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October 24, 1984
83C2236-8

E.I. DuPont de Nemours & Co., Inc.
Niagara Plant
Buffalo Avenue & 26th Street
Niagara Falls, NY

Attention: Mr. Beverly Adams
Engineer - R&D

SUPPLEMENTAL GEOHYDROLOGIC INVESTIGATIONS
NIAGARA PLANT
NIAGARA FALLS, NEW YORK

Gentlemen:

We are pleased to present herein our Report of Supplemental Geohydrologic Investigations, Niagara Plant Site, Niagara Falls, New York. This study was conducted in accordance with the "Supplemental Groundwater Investigation Plan", dated April 10, 1984 submitted by DuPont to the New York State Department of Environmental Conservation. This plan for supplemental investigations was developed to further define the site geohydrologic regime and to provide additional information for the design and implementation of a remediation program.

This report was prepared using the new data from monitoring well installations and from the June/July groundwater sampling and testing series. These new data were used to reassess previously developed interpretations presented in our "Geohydrologic Investigations" report of December 23, 1983. As additional information becomes available, findings and conclusions presented herein will be re-evaluated in light of the continually developing data base. The data utilized during the preparation of this report are included as various tables, plates, and appendices.

Box #14

We sincerely appreciate the opportunity of providing these services to you for this on-going Niagara Plant project. If you have any questions, please contact us.

Very truly yours,

WOODWARD-CLYDE CONSULTANTS

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SUPPLEMENTAL GEOHYDROLOGIC INVESTIGATIONS
NIAGARA PLANT
NIAGARA FALLS, NEW YORK

Submitted to:

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EXECUTIVE SUMMARY

An investigation was undertaken at the DuPont Niagara Plant Site to evaluate the presence and movement of suspect chemical contaminants in the overburden and bedrock flow regimes. Findings and interpretations have been presented in Woodward-Clyde Consultants (WCC) previous report entitled "Geohydrologic Investigations, Niagara Plant, Niagara Falls, New York" dated December 23, 1983. This previous report is a comprehensive study regarding groundwater flow rate and direction within the Lockport Formation and overlying unconsolidated soils, groundwater quality, and contaminant flow into and out of plant boundaries.

The objective of the supplemental geohydrologic investigations described herein was to provide additional data regarding groundwater flow and contaminant distribution. The new information acquired from these supplemental investigations have been used to revise and enhance the interpretations and conclusions presented in our December 23, 1983 report.

The DuPont Niagara Plant site is underlain by unconsolidated overburden deposits consisting of fill, glacial till and glacial lake deposits. Beneath the overburden soils, the site is underlain by the fractured dolomite of the Lockport Formation. Beneath the Lockport Formation, and extending beyond the limit of these investigations, is the Rochester Shale. Groundwater in the area of the DuPont Niagara Plant Site is encountered in both the unconsolidated overburden soils and the underlying rock. To investigate the hydrologic regime in the vicinity of the plant site, a total of 52 monitoring wells were initially installed and an additional 18 wells were installed for these supplemental studies. Specifically, the wells provided a means to sample groundwater for chemical analysis and to determine elevations of the groundwater within overburden and the various bedrock fracture zones. The information collected during this investigation was used to prepare groundwater contour maps for each of the underlying groundwater flow zones (fracture zones), and ultimately to estimate groundwater flow directions at the plant site area within the overburden soils and the Lockport Formation. Additional geological information collected during these supplemental studies has also resulted in minor revisions of the overburden thickness and top of bedrock contour maps.

The source of groundwater recharge for the overburden in the vicinity of the Niagara Plant Site is from direct infiltration of precipitation. The source of groundwater recharge in the underlying Lockport Formation is from induced infiltration of water from the Niagara River, and to a lesser extent, from leakage downward from the overlying overburden groundwater flow regime. Groundwater flow in the overlying overburden zone in the west plant site area (west of Gill Creek) discharges toward Gill Creek and the Niagara River. Based upon hydrologic information collected during these supplemental studies, it is concluded that groundwater flow in the east site (east of Gill Creek) is west toward Gill Creek and toward the northeast. By contrast, groundwater flow direction in the underlying Lockport Formation is from the Niagara River toward the Olin production wells, northwest of the plant site, and toward an unidentified groundwater discharge area, possibly the Power Authority's tunnel excavations, northeast of the site.

During the period of January through May, 1983, chemical analyses were performed on groundwater samples obtained from monitoring wells installed along the north side of the Niagara Parkway by the United States Geological Survey (USGS) for the New York State Department of Environmental Conservation (NYDEC). Sampling and analysis of groundwater from monitoring wells installed by DuPont began in June, 1983, and is continuing. Based upon the analytical results for DuPont-related volatile organic compounds, concentrations for any given parameter have been found to vary from below detectable limits up to thousands of parts per million. DuPont-related compounds refer to those compounds relating to previous manufacturing activities by DuPont. At any given monitoring well, similar, but less dramatic variations over time were observed. The presence of second-phase fluid may account for the wide range of analytical results that have been reported. Based upon field reports during well installation and groundwater sampling, as well as the specific analytical results compared with solubility limits, it is concluded that second-phase fluid does exist at selected locations throughout the plant site. Further, the relative distribution of volatile compounds was compared with the locations of previous processes and events on the plant site. A correlation between the process/event areas and concentrations of the individual compounds at the monitoring well locations appears to be evident. Analyses were also conducted for two non-DuPont related volatile organic compounds, and these were detected at a limited number of monitoring wells, primarily in the eastern portion of the site. It is likely, however, that these compounds are not present as second-phase organics. Analyses were conducted for other DuPont-related organic compounds as well. Again, a corrrelation appears to be established between former site processes and concentrations detected at selected wells. Analyses for DuPont inorganic compounds were also conducted and former processes were identified as likely sources of detected inorganic compounds.

Because of vertical fracturing in the bedrock, pathways exist for downward migration of second-phase fluid into the deeper portions of the rock. This downward migration pattern of second-phase organics resembles a three-dimensional maze. Based upon a review of the available analytical data, it appears that second-phase organics exist in the B-zone, C-zone, and CD-zone monitoring intervals, but not below these intervals.

The migration of contaminants that are dissolved in the water would be controlled primarily by the groundwater flow regime. In the overburden groundwater flow regime, the general lateral flow pattern appears to be radial, with groundwater discharging into Gill Creek and into the Niagara River. There is also a downward component of flow to the deeper bedrock zones. In the deeper bedrock zones, horizontal flow patterns are primarily away from the Niagara River towards the northwest, reflecting the influence of the Olin Pumping Well, and to the northeast, probably reflecting the influence of the Niagara Power Authority tunnel excavations.

Based upon the data available regarding contaminant concentrations and groundwater flow direction and quantity, the total off-site organic loading through the shallow overburden is estimated to be on the order of 8 pounds per day. The total off-site organic loading through the bedrock is estimated to be on the order of 34 pounds per day, of which, 25 pounds per day is estimated to be going to the Olin Production well.

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INTRODUCTION

As described in the DuPont submittal to the New York State Department of Environmental Conservation, dated April 10, 1984 and entitled "Supplemental Groundwater Investigations Plan", additional geohydrologic investigations were proposed to further define the Niagara Plant site geohydrologic regime. This supplemental studies plan described additional steps to be taken to evaluate the presence and movement of suspect chemical contaminants at the DuPont Niagara Plant site in both the overburden and bedrock groundwater systems. Presented herein are the results of these supplemental investigations and our interpretations of the data collected during the field and laboratory phases. Included are rock and monitoring well logs, stratigraphic cross sections and structure contour maps, groundwater elevation data and plates showing groundwater flow directions and water quality data. Also discussed in this report is the impact of the new data on previous interpretations.

PROJECT DESCRIPTION AND PREVIOUS STUDIES

The additional geohydrologic investigations described herein were conducted to supplement the site assessment studies conducted during 1983. The supplemental investigations included: (1) installation of additional monitoring wells in selected areas on and off the plant site to better determine groundwater flow directions and to allow for groundwater sampling for water quality assessments, (2) estimation of the magnitude of vertical communication between water-bearing zones at well clusters by means of low volume pump tests of the B-zone (or C-zone) monitoring wells, (3) implementation of a schedule to record the groundwater elevations on a regular basis so that a viable plant site data base may be established for the purpose of understanding the effects of seasonal changes, (4) collection of additional information with respect to the design of the Power Authorities water intake conduits to help explain the groundwater sink to the northeast of the plant site, and (5) emplacement of additional test pits/utility wells to evaluate the contaminant migration potential along selected manmade passageways.

Previous studies by Woodward-Clyde Consultants (WCC) evaluating the geohydrologic conditions of the Niagara Plant site, located as shown on Plate 1, include the site assessment report entitled, "Geohydrologic Investigations, Niagara Plant, Niagara Falls, New York", dated December 23, 1983. The geologic history, subsurface conditions and geohydrologic conditions of the plant site were initially discussed and evaluated in this report and the reader is referred to this previous report for the details and information concerning these topics. In addition, related studies have been conducted and the results of these studies described in several additional reports.

FIELD INVESTIGATIONS

The following section summarizes the field investigations conducted at the Niagara Plant site as part of these supplemental studies.

MONITORING WELL INSTALLATIONS

A total of 18 additional monitoring wells were installed at five locations on and off the plant site as shown on Plate 2. The wells were installed according to DuPont design specifications and the well and rock logs are included in this report as Appendix A. Table 1 is a complete listing of monitoring wells at the DuPont Niagara Plant site with respect to the horizontal fracture zone each well represents.

At well locations 19 and 20, seven wells were added to further define the effects of the Olin production wells in this area of the site. The added wells in cluster 19 include a C well, three CD wells, a D well and an F well and, at cluster 20, a B well.

A series of wells (A, B, C, D, and F) were installed at new cluster location 22. As shown on Plate 2, this new cluster is located northeast of well cluster 20 and north of Buffalo Avenue. This well cluster location was selected (1) to provide information on the effects of the Olin production well (see Plate 2), (2) to increase the information available with respect to the groundwater hydraulic head in the area of the plant site along Buffalo Avenue, and (3) to investigate the effects of the Buffalo Avenue sewer on the groundwater regime. Another new well cluster at location 23 included A, B, C, D and

F-zone wells. This new well cluster is located to the southeast of monitoring well cluster 17, in the northeast corner of the DuPont property (Plate 2), and was also installed to increase the information available on the groundwater hydraulic head along Buffalo Avenue.

Also installed as part of the new series of well installations was an A-zone monitoring well at location 24. Monitoring well 24A is located along Gill Creek south of monitoring well cluster 12 (see Plate 2). Monitoring well 24A was installed to provide groundwater elevation data. These data will aid in determining if Gill Creek is recharging the groundwater regime in the east plant area.

FRACTURE ZONE HYDRAULIC COMMUNICATION

The principal vertical groundwater flow path in the bedrock of the plant site is through near vertical and vertical fractures. Estimation of the magnitude of vertical communication between horizontal fracture zones at well clusters was evaluated by pump tests. This investigation was the topic of a separate report, entitled "Investigation of the Hydraulic Connection Between the A-zone and B-zone, Niagara Plant, Niagara Falls, New York". As summarized in that report, it was determined that the hydraulic connection between the A-zone and the deeper bedrock fracture zones was poor.

WATER LEVEL DETERMINATIONS

It was recommended that, in order to develop a viable plant site data base, a schedule of water level readings be initiated. These readings will be continued for at least one year so that an understanding of the effects of seasonal changes on the groundwater regime may be developed.

Thus far, data for June, July, and August, 1984 have been recorded. These data are listed in Table 2 and contour maps showing the groundwater elevations for the different fracture zones for each month are shown on Plates 3 through 14. These data will be discussed in more detail in a subsequent section of this report.

SAMPLING AND ANALYTICAL INVESTIGATIONS

To assess the groundwater quality at the Niagara Plant site, a series of water samples was collected from all wells in the numbered well clusters and from the various utility wells. Water samples which were collected in June and July, 1984 were analyzed for volatile organics, metals, PCB's, pesticides, and conventional chemistry (pH, total organic carbon, etc.). Table 3 and Plates 15 through 21 list and locate the compounds collected in selected analyses.

SUBSURFACE CONDITIONS

The subsurface conditions at the Niagara Plant site were discussed in the "Geohydrologic Investigations Report", dated December 23, 1983. For details and descriptions concerning the characteristics of the overburden soils, alluvial and glacial deposits, bedrock, and stratigraphy, the reader is referred to this earlier report.

The installation of additional monitoring wells provided new information which was used to refine contours of overburden thickness and top of bedrock elevations for the plant site. Presented on Plates 22 and 23 are an isopach map of fill/overburden and a top of bedrock structure contour map, respectively. These maps represent a revision of Plates 4 and 11, respectively, from the December 23, 1983 report.

In general, the data from the new well installations conform with earlier interpretations of overburden thickness and top of bedrock elevations. By comparing respective plates in the two reports, a small change is seen in the overburden thickness and top of rock elevation in the area of well 24A along Gill Creek. The overburden is approximately the same thickness in the area of monitoring wells 11, 12, and 24 as shown on Plate 22. The overburden material thickens westward between the area of wells 12 and 24 and the Gill Creek area. From the installation of well 24A, it is known that the top of bedrock elevations in this area are slightly higher than previously interpreted. The top of bedrock elevations decrease toward Gill Creek as shown on Plate 23. The data acquired from the new well locations 22 and 23 had virtually no effect on the previous interpretation of overburden thickness and bedrock elevation.

GEOHYDROLOGY

The geohydrologic characteristics of the Niagara Plant site have been discussed in detail in the WCC "Geohydrologic Investigations Report" dated December 23, 1983. Discussed in the present report are the newly acquired data since the 1983 report and the impact of these data on previous findings and conclusions.

GROUNDWATER LEVEL DATA

Groundwater level readings at the DuPont Niagara Plant site have been taken on a regular basis since June, 1984 in order to establish a data base and to develop an understanding of seasonal effects on the groundwater regime. June, July, and August 1984 readings are listed in Table 2. Plates 3 through 14 are contours of the groundwater elevation for the three sets of data. Note that the groundwater contour maps are constructed for water levels from the same fracture zone. The monitoring well boring logs were reviewed and fracture elevations checked. The reader is referred to our December 23, 1983 report for a detailed discussion as to when and how to utilize groundwater data from any given monitoring well.

In general, for any particular fracture zone, the groundwater elevation is lowest in the northeastern part of the plant site and gradually rises to the west. In most cases, the water levels were highest for the month of June and decreased through July and August. This type of decrease may be related to either seasonal flucuations or river stage differences during the time of measurement. Quarterly readings will continue for at least one year and as additional groundwater level information becomes available, it will be added to the existing data base for interpretation.

GROUNDWATER BEARING FRACTURE ZONES

The monitoring wells installed as part of the supplemental investigations were labeled consistent with that of the previously installed monitoring wells. The monitoring well labeling system is based on the depth and sequential intersection of fracture zones. Geologic cross sections have been developed to aid in the interpretation of the various fracture zones. A Geologic Section Location Plan is shown on Plate 24. Revised geologic cross sections are included as Plates 25 through 27 in this report. These cross sections include the new information obtained from the additional wells.

Illustrated on the cross sections are the relationships between the horizontal fracture zones. The new wells added to monitoring well clusters 19, 20, and 22 are shown on cross section C-C' on Plate 27. From cross section C-C', it is evident that the B-zone horizontal fracture continues across the plant site as originally mapped in wells 20B and 22B. Monitoring wells 22C and 19CD1 have fracture elevations consistent with that of the CD zone. Two additional fracture zones were encountered at location 19 resulting in a decision to install wells 19CD2 and 19CD3 wells. These two zones appear intermediate in depth between the established CD and D zones. Two deep wells, 22D and 22F, were installed at location 22 and are interpreted to intersect the D and F horizontal fractures, respectively.

Shown on Plate 26 is cross section B-B' which includes the new information obtained from installing monitoring well cluster 23. In this cluster, A, B, C, D, and F monitoring wells have been installed. Monitoring well 23C is interpreted to represent the horizontal fracture at the CD level, while the other wells coincide with the lettered fracture zone assigned to them. Refer to Table 1 for a complete listing of existing monitoring wells and the horizontal fracture zone each well represents.

GROUNDWATER FLOW DIRECTIONS

Groundwater elevation contour maps, shown on Plates 3 through 14, were constructed using the June, July, and August, 1984 data previously discussed. The elevation contours represent the approximate configuration of the groundwater potentiometric surface for that fracture zone. The elevation contours for the A-zone represent the configuration of the unconfined water table surface in contact with the overburden soils and the atmosphere. Horizontal groundwater flow is normal to the elevation contours from areas of higher to lower hydraulic head.

A-zone groundwater contour maps are shown on Plates 3 through 5 for the three months mentioned. The groundwater flow direction in the west plant area (west of Gill Creek) is in a radial pattern outward from the central west plant area. Groundwater flow direction in the east plant area exhibits a general northeastward trend. This northeasterly flow of groundwater in the east plant area is possibly being controlled by a groundwater sink northeast of the DuPont Plant site caused by the Power Authority intakes. A groundwater contour map was also constructed for the A-zone in the December 23, 1983 report using October 17, 1983 data and may be found as Plate 31 in this previous report. Comparison of the A-zone groundwater contour maps of the two reports shows that very little has changed with respect to flow directions over the time period from October, 1983 to August, 1984.

The addition of well 24A, however, has allowed for a better understanding of the A-zone groundwater flow near Gill Creek. It appears from Plate 4 that Gill Creek is a discharge boundary for the east plant area, but one that is not well defined. The dominant trend of groundwater flow in the east plant area is to the northeast with a minor component of flow westward into Gill Creek near the east bank of the creek. This interpretation is subject to confirmation as more data becomes available.

Although inconclusive due to the limited amount of data, it appears that a groundwater sink exists in the northwest area of the plant site near well cluster locations 19, 20, and 22. Monitoring wells 20A and 22A were dry during the July 30, 1984 measurements indicating that the overburden has been dewatered. In order to develop a groundwater contour map, the elevation of the bottom of the monitoring well was used. This elevation represents the maximum elevation for the water levels and is presented as an interpretation. When more data becomes available, this interpretation may be subject to revision.

The potential causes for the hydraulic sink include, (1) the regional downward flow potential from the A-zone to the B-zone, (2) the Olin Production well, and (3) the Buffalo Avenue sewer. The direction of groundwater flow to the hydraulic sink in the northwest plant area is defined by the first water bearing zone (B-zone) below the A-zone. Review of the B-zone groundwater elevation contour map shows a groundwater depression in the vicinity of monitoring well 19B. Groundwater flow in the B-zone in the northwestern plant site area is in a radial pattern toward the area of the Olin Production well.Hence, it is likely that the Olin Production well is the controlling hydraulic sink in this area.

B-zone groundwater contour maps are shown on Plates 6, 7, and 8 for the months of June, July, and August, 1984, respectively. The configuration of the groundwater level contours in the B-zone exhibit the same general trend for each measuring time. The direction of groundwater flow west of Gill Creek is toward the northwest. The direction of groundwater flow east of Gill Creek is toward the north/northeast. This configuration of the elevation contours and direction of groundwater flow in the B-zone suggests that the Niagara River is a recharge boundary, i.e., flow is from the Niagara River toward the plant site, and that the area near Gill Creek is a groundwater flow divide. This same conclusion was drawn in the December 23, 1983 report using August and October, 1983 data. Further, the data suggest a controlling influence of the Olin pumping well for the west plant and an off-site sink for the east plant.

As discussed previously, the groundwater contours for the B-zone for July 30, 1984 do show groundwater flow in the direction of the Olin Production wells. The influence of the Olin pumping well on the B-zone groundwater regime in the west plant area is illustrated on Plate 7. With the approximate location of the Olin pumping well shown on Plate 7, it appears that production well is influencing the groundwater flow in the northwest part of the plant site near monitoring well locations 19, 20, and 22. In this area of the site, a groundwater sink, with water flowing radially toward the Olin well, appears to have developed. Due to the purging and sampling of monitoring wells at clusters 19, 20, 22, 23, and 24, August groundwater elevation data were not obtained to further investigate the effects of the Olin well on the B-zone. In addition, no June 1984, data is available for these wells.

As previously discussed, the effects of the Buffalo Avenue sewer on the B-zone groundwater regime is not easily assessed with the existing data. It appears from Plate 7, however, that any effects of the sewer on the flow of groundwater in the B-zone in the northwest area of the site may be insignificant compared to the effects of the Olin pumping well.

Groundwater elevation contour maps for the CD zone were constructed using July and August, 1984 water level data, and appear as Plates 9 and 10. The configuration of the groundwater surface depicts a radial pattern north from the Niagara River with the area just west of Gill Creek defining a flow divide. The groundwater flow direction west of Gill Creek is to the northwest, while the flow direction east of Gill Creek is to the northeast. As with the B-zone, the flow direction in the CD zone suggests that the Niagara River is a recharge boundary. It appears that the direction of groundwater flow is being controlled by two hydrologic discharge boundaries, one to the northeast and one to the northwest. The component of groundwater flow to the northwest is likely being controlled by the Olin production well and to the northeast probably by the Power Authority tunnel excavations. Again, these conclusions and interpretations of the groundwater flow regimes are consistent with those presented in the December 23, 1983 report.

Groundwater elevation contour maps for the D-zone were constructed using July and August 1984 data and appear as Plates 11 and 12. Insufficient data were available to construct a June 1984 contour map. Due to the increased number of D-zone monitoring wells available since the December 23, 1983 report, additional interpretation of the D-zone groundwater flow regime has been developed for this report. Unlike the B and CD groundwater flow directions, where the area near Gill Creek was a flow divide, a divide in the D-zone flow regime is not readily apparent. Previously in our December 23, 1983 report, the D-zone groundwater divide was shown to be in the vicinity of Gill Creek. Review of the geological data for the new D-zone monitoring wells indicate that the D-zone fracture elevation is consistent with the regional D-zone fracture elevation. The historical D-zone groundwater elevation data does exhibit a slight increase in elevation during the June, July and August measurement periods for the previously installed D-zone monitoring wells. The new D-zone monitoring wells only have one groundwater elevation measurement taken during July. In addition, previous Olin pump test data demonstrated an influence in the D-zone. Flow to the Olin well in this area may also be occurring in the CD2 fracture. Utilizing water levels from well 19CD2 to construct D-zone contours would result in flow potentials toward the Olin well for much of the west plant area. However, as noted above, the D-zone fraction elevation at well location 19 is consistent with the regional D-zone fracture elevation. Thus, a more complete interpretation of the location of the D-zone groundwater divide will be made when additional water level measurements are made for the new D-zone monitoring wells.

Groundwater elevation contour maps for the F-zone were constructed using July and August 1984 data and appear as Plates 13 and 14. Insufficient data were available to construct an F-zone groundwater contour map for June 1984. As with the D-zone, an increased number of F-zone wells were available for monitoring since the December 23, 1983 report, thus allowing for a revised description of the F-zone groundwater flow regime. The configuration of the contour elevations and direction of groundwater flow in the F-zone conforms with those observed in the B and CD fracture zones. The configuration is a very broad radial pattern extending north from the Niagara River. The groundwater flow in the west area of the plant site is to the north-northwest and in the east plant area in a northeasterly direction. With this configuration of elevation contours, it again appears that the Niagara River is a recharge boundary for the F water-bearing zone and that the area west of Gill Creek is a groundwater flow divide, although it is not as well defined as in the B and CD-zones. The effects of the Olin Production well on groundwater flow in the western site area, and the Power Authority tunnel excavations on groundwater flow in the eastern site area are still evident, but do not appear as influential as in the the B and CD-zones.

ROCHESTER SHALE PERMEABILITY

It is reported that the Rochester Shale is a relatively impermeable unit which substantially restricts recharge to more permeable sandstones and limestones below.(1) It is further reported that as far as shales are concerned, Rochester Shale is a very impermeable shale.(2)

GROUNDWATER FLOW REGIME SUMMARY

The new data acquired from the various field investigations described in this report, which were used to further define the geohydrologic conditions of the Niagara Plant site, have, for the most part, substantiated the interpretations made in the "Geohydrologic Investigations" report of December 23, 1983.

Comparing the plates of the groundwater contour configurations of the December 23, 1983 report (Plates 31 through 44) with Plates 3 through 14 of this report, which utilized new data, it is evident that most of the same interpretations concerning groundwater conditions may be made. The overburden material at the Niagara Plant site may be described as an unconfined water table regime with the principal source of recharge being direct infiltration of precipitation migrating vertically to the zone of saturation.

The bedrock hydrologic conditions may be described as a leaky confined or "water table fractured rock" groundwater regime. The principal hydrologic controls on groundwater flow in the bedrock are (1) the Niagara River, (2) the Olin production well, (3) a groundwater sink to the northeast believed to be caused by the Power Authority tunnel excavations, and (4) the regional groundwater flow. The data consistently show that the Niagara River is a recharge boundary for the bedrock groundwater regime in the plant site area.

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(1) Johnston, R.H. (1964), "Groundwater in the Niagara Falls Area, New York, with Emphasis on the Water-Bearing Characteristics of the Bedrock" State of New York, Department of Environmental Conservation, Water Resources Commission, Bulletin GW-63, 93pp.

(2) Brett, Carton (1984) Personal Communication, University of Rochester.

With the added well at location 24, it has been determined that Gill Creek is a discharge boundary for the east plant area. This is best illustrated by Plate 4 which shows a very minor westward flow component into Gill Creek along the eastern bank. However, the principal flow component in the east plant area is to the northeast.

The B, CD, and F-zone groundwater elevation contour configurations (Plates 6 through 10, 13 and 14) show that the Niagara River is a recharge boundary for these bedrock zones and that an area near Gill Creek is a groundwater flow divide whereby the water flows to the northwest, west of Gill Creek, and flows northeast, east of Gill Creek.

The D-zone groundwater elevation contour configurations (Plates 11 and 12) show that the groundwater in this zone flows in a northeasterly direction throughout some portion of the site area. The groundwater flow in the D-zone will be further investigated via subsequent groundwater level readings.

Groundwater elevation measurements from wells 19A, 20A and 22A and the B-zone groundwater contour map suggest that the Olin Production well may be creating a sink in this area. Since both monitoring wells 20A and 22A were dry during the July 30, 1984 measurements, only the maximum elevations of the water levels in the A-zone could be used for interpretation. With these elevations, however, it appears, as illustrated on Plate 4, that a groundwater sink has developed in the A-zone in-between monitoring wells 19A and 20A. Additional data are needed to verify this interpretation.

With the existing data, it is difficult to assess the effects of the Buffalo Avenue sewer on the B-zone. From Plate 7, it appears that the Olin Production well is the dominant influence on the groundwater flow in the B-zone in the northwest plant area and any effects of the Buffalo Avenue sewer may be overshadowed by the Olin well.

Although only limited information is available, the Rochester Shale can be considered to be a relatively impermeable unit. The Rochester Shale would therefore serve as an effective horizontal barrier to vertical groundwater flow.

In summary, the Olin Production well influences groundwater flow in the overburden and bedrock groundwater flow regimes. The Olin Production well appears to be effective in isolating the groundwater in the bedrock over most of the west plant site area.

PASNY TUNNELS

For information concerning groundwater flow quantities, velocities, and transmissivities, the reader is referred to the December 23, 1983 report, inasmuch as these properties of the groundwater regime were not included in the scope of this report.

As in the December, 1983 report, hydrologic properties described in this report are estimated and interpretated based on observations made during the course of this study. The heterogeneous, anisotropic nature of the fractured rock imparts a degree of uncertainty in describing the groundwater regime. As further information becomes available, it may be necessary to refine these interpretations.

The Power Authority of the State of New York (PASNY) water intake tunnels are located approximately 0.3 miles up river of the Niagara Plant site. The tunnels extend from the Niagara River to the forebay of the Robert Moses Niagara Power Plant and the Pumped-Storage reservoir, a distance of approximately four miles. The tunnels were constructed between 1958 and 1962. The tunnel intakes are located approximately three miles upstream of the falls. The diverted river water drops an average of 325 feet in hydraulic head between the upper river intake and lower river gorge discharge. The average discharge of the Niagara River as measured at Buffalo, New York is 203, 000 cfs of which at least 100,000 cfs must flow over the river between April 1 and October 31 and 50,000 cfs for the rest of the year. In addition, there are daily flow requirements based on the time of day from April 1 through October 31. These daily requirements result in fluctuations in river level during the day.

In general, the dimensions of the tunnels are approximately 46 by 66 feet with the base at an average depth of approximately 88 to 140 feet. The tunnels were excavated into the Lockport Formation a maximum of 145 feet and concrete was poured to form the sides, floor and roof. Beneath the tunnel, drains with pump houses were installed in order to dewater the tunnels if necessary. Shot rock fill was placed over the tunnels as backfill. It is our understanding that the tunnels were designed not to leak. Therefore, the hydraulic pressure inside the tunnels is not transmitted to the surrounding bedrock. This is somewhat confirmed by PASNY reports that the pump houses and drains below the tunnels are dry. Thus the primary hydraulic influence of the tunnel excavation on the hydrogeology of the Lockport Formation is the effect of the backfill material placed over the tunnels. It would be expected that this material would have a higher permeability than the surrounding rock. Therefore, it is concluded that the backfill material probably acts as a drain (line sink). The effect of the line sink would be to reduce the hydraulic head along its length, creating a local depression in the groundwater surface. The local depression in the groundwater surface is noted in the groundwater contour maps constructed for the overburden and bedrock groundwater regimes at the plant site where groundwater flow is in the direction of the PASNY tunnels.

WATER QUALITY DATA

Groundwater samples from 69 monitoring wells at the DuPont Niagara Plant site were collected in June and July of 1984. Samples from utility wells at the plant site were also collected, but are the subject of a future WCC report, and thus, will not be discussed herein. The original chemical analyses discussed in this report are presented as Appendix B.

The monitoring well samples were collected and analyzed. These new data were then added to and compared with the existing data presented in the December 23, 1983 "Geohydrologic Investigations" report. In the December, 1983 report, a detailed description of the contaminants found at the Niagara Plant site is given, and interpretations and conclusions concerning contaminant transport conditions are derived. The objective of this current report, then, is to supplement what has already been discussed in the December, 1983 report, and to assess the impact of the new chemical data on the previous interpretations.

ASSESSMENT OF ANALYTICAL RESULTS

The groundwater samples from the 69 monitoring wells were analyzed for volatile organics, PCB's/pesticides, metals, and other parameters including pH, specific conductance, and total organic carbon. Table 3 lists these analytical results.

DUPONT VOLATILE ORGANIC COMPOUNDS: As was found with the data presented in the December, 1983 report, concentration values for any given parameter may range from below detectable limits up to hundreds of parts per million (ppm) across the plant area. Also, at any given monitoring well, similar but less dramatic variations with time may be observed. This phenomena is best illustrated in Table 4 where the data from the December, 1983 report for C-1 and C-2 compounds (see December report for definition of C-1 and C-2 compounds) are tabulated against the same compounds using the new data. In several instances, it can be seen that the October, 1983 data and the June, 1984 data differ by an order of magnitude. The C-2 compounds for monitoring well 8B are an example of the fluctuations of the concentrations over time. The October, 1983 concentration of C-2 compounds is almost three orders of magnitude greater than those determined from the June data for this well. This type of large fluctuation in the concentrations is due, in part, to the presence of second phase fluids, and these fluids have been observed at various locations.

To illustrate the relative distribution of the volatile compounds, the chemical analytical data for the June/July, 1984 sampling event were plotted for each compound at each sampling point. The results are shown on Plates 15 through 21. The analytical results for the utility wells are also listed on Plates 15 through 21 and will be discussed in a further report. As with the October, 1983 data, a non-uniform distribution of chemical compounds was found which can be attributed to the previous processes and events at the plant site which occurred at various locations. These locations are shown on Plate 28 of this report and on Plate 53 of the December, 1983 report. Compared with the plots of the individual compounds, correlations between process event areas and monitoring well locations appear to be evident. The reader is referred to the December, 1983 report for a discussion of these correlations.

To provide a conceptual plan view of the relative degree of contamination, the data from the June/July, 1984 sampling were plotted for total C-2 and C-1 compound concentrations and the plots are presented as Plates 29 and 30. The analytical results for the utility wells are also listed on Plates 29 and 30 and will be discussed in a future report. Table 4 lists these data and Plates 31 and 32 illustrate apparent concentration contours of the C-1 and C-2 compounds, respectively, for the June, 1984 sampling of the A-zone wells.

The contoured plot (Plate 31) for the C-1 data shows that several monitoring well clusters on the western part of the plant site have relatively high concentrations. This is consistent with the October, 1983 data where the C-1 compounds were detected primarily on the western part of the plant site. In October, 1983, the highest C-1 concentration was at well cluster 15 whereas for June, 1984, the highest concentration was at well cluster 1. As discussed earlier, this change in relative concentrations at well locations with time is likely a result of the presence of second phase liquids.

The contoured plot (Plate 32) for the C-2 data shows that, although the C-2 compounds are more wide spread across the site than the C-1 compounds, they too are primarily limited to the western plant area. High concentrations of C-2 compounds were detected at well clusters 1 and 14 for the June, 1984 data and at cluster 13 for the October, 1983 data. Again, this type of fluctuation is expected when second phase liquids are present.

Because of the presence of second phase organic fluids, the contours described above do not represent actual groundwater quality conditions, nor do they necessarily represent the actual distribution of second phase fluid. Based on a review of the June, 1984 analytical data, and the characteristics of organic compounds, it is believed that for C-2 compounds in the A-zone, second phase fluids likely exist at wells 1A and 14A. Several other wells (13A, 15A, 21A, 8A, and 10A) were believed to contain second phase fluids based on the October, 1983 chemical analyses. However, this change is not unexpected when considering the nature of second phase fluids. For the June, 1984 data, either the second phase fluids were not withdrawn from the five wells listed above as a result of groundwater sampling techniques, or, at the time of sampling, the C-2 compounds were in low enough concentrations to be completely dissolved in the water.

DUPONT NON-VOLATILE ORGANIC COMPOUNDS: Analyses for indicator parameters included PCB compounds which were considered to be DuPont related. Based on the analytical results, at least one of four PCB compounds (1221, 1232, 1248, and 1260) was detected at five monitoring well locations. Three PCB compounds were detected in wells at cluster 15: PCB-1260 (0.0018 ppm) in well 15A; PCB-1232 (0.0029 ppm) in well 15C; and PCB-1221 in well 15J. PCB-1221 (0.0059 ppm) was also detected in well 17B (0.0562 ppm) and well 12A (.0062 ppm). PCB-1260 (0.0018 ppm) was detected in well 3B. The final PCB compound found during the June/July, 1984 sampling, PCB-1248 was detected in well 5B (0.0035 ppm).

The PCB compounds detected in the June/July, 1984 samples are different from those detected in the October, 1983 data with respect to both the type of PCB compounds found and the monitoring wells in which they occurred. With the October, 1983 data, PCB-1248 and PCB-1254 were found in wells 12A and B, and well 1C, respectively. The detection of PCB-1260 in well 8B was suspect since the concentration found was very close to the lower detection limit of the compound.

The difficulty in assessing the presence of the PCB compounds lies in the fact that very few of the compounds can be related to DuPont processes. PCB 1248 was detected at well location 12 in the October, 1983 data and may have been associated with the former Building 310 site. With the June, 1984 data, however, PCB 1248 was detected only at well cluster 5. This suggests that either the PCB 1248 compound has been transported or that there is an off-site, non-DuPont related source, or both. With the limited information regarding DuPont related and non-DuPont related PCB compounds, it is not possible to establish the source of the other PCB compounds detected in the June/July, 1984 analyses with any degree of confidence.

DUPONT INORGANIC COMPOUNDS: Monitoring well 15A was the only well in which soluble barium was detected (1.6 ppm) in a quantity greater than 1 ppm.

This is consistent with the October, 1983 data which showed that soluble barium was detected in all the wells but never in excess of 1 ppm.

Soluble copper was detected in several monitoring wells (Plate 33), but had concentrations of 1 ppm or greater in only three wells: 14C (1.18 ppm); 15A (2.2 ppm); and 19B (1.00 ppm). The relatively high concentration of copper in well 15A is probably a result of the well cluster being in the immediate vicinity of former building 57 which processed copper cyanide.

Cyanide has been detected at several well cluster locations with concentrations ranging from below the detection limit to 156 ppm. In support of the October, 1983 data, the highest concentrations were found at well clusters 8 and 16. Contour patterns for the A-zone wells shown on Plate 34 indicate the existence of discrete "hot-spots" in these areas of the plant site. The reader is referred to the December, 1983 report for a discussion concerning the location of the "hot-spots" in relation to past plant processes.

NON-DUPONT VOLATILE ORGANIC COMPOUNDS: Benzene and chlorobenzene, two volatile organic compounds considered unrelated to DuPont processes, have been detected at several well cluster locations, of which the majority of them are in the eastern portion of the site (Plates 35 and 36). Although these two compounds have been detected at well clusters different from those in the October, 1983 data, the general trend in which the compounds occur in the eastern portion of the site remains consistent. This is particularly true where the highest concentrations are found at well clusters 8, 10, and 18.

NON-DUPONT ORGANIC COMPOUNDS: Neither hexachlorocyclohexane isomers (BHC's) or phenolics have been associated with any DuPont processes. In both the October, 1983 and June/July, 1984 data, however, BHC's have been detected in almost every monitoring well at very low concentrations (generally less than 1 ppb). Consistent with the October, 1983 data, wells in cluster 1 have the highest total concentration although the concentrations are less for the June, 1984 data (Plate 37).

As for BHC's, total recoverable phenolics have been found in most wells but at very low concentrations (generally less than 0.1 ppm). The highest concentration (2.59 ppm) was detected in well 8A which may be correlated to the relatively high concentrations of benzene in this well, since the two compounds are associated. However, as with the October, 1983 data, there is no apparent pattern to the distribution of phenolics.

TOTAL ORGANIC CARBON: An additional groundwater indicator parameter, total organic carbon, (TOC) was added to the analyses for the June/July 1984 data. The intent of the analyses for TOC was to assess its usefulness as an indicator parameter for determining the distribution of organic compounds within the study area. The results for the June/July, 1984 data are listed on Table 3 and apparent concentration contours for the A-zone wells are shown on Plate 38. Plate 39 lists TOC concentrations for all well samples. Plate 38 shows concentric patterns of the contour lines around well 16 in the west plant area, and well 8 in the east plant area. The apparent concentration contour pattern for TOC appears very similar to the pattern for cyanide (Plate 34) and, in fact, the TOC analytical results are primarily influenced by the cyanide content.

SUMMARY OF ANALYTICAL RESULTS

The analyses of the June/July, 1984 groundwater samples have, in most cases, substantiated the interpretations and conclusions derived using the October, 1983 data as presented in the December 23, 1983 report. However, concentrations of individual parameters at selected wells were found to vary by up to several orders of magnitude between the two sampling times. The change in parameter concentrations impacts the estimates of contaminant loadings as will subsequently be discussed.

Volatile organic compounds were found to have a non-uniform distribution across the plant site which may be related to the locations of previous DuPont processes and events. Although some individual compounds have changed with respect to apparent relative concentration from October, 1983 to June, 1984, total volatile concentrations (C-1 and C-2) have remained consistently high in the same areas of the plant site.

The June, 1984 analyses for the inorganic compounds of soluble barium, soluble copper, and cyanide were very similar to those for October, 1983. Soluble barium and soluble copper were generally found in concentrations less than 1 ppm, whereas, cyanide was detected in relatively high concentrations at well clusters 8 and 16 and decreased radially outward.

Benzene and chlorobenzene, non-DuPont volatile organic compounds, were found with both the October, 1983 and June, 1984 data to be more prevalent in the eastern plant area than the western area.

BHC's and total recoverable phenolics were detected in quantities generally less than 1 ppb and 0.1 ppm, respectively for both data sets. No apparent distribution pattern of the compounds has emerged from either set.

A notable variation between the October, 1983 and June, 1984 analytical results appeared in the analyses for PCB's. Although both data sets had very few detections of PCB's, the type of PCB detected and the well in which they occurred were variable. As discussed in the December, 1983 report, there is no information to specifically link the PCB's, except PCB 1248, with any DuPont related operations.

CONTAMINANT LOADING

Contaminant loadings were estimated for the overburden, B-zone, CD-zone, D-zone and F-zone. The groundwater chemistry and contour maps used to calculate the loadings are those for the dates of June/July 1984 and July 30, 1984, respectively.

The total estimated loading to the off-site environment for the A-zone is approximately 8 lbs/day. Essentially all of the estimated loading is computed to come from the west plant area, since the loading from the east plant is computed to be much less than 1 lb/day.

The total estimated loading to the off-site environment for the B-zone is approximately 30 lbs/day. The major portion of this loading is attributable to the west plant area. Based upon the groundwater contour map of the B-zone, this contaminant loading in the west plant site (approximately 24 lbs/day) contributes to the organic loading in the Olin Production well.

The total estimated loading to the off-site environment for the CD-zone is approximately 1 lb/day. The contaminant loading in the west plant site was computed to be approximately 0.9 lbs/day. This loading contributes to the Olin Production well loading. The contaminant loading to the northeast for the CD-zone in the east plant area was computed at to be less than 0.1 lbs/day.

The total estimated loading to the off-site environment for the D-zone is approximately 1.5 lbs/day.

The total estimated loading to the off-site environment for the F-zone is approximately 1.6 lbs/day. The loading for the west plant site was computed to be approximately 1.4 lbs/day. The loading to the northeast in the east plant area was computed to be approximately 0.2 lbs/day.

In summary, the total off-site loading in the east plant area is estimated to be less than 8 lbs/day. The total off-site loading in the west plant area is estimated at 35 lbs/day.

It must be noted that the calculation of loading is dependent upon the well specific chemistry coupled with water bearing zone permeabilities and areal hydraulic gradients. Thus, differences in well chemistry with time result in differences in computed loadings. It must also be noted that the recent data represents only a selected suite of organic parameters and, as such, the total organic loading is unknown. Finally, since groundwater flow estimates are considered order of magnitude, the contaminant loadings must also be considered order of magnitude.

SUMMARY AND CONCLUSIONS

The field investigations conducted to supplement the information on the geohydrologic conditions and extent of contamination at the DuPont Niagara Plant site have, in most cases, supported the interpretations and conclusions made in the December 23, 1983 report on overburden and bedrock conditions, groundwater flow regimes, and contaminant distribution.

The installation of 15 additional monitoring wells allowed for the interpretation of bedrock fractures into other areas of the plant site and across Buffalo Avenue. These wells also expanded the area over which groundwater flow directions may be interpreted.

The review of groundwater level elevations and their contour configurations in this report resulted in similar interpretations of groundwater flow directions in the different horizontal fracture zones to those found in the December, 1983 report. The A-zone groundwater regime is considered to be under unconfined water table conditions with flow in the eastern part of the plant toward the northeast, and flow in the western part of the plant to be in a radial pattern outward from a west-central high.

The B, CD, and F water-bearing zones have elevation contour configurations which indicate that the Niagara River is a recharge boundary and that Gill Creek is the approximate location of a groundwater flow divide where groundwater flows northwesterly to the west of the creek and northeasterly to the east of the creek. At this time, there is insufficient groundwater level information to indicate if a direction change in the D-zone groundwater flow regime has occurred. When additional data becomes available a more definite conclusion can be made. It appears that the Olin Production well is effectively isolating the bedrock groundwater flow regime over much of the west plant area.

The results of the investigation to define the hydraulic sink in the northwest corner of the plant site indicated:

- The A-zone is dewatered between monitoring well 19A and 20A on DuPont property, and extending across Buffalo Avenue to the north beyond monitoring well 22A.

- The direction of groundwater flow in the first water bearing zone (B-zone) in this area is in the direction of the Olin Production well. That is, the hydraulic head in the B-zone decreases from monitoring well 22B south across Buffalo Avenue and continues to decrease south from monitoring well 20B to monitoring well 19B on DuPont property. In addition, the hydraulic head decreases from monitoring well 5B north to monitoring well 19B. Thus, the configuration of the groundwater elevation contours of the B-zone in this area describes a depression in the groundwater surface.

Based upon the hydrologic data obtained from the installation of monitoring well 24A, it is concluded that Gill Creek is a discharge zone for overburden zone groundwater from the east plant site. The area of the east plant influenced by Gill Creek is defined by a groundwater flow divide between monitoring wells 12A and 24A and monitoring wells 10A and 8A. Groundwater west of this divide flows toward Gill Creek and east of the divide toward the northeast corner of the plant site.

The chemical analyses of the groundwater samples for June, 1984 are generally similar to the earlier sets of analyses with respect to both location and relative concentrations of compounds at the Niagara Plant site. A variation was found in the analyses for PCB's which are believed to be non-DuPont related. Very small concentrations of different PCB compounds were detected in different wells than in the October, 1983 data. The other chemical indicators which were analyzed, including volatile organic, organic, and inorganic compounds, were, in most cases, consistent with the October, 1983 analyses. Areas of the plant site have been established where high (or low) concentrations of a particular compound are repeatedly detected and many of these locations coincide with areas of past processes and events attributable to the concentrations found.

Based upon the data available regarding contaminant concentrations and groundwater flow direction and quantity, the total off-site organic loading through the shallow overburden is estimated to be on the order of 8 pounds per day. The total off-site organic loading through the bedrock is estimated to be on the order of 34 pounds per day, of which, 25 pounds per day is estimated to be going to the Olin Production well.

LIMITATIONS

The findings and conclusions presented in this report are based upon the interpretations developed from the available geologic, subsurface and groundwater chemistry data. These findings and conclusions are subject to confirmation and/or revision as additional information becomes available. Factors which influence the utilization of the data have been discussed in this report and local anamolies should be expected.

Tables

TABLE 1
WELL DESIGNATION AND FRACTURE ZONE REPRESENTATION DUPONT NIAGARA SITE, NIAGARA FALLS, NEW YORK

Well	Represented Fracture Zone
1 A	A
1 B	B
1 C	CD
1 D	D
1 E	E
1 F	F
1 J	J
2 A	A
2 C	CD
3 A	A
3 B	B
4 A	A
4 C	CD
4 J	J
5 A	A
5 B	B
5 CD	CD
5 D	D
5 F	F
6 A	A
7 A	A
7 C	CD
8 A	A
8 B	B
8 J	J
9 A	A
10 A	A
10 C	C
10 D	D
10 F	F
11 A	A
12 A	A
12 B	B
13 A	A
14 A	A
14 C	C
15 A	A
15 C	C
15 CD	CD
15 D	D
15 F	F
15 J	J
16 A	A
16 B	B
17 A	A
17 B	CD
18 A	A
18 C	CD
19 A	A
19 B	B
19 C	C
19 CD1	CD
19 CD2	CD2
19 CD3	CD3
19 D	D
19 F	E
20 A	A
20 B	B
21 A	A
22 A	A
22 B	B
22 C	CD
22 D	D
22 F	F
23 A	A
23 B	B
23 C	CD
23 D	D
23 F	F
24 A	A

TABLE 2
GROUNDWATER ELEVATION DATA
JUNE, JULY, AUGUST 1984

Well		Top of Casing Elevation	DEPTH TO WATER (in feet)			ELEVATION OF WATER		
			June 7	July 30	August 22	June 7	July 30	August 22
1	A	572.43	9.2	9.77	10.09	563.23	562.66	562.34
1	B	571.61	10.06	10.38	—	561.55	561.23	—
1	C	573.07	—	12.12	12.43	—	560.95	560.64
1	D	572.12	—	15.52	16.05	—	556.60	556.07
1	E	570.98	—	11.46	11.88	—	569.52	559.10
1	F	572.69	—	14.98	13.49	—	557.71	559.20
1	J	572.08	—	17.21	18.02	—	554.87	554.06
2	A	570.10	6.95	7.61	8.04	563.15	562.49	562.06
2	C		—	10.48	14.23	—	—	—
3	A	568.99	3.72	3.85	3.93	565.27	565.14	565.06
3	B	568.98	10.36	10.63	10.92	558.62	558.35	558.06
4	A	569.99	9.26	10.17	10.98	560.73	559.82	559.01
4	C	569.98	10.35	10.60	11.34	559.63	559.38	558.64
4	J		38.83	126.98	—	531.17	—	—
5	A	572.66	15.14	15.36	16.35	557.52	557.30	556.31
5	B	572.82	15.70	15.82	16.69	557.12	557.00	556.13
5	CD	572.80	17.74	17.33	18.25	555.06	555.47	554.55
5	D	573.40	16.20	16.47	17.53	557.20	556.93	555.87
5	F	573.00	16.07	16.08	16.93	556.93	556.92	556.07
6	A	571.25	—	—	—	—	—	—
7	A	571.19	15.83	15.47	15.44	555.36	555.72	555.75
7	C	571.17	—	21.07	21.48	—	550.10	549.69
8	A	568.21	4.80	5.20	5.12	563.41	563.01	563.09
8	B	568.02	5.60	5.92	6.48	562.42	562.10	561.54
8	J		—	154.55	—	—	—	—
9	A	571.95	8.88	9.65	9.68	563.07	562.30	562.27
10	A	569.45	7.18	7.62	7.72	562.27	561.83	561.73
10	C	570.58	—	12.74	12.72	—	557.84	557.86
10	D	570.60	—	19.24	18.88	—	551.36	551.72
10	F	570.40	—	12.43	12.72	—	557.97	557.68
11	A	567.92	4.85	5.43	5.54	563.07	562.49	562.38

TABLE 2 (CONTINUED)

		DEPTH TO WATER (in feet)			ELEVATION OF WATER		
Well	Top of Casing Elevation	June 7	July 30	August 22	June 7	July 30	August 22
12 A	572.93	10.98	11.03	11.18	561.52	561.47	561.35
12 B	572.14	11.85	12.23	12.42	560.25	559.87	559.72
13 A	569.51	5.12	5.24	5.36	564.39	564.27	564.15
14 A	572.24	8.30	7.74	7.28	563.94	564.50	564.96
14 C	572.10	—	21.72	16.78	—	550.38	555.32
15 A	571.00	6.28	5.50	5.26	564.72	565.5	565.74
15 C	571.30	15.08	14.82	15.14	556.22	556.48	556.16
15 CD	571.40	—	18.93	19.98	—	552.47	551.42
15 D	571.60	—	16.04	16.82	—	555.56	554.78
15 F	571.70	—	12.67	13.22	—	559.03	558.48
15 J	571.70	—	132.46	—	—	439.24	—
16 A	572.33	7.96	7.90	7.77	564.37	564.43	564.56
16 B	572.90	15.71	15.58	16.02	557.19	557.32	556.88
17 A	568.91	18.60	18.79	18.33	550.31	550.12	550.58
17 B	568.93	22.36	22.50	22.04	546.57	546.43	546.89
18 A	567.48	8.60	8.60	8.51	558.88	558.88	558.97
18 C	570.67	--	10.21	10.04	--	560.39	560.63
19 A	573.67	8.97	7.73	—	564.7	565.94	—
19 B	573.26	17.32	18.18	—	555.94	555.08	—
19 C	573.59	—	19.59	—	—	554.00	—
19 CD1	573.31	—	19.87	—	—	553.44	—
19 CD2	573.41	—	20.01	—	—	553.40	—
19 CD3	569.69	—	—	—	—	—	—
19 D	573.08	—	17.16	—	—	555.92	—
19 F	573.50	—	17.42	—	—	556.08	—
20 A	570.85	Dry	—	—	—	—	
20 B	570.07	—	13.25	—	—	556.82	—
21 A	573.38	10.04	10.20	10.46	563.34	563.18	562.92
22 A	571.13	—	Dry	—	—	—	—
22 B	570.84	—	13.70	—	—	557.14	—
22 C	570.78	—	19.55	—	—	551.23	—
22 D	570.99	—	15.24	—	—	555.75	—
22 F	571.28	—	19.50	—	—	551.78	—

TABLE 2 (CONTINUED)

Well	Top of Casing Elevation	DEPTH TO WATER (in feet) June 7	July 30	August 22	ELEVATION OF WATER June 7	July 30	August 22
23 A	569.82	—	19.55	—	—	550.27	—
23 B	569.63	—	19.81	—	—	549.82	—
23 C	569.74	—	23.33	—	—	546.41	—
23 D	569.87	—	19.78	—	—	550.09	—
23 F	569.90	—	19.50	—	—	550.40	—
24 A	572.51	—	10.28	—	—	562.23	—

— No data available

TABLE 3
ANALYTICAL RESULTS
GROUNDWATER SAMPLES
JUNE/JULY 1984
DUPONT - NIAGARA PLANT SITE

Monitoring Well	Benzene	Chlorobenzene	Chloroform	Trans-1,2-dichloroethane	Methylene Chloride	1,1,2,2-tetra-chloroethane	Tetrachloro-ethylene	Trichloro-ethylene	Vinyl Chloride
1A	—	—	6.230	—	13.625	50.640	57.800	27.875	2.796
1B	—	—	7.070	—	37.320	164.120	220.410	174.250	2.070
1C	1.8519	—	0.0273	—	.0308	—	0.1029	61.509	0.1570
1D	0.0725	—	—	—	—	2.730	—	0.97278	—
1E	0.0654	—	—	—	—	—	—	0.21365	—
1F	—	—	—	—	4.325	11.640	57.645	14.045	—
1J	—	—	—	—	1.256	1.109	1.785	0.322	—
2A	0.01669	—	—	—	0.091	3.094	8.359	1.554	0.589
2C	—	—	—	—	1.827	1.884	1.615	0.907	—
3A	0.07264	—	—	—	0.068	7.145	9.849	2.327	0.043
3B	—	—	157.080	—	19.250	—	0.0504	17.800	0.0149
4A	—	—	0.0673	0.0200	0.0502	1.006	0.1862	0.4552	0.0498
4C	0.00397	—	0.3531	—	0.2535	0.02378	0.07102	—	—
4J	—	—	—	—	1.105	0.07387	1.496	—	—
5A	—	—	0.7105	—	0.1497	1.556	0.4599	0.3806	—
5B	0.02280	—	0.8853	—	0.03409	0.4165	—	0.01223	0.01947
5CD	—	—	0.1713	—	0.07296	0.06447	0.00978	0.03485	0.07968
5D	—	—	0.08704	—	0.3324	1.192	0.7108	0.02124	—
5F	—	—	—	—	1.727	0.783	1.437	—	—
6A	—	—	—	—	0.12845	—	0.05046	—	—
7A	—	—	—	—	0.00905	—	—	—	—
7C	—	—	—	0.00878	0.00061	—	0.00090	0.00061	—
8A	2.410	—	—	3.294	0.084	—	0.107	0.089	—
8B	1.993	—	—	—	0.00141	—	—	—	0.1184
8J	0.1468	--	--	--	0.1937	32.426	0.9638	0.1653	3.166
9A	9.2904	—	—	—	—	—	—	—	—
10A	—	—	0.03704	—	0.00908	0.05294	—	0.03402	0.00342
10C	—	0.03627	—	—	0.0160	0.0257	0.0763	0.0817	0.1246
10D	0.3944	0.0440	—	—	—	—	32.490	10.580	—
10F	—	—	—	—	0.1516	0.5458	0.5781	—	—
11A	—	—	0.17539	—	0.10802	0.93676	0.17396	0.17149	—
12A	—	—	—	—	0.00613	0.02961	—	—	0.01158
12B	—	—	0.529	—	0.198	0.959	1.440	0.891	1.115
13A	—	—	1.144	—	0.05514	0.01666	2.754	0.3659	0.1648
14A	6.73657	—	0.1030	0.1039	0.0312	53.990	55.410	19.830	0.0018
14C	0.01547	—	—	0.1804	—	—	—	—	0.00102
15A	—	—	1.1513	—	0.00524	0.00673	0.09094	0.2727	0.05552
15C	0.29151	0.09812	60.132	—	3.1586	—	26.144	9.794	—
15CD	1.3099	—	—	—	17.375	39.275	0.1618	102.046	1.000
15D	0.06974	—	—	—	1.810	—	29.014	17.826	—
15F	0.03419	—	2.727	—	2.206	2.163	3.776	6.646	—
15J	0.16691	0.07574	0.696	—	2.198	3.103	3.338	13.538	—
16A	—	—	—	—	2.261	3.272	6.171	5.466	0.03717
16B	—	—	22.939	—	11.185	0.800	2.840	1.404	—
17A	—	0.0071	0.0073	0.0337	0.00756	2.6355	0.00702	—	0.000125
17B	—	--	—	—	0.01086	—	0.0676	—	—
18A	—	—	—	—	0.00802	0.05457	—	0.00293	0.00127
18C	0.31572	5.216	—	—	1.363	5.824	1.765	0.453	—
19A	—	—	0.1302	—	0.1366	0.12158	0.05706	0.09653	—
19B	0.09937	0.00654	27.829	—	10.727	10.338	7.427	7.056	—
19C	—	—	—	—	—	—	—	2.4518	1.2640
19CD1	0.01238	—	5.100	—	1.690	—	1.226	0.574	—
19CD2	0.0145	—	5.067	—	1.836	—	0.859	1.770	—
19CD3	—	—	—	—	—	—	—	—	—
19D	—	—	—	—	1.874	1.178	1.533	0.222	—
19F	—	—	—	—	—	—	—	0.83771	—
20A	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
20B	—	--	—	—	1.710	1.628	2.109	0.784	—
21A	—	—	0.088	—	0.145	0.922	0.464	0.924	0.085
22A	—	--	—	—	0.2299	0.06041	0.04307	—	—
22B	—	—	—	—	0.05884	0.07092	0.03033	—	—
22C	—	—	0.4549	0.51193	0.6802	0.3515	0.5114	3.142	0.5268
22D	0.6866	—	—	—	—	—	—	12.699	0.08923
22F	0.0318	—	—	—	—	—	0.064	—	—
23A	0.06941	—	—	—	0.04799	0.00427	0.00364	—	—
23B	0.00860	0.01030	—	—	—	0.435	0.534	—	—
23C	—	—	—	—	—	—	—	—	—
23D	—	—	—	—	—	—	—	1.5045	0.07500
23F	—	—	—	—	—	—	—	2.432	—
24A	—	—	0.134	—	1.394	1.039	2.321	1.108	—

(1) All results in parts per million (ppm) unless otherwise noted.
(2) — = Below Method Detection Limit.
(3) ND = No data available.
(4) DRY = No data available/well dry

TABLE 3 (CONTINUED)

Monitoring Well	PCB-1016	PCB-1248	PCB-1242	PCB-1254	PCB-1260	PCB-1221	PCB-1232	Alpha BHC	Gamma BHC	Beta BHC
1A	—	—	—	—	—	—	—	0.000567	0.000057	0.000023
1B	—	—	—	—	—	—	—	—	0.000081	—
1C	—	—	—	—	—	—	—	0.0140	0.0067	0.0120
1D	—	—	—	—	—	—	—	0.0240	0.0280	0.0037
1E	—	—	—	—	—	—	—	0.00074	0.00078	0.00009
1F	—	—	—	—	—	—	—	0.000016	0.000072	—
1J	—	—	—	—	—	—	—	0.00046	0.00018	—
2A	—	—	—	—	—	—	—	0.000065	0.00029	—
2C	—	—	—	—	—	—	—	0.0220	0.0100	0.0025
3A	—	—	—	—	—	—	—	—	—	—
3B	—	—	—	—	0.00187	—	—	0.0084	0.0043	0.00090
4A	—	—	—	—	—	—	—	0.000389	0.000111	0.00020
4C	—	—	—	—	—	—	—	0.00152	0.000122	0.000292
4J	—	—	—	—	—	—	—	0.000230	—	—
5A	—	—	—	—	—	—	—	0.000058	0.000032	—
5B	—	0.00352	—	—	—	—	—	0.000376	0.000227	—
5CD	—	—	—	—	—	—	—	—	0.000049	0.000024
5D	—	—	—	—	—	—	—	0.000112	0.000037	0.000080
5F	—	—	—	—	—	—	—	—	0.00047	—
6A	—	—	—	—	—	—	—	0.000346	0.000087	0.000183
7A	—	—	—	—	—	—	—	0.000038	0.000028	0.00241
7C	—	—	—	—	—	—	—	0.00150	0.00160	—
8A	—	—	—	—	—	—	—	0.000815	0.00283	—
8B	—	—	—	—	—	—	—	0.00150	0.00180	—
8J	—	—	—	—	—	—	—	—	—	0.0026
9A	—	—	—	—	—	—	—	0.000147	0.000259	0.000112
10A	—	—	—	—	—	—	—	0.000029	0.00372	—
10C	—	—	—	—	—	—	—	0.000402	0.000110	0.000086
10D	—	—	—	—	—	—	—	0.00799	0.00432	0.000452
10F	—	—	—	—	—	—	—	0.000366	0.000076	0.000071
11A	—	—	—	—	—	—	—	0.000075	0.000028	—
12A	—	—	—	—	—	0.00623	—	0.000069	0.000047	—
12B	—	—	—	—	—	—	—	0.0090	0.0016	0.0016
13A	—	—	—	—	—	—	—	—	0.00011	—
14A	—	—	—	—	—	—	—	—	0.0081	—
14C	—	—	—	—	—	—	—	—	0.0020	0.00052
15A	—	—	—	—	0.00187	—	—	0.000180	0.000184	0.000228
15C	—	—	—	—	—	—	0.00297	0.000353	0.000513	0.000418
15CD	—	—	—	—	—	—	—	0.0490	0.0390	0.0200
15D	—	—	—	—	—	—	—	0.0315	0.0163	0.0046
15F	—	—	—	—	—	—	—	—	0.00029	0.00043
15J	—	—	—	—	—	0.0562	—	—	0.00013	0.00030
16A	—	—	—	—	—	—	—	0.000579	0.00119	—
16B	—	—	—	—	—	—	—	—	0.000081	—
17A	—	—	—	—	—	—	—	—	0.000156	0.000010
17B	—	—	—	—	—	0.00591	—	0.000113	0.000158	—
18A	—	—	—	—	—	—	—	—	0.000278	0.000124
18C	—	—	—	—	—	—	—	0.00168	0.000376	0.00122
19A	—	—	—	—	—	—	—	0.0310	0.00240	0.0110
19B	—	—	—	—	—	—	—	0.00360	0.00380	—
19C	—	—	—	—	—	—	—	0.000143	0.000067	0.000086
19CD1	—	—	—	—	—	—	—	0.0110	0.00550	0.00100
19CD2	—	—	—	—	—	—	—	0.00353	0.00169	0.000998
19CD3	—	—	—	—	—	—	—	0.000170	0.000078	0.000020
19D	—	—	—	—	—	—	—	0.000232	0.000027	0.000034
19F	—	—	—	—	—	—	—	0.000236	0.000156	—
20A	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
20B	—	—	—	—	—	—	—	0.000178	0.000052	0.000105
21A	—	—	—	—	—	—	—	0.00012	0.00018	—
22A	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
22B	—	—	—	—	—	—	—	0.000458	0.000047	0.000148
22C	—	—	—	—	—	—	—	0.000422	0.000267	—
22D	—	—	—	—	—	—	—	0.0210	0.0120	0.0070
22F	—	—	—	—	—	—	—	0.00160	0.00107	0.000656
23A	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
23B	—	—	—	—	—	—	—	0.000179	0.000267	0.000788
23C	—	—	—	—	—	—	—	0.000135	0.000220	—
23D	—	—	—	—	—	—	—	0.000212	0.000167	—
23F	—	—	—	—	—	—	—	0.000373	0.000098	0.000017
24A	—	—	—	—	—	—	—	—	—	—

(1) All results in parts per million (ppm) unless otherwise noted.
(2) — = Below Method Detection Limit
(3) ND = No data available.
(4) DRY = No data available/well dry

TABLE 3 (CONTINUED)

Monitoring Well	Soluble Barium	Total Copper	pH	Specific Conductance (umhos/cm)	Temperature °C	Total Suspended Solids	Total Organic Carbon	Total Cyanide	Total Recoverable Phenols
1A	—	0.12	6.7	184	12.5	34.5	5.81	0.005	NX
1B	—	—	6.5	253	12.5	28.5	14.03	0.1	0.060
1C	—	—	11.70	151.4	13.5	27.2	19.00	0.274	—
1D	—	0.38	7.16	236	14.6	165.4	10.7	0.648	0.011
1E	—	—	7.63	400	15.8	120.5	18.7	0.257	0.019
1F	—	—	6.2	158	13.2	36.9	5.43	0.04	0.096
1J	—	—	ND	ND	ND	ND	ND	ND	ND
2A	—	—	7.1	184.2	13.7	53.8	789	0.2	0.090
2C	—	—	8.81	139.0	14.1	81.5	14.18	6.75	0.021
3A	—	0.14	11.4	281	14.1	106.9	22.59	1.1	0.100
3B	—	0.36	6.2	313	13.4	197.7	10.32	4.28	0.085
4A	—	0.21	8.5	123	13.5	162.8	8.71	0.53	0.070
4C	—	—	9.92	60.9	15.3	26.8	4.65	.275	.-13
4J	—	0.14	8.91	415.0	19.1	460.5	14.65	0.062	0.104
5A	—	1.1	7.5	81.35	13.7	4472.9	8.21	1.3	0.050
5B	—	—	7.5	105	15.0	371.4	269.43	3.86	0.040
5CD	—	—	11.2	78.7	15.7	26.1	7.16	0.090	0.013
5D	—	0.21	9.95	185.1	15.3	114.8	10.64	0.520	—
5F	—	—	7.76	40.3	18.0	35.7	7.07	0.044	0.119
6A	—	—	8.9	73.9	14.1	366.8	11.93	0.325	0.021
7A	—	—	7.7	88	14.5	222.5	13.97	1.74	0.045
7C	—	—	6.4	216	11.2	21.2	7.68	0.1	0.131
8A	—	—	8.7	511	18.5	197.4	313.05	21.58	2.597
8B	—	—	5.2	213	13.5	68.3	160.68	6.9	0.976
8J	—	0.10	12.41	798.4	14.6	215.3	93.6	0.492	0.471
9A	—	0.33	6.6	166.2	16.6	579.1	191.11	5.2	0.096
10A	—	0.45	6.8	73.2	14.2	7550.6	4.17	.22	.125
10C	—	—	8.94	39.1	14.4	10.8	8.81	0.137	—
10D	—	—	7.65	252.1	15.8	39.1	7.23	0.067	0.154
10F	—	—	7.30	176.0	17.8	80.3	3.68	0.033	0.058
11A	—	0.21	6.8	186.2	15.6	821.1	6.35	1.04	—
12A	—	0.53	7.1	70.5	15.0	74.4	1.28	NX	.120
12B	—	—	7.72	124.2	14.1	15.7	9.66	0.100	0.045
13A	—	—	6.1	195.1	15.0	78.1	2.50	0.1	0.010
14A	—	0.18	7.6	99	14.3	537.2	11.46	0.05	0.090
14C	—	1.18	6.8	941	13.4	4622.6	67.41	0.2	0.091
15A	1.6	2.2	7.5	202	16.7	1440.8	2.10	7.85	—
15C	—	0.13	6.7	253	12.7	105.8	6.46	0.1	0.067
15CD	—	—	8.6	60.3	14.0	22.7	5.36	0.086	0.013
15D	—	0.32	9.66	39.0	15.9	146.4	15.71	3.40	0.013
15E	—	—	9.9	178.1	20.6	120.5	4.71	0.038	0.096
15J	—	0.51	11.79	763.0	15.6	1917.1	12.03	1.52	0.096
16A	—	—	11.5	340.1	15.6	786.5	90.91	156.0	0.210
16B	—	—	6.6	161.5	13.1	27.5	29.46	70.5	0.191
17A	—	0.71	7.3	33.7	17.5	2635.5	7.02	NX	0.125
17B	—	—	9.0	45.0	17.1	197.6	0.95	0.204	0.01
18A	—	0.47	6.9	289	15.3	3539.7	22.74	2.0	0.090
18C	—	—	8.11	370.1	15.1	10.2	10.87	0.042	0.017
19A	—	—	6.7	60	12.1	180.3	34.58	0.07	0.103
19B	—	1.00	6.9	246	13.1	2891.0	16.47	0.37	0.096
19C	—	—	8.11	320.1	15.1	36.0	5.50	0.157	0.103
19CD1	—	—	9.77	74.4	13.0	147.6	6.66	0.064	0.013
19CD2	—	—	ND	ND	ND	ND	ND	ND	ND
19CD3	—	—	8.68	69.1	14.0	47.1	9.56	0.084	0.01
19D	—	—	8.11	7370.1	15.1	10.2	10.87	.042	.017
19F	—	—	11.11	167.4	17.0	68.7	2.72	0.033	—
20A	ND	ND	ND	ND	ND	ND	ND	ND	ND
20B	—	—	ND	ND	ND	ND	ND	ND	ND
21A	—	—	8.1	127.2	13.5	101	18.59	4.409	0.074
22A	ND	ND	ND	ND	ND	ND	ND	ND	ND
22B	—	--	6.56	40.78	15.0	88.0	1.98	0.020	0.021
22C	—	—	6.02	203.8	14.0	77.4	3.06	0.025	0.013
22D	—	—	9.21	33.6	13.9	59.9	218.45	0.016	—
22F	—	—	7.85	305	14.9	72.7	7.00	0.348	0.037
23A	ND	ND	ND	ND	ND	ND	ND	ND	ND
23B	—	0.10	9.5	67.2	16.0	154.6	5.84	0.020	0.085
23C	—	—	8.2	88.85	14.7	31.5	12.79	0.031	0.037
23D	—	—	8.96	20.8	14.7	32.1	9.39	0.016	0.051
23F	—	—	7.89	306.3	15.1	79.6	16.06	.061	.054
24A	—	0.28	11.92	2.11	18.0	ND	ND	ND	ND

(1) All results in parts per million (ppm) unless otherwise noted.
(2) — Below Method Detection Limit.
(3) ND = no data available
(4) NX = not detected

TABLE 4
TOTAL C1 AND C2 COMPOUND CONCENTRATIONS
OCTOBER, 1983 AND JUNE, 1984
DUPONT NIAGARA SITE, NIAGARA FALLS, NEW YORK

		October, 1983		June, 1984	
Well		C-1 (ppm)	C-2 (ppm)	C-1 (ppm)	C-2 (ppm)
1	A	53.3	68.4	19.8	139.1
1	B	262.9	312	44.4	560
1	C	—	970	.0581	61.8
1	D			—	3.703
1	E			—	.214
1	F	—	2.19	4.3	83.3
1	J			1.256	1.753
2	A	1.5	9.8	.091	13.6
2	C	58.6	239.9	1.827	4406
3	A	.009	.765	.068	19.2
3	B	1220	102.8	176.2	17.9
4	A	.01	.308	.117	1.7172
4	C	.038	.36	.607	.09
4	J	NI	NI	1.1	1.57
5	A	—	2.03	.86	2.4
5	B	.008	.69	.001	.447
5	CD	—	1.32	.24	.188
5	D	—	—	.419	1.92
5	F	.36	.115	1.73	2.22
6	A	.69	.163	.128	.05
7	A	—	.026	.009	—
7	C	.01	.066	.0006	.0103
8	A	—	29.65	.084	3.486
8	B	—	85.9	.0014	.1184
8	J	NI	NI	.1937	35.92
9	A	.098	2.21	—	—
10	A	.027	15.93	.046	.0374
10	C	—	4.46	.016	.3083
10	D	.22	55.0	—	43.07
10	F	—	4.126	.1516	1.124
11	A	—	1.403	.2834	1.2823
12	A	—	.478	.0061	.0412
12	B	—	43.1	.727	4.405

TABLE 4 (CONTINUED)

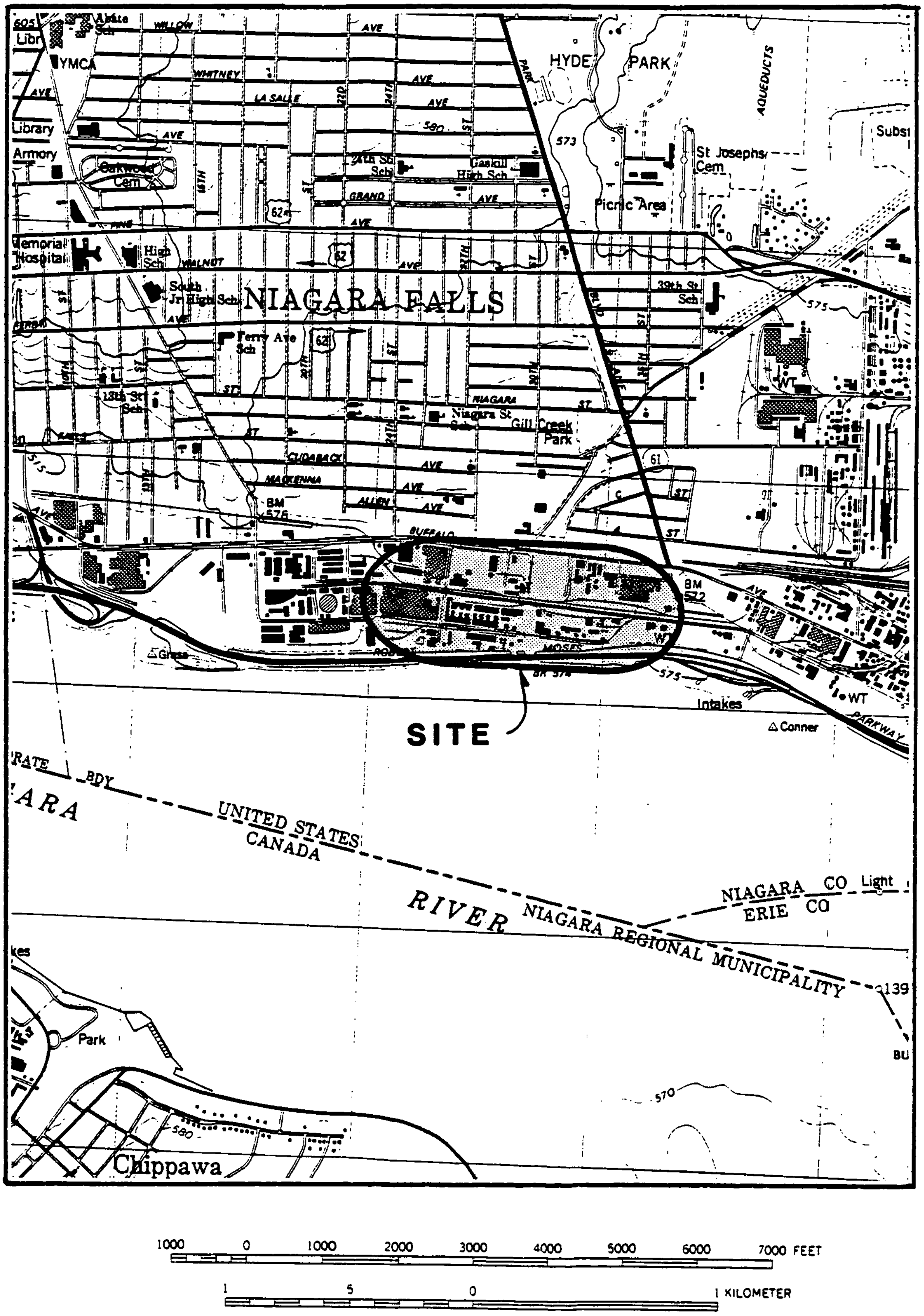
		October, 1983		June, 1984	
Well		C-1 (ppm)	C-2 (ppm)	C-1 (ppm)	C-2 (ppm)
13	A	71.2	259.2	1.199	3.301
14	A	.46	124	.134	129.34
14	C	.16	28.7	—	.1814
15	A	669.0	40.6	1.1565	.4259
15	C	Dry	Dry	63.291	35.938
15	CD	66.0	256.9	17.544	142.712
15	D	111.0	80.2	1.81	46.84
15	F	54.4	112.1	4.933	12.585
15	J	NI	NI	2.894	19.98
16	A	2.50	5.6	2.261	14.946
16	B	2200.0	162.2	34.124	5.044
17	A	—	.032	.0545	.00469
17	B	.002	.091	.01086	.0676
18	A	—	.09	.0080	.0588
18	C	.016	6.16	1.363	8.042
19	A	.070	.378	.2668	.2754
19	B	29.7	9.66	38.556	24.821
19	C	NI	NI	—	3.7158
19	CD1	NI	NI	6.79	1.8
19	CD2	NI	NI	6.903	2.629
19	CD3	NI	NI	—	—
19	D	NI	NI	1.874	2.933
19	F	NI	NI	—	.8377
20	A	DRY	DRY	DRY	DRY
20	B	NI	NI	1.752	4.582
21	A	.130	120.6	.233	2.395
22	A	NI	NI	.2299	.1035
22	B	NI	NI	.0588	.10125
22	C	NI	NI	1.1351	5.0436
22	D	NI	NI	—	12.7882
22	F	NI	NI	—	.064

TABLE 4 (CONTINUED)

Well		October,1983 C-1 (ppm)	October,1983 C-2 (ppm)	June, 1984 C-1 (ppm)	June, 1984 C-2 (ppm)
23	A	NI	NI	.0480	.0079
23	B	NI	NI	—	.969
23	C	NI	NI	—	—
23	D	NI	NI	—	1.5795
23	F	NI	NI	—	2.432
24	A	NI	NI	1.528	4.528

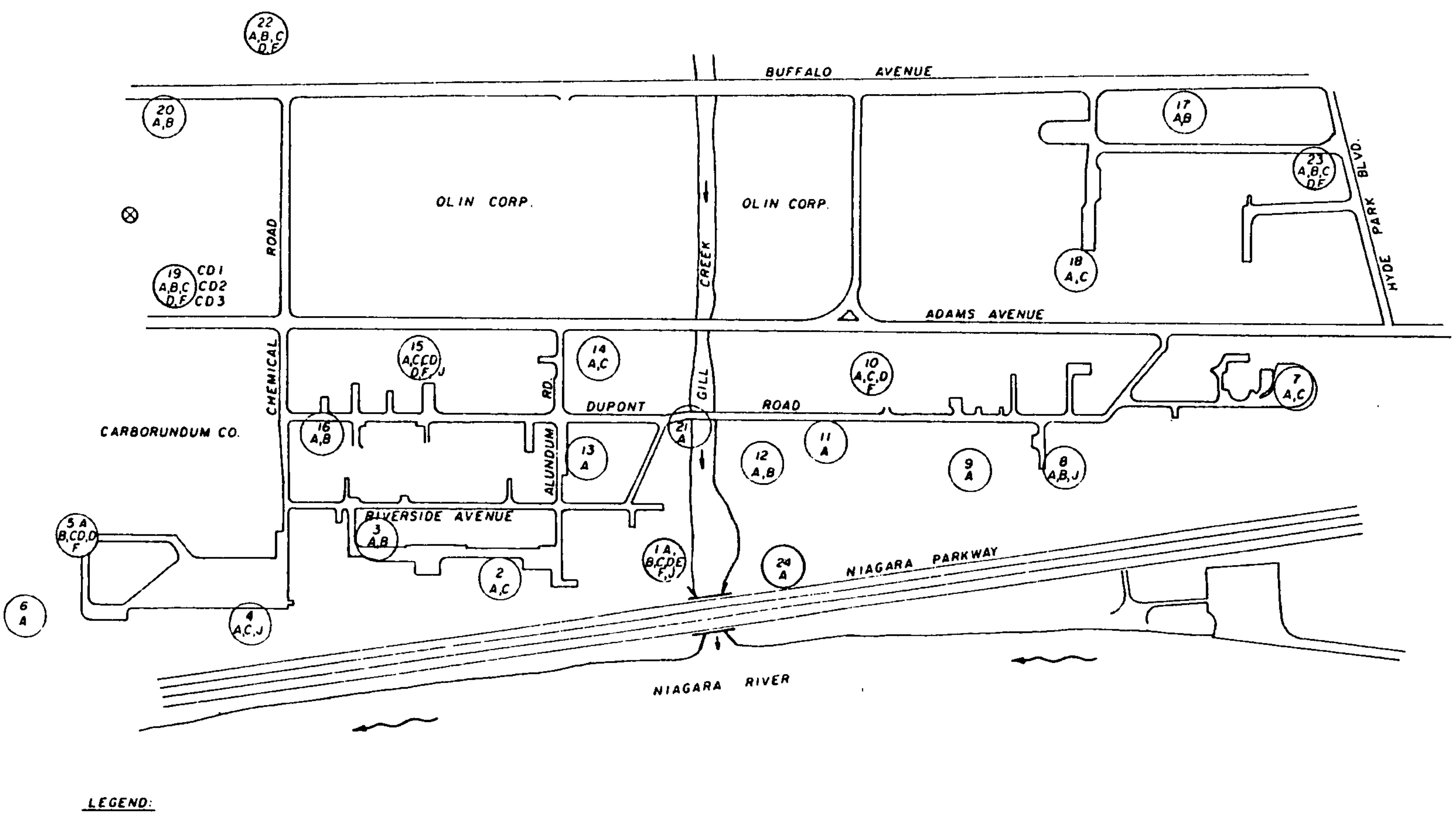
—	Below detection limit
NI	Wells not yet installed

Plates



REGIONAL LOCATION PLAN

PLATE 1



LEGEND:

17 A,B — WELL CLUSTER NUMBER (NO.) — WELL TYPE (LETTER)

⊗ OLIN PRODUCTION WELL

MONITORING WELL LOCATIONS
NIAGARA PLANT
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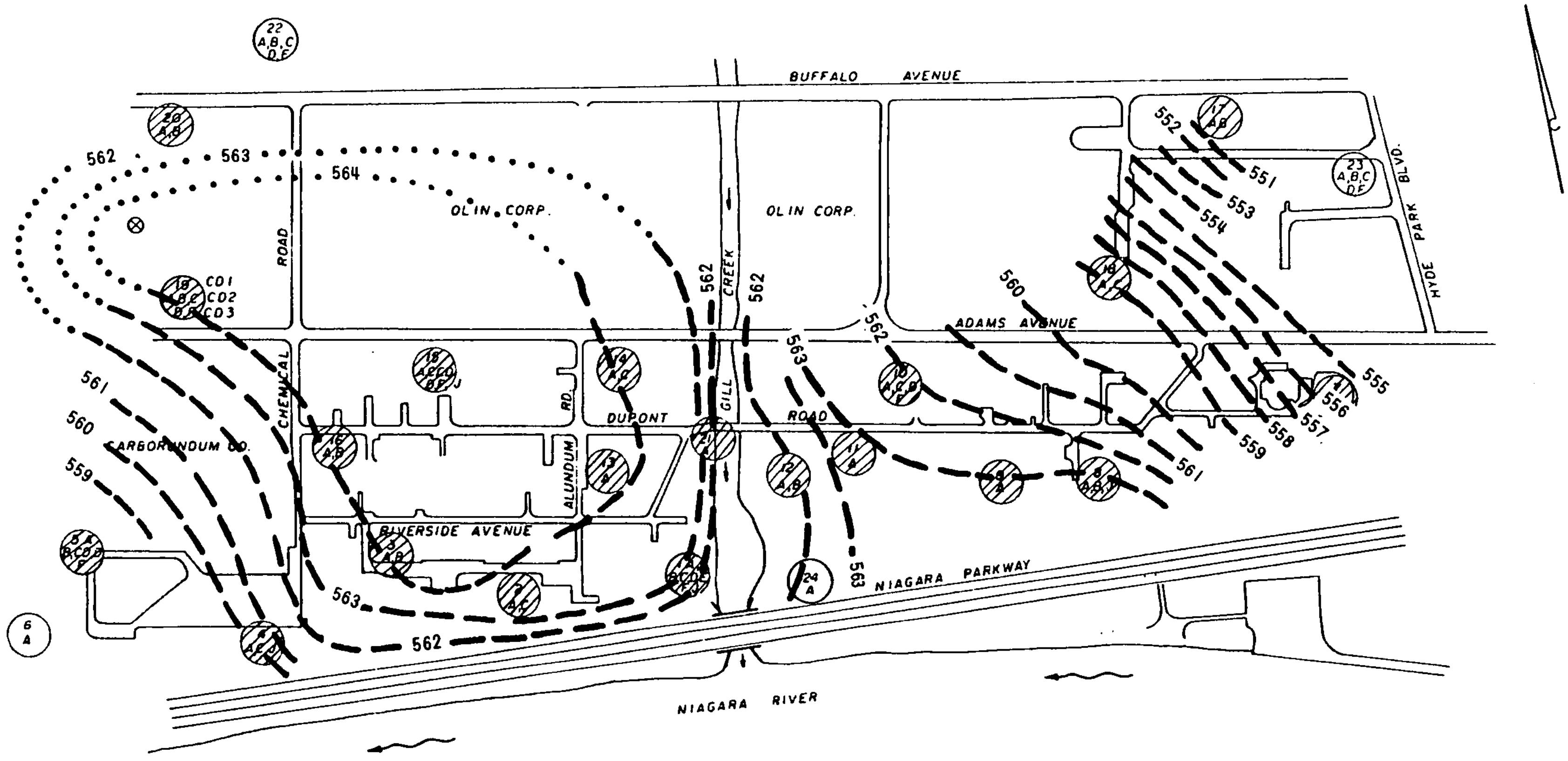
PLATE 2



LEGEND:

17 A,B — WELL CLUSTER NUMBER (NO.) — WELL TYPE (LETTER)

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▨ WELL USED TO GENERATE CONTOURS

— — 562 GROUNDWATER ELEVATION

NOTE: GROUNDWATER CONTOURS HAVE BEEN INTERPOLATED BETWEEN DATA POINTS AND ACTUAL CONDITIONS CAN VARY FROM WHAT IS SHOWN

A-ZONE GROUNDWATER CONTOURS, JUNE 7, 1984

NIAGARA PLANT

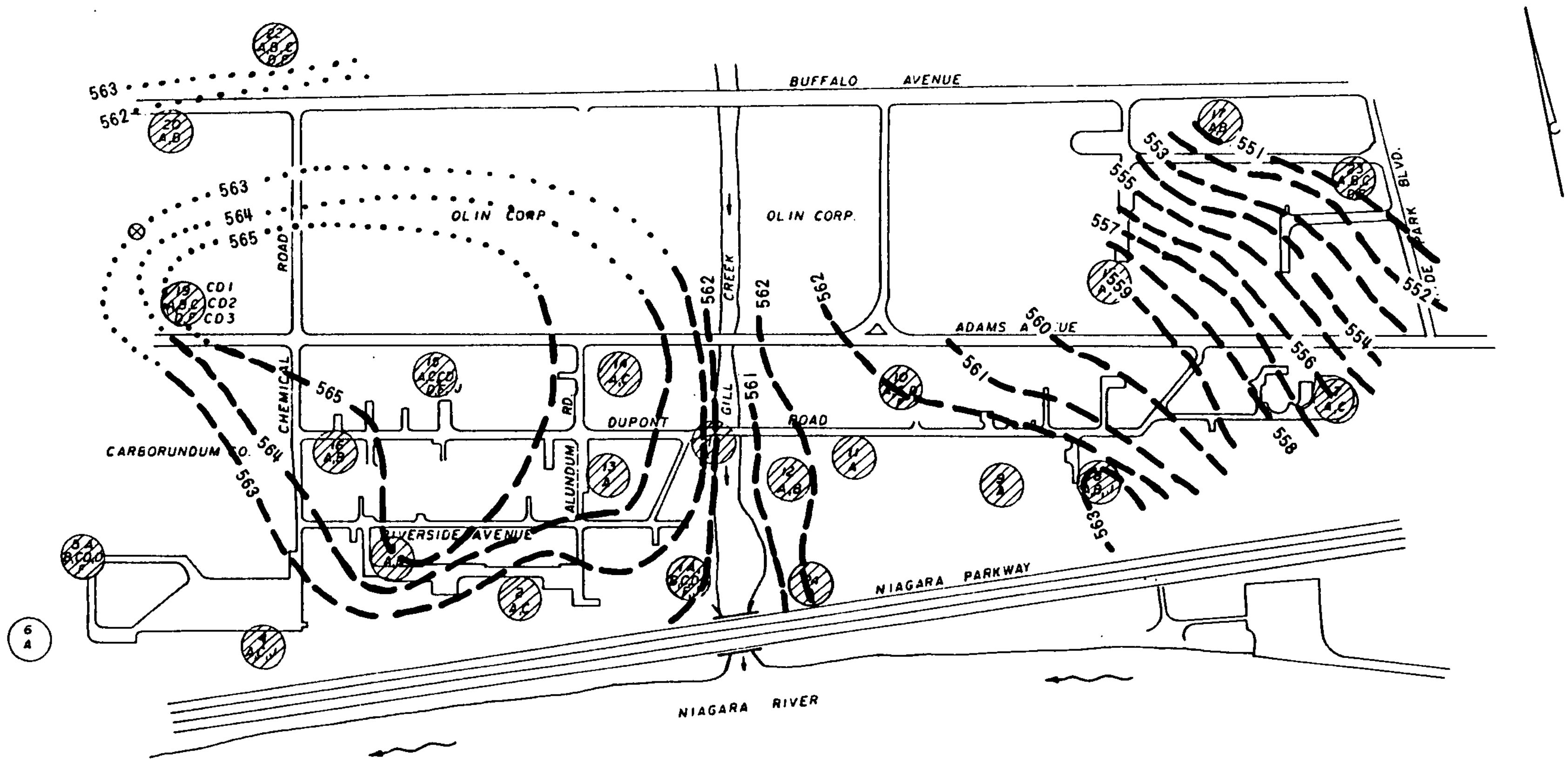
E. I. DUPONT DE NEMOURS & CO.

WOODWARD-CLYDE CONSULTANTS

CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

DRAWN BY: T.P.	SCALE in FEET	DATE: 10/23/84	
CHECKED : J.C.E.	0 300	JOB : 83C2236	

PLATE 3



LEGEND:

17 A,B — WELL CLUSTER NUMBER (NO.) — WELL TYPE (LETTER)

⊗ OLIN PRODUCTION WELL

▨ WELL USED TO GENERATE CONTOURS

— — 562 GROUNDWATER ELEVATION

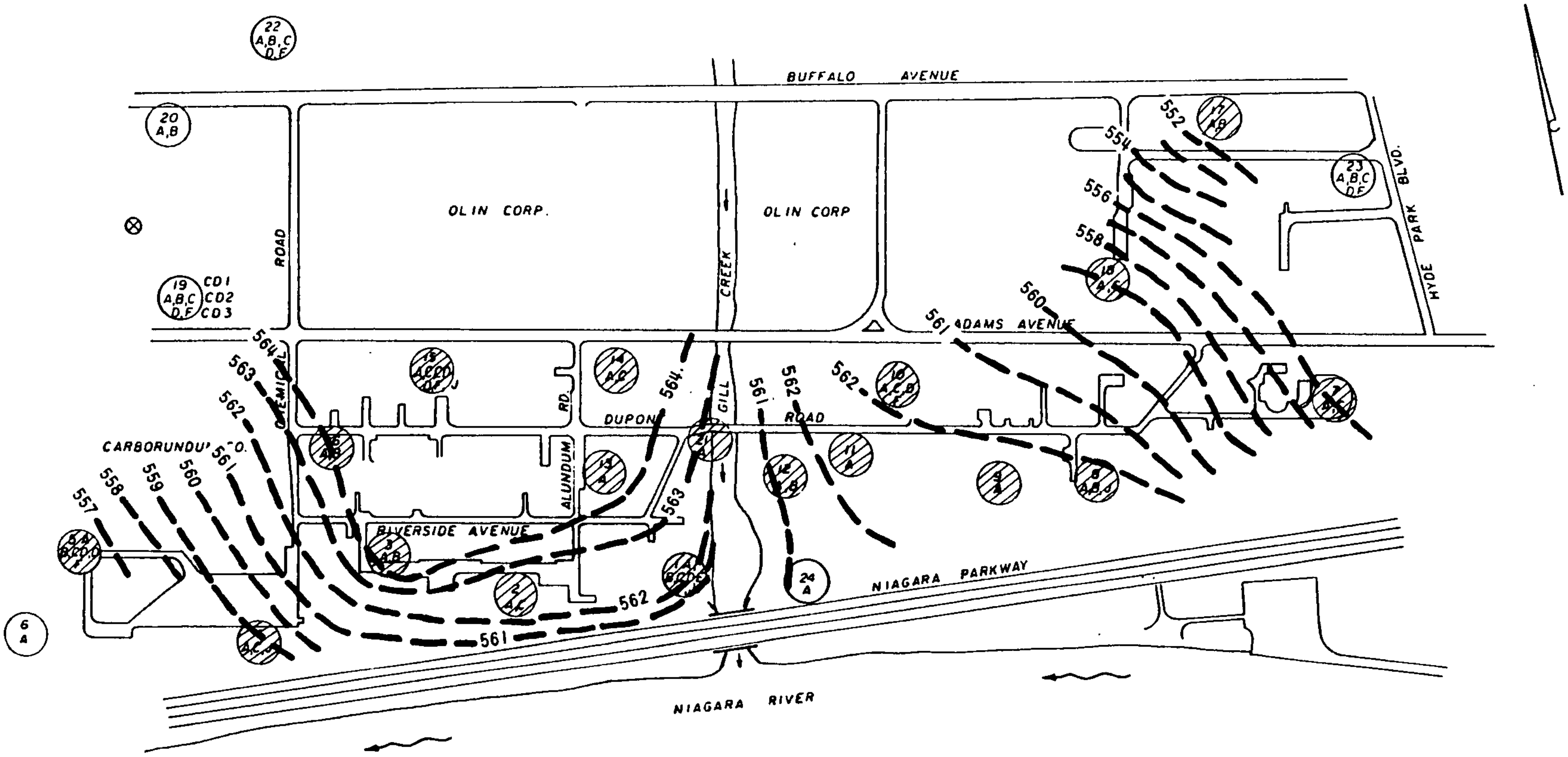
NOTE: GROUNDWATER CONTOURS HAVE BEEN INTERPOLATED BETWEEN DATA POINTS AND ACTUAL CONDITIONS CAN VARY FROM WHAT IS SHOWN

A-ZONE GROUNDWATER CONTOURS, JULY 30, 1984
NIAGARA PLANT
E. I. DUPONT DE NEMOURS & CO.

WOODWARD-CLYDE CONSULTANTS
CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

DRAWN BY: T.P.	SCALE in FEET	DATE: 10/23/84
CHECKED : J.C.E.	0 300	JOB : 83C2236

PLATE 4



LEGEND:

17 A,B — WELL CLUSTER NUMBER (NO.)

— WELL TYPE (LETTER)

⊗ OLIN PRODUCTION WELL

▨ WELL USED TO GENERATE CONTOURS

— — 562 GROUNDWATER ELEVATION

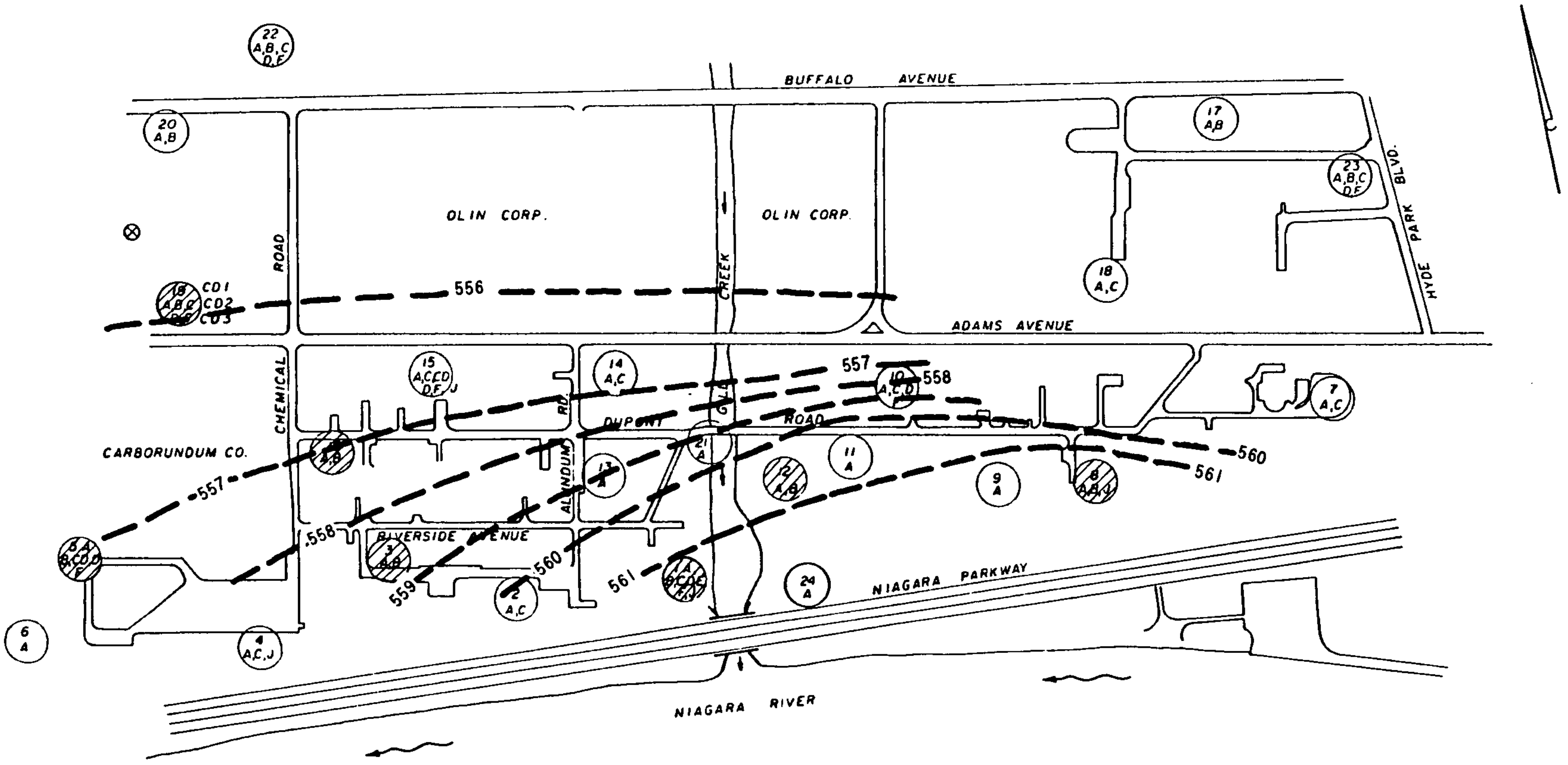
NOTE: GROUNDWATER CONTOURS HAVE BEEN INTERPOLATED BETWEEN DATA POINTS AND ACTUAL CONDITIONS CAN VARY FROM WHAT IS SHOWN

A-ZONE GROUNDWATER CONTOURS, AUGUST 22, 1984
NIAGARA PLANT
E. I. DUPONT DE NEMOURS & CO.

WOODWARD-CLYDE CONSULTANTS
CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

DRAWN BY: T. P.	SCALE IN FEET 0 300	DATE: 10/23/84	
CHECKED: J.C.E.		JOB: 83C2236	

PLATE 5



LEGEND:

17 A,B — WELL CLUSTER NUMBER (NO.) — WELL TYPE (LETTER)

⊗ OLIN PRODUCTION WELL

▨ WELL USED TO GENERATE CONTOURS

— — 562 GROUNDWATER ELEVATION

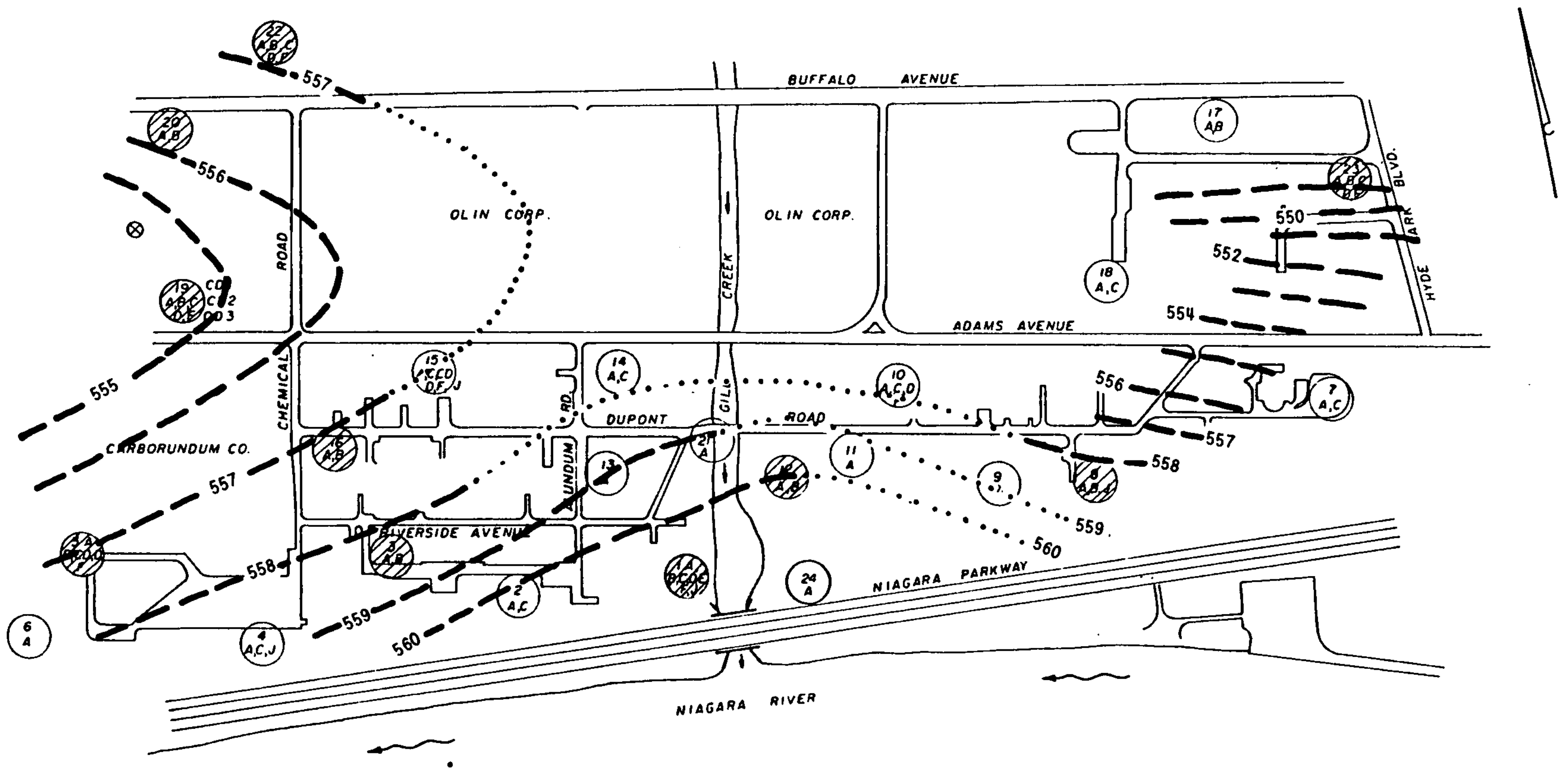
NOTE: GROUNDWATER CONTOURS HAVE BEEN INTERPOLATED BETWEEN DATA POINTS AND ACTUAL CONDITIONS CAN VARY FROM WHAT IS SHOWN

B-ZONE GROUNDWATER CONTOURS, JUNE 7, 1984
NIAGARA PLANT
E. I. DUPONT DE NEMOURS & CO.

WOODWARD-CLYDE CONSULTANTS
CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

DRAWN BY: T.P.	SCALE in FEET 0 300	DATE: 10/23/84
CHECKED : J.C.E.		JOB : 83C2236

PLATE 6



LEGEND:

17 A,B — WELL CLUSTER NUMBER (NO.) — WELL TYPE (LETTER)

⊗ OLIN PRODUCTION WELL

▨ WELL USED TO GENERATE CONTOURS

— — 562 GROUNDWATER ELEVATION

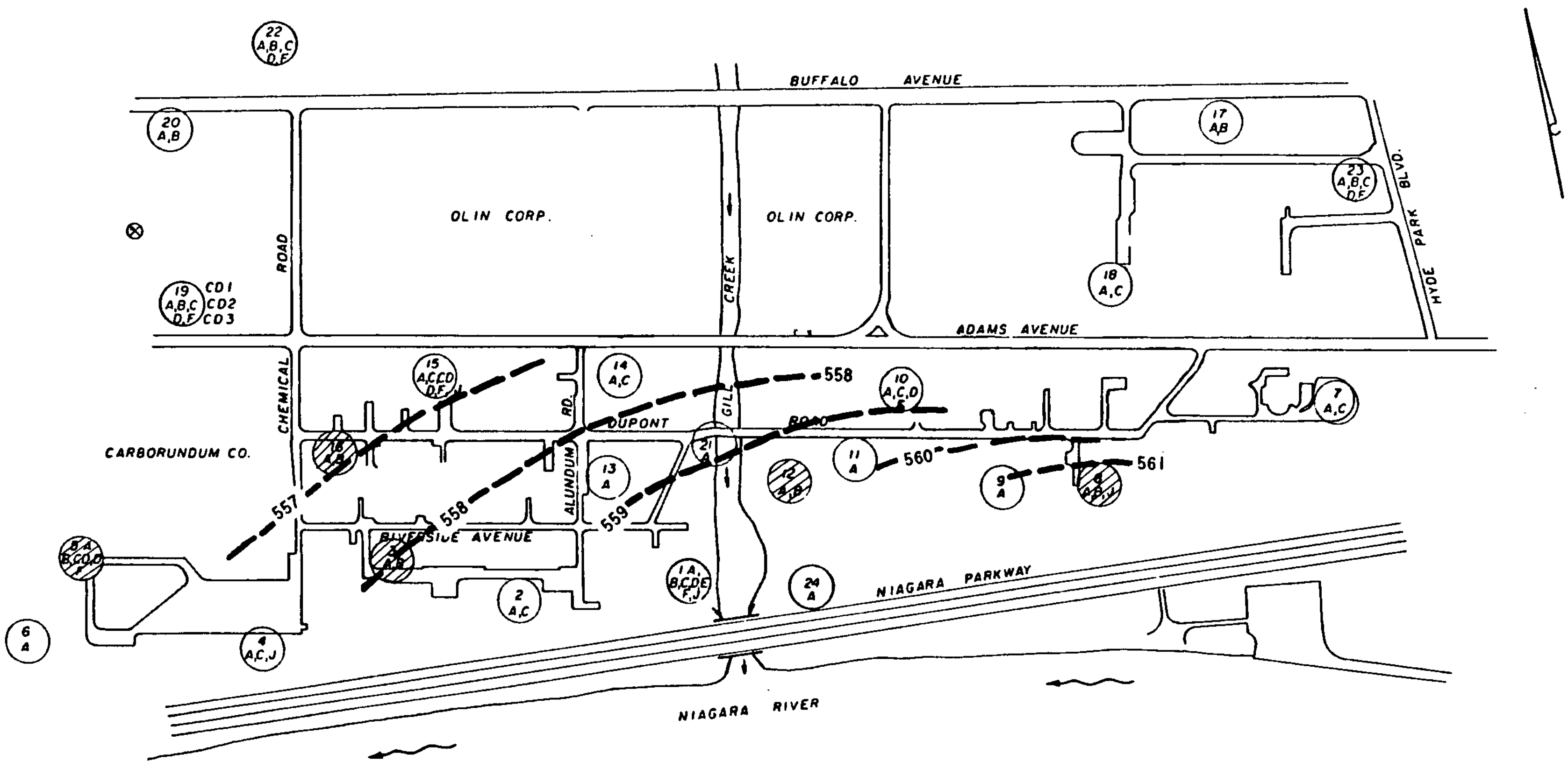
NOTE: GROUNDWATER CONTOURS HAVE BEEN INTERPOLATED BETWEEN DATA POINTS AND ACTUAL CONDITIONS CAN VARY FROM WHAT IS SHOWN

B-ZONE GROUNDWATER CONTOURS, JULY 30, 1984
NIAGARA PLANT
E. I. DUPONT DE NEMOURS & CO.

WOODWARD-CLYDE CONSULTANTS
CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

DRAWN BY: T.P.	SCALE in FEET 0 300	DATE: 10/23/84	
CHECKED: J.C.E.		JOB: 83C2236	

PLATE 7



LEGEND:

17 A,B — WELL CLUSTER NUMBER (NO.) — WELL TYPE (LETTER)

⊗ OLIN PRODUCTION WELL

▨ WELL USED TO GENERATE CONTOURS

— — 562 GROUNDWATER ELEVATION

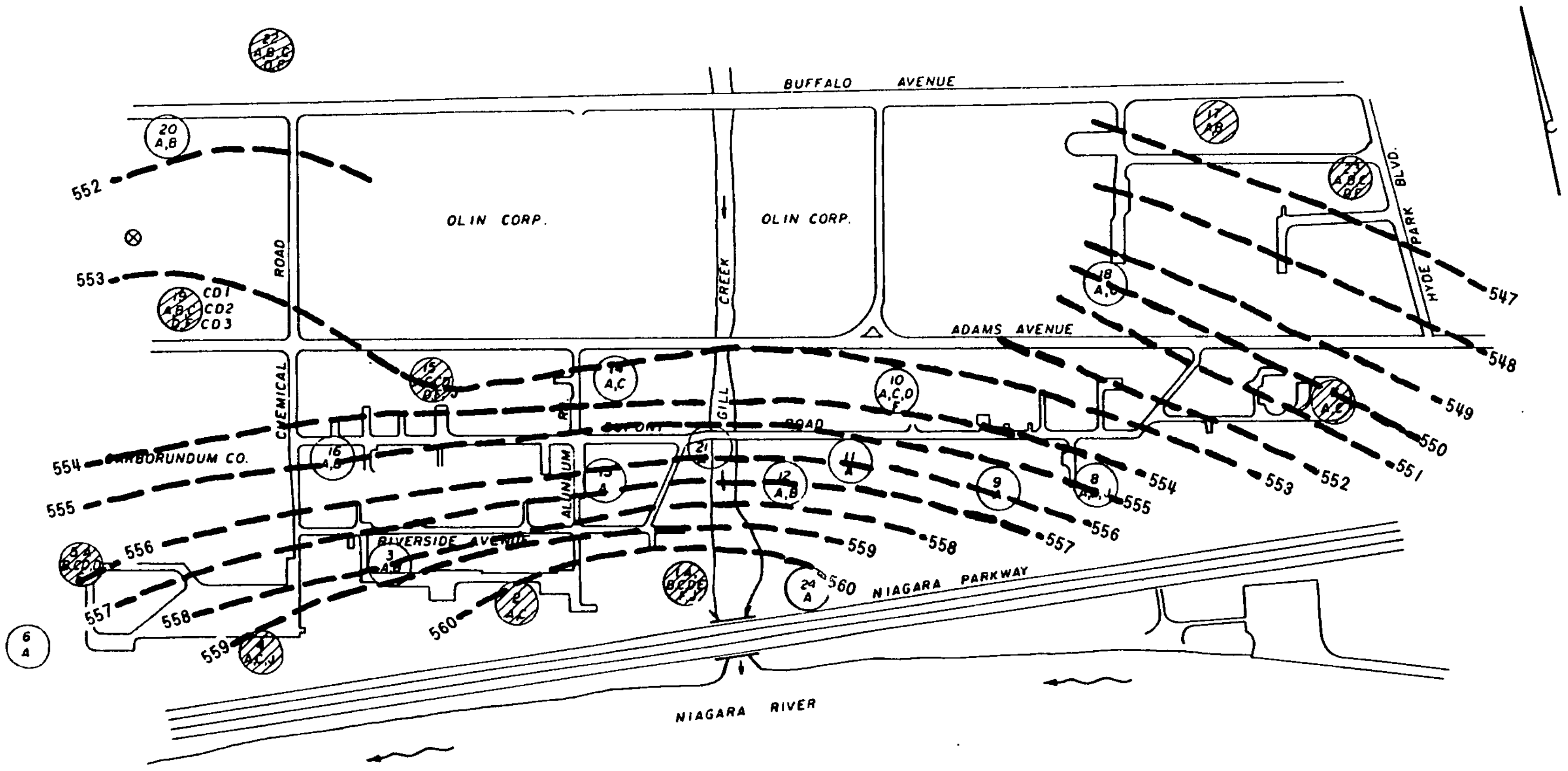
NOTE: GROUNDWATER CONTOURS HAVE BEEN INTERPOLATED BETWEEN DATA POINTS AND ACTUAL CONDITIONS CAN VARY FROM WHAT IS SHOWN

B-ZONE GROUNDWATER CONTOURS, AUGUST 22, 1984
NIAGARA PLANT
E. I. DUPONT DE NEMOURS & CO.

WOODWARD-CLYDE CONSULTANTS
CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

DRAWN BY: T.P	SCALE in FEET	0 300	DATE: 10/23/84
CHECKED : J.C.E.			JOB : 83C2236

PLATE 8



LEGEND:

17 A,B — WELL CLUSTER NUMBER (NO.) / WELL TYPE (LETTER)

⊗ OLIN PRODUCTION WELL

▨ WELL USED TO GENERATE CONTOURS

— — 562 GROUNDWATER ELEVATION

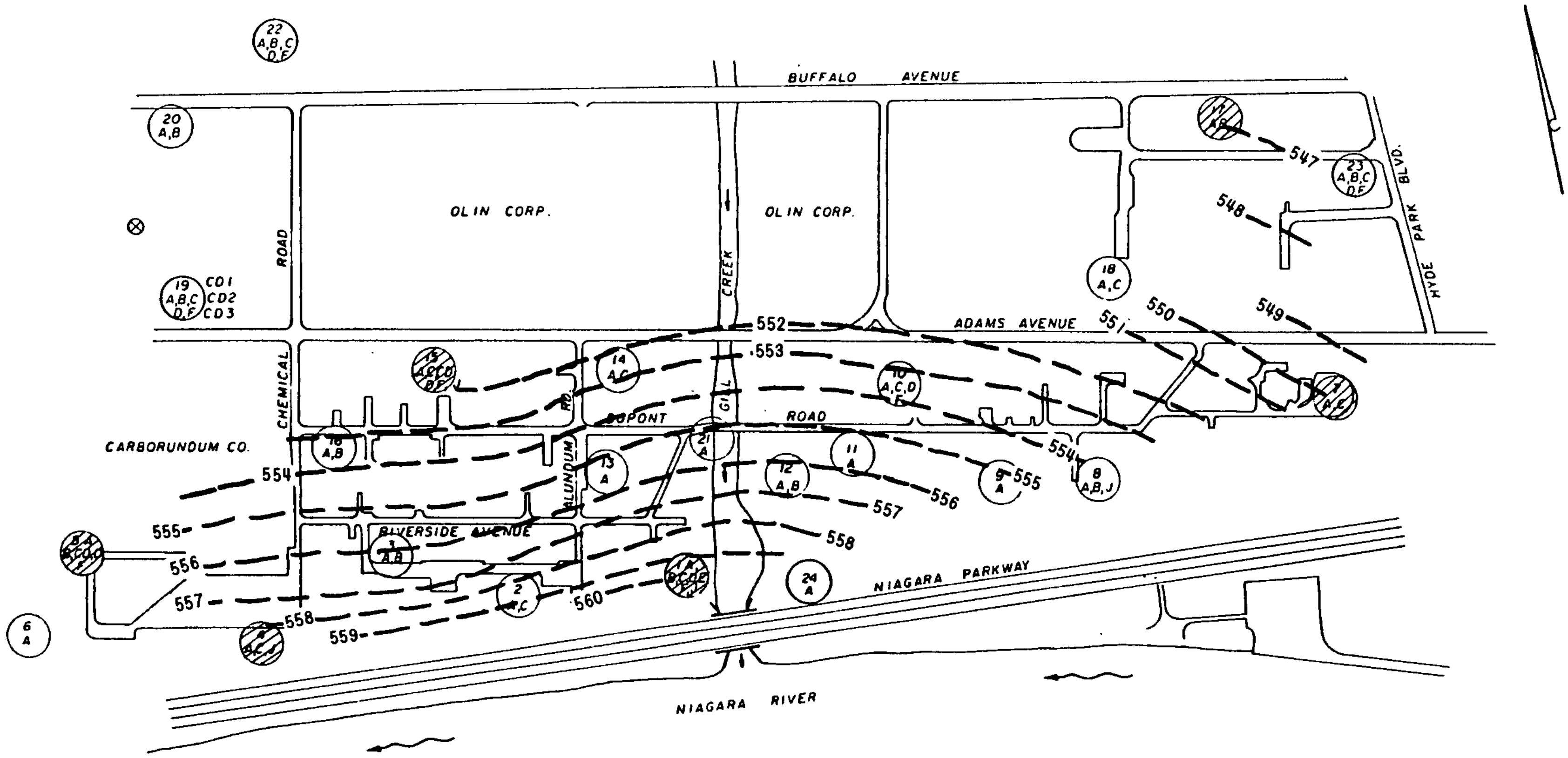
NOTE: GROUNDWATER CONTOURS HAVE BEEN INTERPOLATED BETWEEN DATA POINTS AND ACTUAL CONDITIONS CAN VARY FROM WHAT IS SHOWN

CD-ZONE GROUNDWATER CONTOURS, JULY 30, 1984
NIAGARA PLANT
E. I. DUPONT DE NEMOURS & CO.

WOODWARD-CLYDE CONSULTANTS
CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

DRAWN BY: T.P.	SCALE IN FEET 0 300	DATE: 10/23/84
CHECKED : J.C.E.		JOB : 83C2236

PLATE 9



LEGEND:

- WELL CLUSTER NUMBER (NO.) — 17
- WELL TYPE (LETTER) — A,B
- ⊗ OLIN PRODUCTION WELL
- ▨ WELL USED TO GENERATE CONTOURS
- — — 562 GROUNDWATER ELEVATION

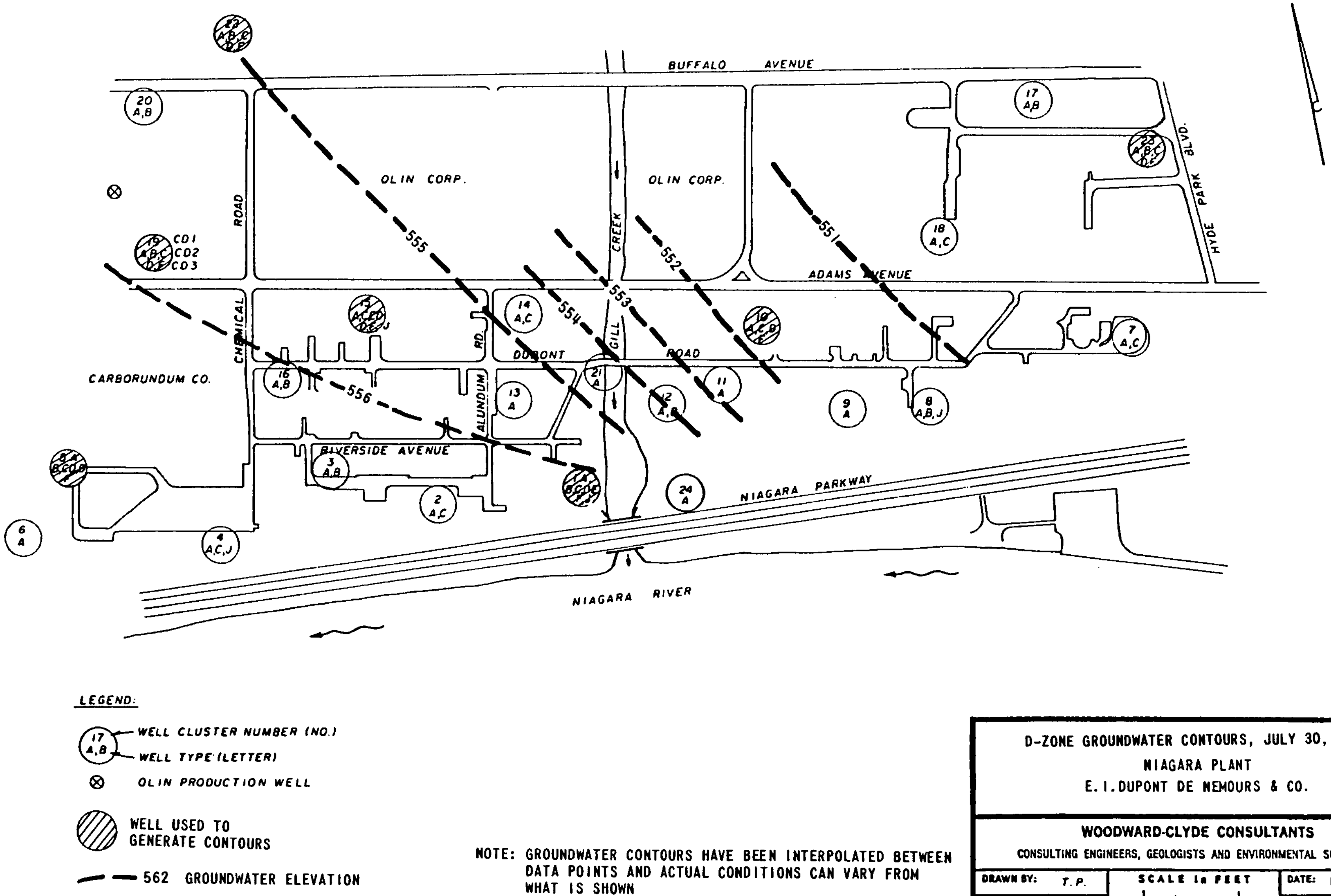
NOTE: GROUNDWATER CONTOURS HAVE BEEN INTERPOLATED BETWEEN DATA POINTS AND ACTUAL CONDITIONS CAN VARY FROM WHAT IS SHOWN

CD-GROUNDWATER CONTOURS, AUGUST 22, 1984
NIAGARA PLANT
E. I. DUPONT DE NEMOURS & CO.

WOODWARD-CLYDE CONSULTANTS
CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

DRAWN BY: T.P.	SCALE IN FEET 0 300	DATE: 10/23/84
CHECKED: J.C.E.		JOB: 83C2236

PLATE 10



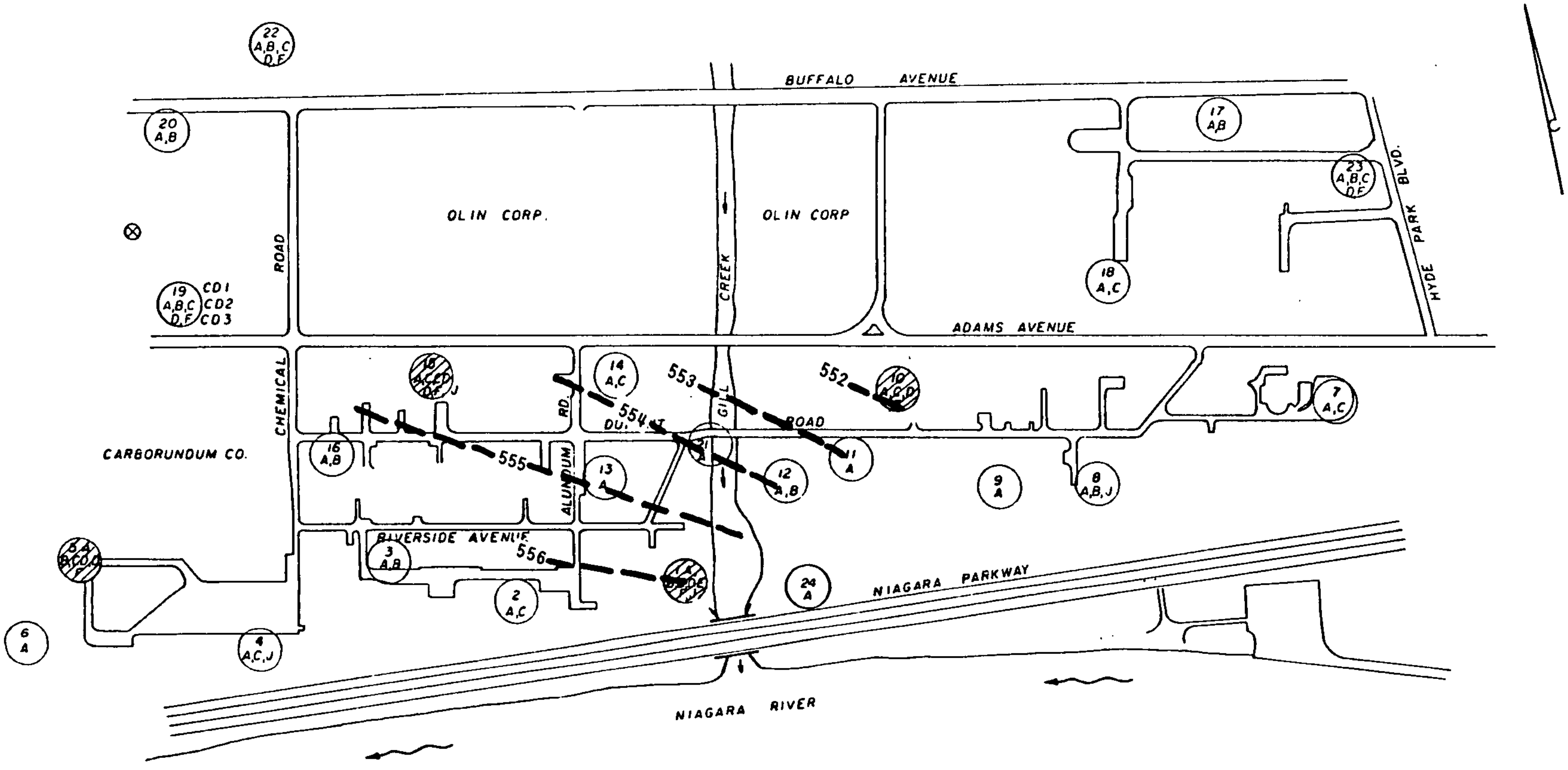
NOTE: GROUNDWATER CONTOURS HAVE BEEN INTERPOLATED BETWEEN DATA POINTS AND ACTUAL CONDITIONS CAN VARY FROM WHAT IS SHOWN

D-ZONE GROUNDWATER CONTOURS, JULY 30, 1984
NIAGARA PLANT
E. I. DUPONT DE NEMOURS & CO.

WOODWARD-CLYDE CONSULTANTS
CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

DRAWN BY: T.P.	SCALE in FEET 0 300	DATE: 10/23/84
CHECKED : J.C.E.		JOB : 83C2236

PLATE 11



LEGEND:

17 A,B — WELL CLUSTER NUMBER (NO.) — WELL TYPE (LETTER)

⊗ OLIN PRODUCTION WELL

▨ WELL USED TO GENERATE CONTOURS

— — 562 GROUNDWATER ELEVATION

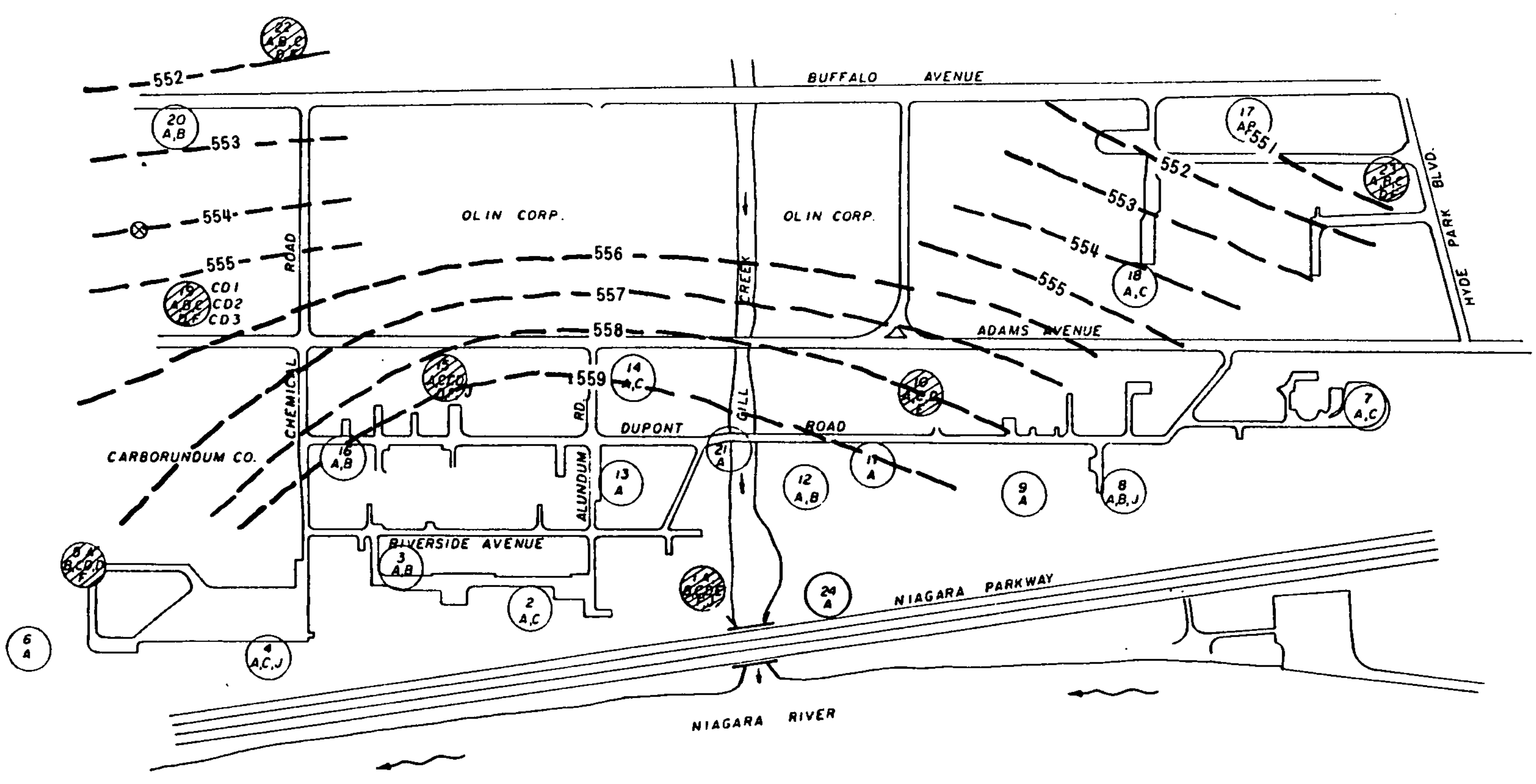
NOTE: GROUNDWATER CONTOURS HAVE BEEN INTERPOLATED BETWEEN DATA POINTS AND ACTUAL CONDITIONS CAN VARY FROM WHAT IS SHOWN

D-ZONE GROUNDWATER CONTOURS, AUGUST 22, 1984
NIAGARA PLANT
E.I.DUPONT DE NEMOURS & CO.

WOODWARD-CLYDE CONSULTANTS
CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

DRAWN BY: T.P.
CHECKED : J.C.E.
SCALE IN FEET 0 300
DATE: 10/23/84
JOB : 83C2236

PLATE 12



LEGEND:

- WELL CLUSTER NUMBER (NO.)
- WELL TYPE (LETTER)
- ⊗ OLIN PRODUCTION WELL
- ▨ WELL USED TO GENERATE CONTOURS
- — — 562 GROUNDWATER ELEVATION

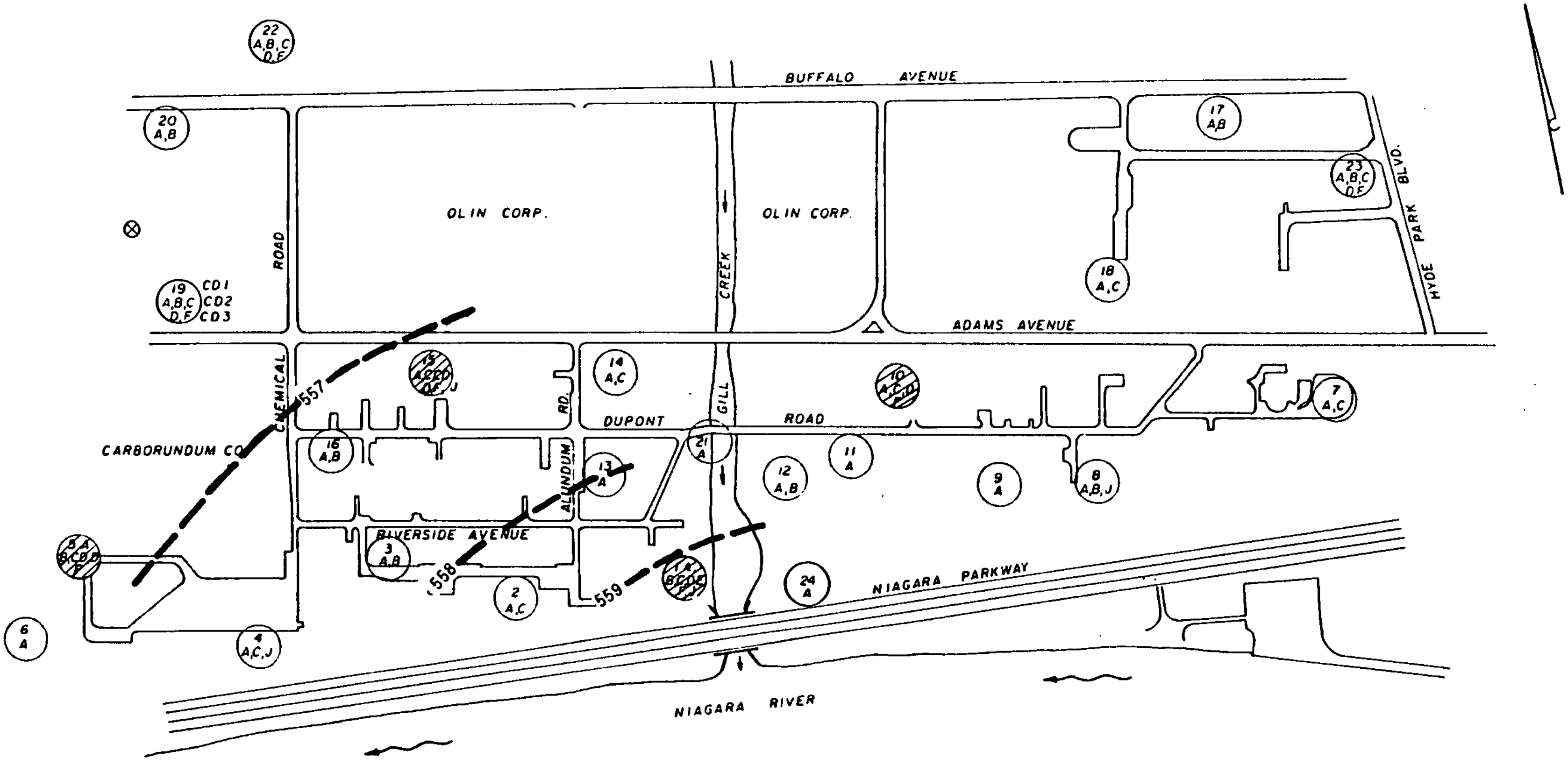
NOTE: GROUNDWATER CONTOURS HAVE BEEN INTERPOLATED BETWEEN DATA POINTS AND ACTUAL CONDITIONS CAN VARY FROM WHAT IS SHOWN

F-ZONE GROUNDWATER CONTOURS, JULY 30, 1984
NIAGARA PLANT
E. I. DUPONT DE NEMOURS & CO.

WOODWARD-CLYDE CONSULTANTS
CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

DRAWN BY: T.P.	SCALE in FEET 0 300	DATE: 10/23/84
CHECKED : J.C.E.		JOB : 83C2236

PLATE 13



LEGEND:

(17 A,B) — WELL CLUSTER NUMBER (NO.)
— WELL TYPE (LETTER)

⊗ OLIN PRODUCTION WELL

▨ WELL USED TO GENERATE CONTOURS

— — 562 GROUNDWATER ELEVATION

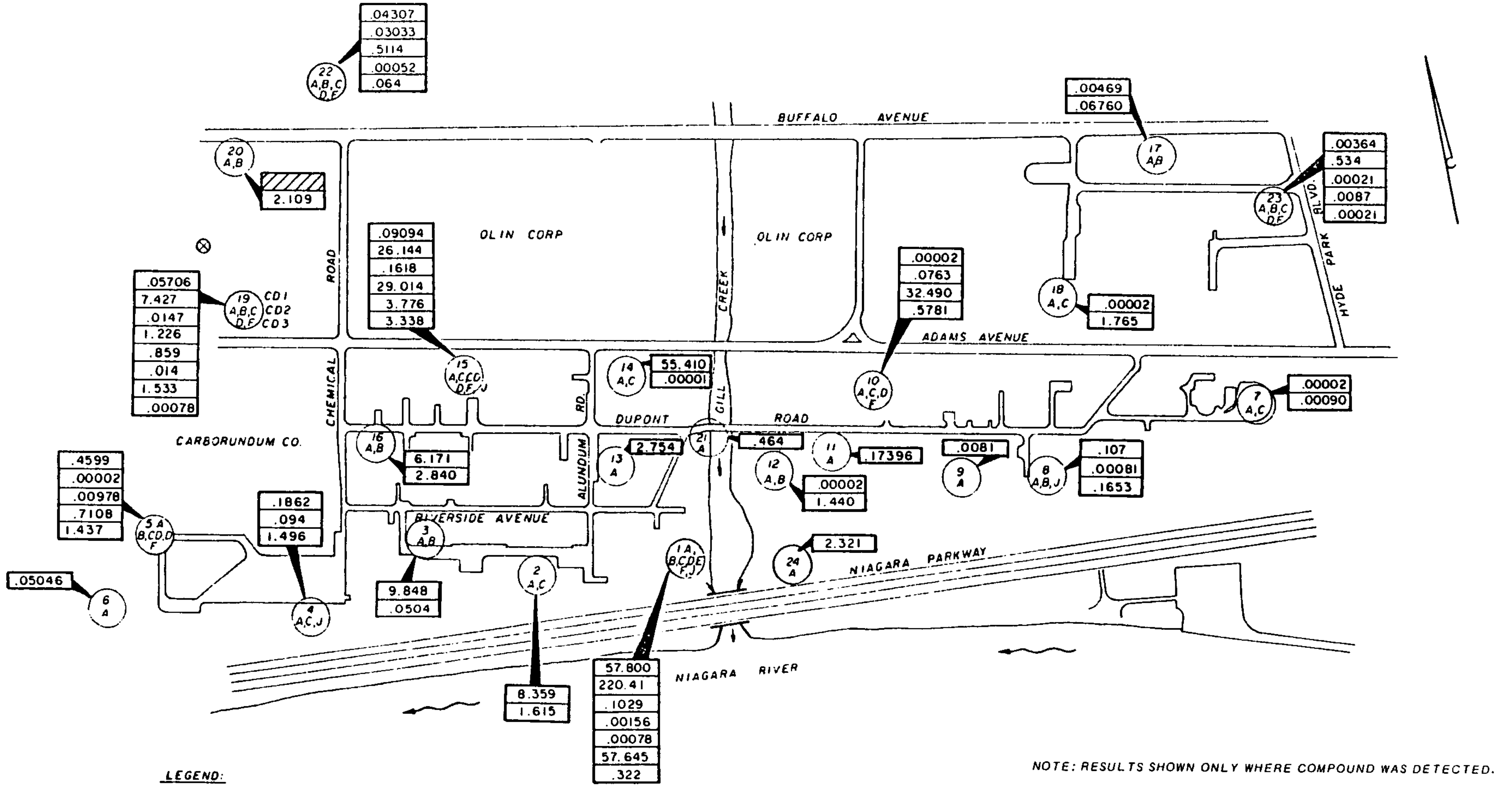
NOTE: GROUNDWATER CONTOURS HAVE BEEN INTERPOLATED BETWEEN DATA POINTS AND ACTUAL CONDITIONS CAN VARY FROM WHAT IS SHOWN

F-ZONE GROUNDWATER CONTOURS, AUGUST 22, 1984
NIAGARA PLANT
E. I. DUPONT DE NEMOURS & CO.

WOODWARD-CLYDE CONSULTANTS
CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

DRAWN BY: T.P.	SCALE in FEET 0 300	DATE: 10/23/84
CHECKED : J.C.E.		JOB : 83C2236

PLATE 14



NOTE: RESULTS SHOWN ONLY WHERE COMPOUND WAS DETECTED.

LEGEND:

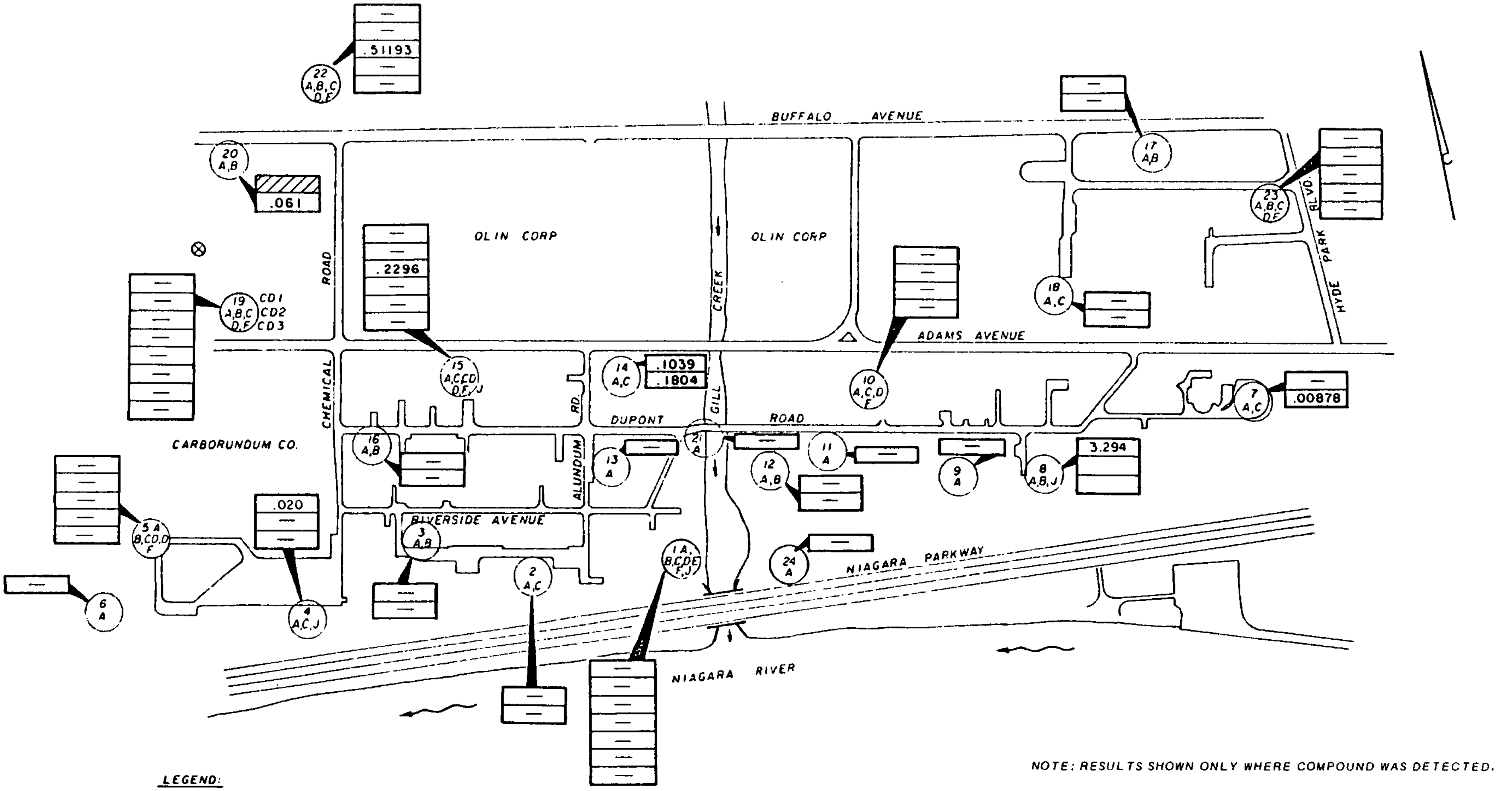
- (17 A,B) — WELL CLUSTER NUMBER (NO) / WELL TYPE (LETTER)
- ⊗ OLIN PRODUCTION WELL
- [40] CONCENTRATION IN PPM
- [—] BELOW DETECTION LIMIT
- ▨ NO DATA / NO SAMPLE

TETRACHLOROETHYLENE CONCENTRATIONS
SUMMER, 1984
NIAGARA PLANT
E. I. DuPONT DE NEMOURS & CO.

WOODWARD-CLYDE CONSULTANTS
CONSULTING ENGINEERS, GEOLOGISTS AND ENVIROMENTAL SCIENTISTS

Drawn By T. P.	SCALE IN FEET 0 300	Date	10/23/84
Checked J. C. E.		Job	83C2236-8

PLATE 15



NOTE: RESULTS SHOWN ONLY WHERE COMPOUND WAS DETECTED.

LEGEND:

17 A,B — WELL CLUSTER NUMBER (NO.) / WELL TYPE (LETTER)

⊗ OLIN PRODUCTION WELL

| 40 | CONCENTRATION IN PPM

| — | BELOW DETECTION LIMIT

▨ NO DATA / NO SAMPLE

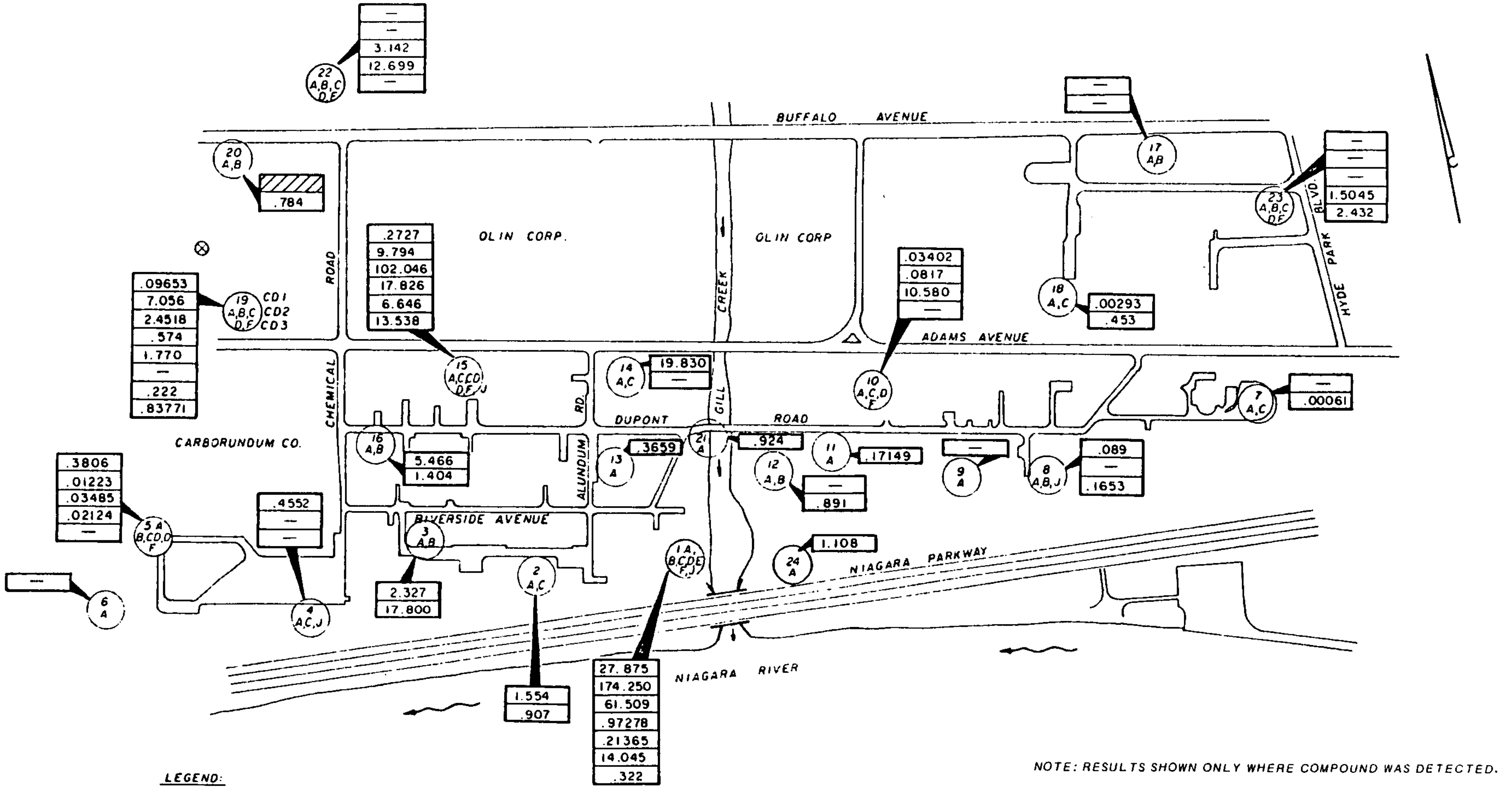
TRANS-1,2 DICHLOROETHYLENE CONCENTRATIONS

SUMMER, 1984
NIAGARA PLANT
E.I.DuPONT DE NEMOURS & CO.

WOODWARD-CLYDE CONSULTANTS
CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

Drawn By	T. P.	SCALE IN FEET	Date	10/23/84
Checked	J. C. E.	0 300	Job	83C2236-8

PLATE 16



NOTE: RESULTS SHOWN ONLY WHERE COMPOUND WAS DETECTED.

LEGEND:

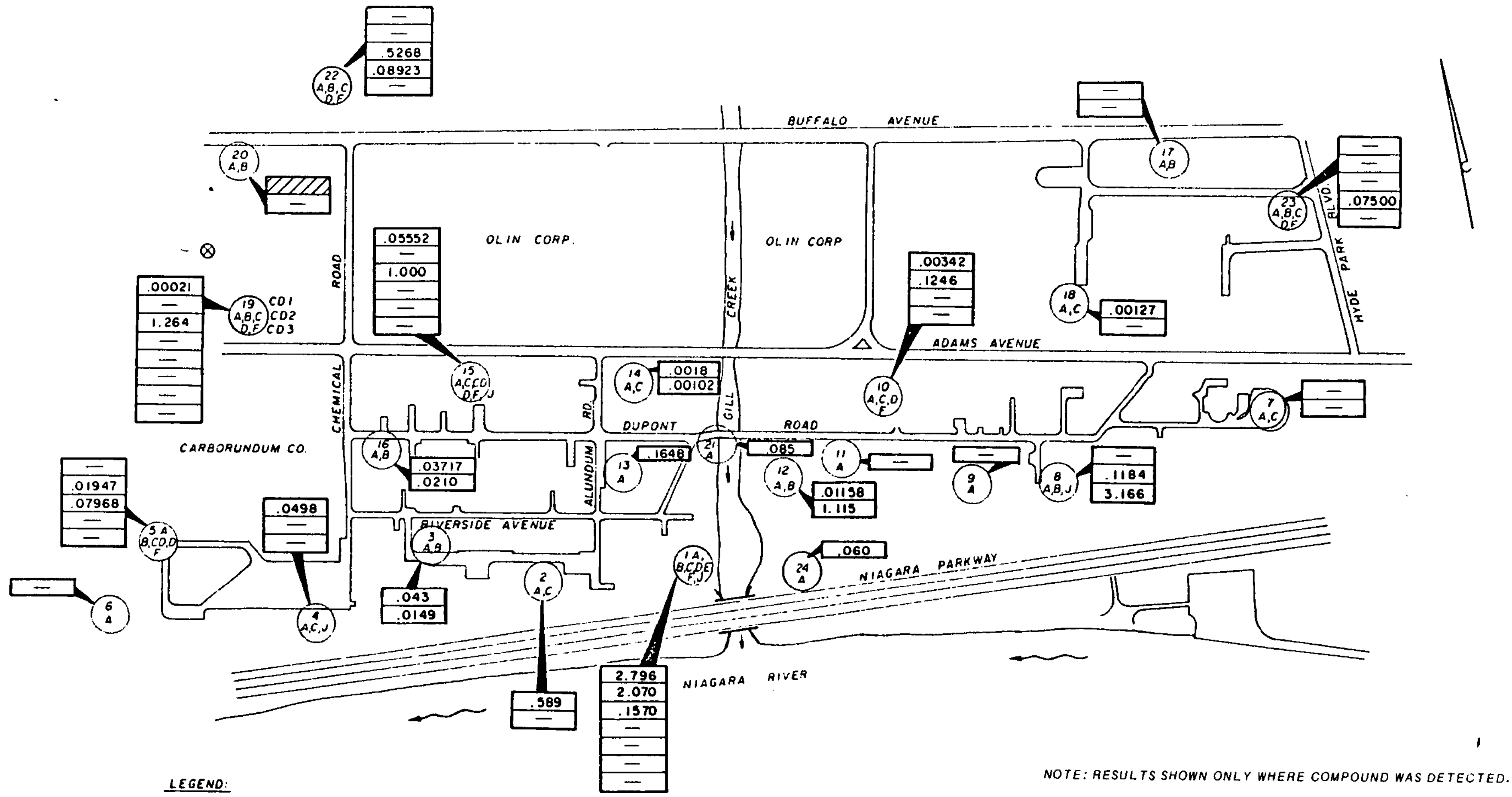
- 17 — WELL CLUSTER NUMBER (NO.)
- A,B — WELL TYPE (LETTER)
- ⊗ OLIN PRODUCTION WELL
- 40 CONCENTRATION IN PPM
- — BELOW DETECTION LIMIT
- ▨ NO DATA / NO SAMPLE

TRICHLOROETHYLENE CONCENTRATIONS
SUMMER, 1984
NIAGARA PLANT
E.I.DuPONT DE NEMOURS & CO.

WOODWARD-CLYDE CONSULTANTS
CONSULTING ENGINEERS, GEOLOGISTS AND ENVIROMENTAL SCIENTISTS

Drawn By T. P.	SCALE IN FEET	0 300	Date 10/23/84
Checked J. C. E.			Job 83C2236-8

PLATE 17



NOTE: RESULTS SHOWN ONLY WHERE COMPOUND WAS DETECTED.

LEGEND:

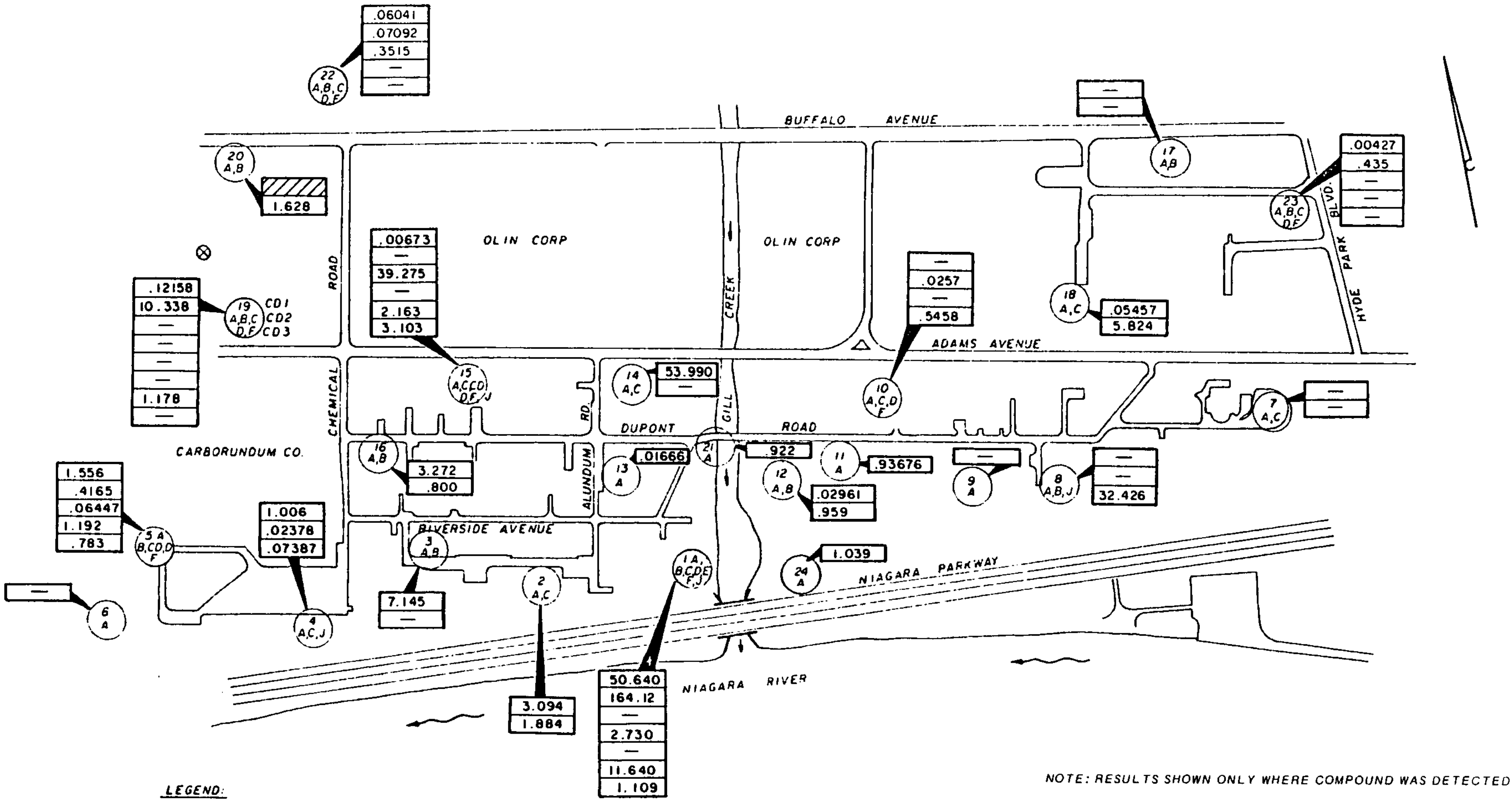
- 17 — WELL CLUSTER NUMBER (NO.)
- A,B — WELL TYPE (LETTER)
- ⊗ OLIN PRODUCTION WELL
- 40 CONCENTRATION IN PPM
- — BELOW DETECTION LIMIT
- ▨ NO DATA / NO SAMPLE

VINYL CHLORIDE CONCENTRATIONS
SUMMER, 1984
NIAGARA PLANT
E.I.DuPONT DE NEMOURS & CO.

WOODWARD-CLYDE CONSULTANTS
CONSULTING ENGINEERS, GEOLOGISTS AND ENVIROMENTAL SCIENTISTS

Drawn By	T.P	SCALE IN FEET	Date 10/23/84
Checked	J.C.E.	0 300	Job 83C2236-8

PLATE 18



NOTE: RESULTS SHOWN ONLY WHERE COMPOUND WAS DETECTED.

LEGEND:

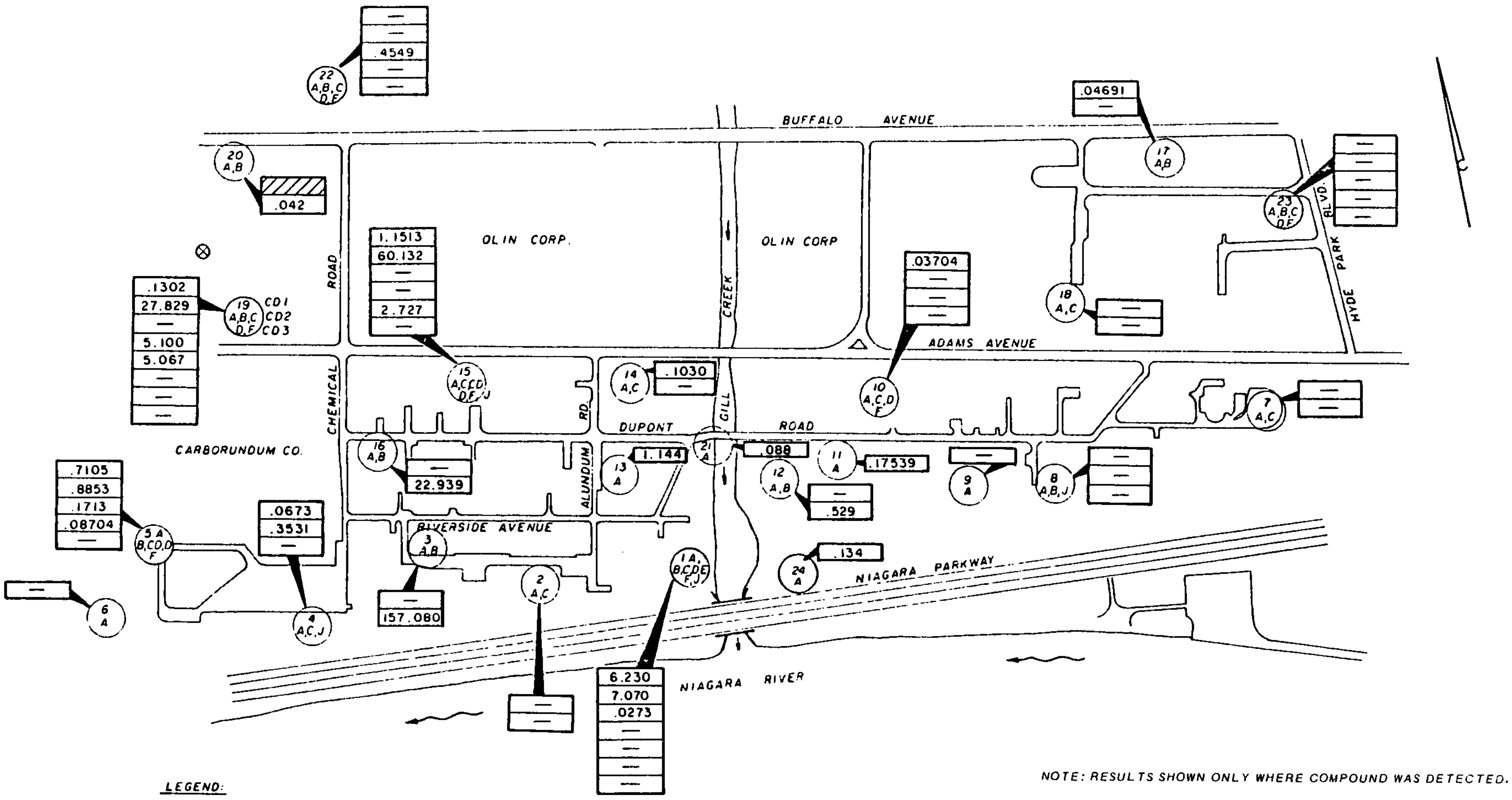
17 A,B	WELL CLUSTER NUMBER (NO.) WELL TYPE (LETTER)
⊗	OLIN PRODUCTION WELL
40	CONCENTRATION IN PPM
—	BELOW DETECTION LIMIT
▨	NO DATA / NO SAMPLE

1,1,2,2-TETRACHLOROETHANE CONCENTRATIONS
SUMMER, 1984
NIAGARA PLANT
E.I.DuPONT DE NEMOURS & CO.

WOODWARD-CLYDE CONSULTANTS
CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

Drawn By T.P	SCALE IN FEET	Date	10/23/84
Checked J.C.E.	0 300	Job	83C2236-8

PLATE 19



NOTE: RESULTS SHOWN ONLY WHERE COMPOUND WAS DETECTED.

LEGEND:

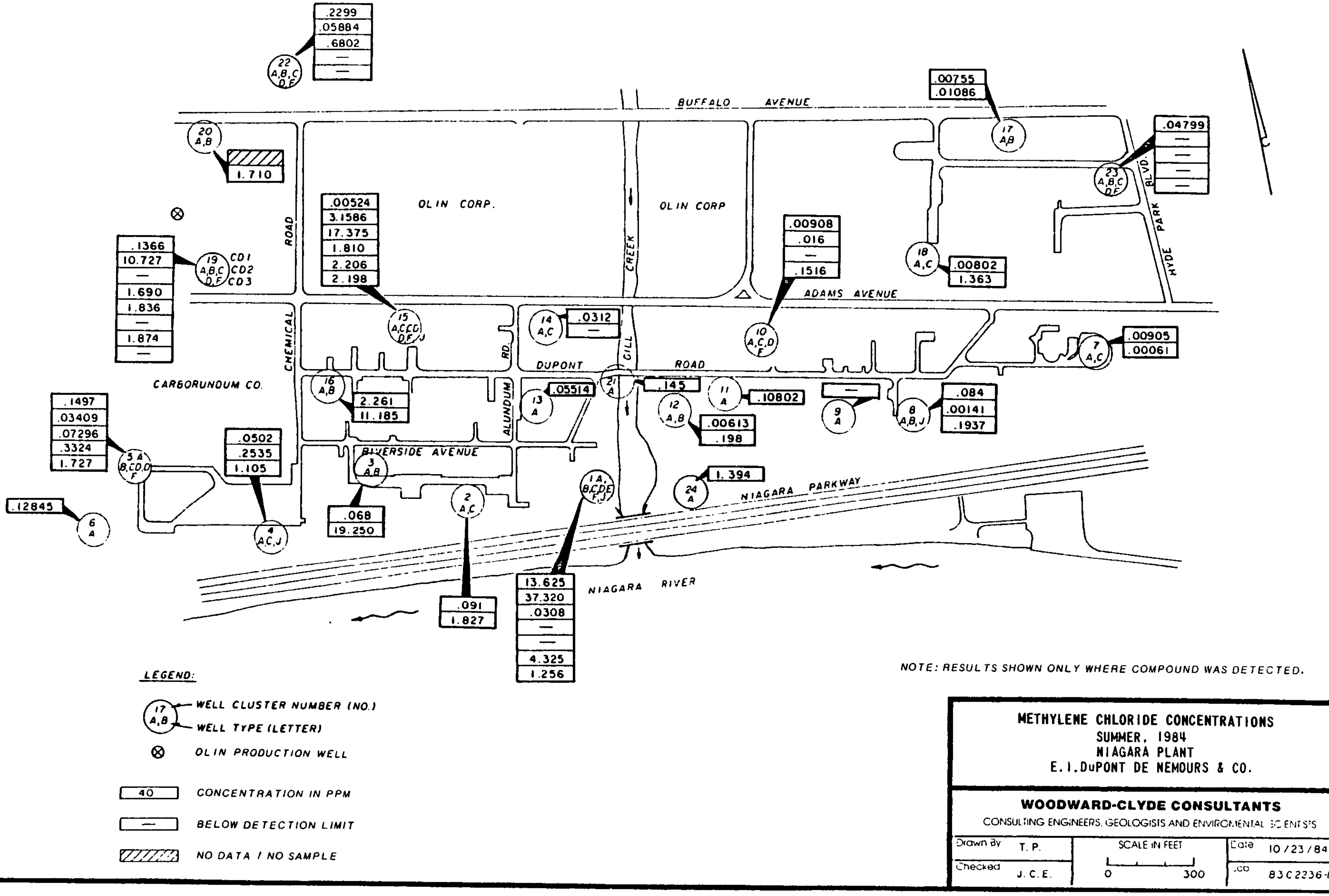
- 17 — WELL CLUSTER NUMBER (NO.)
- A,B — WELL TYPE (LETTER)
- ⊗ OLIN PRODUCTION WELL
- 40 CONCENTRATION IN PPM
- — BELOW DETECTION LIMIT
- ▨ NO DATA / NO SAMPLE

CHLOROFORM CONCENTRATIONS
SUMMER, 1984
NIAGARA PLANT
E.I.DuPONT DE NEMOURS & CO.

WOODWARD-CLYDE CONSULTANTS
CONSULTING ENGINEERS, GEOLOGISTS AND ENVIROMENTAL SCIENTISTS

Drawn By T. P	SCALE IN FEET	Date 10/23/84	
Checked J. C. E.	0 300	Job 83C2236-8	

PLATE 20



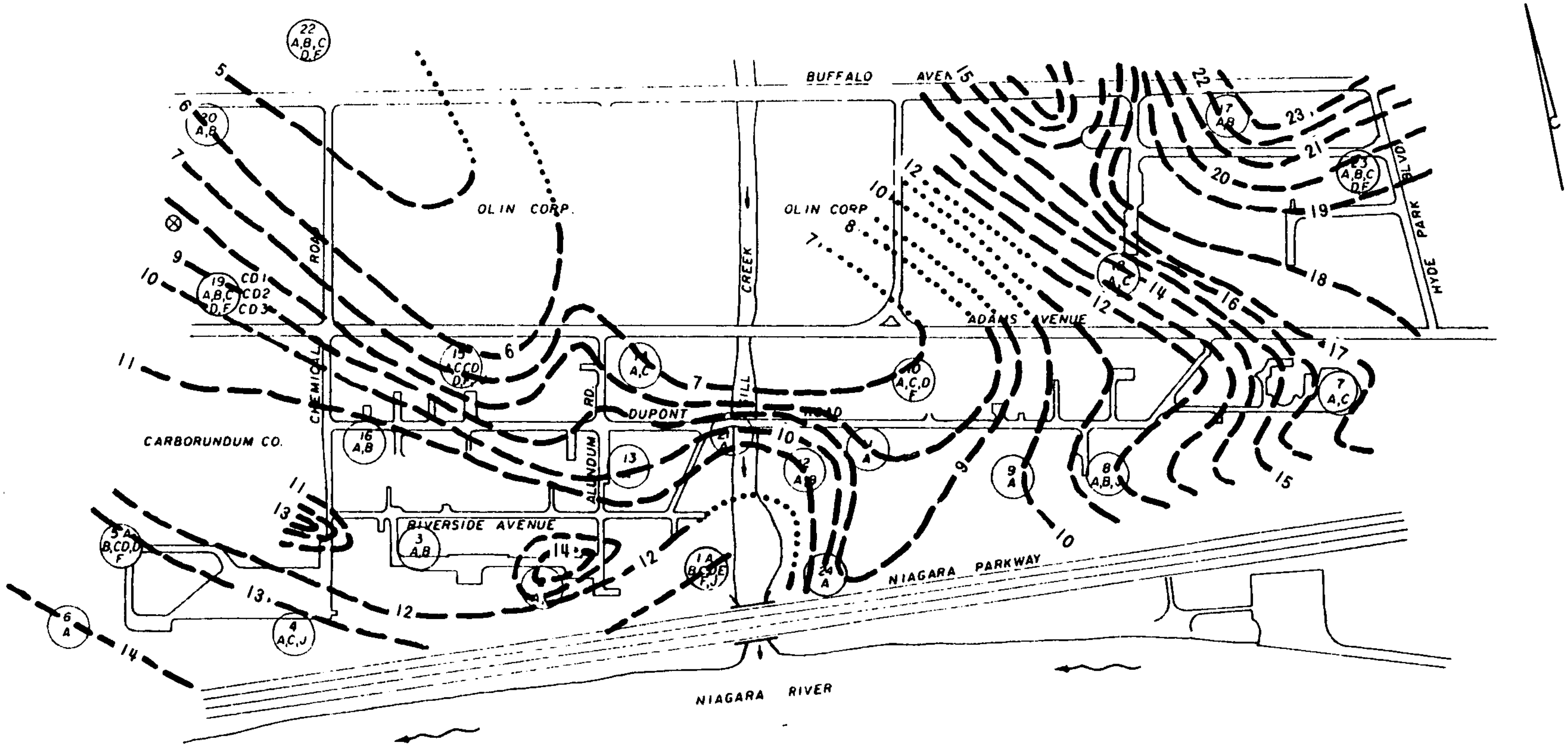
NOTE: RESULTS SHOWN ONLY WHERE COMPOUND WAS DETECTED.

METHYLENE CHLORIDE CONCENTRATIONS
SUMMER, 1984
NIAGARA PLANT
E.I. DuPONT DE NEMOURS & CO.

WOODWARD-CLYDE CONSULTANTS
CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

Drawn By T. P.	SCALE IN FEET	Date 10/23/84
Checked J. C. E.	0 300	No 83C2236-8

PLATE 21



LEGEND:

17 A,B — WELL CLUSTER NUMBER (NO.) — WELL TYPE (LETTER)

⊗ OLIN PRODUCTION WELL

CONTOUR INTERVAL EQUALS 1 FOOT

— — 20 THICKNESS OF OVERBURDEN

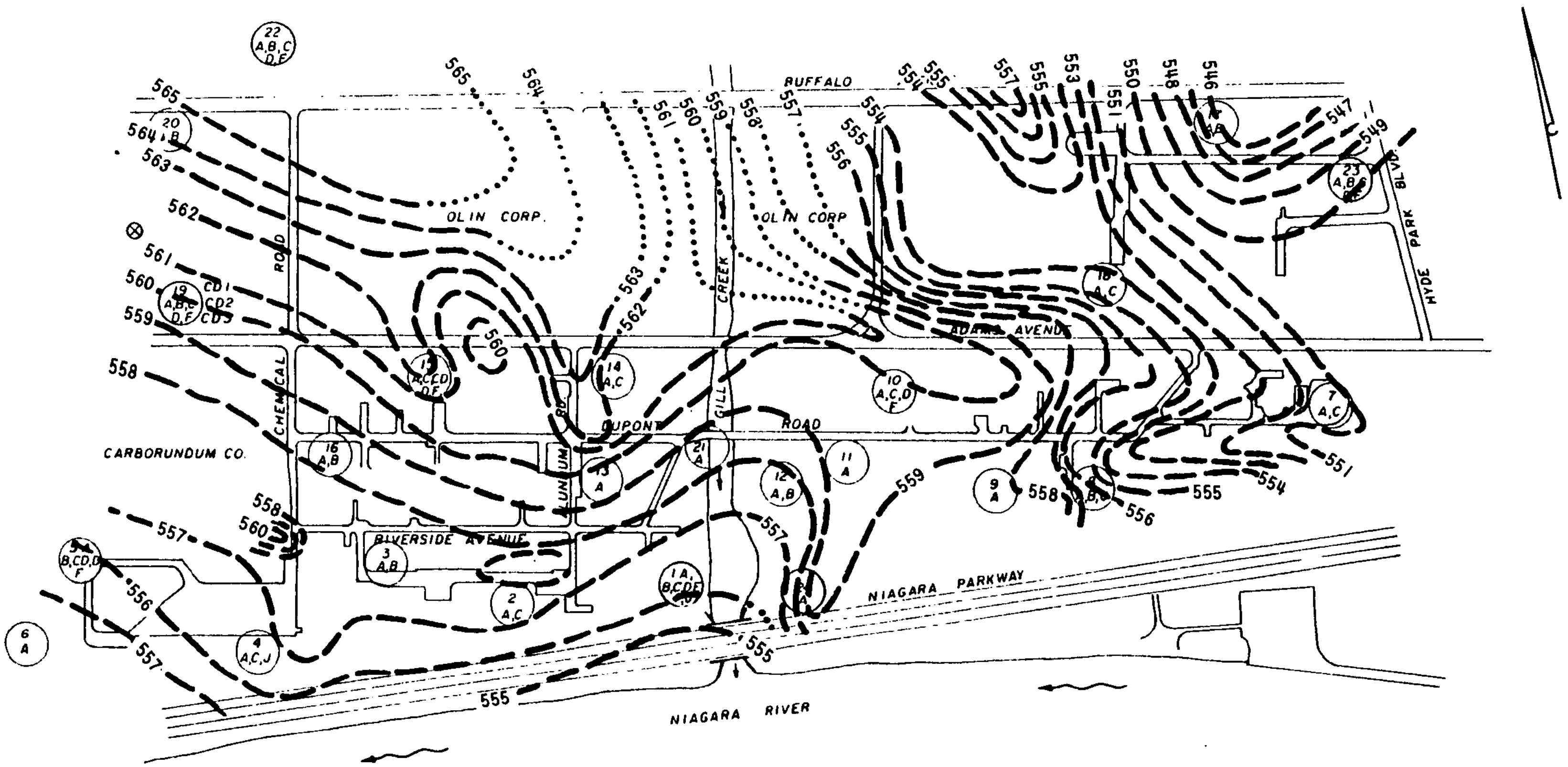
•••••••• 20 PROJECTED THICKNESS OF OVERBURDEN

ISOPACH MAP OF FILL / OVERBURDEN
NIAGARA PLANT
E. I. DUPONT DE NEMOURS & CO.

WOODWARD-CLYDE CONSULTANTS
CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

DRAWN BY: T.P.	SCALE in FEET 0 300	DATE: 10/23/84
CHECKED: J.C.E.		JOB: 83C2236

PLATE 22



LEGEND:

17 A,B — *WELL CLUSTER NUMBER (NO.)* — *WELL TYPE (LETTER)*

⊗ *OLIN PRODUCTION WELL*

CONTOUR INTERVAL EQUALS 1 FOOT
— — 557 ELEVATION OF TOP OF BEDROCK
••••••• 557 PROJECTED ELEVATION OF TOP OF BEDROCK

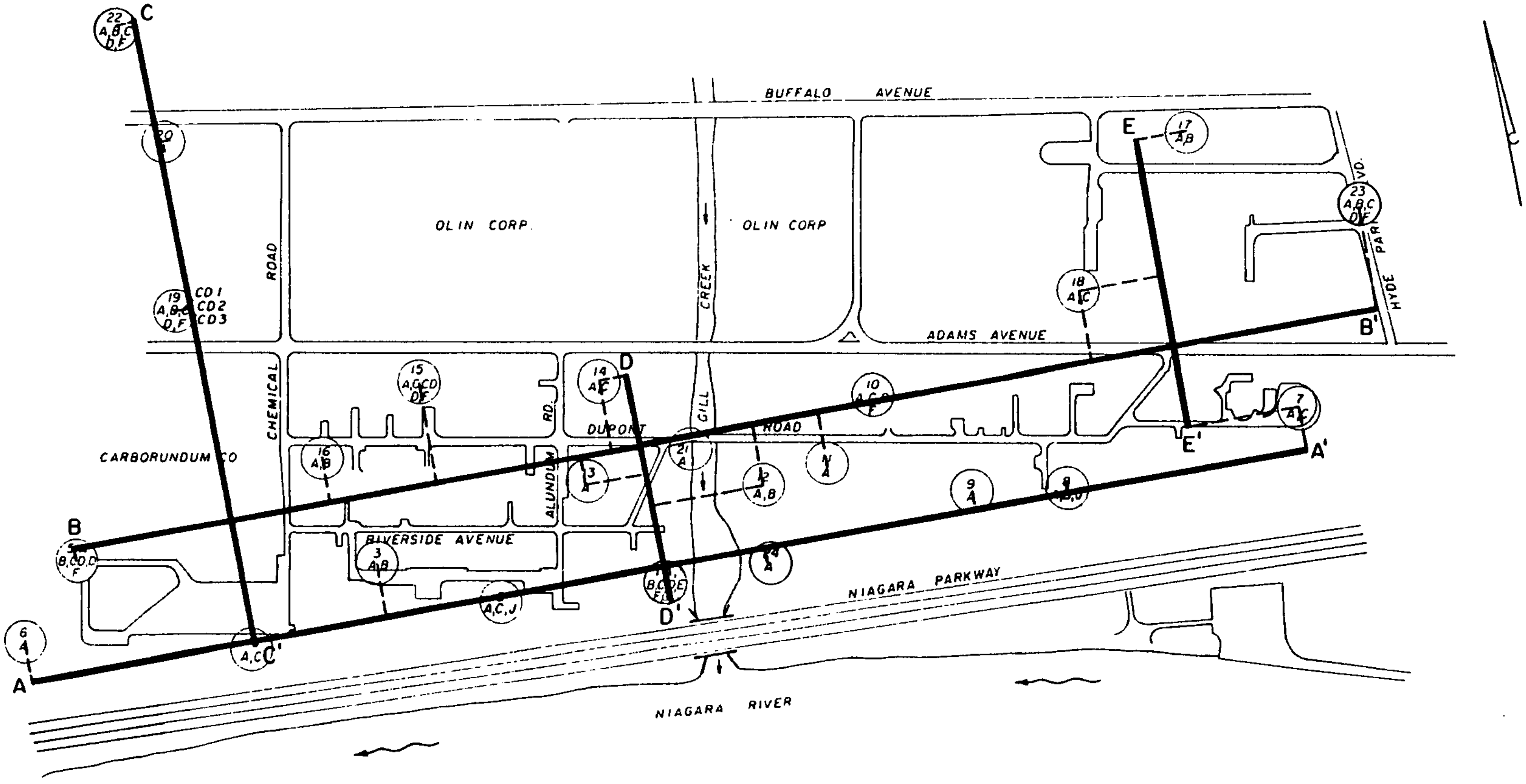
NOTE: TOP OF BEDROCK ELEVATIONS BASED UPON THIS STUDY AND SUPPLEMENTAL DATA FROM DUPONT DRAWING EE 40-2749 SHEETS 1 AND 2

TOP OF BEDROCK STRUCTURE CONTOUR MAP
NIAGARA PLANT
E.I.DUPONT DE NEMOURS & CO.

WOODWARD-CLYDE CONSULTANTS
CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

DRAWN BY: T.P.	SCALE in FEET	DATE: 10/23/84	
CHECKED : J.C.E.	0 300	JOB : 83C2236	

PLATE 23



LEGEND:

17 A,B — WELL CLUSTER NUMBER (NO.) / WELL TYPE (LETTER)

A —— A' GEOLOGIC SECTION

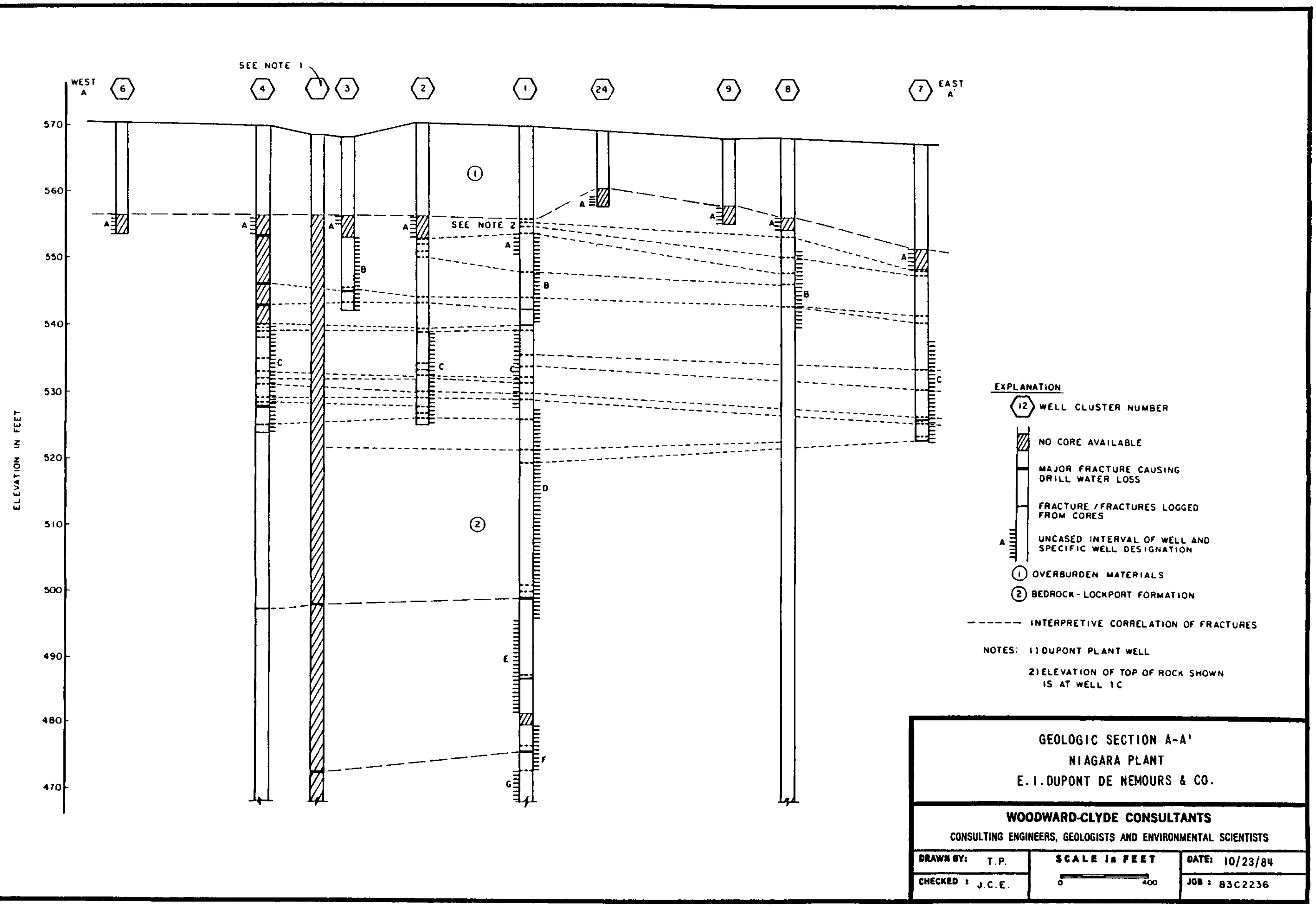
WELL CLUSTER PROJECTION

GEOLOGIC SECTION LOCATION PLAN
NIAGARA PLANT
E.I.DUPONT DE NEMOURS & CO.

WOODWARD-CLYDE CONSULTANTS
CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

DRAWN BY: T.P.	SCALE in FEET 0 300	DATE: 10/23/84
CHECKED : J.C.E.		JOB : 83C2236 - X

PLATE 24

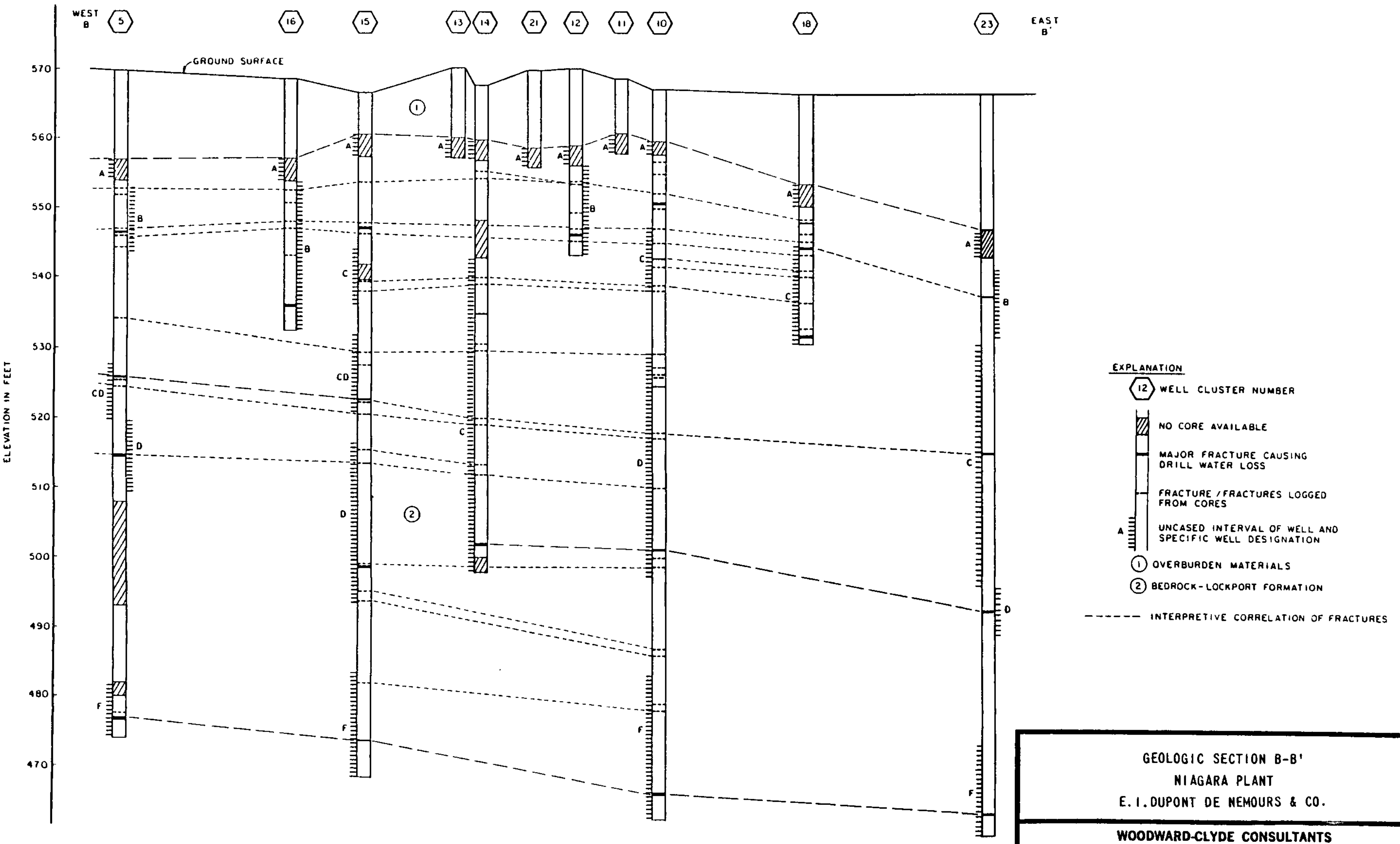


GEOLOGIC SECTION A-A'
NIAGARA PLANT
E. I. DUPONT DE NEMOURS & CO.

WOODWARD-CLYDE CONSULTANTS
CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

DRAWN BY: T.P.
CHECKED : J.C.E.
DATE: 10/23/84
JOB : 83C2236

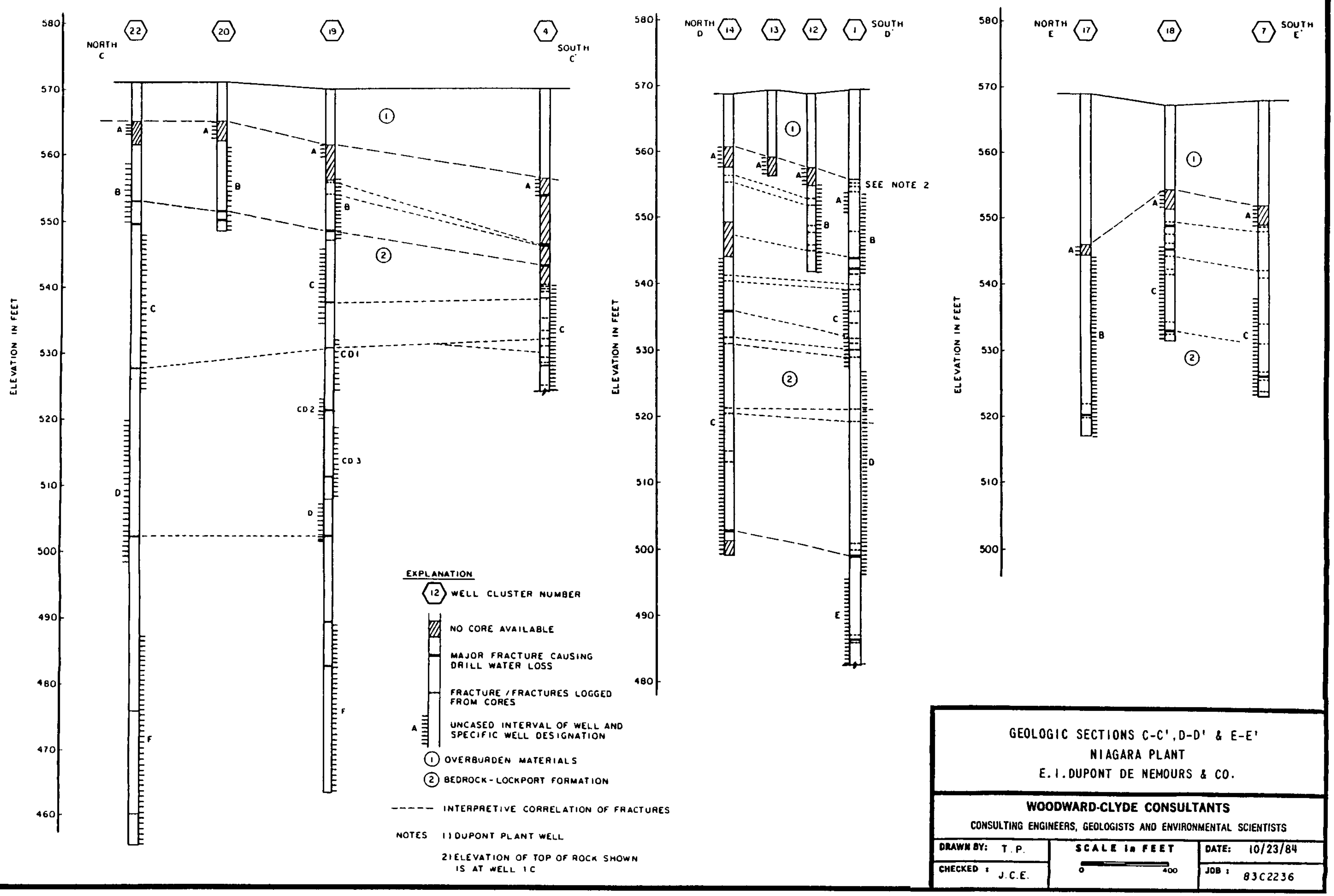
PLATE 25



GEOLOGIC SECTION B-B'
NIAGARA PLANT
E.I. DUPONT DE NEMOURS & CO.

WOODWARD-CLYDE CONSULTANTS
CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

DRAWN BY: T.P.	**SCALE In FEET** 0 400	**DATE:** 10/23/84	
CHECKED : J.C.E.		**JOB :** 83C2236	

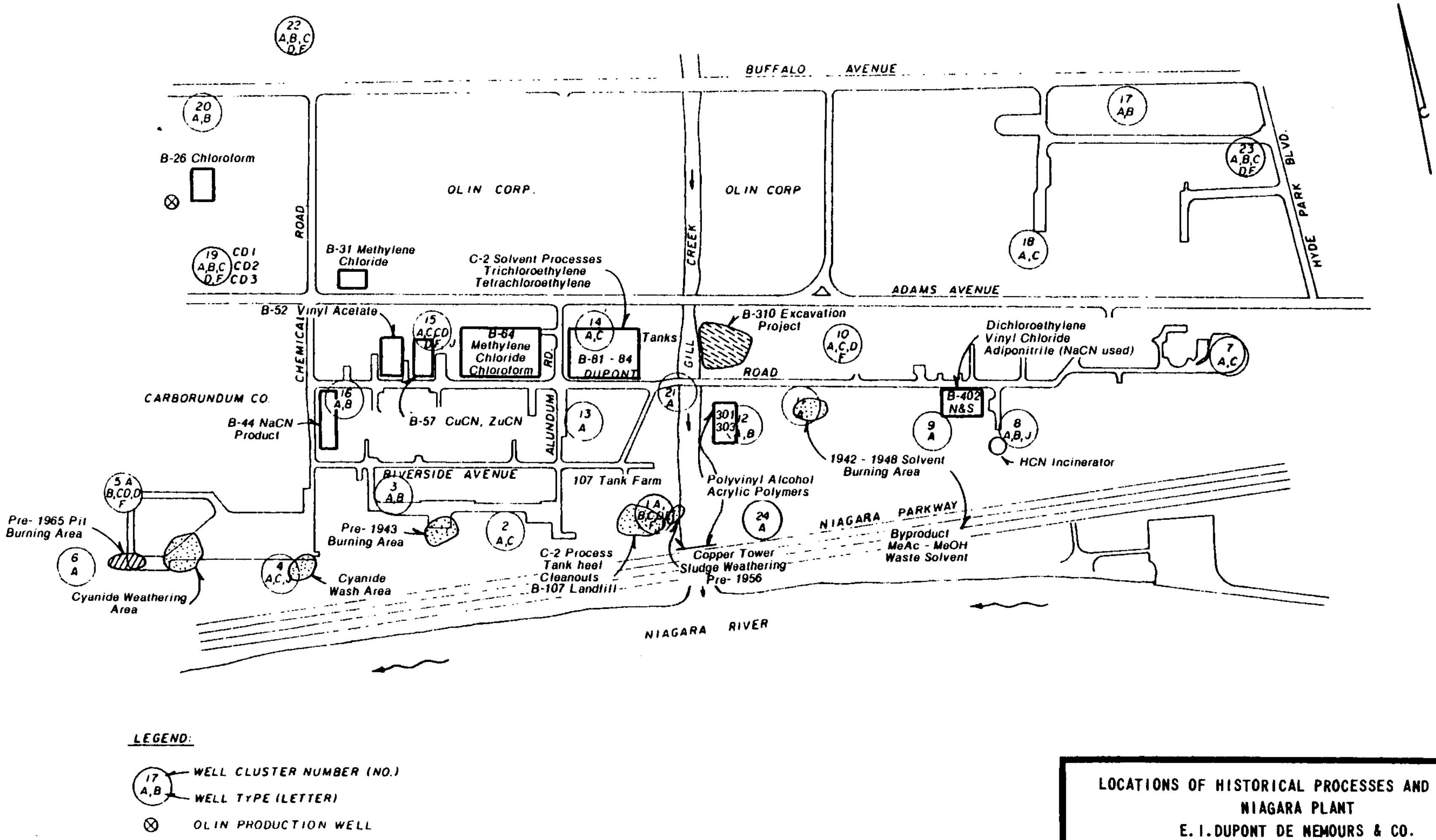


GEOLOGIC SECTIONS C-C', D-D' & E-E'
NIAGARA PLANT
E. I. DUPONT DE NEMOURS & CO.

WOODWARD-CLYDE CONSULTANTS
CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

DRAWN BY: T.P.	SCALE in FEET 0 400	DATE:	10/23/84
CHECKED: J.C.E.		JOB:	83C2236

PLATE 27

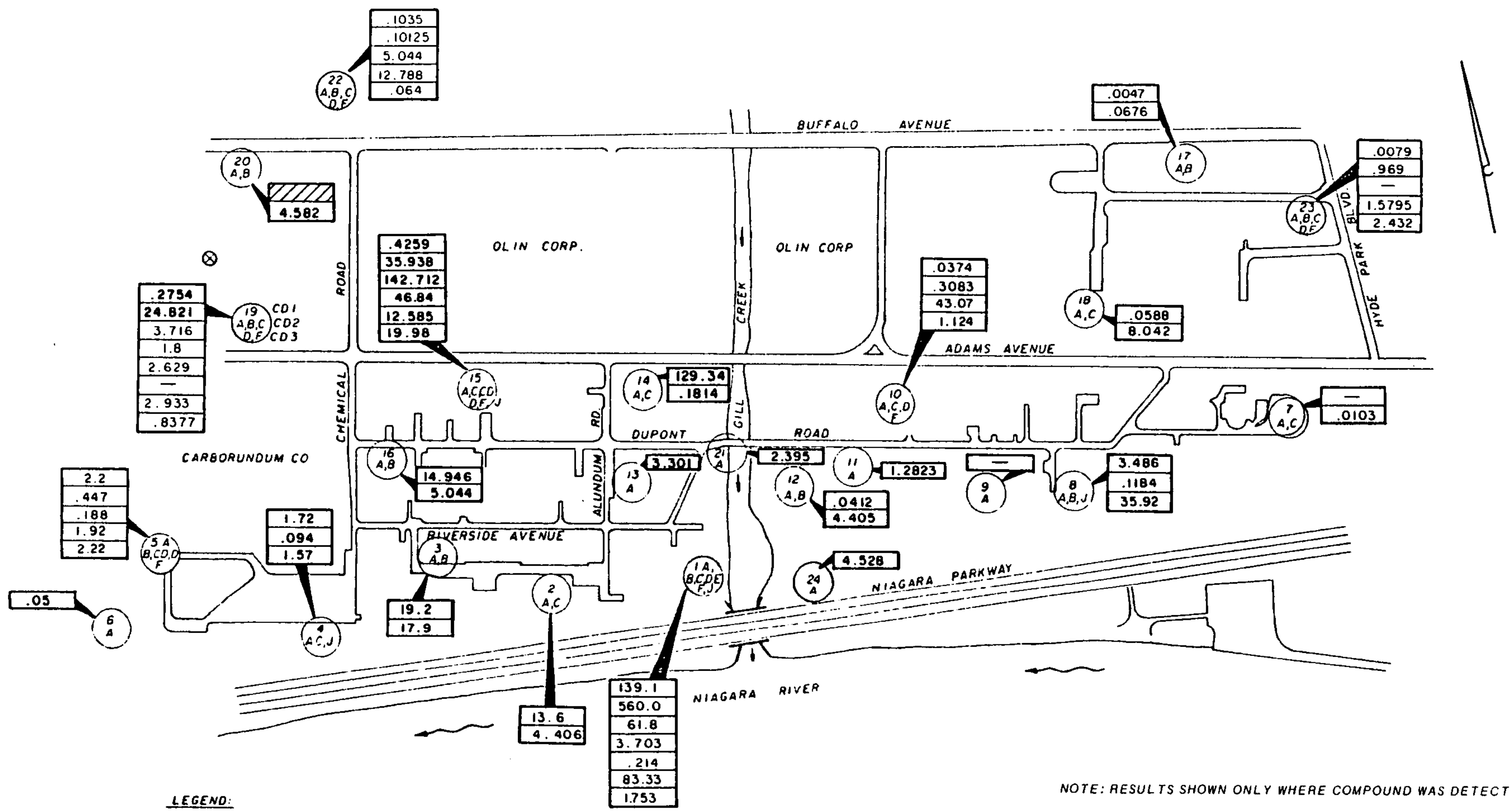


LOCATIONS OF HISTORICAL PROCESSES AND EVENTS
NIAGARA PLANT
E. I. DUPONT DE NEMOURS & CO.

WOODWARD-CLYDE CONSULTANTS
CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

DRAWN BY: T.P.	SCALE in FEET 0 300	DATE: 10/23/84	
CHECKED: J.C.E.		JOB: 83C2236	

PLATE 28



NOTE: RESULTS SHOWN ONLY WHERE COMPOUND WAS DETECTED.

LEGEND:

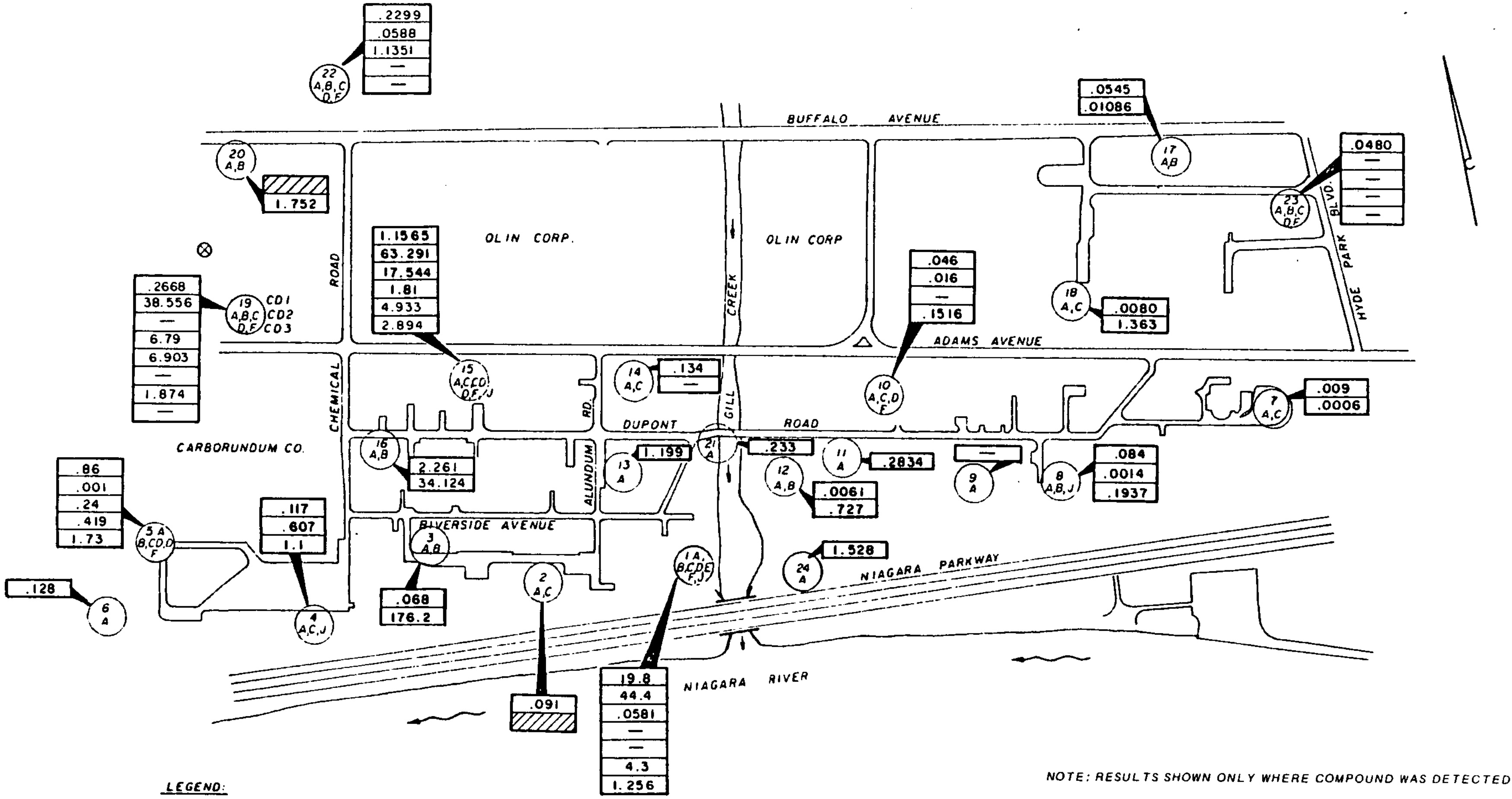
- 17 A,B — WELL CLUSTER NUMBER (NO.) / WELL TYPE (LETTER)
- ⊗ OLIN PRODUCTION WELL
- 40 CONCENTRATION IN PPM
- — BELOW DETECTION LIMIT
- ▨ NO DATA / NO SAMPLE

TOTAL C-2 COMPOUND CONCENTRATIONS
SUMMER, 1984
NIAGARA PLANT
E.I.DuPONT DE NEMOURS & CO.

WOODWARD-CLYDE CONSULTANTS
CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

Drawn By T. P.	SCALE IN FEET	Date 10/23/84	
Checked J. C. E.	0 300	Job 83C2236-8	

PLATE 29



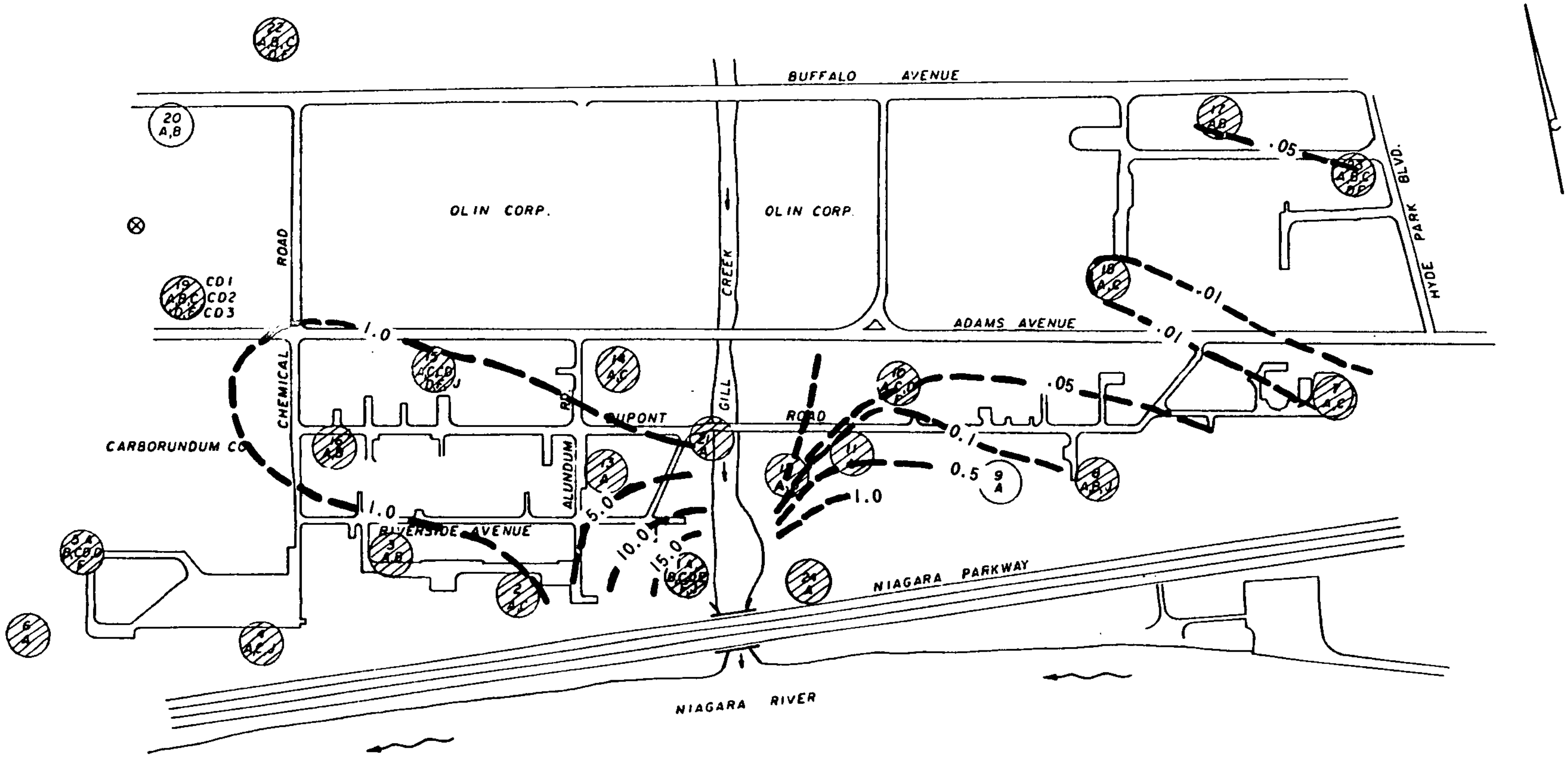
NOTE: RESULTS SHOWN ONLY WHERE COMPOUND WAS DETECTED.

TOTAL C-1 COMPOUND CONCENTRATIONS
SUMMER, 1984
NIAGARA PLANT
E.I.DuPONT DE NEMOURS & CO.

WOODWARD-CLYDE CONSULTANTS
CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

Drawn By: T. P.	SCALE IN FEET	Date	10/23/84
Checked J. C. E	0 300	Job	83C2236-8

PLATE 30



LEGEND:

17 A,B — WELL CLUSTER NUMBER (NO.) — WELL TYPE (LETTER)

⊗ OLIN PRODUCTION WELL

▨ WELL USED TO GENERATE CONTOURS

CONTOUR INTERVAL AS NOTED
CONCENTRATIONS IN PPM

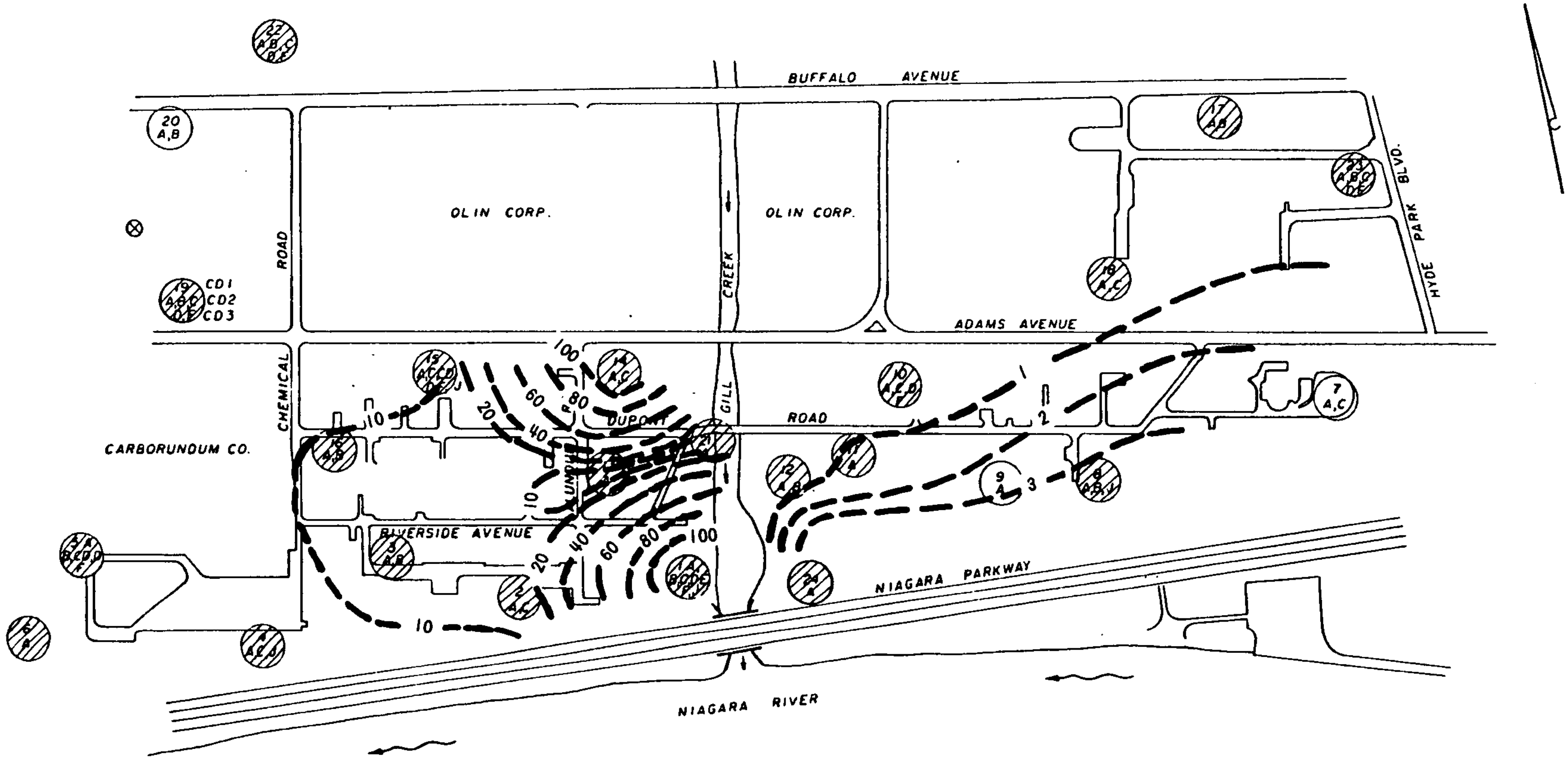
NOTE: CONCENTRATION CONTOURS HAVE BEEN INTERPOLATED TO ILLUSTRATE AREAS OF RELATIVE CONTAMINATION AND ARE NOT INTENDED TO REPRESENT ACTUAL GROUNDWATER QUALITY CONDITIONS

TOTAL C-I COMPOUNDS, A-WELLS
SUMMER, 1984
NIAGARA PLANT
E. I. DUPONT DE NEMOURS & CO.

WOODWARD-CLYDE CONSULTANTS
CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

DRAWN BY: T.P.	SCALE in FEET 0 300	DATE: 10/23/84	
CHECKED: J.C.E.		JOB: 83C2236	

PLATE 31



LEGEND:

WELL CLUSTER NUMBER (NO.)

WELL TYPE (LETTER)

⊗ OLIN PRODUCTION WELL

▨ WELL USED TO GENERATE CONTOURS

CONTOUR INTERVAL AS NOTED
CONCENTRATIONS IN PPM

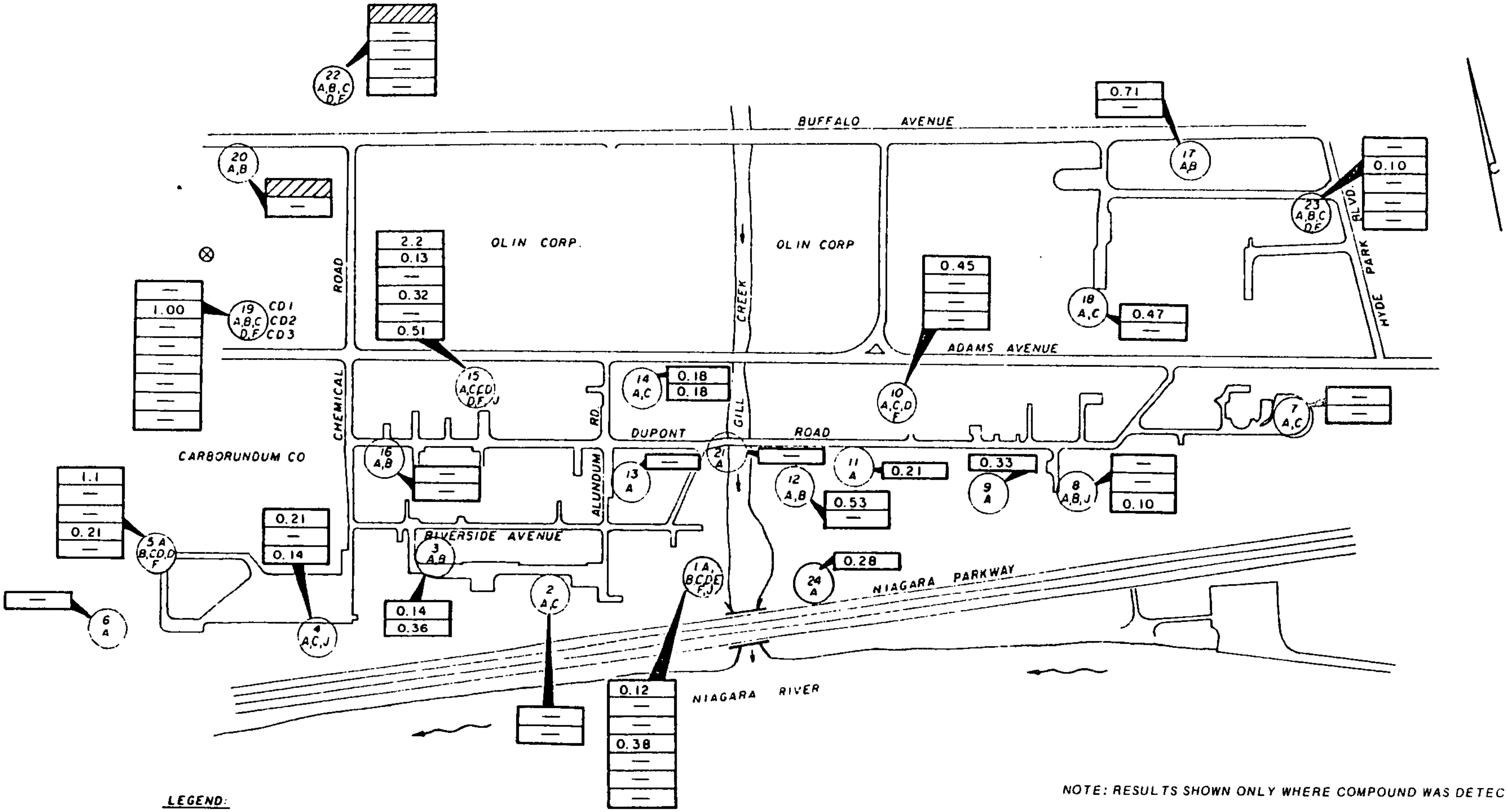
NOTE: CONCENTRATION CONTOURS HAVE BEEN INTERPOLATED TO ILLUSTRATE AREAS OF RELATIVE CONTAMINATION AND ARE NOT INTENDED TO REPRESENT ACTUAL GROUNDWATER QUALITY CONDITIONS

TOTAL C-2 COMPOUNDS, A-WELLS
SUMMER, 1984
NIAGARA PLANT
E. I. DUPONT DE NEMOURS & CO.

WOODWARD-CLYDE CONSULTANTS
CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

DRAWN BY: T.P.	SCALE in FEET 0 300	DATE: 10/23/84	
CHECKED : J.C.E.		JOB : 83C2236	

PLATE 32



LEGEND:

17 — WELL CLUSTER NUMBER (NO.)

A,B — WELL TYPE (LETTER)

⊗ OLIN PRODUCTION WELL

40 CONCENTRATION IN PPM

— BELOW DETECTION LIMIT

▨ NO DATA / NO SAMPLE

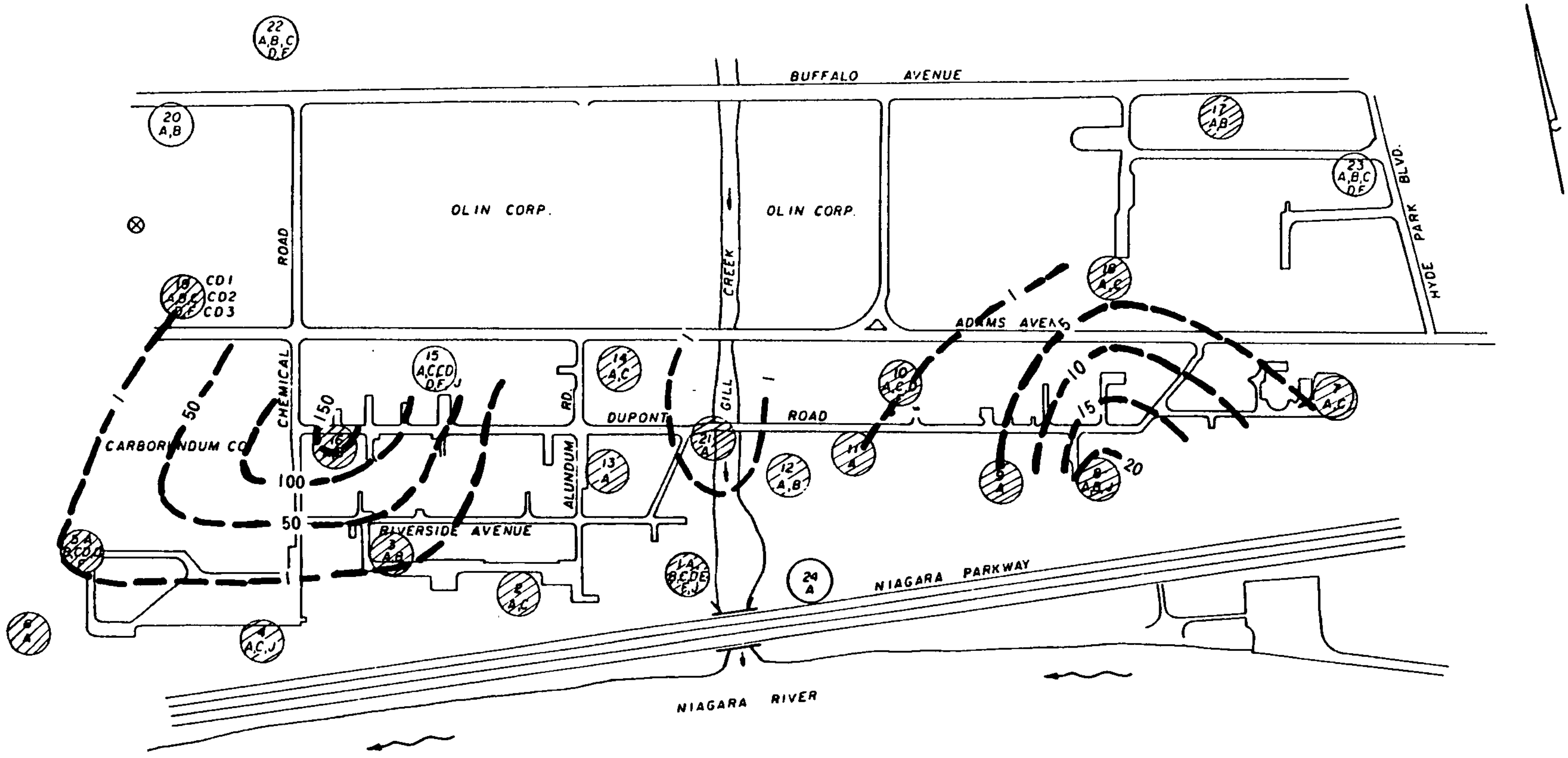
NOTE: RESULTS SHOWN ONLY WHERE COMPOUND WAS DETECTED.

TOTAL COPPER CONCENTRATIONS
SUMMER, 1984
NIAGARA PLANT
E.I.DuPONT DE NEMOURS & CO.

WOODWARD-CLYDE CONSULTANTS
CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

Drawn By T. P	SCALE IN FEET	Date 10/23/84
Checked J. C. E.	0 300	Job 83C2236-8

PLATE 33



LEGEND:

17 A,B — WELL CLUSTER NUMBER (NO.)
— WELL TYPE (LETTER)

⊗ OLIN PRODUCTION WELL

▨ WELL USED TO GENERATE CONTOURS

CONTOUR INTERVAL AS NOTED
CONCENTRATIONS IN PPM

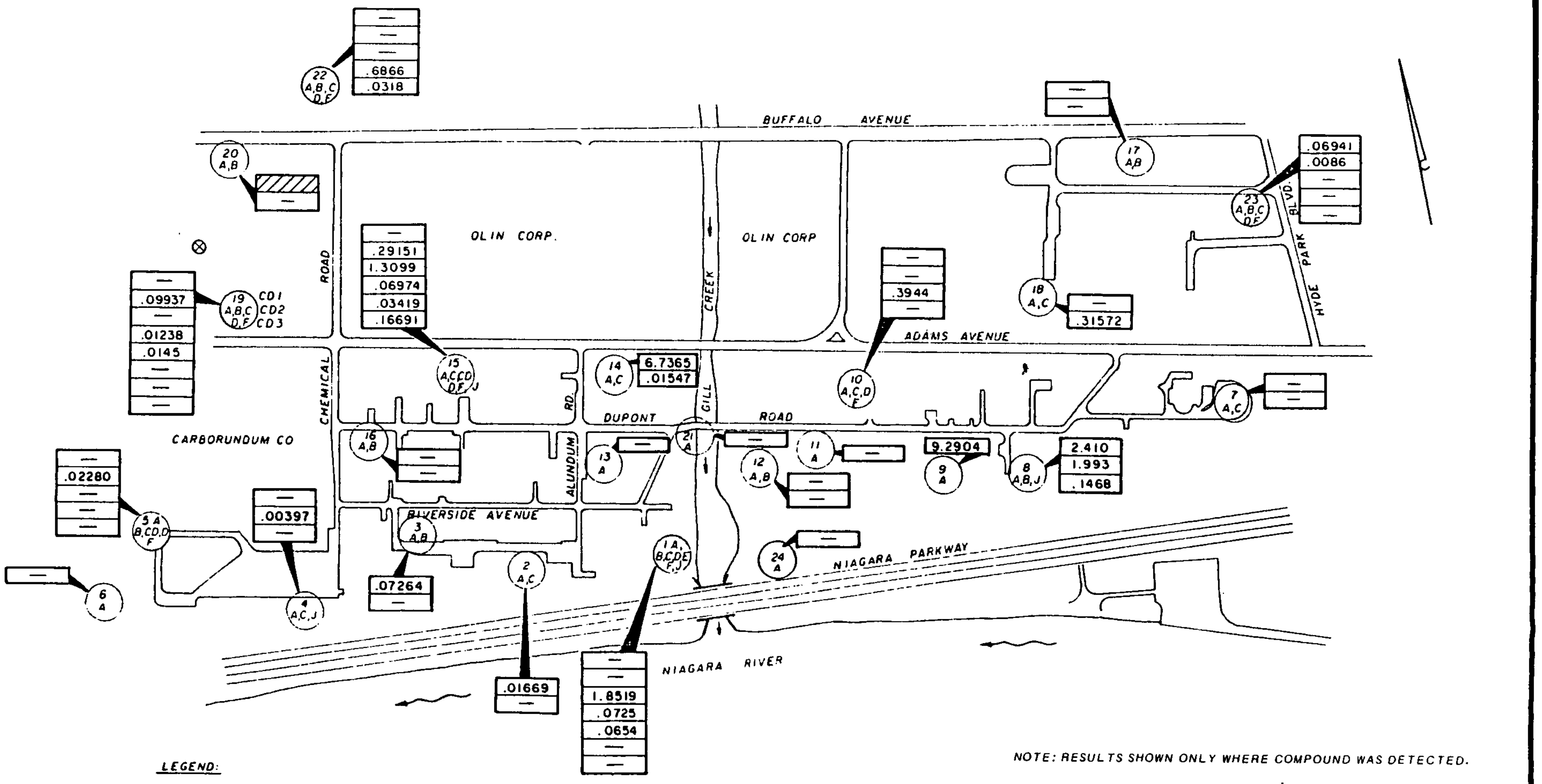
NOTE: CONCENTRATION CONTOURS HAVE BEEN INTERPOLATED TO ILLUSTRATE AREAS OF RELATIVE CONTAMINATION AND ARE NOT INTENDED TO REPRESENT ACTUAL GROUNDWATER QUALITY CONDITIONS

TOTAL CYANIDE CONCENTRATION CONTOURS
SUMMER, 1984
NIAGARA PLANT
E. I. DUPONT DE NEMOURS & CO.

WOODWARD-CLYDE CONSULTANTS
CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

DRAWN BY: T.P.	SCALE in FEET 0 300	DATE: 10/23/84
CHECKED : J.C.E.		JOB : 83C2236

PLATE 34



NOTE: RESULTS SHOWN ONLY WHERE COMPOUND WAS DETECTED.

LEGEND:

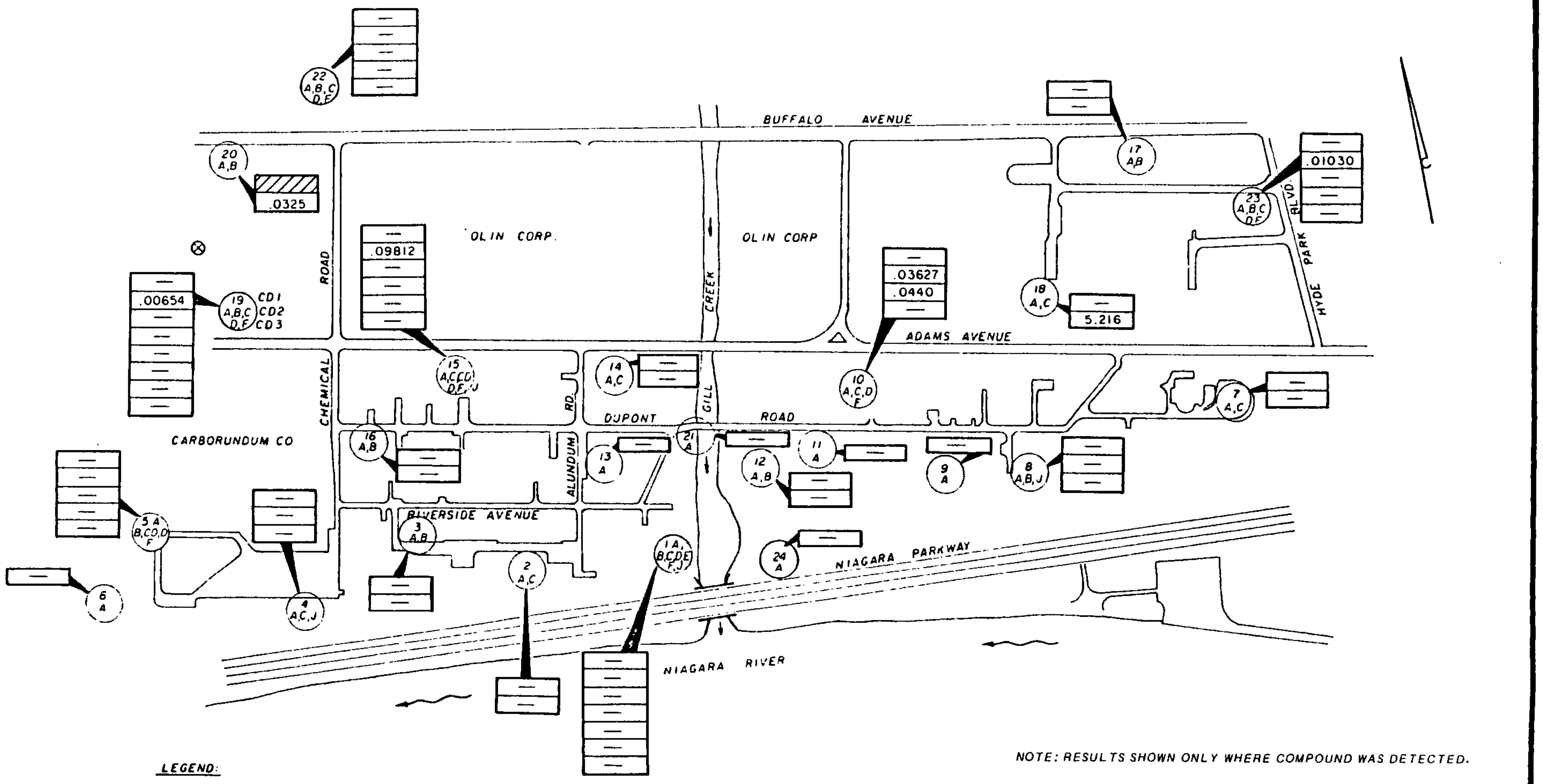
- 17 A,B — WELL CLUSTER NUMBER (NO.) / WELL TYPE (LETTER)
- ⊗ OLIN PRODUCTION WELL
- 40 CONCENTRATION IN PPM
- — BELOW DETECTION LIMIT
- ▨ NO DATA / NO SAMPLE

BENZENE CONCENTRATIONS
SUMMER, 1984
NIAGARA PLANT
E.I.DuPONT DE NEMOURS & CO.

WOODWARD-CLYDE CONSULTANTS
CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

Drawn By T.P.	SCALE IN FEET	Date 10/23/84
Checked J.C.E.	0 300	Job 83C2236-8

PLATE 35



NOTE: RESULTS SHOWN ONLY WHERE COMPOUND WAS DETECTED.

LEGEND:

17 ← WELL CLUSTER NUMBER (NO.)

A,B ← WELL TYPE (LETTER)

⊗ OLIN PRODUCTION WELL

| 40 | CONCENTRATION IN PPM

| — | BELOW DETECTION LIMIT

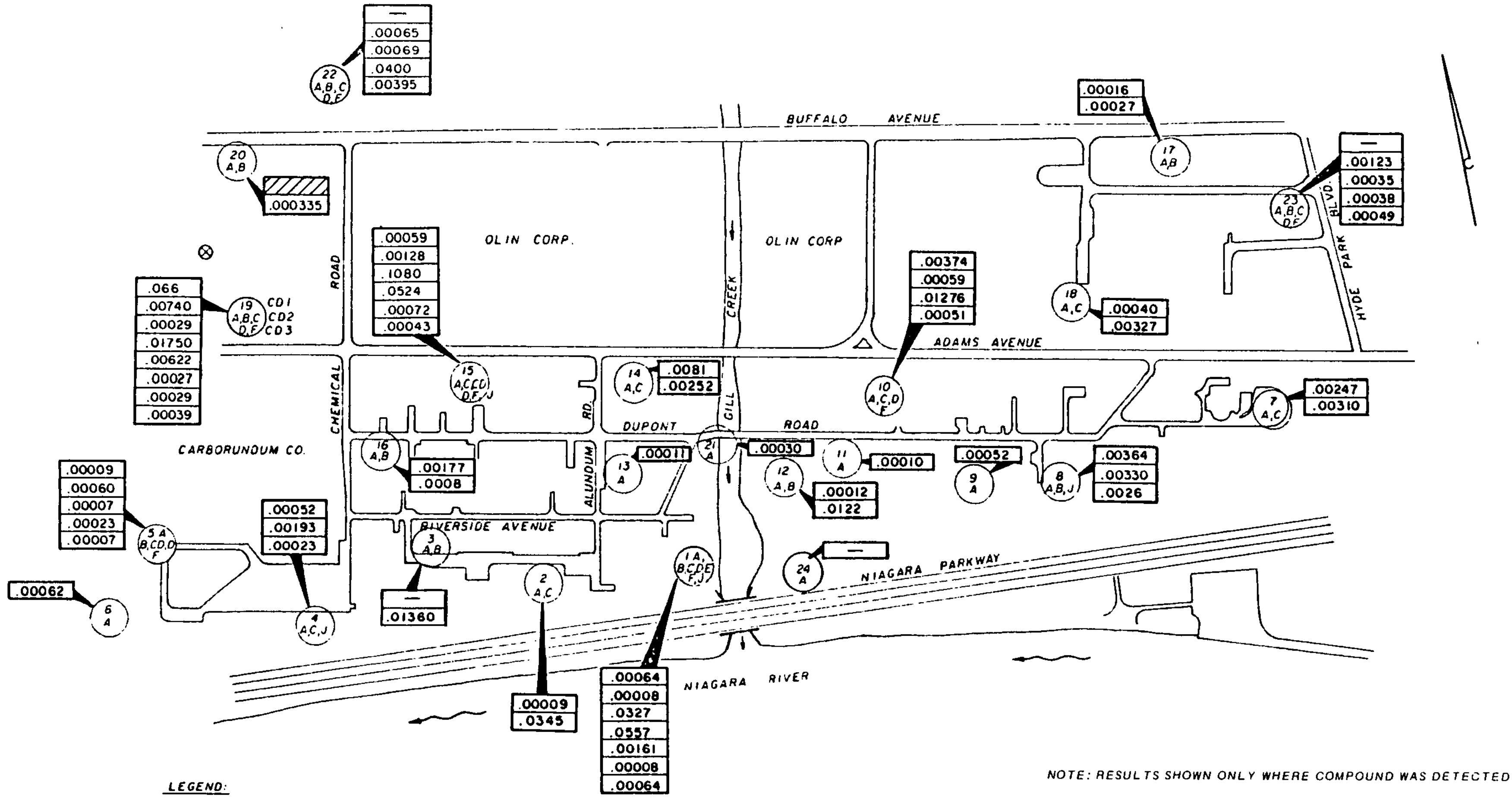
▨ NO DATA / NO SAMPLE

CHLOROBENZENE CONCENTRATIONS
SUMMER, 1984
NIAGARA PLANT
E.I.DuPONT DE NEMOURS & CO.

WOODWARD-CLYDE CONSULTANTS
CONSULTING ENGINEERS, GEOLOGISTS AND ENVIROMENTAL SCIENTISTS

Drawn By T.P	SCALE IN FEET 0 300	Date	10/23/84
Checked J.C.E.		JOB	83C2236-8

PLATE 36



NOTE: RESULTS SHOWN ONLY WHERE COMPOUND WAS DETECTED.

LEGEND:

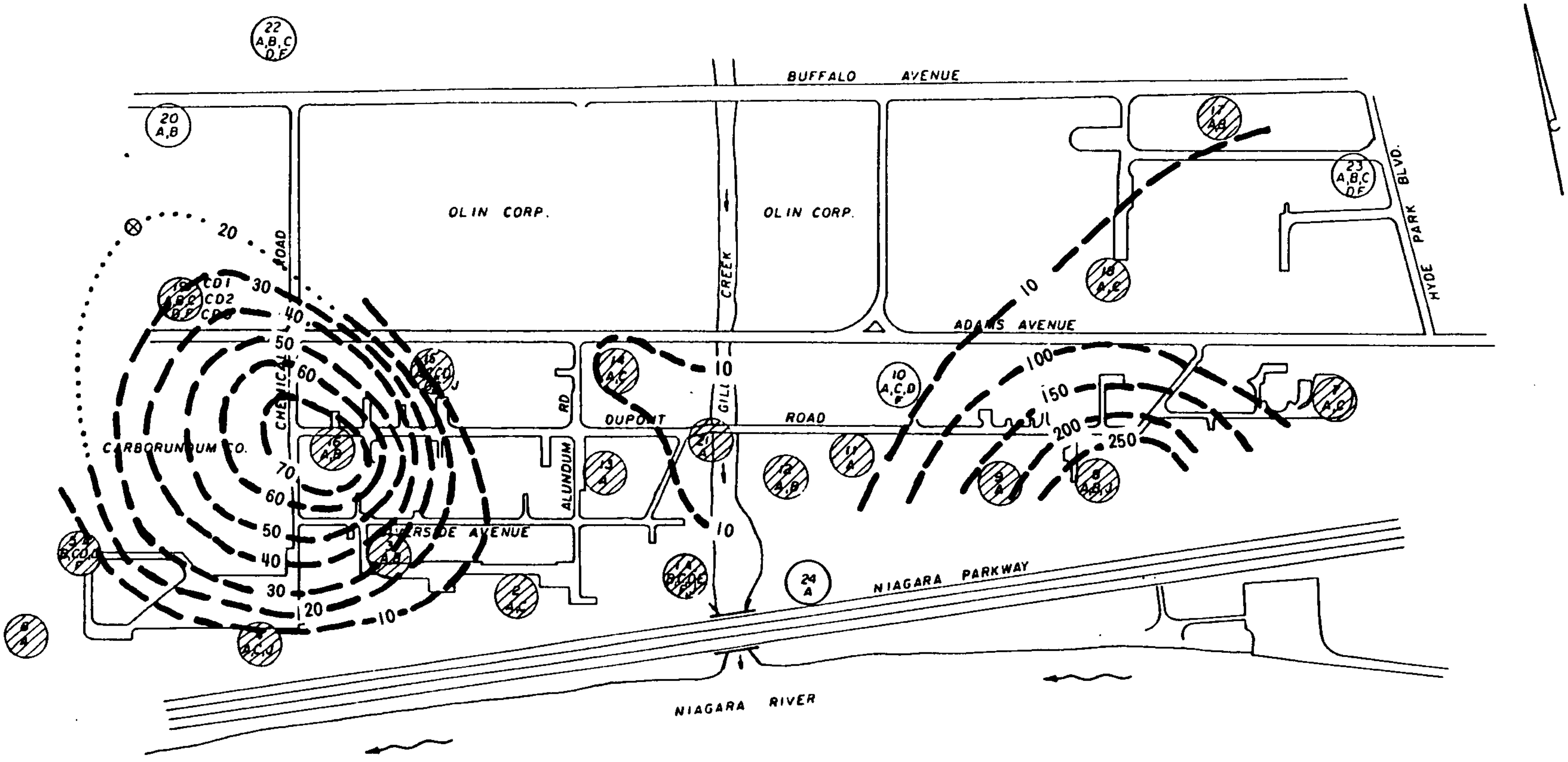
- 17 A,B — WELL CLUSTER NUMBER (NO.); WELL TYPE (LETTER)
- ⊗ OLIN PRODUCTION WELL
- 40 CONCENTRATION IN PPM
- — BELOW DETECTION LIMIT
- ▨ NO DATA / NO SAMPLE

TOTAL BHC CONCENTRATIONS
SUMMER, 1984
NIAGARA PLANT
E.I. DuPONT DE NEMOURS & CO.

WOODWARD-CLYDE CONSULTANTS
CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

Drawn By	T. P.	SCALE IN FEET 0 300	Date	10/23/84
Checked	J. C. E.		JOB	83C2236-8

PLATE 37



LEGEND:

WELL CLUSTER NUMBER (NO.) — 17 A,B — WELL TYPE (LETTER)

⊗ OLIN PRODUCTION WELL

▨ WELL USED TO GENERATE CONTOURS

CONTOUR INTERVAL AS NOTED
CONCENTRATIONS IN PPM

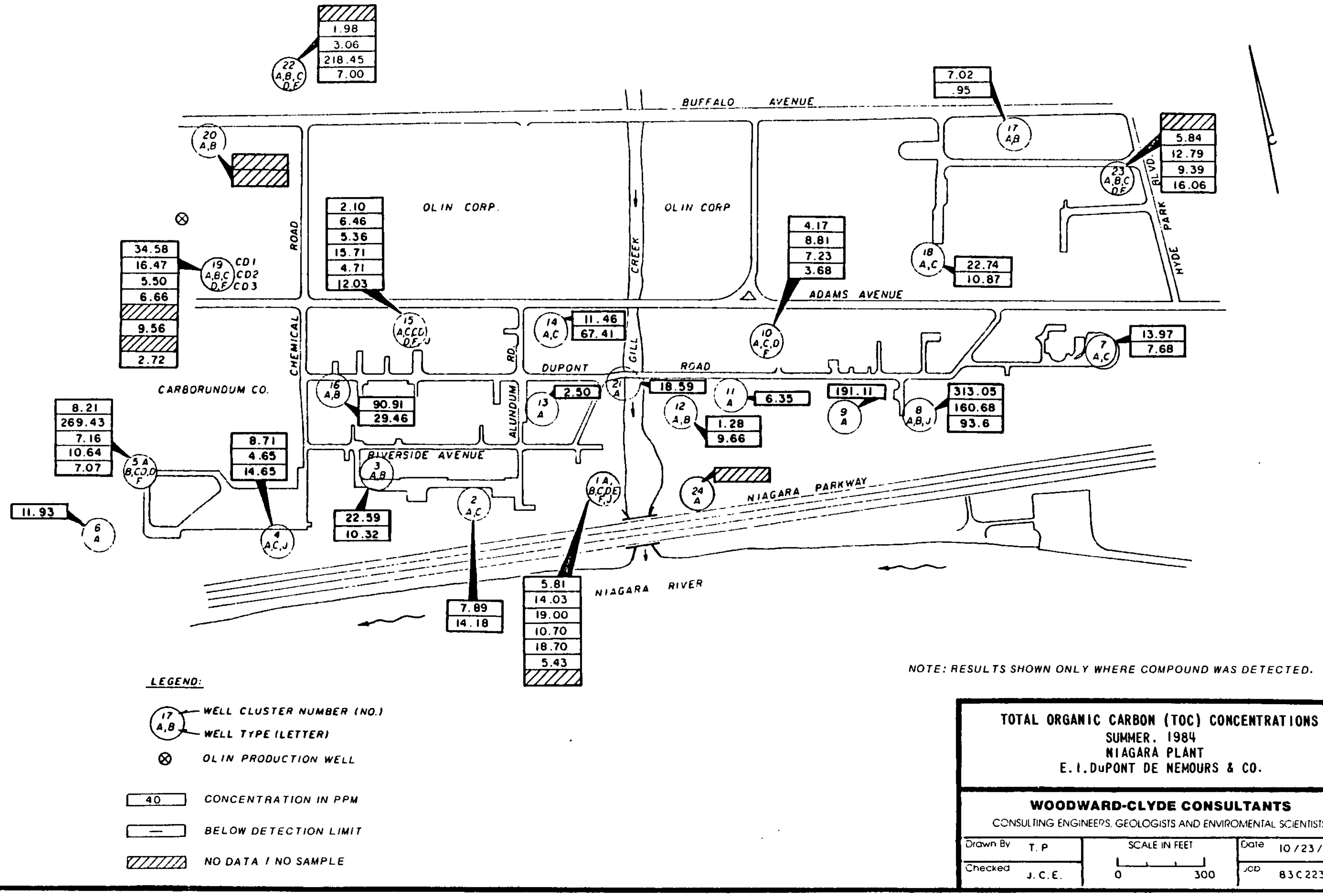
NOTE: CONCENTRATION CONTOURS HAVE BEEN INTERPOLATED TO ILLUSTRATE AREAS OF RELATIVE CONTAMINATION AND ARE NOT INTENDED TO REPRESENT ACTUAL GROUNDWATER QUALITY CONDITIONS

TOC CONCENTRATION CONTOURS, A-WELLS
SUMMER, 1984
NIAGARA PLANT
E. I. DUPONT DE NEMOURS & CO.

WOODWARD-CLYDE CONSULTANTS
CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

DRAWN BY: T.P.	SCALE in FEET 0 300	DATE: 10/23/84	
CHECKED : J.C.E.		JOB : 83C2236	

PLATE 38



NOTE: RESULTS SHOWN ONLY WHERE COMPOUND WAS DETECTED.

TOTAL ORGANIC CARBON (TOC) CONCENTRATIONS
SUMMER, 1984
NIAGARA PLANT
E.I. DuPONT DE NEMOURS & CO.

WOODWARD-CLYDE CONSULTANTS
CONSULTING ENGINEERS, GEOLOGISTS AND ENVIROMENTAL SCIENTISTS

Drawn By T. P	SCALE IN FEET	Date	10/23/84
Checked J. C. E.	0 300	JOB	83C2236-8

PLATE 39

Appendix A

APPENDIX A

Appendix A contains the rock and monitoring well logs of the 18 additional monitoring wells installed for these supplemental studies.

Woodward-Clyde Consultants

Sheet 1 of 1

GROUND WATER OBSERVATION

At ______ Ft. at Completion
At ______ Ft. after ______ hrs.
At ______ Ft. after ______ hrs.
At ______ Ft. after ______ hrs.

JOB DuPont Niagara Plant NO. ______
DRILLING RIG CME-55
OPERATOR Rochester Drilling
INSPECTOR Russell E. Hunter

BORING NUMBER 19-C
BORING OFFSET ______
SURFACE ELEVATION ______
DATE START 5-21-84 FINISH 5-22-84

CORE RUN From	CORE RUN To	RQD Inch	RQD %	RECOVERY Inch	RECOVERY %	Core Type & Resist.	STRATA CHANGE DEPTH	FIELD IDENTIFICATION, TYPE AND COLOR WEATHERING, SEAMS IN ROCK, etc.	FRACTURES No./Ft.	FRACTURES DIP	BED DIP
Box 1											
Run 1 24 to 35.5		91"/138"		124"/138"		NX		Dolomite, grey to brn, dense, hard, dry, trace vugs.	1	5	
									4	5 5 5 5	
								24'7" joint 5°	1	15	
								25'1" " 5°	1	20	
								25'3" " 5°	3	15 15 10	
								25'5" " 5°	0		5
								25'9" " 5°	1	5	
								26'5" " 15°	3	10 15 30	5
								27'10" " 20°	1	5	
								28'1" " 15°	5	5 [illegible]	
								28'7" " 15°	0		
								28'10" " 10°			
								30'7 " 5°			
								30'10 " 5°			
								31'1" " 10°			
								31'4" " 15°			
								31'7" " 30°			
								32'5" " 5° (lost 1' core)			
								33'1" " 5			
								33'5" " 5			
								33'8" " 5			
								33'10" " 5			
								33'11" " 5			
								34' 6" = bottom of core			

T.D. 35.5' by rod measurement

GENERAL NOTES:

37
27
27
91

45
45

Total Depth 35.5'
"ROCK" Drilling ______

Proportions used: trace 0-10%, little 10-20%, some 20-35%, and 35-50%

HOLE NO. ______

FIGURE 1

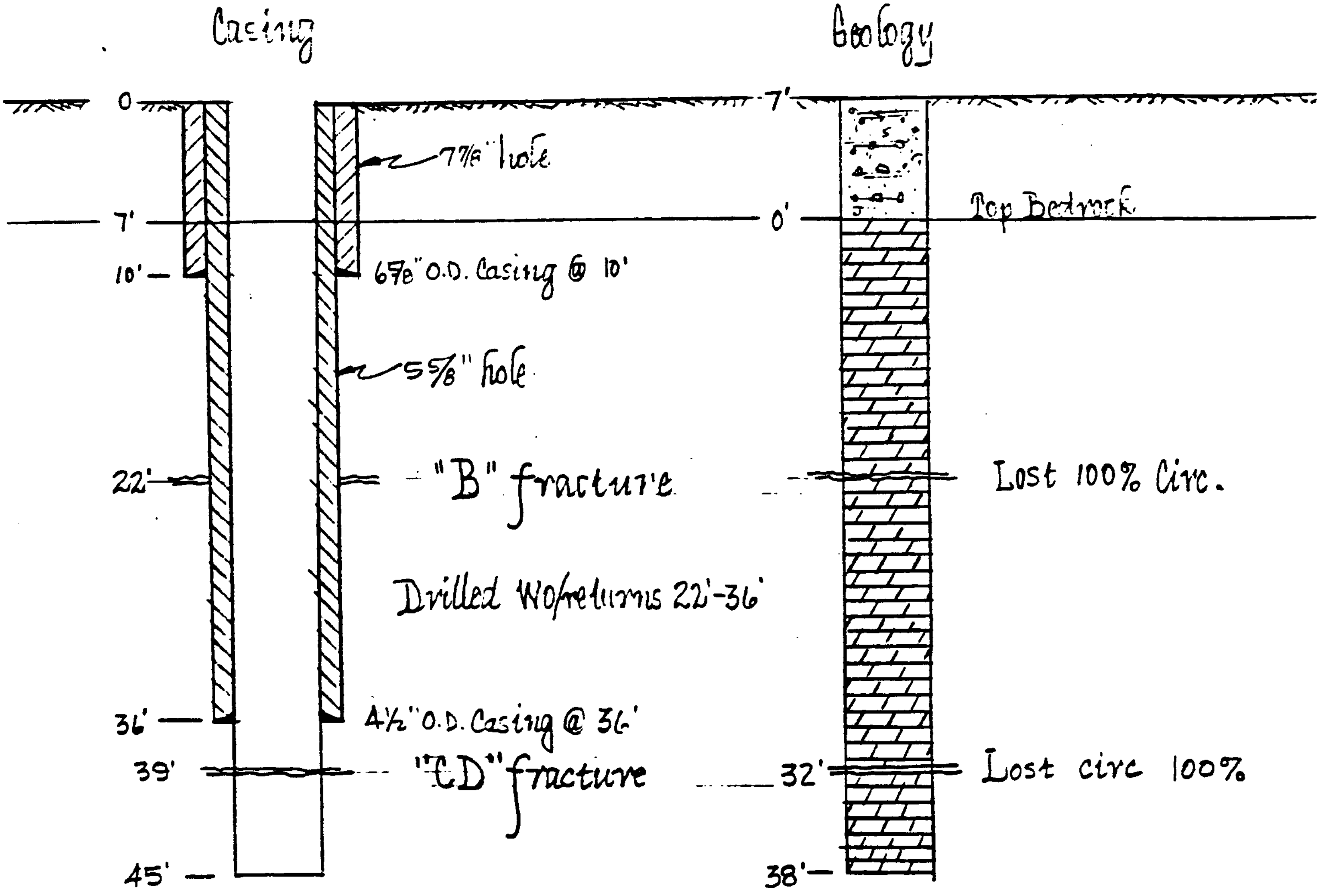
DuPont Exploratory Drilling Program
Well No. 19-CD #1

Plant Site 19

Spud 5-23-84

Hassell E. Hunter

5-25-84



No Odors

5/25/84

Scale 1" = 10'

Woodward-Clyde Consultants

Sheet ______ of ______

GROUND WATER OBSERVATION

At ______ Ft. at Completion

At ______ Ft. after ______ hrs.

At ______ Ft. after ______ hrs.

At ______ Ft. after ______ hrs.

JOB DuPont Niagara Plant NO. ______

DRILLING RIG CME-55

OPERATOR Rochester Drilling

INSPECTOR Harold E. Hunter

BORING NUMBER 19-CD

BORING OFFSET ______

SURFACE ELEVATION ______

DATE START 5-23-84 FINISH 5-25-84

CORE RUN From	CORE RUN To	RQD Inch	RQD %	RECOVERY Inch	RECOVERY %	Core Type & Resist.
Box 1 Run 1 36' to 45.5'		41/114	36%	111/114	97%	NX

FIELD IDENTIFICATION, TYPE AND COLOR WEATHERING, SEAMS IN ROCK, etc.

Dolomite, gray, [illegible], [illegible], dry

36'0"-36'1" broken
36'2 Joint 5°
36'4 " 30° - gyp
36'6" " 5°
36'9" " 15°
36'11" " 5°
37'2" " 10°
37'6" " 10° - gyp
37'7" " 15°
37'11" " 10°
38'2" " 5°
38'7" " 60°
38'10" " 10°
39'1" " 5
39'3" " 10
39'4" " 5 - mineralization - gyp
39'8 " 10°
39'11" " 10°
40'4" " 15°
40'7" " 10°
41'2" " 5
41'5" " 20° mineralization - gyp
42'2" " 20°
42'7" " 10°
42'10" " 5
43'3" 5°
43'5" 30°
43'7" 5°
44'0" 10°
44'3" 10°
45'1" 10°

Bottom of Core 45.5'

HH 5/25/84

DEPTH	FRACTURES No./Ft.	FRACTURES DIP	BED DIP
36	7	5 5 30 5	
37	4		
38	3	5 60 10	5
39	4	5 15 5 10	
40	2	15 10	
41	2	5 20	
42	3	20 10 5	
43	3	5 30 5	
44	2	10 10	5
45	1	10	

GENERAL NOTES:

Total Depth 45.5'

"ROCK" Drilling ______

Proportions used: trace 0-10%, little 10-20%, some 20-35%, and 35-50%

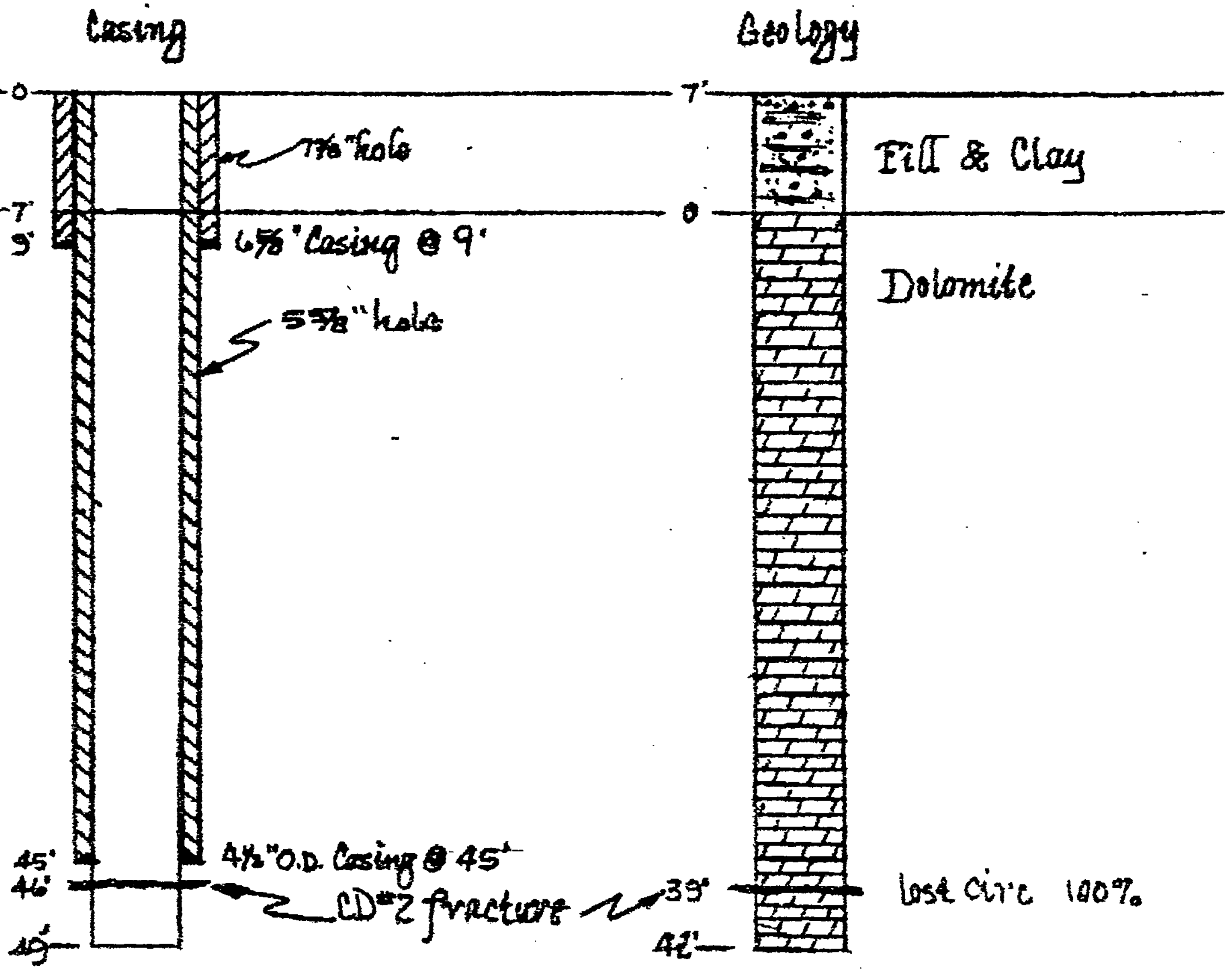
HOLE NO.

FIGURE 1

ENGINEERING DUPONT COMPUTATION SHEET

DuPont Exploratry Drilling Program 19-CD
Well No. 19-CD#2

Spud 5-4-84 Computed by Hassell E. Hunter 5-6-84



No Odor Encountered

6/5/84

dward-Clyde Consultants

FIELD ROCK DESCRIPTION LO

Sheet ______ of ______

ROUND WATER OBSERVATION
At ______ Ft. at Completion
t ______ Ft. after ______ hrs.
t ______ Ft. after ______ hrs.
t ______ Ft. after ______ hrs.

JOB DuPont Niagara Plant NO. ______
DRILLING RIG B-61
OPERATOR Rochester Drilling
INSPECTOR Russell E. Huntley

BORING NUMBER 19-CD#2
BORING OFFSET ______
SURFACE ELEVATION ______
DATE START 6-4-84 FINISH 6-5-84

CORE RUN From	CORE RUN To	RQD Inch	RQD %	RECOVERY Inch	RECOVERY %	Core Type & Realist.	STRATA CHANGE DEPTH	FIELD IDENTIFICATION, TYPE AND COLOR WEATHERING, SEAMS IN ROCK, etc.	FRACTURES No./Ft.	FRACTURES DIP	BED DIP
Box 1											
Run 1 45 to 49		27/48 56%		48/48 100%		NX	gyp gyp	Dolomite, gray to dark gray, dense, fine gr. 45'8" joint 5° 46'0" fracture 45° - CD#3 fracture 46'6" Joint 10° - w/gyp 46'10" " 5° 47'1" " 20° 47'5" " 10° 47'10" " 10° w/gyp	1 3 3 0	5 15 10 5 30 20 10	5 5
Total Depth 49'											

6/5/84

ERAL NOTES:

Total Depth 49
"ROCK" Drilling ______

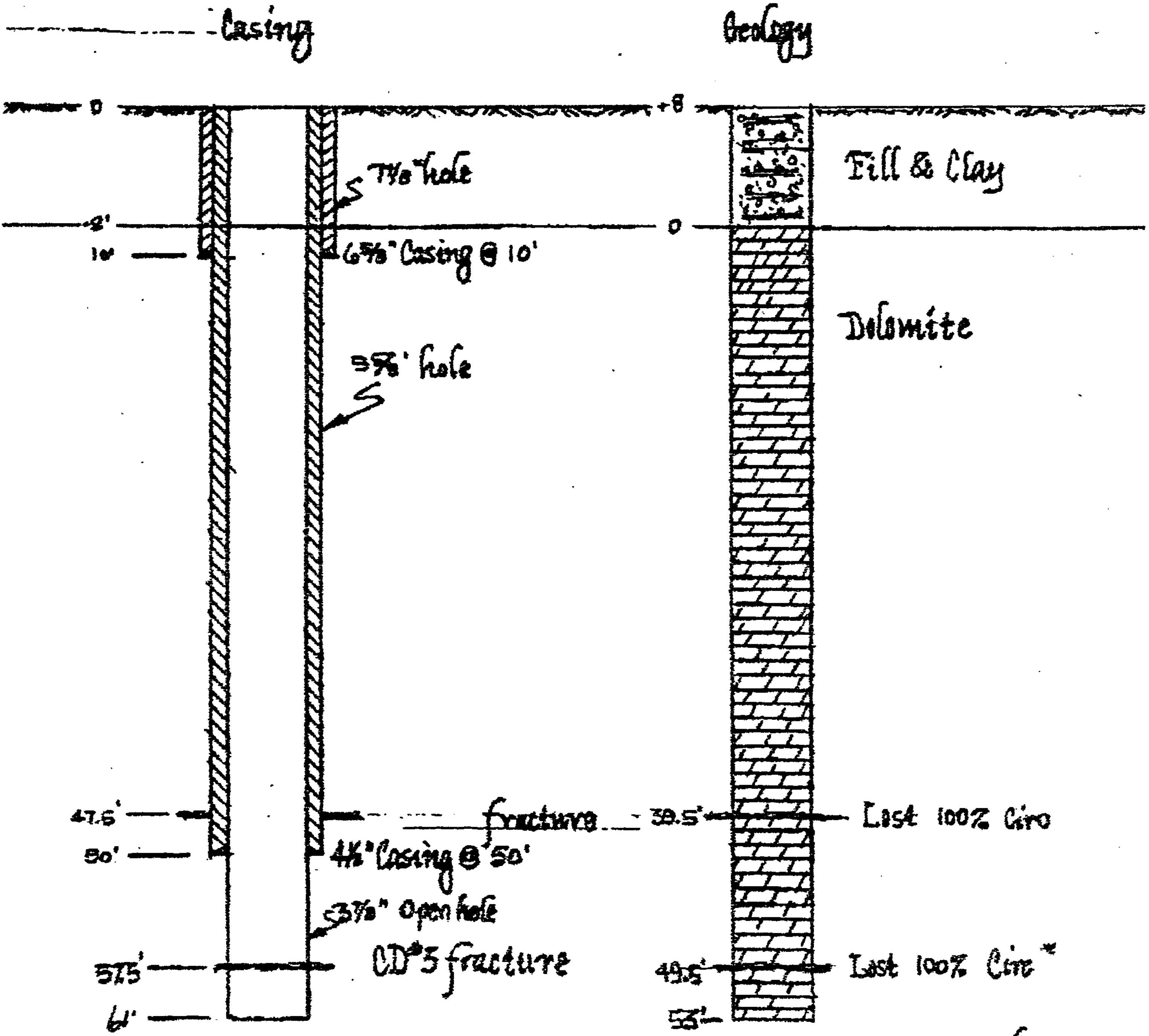
rtions used: trace 0-10%, little 10-20%, some 20-35%, and 35-50%

ENGINEERING COMPUTATION SHEET

DuPont Exploratory Drilling Program 19-CD

Well No. 19-CD#3 Plant Site 19

Spud 5-30-84 Computed Hassell E. Hunter 6-1-84



No Odor encountered

6-1-84

* Water level near surface while coring and reaming

Woodward-Clyde Consultants

Sheet ______ of ______

GROUND WATER OBSERVATION
At ______ Ft. at Completion
At ______ Ft. after ______ hrs.
At ______ Ft. after ______ hrs.
At ______ Ft. after ______ hrs.

JOB DuPont Niagara Plant NO. ______
DRILLING RIG Mobile Rig B61
OPERATOR Rochester Drilling
INSPECTOR Hassell E. Huntard

BORING NUMBER 19-CD #3
BORING OFFSET ______
SURFACE ELEVATION ______
DATE START 5-30-84 FINISH 6-1-84

D	CORE RUN From	CORE RUN To	RQD Inch	RQD %	RECOVERY Inch	RECOVERY %	Core Type & Resist.	STRATA CHANGE DEPTH	FIELD IDENTIFICATION, TYPE AND COLOR WEATHERING, SEAMS IN ROCK, etc.	FRACTURES No./Ft.	FRACTURES DIP	BED DIP
51	Box 1 Run 1						NX		Dolomite, gray, dense, med. gr., gyp at 56'4 - 56'7" 52'1" joint 10° 52'10" " 20° 53'6" " 15° 56'4" " 60° = 2" thick gyp 56'7" " 10° 57'1" " 5° 57'5" " 20° 57'5" - 58'8" } Broken - fractured - Lost circ 100% 61'2" Joint 5	0		
52	51'		100/120		120/120					2	10 20	
53	to 61'					100%				1	15	
54										0		
55										0		
56								GYP			60 10	
57										2	5 20	
58										Broken	XX XX XX XX	
59										0		
60										1	5	
61												

HH 6/1/84

GENERAL NOTES:

Total Depth 61'
"ROCK" Drilling ______

Proportions used: trace 0-10%, little 10-20%, some 20-35%, and 35-50%

HOLE NO.

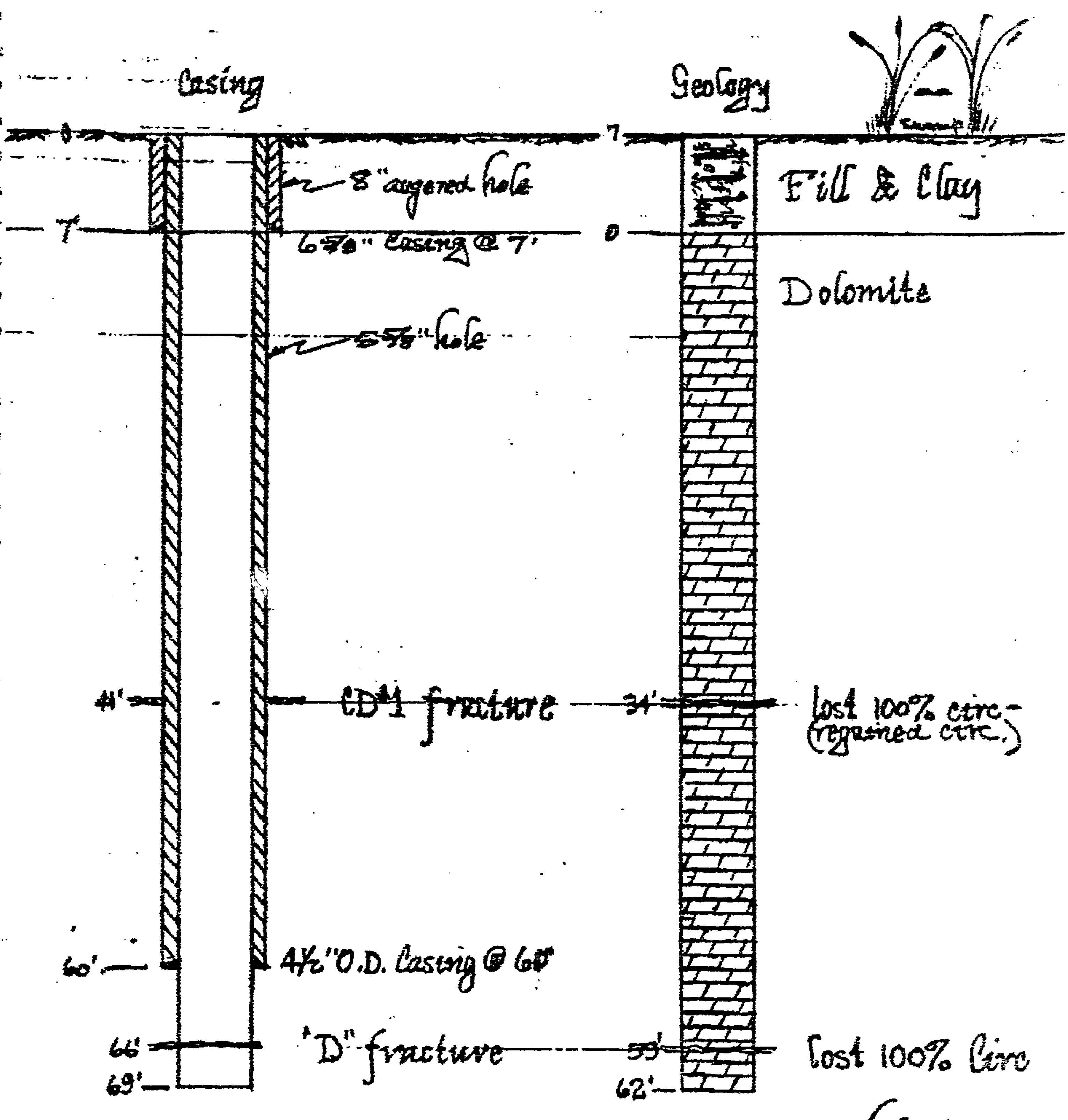
FIGURE 1

ENGINEERING COMPUTATION SHEET

DuPont Exploratory Drilling Program 19-D

Well No. 19-D Plant

Spud 6-6-84 Hassell Hunter 6-8-84



No Odors

6/8/84

Scale 1" = 10'

odward-Clyde Consultants

FIELD ROCK DESCRIPTION LO

Sheet 1 of 1

GROUND WATER OBSERVATION
At ________ Ft. at Completion
At ________ Ft. after ______ hrs.
At ________ Ft. after ______ hrs.
At ________ Ft. after ______ hrs.

JOB DuPont Niagara Plant NO. ________
DRILLING RIG CME-55
OPERATOR Rochester Drilling
INSPECTOR Russell E. Hunter

BORING NUMBER 19-D
BORING OFFSET ________
SURFACE ELEVATION ________
DATE START 6-6-84 FINISH 6-8-8

CORE RUN From	CORE RUN To	RQD Inch	RQD %	RECOVERY Inch	RECOVERY %	Core Type & Barrel	STRATA CHANGE DEPTH	FIELD IDENTIFICATION, TYPE AND COLOR WEATHERING, SEAMS IN ROCK, etc.	FRACTURES No./Ft.	FRACTURES DIP	BE DI
Box 1 Run 1 60' to 69'		47/108 44%		106'/108' 98%		NX		Dolomite, gray, dense 60'1" joint 10° 60'8" " 20° 60'10" " 5° 62'0" " 70° -Vert fracture 62'7" " 5+ 63'0" " 5° 65'10" fracture 5° (2" core missing) 66'9" joint 5° 67'4" " 5° 67'7" " 5° 68'2" " 10° 68'3" " 5° 68'5" " 5° 68'7" " 5° 68'8" " 5° 68'9" " 5° 68'10" " 5° 68'11" " 5°	3 0 2 1 0 1 1 2 8	10 20 5 70 5 5 5 5 5 5	5

GENERAL NOTES:

Lost 100% circulation @ 66'

Total Depth ________
"ROCK" Drilling ________

portions used: trace 0-10%, little 10-20%, some 20-35%, and 35-50%

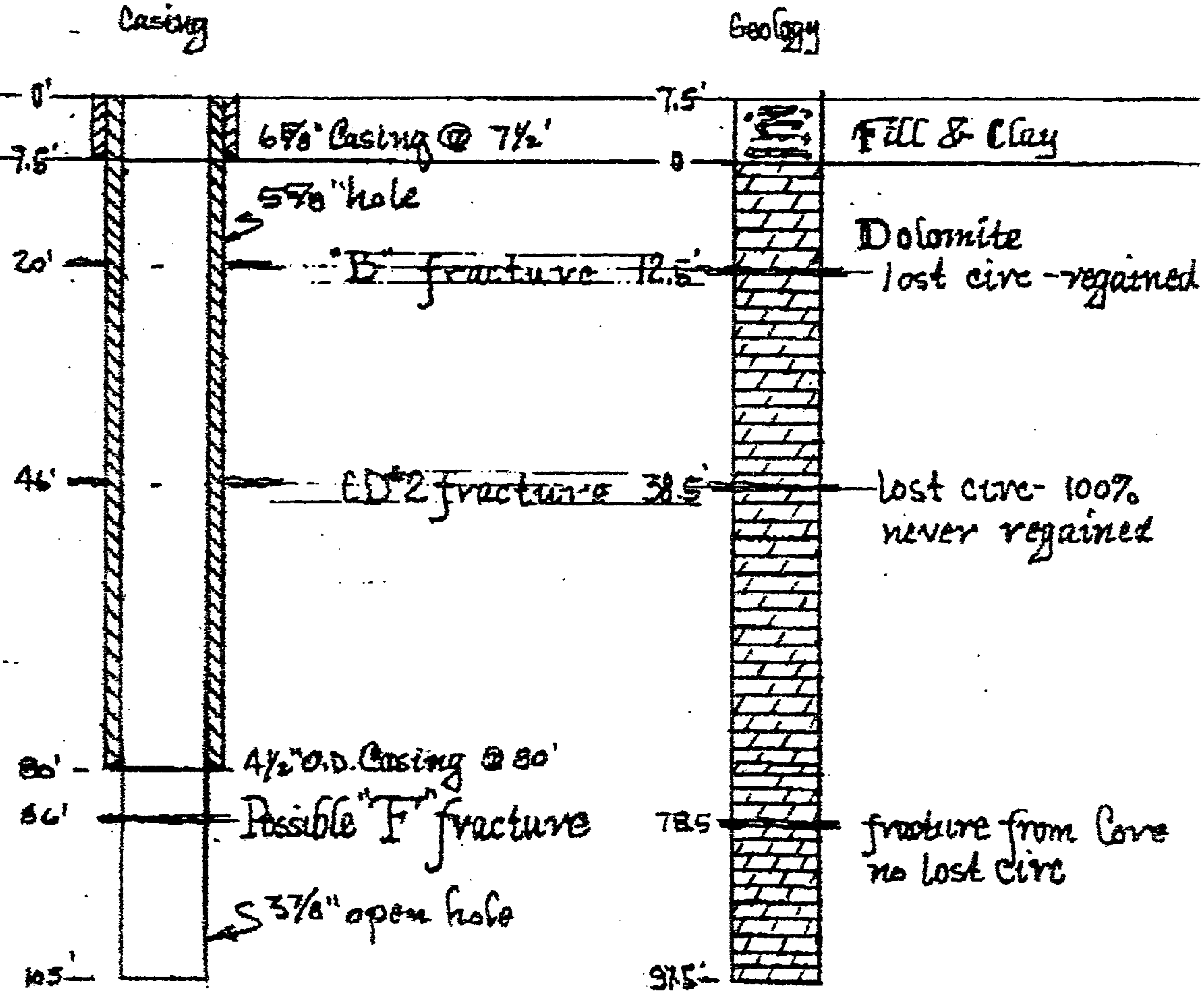
HOLE NO. 19-D

ENGINEERING COMPUTATION SHEET

Title of Project or Study: DuPont Exploratory Drilling Program — Serial or Study No. 19-F

Subject: Well No. 19-F

Spud 6-6-84 — Computed: Hassell Hunter — Date: 6-7-84



No Odors

HH

Scale 1" = 20'

odward-Clyde Consultants

FIELD ROCK DESCRIPTION L

Sheet 1 of 2

GROUND WATER OBSERVATION
At ________ Ft. at Completion
At ________ Ft. after ______ hrs.
At ________ Ft. after ______ hrs.
At ________ Ft. after ______ hrs.

JOB DuPont Niagara Falls No.
DRILLING RIG Mobile Rig B-61
OPERATOR Rochester Drilling
INSPECTOR Hassell B. Hunter

BORING NUMBER 19-E
BORING OFFSET ________
SURFACE ELEVATION ________
DATE START 6-6-84 FINISH 6-7

CORE RUN From	CORE RUN To	RQD inch	RQD %	RECOVERY inch	RECOVERY %	Core Type & Resist.	STRATA CHANGE DEPTH	FIELD IDENTIFICATION, TYPE AND COLOR WEATHERING, SEAMS IN ROCK, etc.	FRACTURES No./Ft.	FRACTURES DIP
Box 1 Run 1 81 to 85		44/48	92%	48/48	100%	NX		Dolomite, gray, dense, no porosity, med gr., occasionan gyp 80'7 joint 5° 84'4' " 15°	1 0 0 1	5 15°
Box 1 Run 2		84/120	70%	115/120	96%	NX		Dolomite, same as above 85'1" joint 5° 85'2" " 0° 86'1" fracture – no Lost circ 86'5 joint 15° 87'0" " 10° 87'10" " 20° 88'2" " 5° 88'11" " 5° w/gyp 89'5" " 10° 89'7" " 20° minerilization 89'8" " 10° 90'6" " 25° 90'7" " 10° – poss. fracture ???? 90'10" " 5° 91'0" " 5° 91'3" " 5° 91' 5" " 5° 91' 8" " 5° 91' 11" " 6° 92' 6" " 5+	2 2 2 2 3 3 5 1	5 5 0 15 10 20 5 5 10 20 10 25 10 5 5

ENERAL NOTES:

Total Depth 10

"ROCK" Drilling ____

roportions used: trace 0-10%, little 10-20%, some 20-35%, and 35-50%

HOLE NO. 19

odward-Clyde Consultants

FIELD ROCK DESCRIPTION LC

Sheet 2 of 2

GROUND WATER OBSERVATION
At ________ Ft. at Completion
At ________ Ft. after ______ hrs.
At ________ Ft. after ______ hrs.
At ________ Ft. after ______ hrs.

JOB DuPont NO: ________
DRILLING RIG B-61
OPERATOR Rochester
INSPECTOR Hassell E. Hunter

BORING NUMBER 19-F
BORING OFFSET ________
SURFACE ELEVATION ________
DATE START 6-6-84 FINISH 6-7-8

CORE RUN		RQD		RECOVERY		Core Type & Hole Size	STRATA CHANGE DEPTH	FIELD IDENTIFICATION, TYPE AND COLOR WEATHERING, SEAMS IN ROCK, etc.	FRACTURES		B
From	To	Inch	%	Inch	%				No./Ft.	DIP	D
Box 1											
Run 2 Cont Box 2								Dolomite, same as previous page 93'3' joint 5+ 93'4' " 10° 94'4' 5+	2 1	5 10 5	
Run 3 95' to 105'		124/120 100%		124/124 100%		NX		Dolomite, drk gray, dense, occasional gyp, meagr. no porosity, no fractures Trace shale partings 97'2" joint 10° 98'5" " 30° 98'10" " 15° 101'5" Mechanical 5° – Driller	0 0 1 2 0 0 1 0 0 0	10° 20 15 5	

GENERAL NOTES:

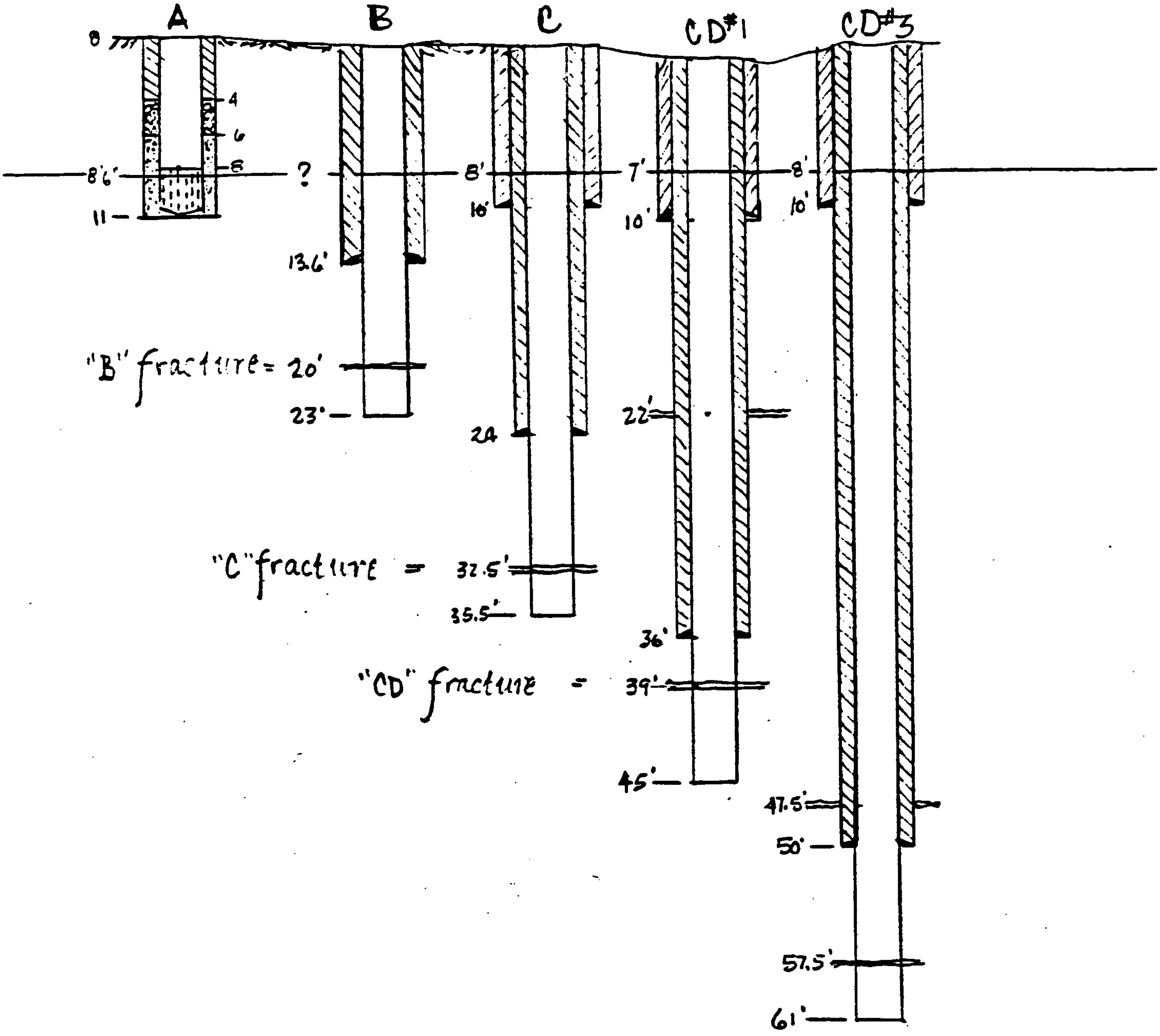
Total Depth 105

"ROCK" Drilling ____

Proportions used: trace 0-10%, little 10-20%, some 20-35%, and 35-50%

HOLE NO. 19-F

DuPont Exploratory Drilling
Site 19 Wells



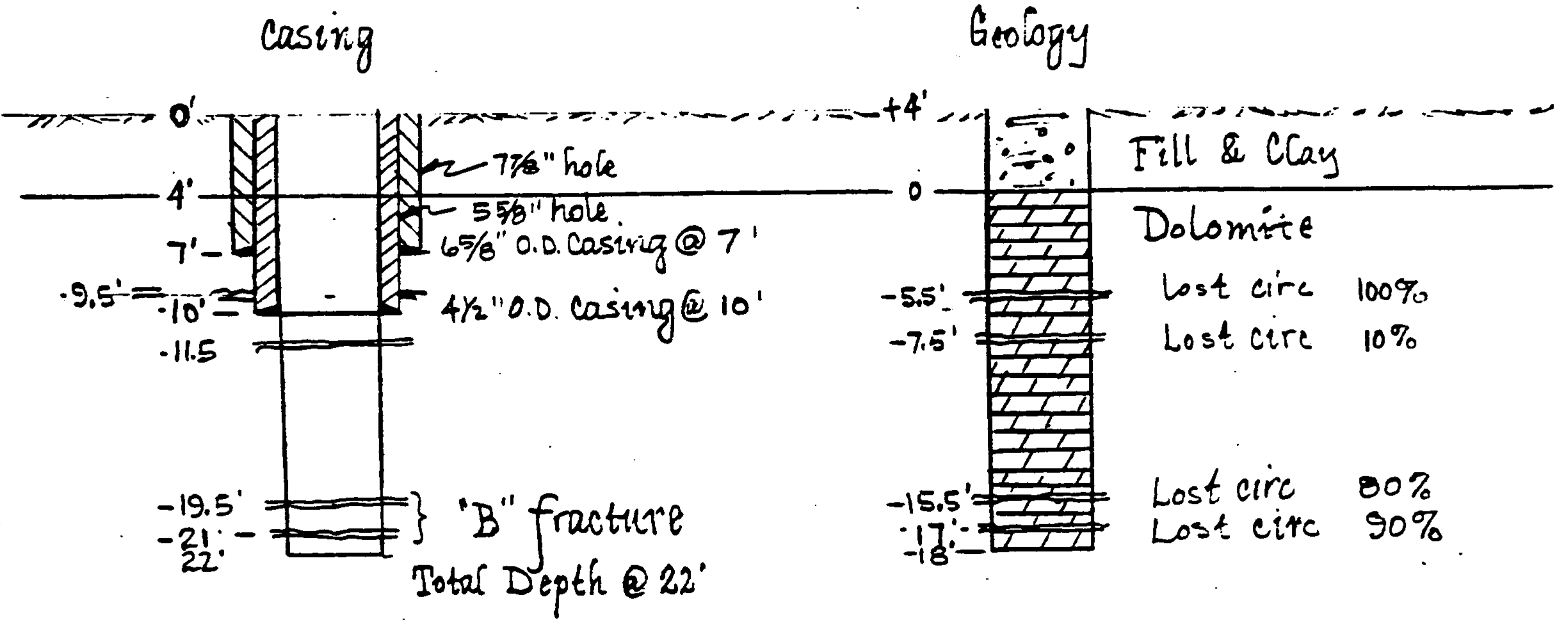
DuPont Exploratory Drilling Program
Well No 20-B

Plant Site

Spud 5-16-84

Hassell E Hunter

5-18-84



No odors detected

5-18-84

Scale 1" = 10'

Woodward-Clyde Consultants

Sheet 1 of 2

GROUND WATER OBSERVATION

At ________ Ft. at Completion

At ________ Ft. after ______ hrs.

At ________ Ft. after ______ hrs.

At ________ Ft. after ______ hrs.

JOB DuPont Niagara Plant NO. ________

DRILLING RIG B61

OPERATOR Rochester

INSPECTOR Hassell Heriter

BORING NUMBER 20-B

BORING OFFSET ________

SURFACE ELEVATION ________

DATE START ________ FINISH ________

DEPTH	CORE RUN From	CORE RUN To	RQD Inch	RQD %	RECOVERY Inch	RECOVERY %	Core Type & Resist.	STRATA CHANGE DEPTH	FIELD IDENTIFICATION, TYPE AND COLOR WEATHERING, SEAMS IN ROCK, etc.	FRACTURES No./Ft.	FRACTURES DIP	BED DIP
7 8 0	Box 1 Run 1 7' to 10.5'		9"/41" 22%		35"/41" 85%		NX		7'1" Joint <5° 7'4" " <5° 7'8" " 5° 7'9" " 10 7'11" " 10 8'0" " 5 8'2" " 10 8'4" " 10 8'9" " 15° 8'10" " 10 9'2" " 5 9'5" " 10° Dolomite, dense, hard, dry	5 5 2	5 5 5 10 10 5 5 5 10 5 10	5
11 12 13 14	Box 1 Run 2 10.5' to 15'		29"/57" 51%		57"/57" 100%			Porous	10'9" Joint 20° 11'2" " 30° 11'6" " 5° 11'7" " 5° 11'8" " 5 11'9" " 5 11'10" " 5 12'4" " 5 12'6" " 5 13'2" " 10 13'7" " 10 14'2 " 5 14'10 " 5 Dolomite Porous, wet	1 6 2 2 2	20 30 5 5 5 5 5 5 10 10 5 5	5
15 16 17 18 19	Box 1 Run 3 15' to 22'		22"/84"		68"/84" 81%				15'1" Joint 5° 15'3" " 5° 15'7" " 10° 15'9" " 5° 15'11" " 10° 16'5" " 10 16'8" " 10 17'6" Broken 17'8" " 18'0 Joint 5° 18'6" " 5 18'9" " 5 18'10" " 5 18'11" " 5 19'0" " 5 Dolomite	5 2 6	5 5 10 5 10 10 5 5 5 5 5 5	5

GENERAL NOTES:

Total Depth 22'

"ROCK" Drilling ________

Proportions used: trace 0-10%, little 10-20%, some 20-35%, and 35-50%

HOLE NO. 20B

FIGURE 1

Woodward-Clyde Consultants

FIELD ROCK DESCRIPTION LOG

Sheet 2 of 2

GROUND WATER OBSERVATION At ____ Ft. at Completion At ____ Ft. after ____ hrs. At ____ Ft. after ____ hrs. At ____ Ft. after ____ hrs.	JOB DuPont Niagara Plant NO. ____ DRILLING RIG RG1 OPERATOR Rochester INSPECTOR Russell E. Hunter	BORING NUMBER 20-B BORING OFFSET ____ SURFACE ELEVATION ____ DATE START ____ FINISH ____

D	CORE RUN From	CORE RUN To	RQD Inch	RQD %	RECOVERY Inch	RECOVERY %	Core Type & Resist.	STRATA CHANGE DEPTH	FIELD IDENTIFICATION, TYPE AND COLOR WEATHERING, SEAMS IN ROCK, etc.	FRACTURES No./Ft.	FRACTURES DIP	BED DIP
	Box 1											
19 20 21	Run 3 Cont.								19'1" Joint 5° 19'2" " 5° 19'4" " 5 19'8" " 5 19'11" " 10° - vug 20'2" " 10° 20'6 " 5° 20'9 Fracture 10° Broken - vuggy Dolomite, dry	5 3 lost	5 5 5 10 10 5 10	5
22									20'9" = last core depth 22'0" = measured depth			

GENERAL NOTES:

Total Depth 22'

"ROCK" Drilling ____

Proportions used: trace 0-10%, little 10-20%, some 20-35%, and 35-50%

HOLE NO. 20B

FIGURE 1

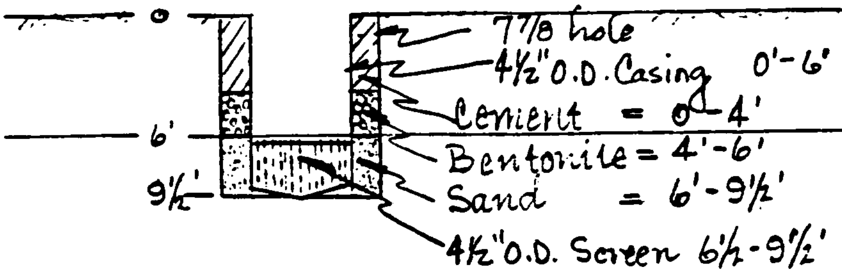
DuPont Exploratory Drilling Program
Well 22A

22-A
Parking Lot

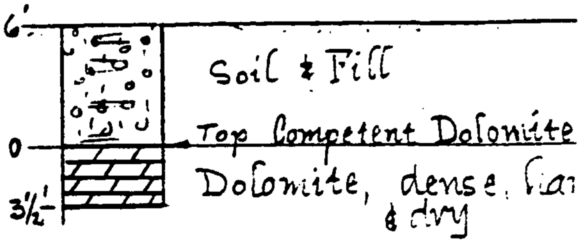
Spud 5-9-84

Hassell E. Hunter 5-11-84

Casing



Geology



No odor detected

5-11-84

Scale 1" = 10'

Woodward-Clyde Consultants

Sheet ______ of ______

GROUND WATER OBSERVATION
At ______ Ft. at Completion
At ______ Ft. after ______ hrs.
At ______ Ft. after ______ hrs.
At ______ Ft. after ______ hrs.

JOB DuPont Niagara Plant NO. ______
DRILLING RIG CME-55
OPERATOR Rochester Drilling Co
INSPECTOR Russell F Hunter

BORING NUMBER 22 - Soil
BORING OFFSET ______
SURFACE ELEVATION ______
DATE START 5-29 FINISH 5-29-84

H	CORE RUN		RQ D		RECOVERY		Core Type & Resist.	STRATA CHANGE DEPTH	FIELD IDENTIFICATION, TYPE AND COLOR WEATHERING, SEAMS IN ROCK, etc.	FRACTURES		BED
	From	To	Inch	%	Inch	%				No./Ft.	DIP	DIP
0									0'-1' Asphalt & Cinders			
									1'-1'8" Clay - brown - firm - moist			
									1'8"-3'0" Clay - light brown - moist			
									3'0"-4'0" Clay, lt. brn-tan, crumbly; dry unconsolidated, dolomite fragments			
									4'0" = depth of refusal no odor no contaminants no water 5/29/84			

ENERAL NOTES:

Total Depth 4'
"ROCK" Drilling ______

Proportions used: trace 0-10%, little 10-20%, some 20-35%, and 35-50%

HOLE NO. 22-S

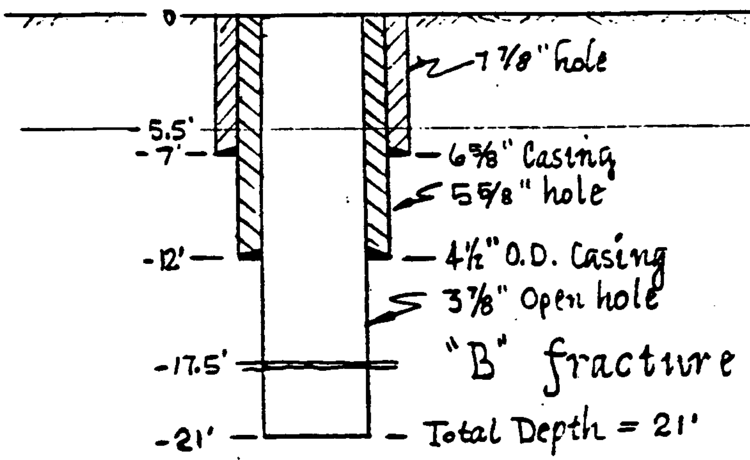
FIGURE 1

DuPont Exploratory Drilling Program
Well No. 22-B

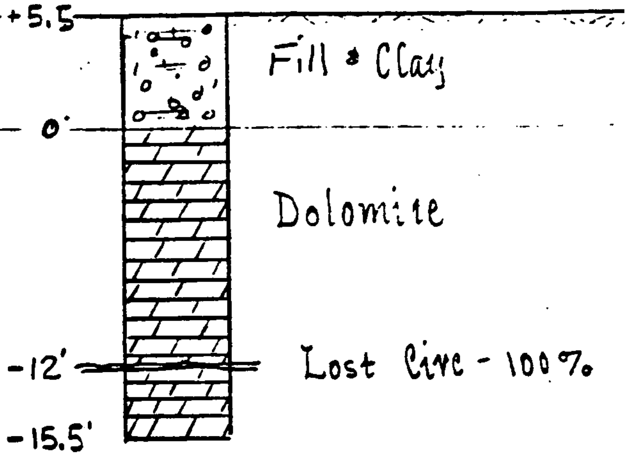
Spud 5-14-84

Hassell E. Hunter 5-15-84

Casing



Geology



No odor detected

5/15/84

Scale 1" = 10'

Woodward-Clyde Consultants

Sheet 1 of 2

GROUND WATER OBSERVATION

At ______ Ft. at Completion
At ______ Ft. after ______ hrs.
At ______ Ft. after ______ hrs.
At ______ Ft. after ______ hrs.

JOB DuPont Niagara Plant NO. ______
DRILLING RIG Mobile Rig - B61
OPERATOR Rochester Drilling Co.
INSPECTOR Russell E. Hunter

BORING NUMBER 22-B
BORING OFFSET ______
SURFACE ELEVATION ______
DATE START 5-14-84 FINISH ______

	CORE RUN		RQD		RECOVERY		Core Type & Resist.	STRATA CHANGE DEPTH	FIELD IDENTIFICATION, TYPE AND COLOR WEATHERING, SEAMS IN ROCK, etc.	FRACTURES		BED
	From	To	Inch	%	Inch	%				No./Ft.	DIP	DIP
	Box 1								7			
7	Run 1						NX		Dolomite	broken	XXX	
8	7'		6		60"				7'0' - 8'0' broken 8		15	
	to		60		60"				8'3' joint 15°		10	
	12'								8'7' " 10		xxx	
9				10%		100%			8'7" - 9'8" broken - vert fracture 9		90°	5
									9'8" - 10'3 vert fracture			
10									10'3' - 10'6" broken 10		xxx	
									10'9 - joint - 20°		20°	5
11									11'5' " 10°		10	
									11'5' - 11'7" broken 11		xxxx	
12									11'9 joint 10° - broken 12			

ENERAL NOTES:

Total Depth ______
"ROCK" Drilling ______

roportions used: trace 0-10%, little 10-20%, some 20-35%, and 35-50%

HOLE NO.

FIGURE 1

Woodward-Clyde Consultants

Sheet 2 of 2

GROUND WATER OBSERVATION		
At ____ Ft. at Completion	JOB DuPont Niagara Plant NO. ____	BORING NUMBER 22-B
At ____ Ft. after ____ hrs.	DRILLING RIG Moble Rig -B61	BORING OFFSET ____
At ____ Ft. after ____ hrs.	OPERATOR Rochester Drilling Co.	SURFACE ELEVATION ____
At ____ Ft. after ____ hrs.	INSPECTOR Russell E. Hunter	DATE START 5-14-84 FINISH 5-15-84

DEPTH	CORE RUN		RQD		RECOVERY		Core Type & Resist.	STRATA CHANGE DEPTH	FIELD IDENTIFICATION, TYPE AND COLOR WEATHERING, SEAMS IN ROCK, etc.	FRACTURES		BED
	From	To	Inch	%	Inch	%				No./Ft.	DIP	DIP
	Box 1											
13	Run 2						NX		Dolomite grey, dense, hard	4	5 5 5 5	
14	13'		57" 96"		89" 96"				13'1" Joint < 5° 13'4" " < 5° 13'8" " < 5° 13'9" " < 5°	3	10 10 5	<5
15	to								14'4" " 10° 14'8" " 10° 14'10" " 5°	4	5 10 10 5	
	21'		59%		93%				15'4 " 5° 15'9" " 10° 15'10" " 10° 15'11" " 10°	2	5 5	<5
									16'2" " 5° 16'7" " 5°	3	5 5 5	
									17'3" " 5° 17'6" " 5° 17'9" " 5°	2	10 10	<5
									18'3" " 10° 18'9" fract. 10°	1	10	
									19'10" " 10°	1	5	<5
	Total Depth 21'								20'2" Joint 5			

4½" Casing set @ 12'

GENERAL NOTES:

Total Depth 21'

"ROCK" Drilling ____

Proportions used: trace 0-10%, little 10-20%, some 20-35%, and 35-50%

HOLE NO. 22-B

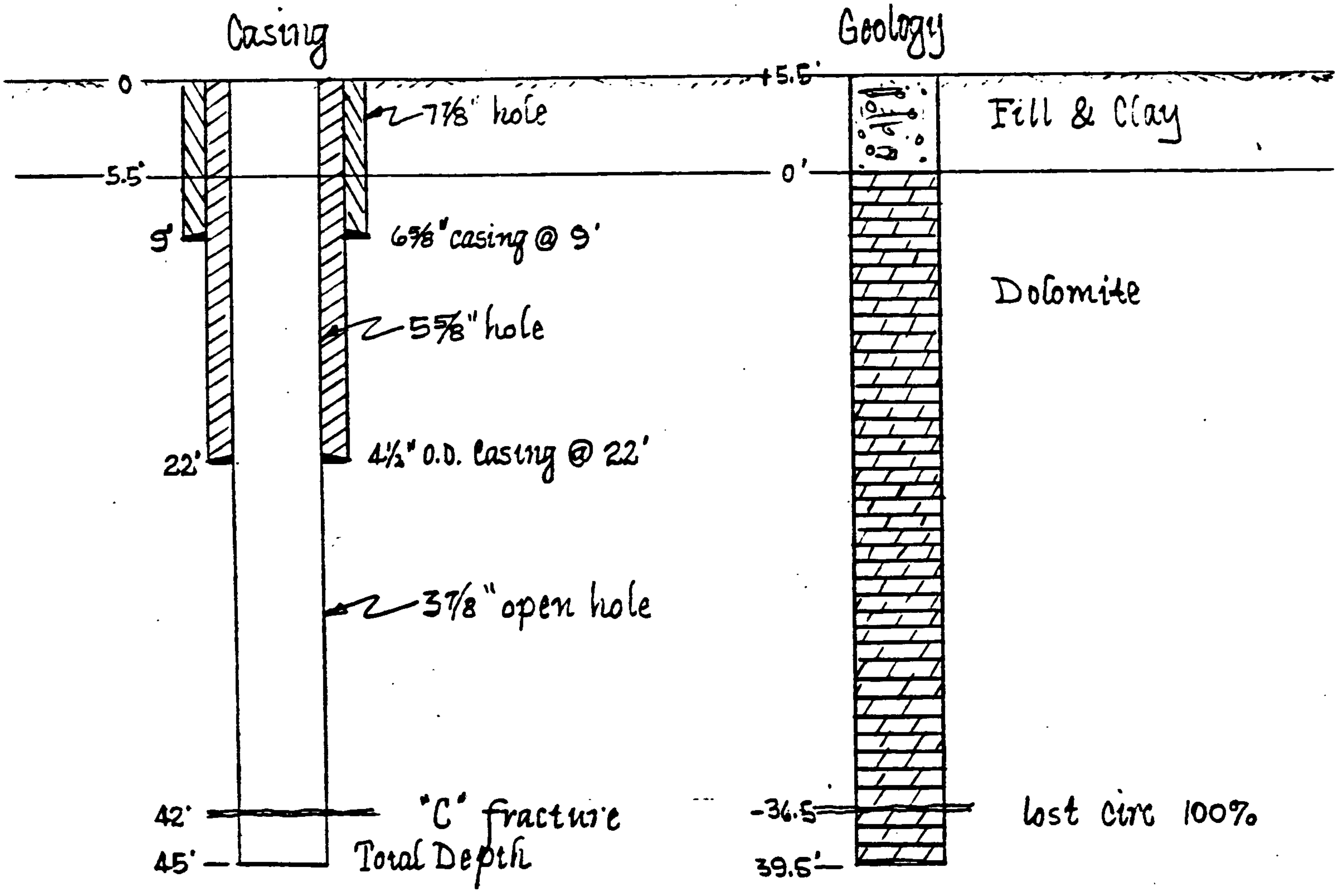
FIGURE 1

DuPont Exploratory Drilling Program
Well No 22-C

22-C
Parking Lot

Spud 5-15-84

Hassell E Hunter 5-17-84



No odor detected

5/17/84

Scale 1" = 10'

FIELD ROCK DESCRIPTION LOG

Woodward-Clyde Consultants

Sheet 1 of 2

GROUND WATER OBSERVATION
At ______ Ft. at Completion
At ______ Ft. after ______ hrs.
At ______ Ft. after ______ hrs.
At ______ Ft. after ______ hrs.

JOB DuPont Niagara Plant NO. ______
DRILLING RIG Mobile Rig - B61
OPERATOR Rochester Drilling
INSPECTOR Hassell E. Hunter

BORING NUMBER 22-C
BORING OFFSET ______
SURFACE ELEVATION ______
DATE START 5-15-84 FINISH ______

D	CORE RUN		RQD		RECOVERY		Core Type & Resist.	STRATA CHANGE DEPTH	FIELD IDENTIFICATION, TYPE AND COLOR WEATHERING, SEAMS IN ROCK, etc.	FRACTURES		BED
	From	To	Inch	%	Inch	%				No./Ft.	DIP	DIP
	Box 1											
23	Run 1 22'11"		105" 123"				NX		23'4" joint 20° 23'5" 24'5" } Broken Dolomite gray, dense hard	1	20°	
24	to 33'2"			85%					26'3" joint 5° 26'8" " 5°			5
25									28'8" " 20° 28'10" " 10°	0		
26									31'8" joint 10° 32'1" " 10° 32'2" " 10°	2	5° 5°	
27									33'0" " 5°	0		
28										2	20° 10°	
9										0		
0										0		5
1										1	10°	
2								Shale Gyp		1	10 10 5	
33		33'2"								1		

ENERAL NOTES:

Total Depth ______
"ROCK" Drilling ______

roportions used: trace 0-10%, little 10-20%, some 20-35%, and 35-50%

HOLE NO.

FIGURE 1

Voodward-Clyde Consultants

Sheet 2 of 2

GROUND WATER OBSERVATION
At ______ Ft. at Completion
At ______ Ft. after ______ hrs.
At ______ Ft. after ______ hrs.
At ______ Ft. after ______ hrs.

JOB DuPont NO. ______
DRILLING RIG B61
OPERATOR Rochester
INSPECTOR Russell E. Hunter

BORING NUMBER 22-C
BORING OFFSET ______
SURFACE ELEVATION ______
DATE START 5-14-84 FINISH 5-16-84

	CORE RUN		RQD		RECOVERY		Core Type & Resist.	STRATA CHANGE DEPTH	FIELD IDENTIFICATION, TYPE AND COLOR WEATHERING, SEAMS IN ROCK, etc.	FRACTURES		BED
	From	To	Inch	%	Inch	%				No./Ft.	DIP	DIP
-33	Box 1											
-34 -35 -37	Run 2 33'2" to 38'		58"/58"	100%	58"/58"	100%	NX	°°° Vugs	36'4" Core break Dolomite, grey, hard, dense	0 0 0 0 0		5
	Box 2											
38 9 0 1 42	Run 2 38' to 43'3"		56/63"	89%	63"/63"	100%	NX	42'	41'11" } "C" fracture, Broken Core 42'3" } 42'5" joint 10° Dolomite same as above "C"-fracture Lost 100% circulation	0 0 0 0 1	~~xxx~~ 10	5
-43	Box 2											
-44 -45	Run 3 43'3" to 45'								44'0" joint 5° 44'10" " 5° at shale parting Dolomite as above	0 2	5 5	

ENERAL NOTES:

Total Depth 45
'ROCK' Drilling ______

roportions used: trace 0-10%, little 10-20%, some 20-35%, and 35-50%

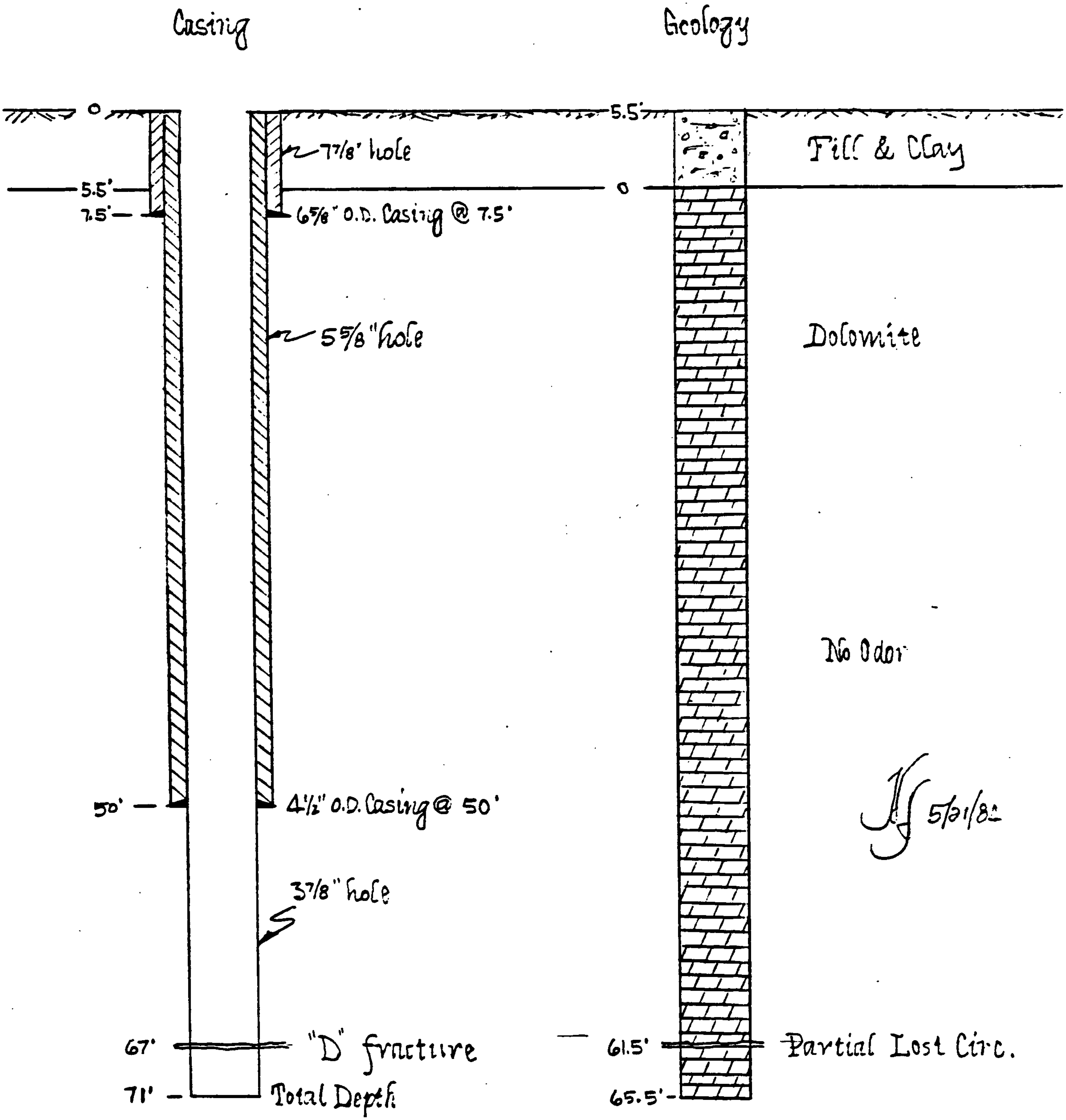
HOLE NO. 22C

FIGURE 1

DuPont Exploratory Drilling Program 22-D

Well No. 22-D Parking Lot

Spud 5-17-84 Hassell E. Hunter 5-21-84



5/21/84

Woodward-Clyde Consultants

Sheet 1 of 2

GROUND WATER OBSERVATION
At ________ Ft. at Completion
At ________ Ft. after ______ hrs.
At ________ Ft. after ______ hrs.
At ________ Ft. after ______ hrs.

JOB De Pere Nicolet Plant NO. ________
DRILLING RIG B6'
OPERATOR Rochester
INSPECTOR Russell E. Hunter

BORING NUMBER 22-D
BORING OFFSET ________
SURFACE ELEVATION ________
DATE START ______ FINISH ______

H	CORE RUN		RQD		RECOVERY		Core Type & Resist.	STRATA CHANGE DEPTH	FIELD IDENTIFICATION, TYPE AND COLOR WEATHERING, SEAMS IN ROCK, etc.	FRACTURES		BED
	From	To	Inch	%	Inch	%				No./Ft.	DIP	DIP
	Box 1											
50	Run 1								Start Coring @ 50'10"			
51	50'10" to 61'0"		118"/122"		122"/122"				51'5" Joint 25° 51'6" " 20° } vertical fracture 51'9" " 10° 53'0" " 10° 56'9 " 5° 58'8 " 10°	3	25° 20 10	
52				97%		100%				0		
53										1	10	
54										0		5
55									Dolomite, grey, med grain, dense hard, dry, no visable water bearing zones	0		
56										1	5	
57										0		
58										1	10	
59										0		
60										0		
61												

ENERAL NOTES:

Total Depth ______
"ROCK" Drilling ______

roportions used: trace 0-10%, little 10-20%, some 20-35%, and 35-50%

HOLE NO.

FIGURE 1

Woodward-Clyde Consultants

Sheet 2 of 2

GROUND WATER OBSERVATION
At ________ Ft. at Completion
At ________ Ft. after ______ hrs.
At ________ Ft. after ______ hrs.
At ________ Ft. after ______ hrs.

JOB DuPont Niagara Plant NO. ________
DRILLING RIG B61
OPERATOR Rochester
INSPECTOR Fassell E. Hughes

BORING NUMBER 22-D
BORING OFFSET ________
SURFACE ELEVATION ________
DATE START ______ FINISH 5-21-84

DEPTH	CORE RUN		RQD		RECOVERY		Core Type & Resist.	STRATA CHANGE DEPTH	FIELD IDENTIFICATION, TYPE AND COLOR WEATHERING, SEAMS IN ROCK, etc.	FRACTURES		BED
	From	To	Inch	%	Inch	%				No./Ft.	DIP	DIP
	Box 2											
61	Run 2 61 to 71'2"		116/122 95%		122/122 100%				61'5 joint 5° 61'11" " 5° 62'10" " 5° 64'8 " 5° 65'8 " 5° 66'7 " 20° 67'0" " 20° Poss. fracture 67'7" frac 30° 67'10" " 30° 67'11" " 10° 68'0" " 10° } "D" fracture 69'4 Joint 5° 70'8" " 15°	2	5 5	
62										1	5	
63										0		
64										1	5	5
65										1	5	
66										1	20	
67										4	20 30 30 10 10	
68									Dolomite, grey, dense, hard dry	0		5
69								0 64'6 Vugs		1	5	
70										1	15	
71												

GENERAL NOTES: Circ 8 minutes at 71'2". Lost 5" out of tub.

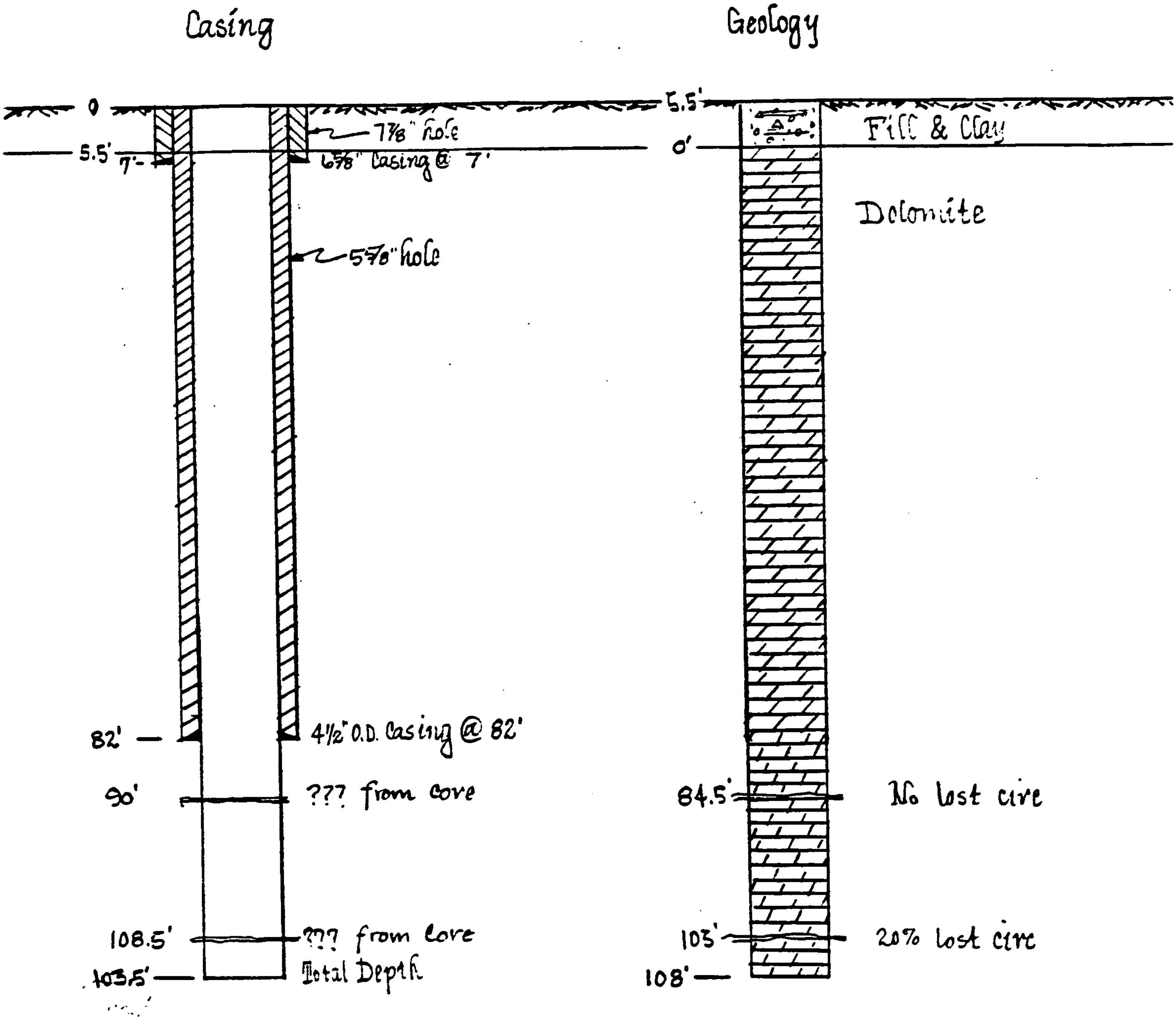
Total Depth 71'2"
"ROCK" Drilling ____

Proportions used: trace 0-10%, little 10-20%, some 20-35%, and 35-50%

HOLE NO.

FIGURE 1

DuPont Exploration Drilling Co. 22-F
Well No. 22-F Parking Lot
Spud 5-21-84 Hassell E. Hunter 5-24-84



No Odors

HH 5-24-84

Scale 1" = 20'

Woodward-Clyde Consultants

Sheet 1 of 3

GROUND WATER OBSERVATION

At ______ Ft. at Completion

At ______ Ft. after ______ hrs.

At ______ Ft. after ______ hrs.

At ______ Ft. after ______ hrs.

JOB DuPont Niagara Plant NO. ______

DRILLING RIG Mobile Rig B61

OPERATOR Rochester Drilling

INSPECTOR Russell E. Hunt

BORING NUMBER 22-F

BORING OFFSET ______

SURFACE ELEVATION ______

DATE START 5-21-84 FINISH ______

	CORE RUN		RQD		RECOVERY		Core Type & Resist.	STRATA CHANGE DEPTH	FIELD IDENTIFICATION, TYPE AND COLOR WEATHERING, SEAMS IN ROCK, etc.	FRACTURES		BED
	From	To	Inch	%	Inch	%				No./Ft.	DIP	DIP
83	Box 1 Run 1 83' to 93'		58"/120"	30%	120"/120"	100%	NX		Dolomite, gray, dense, hard dry	4	5 10 15 15	
84										2	10 10	
85										2	5 5	5
86										1	5	
87										2	5 10	
88										4	5 5 5 10	
89										4	10 5 10 10	
90										3	5 5 10	5
91										1	15	
92										1	5	
93												

83'1"	Joint	5°
83'3"	"	10°
83'6"	"	15°
83'10"	"	15°
84'4"	"	10°
84'9"	"	10°
85'3"	"	5°
85'9"	"	5°
86'6"	"	5
87'3"	"	5
87'10"	"	10
88'6"	"	5
88'7"	"	5
88'9"	"	5
88'10"	"	10°
89'2"	"	10°
89'7"	"	5°
89'9"	frac.	10°
89'10"	"	10°
90'1"	"	5°
90'8"	Joint	5°
90'10"	"	10°
91'7"	"	15°
92'10"	"	

GENERAL NOTES:

Total Depth 103.5

"ROCK" Drilling ______

Proportions used: trace 0-10%, little 10-20%, some 20-35%, and 35-50%

HOLE NO. 22-F

FIGURE 1

Woodward-Clyde Consultants

Sheet 2 of 3

GROUND WATER OBSERVATION

At ______ Ft. at Completion

At ______ Ft. after ______ hrs.

At ______ Ft. after ______ hrs.

At ______ Ft. after ______ hrs.

JOB DuPont Niagara Plant NO. ______

DRILLING RIG Mobile Rig B61

OPERATOR Rochester Drilling

INSPECTOR Harold E. Hunter

BORING NUMBER 22-F

BORING OFFSET ______

SURFACE ELEVATION ______

DATE START 5-21-84 FINISH ______

	CORE RUN		RQD		RECOVERY		Core Type & Resist.	STRATA CHANGE DEPTH	FIELD IDENTIFICATION, TYPE AND COLOR WEATHERING, SEAMS IN ROCK, etc.	FRACTURES		BED
	From	To	Inch	%	Inch	%				No./Ft.	DIP	DIP
93	Box 1 Run 2 93' to 97'5"		53/53	100%	53/53	100%			93'11" joint 5° 94'7" " 15° 95'6" " 20 96'4" " 5° Dolomite, grey, hard, dense, dry med gr, no min., no porosity	1	5	
94										1	15	
95										1	20	
96										1	5	
97										0		
	Box 2 Run 2 97'5" to 103'								99'8" joint 5° 100'1" " 5° 101'10" " 15° Dolomite, same as above	0		
98										0		
99										1	5	
100										1	5	
101										1	15	
102										0		
103												

ENERAL NOTES:

Total Depth 103.5

"ROCK" Drilling ______

roportions used: trace 0-10%, little 10-20%, some 20-35%, and 35-50%

HOLE NO. 22-F

FIGURE 1

Woodward-Clyde Consultants

Sheet 3 of 3

GROUND WATER OBSERVATION	JOB DuPont [illegible] Plant NO. ______	BORING NUMBER 22-F
At ______ Ft. at Completion	DRILLING RIG Rochester Drilling	BORING OFFSET ______
At ______ Ft. after ______ hrs.	OPERATOR Mobile Rig B61	SURFACE ELEVATION ______
At ______ Ft. after ______ hrs.	INSPECTOR Hassall E. Hunter	DATE START 5-21-84 FINISH ______
At ______ Ft. after ______ hrs.		

H	CORE RUN		RQ D		RECOVERY		Core Type & Resist.	STRATA CHANGE DEPTH	FIELD IDENTIFICATION, TYPE AND COLOR WEATHERING, SEAMS IN ROCK, etc.	FRACTURES		BED
	From	To	Inch	%	Inch	%				No./Ft.	DIP	DIP
103	Box 2 Run 3						NX		Dolomite [illegible]	6		
104	103' to 113'6"		100/126	79%	126/176	100%			104'9" joint 5°	1	5	
105									105'2" " 5		5	
									106'9" " 5	1		
									107'1" " 20°			5
06									107'6' " 15°			
									108'1" " 10°	1	5	
07									108'5" } fracture-broken 108'6" }		15	
									109'1" joint 5°	2	10	
108								[illegible]	109'7" " 15°			
09									109'11" } broken 110'0" }		5	
									110'4" joint 5°	2	5	
0									110'6" " 15°		5	
									111'7" " 20°	2	15	
11									112'3" " 5°			5
									112'6" " 10°	1	20	
12									112'9" } broken 112'11" }		5 10	
								[illegible]	113'4 joint 20°			
113									113'6" Bottom of core		20	

ENERAL NOTES:

Total Depth 113'6"

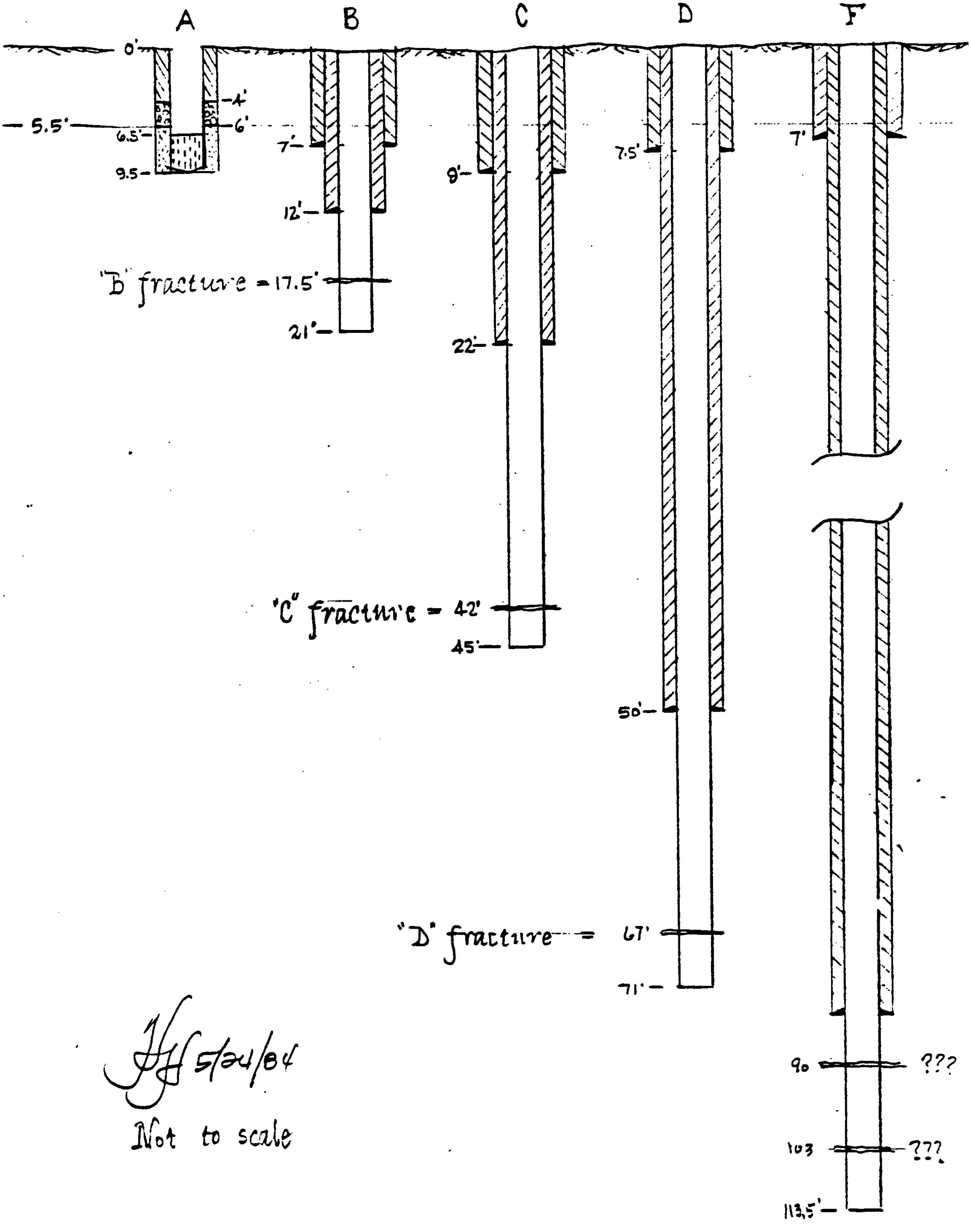
"ROCK" Drilling ______

roportions used: trace 0-10%, little 10-20%, some 20-35%, and 35-50%

HOLE NO. 22-F

FIGURE 1

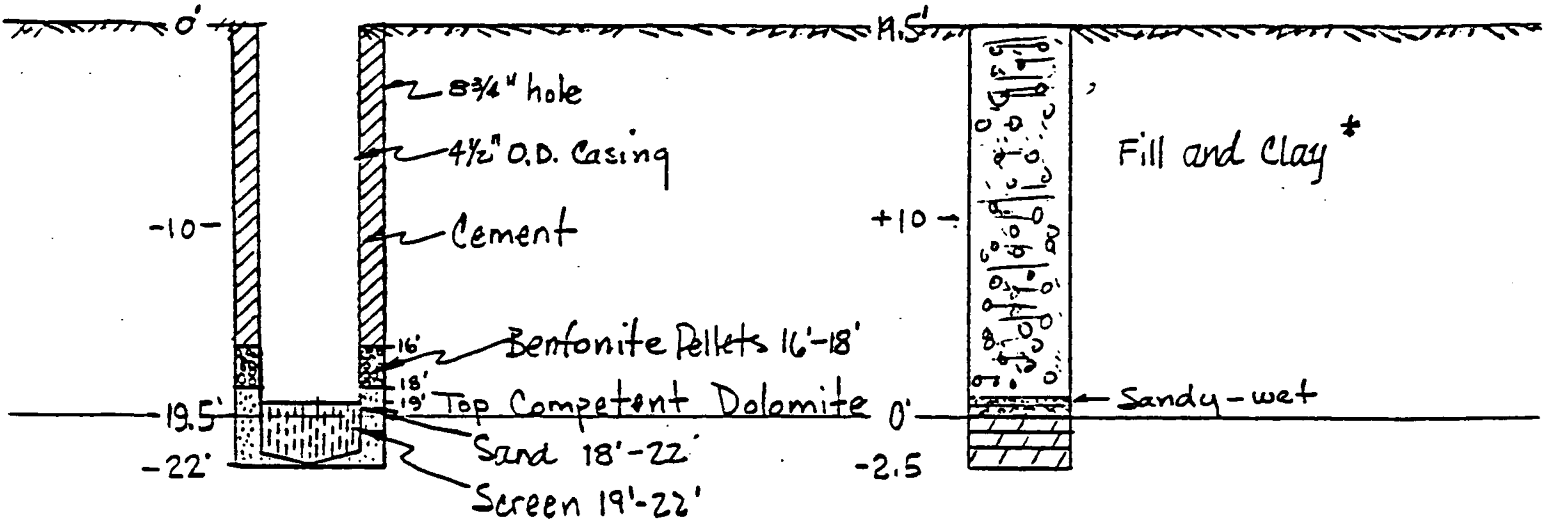
DuPont Exploratory Drilling Program
Site 22 Wells



5/24/84

Not to scale

TITLE OF PROJ OR STUDY DuPont Exploratory Drilling Program PROJ OR STUDY NO 23-A
SUBJECT Well No. 23-A WORKS Plant Site
Spud 4-18-84 COMPUTER Hassell E Hunter DATE 4-18 84



Spud 4-18-84 10:00 am
Complete 4-18-84 5:00 pm

Dolomite rubble at 17'
Competent Dolomite at 19.5'

* Soil sample taken with split barrel on separate hole.

No odor detected while drilling.

4/18/84

Woodward-Clyde Consultants

FIELD ROCK DESCRIPTION LO

Sheet 1 of 2

GROUND WATER OBSERVATION

At ______ Ft. at Completion
At ______ Ft. after ______ hrs.
At ______ Ft. after ______ hrs.
At ______ Ft. after ______ hrs.

JOB Du Pont Niagara Plant NO. ______
DRILLING RIG CME-55
OPERATOR Rochester Drilling
INSPECTOR H.E. Hunter

BORING NUMBER 23- Soil Sm
BORING OFFSET –
SURFACE ELEVATION ______
DATE START 4-18-84 10 am FINISH 4-18-8 3 pm

DEPTH	CORE RUN From	CORE RUN To	RQD Inch	RQD %	RECOVERY Inch	RECOVERY %	Core Type & Resist.	STRATA CHANGE DEPTH	FIELD IDENTIFICATION, TYPE AND COLOR WEATHERING, SEAMS IN ROCK, etc.	FRACTURES No./Ft.	DIP	BED DIP
1 2 3 4	Run No1 0'-5'		0/60"	0%	36"/60"	60%	Split barrel	Misc Fill	Misc fill, brick chips, asphalt, dark grey, dry	None		
	Run No 2		0/60	0%	42"/60"	70%	Split barrel	Clay	12" dark organic clay, no odor, 30" reddish-brown clay, silty reddish-brn clay – prob. river beach	None		
11 12 13	Run No3		36"/60"	60%	50"/60"	83%	Split barrel	Clay	Clay, reddish-brown, one solid pc. 36" long. bottom 24" (13' to 15') very wet Sand seam 1" + 2" thick above wet clay. Probably water flowing thru this sand layer.	None		

ENERAL NOTES:

Total Depth ______
"ROCK" Drilling ______

roportions used: trace 0-10%, little 10-20%, some 20-35%, and 35-50%

HOLE NO. 23-A

Woodward-Clyde Consultants

FIELD ROCK DESCRIPTION LOG

Sheet 2 of 2

GROUND WATER OBSERVATION
At ________ Ft. at Completion
At ________ Ft. after ______ hrs.
At ________ Ft. after ______ hrs.
At ________ Ft. after ______ hrs.

JOB DuPont NO: ________
DRILLING RIG ________
OPERATOR ________
INSPECTOR ________

BORING NUMBER 23-Soil Smpl.
BORING OFFSET ________
SURFACE ELEVATION ________
DATE START ______ FINISH ______

DEPTH	CORE RUN From	CORE RUN To	RQD Inch	RQD %	RECOVERY Inch	RECOVERY %	Core Type & Hoist.	STRATA CHANGE DEPTH	FIELD IDENTIFICATION, TYPE AND COLOR WEATHERING, SEAMS IN ROCK, etc.	FRACTURES No./Ft.	FRACTURES DIP	BED DIP
14	Cont Run No3							Clay				
15 16 17 18 19	Run No 4		0/46"	0%	44"/48"	92%	Split barrel	Dolomite & Clay	6" wet clay as above 42" dolomite, and clay – broken top – rubble – bottom 6" sandy clay. Dry – not water bearing Top Dolomite rubble ≈ 16' End of soil sample			
20									4/18/84			

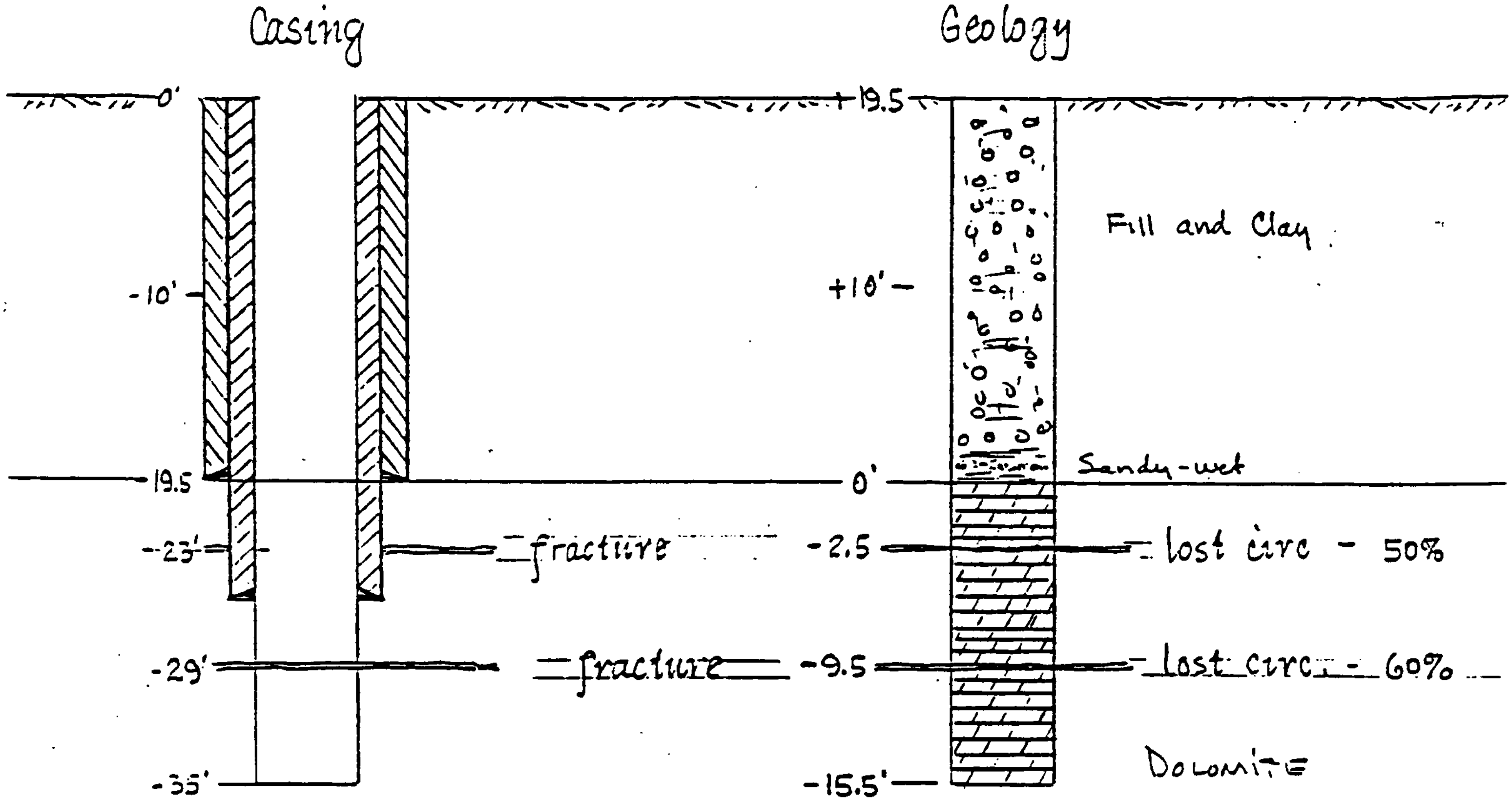
GENERAL NOTES:

Total Depth ______
"ROCK" Drilling ______

Proportions used: trace 0-10%, little 10-20%, some 20-35%, and 35-50%

HOLE NO.

TITLE OF PROJ. OR STUDY DuPont Exploratory Drilling Program PROJ. OR STUDY NO. 23-B
SUBJECT Well No. 23-B WORK #
Spud 4-24-84 COMPUTED BY Hassell E. Hunter DATE 4-25 84



Spud 4-24-84 under surface casing
Complete 4-25-84

No odor detected while drilling.

4/25/84

Woodward-Clyde Consultants

FIELD ROCK DESCRIPTION LO

Sheet 1 of 2

GROUND WATER OBSERVATION

At ________ Ft. at Completion
At ________ Ft. after ______ hrs.
At ________ Ft. after ______ hrs.
At ________ Ft. after ______ hrs.

JOB DuPont Niagara Plant NO: ________
DRILLING RIG CME-55
OPERATOR Rochester Drilling Co
INSPECTOR Hassell Hunter - Conoco

BORING NUMBER 23-B
BORING OFFSET ________
SURFACE ELEVATION ________
DATE START ________ FINISH ________

DEPTH	CORE RUN		RQD		RECOVERY		Core Type & Hoist.	STRATA CHANGE DEPTH	FIELD IDENTIFICATION, TYPE AND COLOR WEATHERING, SEAMS IN ROCK, etc.	FRACTURES		BE
	From	To	Inch	%	Inch	%				No./Ft.	DIP	DI
19	Box 1								Fill & Clay Top Competent Dolomite (Bedrock) @	19.5'		
20 21 22	Run No. 1 19.5' to 22.8'		33"/46" 72%		46"/46" 100%		NX	Frac	DOLOMITE, coursegrain, grey-brn, scattered gyp, dense 19'11" - Jt <5° Jt 20'11" <5° fracture prob Hio 20'1" - <5° " 21'1" 15° " " " 20'3" - <5° " 21'6" <5° joint 20'6" <5° " 22'1 <5° " 20'7" <5° " 22'4 <5° "	1 5 2 2	5° 10° 5° 5° 5°	
23 24 25	Run No 2 22.8 to 25.5'		27"/32" 84%		32"/32" 100%				Dolomite, grey-brn, med. grain, dense 22'10" <5° joint 23'10" <5° " 24'0" 30° " 25'0" 60° - mech. frac in barrel	1 1 1 1	5 5 30 60	

GENERAL NOTES:

Total Depth 25.5'
"ROCK" Drilling 6'

Proportions used: trace 0-10%, little 10-20%, some 20-35%, and 35-50%

HOLE NO. 23-B

oodward-Clyde Consultants

FIELD ROCK DESCRIPTION LOG

Sheet 2 of 2

GROUND WATER OBSERVATION
t ________ Ft. at Completion
At ________ Ft. after ______ hrs.
t ________ Ft. after ______ hrs.
t ________ Ft. after ______ hrs.

JOB DuPont Niagara Plant NO.: ________
DRILLING RIG CME-55
OPERATOR Rochester Drilling
INSPECTOR Hassell Hunter - CONOCO

BORING NUMBER 23-B
BORING OFFSET ________
SURFACE ELEVATION ________
DATE START ______ FINISH ______

DEPTH	CORE RUN		RQD		RECOVERY		Core Type & Ilosisl.	STRATA CHANGE DEPTH	FIELD IDENTIFICATION, TYPE AND COLOR WEATHERING, SEAMS IN ROCK, etc.	FRACTURES		BED
	From.	To	Inch	%	Inch	%				No./Ft.	DIP	DIP
25	Box 2											
26	Run No 3 25.5' to 35'		100/114 88%		114/114 100%		NX	Lockport Group Dolomite	Dolomite, grey-brn, dense, fine-med grain, occasional gyp nodule 25'8" <5° Joint 26'1" <5° " 26'3" } broken 26'6" } 26'8" <5° Joint 26'9" <5° " 27'4" <5° " 27'9" <50 " 28'5" 10° " 28'7" <5° " 28'11" <5° " 29'2" <5° " 29'2" <5° " 29'6" 15° - major fracture - Lost circ 31'1" <5° Joint 31'6' <5° " 32'1" <5 " 32'2" <5° " 32'5" <5° " 34'0" <5° " Total Depth = 35' 34'6" <5° "	1 6 2 3 3 0 2 3 0 2	5° 5° 5 5 5 5 5 5 5 5 5 5 5 5 5	0 0

NERAL NOTES:

Total Depth 35'
"ROCK" Drilling 9.5

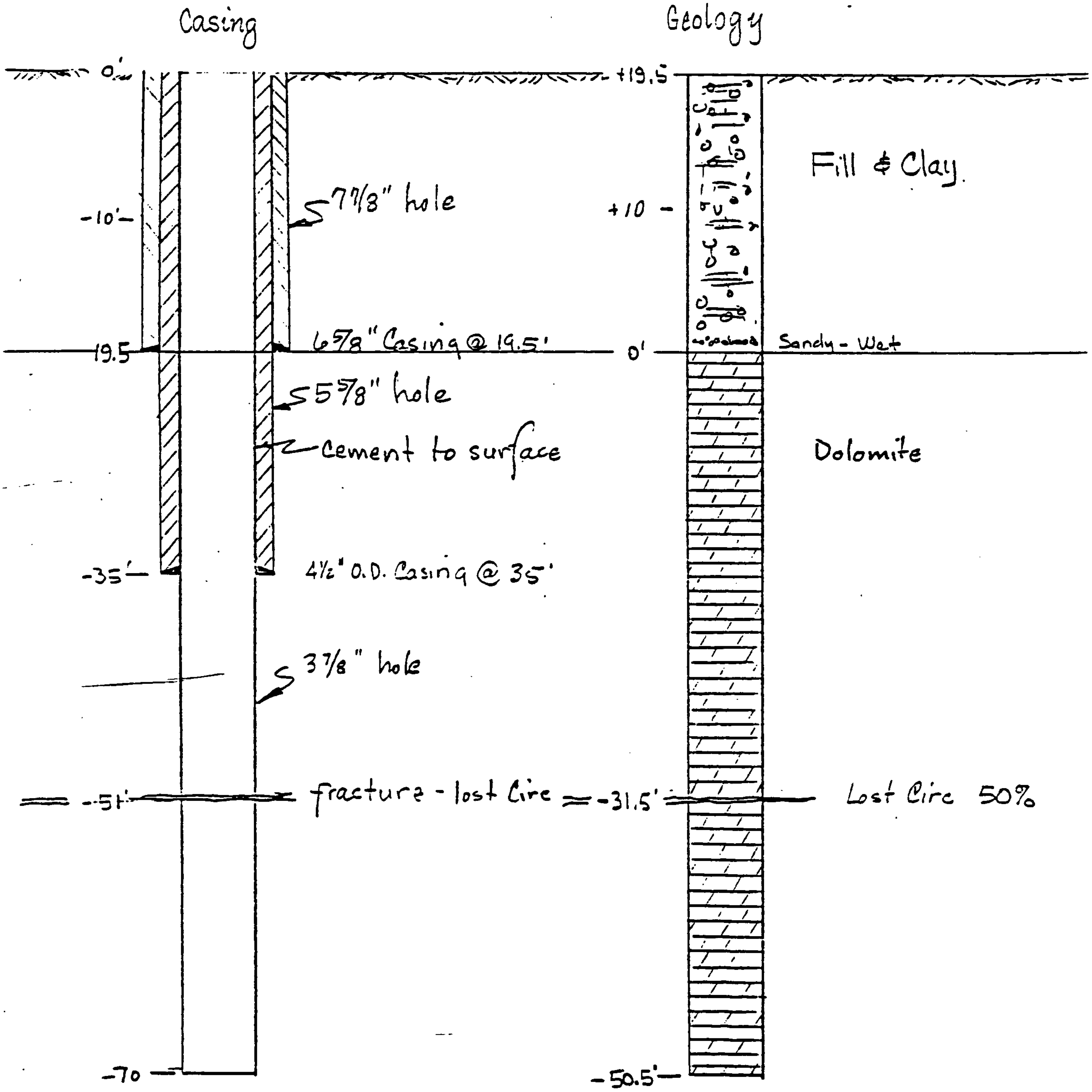
oportions used: trace 0-10%, little 10-20%, some 20-35%, and 35-50%

HOLE NO. 23-B

TITLE OF PROJ. OR STUDY: DuPont Exploratory Drilling Program PROJ. OR STUDY NO.: 23-C

SUBJECT: Well 23-C WORKS: Plant Site

Spud 4-25-84 COMPUTER: Hassell E. Hunter 4-27 84



No odor detected while drilling

4-27-84

Woodward-Clyde Consultants

FIELD ROCK DESCRIPTION LO

Sheet 1 of 3

GROUND WATER OBSERVATION
At ______ Ft. at Completion
At ______ Ft. after ______ hrs.
At ______ Ft. after ______ hrs.
At ______ Ft. after ______ hrs.

JOB DuPont Niagara Plant NO: ______
DRILLING RIG CME-55
OPERATOR Rochester Drilling
INSPECTOR Hassell Hunter-CONOCO

BORING NUMBER 23-C
BORING OFFSET ______
SURFACE ELEVATION ______
DATE START 4-25-84 FINISH 4-2[illegible]

	CORE RUN		ROD		RECOVERY		Core Type & Hoist.	STRATA CHANGE DEPTH	FIELD IDENTIFICATION, TYPE AND COLOR WEATHERING, SEAMS IN ROCK, etc.	FRACTURES		BED
	From	To	Inch	%	Inch	%				No./Ft.	DIP	DIF
35	Box 1											
36	Run						NX		Dolomite, grey-brn, med grain,	1	5	
	No1		157' 174'		174' 174'			Gyp	occasional gyp nodule	1	5	
37	35.5'											
	to		90%		100%						15 5	
38	50'								5° Joint 35'8"	2		
									5° " 36'4"			
									15° " 37'7"			
									5° " 37'11"	0		
								Gyp	5° Break 40' 7"			
									5° Joint 41'4'	0		
									5° " 41 6"			
									5° " 44'5"		5	
									5° " 44'9"	1		
									5° " 44'11"		5	
								Vug	5° " 45' 1" Broken	2	5	
									5° " 45'2"			
									5° " 45'3"	0		
								VUGS	5° " 45'7			10°
									5° " 45'11"			
									5' " 46'5	0		
									10° " 47.5'		5	
									5° " 48'0" Poss. fracture	3	5	
									5° 48 9"		5	
										5		
								Abrais		1		

ENERAL NOTES:

Total Depth 70'
"ROCK" Drilling ____

roportions used: trace 0-10%, little 10-20%, some 20-35%, and 35-50%

HOLE NO. 23-C

oodward-Clyde Consultants

ROCK DESCRIPTION

Sheet 2 of 3

GROUND WATER OBSERVATION

t ______ Ft. at Completion
At ______ Ft. after ______ hrs.
At ______ Ft. after ______ hrs.
t ______ Ft. after ______ hrs.

JOB DuPont Niagara Plant NO: ______
DRILLING RIG CME-55
OPERATOR Rochester Drilling Co
INSPECTOR Hassell Hunter

BORING NUMBER 23-C
BORING OFFSET ______
SURFACE ELEVATION ______
DATE START 4-25-84 FINISH 4-27-84

DEPTH	CORE RUN From.	CORE RUN To	RQD Inch	RQD %	RECOVERY Inch	RECOVERY %	Core Type & fossil.	STRATA CHANGE DEPTH	FIELD IDENTIFICATION, TYPE AND COLOR WEATHERING, SEAMS IN ROCK, etc.	FRACTURES No./Ft.	FRACTURES DIP	BED DIP
	Run No.1									1	10°	
48	Cont.									2	5 5	
49												
50	Box 2									0		
	RUN No.2 50' to 65'		165'/180' 92%		180"/180" 100%		NX	VUGS Broken	Dolomite grey brn, dense, little vugs 5° Joint 50'8" 5° " 50'9" 5° Joint 51'0" 5° " 51'3" } Possible fracture. 10° " 51 4" } 10° " 51 6" 10° " 51' 9" 10° " 51'10" 20° " 53'6" 5° " 56'6" 5° " 58'0' 10° " 58'4" 10° " 64'8"	2 6 0 1 0 0 1 0 1	5 5 5 10 10 20° 5° 10°	

NERAL NOTES:

Total Depth 70'
"ROCK" Drilling ______

portions used: trace 0-10%, little 10-20%, some 20-35%, and 35-50%

HOLE NO. 22-C

Woodward-Clyde Consultants

FIELD ROCK DESCRIPTION LO

Sheet 3 of 3

GROUND WATER OBSERVATION

At ______ Ft. at Completion
At ______ Ft. after ______ hrs.
At ______ Ft. after ______ hrs.
At ______ Ft. after ______ hrs.

JOB DuPont Niagara Plant NO: ______
DRILLING RIG CME-55
OPERATOR Rochester Drilling
INSPECTOR Hassell Hunter/Conoco

BORING NUMBER ______
BORING OFFSET ______
SURFACE ELEVATION ______
DATE START ______ FINISH 4-

DEPTH	CORE RUN From	To	RQD Inch	%	RECOVERY Inch	%	Core Type & Hoist.	STRATA CHANGE DEPTH	FIELD IDENTIFICATION, TYPE AND COLOR WEATHERING, SEAMS IN ROCK, etc.	FRACTURES No./Ft.	DIP	BED DIP
	Run 2 Cont.								Data on previous page	0		
61												
62										0		
63										0		
64										0		
	Box 3									1	10°	
65	Run No 3 65' to 70'		60"/60"	100%	60"/60"	100%	NX		Dolomite, grey w/brn, dense Some vuggular porosity 5° ~~Joint @ 68~~0'			
										1	5°	
									Total Depth 70'			

GENERAL NOTES:

Total Depth ______
"ROCK" Drilling ______

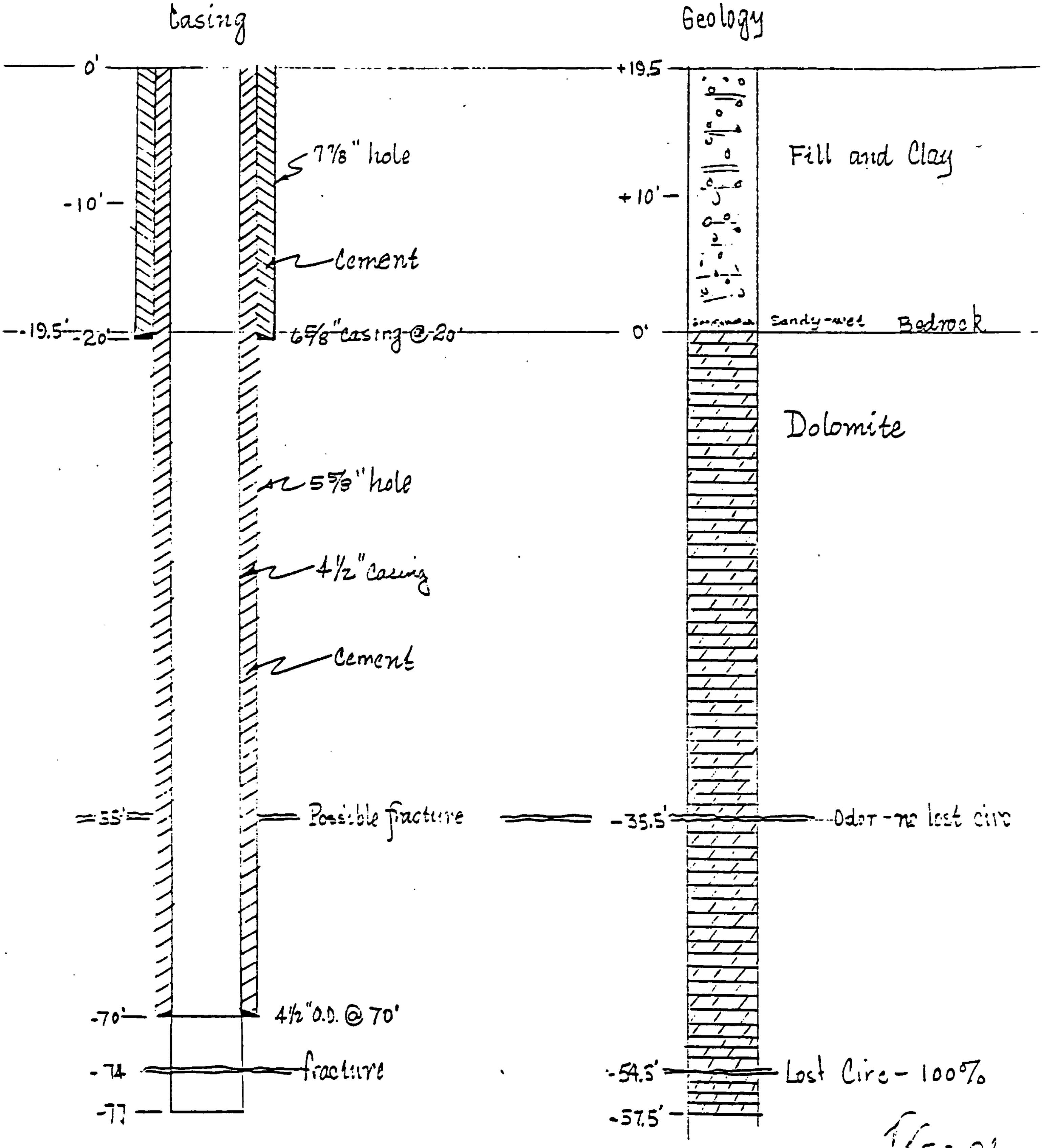
Proportions used: trace 0-10%, little 10-20%, some 20-35%, and 35-50%

HOLE NO.

TITLE OF PROJ. OR STUDY DuPont Exploratory Drilling Program PROJ. OR STUDY NO. 23-D

SUBJECT Well 23-D WORKS Plant Site

Spud 4-27-84 SIGNATURE Hassell E Hunter DATE 5-1-84



cleaning fluid type odor at 55'

5-2-84

Woodward-Clyde Consultants

FIELD ROCK DESCRIPTION LOG

Sheet 1 of 1

GROUND WATER OBSERVATION

At ________ Ft. at Completion
At ________ Ft. after ______ hrs.
At ________ Ft. after ______ hrs.
At ________ Ft. after ______ hrs.

JOB Dufont Niagara Plant NO. ________
DRILLING RIG CME-55
OPERATOR Rochester Drilling
INSPECTOR Hassell Hunter-Conlnen

BORING NUMBER 23-D
BORING OFFSET ________
SURFACE ELEVATION ________
DATE START 4-27-84 FINISH 5-2-84

DEPTH	CORE RUN		ROD		RECOVERY		Core Type & Resist.	STRATA CHANGE DEPTH	FIELD IDENTIFICATION, TYPE AND COLOR WEATHERING, SEAMS IN ROCK, etc.	FRACTURES		BED
	From	To	Inch	%	Inch	%				No./Ft.	DIP	DIP
	Box 1											
	Run 1 70'-70'8"		0/8	0%	8/8	100%	NX		70'2" joint <5° 70'3" " <5° 70'4" " <5° Dolomite, brn-gray, coarse [illegible]	3	5 5	
	Run 2 70'8" ± 77'		41/84	49%	78/84	93%				1	10	
									70'10" joint 10° Dolomite, as above	3	10 15 20	
72									71'3" " 10°			
									71'6" " 15°		5	
									71'11" " 20°	2	lost 6"	
								calcite	72'2" " 5°			
73									72'2 - 72'8" Lost 6" core = possible fracture		5 5 5 5	
									72'11" joint 5°	5		
									73'1" " <5°			
74									73'2" " <5° (Lost core @ 73'-74' 100%)			
									73'3" " <5°		5	
									73'6" " <5°	2	5	
75									73'8" " <5°			
								vugs	74'0" " <5°		5	
									74'9" " 5°	2	5	
76									75'3" " 5°			
									75'8 " 5°		10	
									76'6" " 10°	2		
77								gyp	76'11" " 5		5	
									TOTAL DEPTH = 77'			

GENERAL NOTES:

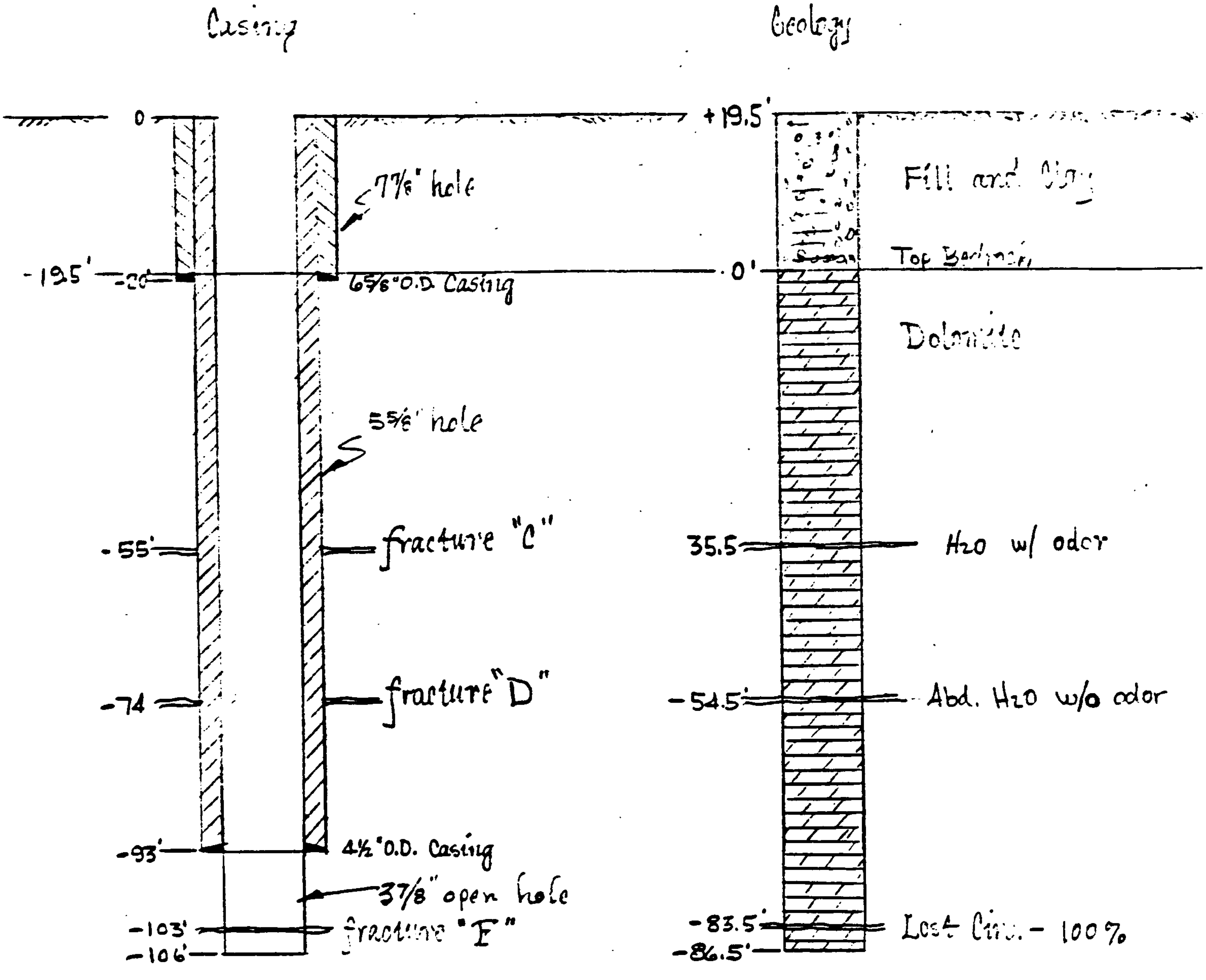
Total Depth 77
"ROCK" Drilling ____
HOLE NO.

Proportions used: trace 0-10%, little 10-20%, some 20-35%, and 35-50%

23-F
Plant Site

DuPont Exploratory Drilling Program
Well No. 23-F

Spud 5-3-84 Hassell E Hunter 5-10-84



Scale 1" = 20'

Core #1 · 94-106'

5-10-84

Scale 1"=20'

Woodward-Clyde Consultants

FIELD ROCK DESCRIPTION LOG

Sheet 1 of 1

GROUND WATER OBSERVATION
At ______ Ft. at Completion
At ______ Ft. after ______ hrs.
At ______ Ft. after ______ hrs.
At ______ Ft. after ______ hrs.

JOB DuPont Niagara Falls Plant NO: ______
DRILLING RIG CME-55
OPERATOR Rochester Drilling Co.
INSPECTOR Hassell E. Hunter

BORING NUMBER 23-F
BORING OFFSET ______
SURFACE ELEVATION ______
DATE START 5-3-84 FINISH 5-10-84

DEPTH	CORE RUN From	CORE RUN To	RQD Inch	RQD %	RECOVERY Inch	RECOVERY %	Core Type & Resist.	STRATA CHANGE DEPTH	FRACTURES No./Ft.	BED DIP
	Box 1									
	Run 1						NX		6	
95	94' to 106'		48/144		144"/144"					
96				33%		100%			6	<5
97									3	
98									6	
99									2	<5
100								gyp	5	
									4	
									5	<5
								gyp	2	
									2	<5
									2	
									0	

FIELD IDENTIFICATION, TYPE AND COLOR WEATHERING, SEAMS IN ROCK, etc.

94'1" joint <5°
94'3" " <5°
94'4" " <5°
94'7" " 10°
94'9" " 5°
94'10" " 5
95'1" " 15°
95'3" " 10°
95'6" " 5°
95'7 " 5°
95'8" " 5°
95'11" " 5°
96'2" " 5°
96'5" " 5°
96'10" " 5
97'0" " 5
97'1" " 5
97'4 " 5
97'5 " 5
97'7 " 5
97'10" " 5
98'6" " 5
98'8" 5
99'0" " 5
99'1" " 5
99'5" " 5
99'6" " 5
99'11" " 5
100'0" fine
100'2" free 10°
100'5' joint 5
100'8" " 10°
101'0" " 5
101'2" joint 5°
101'6" " 5°
101'8' " 5°
101'11" " 5°
102'7" 5
102'11" " 15°
103'6" " 5°/15°
103'7" " 5°
104'2" " 10°
104'11" " 5°

Dolomite, grey w/ drk grey thin laminations. hard, dense, dry, little gyp. possible fracture at 100' & 103'.

lost 100% water @ 103'

J 5/11/84

GENERAL NOTES:

Total Depth 106
"ROCK" Drilling ______

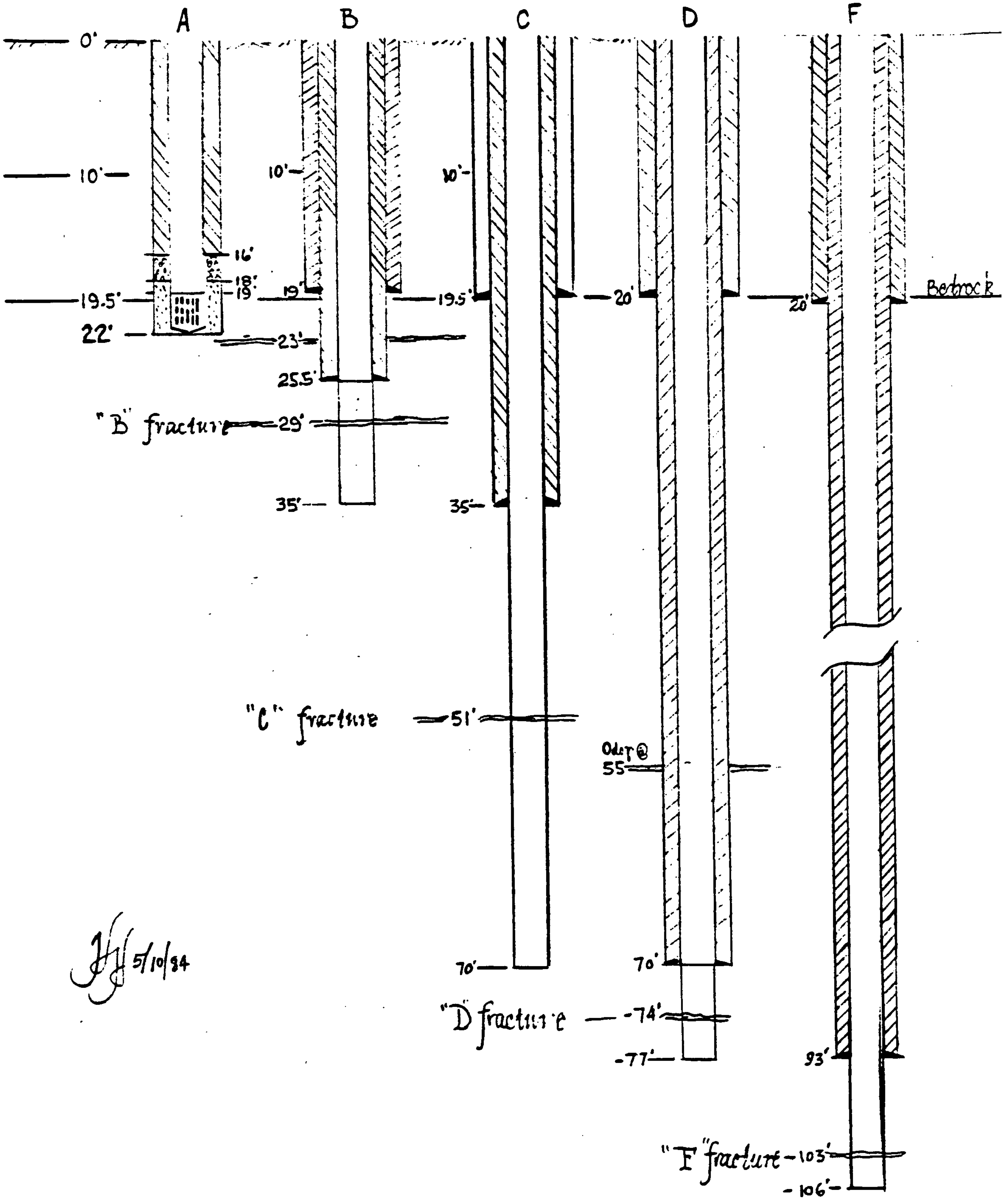
Proportions used: trace 0-10%, little 10-20%, some 20-35%, and 35-50%

HOLE NO. 23-F

DuPont Exploratory Drilling Program
Site 23 Wells

Plant Site

Hassell E Hunter



5/10/84

Woodward-Clyde Consultants

FIELD ROCK DESCRIPTION LOG

Sheet 1 of 1

GROUND WATER OBSERVATION

At _____ Ft. at Completion

At _____ Ft. after _____ hrs.

At _____ Ft. after _____ hrs.

At _____ Ft. after _____ hrs.

JOB DuPont Niagara Plant NO. _____

DRILLING RIG CME-55

OPERATOR Rochester Drilling Co

INSPECTOR Haskell B. Hunter

BORING NUMBER 2A-Soil #1

BORING OFFSET _____

SURFACE ELEVATION _____

DATE START 5-29 FINISH 5-29-84

DEPTH	CORE RUN		RQD		RECOVERY		Core Type & Resist.	STRATA CHANGE DEPTH	FIELD IDENTIFICATION, TYPE AND COLOR WEATHERING, SEAMS IN ROCK, etc.	FRACTURES		BED
	From	To	Inch	%	Inch	%				No./Ft.	DIP	DIP
									Soil Sample Hole #1 Site 24			
0												
0'6"	0'-6"								Soil, grass, roots 0-6"			
1	6"-16"								Clay, brown, w/dolomite pcs 6'-1'4"			
1'4"	16"-24"								Dolomite, broken, dense, dry 1'4"-2'0"			
2	24"-36"		no rec.						3' = Depth of refusal			
3												
4									Cored 3', recovered 2'			
5												
6												
7												
8												
9									5/29/84			

GENERAL NOTES:

Total Depth 3'

"ROCK" Drilling _____

Proportions used: trace 0-10%, little 10-20%, some 20-35%, and 35-50%

HOLE NO.

FIGURE I

Woodward-Clyde Consultants

Sheet 1 of 1

GROUND WATER OBSERVATION
At ________ Ft. at Completion
At ________ Ft. after ______ hrs.
At ________ Ft. after ______ hrs.
At ________ Ft. after ______ hrs.

JOB [illegible] Nitrogen Plant NO. ________
DRILLING RIG CME 55
OPERATOR Dochester Drilling
INSPECTOR Hassell E. Hunter

BORING NUMBER 2A · Soil #2
BORING OFFSET ________
SURFACE ELEVATION ________
DATE START 5-29 FINISH 5-29-84

D	CORE RUN		RQD		RECOVERY		Core Type & Resist.	STRATA CHANGE DEPTH	FIELD IDENTIFICATION, TYPE AND COLOR WEATHERING, SEAMS IN ROCK, etc.	FRACTURES		BED
	From	To	Inch	%	Inch	%				No./Ft.	DIP	DIP
0	0"-9"								Clay, brown, moist			
1	9"-18"								Clay w/ broken Dolomite, brn			
2	18"-24"								24" = Depth of refusal			
									no odor, no water, No contaminants			

HH 5/29/84

ENERAL NOTES:

Total Depth 2'
"ROCK" Drilling ____

roportions used: trace 0-10%, little 10-20%, some 20-35%, and 35-50%

HOLE NO.

FIGURE 1

Appendix B

APPENDIX B

Presented in Appendix B is the Scope of Work, Methodology and Field Report prepared by Advanced Environmental System (AES). Appendix B also contains a computerized summary of the analytical data from which Table 3 was generated. The summary was compiled by E. I. duPont de Nemours & Co., Inc.

SCOPE OF WORK

At the request of Mr. Bev Adams of E. I. DuPont DeNemours & Company, Inc., Advanced Environmental Systems (AES) has completed the sampling and analysis of monitoring and utility wells located at the Niagara Falls Plant on Buffalo Avenue.

Wells were purged of four water volumes (or to dryness) from May 30, 1984 to July 16, 1984.

Samples were collected within 48 hours of purging from May 30, 1984 to July 16, 1984

Field measurements of pH, temperature and specific conductivity were made.

Samples were taken to the laboratory for analysis of Total Suspended Solids, Total Organic Carbon, Soluble and Total Barium, Total Copper, BHC's, PCB's, Cyanide, Phenols, and nine (9) Volatile Organic indicator parameters.

Specific methodologies are listed in subsequent tables. Cyanide analysis was done by two methods due to interferences present in some samples that rendered determination of titrimetric endpoint difficult or impossible.

METHODOLOGY

1 - GENERAL - Water Samples

pH	150.1	EPA 600/4-79-020 (1983)
Specific Conductance	120.1	" "
Temperature	170.1	" "
Total Organic Carbon	415.2	" "
Total Suspended Solids	160.2	" "
Barium (Soluble)	208.1	" "

2 - INDICATOR PARAMETERS

a. Volatile Indicators

Chloroform	601	EPA 600/4-82-057
trans-1,2-dichloroethane	601	" "
Methylene Chloride	601	" "
1,1,2,2-tetrachloroethane	601	" "
Tetrachloroethylene	601	" "
Trichloroethylene	601	" "
Vinyl Chloride	601	" "
Benzene	602	" "
Chlorobenzene	602	" "

b. Pesticides and PCB's

BHC (4 isomers)	608	EPA 600/4-82-057
PCB's (7 arochlors)	608	" "

c. Metals

Metals Processed by	4.1.4	EPA 600/4-79-020 (1983)
Total Copper	220.1	" "

d. Other

Cyanide	335.2	EPA 600/4-79-020 (1983)
Cyanide (Ion Selective Electrode)	412E	Standard Methods, 15th Ed. 1980
Phenols	420.1	EPA 600/4-79-020 (1983)

FIELD REPORT

Water levels from the top of the well casings were measured prior to purging and again after sampling. A copy of the original field logs is included in this report.

The bottom of each well was sampled using a solvent-cleaned Kemmerer sampler.

The purging and sampling of the Niagara Plant Groundwater Monitoring wells took place between May 29, 1984 and July 13, 1984.

Most of the wells with a water level depth of less than 25 feet were evacuated of 4 well volumes (or until dryness) with a Vanton Flex-I-Liner Sealless Peristaltic pump with dedicated teflon tubing.

Most wells with a water level depth greater than 25 feet were evacuated of 4 well volumes (or until dryness) using a Standard Model 12X7 Submergible pump.

All wells were sampled within 48 hours after purging with a teflon bailer and thoroughly cleaned (3 times) with an acetone wipe, a hexane wipe and a Deionized water rinse between each well.

The monitoring information and the method of purge and ssmpling is listed in Table 1.

TABLE I

Well Number	Water Level Below T-O-C	Well Depth Below T-O-C	Groundwater Elevation (ft)	Volume of Standing Water (gal)	Volume Purged (gallons)	Method of Purge
1A	9.55	20±	562.88	6.79	27	P.P.
1B	10.6	30±	561.01	12.61	50	P.P.
1C	12.05	40±	561.02	18.2	75	P.P.
1D	16.0	78.41	556.12	40.56	169	S.P**
1E	12.15	55.6	558.83	28.2	120	S.P.
1F	13.35	100±	559.34	56.3	225	P.P.
1J	17.63	174.83	554.45	102.16	420	S.P.
2A	7.0	20±	563.10	8.45	34.5	P.P.
2C	14.4	40±	Unknown Elevation	16.64	67	P.P.
3A	3.85	10.18	565.14	4.1	12 Purged Dry	P.P.
3B	10.75	25.35	558.23	9.49	39	P.P.
4A	9.45	20±	560.54	6.9	30	P.P.
4C	10.6	46.11	559.38	23.07	90	P.P.
4J	37.8	172.07	Unknown Elevation	87.27	230 Purged Dry	S.P.

For ADVANCED ENVIRONMENTAL SYSTEMS William D. Knight

Date 8/14/84

TABLE I

Well Number	Water Level Below T-O-C	Well Depth Below T-O-C	Groundwater Elevation (ft)	Volume of Standing Water (gal)	Volume Purged (gallons)	Method of Purge
5A	15.4	17.65	557.26	1.46	6	P.P.
5B	16.13	27.39	556.69	7.3	30	P.P.
5C	18.9	40	553.90	13.7	90	P.P.
5D	17.44	60.1	555.96	27.7	111	P.P.
5F	16.8	98.23	556.20	52.9	230	S.P.
6A	11.7	16.2	Unknown Elevation	2.9	15	P.P.
7A	15.9	20.98	555.29	3.3	9 Purged Dry	P.P.
7C	21.7	48.15	549.47	17.2	69	P.P.
8A	4.7	14.1	563.51	6.11	18 Purged Dry	P.P.
8B	5.55	28.2	562.47	14.7	60	P.P.
8J	143.0	170.11	Unknown Elevation	17.62	45 Purged Dry	P.P.
9A	9.25	16.38	559.05	4.6	18	P.P.

For ADVANCED ENVIRONMENTAL SYSTEMS William D. Knight

Date 8/14/84

TABLE I

Well Number	Water Level Below T-O-C	Well Depth Below T-O-C	Groundwater Elevation (ft)	Volume of Standing Water (gal)	Volume Purged (gallons)	Method of Purge
10A	7.3	12.1	562.15	3.12	12	P.P.
10C	12.9	40±	557.68	17.6	75	P.P.
10D	19.7	73.75	550.90	35.1	141	P.P.
10F	12.85	108.08	557.55	61.89	250	S.P.
11A	4.95	9.9	562.96	3.2	15	P.P.
12A	11.1	15.72	561.40	3.0	12	P.P.
12B	11.84	30.1	560.26	11.8	50	P.P.
13A	5.25	20±	Unknown Elevation	9.58	39	P.P.
14A	8.35	20±	563.89	7.6	18 Purged Dry	P.P.
14C	16.31	31.8	555.79	10.1	42	P.P.
15A	6.0	11.9	565.00	3.8	6 Purged Dry	P.P.
15C	15.4	33.10	559.90	11.5	48	P.P.
CD	20.7	45±	550.70	15.8	64	P.P.

For ADVANCED ENVIRONMENTAL SYSTEMS William D. Knight

Date 8/14/84

TABLE I

Well Number	Water Level Below T-O-C	Well Depth Below T-O-C	Groundwater Elevation (ft)	Volume of Standing Water (gal)	Volume Purged (gallons)	Method of Purge
D	16.71	74.10	554.89	37.3	150	P.P.
E	13.4	100.6	558.30	56.81	240	S.P.
J	13.8	161.10	557.90	95.75	195 Purged Dry	S.P.
16A	8.25	20	564.08	7.6	18 Purged Dry	S.P.
16B	16.6	35.86	556.30	12.5	51	P.P.
17A	19.6	22.85	549.31	2.11	2	P.P.
17B	23.2	52.1	546.73	18.8	80	S.P.
18A	8.9	15.7	558.58	2.795	12	S.S.B.*
18C	10.08	30.47	557.52	13.25	54	P.P.
19A	9.17	14.36	564.50	3.4	15	P.P.
19B	21.2	27.15	552.06	3.9	15	P.P.
19C	21.1	40	Unknown Elevation	12.28	55	P.P.
CD1	21.8	45	Unknown Elevation	15.08	65	P.P.

For ADVANCED ENVIRONMENTAL SYSTEMS William D. Knight

Date 2/11/84

TABLE I

Well Number	Water Level Below T-O-C	Well Depth Below T-O-C	Groundwater Elevation (ft)	Volume of Standing Water (gal)	Volume Purged (gallons)	Method of Purge
CD2	22.8	45±	Unknown Elevation	14.4	60	P.P.
CD3	14.8	45±	Unknown Elevation	19.6	79	P.P.
D	17.64	74.2	Unknown Elevation	36.7	150	P.P.
F	17.11	101.3±	Unknown Elevation	54.7	219	P.P.
20A	Dry	8.5	-	-	-	-
20B	13.68	22.7	Unknown Elevation	5.86	24	P.P.
21A	10.0	20±	563.38	6.5	27	P.P.
22A	7.0	7.1	Unknown Elevation	0.65	0.65 Purged Dry	P.P.
22B	13.84	20.95	Unknown Elevation	4.62	18	P.P.
22C	19.2	44.76	Unknown Elevation	16.61	66	P.P.

For ADVANCED ENVIRONMENTAL SYSTEMS William D. Knight

Date 2/14/84

TABLE I

Well Number	Water Level Below T-O-C	Well Depth Below T-O-C	Groundwater Elevation (ft)	Volume of Standing Water (gal)	Volume Purged (gallons)	Method of Purge
22D	16.6	71.05	Unknown Elevation	35.39	140	S.P.
22F	22.52	112.8	Unknown Elevation	58.68	200 Purged Dry	S.P.
23A	19.7	23.3	Unknown Elevation	2.34	9	P.P.
23B	19.68	34.46	Unknown Elevation	9.6	40	P.P.
23C	23.6	66.4	Unknown Elevation	27.8	110	S.P.
23D	19.75	77.77	Unknown Elevation	37.7	160	S.P.
23F	20.5	106.35	Unknown Elevation	55.8	240	S.P.
24A	10.04	10.93	Unknown Elevation	0.57	2.3 Purged Dry	P.P.

DEC wells were buried due to construction on the parkway.

For ADVANCED ENVIRONMENTAL SYSTEMS William D. Knight

SITE GROUNDWATER INVESTIGATION
MONITOR WELL INDICATOR PARAMETER ANALYSIS
5/31/84 - 8/16/84

VOLATILES	UNITS OF					WELL	NUMBER				
COMPOUND	MEASURE	1-A	1-B	1-C	1-D	1-E	1-F	1-J	2-A	2-C	3-A
Benzene	(ppb)	<1.01	<5.03	1851.9	72.5	65.4	<2.51	<12.1	16.69	<5.3	72.64
Chlorobenzene	(ppb)	<2.98	14.92	<229.9	<15.5	<15.5	<7.46	<32.5	<0.309	<15.5	<0.309
Chloroform	(ppb)	6230	7070	27.3	<8.44	<4.22	<80	<42	<8	<200	<8
Trans-1,2-dichlorethylene	(ppb)	<1.0	<50	<7.66	<11.48	<5.74	<100	<61	<10	<250	<10
Methylene chloride	(ppb)	13625	37320	30.8	<5.75	<2.88	4325	1256	91	1827	68
1,1,2,2-Tetrachloroethane	(ppb)	50640	164120	<4.89	2730	<3.66	11640	1109	3094	1884	7145
Tetrachloroethylene	(ppb)	57800	220410	102.9	<1.56	<0.78	57645	1785	8359	1615	9848
Trichloroethylene	(ppb)	27875	174250	61509	972.78	213.65	14045	322	1554	907	2327
Vinyl chloride	(ppb)	2796	2070	157	<11.4	<5.72	<70	<60	589	<28	43
TOTAL VOLATILES	(ppb)	158966	605255	63679	3775	279	87655	4472	13704	6233	19504
PESTICIDES/PCB's	UNITS OF										
PARAMETER	MEASURE										
Alpha-BHC	(ppb)	0.567	<0.002	14	24	0.178	0.016	0.46	0.065	22	<0.002
Beta-BHC	(ppb)	0.023	<0.005	12	3.7	0.105	<0.005	<0.01	<0.005	2.5	<0.005
Gamma-BHC	(ppb)	0.057	0.081	6.7	28	0.052	0.072	0.18	0.029	10	<0.002
PCB-1016	(ppb)	<0.19	<3.8	<3.8	<3.8	<0.19	<0.19	<3.8	<0.19	<3.8	<0.19
PCB-1221	(ppb)	<1.5	<15	<7.7	<15	<0.15	<23	<23	<1.5	<3.1	<0.15
PCB-1232	(ppb)	<0.15	<3.1	<3.1	<3.1	<0.15	<0.15	<3.1	<0.15	<3.1	<0.15
PCB-1242	(ppb)	<0.29	<5.8	<5.8	<5.8	<0.29	<0.29	<5.8	<0.29	<5.8	<0.29
PCB-1248	(ppb)	<0.24	<4.7	<4.7	<4.7	<0.24	<0.24	<4.7	<0.24	<4.7	<0.24
PCB-1254	(ppb)	<0.28	<2.8	<0.14	<0.14	<0.14	<0.14	<0.14	<1.4	<0.14	<0.14
PCB-1260	(ppb)	<0.38	<3.8	<0.19	<0.19	<0.19	<0.19	<0.19	<1.9	<0.19	<0.19
OTHER	UNITS OF										
PARAMETER	MEASURE										
Total Suspended Solids	(ppm)	34.5	28.5	27.2	165.4	120.5	36.9	52.6	53.8	81.5	106.9
Total Organic Carbon	(ppm)	5.81	14.03	19	10.7	18.7	5.43	89.63	7.89	14.18	22.59
Total Cyanide	(ppm)	0.05	0.1	0.274	0.648	0.257	0.04	0.67	0.2	6.75	1.1
Total Recoverable Phenols	(ppm)	ND	0.06	<0.01	0.011	0.019	0.096	0.066	0.09	0.021	0.1
Soluable Barium	(ppm)	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Total Copper	(ppm)	0.12	<0.1	<0.1	0.38	<0.1	<0.1	<0.1	<0.1	<0.1	0.14

VOLATILES	UNITS OF					WELL	NUMBER				
COMPOUND	MEASURE	3-B	4-A	4-CD	4-J	5-A	5-B	5-CD	5-D	5-F	6-A
Benzene	(ppb)	<11.65	<1.01	3.97	<6.03	<2.36	22.8	<0.99	<5.3	<6.03	<0.99
Chlorobenzene	(ppb)	<53.34	<2.98	<2.57	<16.23	<17.2	<8.60	<2.57	<15.5	<16.23	<2.57
Chloroform	(ppb)	157080	67.3	353.1	<5.1	710.5	885.3	171.3	87.04	<51	<7.3
Trans-1,2-dichlorethylene	(ppb)	<13.8	20	<1.1	<7.7	<0.8	<0.01	<4.4	<31	<78	<1.1
Methylene chloride	(ppb)	19250	50.2	253.5	1105	149.7	34.09	72.96	332.4	1727	128.45
1,1,2,2-Tetrachloroethane	(ppb)	<22.6	1006	23.78	73.87	1556	416.5	64.47	1192	783	<12.5
Tetrachloroethylene	(ppb)	50.4	186.2	71.02	1496	459.9	<0.02	9.78	710.8	1437	50.46
Trichloroethylene	(ppb)	17800	455.2	<0.60	<41	380.6	12.23	34.85	21.24	<41	<6.0
Vinyl chloride	(ppb)	14.9	49.8	<1.5	<21	<0.8	19.47	79.68	<29	<21	<1.5
TOTAL VOLATILES	(ppb)	194195	1835	705	2675	3257	1390	433	2343	3947	179
PESTICIDES/PCB's	UNITS OF										
PARAMETER	MEASURE										
Alpha-BHC	(ppb)	8.4	0.389	1.52	0.23	0.058	0.376	<0.002	0.112	<0.002	0.346
Beta-BHC	(ppb)	0.9	0.02	0.292	<0.005	<0.005	<0.023	0.024	0.08	<0.005	0.183
Gamma-BHC	(ppb)	4.3	0.111	0.122	<0.002	0.032	0.227	0.049	0.037	0.47	0.087
PCB-1016	(ppb)	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<3.8	<0.19	<3.8
PCB-1221	(ppb)	<23	<0.15	<3.1	<23	<0.15	<0.77	<0.15	<3.1	<23	<23
PCB-1232	(ppb)	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<3.1	<0.15	<3.1
PCB-1242	(ppb)	<0.29	<0.29	<0.29	<0.29	<0.29	<0.29	<0.29	<5.8	<0.29	<5.8
PCB-1248	(ppb)	<0.24	<0.24	<0.24	<0.24	<0.24	3.52	<0.24	<4.7	<0.24	<4.7
PCB-1254	(ppb)	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14
PCB-1260	(ppb)	1.87	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19
OTHER	UNITS OF										
PARAMETER	MEASURE										
Total Suspended Solids	(ppm)	197.7	162.8	26.8	460.5	4472.9	371.4	26.1	114.8	35.7	366.8
Total Organic Carbon	(ppm)	10.32	8.71	4.65	14.65	8.21	269.43	7.16	10.64	7.07	11.93
Total Cyanide	(ppm)	4.28	0.53	0.275	0.062	1.3	3.86	0.09	0.52	0.044	0.325
Total Recoverable Phenols	(ppm)	0.085	0.07	0.013	0.104	0.05	0.04	0.013	<0.01	0.119	0.021
Soluable Barium	(ppm)	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Total Copper	(ppm)	0.36	0.21	<0.1	0.14	1.1	<0.1	<0.1	0.21	<0.1	<0.1

VOLATILES	UNITS OF					WELL	NUMBER				
COMPOUND	MEASURE	7-A	7-C	8-A	8-B	8-J	9-A	10-A	10-C	10-D	10-F
Benzene	(ppb)	<5.895	<9.52	2410	1993	146.8	9290.4	<5.895	<5.3	394.4	<6.03
Chlorobenzene	(ppb)	<42.90	<13.10	<245	<122.65	<16.23	<214.4	<42.90	36.27	44	<16.23
Chloroform	(ppb)	<0.01	<0.15	<150	<0.76	<20	<7.6	37.04	<1.6	<170	<20
Trans-1,2-dichlorethylene	(ppb)	<0.01	8.78	3294	<0.69	<31	<6.9	<0.01	<1.2	<225	<31
Methylene chloride	(ppb)	9.05	0.61	84	1.41	193.7	<2.0	9.08	16	<115	151.6
1,1,2,2-Tetrachloroethane	(ppb)	<0.23	<0.26	<23	<1.13	32426	<11.3	52.94	25.7	<150	545.8
Tetrachloroethylene	(ppb)	<0.02	0.9	107	<0.81	963.8	<8.1	<0.02	76.3	32490	578.1
Trichloroethylene	(ppb)	<0.01	0.61	89	<0.54	165.3	<5.4	34.02	81.7	10580	<17
Vinyl chloride	(ppb)	<0.01	<0.13	<75	118.4	3166	<6.5	3.42	124.6	<225	<28
TOTAL VOLATILES	(ppb)	9	11	5984	2113	37062	9290	137	361	43508	1276

PESTICIDES/PCB's PARAMETER	UNITS OF MEASURE										
Alpha-BHC	(ppb)	0.038	1.5	0.815	1.5	<0.02	0.147	0.029	0.402	7.99	0.366
Beta-BHC	(ppb)	2.41	<0.110	<0.23	<0.23	2.6	0.112	<0.005	0.086	0.452	0.071
Gamma-BHC	(ppb)	0.028	1.6	2.83	1.8	<0.02	0.259	3.72	0.11	4.32	0.076
PCB-1016	(ppb)	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19
PCB-1221	(ppb)	<0.15	<7.7	<7.7	<1.5	<0.77	<0.15	<0.15	<23	<7.7	<0.15
PCB-1232	(ppb)	<0.15	<0.15	<1.5	<1.5	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
PCB-1242	(ppb)	<0.29	<0.29	<2.9	<2.9	<0.29	<0.29	<0.29	<0.29	<0.29	<0.29
PCB-1248	(ppb)	<0.24	<0.24	<2.4	<2.4	<0.24	<0.24	<0.24	<0.24	<0.24	<0.24
PCB-1254	(ppb)	<0.14	<0.14	<2.8	<1.4	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14
PCB-1260	(ppb)	<0.19	<0.19	<3.8	<1.9	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19

OTHER PARAMETER	UNITS OF MEASURE										
Total Suspended Solids	(ppm)	222.5	21.2	197.4	68.3	215.3	579.1	7550.6	10.8	39.1	80.3
Total Organic Carbon	(ppm)	13.97	7.68	313.05	160.68	93.6	191.11	4.17	8.81	7.23	3.68
Total Cyanide	(ppm)	1.74	0.1	21.58	6.9	0.492	5.2	0.22	0.137	0.067	0.033
Total Recoverable Phenols	(ppm)	0.045	0.131	2.597	0.976	0.471	0.096	0.125	<0.01	0.154	0.058
Soluable Barium	(ppm)	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Total Copper	(ppm)	<0.1	<0.1	<0.1	<0.1	0.1	0.33	0.45	<0.1	<0.1	<0.1

VOLATILES COMPOUND	UNITS OF MEASURE					WELL	NUMBER				
		11-A	12-A	12-B	13-A	14-A	14-C	15-A	15-C	15-CD	15-D
Benzene	(ppb)	<5.90	<2.36	<9.37	<2.36	6736.57	15.47	<2.36	291.51	1309.9	69.74
Chlorobenzene	(ppb)	<42.90	<17.2	<21.22	<17.2	<7.73	<4.91	<17.2	98.12	<229.9	<2.57
Chloroform	(ppb)	175.39	<0.02	529	1144	103	<0.01	1151.3	60132	<168.9	<15
Trans-1,2-dichlorethylene	(ppb)	<0.03	<0.01	<1.53	<6.9	103.9	180.4	<0.14	<13.9	<229.6	<22
Methylene chloride	(ppb)	108.02	6.13	198	55.14	31.2	<0.01	5.24	3158.6	17375	1810
1,1,2,2-Tetrachloroethane	(ppb)	936.76	29.61	959	16.66	53990	<0.11	6.73	<10.2	39275	<25
Tetrachloroethylene	(ppb)	173.96	<0.02	1440	2754	55410	<0.01	90.94	26144	161.8	29014
Trichloroethylene	(ppb)	171.49	<0.01	891	365.9	19830	<0.05	272.7	9794	102046	17826
Vinyl chloride	(ppb)	<0.03	11.58	1115	164.8	1.8	1.02	55.52	<10.5	1000	<30
TOTAL VOLATILES	(ppb)	1566	47	5132	4501	136206	197	1582	99618	161168	48720
PESTICIDES/PCB's PARAMETER	UNITS OF MEASURE										
Alpha-BHC	(ppb)	0.075	0.069	9	<0.02	<0.04	<0.05	0.18	0.353	49	31.5
Beta-BHC	(ppb)	<0.005	<0.005	1.6	<0.05	<0.09	0.52	0.228	0.418	20	4.6
Gamma-BHC	(ppb)	0.028	0.047	1.6	<0.11	8.1	2	0.184	0.513	39	16.3
PCB-1016	(ppb)	<0.19	<0.19	<0.19	<0.19	<0.38	<0.19	<0.19	<0.19	<1.5	<0.19
PCB-1221	(ppb)	<0.15	6.23	<7.7	<1.5	<7.7	<7.7	<0.15	<7.7	<23	<3.1
PCB-1232	(ppb)	<0.15	<0.15	<0.15	<0.15	<0.30	<0.15	<0.15	2.97	<1.5	<0.15
PCB-1242	(ppb)	<0.29	<0.29	<0.29	<0.29	<0.58	<0.29	<0.29	<0.29	<2.9	<0.29
PCB-1248	(ppb)	<0.24	<0.24	<0.24	<0.24	<0.48	<0.24	<0.24	<0.24	<2.4	<0.24
PCB-1254	(ppb)	<0.14	<0.14	<0.14	<0.14	<2.8	<0.14	<0.14	<7.1	<0.14	<0.14
PCB-1260	(ppb)	<0.19	<0.19	<0.19	<0.19	<3.8	<0.19	1.87	<9.6	<0.19	<0.19
OTHER PARAMETER	UNITS OF MEASURE										
Total Suspended Solids	(ppm)	821.1	74.4	15.7	78.1	537.2	4622.6	1440.8	105.8	22.7	146.4
Total Organic Carbon	(ppm)	6.35	1.28	9.66	2.5	11.46	67.41	2.1	6.46	5.36	15.71
Total Cyanide	(ppm)	1.04	ND	0.1	0.1	<0.05	0.2	7.85	0.1	0.086	3.4
Total Recoverable Phenols	(ppm)	<0.01	0.12	0.045	0.01	0.09	0.091	<0.01	0.067	0.013	0.013
Soluable Barium	(ppm)	<1	<1	<1	<1	<1	<1	1.6	<1	<1	<1
Total Copper	(ppm)	0.21	0.53	<0.1	<0.1	0.18	1.18	2.2	0.13	<0.1	0.32

VOLATILES	UNITS OF					WELL	NUMBER				
COMPOUND	MEASURE	15-F	15-J	16-A	16-B	17-A	17-B	18-A	18-C	19-A	19-B
Benzene	(ppb)	34.19	166.9	<11.65	<8.92	<1.179	<6.76	<2.36	315.72	<0.892	99.37
Chlorobenzene	(ppb)	<16.23	75.74	<53.34	<2.45	<8.576	<22.99	<17.2	5216	<0.245	6.54
Chloroform	(ppb)	2727	696	<38.1	22939	46.91	<1.6	<0.02	<42	130.2	27829
Trans-1,2-dichlorethylene	(ppb)	<61	<61	<34.6	<27.8	<0.01	<2.2	<0.01	<61	<0.28	<27.8
Methylene chloride	(ppb)	2206	2198	2261	10727	7.55	10.86	8.02	1363	136.6	10727
1,1,2,2-Tetrachloroethane	(ppb)	2163	3103	3272	10338	<0.23	<3.2	54.57	5824	121.58	10338
Tetrachloroethylene	(ppb)	3776	3338	6171	7427	4.69	67.6	<0.02	1765	57.06	7427
Trichloroethylene	(ppb)	6646	13538	5466	7056	<0.01	<1.2	2.93	453	96.53	7056
Vinyl chloride	(ppb)	<60	<60	37.17	<21.0	<0.01	<24	1.27	<60	<0.21	<21.0
TOTAL VOLATILES	(ppb)	17552	23116	17207	58487	59	78	67	14937	542	63483

PESTICIDES/PCB's	UNITS OF										
PARAMETER	MEASURE										
Alpha-BHC	(ppb)	<0.02	<0.02	0.579	<0.002	<0.002	0.113	<0.002	1.68	31	3.6
Beta-BHC	(ppb)	0.43	0.3	<0.005	<0.005	0.01	<0.005	0.124	1.22	11	<0.23
Gamma-BHC	(ppb)	0.29	0.13	1.19	0.081	0.156	0.158	0.278	0.376	24	3.8
PCB-1016	(ppb)	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19
PCB-1221	(ppb)	<0.15	56.2	<23	<3.1	<23	5.91	<0.15	<23	<7.7	<7.7
PCB-1232	(ppb)	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
PCB-1242	(ppb)	<0.29	<0.29	<0.29	<0.29	<0.29	<0.29	<0.29	<0.29	<0.29	<0.29
PCB-1248	(ppb)	<0.24	<0.24	<0.24	<0.24	<0.24	<0.24	<0.24	<0.24	<0.24	<0.24
PCB-1254	(ppb)	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14
PCB-1260	(ppb)	<0.10	<0.10	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19

OTHER	UNITS OF										
PARAMETER	MEASURE										
Total Suspended Solids	(ppm)	120.5	1917.1	786.5	27.5	2635.5	197.6	3539.7	120.7	180.3	2891
Total Organic Carbon	(ppm)	4.71	12.03	90.91	29.46	7.02	0.95	22.74	8.85	34.58	16.47
Total Cyanide	(ppm)	0.038	1.52	156	70.5	ND	0.204	2	0.073	0.07	0.37
Total Recoverable Phenols	(ppm)	0.096	0.096	0.21	0.191	0.125	<0.01	0.09	0.06	0.103	0.096
Soluable Barium	(ppm)	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Total Copper	(ppm)	<0.1	0.51	<0.1	<0.1	0.71	<0.1	0.47	<0.1	<0.1	1

VOLATILES	UNITS OF					WELL	NUMBER				
COMPOUND	MEASURE	19-C	19-CD1	19-CD2	19-CD3	19-D	19-F	20-B	21-A	22-A	22-B
Benzene	(ppb)	<2.1	12.38	14.5	<9.37	<5.3	<6.03	<12.1	<10.05	<0.99	<0.99
Chlorobenzene	(ppb)	<6.2	<15.3	<15.5	<21.22	<15.5	<16.23	<32.5	<29.84	<2.57	<2.57
Chloroform	(ppb)	<16.9	5100	5067	<16	<42	<4.22	<42	88	<0.64	<0.26
Trans-1,2-dichlorethylene	(ppb)	<22.96	<1.53	<22	<22	<61	<5.74	<61	<10	<1.1	<0.45
Methylene chloride	(ppb)	<11.5	1690	1836	<12	1874	<2.88	1710	145	229.9	58.84
1,1,2,2-Tetrachloroethane	(ppb)	<8.7	<0.98	<32	<32	1178	<3.66	1628	922	60.41	70.92
Tetrachloroethylene	(ppb)	<14.7	1226	859	<14	1533	<0.78	2109	464	43.07	30.33
Trichloroethylene	(ppb)	2451.8	574	1770	<12	222	837.71	784	924	<0.66	<2.6
Vinyl chloride	(ppb)	1264	<1.53	<24	<24	<60	<5.72	<60	85	<0.79	<0.32
TOTAL VOLATILES	(ppb)	3716	8602	9547	0	4807	838	6231	2628	333	160
PESTICIDES/PCB's	UNITS OF										
PARAMETER	MEASURE										
Alpha-BHC	(ppb)	0.143	11	3.53	0.17	0.232	0.236	0.178	0.12	NR	0.458
Beta-BHC	(ppb)	0.086	1	0.998	0.02	0.034	<0.005	0.105	<0.05	NR	0.148
Gamma-BHC	(ppb)	0.067	5.5	1.69	0.078	0.027	0.156	0.052	0.18	NR	0.047
PCB-1016	(ppb)	<1.9	<3.8	<1.5	<0.19	<0.19	<0.19	<0.19	<0.19	NR	<0.38
PCB-1221	(ppb)	<1.5	<7.7	<0.15	<0.15	<0.15	<0.15	<0.15	<1.5	NR	<0.15
PCB-1232	(ppb)	<1.5	<3.1	<1.5	<0.15	<0.15	<0.15	<0.15	<0.15	NR	<0.30
PCB-1242	(ppb)	<2.9	<5.8	<2.9	<0.29	<0.29	<0.29	<0.29	<0.29	NR	<0.58
PCB-1248	(ppb)	<2.4	<4.7	<2.4	<0.24	<0.24	<0.24	<0.24	<0.24	NR	<0.48
PCB-1254	(ppb)	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	NR	<0.14
PCB-1260	(ppb)	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	NR	<0.19
OTHER	UNITS OF										
PARAMETER	MEASURE										
Total Suspended Solids	(ppm)	10.2	147.6	36	47.1	38.8	68.7	76.3	101	NR	88
Total Organic Carbon	(ppm)	10.87	6.66	5.5	9.56	4.26	2.72	11.11	18.59	NR	1.98
Total Cyanide	(ppm)	0.042	0.064	0.157	0.084	0.041	0.033	0.087	4.409	NR	0.02
Total Recoverable Phenols	(ppm)	0.017	0.013	0.103	<0.01	0.011	<0.01	0.015	0.074	NR	0.021
Soluable Barium	(ppm)	<1	<1	<1	<1	<1	<1	<1	<1	NR	<1
Total Copper	(ppm)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NR	<0.1

VOLATILES	UNITS OF					WELL	NUMBER			
COMPOUND	MEASURE	22-C	22-D	22-F	23-A	23-B	23-C	23-D	23-F	24-A
Benzene	(ppb)	<0.99	686.6	31.8	69.41	8.6	<2.1	<5.3	<5.3	<2.41
Chlorobenzene	(ppb)	<2.57	<46.0	<31.1	<2.57	10.3	<6.2	<15.5	<15.5	<6.49
Chloroform	(ppb)	454.9	<2.82	<16	<0.26	<19	<1.13	<16.89	<1.13	134
Trans-1,2-dichlorethylene	(ppb)	511.93	<3.83	<22	<0.45	<25	<1.53	<22.96	<1.53	<61
Methylene chloride	(ppb)	680.2	<1.92	<12	47.99	<14	<0.77	<11.50	<0.77	1394
1,1,2,2-Tetrachloroethane	(ppb)	351.5	<2.44	<32	4.27	435	<0.98	<14.7	<0.98	1039
Tetrachloroethylene	(ppb)	511.4	<0.52	64	3.64	534	<0.21	<8.7	<0.21	2321
Trichloroethylene	(ppb)	3142	12699	<12	<0.26	<11	<0.58	1504.5	2432	1108
Vinyl chloride	(ppb)	526.8	89.23	<24	<0.32	<20	<1.53	75	<1.53	<60
TOTAL VOLATILES	(ppb)	6179	13475	96	125	988	0	1580	2432	5996
PESTICIDES/PCB's	UNITS OF									
PARAMETER	MEASURE									
Alpha-BHC	(ppb)	0.422	21	1.6	NR	0.179	0.135	0.212	0.373	<0.02
Beta-BHC	(ppb)	<0.005	7	0.656	NR	0.788	<0.005	<0.005	0.017	<0.05
Gamma-BHC	(ppb)	0.267	12	1.07	NR	0.267	0.22	0.167	0.098	<0.02
PCB-1016	(ppb)	<0.19	<1.9	<0.19	NR	<0.19	<3.8	<0.19	<0.19	<0.19
PCB-1221	(ppb)	<0.15	<0.15	<0.15	NR	<0.15	<0.23	<0.15	<0.15	<0.15
PCB-1232	(ppb)	<0.15	<1.5	<0.15	NR	<0.15	<3.1	<0.15	<0.15	<0.15
PCB-1242	(ppb)	<0.29	<2.9	<0.29	NR	<0.29	<5.8	<0.29	<0.29	<0.29
PCB-1248	(ppb)	<0.24	<2.4	<0.24	NR	<0.24	<4.7	<0.24	<0.24	<0.24
PCB-1254	(ppb)	<0.14	<0.14	<0.14	NR	<0.14	<0.14	<0.14	<0.14	<0.14
PCB-1260	(ppb)	<0.19	<0.19	<0.19	NR	<0.19	<0.19	<0.19	<0.19	<0.19
OTHER	UNITS OF									
PARAMETER	MEASURE									
Total Suspended Solids	(ppm)	77.4	59.9	72.7	NR	154.6	31.5	32.1	79.6	1017.6
Total Organic Carbon	(ppm)	3.06	218.45	7	NR	5.84	12.79	9.39	16.06	12.46
Total Cyanide	(ppm)	0.025	0.016	0.348	NR	0.02	0.031	0.016	0.061	0.62
Total Recoverable Phenols	(ppm)	0.013	<0.01	0.037	NR	0.085	0.037	0.051	0.054	0.081
Soluable Barium	(ppm)	<1	<1	<1	NR	<1	<1	<1	<1	<1
Total Copper	(ppm)	<0.1	<0.1	<0.1	NR	0.1	<0.1	<0.1	<0.1	0.28

FOOTNOTES: NR = Not reported
ND = Not detected
<X = < indicates below detection limit