>1</u>		NAV ALBERT WARREN WAR			ı				***************************************] .	1	SANDSTO iointir	NE, S	ILTSTONE dominant	, SHALE, hor: , shale west: cross-bedding	hered	l auge dept	r used to h of 2.8' VC surface
NQ	5.6	5 3	• 7	66	15	1 2 3	5 5 5			1	R	slump i Yellow	eatur brown	es. stains	ar 4.1-4.5,	_	casi	ng cemente lace.
- 7 8	•	***************************************		We see all We was all		4 5	5 5	V Vermine ver ver min	10		. N	sandsto	3 - one wi	vertical th tan a	fracture in cicular or			all water
	A LIA LIA LA LA LA LA LA LA LA LA LA LA LA LA LA		-	TO A TAX THE VALUE OF THE VALUE			err Andreada of the alliando of the			1		Precip	tate		te formed. mi-redial pa HCl.	tt er ns	2.01	r level: 10-22-81
NQ	3.:	1 :	5.1	100	64	1 2	3 3			1	R U N	Yellow joint			on horizont	al	bori	ng at 37°.
	ļ					3	3		15		3							
END						2 3 4	7.5 7.5 7.5 7.5			1	R U N							
BOX 1 NQ	20.0	9	.85	98	70	5 6 7 8 9	7.5 7.5 7.5 7.5 7.5		20		4							
			•			10	7.5	444.2	1			23.01-	30.1*	Reca) (CR	LISSY IX.			
				4					25]	-	Pale g hard, tight,	reen t fine p l cm	o gray, grained S thick cl	fresh, mediu ANDSTONE, ve ay seam at 2	ry 8.3.	1	
		:		Í				A THE STATE OF THE		7777	R U N	Green	cray (ır snale,	soft, fresh	•		
NQ	ho.(9	.95	99	66	1-10	7.5	437.3	30	Link	5	05 4.5						
	THE SALE OF THE SA	V V Villas I . Assessmental V		na ana AAA ana anaoaAAA		manaconomica de la companya de la co				1		Dark re to gre	ed bro	ft to me	EN FM. own, pale gr dium hard, f d fine-grain	resh		
END SOX	**************************************	more wranted was	W W W W W W W W W W W W W W W W W W W	оснусносноений применений примене								to mic SHALE,	LIMES	stalline STONE, ca	interbedded, lcareous SAN horizontall	DSTONE		
*	L			70N; \$T				432.4	35	1	1.1		***************************************				HOLE NO	3
c	- 51	W. to 6	140	M;	FC### (Q = Q1	'MES	-	۷a	n De	Man	'k					D-6	1



		В	ORI	NG	LC)G		HOITE		ner	set Railroad	14818	ı	or 2	D-61
ANG DIAMETER	PARTIES ADVANCE	COME RECOVERY	はない かんだい かんかい かんかい かんかい かんかい かんかい かんかい かんか		ETRA BLOW		ELEVATION (FT.)	DEPTH-FT	UNIFIED SOIL	*****	DESCRIPTION AND CLASS	BiF (GATION	And the second s	MAT WAT WAT	EA ON. ER LEVELS, ER RETURN, RECTER OF LLING, ETC.
NQ	10.0	10.0	100	100		7.5		40		BUR 6	30.1'-46.1' POWER GLEN F jointed, occasional band features, overall rock is 34.5 - color of rock turn of gray, lt. gray to dk. 34.0' - horizontal joint brown coatings.	ing and slum s tight. ns to shade: gray.	5		
ND OX 3							421.3	45 50			Boring completed to 46. Boring completed as obsesses well completion representation details.	ervation wel		6" di follo	g reamed to ameter wing coring d to 45.9'.
\$ \$ D ~			POM; ST *			ì	ITE.				Van De Mark			×ole mo. D-(



		B	ORI	VG	LC)G	!	AQJE		rset i	Railroa	d		/2= +0. 14818	!	er no.	D-62
37 E	Van	De M	ark	***************************************			COCORDINA	-			E 468,3			A	90"	M MORIZ.	WEADING
#64 A / 1		3	M*LETED /29/81	!	m Empir	St.		V Chamman		MARK A	ND MODA	F j.		OYMABURDEN!	L		TOYAL DEFTH
		i_	/29/SI ·(**/%)				16 EL TOP 0	T CAR			8 &. (FT.)	DEFTH	NX/6	1.0 WATER (FT.)		. 6	60,3
7.6	/98				5	ļ	471,04			469.	0	51.7	//417.3			468.0	
4 M P	L# NA		WEIGHT!	PALL	CAI	HNG LE	TT 14 HOLE;	DIA./C	KR4TI	*	LOGGED		cone/D.	Middleton			
2 4 4	ADVANCE CORE BUS	Y MACOVER Y	A SACOR	8	TRAT			ŧ.	SOIL			*				*01 WA1	## QN.
AND DIAMETER		※本学を心所 は のののの 日本の日本の日本の日本の日本の日本の日本の日本の日本の日本の日本の日本の日本の日	PERCENT C	181 6"	GMZ		(FT.)	DEPTH-FT	UNIFIED SOIL	# 4	DE	SCHIPT IC	n and clas	Heick (198		WA1	FRE PRYLERS, LPACTEN OF LLING, STC.
				RQD Z			468		1				dual Soi	I FM: SANDSTO	VI-	Drilli	ing with NX
NX	5.0	4	68	56	TO THE MINISTER CONTROL AND A PART AND A PAR	THE PROPERTY OF THE PROPERTY O		5 -		RUN H	SILTST SS + s SANDST green bedded mod. w	CONE, Solits./2 CONE to while (horizonther	HALF int 15-30% sh dk. red te, fine zontal) ed, occa	erbedded. 7	le hin- to	Boring 6" non Resmed	tube core to 60.3'. reamed to diam. to 59.1'. used as
VX.	5,0	4.9	98	16				10		R U N	red-br SILTST green, (horiz mod. w Gradat SHALE	CONE - V. fittontal) veather ional - dk.	change t	le dded to	Lost 1 @ 2.0 denimal of drithrough	ing fluid. return wate i return til water ghout drill mainder of	
NX	5.0	4.8	96	27				15		R 1 3	Beddir w/clay 5.8. 6 8.9, 1	mpletel resid 3-6-5 11-0-12	iy weathe ne joints lue): 4.8 i, 6.7, 7 3.0, 13.3 17.7, 18.	le, soft, m red. (Fe staine, 5.3-5.5, .1-7.6, 8.3 -14.0, 16.2 8-19.4, 19.	d =8.5. -16.4, 8-20.0,	hole.	
END BOX 1	•	WHOOMOOD AND AND AND AND AND AND AND AND AND AN		17 y 17 y 112 000 600 600 100 100 100 100 100 100 100	×	7.5				R D N 4	24.6, Vertic	24.7, al joi 1, 7.7	25.0. ints (Fe	stained): 1 4, 8.9, 13.	.3-1.4.		•
•X	5.0	5.0	100	22				20 -		R							
ХX	5.0	4.9	98	79				25		N 5							
NX	5.0	5.0	100	82		The second control of the second control of				R U	gray 1	o pale		RIMSBY FM., fine graine		**************************************	
end Box 2	5.0	5.0	100	28		Annual Parket Control of the Control	438.05	30		B U N	SHALE intert thin t fresh Occasi Limest	and Li edded, edded, to sli lonal l	moderateship we sanding in cross-b	y to lt. gr ely hard to athered.	soft,		
						1	434.0	35	<u> </u>								****
			POON; HT			••	TE	Van	De Ma	ıτĸ						HOLE NO	-62



BORING LOG	F#0/60		88	į	2 pp 2 D-62
PENETRATION BLOWS BLOOM	** ***********************************	CLASSIFICATION	# X T T L M	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
NX 5.0 4.8 96 0	40		R U N	30.95'-53.6' POWER GLEN FM. (cont.) Bedding joints: 36.5, 36.8, 36.9.	
NX 5.0 4.8 96 26	45		RUN	•	
NX 3.5 3.5 100 66	50		R UN IC	Power glen fm.	
NX 3.8 3.8 100 NX 5.0 5.0 100 58 414.4	55 55 77 77 7		11 R U N	54.6'-60.3' WHIRLPOOL PM. SANDSTONE: 1t. to dk. gray, fine grained, very hard to soft, fresh to slightly weathered occasional interbedded shale seams (1 mm-2 cm thick) occur in upper 3' of unit.	
NX 2.0 2.0 100 409.7	60		R: 3	Bedding joints: 56.1, 56.3	-
				Bottom of Hole 60.3 [†] . Hole completed as observation well. See well completion report for construction details.	
AS = SPLIT SPOOM; AT = SHELBY TUBE; O = DENNISON; P = PITCHER; O = OTHER	Van D	e Ma	rk		MOLE NO. D-62



	4 ²	***************************************	ORII	NG	1)G		#GJE	CŤ		Somerset i	? ⊿ ∢1.	rnad	70€ ₩0. 1481			тно. DF 2	MQLE NO. D=63
41 T E	د د سر					- Tu-1	COGRDINA					· · · · · · · · · · · · · · · · · · ·	LUBU		ANGL	E ##PI	M HORIZ.	
# E G (in		Van De 1		.E#		N 1	,160,			468,464		HOLE SIZE	ひんまが新りまなる		90°	T.T.	TOTAL DEFT
	4/81		0/24/81		Lamb,				CME				NX /3	0.5		3	i7.5	38.0
	.1/9		[FT./w]		# #0*# 3	S SAMPL	45 EL TOP 0	T.)	ING		но «L. (FT.) Р 9.7	EPTH/	€1. SHOUN	P WATER (FT.) a		el. 70F 0 469.2	F MOCK (FT.)
	-		-		CA		FT IN HOLE:				LOGGED BY							_ ····
	¥.1	2.2		1	ETRA		ds & barr	21/10	1	T	C. F	. Wat	11				****	
***	-	DVER	* COME		BLOW			t	UNIFIED SOIL	×							HOTE	ES ON. En levels,
PLAN TYPE	# # T	A BECOV	**************************************			٤.	ELEVATION (FT.)	DEPTH	FIED	****	DESCR	I PT HQE	N AND CLAS	SIFICATION		:	WATE CHAI DRIL	KR 非常下过养外。 各类之学联系
* * *	EAMET, EP	CONT.		2	2 XX	S K	469.7	•	35									
				RQD	2 -					Ř	GRIMSBY	FM.	dual Soi					
иv	/. E	4.5	100	0	0				_	U	dk reddi:	sh b	rown to p	edded SHA sale green	, ¥.		split-t	g with NX ube core
	ر , بد	4.5	700	J			MANAGE AND AND AND AND AND AND AND AND AND AND		1	1	fresh to	com	pletely v	veathered	(sha	· .	barrel.	
								5-]		grained,			stone is f l.	106			
					***************************************				1	R U N	Come law-	1 er	n caucec	Ly weather	a d			
NX	4.0	4.0	100	0.7	17				1	2	sandston	e an	d shale (ly weather }6.8-6.9, l2.5-13.6.	7.3-	7.7,		
									1					34.3–34.		ļ		
	Washington Co.							10.	1	Z U Z				ind/or bro 0.6-20.3		_0		
NX	4.0	4.1	102	0	0				1	3	23.3. 24	. 3-2	4.4, 24.5	-25.1, 29 .9, 34.1-3	.0.	- 1		
				B]	-	35.0-37.				,			
			Transcent of the Control of the Cont		†				1	Ř Ü				.6-13.9 (u			Lost dr	illing it 18.5 ft
МX	5.0	4. A	98	3.1	62			15.]	N	clay coa	Ling), 18.8+	19.2(rehea) (uneven,	led)	,		
END]	4	33.4-33.	8 & .	33.9-34.1	crange s	d),	ing)		
BOX 1			Million And And Andrews	V-1000F			• .				orange s			ough surfa led from	ce,	A. P		
			· ·						1	R	36.3).					ĺ	•	
ХК	5.0	4.9	98	3,2	64			20	4	N								
				V-					=	5								
			MAN Abrilliands Assess						1									
]	Ü]		
NX	5.0	4.8	96	3.5	70		•	25	-	N						1		
		r L	,						}	6								
		1																
		,	VAN COMMON TO A MARKET						7	Ŗ U								
	5.0	4.9	98	4.7	94			30-]	N						THE PERSON NAMED AND ADDRESS OF THE PERSON NAMED AND ADDRESS O		
END BOX				* manual An. a. a. An.					-	7						AMMININA AMALINA A		
2					ļ				***************************************							A		
						_												
•	5 - 4	LIT N	POGH; ST	- EH#L	# 7 7 U B	t; Si	TE		1				·				HOLE NO	
5	- 51	MHIRG			0 - 07	" 1		۷a	n De	Mar	K					W rammer www		D-63



		B	0	R		NG	L(OG		MOJEC		. se	t Railroad	14818	2 or 2	
SAMPLER TVPE	TETET CORR SCE	SAMPLE RECOVERY	*****	Z	PERCENT CORR	PE	HETRA BLOV		ALEVATION (FT.)		UNIFIED SOIL.	*****	DESCRIPTION AND CLASSIF	FICATION		NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
NX 5.	-		1	02		RQD	34	I		-		R U N				
ND CX 3									427.7	45			NOTE: Core barrel fused to rock Unable to retrieve. Stee hole from 26.0-42.0 ft. Hole grouted to surface.			
							17 Yes	E; [Estre Va	an De	Mar				MOFF	no. D-63



		17							_	_	set Railroad		P0000000			D-63A
0/2			De Mark				COORDINAT		674	E	468,453			90°	M но#12.	**************************************
0 F E	6/21	cc	10/28/83	omicua I.		en/Ewj			MILL		AND MODEL	HOLE SIXE (INCHES) NX/6	oversumoe,	(/ ***) *** O	9.8	101.3
96.		- }	(FT./%)			PVING R	***************************************	F GANI			HO EL (FT.) DEPTH/					F NOCH (FT.)
	45/9		# WEIGHT/	7		13	471.6	3			69.6 59.	2/410.4		1	.5/468.	1
										`		II/D. MI	idleton			
14 4 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	CONT. RUC	日本 日本 日本 日本 日本 日本 日本 日本 日本 日本 日本 日本 日本 日	E CORE	PENE	TRAT		ELEVATION	ţ	SOIL		DESCRIPTIO	n and clat	LIFICATION		NOT WAT	ES CH.
2 - 1	SARPLER C	COLUMN ERCONE	は	*	***************************************	***	(PT.) 469.6	OEPTH - FT	UNIFIED SOIL CLASSIFICATION	Y145 K					CHA	RACTER OF LLING, ETC.
	•			RQD Z				-			0'-1.5' Residual Soi	1			Drill	ing with N)
NX	4.5	ربا چي	78	0	AND THE PROPERTY OF THE PROPER		468.1	5 -	des Masses of Newson than a definite software for strongth to the desire software for the form	RUN	1.5'-30.7' G SANDSTONE wi dk. reddish v. hard (san fresh to sev and severely (shale). Sa	th inter brown to dstone) erely we to comm	pedded SHA pale gree to v. soft athered (s letely wea	n, (shale) endstone thered	splic barre	-tube core
NX	2.0	1.8	90	15				- -	-	N 2	and cross-be Severely to shale @ 2.1-	dded & f	ossilifero	us.		
NX	8.5	7.1	83	0	- 1		4	10		R U N	Sandstone is 1.5-2.1, 5.4 Bedding sepa or orange st 8.4, 8.9, 9. (broken zone ing), 16.9, Bed. sep. w/ Vertical joi surface, sl. (rehealed to w/staining t rough surface	-8.0, 11 rations aining @ 3, 10.1, w/orang 18.1, 18 no stain nts @ 8. weath.	.0-16.5. with clay 6.5, 6.7, 10.3, 10. e & black .2, 26.3, ing @ 21.9 2-8.6(roug stain), 9. igh surfact 12.9-16.0	filling 7.4, 8. 7-16.5 stain- 30.7. , 22.0. h 2-9.8	1.	
nx nd ox 1	5.0	5.0	100	66	Pack			ZO _	mer Aren Meneralism set beine dikter aller stellk anv strangen.	8000 A	•				At A care and a care a	
NX	2.0	1.8	93	80	Test	× 10	4	-		27.24					Ban An Chemban An Chem	
ΝX	8.0	7.7	96	2) D	CITY CONTRACTOR OF THE CONTRAC	sec_		25 -	And the second s	5 8 U N 6		,				
NX ND OX 2	10.0	10.0	100	78	Pack Test #7		438.9	30		R U N 7	30.7'-59.3' SHALE, calcardk. reddish tdk. gray, v. fresh to mod. banded, fine	reous SAN brown to hard to weather	DSTONE & L white to med. soft, ed, fossil	ed. to iferous		
81	i = 1.7	LIT #	POON; #7	- SHE'S	Y TUBE;	BIT	434,6 E Van D	35 7		<u>l</u>	<u> </u>				HOLENO	-



		B	0	RII	NG	LOG	* 	soire So		iet		et no, — мо⊾е no. o≠ 3 — D~63A
A TO K		STREET SHOOTEN	**************************************	PERCENT CORR	1	ETRATION	(FT.)	GETH-FT	UNIFIED SOIL CLASSIFICATION	*AMPLE	DESCRIPTION AND GLASSPICATION	NOTES UNI WATER LEVELS, WATER RETURN, CHARACTER OF ORILLING, ETC.
	*****	e Sb	æet	1.*	RQD	Packer Test #7	5	40		R U N	3.7'-59.3' POWER GLEN FM. (cont.): occasionally vugzy. Bed. sep. @ 32.1, 37.5 (no stain.) Vertical joint @ 37.2-37.5 (uneven, rough surface, orange staining).	
NX 10		10.0	The state of the s	00	100	Packer Test #6 1.3 x 10	6	45-		RUN 8	•	
ND OX 3	- TANAMATAN TO THE TANAMATAN THE TANAMATAN TO THE TANAMATAN TO THE TANAMATAN TO THE TANAMATAN THE TANAMATAN TO THE TANAMATAN TO THE TANAMATAN TO THE TANAMATAN					Packer Test		504				
NX 10.	**************************************	9.9		99	75	65 7.3 x 10-5 cm/sec		25.		R U N 9	Interbedded SHALE, calcareous SANDSTONE LIMESTONE, banded. Horizontal joints, except as noted: 52.6, 53.1, 53.7, 54.45, 54.95, 55.95, 56.7, 57.5, 57.65, 58.0, 58.2, 58.5, 59.3, 57.55. vertical. 58.2'-58.5': vertical. 58.2'-58.5': vertical. 57.15, 57.15-57.65, 58.0, 59.3.	
						Packer Test	410.3	60		-		
NX 10.		9,9	9	92	55	#4 1.3 x 10 6 cm/sec	400.9	65 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		R U N	59.3*-68.7* WHIRLPOOL FM. SANDSTONE, white to light gray, v. bard, fresh to slightly weathered, f.grained. 59.3-59.95: vertical joint. 60.0-60.2: vertical joint. Horiz. joints: 62.4, 62.8, 63.8, 64.6, 65.1, 67.65, 67.1-67.8: vert. fract., vuggy.	
20 VIII 20 VII	***************************************	She	**	3.		Packer Test # 3 Zero Flow	394.6	70		AUZ I	68.7'-101.31' QUEENSTON FM. SHALE, red, fresh, Horiz. joints: 69.0, 69.65, 69.7, 69.8, 71.7, 71.9, 72.0, 72.75, 73, 73.5, 73.7, 73.85, 74.2, 74.3, 75.7,75.95, 77.1.	
					SMRLBY CHER; O	TURE: SITE			Van	De	Mark	D-63A



			R	_	ìR	IN	٧G	ΙC)G	7	SBIOP				108 NO. 14818	\$M#\$T		D-63A
T * P E	*	231 2	7	-			PENE	TRAT	HON					ilroad			ran	ES ON.
SAMPLEM TYPE	SAMPLEN ADVANCE	LENGYPS CORE	かはいらい はま はまなながた かばいらい はんしん かんしん はんしん はんしん はんしん はんしん はんかいい		株式のい意 新山木美や地	THROBY CORR	7	Q.4.2	2 4	394,6	1.4. + 1.4.20 2.4. + 1.4.20	UNIFIED SOIL	EAMPLE	DESCRIPTION AND CLAS	ŖĘŹ÷ŒĄŸIDĦ		WAT CHA	TEN LEVALS, TEN METURN, IMACTER OF LLING, ETC.
NX END BOX 5				*****	101		RQD 2 67	Pac Te: \$3 Ze: F1c	ro				R U N	68.7'-101.31' QUEENSTON Horiz joints (cont'd): 7 Fractured core @ 77.7.	PM (cont.): 8.8, 80.5,	The state of the s		
NX	The state of the s		10.	0	100	(W) (W) (W) (W) (W) (W) (W) (W) (W) (W)	76	— ∑(#: Z(cker est cow		85	in the state of th	X U N	Green seams @ 81.9-82.0 88.2-88.4. Common mechanically cre joints.				
END BOX 6 NX	A STATE OF THE PARTY OF THE PAR).8	9.1	The second secon	98		61	— Te #1 2e	İ		90		RUN	92.6-92.7: clay seam wa coring.	whed out by			
END BOX 7		τ.	D. •	A-1/A-1/A-1/A-1-1-1-1	101	. 31		i i		368.3	100	The state of the s		Boring completed to 101. completed as observation well completion reports in details.	well. See		6" no	g reamed to minal ter to 101'.
	The state of the s	The state of the s		The state of the s									Hardware and the state of the s	ufleils.		A Million of the Control of the Cont		
							NWW; D		;	SITE V	an De	Mar	اا k.			H	D.K. NO	-63A



			B	OR		٧G	L)G		***¢#* \$2		set	lailroad	≠ 0	зикят но. 1 ат 2	D-64
51T#		an	De	Mark					COSSDIMA N 1,16		3 E	468	448	A	GLE PROM HORE	Z, SEARING
	22/	81	10	/23/	81	0#11,U		sen/Er	- <u> </u>		MILL			1.2	47.5	70YAL 08F7H (FT) 48.7
			7.0	(F 7.)	~j	CO#1	4	10	471.3		44		NO SE. (FT.) DEPYN/RE. GROUND 19-1 26. 5/442.6	WATER (PT.)	1 .	P 0F #0CH (FT.)
				Weid	₩ + /#	*LU			TIN HOLE:		ENGT		26.5/442.6 LOGGED BY: C. F. Wall		1,2/467.9	gyppinnes de styrppinne delle prime medici
***	ADVARCE	*	RECOVERY	***	CORE R<		ETRA			Ŀ	OH.				N	37 %\$ 6 %
AND DIAMENE	EAMPLE'S AC		CONE RECOVER	**************************************	PRECENT CORE	\$ 1 \$	**************************************	,, o e e	ELEVATION (FT.)	DE 77 H · F.	LANFIED SOIL CLASSIFICATION	RAE FLE	DESCRIPTION AND CLASSI	FICATION	# # # # # # # # # # # # # # # # # # #	从下程序,上层V化L头。 从下层度,并至TU特别。 MARACTER OF BILLING。 性下达、
		-				RQD	*		467.9 -	-		RI-	0'-1.2' Residual Soi			
ΝX	2.	5	2.4	96		0	0					D N	SANDSTONE with interb dk. reddish brown wit pale green mottling.	edded SHAL h lt. gray v. hard (s	and bar	lled with MX it-tube core rel to 48.7
ŧχ	5.	C.	4.2	84		0.75	15			5-	And the state of t	RUN	stone) to v. soft (sh completely weathered, & thin bedded, cross- sandstones, occasions Numerous bedding sepa	fine graf bedding in ally fossil trations wi	ned Rea 5-7 iferous, bit	med with /8 roller-ro
vх	5	0	5.1	102		ð	0			10	A THE STREET STREET	RUM	Slight staining to 18 Severely to completel shale beds @ 2.0-2.2, 6.5-6.9, 8.7-9.6, 12. 20.9. Vertical joints @ 4.9 ing), 10.3-11.8 (curv	y weathers 3.2-3.5, 1-13.7, 20 4-5.0 (no s rilinear wi	4.8-5.0, .5- tain- th	
ΝX	87	0	4.9	98		3.5	70		·	15 -	White the second	RUN	rough surface, orange ing), 11,9-12.9 (no s 22.5-23.0 (rehealed), (slight orange staini (rough surface with o Moderate to severely sandstone @ 14.5-19.6 Bedding separations	taining) 27.3-27.8 ang) 36.6-3 brange stai weathered brith slight	7.1 ning).	
ЯX	5.	o	5.1	102		3.6	72			20		R U	staining @ 19.4, 19.9 23.4, 25.9, 27.1. 28.7 to 37.6: banded sandstone with thin s Separations @ shale b staining. Bedding is predominat	fine grain hale inter eds with r	ed beds.	
X	**************************************	0	5,0	100	**************************************	3.7	74			25	and the second s	NUX 6				
VX.	Çx	0"	5.1	102		4.1	82		1	30	average and the second	R V 7				
·	See	3	heet	2.	-				, m, -	-						
*	<u> </u>					SHEN: SHEFE		- 1		an De	e Ma:	<u> </u> rk			HOLE	-64



		-	В	C)F	}	N	G	LO	G	7	90/EC		set	Railroad	14818	I	вт но. ог 2	D=64
TVPE	NA A CE	# # FUR	大学 はいこうじょう		***	COA#			TRAT		Milliand and American		A TON					#6* #4*	ES ON:
KAMPLER TVPE ARE DIAMETER	A # 3 . 4 # A	CHEST CON H FUN	本語へのひか 米によびから 本語ののの 本語ののの 本語ののの 本語ののの		AND ELOKE	PERCENT CORE			Sour	TRO C.	ELEVATION (FT.)	DEPTH-PT	UNIFIED SOIL	****	DESCRIPTION AND CLAS	##FICATION		CHA	WE RETURN, MACYER OF LINE, ETC.
	**************************************	_	<u>** </u>				-	RQD	z		434.1	<u>دد</u> - -		R	1.2*+37.6* GRIMSBY FM.	(cont.)			
NX	5.	0	4.5	5	9	0		2.0	40	وون	431.5			U 8	37.6'-48.7' POWER CLEN SHALE with interbedded dolomite and calcareous	limestone.	·····	TO COLOR OF THE CO	
NX	5	.0	5.1		10	2	(0.5	10			40 -		R U N	dk. reddish brown to pa grayish green to greeni hard to v. soft, slight weathered.	le green to			
												-		9	No staining on numerous bedding breaks.	horizontal			
ΝX	5	۰.	4.7		9	4	4.3	3.1	62		**************************************	45 _		R U	Clay layer @ 40.5-40.6. Vertical joints @ 40.6-4 surface, orange staining (uneven, no staining).	L.1 (rough	7	0.000.000.000.000.000.000.000.000.000.	
ND OX 3											420-4	48.7		to					reamed to
END SOX 4							To propriet the second					50			Bottom of Boring @ 48.7 Boring completed as obs- See well completion re- details.	ervation well		6" diam	
		##\.	*****************) N	\$T =	<u> </u>	MELSY	TURK;	s	l7£	***	1	Ш				HOLE NO.	
.	- B	III. (4) 2	Y1#61	M :		P271	CXI	# #; 0	- 07H	**	Van 1	De Ma	τk					r)-64



		B	ORII	VG	LC)G		PRQ1E		oner	set Rail	oad		.o. ×o. 14818	1 4	r+∞. >= 2	D-65
SITE	**-						COGRDIMA								LE PROM		BEARING
		De I	Mark Mark	DMILL	E#		N 1,	,161,		MAK	E 468,43		HOLE SIZE	GVERWUNDEN (FT	90°	PY.)	TOTAL DEPTH
	23/8		10/24/8	_!	Jens		-		СМ	E 55			NX/6	2.5	58.	.0	60.5
58/	100		(F7.1%)	:	4	1	2 471.		i MG		ин р ж ълета 1 9. 1		#L. #MOUN! 4/418.7	B WATER (FT.)		ik. +o+ a /466.6	# WOCH (FT.)
AMP	LE M	4 M M R 1	WEIGHT!	PALL	CAT	ING LE	FT IN HOLE:	OIA./I	* ## Y	H	LOGGED		. Wall				A THE RESERVE OF THE PARTY OF T
# G # #	ABUANCE COME JUS	COVERY	arome a come		TRAT			-	- K						1. M. s determine	WGT	tu 0%.
sampler type and diameter	PAMPLES ABUS	. 😈 [💥]	N ARRONAL STATES		** 0 **	į.	ELEVATION (FT.)	OKFTH-FT	UNIFIED SOIL	#4####################################	DES	CRIPTIO	N ARD CLAS	SIFICATION	**************************************	WAT WAT CMA DR(L	TH LEVELS, ER RETURN PACTER OF LINE, ETC.
	<u> </u>	≦ '♥		RQD	- -	•	469,1				01-2.	5'					
					***************************************		466.5 _		1		Resid	ual So	11			ft vi	led to 60.5 ith NX spli:
NX	3.0	3,1	103	0	0			5*	-	U N	SANDS dk. r mortl	ione w ddish ing, v	brown w	rbedded SHALE ith pale gree o v. soft (sh	n ale),	Reamo	core barrel d to 63.0 ith 5-7/8" er-rock bic.
NX	5.0	4.9	98	0.45	9			4		R U N	Sands thick occas Compl	cone i bedde ionall	s fine grad, cross- y fossil:	ely weathered	to		
NX	5.0	4.B	96	0.78	16			10		R SK 3	10.7, 14.2, 24.2, Complesands	12.2- 18.3- 33.2- etely cone b	13.1, 13. 18.8, 21. 33.4. to severe eds @ 15.	4, 7.3-7.4, 1 .6-13.7, 14.1 .6-22.1, 23.9 ely weathered .0-17.8, 23.0	-23,9		
ND OX					With the second			15-		R	weath beddi	red z	ones. In arations	coincident was addition. 03.2, 19.5.			
1 nx	5.0	5.1	102	0.8	16	4		20-		RUN 4	(curv stain 15.0, 15.7- (rougi 24.2-	ilinea ing), (rough 15.8, 1 surf 24.7 (r, rough 6.4-6.8, h surface 17.8-18.8 ace,no te rough sur	.5-3.1, 4.5-5 surface, ora 7.4-7.7, 14. e. no stainin 8, 20.4-21.0 o slight stai rface, slight 2 (rough surf	nge 6- g), ning)		
XX	5.0	4.9	98	3.0	60	7000		25		R U S	black (rehered. (roug 35,9- bland	& orange or and orange or angel or ange	nge stain 33.4-33. aining), ace, oran uneven, e stainin	ning), 31.7-3 .6 (rough sur 34.9-35.2 nge staining) rough surface ng), 37.3-38. surface, sli	2.4 face,		
NX	5.0	5.1	102	3.7	74					R U N 6	Joint stain		5 @ 50*	(rough surfac	& 3		
ND XX								30.		8							
2 NX	5,0	4.9	98	2.6	52			*		N 7					***************************************		
		<u></u>				le.	434.1	35	1	Ш_						HOLE NO.	
1			POON; \$1 IN: F = FE1			'']		ı De	Mark						1	nole no. D-6	



E	3(DRIP	NG	LO	G		HOIR¢	т		Somerset Railroad	14818	1	er wo.	D-65
12 3 74				TRAT	ION		-	OH, THOM	*	JUMES SEL MALLUAGE		<u></u>	***	žs čn;
SAMPLEN TYPE AND DIAMETER SAMPLER ADVANCE LENGTH CORE NOT SAMPLE PERCOVEN	COME WELL	MEGU NUBURNA LA.	18T 4°	", GM2	380 6	#LEVATION (FT.)	DEFTH-FT	UNIFIED SOIL CLASSIFICATION	***	DÉSCRIPTION AND CLAS	BIP ICATION		WAT	· 选带 。这是少年之子。 「宣称 "此事子心明"的。 《表述】"宣称 "必予 LL(NG" "原下G.
NX 5.0 5	5.1	100	2.3 2.6 4.2	¥ 46 52 84 74		434.1	40-		RUN 8 RUN 10 RUN 11 RUN 12	38.2'-56.7' POWER GLEN SHALE with interbedded SANDSTONE and LIMESTONI greenish gray to lt. gr reddish brown, v. hard slightly to mod. weather Vertical joint @ 40.0- curvilinear, rough surstaining), 54.3-54.6 (mostaining).	FM. calcareous calcare	ts,	drilli from 3 NOTE: Beddir diffic in P.C of wee of roo to be from c natura numerc P.G., stain: evider	s (whether irilling or al) are ous in the however, no ing was
OND SOX 4						408.6	60.5			Bedding separations us partings @ 56.7, 57.1, 58.3, 58.8 to 59.2 (no Vertical joints @ 57.9 rough surface, black as staining), 59.8-60.5 (surface, with black an staining and spots of (5G6/6) mineralization Boring completed to 60 Boring completed as ob See well completion redetails of well constr	57.3, 57.8, staining)59.6 (unevend orange uneven, rough orange brilliant gr.)51. servation we ports for	en,		

ATTACHMENT 7.2-1 (Continued)

D-66

BECHTEL'S HADROGEOLOGIC STUDY

OF DANIELEWICZ RTE (Feb. 182) IDLE NO. **BORING LOG** 1 07 1 D-66 14818 Somerset Railroad NGLE FROM HORIZ, BEARING COURDINATES ... 90* N 1,160,859 E 468,567 Van De Mark 8 E G U N DRILL MAKE AND MODEL HOLE SIZE OVERBURDEN(FT.) ROCK (FT.) OTAL DEPTH (FT.) COMPLETED DRILLER J. Genovese/Empire CME 45B 10/26/81 10/27/81 35.5 NX/5-7/8 DEPTH/EL. TOP OF HOCH (FT.) CORE BOXES SAMPLES EL TOP OF CASING GROUND EL.(FT.) DEPTH/EL, GROUND WATER (FT.) CORE RECOVERY (FTJA) 466.33 25.6/438.8 11.0/453.4 AMPLE HAMMER WEIGHT/PALL CASING LEFT IN HOLE: DIA./LENGTH LOGGED BY: C. F. Wall CORE RECOVERY PROCENT COME PENETRATION UNIFIED SOIL BLOWS NOTES ON: WATER LEVELS, WATER RETURN, ELEVATION DESCRIPTION AND CLASSIFICATION (FT.) CHARACTER OF 18T 6" DRILLING, ETC. N 380 464.4 0'-11.0' Z RQD Drilling with NX Residual Soil split-tube core barrel to 35.5 ft. Reamed with 5-7/8 roller-rock bit to 38.0 ft. Installed 3" flush joint casing to 13.0 ft. 0 0 3.8 2.3 10 11.0'-31.7' GRIMSBY FM. 453.4 SANDSTONE and interbedded SHALE: dk. reddish brown to pale green, 3" EASING v. hard to med. hard (sds) and mod. hard to v. soft (shale), fresh to completely weathered, fossiliferous, banded, fine grained to microcrystalline. 2.0 56 3.6 3.5 Bed. Sep. @13.1,13.3, 13.4, 13.6, 16.9 17.4, 17.6, 17.7, 18.2, 20.0, 20.1, 20.2, 31.1, 31.7 (weathering staining) Vertical joints @ 31.1-32.9 (rough surface, uneven, no staining), 34.3-34.8 (uneven, rough surface, no staining, 2 joints), 35.25-35.35 20 NX 10.0 7.7 77 64 (gray clay filled). 25 ∇ END вох 30 40 MX 9.9 10.0 101 4.0 31.7'-35.5' SHALE w/interbedded lime-Boring completed at 35.5 ft. stone & calcareous SANDSTONE: dk. reddish brown to grayish green, 432.7 Completed as v. hard to med. hard, sl. to severely observation well. weathered. See well completion report for construction details.

SS - SPLIT SPOON; ST + SHELBY TURE; D . DERNISON; P . PITCHER; O . OTHER SITE 428.9

Van De Hark



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-		R	ORIN	4G	10)G	•	**************************************		Sor	erset Railroad		14818	- 1	T NO. OP 5	D-67
\$17 E			<u> </u>			, 	COORDINA	78.0		301	EIREL MAILIONG				M HONIE.	
		e Mar						N 1,1			E 468,575	I	OVERBURDEN PT.	90*	/ \	
10/2	.≒ 25/8:	- 1	MPLETED 0/26/81	M.		ly/Emp	ire	ľ		45		NX/6	9.5	90.	•	100.0
.096	# E C	OVERY	(FTJ%)	COME	DOXE	S	ES EL TOP 0	T CASI	NG	C # D	IND EL.(FT.) DEPTH	EL. GROUNI	WATER (FT.)	-		POCK (FT.)
	8/93		WEIGHT/P	,	6	1	465.				62.9 50.	1/412.8		9.	.5/453.4	·
-	140\$										1	[sham/S.	Balone/D. Mid	dletor	1	
	E 2	* }			ETRA				, z	П						
SAMPLER TYPE AND DIAMETER	ADVANCE CORE HU	COVE	T CON		BLOW	S	ELEVATION	1.94	UNIFIED SOIL	1	DESCRIPTIO	N AND CLAS	SIFICATION	-	WATE	S ON: R LEVELS, R RETURN,
A 0 0	144	F 7	PRECENT O	•	0		(FT.)	DEPTH-FT	ASSIF	BAMPLE				1	CHAR	ACTER OF
• 4	SAMPLES LENGTH	SAMPLE PEC		181	GNE	Q M K	462.9		29							
ss	24"		7	3	3	4	•	-					arse SAND, som			similar to ne during
ss	plastic (fill), some plastic silty CLAY, trace gravel.													soil	sampling.	
-								-		$\ \ $						
ss	24"	5"	10	2	4	6		5 -								, 4 <u>1</u> - 1
SS	24"	4"	35	7	27	8		-								
SS	24"		120+	47	70	50/0"	453.4	-								
			REC.	RQDZ			,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	10 -		R			SANDSTONE w/	/in-		
		, ,		10				-		U N			ale green, sha	ale		
	CASI	1.0 NG	40	18				-		1	Horiz. frac		3.95 (clay-fil Lled), 15.42,			
								-		R	Fractures:	14.85(20	'), 15.2(10°), .35, 17.8-18.3	,		
								15 -		U N	vertical, F	eO stain.				
NΧ	5.0	4.85	97	44	Pac Tes			-		2	fine-graine	d SS, wea	thered, med.	į		
					# 8	7 × 10	-6	•			shaly parti	ngs at 0°	dip, otherwinear horizonta	ise		
····	, ,,	7 21	100	86	cm	sec x 10		-	R	Н			ained 18.52'-			
ΝX	μ.Ζ'	11.2.	100	00				20 -		3			nticular storm	۵		
								_		R	18.5'-19.7'	: Thinly	interbedded ((0°)		
NY	6.91	6.85	99	91				-		N	gray v. I.	sandy to	silty shale.			
	[=		4						
								25 -								
END					,	ker]		32.0 -46.4					
вох	1		İ		Tes ≢7	-		-		П			SHALE, med. so eathered, hori			
1						x 10 /sec	6	-]	R	zontal bedd	-	ad North Co	4.5		
									}	U	gray f. to	med. SS a	red-brown to land green-gray	soft		
10X	10.0	9.81	98	57		2		30 <u> </u>	1	5	mod. well i	ndurated;	oft to med. ha	ures		
							430.9	-	1		and boudin Bedding var	shaped le ies 0° to	enses present.	•		
								-			Light red-b	rn. f. gr	m. SS, faint			
							T	-			cross-beddi	11 8 •				
	<u></u>	1	**************************************		V 70=	<u> </u>	[427.9	35	<u> </u>	Щ					HOLE NO.	• • • • • • • • • • • • • • • • • • • •
,	D - DENNISON; P - PITCHER; O - OTHER Van De Mark 2 3 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2													ľ		



		B	DRII	NG	LC)G		ľ	#0/EC			t Railroad	14818	1	ET NO.	- 1	D-67	
SAMPLES TYPE AND DIAMETER SAMPLES ADVANCE	71"	7	* * * * * * * * * *	PEN	ETRAT	rion		VATION	та-нтаво	Jon No	BAMPLE	DESCRIPTION AND CLAS				OTES		
AND DI	LENGT	COME	PERCENT OF THE PERCEN	i i	ONE	O K	42	7.9	ă	35	•					*11.11	MG, ETC.	•
NX S	See	She	et 1.	RQD Z	Pac Tes	•			1 1 1		R	27.9'-46.4' POWER GLEN 30.1-30.45: red-brn. 1 med. soft, fresh to sl Color change to silver irregular near-horizon 30.45' - 3 mm diam. ca	aminated SHA ightly weath -gray @30.3.tal bedding.	LE, ered			•	
NX 10).d!	9.68	97 ·	49	# 6 5•1 c¤	x 10 /sec	-5		40 1 1 1		6	30.8'-32.05': similar with thin inter/x-bedd 32.05'-32.5': dark stemed. soft thin-bedded lenses lt. brown to gr. SS, bedding 0°.	ed SS. el-gray soft shale w/thin	to				
2		ų.			Pac Tes \$5	ker t	41	6.5	45 1 1			32.5-33.15': similar to 33.15'-42.8': v. similar 32.5', med. soft. Numer interbeds of lt. gray Alternates thin-bedded to massive to laminated	ar to 32.05° rous thin fgrained S (poker chip	- S. s)			, 4 1	
NX 10.	0.09	9.91	99	76		x 10 e/sec	-5		50-		R U K	varies to mudstone. Bedding 0° to 3°. SS 16 thicker, more numerous 42.8'-46.4': Similar to here predominated w/thibeds of dark steel gramudstone, locally soft, grained, hard, local fresh, v. well indurate varies 0° to 15°.	with depth. above, but in to med. in shale & SS is lt. lly massive,	SS nter-		<u> </u>	7	
END SOX 3					- Tes #4 3.7	ker t — x 10 /sec			55	1	RUN	46.4'-61.0' WHIRLPOOL It. gray-white f. grai sandstone/qtzite., v. indurated, massive but to 55.2' w/dk. steel gr scribed above. Below 55. shaly laminae 1/32" this	ned nard, v. well interbedded ray shale de- 2' common					
кх 10.	.0	. 75	98	72	1	ker	40: T	1.9	65	1	8	61.0'-100' QUEENSTON FR 61.0'-61.4': Dark greer massive, med. soft, fre weathered, sharp upper 63.48'-63.7': green sha 69.0-69.3: green shale 74.3-74.4: green shale	contact. le interbed. interbed.	LIY				
NX 10. PO SOX 4	.0.9	9.55	96	86	CI	x 10 i/sec			70		R U N 9	61.4'-100.0': dark red- silty shale, med. soft fresh to slightly weath bedded @ 0°, clayey zor Intermittent thin greer 79.2-80.05, 80.25-80.58 84.06-84.23, 93.85-93.5 97.4-97.5.	to med. hard hered, thin- he 61.9'-62.1 h shale beds 3, 83.31-83.1	d, 15'. 73,	j.			



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BORING L	OG [PROJECT		er		ET NO. HOLE NO
SAMPLER TVPE AND DIAMETER ANDLE RECOVERY COR	RLEVATION (FT.)	DEPTH-PT	UNIFIED SOIL CLASSIFICATION	DAMPLE	DESCRIPTION AND CLASSIFICATION	HOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
NX See Sheet 2. RQD Z Z P:	acker	80 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		R U N	61.0'-100' WHIRLPOOL FM (cont.) Boring completed to 100'. Boring completed as observation well. See well completion report for construction details. Fractures 18.4 0° mod. weath. irregular smooth. 18.43 0° tight thin gray clayey silt coating. 18.52 0° weath. open 1/16", mustard—yellow discoloration, smooth.	
END TO	acker est 1 .7 x 10 c=/sec	90 1		R U N	18.58-18.68: (4) 0° bedding plane partings, weath., tight, smooth, flat, 1/16" thick shallayers @ partings. 18.74 0°, tight, hi. weath., mustard- ylw. discoloration. 18.96 0°, open 1/16", hi.weath., gray shaly coating. 19.02: 5°, tight, rough, hi. weath. 19.58: 0°, weath., open 1/16" 19.7: 0°, weath., open > 1/16" 19.71-19.73: (3) 0°, weath., tight, smooth. 21.27':5°, sli. weath., open 1/16", rou 23.15: 10°, fresh, tight, smooth. 26.03: 0°, fresh, closed, rough. 26.0'-26.4': 90°, fresh, closed.	gh
NX 3.6 1.73 38 48	362.9	95	ì	R U N	26.65': 50°, sli. weath., tight, smooth 26.87: 40°, tight, weath., rough. 27.28: 20°, open 4 1/16", weath., rough 28.0: 5°, sli. weath., open 1/4", irreg 28.56: 0°, fresh, tight to open 1/16". 28.78: 5°, tight, sli. weath. 29.10: 0°, weath., open 4 1/16". 29.17: 0°, weath., open 4 1/16". 29.30: 0°, closed, sli. weath.	ular
END 50X B.O.E. 100.0'					29.84: 20° tight, sli. weath. 29.84-30.2: 90°, fresh, closed. 30.0: 0°, closed, fresh (mech. break). 30.2: 0°, sli. weath., open 1/16". 30.29: 0°, sli. weath., open 1/16" to 1/30.4: 10° weath., open 1/16" to 1/4". 30.52: 50°, weath., open 1/16" to 1/4". 30.52-30.9: 90°, open < 1/16", calcite coated, sli. weath. 30.9: 0°, fresh, smooth, spun core. 31.0: 35°, tight, fresh, smooth. 31.17: 15°, tight, fresh, smooth. 31.32: 5°, open 1/16"-1/4", fresh, smooth. 32.04: 0°, fresh, tight to open 1/16", smooth. 32.15: 0° fresh, tight to open 1/16", smooth. 32.27: 0°, fresh, tight, smooth. 33.09: 0°, fresh, tight, smooth. 33.09: 0°, fresh, closed, smooth. 33.4: 5°, tight, thin weath. calcite. 33.44: 0°, fresh, closed, smooth. 33.68: 0°, fresh, open 1/16-1/4, smooth.	Boring reamed to 6" diameter following coring.
SS - SPLIT SPOON; ST - SHELBY TUE D - DEHNISON; P - PITCHER; O - O	SITE THER	1			Van De Mark	D-67



BORII	NG LOG	3	PROJEC		erse	t Railroad .	14818	l	T HO.	D-67
SAMPLE RECOVERY CORE RECOVERY CORE RECOVERY CORE RECOVERY FRECENT CORE RECOVERY	PENETRATIO BLOWS	ELEVATION (FT.)	DEPTH.PT	JO NO	BYMME	DESCRIPTION AND CLAS	· . •		NOTE WATE WATE CHAR DRILL	S ON: R LEVELS, R RETURN, ACTER OF .ING, ETC.
SS - SPLIT SPOON: ST -	S-CLBY TUBE;	SITE		n De	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	34.07: 0°, fresh, tight 34.41: 0°, fresh, tight 34.54: 0°, fresh, open 35.1: 0°, fresh, close 35.23: 0°, fresh, tight 35.84: 0°, fresh, tight 36.16: 0°, fresh, open 36.52: 0°, fresh, open 36.52: 0°, fresh, open Unless otherwise noted, fractures dip 0° to 5° to open 1/16": 36.62, 36.8, 36.9, 37.1 37.8, 37.95, 38.15, 38. 39.0, 39.15, 39.63, 39. 40.4, 40.95, 41.4, 41.4 42.13: 0°, 1/4" clay at 42.33, 42.53, 42.6: 1/2" shale frag! 42.85, 43.82, 44.0, 44, 45.35, 45.9, 47.65, 47, 47.93 to 48.88: 90°, ti weathering, 48.88, 48, 50.23, 51.14, 51.52, 52, 53.07, 53.1-53.4: 90°, closed, 53.25, 53.55, 53.67, 56, 54.8, 55.14. 55.34: < 1/4" clay & 55.98, 56.32.	, smooth. 1/16", smooth. , irregular, , smooth. 1/16", smooth. 1/1	.55,.27,.9,.8's		
			, .			• •				



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PENETRATION BLOWS L D D Unless metad otherwise, all fractures lated below are war horizontal, tight, and fresh, s. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1.	. R	ORIM)G		POJEC					JDB NO.	1	ET HO.	HOLE NO		
### SHOWS	18.215	T				<u> </u>	S	1	7	et T	Railroad ·	14818	5	67 5	D-67
Deliess noted otherwise, all fractures listed below are near horizontal, tight, and fresh. 56.55, 57.3, 57.3, 57.55, 58.06, 58.1, 60.1, 61.0, 61.23, 61.3, 61.0, 61.23, 61.3, 61.9, 62.12; 0°, 2° zone of clay & weathered shale, 62.45, 62.74. 62.83 to 62.92; 0°, crushed zone from drilling. 63.14 20°, tight. 64.120°, tight. 64.89; 10°, tight. 65.81; tregular fract, w/crushed freg s. 65.9; 66.07, 66.5, 67.02, 67.07, 67.07, 67.07, 67.07, 67.17 zone of crushed freg's. 65.68; tregular fract, w/crushed freg's. 65.09; 10°, 12° clay seam. 65.68; tregular fract, w/crushed freg's. 65.09; 10°, 58.59, 69.3, 74.62 (sechanical), 75.05, 75.58, 76.44, 76.6; 40°, fresh, poor fit. 76.10°, 77.77, 77.75, 77.61, 77.7, 77.86, 77.99, 78.12, 78.23, 78.23, 78.45, 77.99, 78.12, 78.23, 78.23, 78.25, 78.74, 79.11; 30°, fresh. 77.99; 78.12, 78.23, 78.23, 78.23, 78.45, 77.99; 78.12, 78.29; 81.15, 81.54, 82.32, 82.57, 87.87, 87.24, 78.87, 87.25, 87.26, 88.27, 40°, fight. 77.98; 79.29; 81.15, 81.54, 82.32, 82.21, 82.26, 83.99, 74.64, 87.76, 88.27; 40°, fight. 88.29; 40°, fight. 88.29; 40°, fight. 88.29; 40°, fight. 88.29; 40°, fight. 88.29; 40°, fight. 88.29; 40°, fight. 88.29; 40°, fight. 88.29; 40°, fight. 88.29; 40°, fight. 88.29; 40°, fight. 88.29; 40°, fight. 88.29; 40°, fight.	AND DIAMETER AVIE TO DIAMETER ADDIAMETER ADD	3: 20	8	LOWS	5 <u>.</u>		DEPTH-PT	UNIFIED SOIL	CLASSIFICATION	-1.mva	DESCRIPTION AND CLASS	IFICATION		NDT: WAT WAT CHA DRIL	ES ON: ER LEVELS, ER RETURN, RACTER OF- LING, ETC.
								┷╸╅┸┩╫┩╇╬╬┩╃┩╫╃┸╫╃╫╃┸╃╃╇╫╃┪┩╇╇╇╬╫╇╇╇╇╇╇╇╇╇╇╇╇╇╇╇╇╇╇╇╇╇╇╇╇╇╇╇╇╇╇╇╇╇			listed below are near ho and fresh. 56.55, 57.3, 57.55, 58.0 61.0, 61.23, 61.3 (crush coring to 61.4), 61.54, 62.12: 0°, 2" zone of c1 shale, 62.45, 62.74. 62.83 to 62.92: 0°, crus drilling. 63.14: 20°, tight. 63.19-63.3: crushed from 64.1: 20°, tight. 64.48: 30°, tight. 64.89: 10°, tight, shale 65.21: 0°, 1/2" clay sear 65.68: irregular fract., 65.9, 66.07, 66.5, 67.02 67.07-67.17 - zone of crushed 68.45, 68.52, 69.3, 74.66, 75.05, 75.58, 76.44, 76.6: 40°, fresh, poor from coring 79.1: 30°, fresh. 79.1: 30°, fresh. 79.25-79.3: 1/2" zone of 79.49: 50°, fresh. 79.78, 79.92, 81.15, 81.58, 88.68, 84.23, 84.25, 84.48, 85.1, 85.51, 86.1, 87.64 87.99. 88.27: 40°, tight. 88.52, 88.68, 89.31, 89.58, 89.45: 30°, tight. 90.4: 0°, crushed core, p. 90.63: 20°, tight. 91.2: 15°, tight. 91.59, 92.1, 92.13	rizontal, t 6, 58.1, 60 ed zone fro 61.9, ay 6 weathe hed zone fr coring, 63 partings. w/crushed , 67.07, ushed frag': 2 (mechanics it. 1, 77.7, 77. 33, 78.45, fit. crushed cor 54, 82,32, 4, 87.76, 6, 80.00 fit.	ight .1, m red om .48. frag s.	· .	
						<u>-</u>	- - - -								The state of the s
D = DENMISON; P = PITCHER; O = OTHER Van De Mark	88 + 6PLIT 5PE	DON; ST -	5 H K L B Y	TU##;	5			I			* v.,			HOLE NO.	,



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English Lines.

	<u></u>		-											 		T		1
		B	OF	211	NG	L()G		PR01E		OB	erset Railroad		14818		1 0		D-68A
517 E								COORDINA							ANGLE		HOR12.	BEARING
9 E G				De Ma		ER		N 1,	160,8			468,555	HOLE SIZE	OVERBURDE		90°	7.)	TOTAL DEPTH
10,	/24/8	B1 1	0/26	5/81	s	. Gau	dy/Emp			CH	E 4	45B	NX/3	10.0		44	. 2	54.2
		DVER	¥ [F ¥.	J*)			; swa	467.		≈G		465.2 47	.4/417.8	WATER (FT.	1	LO.0/4		PROCK (FT.)
	8.8/9	9/-	- w E	16 47/	i	3		FT IN HOLE:		E = 0 T ;		LOGGED BY:	.4/41/10					
140)¢/30	יינ	·		,			_	,		,	J. C. Isha	m/C. F. 1	Vall				
3 4	N N CH	VERY	*	CO 3 4	PEN	ETRA BLOW			_	15 S							# 018	IS ON:
PART	ADVA	******	NO.	CENT C	<u> </u>			ELEVATION (FT.)	DEPTH-P1	UNIFIED SOIL	N PLR	DESCRIPTIO	H AND CLAS	SIFICATION			WATE	ER LEVELS, ER RETURN,
AND D	LENGTH	CONE N		PERCENT		 Q	 Q		8	LASS	*						DRIL	LING, ETC.
- ‹	£13	1 1 8	•	1st		3rd	4th	465.2		- 6	\coprod		···					
SS 2"	2.0'	2.0'] ,10	1	3	4	6				1	0.0'-10.0' Fill Dk, reddish br		ture of o	ravel	. 1 "		surface
									=		H	clay & black p	•	•	-	e. c	_	installed epth of
SS 2"	2.0'	0	5	3	2	2	3] :		4					1	2.5 ft	t.
SS									5-		٦					•		used as a ng fluid.
	2.0'	1.0	6	2	3	2	4]		Ц							ΑŢ.
SS]				,.]		4							
2" SS	2.0	15' 	58	40	10	41	17				H							
	2.0	1	43	57	42	53	90				2							
SS	l							455.2 -	10-	ĺ	6	_ Top of weather	ed rock.					
2"	1.3'			150	23	50	100/4											
	.51				104/6				-		Z R	Top of unweath				_		
NX	3.4	3.4	10		RQD Z				=		U	10.0'-29.0' GR Banded & mottl	led dark	reddish b				
									15		N 1	pale green int & soft shale.				e	٠	
	<u> </u>	<u> </u>							=	!	5	Borizontal fra 13.8, 14.15, 1	14.25, 14			8,		
KX.	1.6	1.6	10	0	36				=		RUZZ	some with FeO Fracture zone	15.1-15.					
											H	Vertical fract Horizontal fra			.5,			
									20-		R	16.6, 16.9, 17 18.7, 18.8, 18	7.5, 17.6	, 17.7, 1	7.75,	.		
10.	p L	7.3	8	7	53				=		U	20.4, some with Vertical fract	th FeO st	ains.				
	"			•							3	Horizontal fra 21.4, 21.9-22.	ac. 20.55	, 20.65,	21.2-			
									-			23.0, 23.4, 23	3.75.	·	·,			
									25-			Vert. frac. 20 Basal GRIMSBY						
																!		
	 	i					<u>'</u> 				H	Rorizontal fra Shale bed 28-2		26.95, 27	.05.			
									-		R U	5						
507 570								436.2 -	-		X	29.0'-52.4' PO				4		
90X 1			•						30-		4	banded & mott: pale green & g	gray, int	erbedded	sand-	. [
NΧ	ε.6	7.85	9	1	58				-			stone and shall Horizontal fra						
		1										to 32.2, 32.0 34.75.	33.0,	33.35, 34	.05,			
												34.75.						
	<u></u>		<u> </u>					430.2	_35_	L	Ш					1	DLE NO.	
•	# DE	PLIT 8 : WMISC	**	; 6T		0 - 01			Van D	e Mar	rk	Lakirdin				1"		-68 A
SC JOSEPH									-						_	- 1		

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Someter Railroad 14818 2 ° 7 D-68A 18	· DUITING - I LIE					108 NO.	1	ET NO.	HOLE HO.
NX 5.0 5.0 110 18	BORING LOG			77	Somerset Railroad '	14818	2	or 2	D-68A
NX 5.0 5.0 110 18	PENETRATION BLOWS PENETRATION B	1	UNIFIED SOIL	CLASSIFICATION SAMPLE	DESCRIPTION AND CLAS	SIFICATION		WATE WATE	TR LEVELS, TR RETURN, TACTER OF
NX 5.0 4.7 96 36	RQD Z			U N	Vert. joints 30.4-30.9, 32.3-32.5, 34.9-35.5. 35.5-52.4: interbedded L SS, med. soft to med. ha dark gray, slightly to m	31.4-31.8, S, SH, calc. rd, med. to			
NX 4.4 4.95 113 85	5.0 4.7 96 36	40		U N	Vert. joints: 37.9-38.1,				
NX 5.0 5.0 100 69 412.8 - RUN	4.4 4.95 113 85	45		U N					<u>7</u>
Snale partings, vert. Fract.: 52.8- Solution of boring: 54.2 ft. Boring completed as observation well. See well completion report for Boring reamed to 6" diam. to 58.0'.	412	2.8		U N	SANDSTONE, lt. gray to w fresh to sli. weath., f.	hite, very h grained, oc	ard.		
					53.1, 53.5-54.0. Bottom of boring: 54.2 f Boring completed as obse See well completion repo	t. rvation well		6" di	am. to



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Till Wall

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		B	ORII	VG	L(OG		P#0/E		one	erset 1	Railı	road		1481		1	P 1	D-69	
SITE	N	orto	a			•	COORDIN	A 7 E S	N	1,	160,836	6	E 468,	601	•		0	M HORIZ,		
10		- 1	0/28/81	DRILL		vese/I	imnire		Cri		KR AND	MODE		HOLE SIZE (INCHES)	12.7	*(**.)		(FTJ) 3.7	16,4	TH
CCAE	RECO		· (***)	COR		3 24	43 EL TOP			G P	OUND EL	(FT.)		EL, GROUN	D WATER (FT		EPTH/	EL. 107 0	PROCH (FT.	<u>., </u>
	1/74		R WEIGHT/	PALL .	CA	1 1	466.		ENGT	1	464.4	GGED	1	.8/458.6			12.7	/451.7		
	140#	/30"						- ·	т	_		с,	P. Wal	1						
PLEN TYPE DIAMPTEN	SAMPLEN ADVANCE	RECOVER	PERCENT CORE	1	ETRA BLOW		ELEVATION	DEPTH - PT	UNIFIED SOIL	SAMPLE		DES	CRIPTION	NAND CLAS	SIFICATION			NOTE WATE	IS ON: IR LEVELS IR RETURN	i, 4 ,
SAMPLER AND DIAM	BAMFLEN ABVA		PERCENT C	0 181	ONE	Que 42	(FT.) 464.4	0	UNIFIE	.48							-	DRIL	LING, KTG.	
2" SS	2	0.6	12	6	7	5/4				1	Fill CLAY	and	n to b	y SAND a	. to crem nd plasti dense to	c, me	ty tal.	ID hol	ng with 5 low-stem	
SS	2	0.9	10	2	3	7/9				2	dens	se, w	et, tr	. gravel	, occasio	v. nal		Drilli	to 11.4 is with it-tube c	
ss	2	0.7	8	6	4	4/2		5-		3									to 16.4'	
ss	2	0	12	5	2	10/12			1	4 5								roller-	w/5-7/8 -rock bit	
ss	2	0.9	52	50		15/30		10		5A		1 16	/1 ==	IMSBY FM				18.01.		
SS	1.4	0.7	70	14	24	46/.4		-		6	SAND	STON	E w/in	terbedde	d SHALE: ale green	. V.				
				RDQ	Z		451.7		1	R	hard	to	med. h	ard to s	oft, sl. i fine-grain	to				
NX	5.0	3.7	74	0	0			15		T Z	oran	ge s	tain.)	. 13.9 (), 13.7 (s tr. clay), l clay), 1	. 14.1				
							448.01	-	_		(blu n thic	eish k),	-yello: 14.9 (wish gree 0.04° sa	en clay 0. me as @ 14 /yellow-gr	.05' (.5)				
							•	-			clay Vert	coa ical	ting). joint	@ 12.8-	13.2 (rous	zh				
								20 -			14.9	-15.	V. 51 0 (rou	orange	staining) ce, no sta	, Eining	3).			
											Bott comp	om o lete	f borin	ng @ 16.4 oservatio	4 ft. Bor on well	ing				
														etion repetails.	port for					
:					·		Appropriate the fills of the control of the file of the control of		7			7.		-						
•	1 - 9°	LIT \$	POON; 87	- SHELS	Y TUB	E; 51	TE CO. S.	<u></u>	1 No	ort	on	1000	<u>. 1</u>			• •		HOLE NO. D-69	* * * * .	



---**BORING LOG** 14818 1 or 1 Somerset Railroad D-70 COURDINATES 90* Norton N 1,160,737 E 468,896 DRILL MAKE AND MODEL (INCHES) DVERBURDEN[FT.] ROCK [FT.] BEGUN COMPLETED 10/28/81 10/29/81 CME 45B Empire CORE BOXES SAMPLES EL TOP OF CASING GROUND EL. (FT.) DEPTH/EL, GROUND WATER (FT.) CORE RECOVERY (FTJ%) DEPTH/EL. TOP OF ROCK (FT.) 7 1 468.10 466.3 6.7/459.6 14/452.3 CASING LEFT IN HOLE: DIA./LENGTH SAMPLE HAMMER WEIGHT/PALL LOGGED BY: 1407/30" C. F. Wall/D. Middleton LENGTH CONE HUN SAMPLE RECOVERY CONE RECOVERY PERCENT CORE PENETRATION SMOTE STONE UNIFIED SOIL BLOWS BAMPLE DESCRIPTION AND CLASSIFICATION (FT.) 187 Š 2 466.3 2' 0'-14' SS 2 7/4 0.7 10 1 3 Pill: dk. reddish brown, loose, moist, Drilling with v. fine clayey SAND and plastic, metal, 5" ID hollow-stem carbon rods, tr. med. sand augers to 6.9 ft. 0.2 6 3 3 3/4 5 30/40 SS 2 1.0 40 10 0.1 20 100/4 SS 0.9 2.0 0.8 8 4 4 4/7 2.0 0.9 17 14/70 SS 29 15 1.5 0.9 19 29 50 SS Top of rock. 14.0'-19.0' GRIMSBY FM. Ream with 6" 452.3 roller rock bit to RQD Dark red-brown to pale green, fresh to 19.4'. $\frac{1.05}{217}$ severely weathered, fine grained to microcrystalline, interbedded SANDSTONE NX 5.0' 3.9 78 SILTSTONE, and SHALE, shale completely weathered to clay. 447.3 Bottom of boring @ 19.0. 20 -Boring completed as observation well. See well completion reports for construction details. 25 HOLE NO. SE - SPLIT SPOON; ST - SHELBY TURE; Norton D - DEWNISON; P + PITCHER; O - OTHER

APPENDIX B

GROUND WATER OBSERVATION WELL REPORTS

WELLS D-7 AND D-49 THROUGH D-70

_		ONCOND W		DOLKVATION WELL IN	LIVILI
	PR	OJECT <u>Somerset</u> F	ailroad	Page	23 of 23
	LOC	ATION <u>Danielewic</u>	z Route - Sta		No
		e Completed 9/25/8			fer Whirlpool-
				Date 9/25/81	Power Glen
		• • • • • • •			Interval 428.7-413.
╞					
	NOT	TE: December 15, 19	981, Dry Hole		
				Elevation of top of surface casing / riser pipe.	460.5/460.4
		ound		Heigth of top of surface casing/rises pipe above ground surface.	2.4'/2.3'
		vation 458.1		Depth of surface seal below ground surface Type of surface seal: Cement	2.5'
		,		Bentonite	
***************************************	***************************************	0.00	\$ 6 B	I.D of surface casing. Type of surface casing: Steel with the surface casing:	th4"
	And the state of t	Grimsby-Power		locking cap Depth of surface casing below groun	2.01
		Glen Contact 438.8		I.D. of riser pipe. Type of riser pipe: Schedule 40	2"
1	-			PVC	
- [evel			Diameter of borehole	3.75"
	֓֡֓֜֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓	Power Glen-		Depth of borehole	
١	Water	Whirlpool Contact		Type of backfill: Bentonite-cement	grout
	-	417.0		Elev./depth top of seal. Type of seal: Bentonite	429.2/28.9
	and			Elev./depth bottom of seal.	427.8/30.3'
	raphy			Type of sand pack. 2-Q Sand Depth of top of sand pack.	30.3'
	tratigraphy			Elev./depth top of screened section. Type of screened section: Sch 40 PV	422.3/35.8' C
	S			Discribe openings 0.010" machine slot-horizontal slot	
	ized			I.D. of screened section.	2"
	Generaliz			Elev /depth bottom of screened section	on. $\frac{413.1/45.0'}{0.3}$
	Ğ	A promise of the contract of t		Length of blank section.	
		Farmer of the state of the stat		Elev./depth bottom of plugged blank section.	412.8/45.3' 411.5/46.6'
18/		A CONTRACTOR OF THE CONTRACTOR		Elev./depth bottom of sand column	411.0/40.0
iPO 13865 11/81			-	Type of backfill below observation pipe Natural Gravel	
1 2			<u> </u>	. Elev/depth of hole.	411.5/46.61

PROJECTSomerset Railroad - Van De M	lark Poge	1 of 23
LOCATION N1.161,003 E468.422		<u>D-49</u>
Date Completed $10/30/81$ Original Dept	h Aquifer	Power Glen
Inspected By <u>D. L. Middleton</u> Date		ol Contact
Checked By Date	Elev. Inte	rvo 408.45-428.
		
Ground Elevation 459.8 Grimsby-Power Glen Contact 437.75 422.1	of top of surface casing/riser bove ground surface. of surface seal below ground e Cement surface casing. of surface casing: Cast iron th lock cap	461.95/461.9 2.2/2.15 27.5' 4"
Diamet Depth Type of Elev./o Type of Depth of Depth of Depth of Depth of Depth of Depth of Depth of Depth of Depth of Depth of Describe slot of Depth of Describe slot of Depth of Describe slot of Describe slot of Depth of Describe slot of Descr	riser pipe: Sch 40 PVC er of borehole of borehole of backfill: Cement depth top of seal. of seal: Bentonite depth bottom of seal. of top of sand pack. depth top of screened section. of screened section: Sch 40 PVC e openings 0.010" machine - horizontal slot screened section. depth bottom of screened section. depth bottom of screened section. depth bottom of screened section. depth bottom of screened section. depth bottom of screened section.	6" 51.3' 432.3/27.5' 428.8/31' sand) 31' 418.8/41.0' 409.5/50.3' 1' 408.5/51.3'
pipe	f backfill below observation N/A tepth of hole.	408.5/51.3'

PR	OJECT Somerset R	ailroad - Va	n De Mark	Page 2	of 23
LO	ATIONN1,160,983	E468.4	15	Well No.	
	te Completed 10/23/8	1 Origini	of Depth 91.0'		irlpool -
ł	pected By D. L. Mi	_	· · ·	Queenston	1
	•				
Ln:	ecked By		Dave	TEV. Interva	369.8-410.3
Ele	ound vation 460.8 Grimsby-Power Glen Contact 438.0	20 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Elevation of top of surface carriser pipe. Heigh of top of surface casing pipe above ground surface. Depth of surface seal below ground surface. Type of surface seal: Cement	462	3' 2.1/1.97' 46.10 4"
nd Water Level	Power Glen-Whirl- pool Contact 414.9		Diameter of borehole Depth of borehole Type of backfill: Cement Elev./depth top of seal. Type of seal: Bentonite	41	6" 91.0' 4.7/46.10'
αu			Elev./depth bottom of seal.		0.3/50.5'
phy		<u> </u>	Type of sand pack. Q-02 (fine	to med. sa	ind) 10.3/50.5'
Stratigraphy		<u> </u>	Depth of top of sand pack.	•	
rati			Elev./depth top of screened sect Type of screened section: Sch	ion. 40 PVC	402/58.8*
S			Describe openings 0.010" macl	nine	
ا م	Queenston-Whirlpool Contact 404.3		slot - horizontal slot		- 44
ize	Contract 404.3		I.D. of screened section.		211
Generalized			Elev./depth bottom of screened	section.	373.2/87.6'
ن			Length of blank section.		1,
			Elev. / depth bottom of plugged	blank	372.2/88.6'
			section. Elev./depth bottom of sand col	,	372.2/88.6
			Type of backfill below observa		
			Elev./depth of hole.		369.8/91.0'

PROJECT Somerset I	ailroad - Van De Mark	Page 3 of 23 Well No. D-51
Date Completed 10/27/81	Original Depth 43.31	
	odnikar Date 10/27/81	Power Glen Contact
,	Date	Elev. Interva 416.2-444.

Ground Elevation 459.5 Alexandra Control Cont	Elevation of top of surface riser pipe. Height of top of surface pipe above ground surface. Depth of surface seal: Type of surface casing. Type of surface casing iron with lock cap Depth of surface casing	462/461.77' casing/riser 2.5'/2.27 below ground 11.75 Cast 4"
and Water Level	Type of riser pipe: Sch Diameter of borehole Depth of barehole Type of backfill: Cemen Elev./depth top of seal. Type of seal: Benton Elev./depth bottom of se	6" 41' nt 447.75/11.75
Grimsby-Power Glen Contact 438.0	Type of sand pack <u>Q-03</u> Depth of top of sand pac	k. 14.75'
70	Type of screened section Describe openings 0.010 horizontal slot	n: <u>Sch 40 PVC</u> O machine slot-
Generalize	I.D. of screened section. Elev./depth bottom of sc	2" 419.5/40'
Gen	Length of blank section.	1'
	Elev./depth bottom of p	
	Elev./depth bottom of so	(20 = 1:4 =
	Type of backfill below o	
	Elev./depth of hole.	416.2/43.3

PROJECT Somerset Railroad - Van De Mark	Page 4	of23
LOCATION N1,160,634 E468,308	[]	D-52
Date Completed 10/25/81 Original Depth 90.2'		Whirlpool-
Inspected By D. L. Middleton Date 10/25/81	II.	n Contact
Checked By Date		val 376.3-405.5
Ground Elevation 466.5 Cound	ground Cast	468.8/468.69' 2.1/1.97 3' 4"
Power Glen-Whirl pool Contract 411.9 Diometer of borehole Depth of borehole		90.2
Type of backfill: Cement Elev./depth top of seal. Type of seal: Bentonite Elev./depth bottom of seal. Type of sand pack. Q-02 (fill) Depth of top of sand pack. Elev./depth top of sand pack. Type of screened section: Sci	ection.	399.1/67.4'
I.D. of screened section. Elev /depth bottom of screened section. Elev./depth bottom of plugge section. Elev./depth bottom of sand Type of backfill below obser pipe. Cuttings Elev./depth of hole.	ed blank column.	2" 381.5/85' 1' 380.5/86' 376.3/90.2'

Pf	ROJECT Somerset	Railroad - Va	nn De Mark	Page	5 of 23
LC	CATIONN1,160,62	6 E468,353	3	Well No.	D-53
Do	ate Completed 10/20/	81Origin	od Depth 45.9' (cored)		Grimsby-
ļ			Date 10/20/81		len Contact
ĺ	necked By			Elan Inte	rva <u>421.5-442.3</u> 4
				CTEA' HUE	
1 "	round evation 467.4	000	Elevation of top of surface coriser pipe. Heigth of top of surface casing pipe above ground surface. Depth of surface seal below a surface. Type of surface seal: Cement Cemen	g/riser ground t st iron ground	469.18/469.18' 2.0'/2.0' 3.0' 4"
Generalized Stratigraphy and Water Level	Grimsby-Power Glen Contact 434.3		Type of riser pipe: Sch 80 Pt Diameter of borehole Depth of borehole Type of backfill: Cement Elev./depth top of seal. Type of seal: Bentonite Elev./depth bottom of seal. Type of sand pack. 0-02 (fine Depth of top of sand pack. Elev./depth top of screened section: Sch Describe openings 0.010" mach slot - horizontal slot I.D. of screened section. Elev./depth bottom of screened Length of blank section. Elev./depth bottom of plugged section. Elev./depth bottom of sand co Type of backfill below observa pipe. Cuttings Elev./depth of hole.	tion, 1 80 PVC nine section. blank	0.5' 46.0' 445.4/22.0' 442.34/25.06' sand) 442.34/25.06' 437.2/30.2' 2" 422.8/44.6" 1.0' 421.8/45.6 421.8/45.6

Height of top of surface casing/riser pipe above ground surface. 2.4/2.16'	PROJECT Somerset Railroad -		$\frac{6}{}$ of $\frac{23}{}$
Ground Elevation of top of surface casing / riser pipe. Height of top of surface casing / riser pipe dbove ground surface. Grimsby-Power Clen Contact 433.9 412.4 Depth of surface seal below ground surface casing. Type of surface casing. Type of surface casing. Type of surface casing. Type of surface casing. Type of surface casing below ground surface. I.D. of surface casing. Cast iron with lock cap Depth of surface casing below ground 3.1 I.D. of riser pipe. Type of surface casing below ground 3.1 I.D. of surface casing below ground 3.1 I.D. of surface casing below ground 3.1 I.D. of surface casing below ground 3.1 I.D. of surface casing below ground 3.1 I.D. of surface casing below ground 3.1 I.D. of surface casing below ground 3.1 I.D. of surface casing below ground 3.1 I.D. of surface casing below ground 3.1 I.D. of surface casing below ground 3.1 I.D. of surface casing below ground 3.1 I.D. of surface casing below ground 3.1 I.D. of surface casing below ground 3.1 I.D. of surface casing below ground 3.1 I.D. of surface casing below ground 3.1 I.D. of surface casing below ground 3.1 I.D. of surface casing cast iron 4.2 I.D. of surface casing below ground 3.1 I.D. of surface casing below ground 3.1 I.D. of surface casing below ground 3.1 I.D. of surface casing below ground 3.1 I.D. of surface casing below ground 3.1 I.D. of surface casing below ground 3.1 I.D. of surface casing below ground 3.1 I.D. of surface casing below ground 3.1 I.D. of surface casing below ground 3.1 I.D. of surface casing below ground 3.1 I.D. of surface casing below ground 3.1 I.D. of surface casing below ground 3.1 I.D. of surface casing below ground 3.1 I.D. of surface casing below ground 3.1 I.D. of surface casing below ground 3.1 I.D. of surface casing below ground 3.1 I.D. of surface casing below ground 3.1 I.D. of surface casing the surface casing below ground 4.24.3/42.1 I.D. of surface casing the surface casing the surface the surface the surface the surface the surface the surface th		well	No. <u>D-54</u>
Ground Elevation 466.4 Crimsby-Power Glen Contact 433.9		11441	er Power Glen
Ground Elevation of top of surface casing / riser pipe. Height of top of surface casing / riser pipe above ground surface. Depth of surface seal below ground surface. Type of surface casing. LD of surfa			Ipool Contact
Ground Elevation 466.4 Grimsby-Power Glen Contact 433.9 Al2.4 Depth of surface seal below ground surface Type of surface casing. Type of surface casing Cast iron with lock cap Depth of surface casing Cast iron with lock cap Depth of surface casing below ground 3' L.D. of riser pipe. Type of fiser pipe: Sch 40 PVC Diameter of borehole Depth of borehole Depth of borehole 58' Type of seal: Bentonite Elev./depth top of seal. Type of seal below ground 3' Liph of surface casing below ground 3' Liph of riser pipe: Sch 40 PVC Diameter of borehole 58' Type of seal: Bentonite Elev./depth top of seal. 424.3/42.1 Type of seal below ground 3' Liph of surface casing below ground 3' Liph of surface casing below ground 3' Liph of surface casing below ground 3' Liph of surface casing below ground 3' Liph of surface casing below ground 3' Liph of surface casing below ground 3' Liph of surface casing below ground 3' Liph of surface casing cast iron with lock cap Depth of surface casing below ground 3' Liph of surface casing cast iron with lock cap Depth of surface seal: Cement Elev./depth borton of seal. 424.3/42.1 Elev./depth top of seal. 56' Discribe openings 0.010' machine slot horizontal slot Liph of blank section 1' Elev./depth bottom of surface casing cast iron with lock cap Depth of surface casing cast iron with lock cap Diameter of borehole 58' Type of seal: Cement 66'' Diameter of borehole 58' Type of screened section. 424.3/42.1 Elev./depth top of screened section. 56' 40 PVC Discribe openings 0.010' machine slot horizontal slot Liph of blank section 1' Elev./depth bottom of surface casing cast iron with lock cap Liph of blank section 1' Elev./depth bottom of sand column. 408.4/58' Type of backfill below observation	Checked By	Date Elev.	Interval 408-4-424
Type of riser pipe: Sch 40 PVC Diameter of borehole 58' Type of backfill: Cement Elev./depth top of seal. 428/38.4' Type of seal: Bentonite Elev./depth bottom of seal. 424.3/42.1 Type of sand pack. 0-02 (fine to med. sand) Depth of top of sand pack. 424.3/42.1 Elev./depth top of screened section. Sch 40 PVC Discribe openings 0.010" machine slot horizontal slot I.D. of screened section. 2" Elev./depth bottom of screened section. 2" Elev./depth bottom of screened section. 1' Elev./depth bottom of plugged blank section. Elev./depth bottom of sand column. 408.4/58' Type of backfill below observation	Grimsby-Power Glen Contact 433.9	riser pipe. Heigth of top of surface casing/riser pipe above ground surface. Depth of surface seal below ground surface Type of surface seal: Cement I.D of surface casing. Type of surface casing: Cast iron with lock cap Depth of surface casing below ground	2.4/2.16' 38.4' 4" 31
	Seneralized Stratigraphy and Water L. Myllool Contact 411.9	Type of riser pipe: Sch 40 PVC Diameter of borehole Depth of borehole Type of backfill: Cement Elev./depth top of seal. Type of seal: Bentonite Elev./depth bottom of seal. Type of sand pack. Q-02 (fine to me Depth of top of sand pack. Elev./depth top of screened section. Type of screened section: Sch 40 PVC Discribe openings 0.010" machine slo horizontal slot I.D. of screened section. Elev./depth bottom of screened section Length of blank section Elev./depth bottom of plugged blank section. Elev./depth bottom of sand column.	6" 58' 428/38.4' 424.3/42.1 d. sand) 424.3/42.1 418.7/47.7 t - 2" 409.4/57.0 1' 408.4/58'

PROJECTSomerset Rai	lroad - Van De Mark	Page7 of23
LOCATIONN1,160,756	E468,241	Well No
Date Completed 10/19/81	Original Depth 46.7 (cored)	Aquifer Grimsby-
Inspected By J. C. Isham	Date10/19/81	Power Glen Contact
	Date	Elev. Interval420.7-439.4
Ground Elevation 467.4 432.8	Elevation of top of surface riser pipe. Heigth of top of surface pipe above ground surface Depth of surface seal: Type of surface casing. Type of surface casing: with lock cap Depth of surface casing I.D. of riser pipe.	Cast iron 469.36/469.36
and Water Level	Diameter of borehole Depth of borehole (rear Type of backfill: Cemer Elev./depth top of seal. Type of seal: Bentonit Elev./depth bottom of se	0.5' med) 45.0' nt 442.3/25.1'
y h	Type of sand pack. Q-02	2 (fine to med. sand)
Grimsby-Power	Depth of top of sand pact	
Grimsby-Power Glen Contact 433.5	Type of screened section Describe openings 0.010 slot - horizontal slot	o" machine
ize	I.D. of screened section.	2.0"
= -	1	reened section. 423.3/44.1'
	Elev./depth bottom of sc	
Genera	Length of blank section.	0.01
Genera	Length of blank section. Elev./depth bottom of pl	0.9'
Generalized	Length of blank section. Elev. / depth bottom of pl section.	0.9' lugged blank 422.4/45.0'
	Length of blank section. Elev./depth bottom of pl	0.9' lugged blank 422.4/45.0' and column. 422.4/45.0'

PROJECT Somerset Railroad - Van De Mark	_ Page <u>8</u> of <u>23</u>
LOCATION N1,160,739 E468.251	Well No D-56
Date Completed $10/28/81$ Original Depth 109.0	_ Aquifer Whirlpool -
inspected By <u>J. C. Isham</u> Date <u>10/28/81</u>	Queenston Contact
Checked By Date	Elev. interval 358.3-407.5
Ground Elevation 467.3 Height of top of surface cappe above ground surface Depth of surface seal belowed by the surface casing to the surface casing	469.7/469.44' sing/riser 2.4/2.14' ow ground ment 4" ast iron low ground 3.0' 2"
Power Glen-Whirl-pool Contact 413.3 Power Glen-Whirl-pool Contact 413.3 Type of riser pipe: Diameter of borehole Depth of borehole Type of backfill: Cement	109.0'
Elev./depth top of seal. Type of seal: Bentonit Elev./depth bottom of seal.	407.5/59.8
Type of sand pack. Q-02 (f Depth of top of sand pack. Whirlpool-Queenston Contact 401.2 Describe openings 0.010" slot - horizontal slot I.D. of screened section.	Sch 40 PVC
slot - horizontal slot I.D. of screened section. Elev /depth bottom of scree Length of blank section. Elev./depth bottom of plugg section.	2.0'
Elev./depth bottom of sand Type of backfill below obse	
pipe. <u>Cuttings</u> Elev./depth of hole.	358.3/109.0'

Pf	ROJECT Somerset I	Railroad - Va	n De Mark	Page 9 of 23
ا در	CATIONN1,160,739	E468,229		Well No
Do	ate Completed 10/28/8	31 Origin	al Depth <u>59.3 (cored)</u>	Aquifer Power Glen
l	spected By D. L. M			Whirlpool Contact
	necked By			
	recked by		. Date	Elev. Interva (408.0-426.2
1	Grimsby-Power Glen Contact 434.7	000	Elevation of top of surface coriser pipe. Heigh of top of surface casing pipe above ground surface. Depth of surface seal below g surface. Type of surface seal: Cemen I.D. of surface casing. Type of surface casing. With lock cap Depth of surface casing below I.D. of riser pipe.	469.55/469.27* ground 37.8* t iron
Water Level			I. D. of riser pipe. Type of riser pipe: Sch 40 P Diameter of borehole Depth of borehole Type of backfill: Cement	
M Pu			Elev./depth top of seal. Type of seal: Bentonite .	429.2/37.8'
0			Elev./depth bottom of seal.	426.2/40.81
J. E.			Type of sand pack. <u>0-02</u> (fine	
gra			Depth of top of sand pack.	40.8'
Stratigraphy			Elev./depth top of screened sect Type of screened section: Sch	tion. 418.8/48.2' 418.8/48.2'
	Power Glen- Whirlpool Contact		Describe openings 0.010" mac	hine
zec	412.8		slot - horizontal slot I.D. of screened section.	215
Generalized			Elev./depth bottom of screened	
Ů			Length of blank section,	1'
			Elev. / depth bottom of plugged section.	blank 408,5/58,5*
			Elev./depth bottom of sand co	lumn. 4 <u>08.5/58.5</u>
		+	Type of backfill below observa	tion
			Elev./depth of hole.	4077/59.3'

FROJECI	ISEL KALILUAG - V		Page $\frac{10}{23}$ of $\frac{23}{23}$
LOCATIONN1,1	60,948 E468,24	1	Well No. D-58
Date Completed $\underline{}$	<u>0/20/81</u> Origin	nal Depth <u>51.5' (cored)</u>	Aquifer Grimsby-
Inspected By	. C. Isham	Date10/20/81	ower Glen Contact
			.ev. Interval414.2-440.7
Ground Elevation 465.7 One of the state of	000000000000000000000000000000000000000	Elevation of top of surface casing/ riser pipe. Height of top of surface casing/ pipe above ground surface. Depth of surface seal below ground surface Type of surface seal: LD. of surface casing. Type of surface casing: with lock cap Depth of surface casing below grounds. LD. of riser pipe.	467.68/467.68' riser 2.0/2.0' und 3.0' 4" iron ound 3.0' 2"
Generalized Stratigraphy and Water Level Couract 436.		Type of riser pipe: Sch 80 PVC Diameter of borehole Depth of borehole (reamed) Type of backfill: Cement Elev./depth top of seal. Type of seal: Bentonite Elev./depth bottom of seal. Type of sand pack. Q-02 (fine to Depth of top of sand pack. Elev./depth top of screened section: Sch 80 Describe openings 0.010" machin horizontal slot I.D. of screened section. Elev./depth bottom of screened section. Elev./depth bottom of screened section. Elev./depth bottom of screened section. Elev./depth bottom of sand column to backfill below observation pipe. Cuttings Elev./depth of hole.	0.5' 51.0' 444.4/21.3' 440.7/25.00' to med. sand) 25.00' 425.15/40.55 PVC te slot - 2" 415.55/50.15 1.15' ank 414.4/51.3' 414.4/51.3'

PROJECT Somerset Railroad - V	an De Mark	Page of
LOCATION N1.160.951 E468.	216	Well No
Date Completed 10/25/81 Origi		Well No.
<u> </u>		Aquifer Whirlpool -
Inspected By D. L. Middleton		Queenston Contact
Checked By	_ DateE	lev. Interva <u>865.0-409.0'</u>
Ground Elevation 465.0	Elevation of top of surface castriser pipe. Heigh of top of surface casing/pipe above ground surface. Depth of surface seal below ground surface Type of surface seal: Cement I.D of surface casing. Type of surface casing: Cas	467.7/467.25° riser 2.7/2.25° 59° 4"
Grimsby-Power	iron with lock cap Depth of surface casing below of l.D. of riser pipe. Type of riser pipe: Sch 40 PV	ground 31
438.15	Diameter of borehole	. 6"
	Depth of borehole	100'
Whirlpool Contact	Type of backfill: Cement	
- 413.0	Elev./depth top of seal.	406.0/59'
Whirlpool-Queenston	Type of seal: Bentonite	
	Elev./depth bottom of seal.	409.0/56'
€ 	Type of sand pack <u>0-02</u> (fine	to med. sand) 409.0/56'
Stratigraphy	Depth of top of sand pack.	
	Elev./depth top of screened section: Sch	
 	Describe openings 0.010" mach	
	slot - horizontal slot	
	I.D. of screened section.	2"
Generalized	_ Elev./depth bottom of screened s	366.0/99'
5	Length of blank section.	1'
	Elev./depth bottom of plugged b	donk acs 0/1001
	section.	365.0/100'
4	. Elev./depth bottom of sand colu	
-	Type of backfill below observation pipe. N/A	on
	Elev./depth of hole.	365.0/100'

PROJECTSomers	t Railroad - Van De Mark	Page
LOCATIONN1.160	934 E468,227	Well NoD-60
Date Completed 10/2	6/81 Original Depth 58.0'	Aquifer Power Glen-
inspected By C. F.	Wall Date 10/26/81	Whirlpool Contact
	Date	Elev. Intervaβ99.8-414.8
Grimsby-Power Glen Contact 437.5	Elevation of top of surface riser pipe. Height of top of surface capipe above ground surface Depth of surface seal below surface Type of surface casing. Type of surface casing: with lock cap Depth of surface casing be I.D. of riser pipe. Type of riser pipe: Sch 4 Diameter of borehole Depth of borehole Type of sal: Elev./depth top of seal. Type of sand pack. Elev./depth bottom of seal. Type of screened section: Describe openings 0.010" slot - horizontal slot I.D. of screened section. Elev./depth bottom of screened action. Elev./depth bottom of screened section. Elev./depth bottom of screened section. Elev./depth bottom of screened section. Elev./depth bottom of sand Type of backfill below observing. None Elev./depth of hole.	### ##################################

PROJECT <u>Somerset</u>	Railroad - Van De Mark	Page of
LOCATION N1,160,8	65 E468,343	Well No
Date Completed 10/23/	81 Original Depth 46.0' (cored)	Aguifer Grimsby-
Inspected By J. C.	Isham Dote10/23/81	Power Glen Contact
Checked By		Elev. Interva 421.4-441.4
CHECKED DY		- Interval
Ground Elevation 467.4	Elevation of top of surface riser pipe. Height of top of surface pipe above ground surface Depth of surface seal be surface Type of surface casing. Type of surface casing: with lock cap Depth of surface casing: L.D. of riser pipe. Type of riser pipe: Sch	Cast from
Generalized Stratigraphy and Water Level Court 437.5	Diameter of borehole Depth of borehole Type of backfill: Cement Elev./depth top of seal. Type of seal: Benton: Elev./depth bottom of se Type of sand pack. Q-02 Depth of top of sand pack Elev./depth top of screene Type of screened section Describe openings 0.016 slot - horizontal si I.D. of screened section. Elev./depth bottom of sc Length of blank section. Elev./depth bottom of pl section. Elev./depth bottom of sc Type of backfill below of	ite al. 441.4/23.0' (fine to med. sand) k. 26.0' ed section. 32.1/35.3' sch 40 PVC 0" machine lot 2" reened section. 422.5/44.9' lugged blank 421.5/45.9' and column. 421.5/45.9'
	pipe. Cuttings Elev./depth of hole.	421.3/46.3'

PROJECT Somerset	Railroad - V	van De Mark	Page <u>14</u>	of _23
LOCATION N1,160,8	78 E468,	358	Well No	D-62
Date Completed 10/29/8	1Origin	al Depth 59.3'		Power Glen
Inspected By D. L. M				ol Contact
•			Elev. Inter	vol 409.7-422.7
Ground Elevation 469.0 Grimsby Power Glen Contact 438.1	K 00:00 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Elevation of top of surface cariser pipe. Height of top of surface casing pipe above ground surface. Depth of surface seal below garface. Type of surface seal: Cement I.D. of surface casing. Type of surface casing. With lock cap Depth of surface casing below I.D. of riser pipe. Type of riser pipe: Sch 40 P	round t iron	471.16/471.04 2.3/2.18' 43.3' 4"
Generalized Stratigrophy and Water Level Mycle Couract A14.4		Diameter of borehole Depth of borehole Type of backfill: Cement Elev./depth top of seal. Type of seal: Bentonite Elev./depth bottom of seal. Type of sand pack. Q-02 (fine) Depth of top of sand pack. Elev./depth top of screened section: Shot - horizontal slot L.D. of screened section. Elev./depth bottom of screened Length of blank section. Elev./depth bottom of plugged section. Elev./depth bottom of sand co Type of backfill below observa pipe. Cuttings Elev./depth of hole.	to med. s tion. ch 40 PVC hine section. blank	6" 59.1' 425.7/43.3' 422.7/46.3' and) 46.3' 420.2/48.8' 2" 410.9/58.1' 1' 409.9/59.1' 409.9/59.1'

PF	ROJECT Somerset	ailroad - Van De Mark	Page	
LOCATIONN1.160.674				Vo D-63A
		$rac{1}{}$ Original Depth $_$	ll l	
1				Whirlpool-
	•	odnikar Dote		nston Contact
Cr	ecked By	Date		nterval <u>368.6-404.6</u> '
Ele	Grimsby-Power Glen Contact 438.9	Depth of surface Type of surfa	op of surface casing/riser e ground surface. surface seal below ground urface seal: Cement face casing. surface casing: Cast h lock cap	47 <u>1.73/471.63'</u> 2.13/2.03' 61' 4" 3.17' 2"
er Level	Power Glen-Whirl- pool Contact 410.3	Diameter Depth of 1	of borehole borehole	6"
y and Water		Elev./dept Type of se	h top of seal. Bentonite h bottom of seal.	400.6/61'
l d			and pack Q-02 (fine to med	<u>. s</u> and) 65'
Stratigraphy	Whirlpool-Queensto Contact 400.9	Elev./dept Type of so Describe of	op of sand pack. In top of screened section. Ereened section: Sch 80 PVC Openings 0.010" machine	397.3/72.3'
p a		<u> </u>	prizontal slot	
liz		I.D. of scr	eened section.	
Generalize		Flev /dent	h bottom of screened section.	369.4/100.2'-
Gen			blank section.	0.8'
		1 17	th bottom of plugged blank	368.6/101'
		•	th bottom of sand column.	368.6/101'
		Type of be	ackfill below observation	
		Elev./dept	h of hole.	368.6/101'

		17
PROJECT Somerset Rai	lroad - Van De Mark	Page of
LOCATION N1.160.713	E468,448_	Well No
Date Completed 10/23/81	Original Depth 47.7'	Aquifer Grimsby-
	eton Date 10/23/81	Power Glen Contact
	Date	
		Trave line 148
Ground Elevation 469.1 442.6 Grimsby-Power Glen Contact 431.5	Elevation of top of surface riser pipe. Heigth of top of surface capipe above ground surface Depth of surface seal below surface Type of surface casing. Type of surface casing. Type of surface casing below to surface casing. With lock cap Depth of surface casing below to surface casing below to surface casing below to surface casing below to surface casing below to surface casing below to surface casing below to surface casing below to surface casing below to surface casing below to surface casing below to surface casing below to surface casing below to surface casing below to surface casing below to surface casing below to surface casing below to surface casing below to surface casing below to seal. Type of backfill: Elev./depth top of sand pack. Elev./depth top of screened section: Describe openings 0.010" slot - horizontal slot I.D. of screened section. Elev./depth bottom of screened section. Elev./depth bottom of sand Type of backfill below obse	2.5/2.32'
	pipe. N/A	421.4/47.7'

PROJECTSomerset Railroad -	Van De Mark	oge <u>17</u> of <u>23</u>
LOCATION NI,160,735 E468,4		eli No. <u>D-65</u>
Date Completed 10/24/81 Orig		quifer Power Glen-
Inspected By D. L. Middleton		nirlpool Contact
Checked By	1	
Checked By	E1e	ev. Interval 406.1-422.1
Ground Elevation 469.1 Grimsby-Power Glen Contact 436.6	Elevation of top of surface casing riser pipe. Height of top of surface casing/ripipe above ground surface. Depth of surface seal below ground surface. Type of surface seal: Cement I D of surface casing. Type of surface casing: 4" Cast iron with lock cap Depth of surface casing below ground in D. of riser pipe. Type of riser pipe: 2" Sch 40 PVC	471.43/471.33' ser
L e c	Diameter of borehole	63'
Water	Depth of borehole Cement	·
° 	Type of backfill: Cement	425.9/43.2'
Power Glen-Whirl-	Elev./depth top of seal: Type of seal: Cement	
5 pool Contact 412.4	Fley /death bottom of seal	422.1/47'
[Type of sand pack. Q-02 (fine to	o med. sand) 47'
	Depth of top of sand pack.	(1/ 0/00 0)
Stratigraphy	Elev /depth top of screened section. Type of screened section: Sch 40	PVC
\sigma_{=}^{\sigma}	Describe openings 0.010" machine	2
	slot - horizontal slot I.D. of screened section.	2"
Generalize d	I I.D. OF Screened Section.	·
	Elev./depth bottom of screened sec	tion. $\frac{407.1/62}{1}$
° 	_ Length of blank section.	***************************************
	Elev. / depth bottom of plugged blat section.	4 <u>06.1/63'</u>
	_ Elev./depth bottom of sand colum	n. 406.1/63'
	Type of backfill below observation pipe.	
	Pipris.	406.1/63'

Elev./depth of hole...

PROJECT Somerset Railroad -	Van De Mark Poo	ge <u>18</u> of <u>23</u>
LOCATION N1.160.859 E468		II No. <u>D-66</u>
Date Completed 10/28/81 Origin	i i	uifer <u>Grimsby-</u>
Inspected By J. C. Isham		ver Glen Contact
Checked By	_ Date Elev	, Interval <u>426.4-440.4'</u>
Ground Elevation 464.4 7/7////////////////////////////////	Elevation of top of surface casing riser pipe. Height of top of surface casing/rispipe above ground surface. Depth of surface seal below ground surface Type of surface seal: LD. of surface casing. Type of surface casing:	466.53/466.33 ser 2.2/2.0' 20.8'
. Water Level	I.D. of riser pipe. Type of riser pipe: Diameter of borehole Depth of borehole Type of backfill: Elev./depth top of seal.	38.0° 443.6/20.8°
Pu	Type of seal: Bentonite	440.4/24.0
	Elev./depth bottom of seal.	
Grimsby-Power Glen Contact 433.8	Type of sand pack Q-02 (fine to Depth of top of sand pack.	440.4/24.0
5 Grimsby-Power Glen		437.0/27.4
Contact 433.8	 Elev./depth top of screened section. Type of screened section: Sch 40 P 	
°	Describe openings 0.010" machine	***************************************
	slot - horizontal slot	2"
Generalized	I.D. of screened section.	
•	Elev /depth bottom of screened sect	ion. 427.4/37.0!
[]	Length of blank section.	1'
B2	Elev./depth bottom of plugged blan	k 426.4/38.0'
	section. Elev./depth bottom of sand column	/2/ //20 0!
	Type of backfill below observation	
	pipe _ Elev.∕depth of hole.	426.4/38.0'

P.	ROJECTSomerset	Railroad - Van De Mark	Page 19 of 23
LOCATION N1,160,874 E468,575			Well No
Date Completed 10/30/81 Original Depth 100'			Aquifer Whirlpool-
	spected ByJ. Stor	· · · · · · · · · · · · · · · · · · ·	Queenston Contact
С	hecked By	Date	Elev. Interval 362.9-408.9
			DICV. IIIIE: 40
-	round evation 462.9 Grimsby-Power Glen Contact 435.0	Elevation of top of surface riser pipe. Height of top of surface casin pipe above ground surface. Depth of surface seal below surface Type of surface seal: I D of surface casing. Type of surface casing: Cation with lock cap. Depth of surface casing below. I. D. of riser pipe.	466.21/465.91' ng/riser 2.0/1.7' 52' ast. w ground 3' 2"
Generalized Stratigraphy and Water Level	Power Glen-Whirl- pool Contact 416.5 Whirlpool-Queenstor Contact 401.9	Type of riser pipe: Sch 40 Diameter of borehole Depth of borehole Type of backfili: Cement Elev./depth top of seal. Type of seal: Bentonite Elev./depth bottom of seal. Type of sand pack.Q-02 (fir Depth of top of sand pack. Elev./depth top of screened seal. Type of screened section: Sc	6" 100' 410.9/52' 408.9/54' ne to med. sand) 54' 405.9/57' ed section. 2" add section. 363.9/99.0' 1' d blank 362.9/100' N/A

PROJECTSomerset Railroad - Van De Mark	Page 20 of 23
LOCATION N1,160,838 E468,555	Well No. D-68A
Date Completed 10/30/81 Original Depth 58*	Aquifer Power Glen
Inspected By D. L. Middleton Date 10/30/81	Whirlpool Contact
Checked By Date	Elev. Intervo 407.2-421.2'
	Elev, mervo
Ground Elevation 465.2 Height of top of surface pipe above ground sur	### ##################################
Diameter of borehole Depth of borehole Depth of borehole Type of backfill: Elev./depth top of seal Type of sand pack Q-OZ Depth of top of sand pa Elev./depth top of scree Type of sand pack Q-OZ Depth of top of sand pa Elev./depth top of scree Type of screened section Describe openings 0.0 slot - horizontal I.D. of screened section Elev./depth bottom of section. Elev./depth bottom of section. Elev./depth bottom of section. Elev./depth bottom of section. Elev./depth bottom of section.	6" 58' ment 429.2/36.0' nite 421.2/44.0' 2 (fine to med. sand) ck. 421.2/44.0' 417.5/47.7' 2010" Machine slot 2" screened section. 1' plugged blank 407.2/58' 407.2/58'
Elev./depth of hole.	407.2/58'

PROJECT <u>Somerset</u>	Railroad - N	Jan De Mark	Page 21	of23
LOCATION N1,160,8	36 E468,€	601	Well No.	-
Date Completed 10/28/8	1 Origin	of Depth 18'		Grimsby-Soil-
Inspected By <u>C. F. W</u>			Landfill	
Checked By			37 1-4	446.4-458.4
			Slev. Interv	
Ground Elevation 464.4 Fill: clayey f. o. for med. SAND and multi-colored plastic, fibers, metal 458.6 454.9 v. fine to fine clayey SAND 451.7 SANDSTONE: sl. to com. weathered, w/shale interbed and clay coating.	0 :: 0 0 5 6 5 . s.	Elevation of top of surface casing pipe above ground surface. Depth of surface seal below groundsurface. Depth of surface seal:Cement	to med. sa on. PVC ine section.	2.2/1.75' 4.2' 4" 3" 2" 10" to 11.4' 6" to 18.0' 18.0' 460.2/4.2' 458.4/6.0' and) 6.0' 456.65/7.75' 2" 447/17.4' 447/17.4' 446.4/18.0'

PROJECTSomerset	Railroad - Va	n De Mark	tage $\frac{22}{}$ of $\frac{23}{}$
LOCATION N1,160,7	37 E468,6	96 W	/ell NoD-70
Date Completed $\frac{10/29/8}{}$	$\frac{1}{2}$ Original	Depth 19-47	quifer Grimsby-Soil
Inspected By J. C. I	sham		Landfill
			ev. Intervol446.9-458.3
Fill: clayey med. Sand and multicolored plastic. 456.3 clayey fine grained sand 452.3 siltstone sl. to completely weathered, w/shale interbeds		Elevation of top of surface casing riser pipe. Height of top of surface casing/roipe above ground surface. Depth of surface seal below grousurface Type of surface seal: Cement Depth of surface casing. Type of surface casing: Cast iron with lock cap Depth of surface casing below ground iron with lock cap Depth of surface casing below ground iron with lock cap Depth of surface casing below ground iron with lock cap Depth of surface casing below ground iron with lock cap Depth of surface casing below ground iron with lock cap Depth of borehole Type of sal: Sch 80 PVC Depth of borehole Elev./depth top of seal. Type of sand pack. Elev./depth bottom of seal. Depth of top of sand pack. Elev./depth bottom of screened section. Elev./depth bottom of screened section. Elev./depth bottom of screened section. Elev./depth bottom of screened section. Elev./depth bottom of sand column figure of blank section. Elev./depth bottom of sand column figure of backfill below observation pipe. Elev./depth of hole.	468.35/468.10' iser 2.2/1.95' nd 3.0' 4" 3.0' 6" 19.4' 461.3/5.0' 458.3/8.0' 5 med. sand) 8.0' 456.6/9.7' PVC 2" ction. 447.2/19.1' -3' nk 446.9/19.4' 461.9/19.4' nn.

APPENDIX C-1

CHEMICAL ANALYSES OF GROUND WATER SAMPLES

DATA SHEETS FROM RECRA RESEARCH, INC.

FIRST ROUND ANALYSES

BECHTEL CIVIL & MINERALS, INC.

Report Date: 11/11/81

AAAA	, , , , , , , , , , , , , , , , , , ,	SAMPLE IDENTIFICATION (DATE)				
PARAMETER	UNITS OF MEASURE	D-49A (11/3/81)	D-49B (11/3/81)	D-50A (11/2/81)	D-50B (11/2/81)	
pH (field)	Standard Units	8.85	9.00	11.90	11.90	
Specific Conductance (field)	µmhos/cm	283	305	1,830	1,830	
Temperature (field)	°C	11.5	12	12	11.5	
Total Organic Carbon	mg/l	1.1	1.3	4.5	5.7	
Total Filterable Residue (180°C)	mg/1	290	290	790	750	
Chloride	mg/l	20	20	33	33	
Total Iron	mg/l	16	8.8	0.91	0.90	
Total Recoverable Oil and Grease	mg/l	<5	<5	<5	<5	

COMMENTS:

Comments pertain to data on all pages of this report. Samples were collected by Recra personnel on 11/2/81 and 11/3/81. The specific date of collection is located under the sample identification.

BECHTEL CIVIL & MINERALS, INC.

Report Date: 11/11/81

***		SAMPLE IDENTIFICATION (DATE)				
		D-51A	D-51B	D-52A	D-52B	
PARAMETER	UNITS OF MEASURE	(11/3/81)	(11/3/81)	(11/2/81)	(11/2/81)	
pH (field)	Standard Units	6.90	7.15	6.35	7.15	
Specific Conductance (field)	umhos/cm	295	295	3,000	2,690	
Temperature (field)	*c	12.5	12	12.5	12	
Total Organic Carbon	. mg/1	2.4	5.2	8.8	9.6	
Total Filterable Residue (180°C)	mg/1	260	260	2,700	2,300	
Chloride	mg/l	28	27	1,100	910	
Total Iron	mg/l	6.1	14	1.4	0.70	
Total Recoverable Oil and Grease	mg/l	<5	<5	30	6	

COMMENTS: Analyses were performed according to U.S. Environmental Protection Agency methodologies.

FOR RECRA RESEARCH, INC.

DATE ////6/



BECHTEL CIVIL & MINERALS, INC.

Report Date: 11/11/81

		SAMPLE IDENTIFICATION (DATE)				
		D-53A	D-53B	D-54A	D-54B	
PARAMETER	UNITS OF MEASURE	(11/2/81)	(11/2/81)	(11/3/81)	(11/3/81)	
pH (field)	Standard Units	6.65	6.75	9.50	9.65	
Specific Conductance						
(field)	µmhos/cm	353	360	1,480	1,480	
Temperature (field)	°C	12	12	11.	11	
Total Organic Carbon	mg/1	8,1	4.2	2.4	6.4	
Total Filterable			Annual Control			
Residue (180°C)	mg/1	280	340	1,400	1,400	
				###posementaria	Account of the second of the s	
Chloride	. mg/1	32	32	290	270	
Total Iron	mg/l	3.8	2.5	22	49	
Total Recoverable	1118/ 1		7.4	<u> </u>	1	
Oil and Grease	mg/1	<5	<5	<5	<5	

COMMENTS: pH, Specific Conductance, and Temperature analyses were performed on site by Recra personnel.

for recra research, inc. O. U. Finn

DATE //////

BECHTEL CIVIL & MINERALS, INC.

Report Date: 11/11/81

		S.	AMPLE IDENTI	APLE IDENTIFICATION (DATE)		
PARAMETER	UNITS OF MEASURE	D-55A (11/2/81)	D-55B (11/2/81)	D-56A (11/3/81)	D-56B (11/3/81)	
pH (field)	Standard Units	6.55	6.80	10.45	10.70	
Specific Conductance (field)	umhos/cm	430	430	500	600	
Temperature (field)	°C	12	11.5	11	11	
Total Organic Carbon	mg/l	4.8	. 4.7	6.4	5.0	
Total Filterable Residue (180°C)	mg/l	370	360	460	480	
Chloride	mg/l	37	37	. 79	79	
Total Iron	mg/1	7.1	4.8	5.6	7.2	
Total Recoverable Oil and Grease	mg/1	<5	<5	· <5	<5	

COMMENTS: Values reported as "less than" (<) indicate the working detection limit for the particular sample or parameter.

FOR RECRA RESEARCH, INC.

DATE //// S/

BECHTEL CIVIL & MINERALS, INC.

Report Date: 11/11/81

***************************************		SAMPLE IDENTIFICATION (DATE)				
		D-57A	D-57B	D-59A	D-59B	
PARAMETER	UNITS OF MEASURE	(11/3/81)	(11/3/81)	(11/2/81)	(11/2/81)	
pH (field)	Standard Units	8.10	8.15	8.30	8.25	
Specific Conductance						
(field)	μmhos/cm	483	415	249	251	
To continue the continue of th						
Temperature (field)	°C	10	10	10.5	10.5	
Total Organic Carbon	mg/1	3.8	3.7	4.5	7.9	
Total Filterable	* _				4	
Residue (180°C)	mg/l	540	660	220	220	
	The state of the s	the control of the co		900 ADV		
Chloride	mg/l	39	40	2.2	22	
Total Iron	mg/1	9.8	11	2.6	2.8	
Total Recoverable		1 2.0		<u> </u>	4.0	
Oil and Grease	mg/1	<5	<5	<5	< 5	

COMMENTS: Refer to pages 1 through 4.

FOR RECRA RESEARCH, INC. DATE //////8/

BECHTEL CIVIL & MINERALS, INC.

Report Date: 11/11/81

		SAMPLE IDENTIFICATION (DATE)			
PARAMETER	UNITS OF MEASURE	D-60A (11/2/81)	D-60B (11/2/81)	D-61A (11/3/81)	D-61B (11/3/81)
pH (field)	Standard Units	7.35	7.55	6,65	6.75
Specific Conductance (field)	µmhos/cm	1,680	1,700	420	510
Temperature (field)	°С	10.5	10.5	10	10
Total Organic Carbon	mg/l	8.1	7.3	6.0	10
Total Filterable Residue (180°C)	mg/l	1,700	1,800	410	390
Chloride	mg/l	36	30	36	36
Total Iron	mg/1	16	2.9	2.0	11
Total Recoverable Oil and Grease	mg/l	<5	<5	26	<5

COMMENTS: Refer to pages 1 through 4.

I.D. #81-1000

BECHTEL CIVIL & MINERALS, INC.

Report Date: 11/11/81

		SAMPLE IDENTIFICATION (DATE)				
		D-62A	D-62B	D-63AA	D-63AB	
PARAMETER	UNITS OF MEASURE	(11/3/81)	(11/3/81)	(11/3/81)	(11/3/81)	
pH (field)	Standard Units	9.95	10.25	9.65	9.80	
Specific Conductance						
(field)	µmhos/cm	510	505	255	275	
Temperature (field)	°C	10	10	12	11	
Total Organic Carbon	mg/l	3.3	1.5	5.6	5.8	
Total Filterable Residue (180°C)	mg/1	550	520	270	270	
Chloride	mg/1	19	19	23	24	
Total Iron	mg/l	17	18	4.7	3.0	
Total Recoverable Oil and Grease	mg/l	6	<5	<5	<5	

COMMENTS: Refer to pages 1 through 4.

FOR RECRA RESEARCH, INC.

DATE 1//1/81

BECHTEL CIVIL & MINERALS, INC.

Report Date: 11/11/81

		SAMPLE IDENTIFICATION (DATE)				
PARAMETER	UNITS OF MEASURE	D-64A (11/2/81)	D-64B (11/2/81)	D-65A (11/2/81)	D-65B (11/2/81)	
pH (field)	Standard Units	8.20	8.45	7.85	8.30	
Specific Conductance (field)	pmhos/cm	244	242	1,290	1,290	
Temperature (field)	°C	11.5	13	11.5	11.5	
Total Organic Carbon	mg/1	5.7	6.8	4.5	9.5	
Total Filterable Residue (180°C)	mg/1	180	170	1,200	1,100	
Chloride	mg/l	24	23	37	37	
Total Iron	mg/1	1.8	21	4.8	3.3	
Total Recoverable Oil and Grease	mg/1	8	<5	<5	<5	

COMMENTS: Refer to pages 1 through 4.

BECHTEL CIVIL & MINERALS, INC.

Report Date: 11/11/81

		S	FICATION (DA	ATE)	
		D-66A	D-66B	D-67A	D-67B
PARAMETER	UNITS OF MEASURE	(11/3/81)	(11/3/81)	(11/3/81)	(11/3/81)
pH (field)	Standard Units	7.50	7.45	10.65	10.75
Specific Conductance (field)	umhos/cm	1,040	1,000	540	530
Temperature (field)	°c	1.3	12.5	13	12.5
Total Organic Carbon	mg/1	4.0	4.4	3.2	2.0
Total Filterable Residue (180°C)	mg/1	860	830	410	410
Chloride	mg/1	200	190	33	33
Total Iron	mg/1	8.0	1.6	3.1	3.5
Total Recoverable Oil and Grease	mg/l	<5	<5	<5	15

COMMENTS: Refer to pages 1 through 4.

FOR RECRA RESEARCH, INC. Q. U. Fin

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BECHTEL CIVIL & MINERALS, INC.

Report Date: 11/11/81

		SAMPLE IDENTIFICATION (DATE)				
		D-68A	D-68B	D-69A	D-69B	
PARAMETER	UNITS OF MEASURE	(11/3/81)	(11/3/81)	(11/3/81)	(11/3/81)	
pH (field)	Standard Units	8.75	8.95	6.70	6.80	
Specific Conductance (field)	µmhos/cm	255	258	800	780	
Temperature (field)	°c	12	12	14	14	
Total Organic Carbon	mg/l	1.8	2.5	6.8	8.7	
Total Filterable Residue (180°C)	mg/l	230	240	670	730	
Chloride	mg/l	19	20	29	29	
Total Iron	mg/1	8.4	6.7	7.4	89	
Total Recoverable Oil and Grease	mg/l	<5	<5	14	<5	

COMMENTS: Refer to pages 1 through 4.

FOR RECRA RESEARCH, INC. OL V. Fring DATE 11/81



BECHTEL CIVIL & MINERALS, INC.

Report Date: 11/11/81

		SAMPLE IDENTIFICATION (DATE)		
		D-70A	D-70B	
PARAMETER	UNITS OF MEASURE	(11/3/81)	(11/3/81)	
pH (field)	Standard Units	6.85	6.80_	
Specific Conductance				
(field)	umhos/cm	640	540	
Temperature (field)	°c	14.5	13	
Total Organic Carbon	mg/l	24	33	
Total Filterable Residue (180°C)	mg/l	570	590	
Chloride -	mg/l	31	32	
Total Iron	mg/1	120	260	
Total Recoverable				
Oil and Grease	mg/1	73]31_	

COMMENTS: Refer to pages 1 through 4.

FOR RECRA RESEARCH, INC. 2 U. Jim DATE 1/1/8/



APPENDIX C-2

CHEMICAL ANALYSES OF GROUND WATER SAMPLES

DATA SHEETS FROM RECRA RESEARCH, INC.

SECOND ROUND ANALYSES

BECHTEL CIVIL AND MINERALS, INC.

Report Date: 11/18/81

Date Received: 11/13/81 - 11/17/81

		SAMPLE IDENTIFICATION			
PARAMETER	UNITS OF MEASURE	D-51	D-53	D-55	D-61
pH (field)	Standard Units	7.15	6.15	6.85	6.25
Conductance (25°C)	umhos/cm	480	430	430	500
Chloride	mg/1	74	42	42	47
Fluoride	mg/1	0.50	0.36	0.54	0.30
Total Organic Carbon	mg/1	10	3.7	2.8	7.3
Total Cyanide	υg/1	<10	<10	<20 ·	<20
Total Zinc	mg/1	0.226	0.212	0.161	0.266
Soluble Zinc	mg/l	0.054	0.189	0.198	0.118
Soluble Antimony	mg/1	<0.3	<0.3	<0.3	<0.3
Total Recoverable Oil and Grease	mg/1	<5	<5	<5	< 5

COMMENTS: Samples were collected by Recra personnel on 11/13/81, 11/16/81, and 11/17/81. Analyses were performed according to U.S. Environmental Protection Agency methodologies.

FOR RECRA RESEARCH, INC.



BECHTEL CIVIL AND MINERALS, INC.

Report Date: 11/18/81

Date Received: 11/13/81 - 11/17/81

PARAMETER	UNITS OF MEASURE	SAMPLE IDENTIFICATION			
		D-64	D-66	D-69	D-70
pH (field)	Standard Units	6.75	7.30	6.40	6,15
Conductance (25°C)	ymhos/cm	670	810	615	490
Chloride	mg/1	84	100	31	36
Fluoride	mg/l	0.33	0.36	0.39	0.26
Total Organie Carbon	mg/1	33	8	7.6	7.6
Total Cyanide	ug/1	<10	<10	<10	<20
Total Zinc	mg/1	0.083	0.235	1.4	3.4
Soluble Zinc	mg/l	0.099	0.125	0.443	0.533
Soluble Antimony	mg/l	<0.3	<0.3	<0.3	<0.3
Total Recoverable Oil and Grease	mg/1	<5	<5	<5	7

COMMENTS: Values reported as "less than" (<) indicate the working detection limit for the particular sample or parameter.

FOR RECRA RESEARCH, INC.

DATE ///8/8/