ORIGINAL (Red)

A PRELIMINARY ASSESSMENT OF DWYER PROPERTY ELKTON, MARYLAND

FINAL REPORT
MARCH 1989

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1.0 INTRODUCTION

1.1 AUTHORIZATION

The Maryland Department of the Environment, Hazardous and Solid Waste Management Administration (MDE/HSWMA) performed this study under Environmental Protection Agency (U.S. EPA) contract No. MD88-0526-0408.

1.2 SCOPE OF WORK

MDE/HSWMA was contracted to conduct a Preliminary assessment (PA) at the subject site. This PA will address past practices and current conditions at the Dwyer Site and make recommendations.

1.3 EXECUTIVE SUMMARY

The Dwyer property came to the attention of Maryland Department of the Environment (MDE) as a result of a real estate transaction. Based upon the previous history of the site as a munitions manufacturing plant, a complete groundwater assessment was recommended. Three monitoring wells were drilled at the site as a first step.

Triumph Fuses and Fireworks manufactured fireworks on the property since 1933. They changed their name to Triumph Explosives, Inc. and manufactured ammunitions for the Navy and Army until 1946. After 1946, the site was used to manufacture batteries and spark plugs. In 1948,

when Aerial Products, Inc. acquired the property, it was once again used for explosives manufacture until 1958 when Mr. Dwyer purchased the property. Presumably, he used the land for cattle grazing. At present, the site is wooded with demolished buildings and evidence of recent dumping.

Results of sampling the three monitoring wells on the Dwyer property showed that there is serious volatile organic contamination in the ppm range. Contaminants include trans-1,2-dichloroethene (trans-DCE), trichloroetene (TCE), and tetrachloroethene (PCE). Sampling of five home wells in the area did not show volatile contamination, however, stream samples of Dogwood Run showed low level contamination similar to the monitoring wells. A shallow, possibly hand-dug well on the Dwyer site also showed contamination.

As a result of the high concentrations of volatile organics in the shallow aquifer at the Dwyer site, a high priority site inspection is recommended at the earliest time.

The sampling plan should be preceded by proton magnetometer sweep of the site to determine if there are buried drums, metal or munitions. This should be followed by the collection of soil gas samples on 100 foot grid squares over the entire seventy-one (71) acres to detect the source of any plume or plumes emanating from the site. Wells may be located based upon the first two procedures.

2.0 THE SITE

2.1 LOCATION

The Dwyer site is located north of the junction of MD Routes 279 and 545 in Cecil County, Maryland. The site can be accessed via a gravel road approximately 1,000 feet north from the junction of MD Routes 279 and 545 along Route 545 north right before the bridge over Dogwood Run. Figure 1 shows the street map of the site and the vicinity. The latitude of the site is 37^{O} 37' 04" N and the longitude is 75^{O} 50' 41" W.

2.2 SITE LAYOUT

The Dwyer site is approximately 71 acres. There are approximately 70 demolished buildings on-site (USGS, 1953). These buildings were concentrated at the southwest part of the site as shown in Figure 2. Several gravel roads form a network across the site with the main road northeast-southwest bound. Dogwood Run flows across the northwest part of the site.

There is a cluster of residential houses adjacent to the southeast portion of the site. The site and the cluster of houses are bordered by MD Route 213 to the east and MD Route 279 to the south. MD Route 545 lies to the west of the site. There are about a dozen residential

houses along the east side of Route 545 to the northwest. A wooded area with stressed vegetation lies to the north.

2.3 OWNERSHIP HISTORY

The site consists of six (6) parcels of property acquired by Triumph Explosives, Inc. during the period of 1933 to 1945 from individual residents and Elk Mills Loading Corp. After Triumph Industries (formerly Triumph Explosives, Inc.) disbonded, the following transactions were recorded:

Date of Transaction	Seller/Buyer	Record Number
	Triumph Industries, Inc.	
06/01/46	↓	RRC 17/55
	Bowens Battery & Spark Plug	
4/20/48	↓	RRC 31/108
	Aerial Products, Inc.	
05/09/58	↓	WAS 60/217
	Martin Dwyer	
02/23/72	↓	NDS 12/60
(Trust Agreement)	Trustees: Martin Dwyer, Jr., Thomas Johnson Dwyer, Delaware Trust Co.	
	↓	
08/18/86: (Will)	Granted: Martin Dwyer, Jr., Thomas Johnson Dwyer, Delaware Trust Co.	---

2.4 SITE USE HISTORY

Triumph Fuses & Fireworks began to manufacture fireworks at the site in 1933. They changed their name to Triumph Explosives, Inc. and manufactured ammunitions for the Navy and Army since 1935 (Geraghty & Miller, 1987). The property was sold to Bowers Battery and Spark Plugs

Co. in 1946 and the site was apparently used to manufacture batteries and spark plugs. The Aerial Products, Inc. acquired the property in 1948 and used it for an explosives manufacturing facility until 1958 when Mr. Dwyer purchased the lot. Mr. Dwyer owned a dairy farm in the nearby area. Therefore, it is assumed that Mr. Dwyer used the site for raising cattle stock. The site is currently wooded with demolished buildings among wooded areas.

2.5 PERMIT AND REGULATORY ACTION HISTORY

There is no knowledge regarding the permit issued to the different past owners. There has been no regulatory action taken up to date.

2.6 REMEDIAL ACTION TAKEN TO DATE

There has been no remedial action taken to date at the site.

3.0 ENVIRONMENTAL SETTING

3.1 WATER SUPPLY

The town of Elkton receives its water via: a) two (2) public water wells located south and east of Elkton, and b) direct draw from the Big Elk Creek (see Figure 3).

The #1 well is located near the southeast corner of the intersection of US Routes 40 and 213 (about 1.6 miles southeast to the site). This well draws 120 gpm for 2 hours a day from the Patapsco Formation of the Potomac Group and produces from 110 feet deep.

Well #3 is located on a service road south from US Route 40, 1.7 miles east of the junction of US Routes 40 and 213 (about 2.9 miles southeast to the site). The #3 well draws 850 gpm for 10 hours a day from a depth of 157 feet (undifferentiated Potomac).

Wells #2 and #4 were closed down due to insufficient production.

The intake from the Big Elk Creek is located within the city limits of Elkton near where MD Route 7 crosses the Big Elk Creek (about 1.4 miles east to the site). The Elkton Water Department of the Cecil County Water and Sewage Division reports this intake has a maximum capacity of 2 mgd but it currently produces 1 mgd.

There are, reportedly, 118 wells within a three 3 mile radius of the Dwyer site, of which 51 are slated for domestic use (USGS, 1989). Many of the remaining wells are no longer active and it is estimated that only 70-75 wells are currently in use (Geraghty & Miller, 1988). There are numerous well-like structures on the Dwyer property of which only one (1) is reported in the USGS well listing. These wells produce predominately from the Potomac Group although there is minor production from the overlying Talbot Formation and the underlying bedrock.

3.2 SURFACE WATERS

There are several bodies of water within a three (3) mile radius of the site. The closest moving water systems are the Little Elk Creek 1000 feet to the southwest, Mill Creek 1.25 miles to the southwest, Big Elk Creek one half mile to the east and Dogwood Run flows across the site. In addition, there are numerous streams which meander in a general southerly direction (see Figure 3). There is a large man made duck pond about one half mile due southwest of the site along with several wildlife marshes.

Big Elk and Little Elk Creeks are occassionally used for recreational fishing while Big Elk Creek is large and deep enough for small boats. It is not known if any of these bodies of water are used for irrigation purposes within three miles downstream. Because of the area's sufficient rainfall, irrigation would not seem necessary for most crops. Although it is not documented, there is reason to believe that some of the local population draws water directly from Dogwood Run for domestic purposes.

3.3 HYDROGEOLOGY

3.3.1 GEOLOGY

The Dwyer site is situated within the Atlantic Coastal Plain province which consists of a southeasterly thickening sequence of

Mesozoic-to-Cenozoic, unconsolidated detrital sediments which lie upon Precambrian and Paleozoic metamorphic rocks (see Figure 4). The Dwyer property is two (2) miles south-southeast of the Fall Line which is the three mile wide zone separating the Coastal Plain province from the intensely metamorphosed Piedmont province. Topographic relief of the area is approximately 300 feet although, within the site area, relief is nearly 70 feet.

The specific bedrock type of the site area is poorly understood. It can be shown that there are at least three distinctive bedrock materials which include: a) the Elkton Gneiss, b) a granodiorite, and c) a serpentinized gabbro. The Elkton Gneiss, a micaceous feldspathic rock, has been observed in wells drilled 5000 feet to the southwest. Granodiorite has been reported (Overbeck, Slaughter and Hulme, 1958) in a well 2000 feet to the northwest but it is felt that this material should either be the Elkton Gneiss or the Principio Furnace Member of the James Run Formation.

The Principio Furnace Member is described as interbedded gray-to-white granofels and diamictite. The granofels are fined grained and are composed of quartz, plagioclase and crystals of amphiboles. The diamictites are a medium-grained gneiss composed of biotite, quartz and plagioclase.

Serpentinized gabbros have been encountered in wells 11,000 feet due west on the Boulden site property (MDE files, 1986), outcropping

7000 feet to the west immediately south of the Little Elk Creek-Laurel Run union (Higgins and Conant, 1986) and possibly encountered again in Morton Thiokol wells 5000 feet to the southwest (Geraghty & Miller, 1988). That the gabbros may exist in the Morton Thiokol wells is based upon the well logs.

Regardless of the composition of the bedrock, it had weathered into a saprolite prior to the deposition of the undifferentiated Potomac Group. It did not weather flat however, as evidenced by small pinnacles that pierce eroded portions of the overlying unit.

The Potomac Group of Cretaceous age has been interpreted as being of continental origin (Overbeck, Slaughter and Hulme, 1958) consisting of gravels, sands, silts and clays deposited on the gently rolling plains of the weathered basement rock. Because of its continental origin, the specific lithologies consist of small discontinuous lenses of sands and clays with the clays acting as barriers to the vertical and horizontal migration of groundwater (see Figure 5). Regional dip of this group is to the southeast and its strike bears a northeast-southwest attitude. This unit is the most utilized aquifer within the area (Geraghty & Miller, 1988; USGS, 1989).

Unconformably upon the Potomac Group rests the Quaternary-age Talbot Formation. Like the Potomac Group, this formation consists of fluvial and deltaic gravels, sands, silts and clays and distinguishing between the two sequences, in the field and from logs, can be difficult.

The Talbot does produce water and is currently exploited within a three (3) mile radius.

3.3.2 SOILS

There are 2 minor soil types within the soil horizon: a) the Metapeake silt loams, and b) the Beltsville silt loam.

The Metapeake soils are deep, well drained, well aerated, medium-textured soils with strongly developed horizons. The surface is usually eight (8) inches of dark grey-brown silt loam which overlies four (4) inches of a brown friable silt loam. Beneath this horizon is about 25 inches of brown, yellowish-brown silt loam which overlies ten (10) inches of yellow-red sandy loam. The final horizon is a twelve (12) inch thick brown loamy sand.

The Metapeake soils are suitable for most crops. They possess a good nutrient content and have an excellent available moisture capacity. Erosion is not considered a problem if proper soil management practices are followed.

The second soil type, the Beltsville silt loam, is a moderately-to-poorly drained, medium texture material found on slopes of 5-10^{o}. Physically, the soil is a yellow-brown loam at the surface with a silt content increasing with depth. Permeabilities are low and water will not percolate easily through the subsoil being retained, instead, for

long periods. Soils are most utilized as pastoral and for general crops, although the upper horizon will form a hard fragipan, when dry, which makes it difficult for plant roots to penetrate. This condition creates a moderate erosion hazard (USDA, 1973).

3.3.3 GROUNDWATER

Groundwater will migrate primarily through both the Talbot and Potomac units to the southeast so as to follow regional dip. Migration paths of groundwater are moderately tortuous as a result of the laterally discontinuous nature of the conductive sands and gravels (see Figure 5). Although the units are hydrologically interconnected, lenses of clay will act as local vertical and horizontal barriers to fluid movement. Well logs indicate that these clay lenses can be as much as 125 feet thick although their lateral extent is very difficult to determine.

Regional transmissivity values of the Potomac Group sands range from 3000 to 68,000 gpd/ft. A four hour pump test performed at MTI production well W-7 (A-4), which is approximately 5800 feet from the Dwyer property, recorded a transmissivity of 1600 gpd/ft (Geraghty & Miller, 1988). Well yields in the Potomac Group vary from 2.5 to 120 gpm however, locally, the yields range from 0.8 to 50 gpm (Overbeck, Slaughter and Hulme, 1958). These low yields may reflect the discontinuous nature and relatively small size of the water-bearing sand

units. This concept is strengthened by well logs which, seemingly, are not correlative.

Transmissivities in the alluvium near Little Elk Creek range from 800 to 1700 gpd/ft (Overbeck, Slaughter and Hulme, 1958) although regional values are much higher and vary from 15,000 to 97,000 gpd/ft.

The USGS reports 118 wells within a three (3) mile radius of which 51 are slated for domestic use. Many of the remaining wells are no longer active and it is estimated that only 70-75 wells are currently producing (Geraghty & Miller, 1988). The closest domestic well is on Blue Ball Road approximately 1000 feet to the northwest.

3.4 METEOROLOGY

Based on data available in the HRS manual, the following meterological information is obtained through interpolation. The mean annual precipitation in this area is approximately 45 inches. The mean annual lake evaporation in this area is approximately 35.5 inches. Thus, the net precipitation in the vicinity of the site can be determined to be 9.5 inches. The one-year, 24-hour rainfall averages 2.7 inches in the vicinity of the site.

3.5 LAND USE

There is a residential area, as well as an industrial area, one quarter mile from the contaminated monitoring well. The contaminated Dogwood Run flows through the site.

3.6 POPULATION

Combining the information from the 1980 census tract data (MD Department of State Planning, 1980) and USGS topographic map (1985), the population within a 3-mile radius is estimated to be 13,514 people.

3.7 CRITICAL ENVIRONMENT

According to the wetland maps (Fish and Wildlife Services, 1982), there is a fresh water wetland greater than 5 acres within 1 mile from the site. In addition, the State of Maryland is designated as a habitat for the peregrine falcon, the bald eagle, the Indiana bat, the eastern cougar, and the Maryland Darter fish by Fish and Wildlife Service. These species are included on the U.S. Department of Agriculture Endangered Species List.

4.0 PRELIMINARY SAMPLING RESULTS

As a result of the possible sale of the Dwyer property, MDE recommended that, based upon the past history of the site as a munitions

manufacturing plant, the Dwyer consultant perform a complete groundwater assessment. As a beginning step, three wells were installed roughly parallel to Dogwood Run.

Well #1, the southern most, is directly downgradient of the old machine shop and was drilled to a depth of twenty (20) feet. Water is encountered at fifteen (15) feet. Further north is Well #2, which was drilled to a depth of fiteen (15) feet with water at four (4) feet. The third and northern most well was drilled to a depth of nineteen (19) feet with ten (10) feet to water.

After these wells were developed and purged, MDE split samples and analyzed them at the State of Maryland, Department of Health and Mental Hygiene Laboratories, using EPA method 601 (MDE, 1989). On the Well #1 analysis, the detection limit was 200 ppb for most contaminants. Contaminants found in this sample were: trans-1,2-dichloroethene (trans-DCE) 19,200 ppb and trichloroethene (TCE) 15,800 ppb. Well #2 results showed contamination of 10,600 ppb TCE and 360 ppb tetrachloroethene (PCE). Well #3 was the least contaminated with 238 ppb TCE and 52 ppb PCE.

Following the receipt of these analyses from the laboratory, MDE sent inspectors to sample the local residences that are using wells as a water supply. No homes are directly downgradient of the monitoring wells. Five homes were sampled along Dogwood Road (Figures 1,2), Brooks Lane and Blue Ball Road. All residential wells were clean for purgeable

halocarbons, however, benzene, ethybenzene, toluene, and xylene were present at 40 Dogwood Road (Pt. 2). Toluene was detected at 418 Blue Ball Road (Pt. 1).

In addition, four (4) stream samples were collected along Dogwood Run. The upgradient sample (Figure 2) was clean (Pt. 5). A sample collected near the central part of the site (Pt. 7) as intercepted by the stream and was the most contaminated stream sample with 1 ppb trans-DCE, 27 ppb TCE and 1 ppb PCE. A sample taken further downstream (Pt. 8) was also contaminated with 1 ppb trans-DCE, 19 ppb TCE and 1 ppb PCE. The fourth stream sample was taken just south of Blue Ball Road (Pt. 9). Trans-DCE was detected at 1 ppb, with 13 ppb TCE and 1 ppb PCE. Finally, a sample (Pt. 10) was taken on the site in a possible hand-dug well (Section 10.0). In this sample there were 31 ppb trans-DCE, 43 ppb TCE and 4 ppb PCE.

5.0 WASTE TYPE AND QUANTITY

The Dwyer site is currently inactive. Prior to Dwyer's ownership, there are three different industrial owners, namely, Aerial Products, Bowers Battery and Spark Plugs and Triumph Industries (formerly Triumph Explosives). There is no document showing controlled hazardous substancs (CHS) on-site. During the site visit, numerous empty drums and empty flare containers were discovered. One drum laying horizontally (Section 10.0) was found to contain salmon-colored, sugary solid. Though the identity of the substance is unclear, the bottom of

the drum has been rusted and broken and the wall of the drum was severely corroded.

In a publication (TNT, 1944) obtained by MDE inspectors during the PA, an article regarding proper waste material handling was included to urge the workers to pursue a safer workplace by following proper procedures. As indicated in the article, spills from overly full drums occurred from time to time. After the waste wet powder was dumped into the firehole, the drums were placed on a wash rack where they were throughly hosed out and cleaned. The powder sludge that was washed from the drums was trapped in a sump waiting to be burned after water was drained off. Since the site has been used for ammuntion/explosives manufacturing in the 1930's and 1940's and the waste reject explosives handling practice, it is reasonable to assume that the contaminants shown in the samples were present on-site with unknown quantity.

6.0 FIELD TRIP REPORT

6.1 PERSONS CONTACTED

Bill Lucas
Environmental Engineer of MTI
(301) 398-3000

6.2 FIELD TRIPS

MDE personnel Mary-Linda Adams and Alan Williams visited the site on February 17, 1989 for a site reconnaissance. On March 8, 1989, the site was visited by MDE personnel Mary-Linda Adams and W. Eric Huang for the purpose of a preliminary assessment.

6.3 SITE OBSERVATIONS

The property is vacant with numerous buildings that have been demolished. For the most part, the rubble from these buildings is spilled on-site. In several areas of the site, there are metal containers ranging in size from 55-gallon drum to paint can. Some of these containers contain an unknown product, mostly a powder. In one area, there is a large pile of flare casings. In all likelihood, these casings were discarded because they did not meet specifications. In the southeastern corner of the site (along Route 279), there appears to be a hand-dug well (Section 10.0). The well is only approximately one foot deep, but it is possible that it had been filled in. The result of the sample from this well shows 43 ppb TCE, 4 ppb PCE and 31 ppb trans-DCE.

In general, the property has been neglected and is overgrown with vegetation. There is also a great deal of nuisance dumping taking place.

7.0 RECOMMENDATIONS

As a result of the high level of the volatile organic contamination in the shallow aquifer on the site, a high priority site investigation is recommended, which would include the use of a proton magnetometer to detect any buried metal, drums, or munitions. In addition, soil gas samples must be taken over the entire site on 100 foot grid squares to define the plume or plumes. Wells will be drilled in the Talbot and Potomac Group aquifers based upon the results from the magnetometry and the soil gas.

8.0 REFERENCES

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Well Data within 3-mile Radius.

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9.0 FIGURES

DWYER SITE MAP

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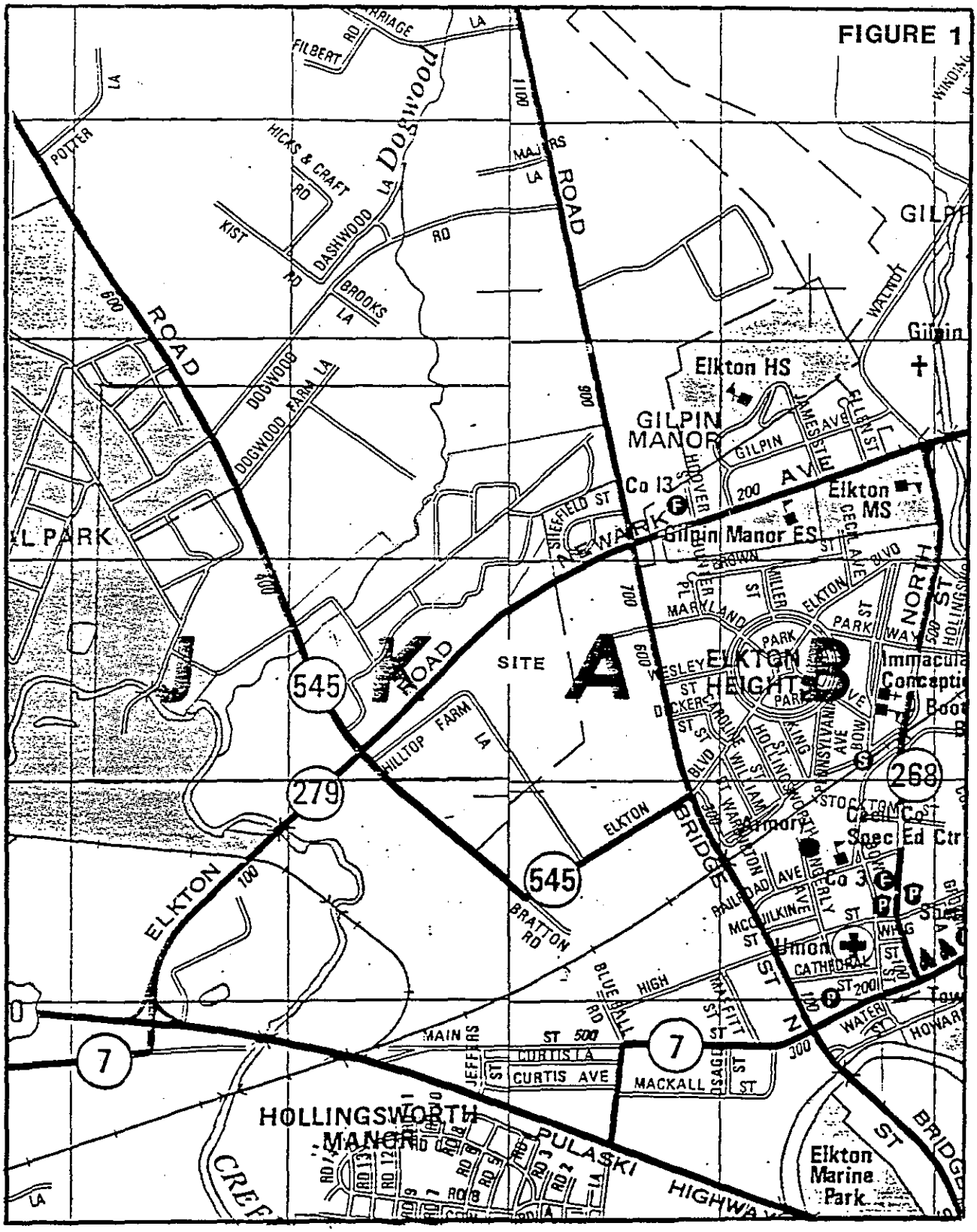
FIGURE 1



ADC Publication, 1983

Use No. 30588011

0 1000 2000

scale in feet

N

22

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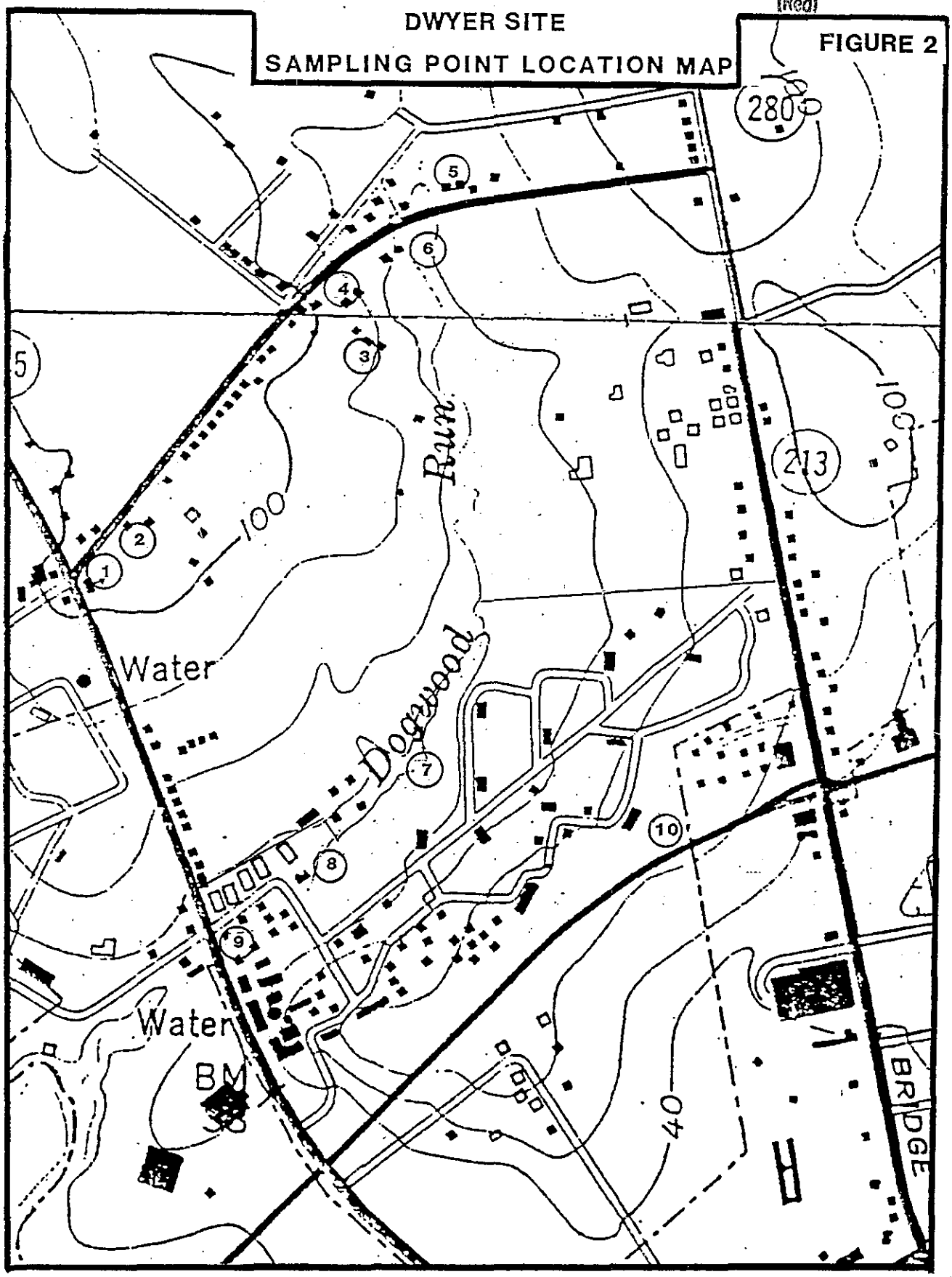
DWYER SITE
SAMPLING POINT LOCATION MAP

FIGURE 2



0 500 1000

scale in feet

N

U.S.G.S. Topographic Map, 1970

○ Sampling Point

23

AR000101

BODIES OF SURFACE WATERS

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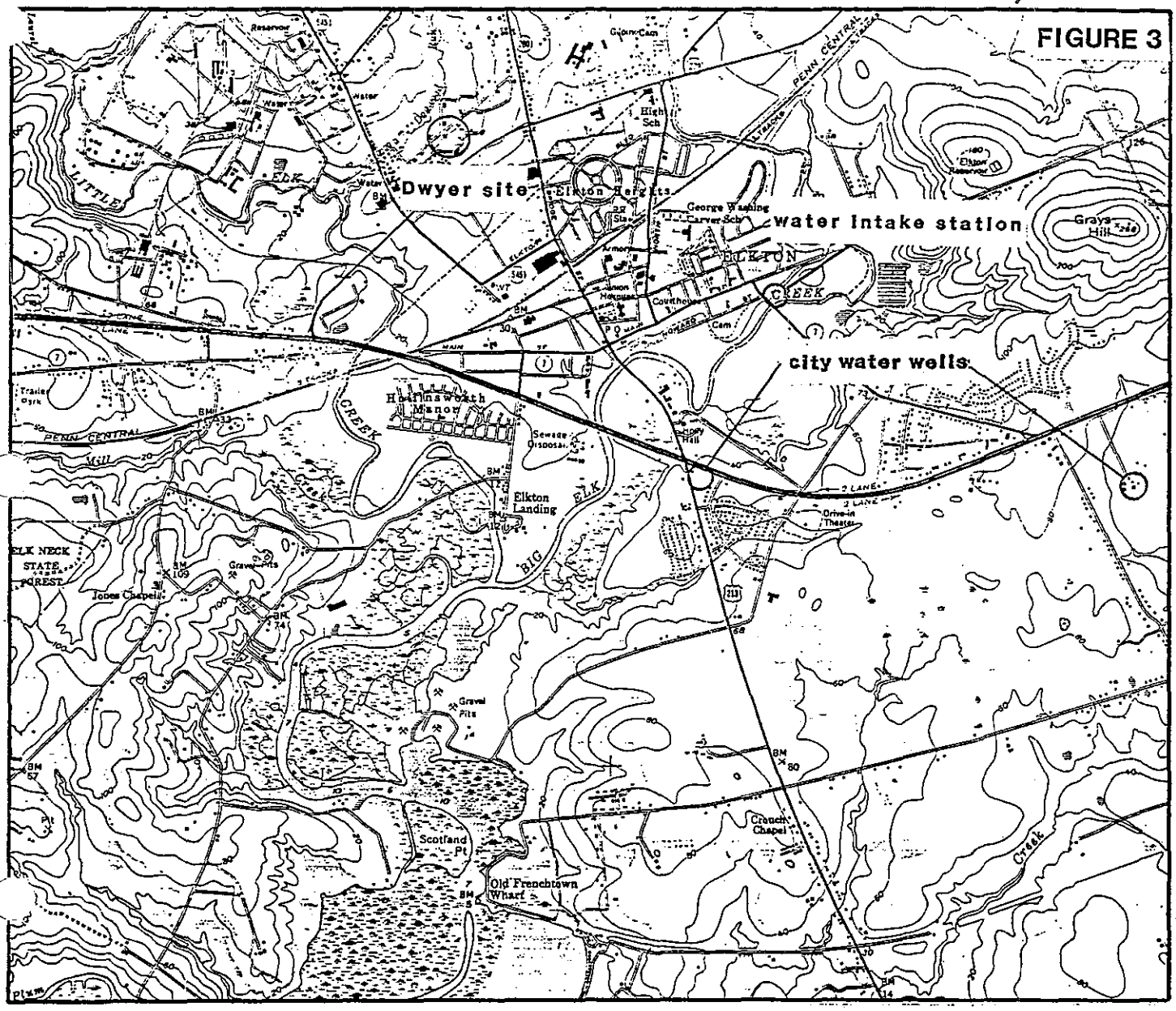
FIGURE 3



U.S.G.S. topographic map, 1970

0 3000 6000

scale in feet

N

24

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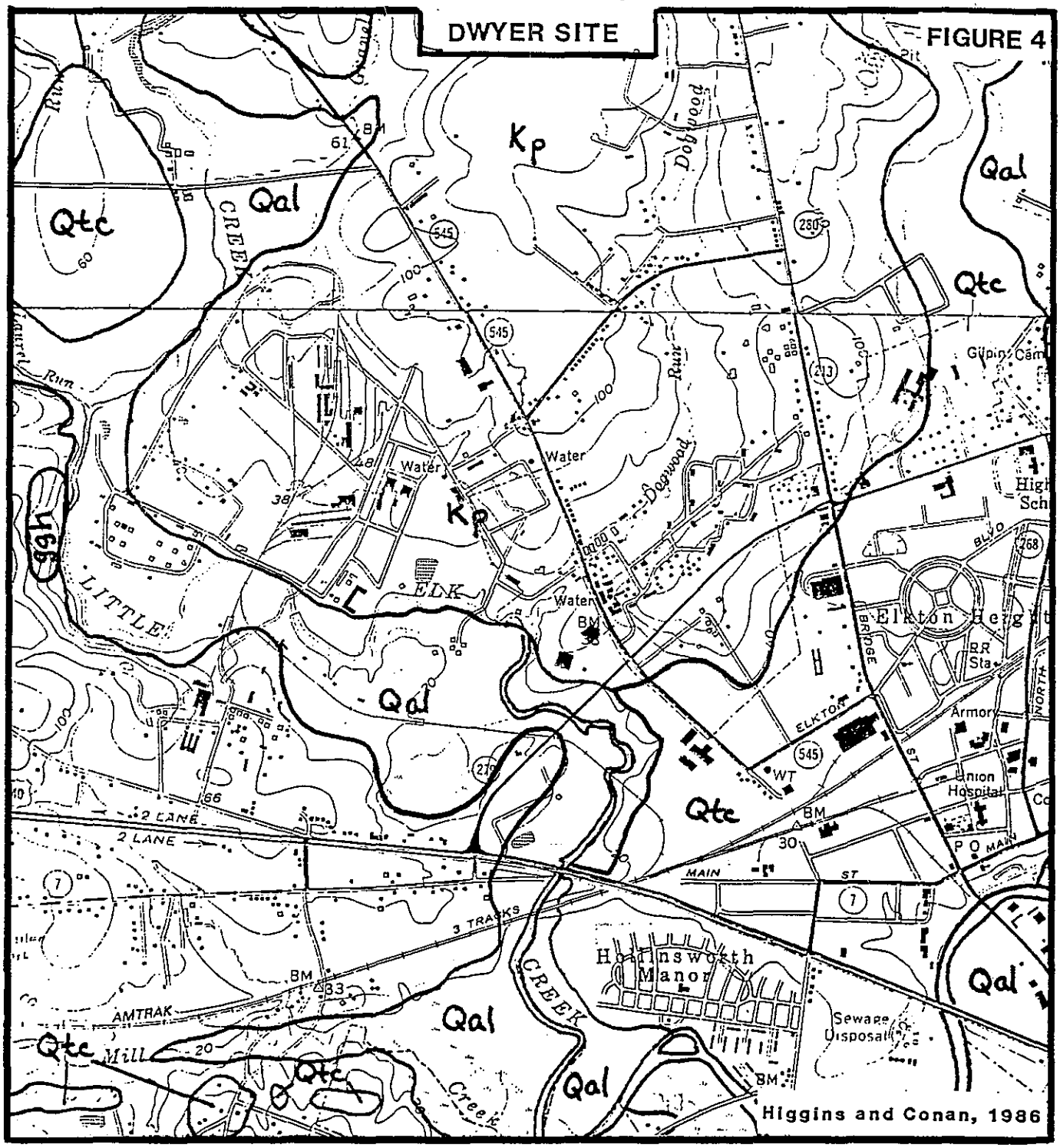
GEOLOGIC MAP

DWYER SITE

FIGURE 4



N

0 1500 3000

scale in feet

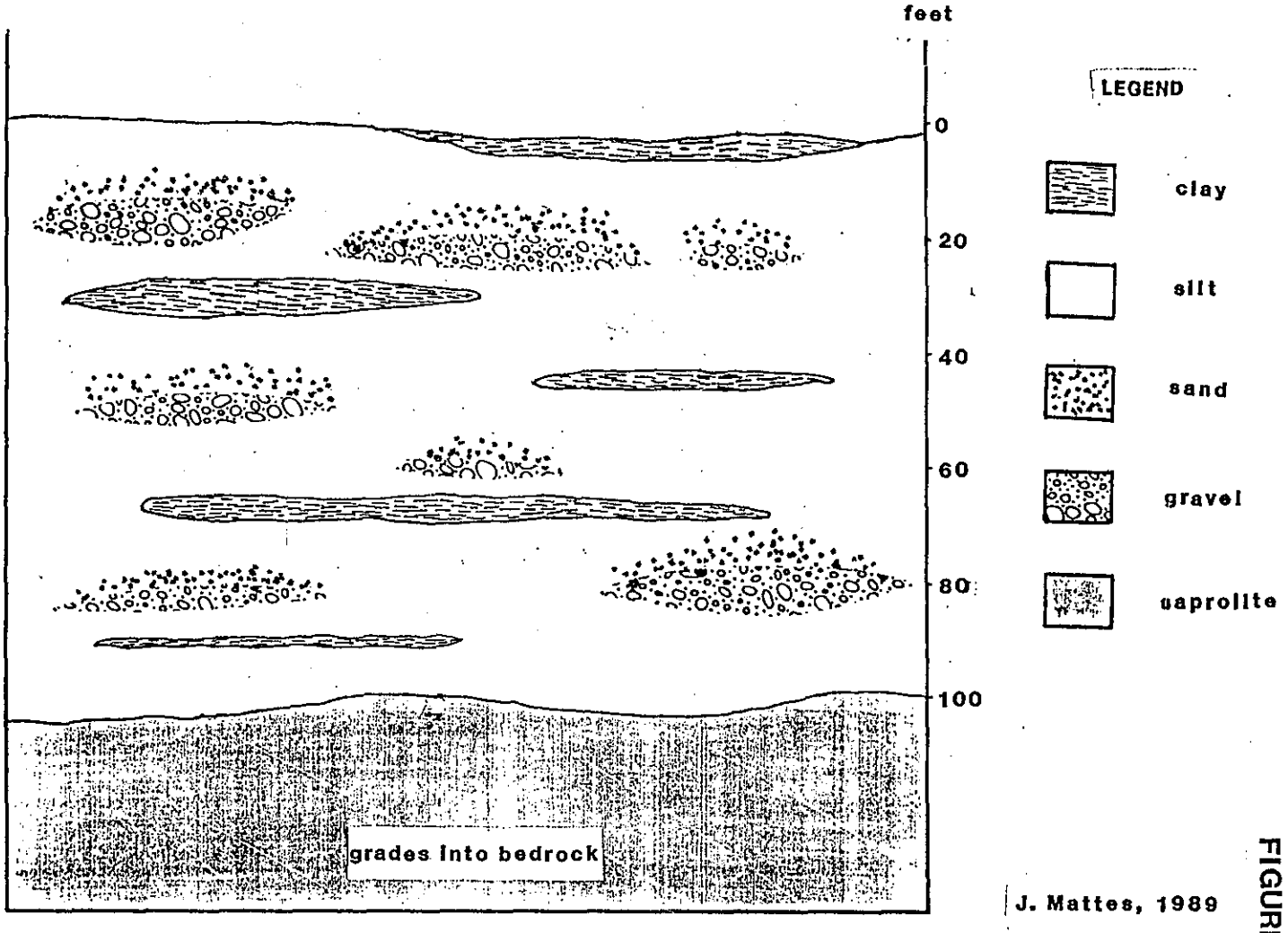
Qal	alluvium
Qtc	Talbot Formation
Tu	Upland Gravel Formation
Kp	Potomac Group
ggh	gabbro and serpentinite

25

AR000103

STYLIZED GEOLOGIC CROSS-SECTION

DWYER SITE



J. Mattes, 1989

MDE

FIGURE 5

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10.0 PHOTOS