NUS CORPORATION
A Halliburton Company

PROJECT FOR PERFORMANCE OF REMEDIAL RESPONSE ACTIVITIES AT UNCONTROLLED HAZARDOUS SUBSTANCE FACILITIES—ZONE 1

NUS CORPORATION
SUPERFUND DIVISION

R-585-10-4-26

SITE INSPECTION OF NCR CORPORATION PREPARED UNDER

TDD NO. F3-8409-14
EPA NO. DE-042
CONTRACT NO. 68-01-6699

FOR THE

HAZARDOUS SITE CONTROL DIVISION
U.S. ENVIRONMENTAL PROTECTION AGENCY

JANUARY 15, 1984

NUS CORPORATION
SUPERFUND DIVISION

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Site Name: NCR Corporation
TDD No.: F3-8409-14

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SECTION 1

1.0 INTRODUCTION

1.1 Authorization

NUS Corporation performed this work under Environmental Protection Agency Contract No. 68-01-6699. This specific report was prepared in accordance with Technical Directive Document No. F3-8409-14 for the NCR Site located in Millsboro, Delaware.

1.2 Scope of Work

NUS FIT III was requested to perform a desk-top site inspection using available information of the site. Pursuant to this task, information from "A Preliminary Assessment of NCR," conducted by the Delaware Department of Natural Resources and Environmental Control (DNREC), Solid Waste Branch, dated April 1984, and "Groundwater Quality Investigation and Groundwater Quality Management Plan Interim Report for NCR Corporation," by Richard E. Sacks, Geologist, Betz, Converse, Murdock (BCM) Eastern, Inc. (One Plymouth Meeting Mall, Plymouth Meeting, Pennsylvania 19462), dated March 1984, was reviewed, as were state and EPA records and files regarding the site.

1.3 Summary

NCR, or National Cash Register, operated a manufacturing plant southeast of Millsboro, Delaware until its closure in November 1981. The company had an electroplating facility which used heavy metals (including chromium and lead), as well as degreasing material such as Trichloroethylene (TCE). The operation was started in October 1967. It changed from manufacturing to assembly only from 1974 until 1979. The electroplating operation was subsequently discontinued.[5]

The plating process, which was part of the NCR operation, produced a chromium-bearing wastewater, which was treated onsite near the northeast corner of the plant. The wastes were diluted and caustic soda was added to them. The waste then settled in the 3 cement-lined 30,000 gallon lagoons. The supernatant was discharged into a drainage ditch, which emptied into the Iron Branch Creek.

The electroplating sludge lagoons were cleaned out in 1974 and the contents were disposed of in an on-site 10 x 20 foot benonite and polyeutrethane lined pit (based on conversations with NCR, not field confirmed). Only 1 lagoon has been used for collection and discharge of cooling water since 1978. The other lagoons have been idle since 1978. At the end of July 1978, the lagoons were decontaminated and cleaned out by Clean America. The wastes were hauled by AT&T to the Baltimore facility of American Recovery.

In November 1981, the property was sold to First National Bank of Maryland. The building and property are presently referred to as First Freedom. NCR agreed to be responsible for groundwater monitoring and testing, and for any existing contaminants produced by their manufacturing facility.[5] BCM was retained by NCR to perform the quarterly groundwater monitoring associated with the closure of the plant.[1]

The initial causes for concern were the results of the groundwater monitoring, which showed high chromium levels in 1 of the monitoring wells in February and March 1981.

After April 1983, the main concern at the site became the presence of elevated TCE concentrations in the groundwater at the northeast corner of the property. BCM continued an investigation of the possible sources and of the extent of TCE contamination in the groundwater. They have currently (April 1984) issued detailed reports on the TCE and chromium contamination in the groundwater at the site. The latest known sampling was done between January 3 and 5, 1984. The monitoring wells contain significant amounts of 2 chlorinated ethylenes, trans 1, 2-di-chloroethylene TDE and tri-chloroethylene TCE.[1]

BCM has collected much of their data for the reports from the 22 monitoring wells presently on the site. (See appendix B, figure 1 and table 3 for dimension and contruction details.)[1] From these they have been able to track the location, and to some degree, the extent of the TCE plume. The plume is presently moving northeast from the northeast corner of the building, where concentrations have been found to been highest. TCE contaminated groundwater has reached, and is flowing into, Iron Branch, as revealed by stream sampling there.[2]

ORIGINAL

SECTION 2

2.0 THE SITE

2.1 Location

The site is located approximately 1/2 mile southeast of the town of Millsboro, Sussex County, in south central Delaware. The site is bordered on the west and south by Route 113. To the northwest is Iron Branch, and to the east are agricultural areas and Wharton's Branch.

2.2 Site Layout

The plating process, which was part of the NCR operation, produced a chromium-bearing wastewater. This wastewater was treated onsite near the northeast corner of the plant. Sludge produced by this treatment was disposed of in an unlined pit near the center of the northeastern property line. There were 3 cement-lined storage lagoons on site.

After April 1983, the main concern at the site shifted to the presence of elevated TCE concentrations in the groundwater at the northeast corner of the property. At present, there are 22 monitoring wells on the site (refer to appendix B, figure 1.4, for location of building and monitoring wells).

2.3 Ownership History

NCR owned the property until November 1981, when it was sold to the First National Bank of Maryland. The address of the current owner is First National Bank of Maryland, P.O. Box 1596, Baltimore, Maryland 21203. The phone number is (301) 244-4480.

2.4 Site Use History

Chronology

October 1967	The plant opened, using the electroplating process.
1967-1974	Electroplating wastes were buried onsite in bentonite-lined pits.
1974-1979	Electroplating was discontinued.
January 26, 1981	The DNREC received notification of hazardous waste activities.
February & March 1981	Well monitoring showed high levels of chromium.
July 1981	The lagoons were cleaned and decontaminated.
August 10, 1981	A site inspection was conducted under the Uncontrolled Site Program and RCRA.
August 12, 1981	The DNREC received "Closure Plan" from NCR.
September 2, 1981	The drums were removed.
September 21, 1981	The old disposal pit was excavated.
September 25, 1981	The storage area was cleaned and decontaminated.
October 21, 1981	The DNREC received "Professional Engineer's Certification of Closure" and "Hazardous Waste Site Investigation Report".
November 12, 1981	Four new groundwater monitoring wells were installed.
November 30, 1981	The groundwater monitoring program was initiated.
December 9, 1981	The plant was closed.
March 1982	Four new groundwater monitoring wells were installed (total of 13 wells).
April 1983	TCE concentrations became a concern.
November 1983	Soil sampling was conducted by BCM.
December 1983	Seven new monitoring wells were installed to study TCE plume.
January 1984	Stream sampling was conducted in Iron Branch by BCM. TCE contamination was found.
April 1984	BCM issued reports on TCE. Chromium contamination testing continues.
July 3, 1984	The DNREC visits the NCR facility.[2]

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2.5 Permit and Regulatory Action History

Permits:

1980 NPDES Permit No. 0000353 renewal, Process changed.
1981 NPDES Permit No. 0000353 Void - Plant Closure. RCRA Permit closed October 1981.

Well Permit No. 30081/1973 Industrial.

2.6 Remedial Action To Date

The sludge produced by the treatment of the chromium-bearing wastewater was excavated and removed in October 1981. The toxic (chromium) material in 2 of the 3 concrete lagoons was drained and shipped to American Recovery.[2]

Since the depth of the TCE plume and its precise source have yet to be determined, the potential environmental impact of the TCE cannot be fully assessed. Due to this uncertainty, an additional investigatory phase will be implemented by BCM to determine the following:

- The contaminant source
- The vertical extent of TCE migration
- The concentration profile of the TCE plume, in order to verify the observed data, and to estimate the temporal characteristics of the plume
- The migration and discharge pattern of the TCE plume

NCR has agreed to be responsible for groundwater monitoring and testing for any existing contaminants produced by their facility.[5] BCM has been retained by NCR to perform the quarterly groundwater monitoring associated with the closure of the plant.

ORIGINAL
(Red)

SECTION 3

3.0 ENVIRONMENTAL SETTING

3.1 Water Supply

NCR utilized 3 production wells. One was not used afer 1969. Well no. 3 was inoperative after 1978. Presently, First Freedom Corporation is using Millsboro's municipal water for their drinking water. Water is being drawn from 1 of the operating production wells to be used in the cooling unit. It does not come into contact with the drinking water. Areas adjacent to the site receive Millsboro municipal water. Millsboro's supply wells are located 1 mile northwest of the NCR site, near the center of town.

The municipal water supply is drawn from 3 wells. The depth of the wells are 85 feet, 85 feet, and 180 feet. The population served is approximately 1,300.[6] Pumping capacity for the 2, 85 feet deep wells is 250 (gpm) and 350 (gpm).

The municipal water supply lines extend approximately 1 mile from source; therefore, many private wells are used in the area. One private drinking water well is located 100 feet south of the NCR property line and is 65 feet deep.[3] No further information is available on local private wells.

3.2 Surface Waters

Iron Branch, the closest source of fresh surface water, flows on the northwest, north, and northeast edges of the NCR site. Iron Branch has a watershed that is 8 square miles. Iron Branch joins Wharton's Branch and flows to Indian River, a tidal estuary. The section of Iron Branch near the plant site receives groundwater discharge from the direction of the plant. Recent stream sampling by BCM (January 4, 1984) revealed high concentrations of TCE in Iron Branch northeast of the facility (see appendix B, table no. 1).[1] Historical, water quality problems exist in Indian River with severe fecal coliform exceedences and minor D.O. depressions.

Surface water samples taken at 11 locations on Iron Branch were also analyzed for the 601 series of purgeable halocarbons (see appendix B, figure 2 for sampling locations). Concentrations of TCE ranged from a highest concentration of 1,400 ug/l to less than 100 ug/l. Three samples had concentrations between 100 to 1,000 ug/l. Trans-1,2-dichloroethene was present in all but one of the stream samples.

Six other purgeable halocarbons were present at concentrations between the detection limit and 30 mg/l (see appendix B, table no. 1).[1]

3.3 Geology and Soils

The site, located in the Atlantic Coastal Plain Province, is underlain by unconsolidated sediments of Quaternary, Tertiary, Cretaceous, and possibly Triassic age. These sediments rest on a basement complex of igneous and metamorphic rock composed of gneiss, schist, and gabbro, which occurs at a depth of between 4,200 and 7,800 feet.[1]

The 2 uppermost series of sedimentary deposits, the Pleistocene Columbia Group and the Miocene Chesapeake Group, are of primary interest to this investigation. In the Millsboro area, the Columbia and the Chesapeake Groups are approximately 100 and 1,000 feet thick, respectively.[1]

The Columbia Group, which is exposed at the site, unconformably overlies the Chesapeake Group, and is generally composed of fine-to-coarse, moderately sorted quartz sand, with considerable amounts of gravel. Thin interbeds of silt are present in some areas. Sediments of the Columbia Group are usually yellow to reddish-brown.[1]

Miocene sediments from the Chesapeake group consist of predominantly gray and bluish-gray silt, containing beds of gray, fine-to-medium sand, and some shell beds.[1]

borings for monitoring well installation and soil sampling at the site indicate that the property is underlain by fine-to-coarse sand and gravel of the Columbia Group. (Boring logs are included in Groundwater Quality Investigation and Groundwater Quality Management Plan, which are included in appendix C.) Clay layers of up to several feet in thickness were present in some borings. None of these borings were deep enough to encounter Chesapeake Group sediments.[1]

Selected soil samples from borings in the northern section of the former NCR facility were analyzed for TCE, perchloroethylene, and 1,1,1-trichloroethane. The results from these analyses indicate that TCE and perchloroethylene are present in most of the samples at concentrations between 0.01 and 5.8 mg/kg (ppm).[1]

3.4 Groundwaters

Shallow groundwater beneath the site is contained in interconnected pores within the sand and gravel of the Columbia Group, and is under water table conditions. The water table does not remain at a fixed elevation, but fluctuates in response to seasonal changes in groundwater recharge. There is an annual variation of approximately 2 to 4 feet.[1] The average depth of the water table is 12-13 feet below grade. Groundwater flows slowly downward and laterally toward areas of lower elevation or lower hydraulic potential.

The shallow groundwater flowing beneath the site is apparently discharged to Iron Branch, a tributary of the Indian River, along a zone northeast of the former NCR facility. The confluence of Iron Branch and Wharton's Branch is approximately 1/4 to 1/2 mile downstream from this area. Beyond this point they flow northeasterly to the Indian River. A deeper component of the groundwater may flow beneath the Iron Branch, directly to the Indian River.[1]

Data from a pump test conducted on well no. 12 was used to calculate the transmissivity and storativity of the water table aquifer. These values were determined to be 3,820 gallons/day/foot, and 0.184 (dimensionless), respectively. With this information, the hydraulic conductivity was estimated from:

$$K = T/b$$

where:

T = transmissivity, gal/day/ft (3,820 gal/day/ft)
b = saturated thickness of the aquifer, ft (30 ft)
K = hydraulic conductivity, cu ft/sq ft/day

The hydraulic conductivity, which was determined to be 127 ft/day, was then used to calculate the linear (seepage) velocity of groundwater flow from:

$$V = Ki/n$$

where:

V = velocity, ft/day
K = hydraulic conductivity, cu ft/sq ft/day (127 ft/day)
i = hydraulic gradient, ft/ft
n = effective porosity, cu ft/cu ft

Assuming that an effective porosity of 35 percent and a hydraulic gradient of 3.2×10^{-3}, linear velocity was estimated at 1.2 ft/day.[1]

The main aquifer in the study area is the Columbia Group which, based on well logs in references no. 3, appendix A, consists of fine-coarse sand with gravel and discontinous 3 to 9 foot thick clay layers, 4 to 10 feet below grade.[3]

While maximum thickness of the Columbia Group is not known, a structure contour map of the base of the Columbia (Pleistocene) deposits in Delaware, indicates the base of the Columbia in the Millsboro area is approximately 80 to 90 feet below grade.[7] The presence and nature of a hydrologic connection between the Columbia Group and underlying units cannot be determined with available data. Differentiation between the Columbia deposits and underlying Miocene sands is difficult. Hydrologically, the 2 units act as a single water table aquifer.[7]

Groundwater samples taken on January 3 and 5, 1984, from 16 monitoring wells at the former NCR facility, were analyzed for the 601 series of purgeable halocarbons (see appendix B, table no. 2).[1] Samples from well nos. 20, 8, and 12 were found to have TCE concentrations greater than 1,000 ug/l (ppb). Those from well nos. 9, 13, and 21 had concentrations between 100 and 1,000 ug/l. All other monitoring wells sampled had TCE concentrations less than 100 ug/l. Trans-1,2-dichloroethene was present in lesser amounts, with the highest concentrations occurring in well nos. 8, 20, and 21. Low concentrations of several other organic compounds were also found in some of the wells.[1]

3.5 Climate Meteorology

Sussex County has a temperate, rather humid, climate. Precipitation exceeds evapotranspiration in the county. Temperatures range from a high of 86°F in July, to a low of 25°F in January and February. The average precipitation is 38.5 inches per year.[4]

3.6 Land Use

To the north of the NCR site are the Conrail tracks, Iron Branch, agricultural areas, woodlands, and 1/2 mile away, low density housing. Northwest, 1/2 to 1 mile, is the town of Millsboro, Delaware. To the west is Route 113, Iron Branch, and low density housing. To the south is Route 113 and a roadside business district. To the east are the Conrail tracks, agricultural areas, and Wharton's Branch.

3.7 Population Distribution

The site lies just south and east of Millsboro, Delaware, which had a population of 1,233 in 1980.[2]

3.8 Critical Environments

The site borders the Iron Branch. Since groundwater flow is in a northeastern direction, TCE contaminated groundwater could potentially reach this area. Iron Branch is recognized by the federal government as a wetlands area.

ORIGINAL
(Red)

SECTION 4

ORIGINAL
(Red)

4.0 WASTE TYPES AND QUANTITIES

Through monitoring and sampling procedures, evidence has been found of chromium (total), chromium (hexavalent), trans-1,2-dichloroethylene and trichloroethylene (TCE) contamination in the soil and water around the NCR site.

The TCE contamination and its extent is of primary concern. To date, the exact depth of the TCE plume and extent, if any, of the deeper aquifer contamination is not known.

The volume of waste sludge treated in lagoons and later disposed of in an on-site pit is unknown. It is known, however, that the 60 drums of waste flux, freon, and solvents have been removed. Also, the lagoons have been cleaned and decontaminated. The extent and quality of decontamination is not available at this time. The cleaning and decontamination of the lagoons was done by Clean America. The drums and remaining waste were hauled away by AT&T, and disposed of at the Baltimore facility of American Recovery.

ORIGINAL
(Red)

SECTION 5

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
DE	42

II. HAZARDOUS CONDITIONS AND INCIDENTS

(Red)

01 ☐ A. GROUNDWATER CONTAMINATION
03 POPULATION POTENTIALLY AFFECTED _____
02 ☒ OBSERVED (DATE 2/81/3/81) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

Cr levels and TCE found in monitoring wells.

01 ☐ B. SURFACE WATER CONTAMINATION
03 POPULATION POTENTIALLY AFFECTED _____
02 ☐ OBSERVED (DATE _____) ☐ POTENTIAL ☒ ALLEGED
04 NARRATIVE DESCRIPTION

Workers observed TCE spills occassionally.

01 ☐ C. CONTAMINATION OF AIR
03 POPULATION POTENTIALLY AFFECTED _____
02 ☐ OBSERVED (DATE _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

N/A

01 ☐ D. FIRE/EXPLOSIVE CONDITIONS
03 POPULATION POTENTIALLY AFFECTED _____
02 ☐ OBSERVED (DATE _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

N/A

01 ☐ E. DIRECT CONTACT
03 POPULATION POTENTIALLY AFFECTED _____
02 ☐ OBSERVED (DATE _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

N/A

01 ☐ F. CONTAMINATION OF SOIL
03 AREA POTENTIALLY AFFECTED unknown (Acres)
02 ☐ OBSERVED (DATE _____) ☐ POTENTIAL ☒ ALLEGED
04 NARRATIVE DESCRIPTION

High levels of chromium and TCE detected in soil. Workers observed spilling of TCE periodically.

01 ☐ G. DRINKING WATER CONTAMINATION
03 POPULATION POTENTIALLY AFFECTED unknown
02 ☐ OBSERVED (DATE _____) ☒ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

Possible migration of TCE to downstream wells. One well is located 100 feet south of NCR property line. Its depth is 60-65 feet. (Owner's name unknown - address Mitchell Road)

01 ☐ H. WORKER EXPOSURE/INJURY
03 WORKERS POTENTIALLY AFFECTED. _____
02 ☐ OBSERVED (DATE. _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

N/A

01 ☐ I. POPULATION EXPOSURE/INJURY
03 POPULATION POTENTIALLY AFFECTED. _____
02 ☐ OBSERVED (DATE _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

N/A

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EPA FORM 2070-13 (7-81)

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POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION
01 STATE: DE | 02 SITE NUMBER: 42

II. HAZARDOUS CONDITIONS AND INCIDENTS (Continued)

01 ☐ J. DAMAGE TO FLORA — 02 ☐ OBSERVED (DATE _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

No

01 ☐ K. DAMAGE TO FAUNA — 02 ☐ OBSERVED (DATE _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION (Include numbers of species)

No

01 ☐ L. CONTAMINATION OF FOOD CHAIN — 02 ☐ OBSERVED (DATE _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

No

ORIGINAL

01 ☐ M. UNSTABLE CONTAINMENT OF WASTES (Spills, Runoff, Standing waste, Leaking drums) — 02 ☐ OBSERVED (DATE _____) ☐ POTENTIAL X ALLEGED
03 POPULATION POTENTIALLY AFFECTED _____ 04 NARRATIVE DESCRIPTION

Chromium contained in unlined pits. Workers' observation of TCE spilled on ground.

01 ☐ N. DAMAGE TO OFFSITE PROPERTY — 02 ☐ OBSERVED (DATE _____) X POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

Possible contamination of local water supply and aquifer.

01 ☐ O. CONTAMINATION OF SEWERS, STORM DRAINS, WWTPs — 02 ☐ OBSERVED (DATE _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

N/A

01 ☐ P. ILLEGAL/UNAUTHORIZED DUMPING — 02 ☐ OBSERVED (DATE _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

N/A

05 DESCRIPTION OF ANY OTHER KNOWN, POTENTIAL, OR ALLEGED HAZARDS

N/A

III. TOTAL POPULATION POTENTIALLY AFFECTED: Can not yet be determined

IV. COMMENTS

V. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

Preliminary Assessment of NCR by Delaware DNREC, Solid Waste Branch, Andrew J. Letzinger and Robert Pickett.

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EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION
PART 4 - PERMIT AND DESCRIPTIVE INFORMATION

I. IDENTIFICATION
01 STATE: DE | 02 SITE NUMBER: 42

II. PERMIT INFORMATION

01 TYPE OF PERMIT ISSUED (Check all that apply)	02 PERMIT NUMBER	03 DATE ISSUED	04 EXPIRATION DATE	05 COMMENTS
X A. NPDES	0000353	1980	1981	void-plant closure
☐ B. UIC	renewal process changed			
☐ C. AIR				
X D. RCRA			1980	permit closed Oct. 1981
☐ E. RCRA INTERIM STATUS				
☐ F. SPCC PLAN				
X G. STATE (Specify)	WPCC 3118 a/74			
☐ H. LOCAL (Specify)				
X I. OTHER (Specify) well permit	30081/1973	1973		industrial
☐ J. NONE				

III. SITE DESCRIPTION

01 STORAGE/DISPOSAL (Check all that apply)	02 AMOUNT	03 UNIT OF MEASURE
☐ A. SURFACE IMPOUNDMENT		
☐ B. PILES		
☐ C. DRUMS, ABOVE GROUND		
☐ D. TANK, ABOVE GROUND		
☐ E. TANK, BELOW GROUND		
☐ F. LANDFILL		
☐ G. LANDFARM		
☐ H. OPEN DUMP		
☐ I. OTHER (Specify)		

04 TREATMENT (Check all that apply)
- ☐ A. INCINERATION
- ☐ B. UNDERGROUND INJECTION
- ☐ C. CHEMICAL/PHYSICAL
- ☐ D. BIOLOGICAL
- ☐ E. WASTE OIL PROCESSING
- ☐ F. SOLVENT RECOVERY
- ☐ G. OTHER RECYCLING/RECOVERY
- ☐ H. OTHER (Specify)

05 OTHER
- X A. BUILDINGS ON SITE — former NCR facility

06 AREA OF SITE: 58 (Acres)

07 COMMENTS

IV. CONTAINMENT

01 CONTAINMENT OF WASTES (Check one)

☐ A. ADEQUATE, SECURE | X B. MODERATE | X C. INADEQUATE, POOR | ☐ D. INSECURE, UNSOUND, DANGEROUS

concrete lagoons; unlined pit

02 DESCRIPTION OF DRUMS, DIKING, LINERS, BARRIERS, ETC

TCE and chromium contained in 3 concrete lined lagoons. Chromium bearing wastewater dumped in unlined pits.

V. ACCESSIBILITY

01 WASTE EASILY ACCESSIBLE: X YES ☐ NO

02 COMMENTS

VI. SOURCES OF INFORMATION (Cite specific references, e.g. state files, sample analysis, reports)

Preliminary Assessment of NCR by Delaware DNREC, Solid Waste Branch, Andrew Leitzinger and Robert Pickert

AR100366

EPA FORM 2070-13 (7-81)

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 6 - WATER, DEMOGRAPHIC, AND ENVIRONMENTAL DATA

I. IDENTIFICATION
01 STATE: DE | 02 SITE NUMBER: 42

II. DRINKING WATER SUPPLY

01 TYPE OF DRINKING SUPPLY (Check as applicable)	SURFACE	WELL	02 STATUS	ENDANGERED	AFFECTED	MONITORED	03 DISTANCE TO SITE
COMMUNITY	A. ☐	B. ☒		A. ☒	B. ☐	C. ☐	A. 1 (mi)
NON-COMMUNITY	C. ☐	D. ☐		D. ☐	E. ☐	F. ☐	B. (mi)

III. GROUNDWATER

01 GROUNDWATER USE IN VICINITY (Check one)

☐ A. ONLY SOURCE FOR DRINKING ☒ B. DRINKING (Other sources are available) COMMERCIAL, INDUSTRIAL, IRRIGATION (No other water source is available) ☐ C. COMMERCIAL, INDUSTRIAL, IRRIGATION (Limited other sources available) ☐ D. NOT USED, UNUSEABLE

02 POPULATION SERVED BY GROUND WATER	03 DISTANCE TO NEAREST DRINKING WATER WELL
approx. 1,300	100 feet (mi)

04 DEPTH TO GROUNDWATER	05 DIRECTION OF GROUNDWATER FLOW	06 DEPTH TO AQUIFER OF CONCERN	07 POTENTIAL YIELD OF AQUIFER	08 SOLE SOURCE AQUIFER
12-13 (ft)	northeast	12-13 (ft)	3,820 gdf (gpd)	☐ YES ☒ NO

09 DESCRIPTION OF WELLS (Including usage, depth, and location relative to population and buildings)

There are currently 3 municipal wells serving Millsboro and its surrounding area. The wells are approximately 85 feet, 85 feet, and 180 feet deep. Population served is approximately 1,300. The area served is approximately 2 miles from the wells. As a result, many local private wells are in the area.

10 RECHARGE AREA		11 DISCHARGE AREA	
☒ YES	COMMENTS	☐ YES	COMMENTS
☐ NO	Water flows generally to the northeast. Discharges into Iron Branch then Indian River	☐ NO	

IV. SURFACE WATER

01 SURFACE WATER USE (Check one)

☒ A. RESERVOIR, RECREATION, DRINKING WATER SOURCE ☐ B. IRRIGATION, ECONOMICALLY IMPORTANT RESOURCES ☐ C. COMMERCIAL, INDUSTRIAL ☐ D. NOT CURRENTLY USED

02 AFFECTED/POTENTIALLY AFFECTED BODIES OF WATER

NAME	AFFECTED	DISTANCE TO SITE
Iron Branch	☒	200 feet (mi)
Wharton's Branch	☒	500 feet (mi)
Indian River	☒	approx. 1 (mi)

V. DEMOGRAPHIC AND PROPERTY INFORMATION

01 TOTAL POPULATION WITHIN			02 DISTANCE TO NEAREST POPULATION
ONE (1) MILE OF SITE	TWO (2) MILES OF SITE	THREE (3) MILES OF SITE	
A. 361 NO. OF PERSONS	B. 2,736 NO. OF PERSONS	C. 4,780 NO. OF PERSONS	< 100 feet (mi) from border of facility

03 NUMBER OF BUILDINGS WITHIN TWO (2) MILES OF SITE	04 DISTANCE TO NEAREST OFF-SITE BUILDING
933	< 100 feet (mi)

05 POPULATION WITHIN VICINITY OF SITE (Provide narrative description of nature of population within vicinity of site, e.g., rural, village, density, population of urban area)

Area within 1 mile of the site is a sparsely populated rural area. The town of Millsboro is approximately 1.5 miles northwest of the site, with a population of 1,233 (in 1980). The town of Dagsboro is approximately 2 miles southeast of the site, with a population of 1,040 (in 1980 census).

AR100367

EPA FORM 2070-13 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 5 - WATER, DEMOGRAPHIC, AND ENVIRONMENTAL DATA

I. IDENTIFICATION
01 STATE: DE | 02 SITE NUMBER: 42 NCL (illegible)

VI. ENVIRONMENTAL INFORMATION

01 PERMEABILITY OF UNSATURATED ZONE (Check one)

☐ A. 10^{-6} - 10^{-8} cm/sec ☐ B. 10^{-4} - 10^{-6} cm/sec ☐ C. 10^{-4} - 10^{-3} cm/sec ☒ D. GREATER THAN 10^{-3} cm/sec

02 PERMEABILITY OF BEDROCK (Check one) N/A - too deep

☐ A. IMPERMEABLE (Less than 10^{-6} cm/sec) ☐ B. RELATIVELY IMPERMEABLE (10^{-4} - 10^{-6} cm/sec) ☐ C. RELATIVELY PERMEABLE (10^{-2} - 10^{-4} cm/sec) ☐ D. VERY PERMEABLE (Greater than 10^{-2} cm/sec)

03 DEPTH TO BEDROCK	04 DEPTH OF CONTAMINATED SOIL ZONE	05 SOIL pH	
4,200-7,800 (ft)	unknown (ft)	N/A	

06 NET PRECIPITATION	07 ONE YEAR 24 HOUR RAINFALL	08 SLOPE: SITE SLOPE	DIRECTION OF SITE SLOPE	TERRAIN AVERAGE SLOPE
44.5 (in)	3.0 (in)	< 3 %	northwest	N/A %

09 FLOOD POTENTIAL
SITE IS IN 100 YEAR FLOODPLAIN

10 ☐ SITE IS ON BARRIER ISLAND, COASTAL HIGH HAZARD AREA, RIVERINE FLOODWAY

11 DISTANCE TO WETLANDS (5 acre minimum)
ESTUARINE: A < 1/2 (mi) OTHER: B _____ (mi)

12 DISTANCE TO CRITICAL HABITAT (of endangered species)
_____ (mi)
ENDANGERED SPECIES _____

13 LAND USE IN VICINITY

DISTANCE TO COMMERCIAL/INDUSTRIAL	RESIDENTIAL AREAS; NATIONAL/STATE PARKS, FORESTS, OR WILDLIFE RESERVES	AGRICULTURAL LANDS: PRIME AG LAND	AG LAND
A < 1 (mi)	B < 1/2 (mi)	C. _____ (mi)	D < 1 (mi)

14 DESCRIPTION OF SITE IN RELATION TO SURROUNDING TOPOGRAPHY

Flat costal plain

VII. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

Groundwater Quality Investigation and Groundwater Quality Management Plan Interim Report for NCR Corp. by Richard E. Sacks of Betz, Converse, and Murdoch Eastern, Inc., dated 3/22/84

A Preliminary Assessment of NCR Corp, prepared by Delaware DNREC, Solid Waste Branch, dated 6/84

AR100368

EPA FORM 2070-13 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 6 - SAMPLE AND FIELD INFORMATION

I. IDENTIFICATION
01 STATE: DE | 02 SITE NUMBER: 42

II. SAMPLES TAKEN

SAMPLE TYPE	01 NUMBER OF SAMPLES TAKEN	02 SAMPLES SENT TO	03 ESTIMATED DATE RESULTS AVAILABLE
GROUNDWATER		Continuing investigation by Betz, Converse, and	
SURFACE WATER		Murdoch Eastern, Inc.	
WASTE			
AIR		ORIGINAL (illegible)	
RUNOFF			
SPILL			
SOIL			
VEGETATION			
OTHER		* Sampling done by Betz, Converse, and Murdoch and DNREC	

III. FIELD MEASUREMENTS TAKEN

01 TYPE	02 COMMENTS
	NO ON-SITE WORK

IV. PHOTOGRAPHS AND MAPS

01 TYPE ☐ GROUND ☐ AERIAL — 02 IN CUSTODY OF _____ (Name of organization or individual)

03 MAPS ☐ YES ☐ NO — 04 LOCATION OF MAPS _____

V. OTHER FIELD DATA COLLECTED (Provide narrative description)

N/A

VI. SOURCES OF INFORMATION (Cite specific references, e.g. state files, sample analysis, reports)

Groundwater Quality Investigation and Groundwater Quality Management Plan Interim Report by Richard E. Sacks of Betz, Converse, and Murdoch Eastern, Inc.

Excavated Sludge Disposal Site and Post Closure Monitoring and Groundwater Quality Assessment (author same as above)

EPA Preliminary Assessment

AR100369

EPA FORM 2070-13 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 7 - OWNER INFORMATION

I. IDENTIFICATION
01 STATE: DE | 02 SITE NUMBER: 42

II. CURRENT OWNER(S)

01 NAME	02 D+B NUMBER	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	05 CITY	06 STATE	07 ZIP CODE
First Freedom Center/ First National Bank of Maryland		P.O. Box 1596	60025	Baltimore	MD	21203
N/A		N/A				
N/A		N/A				
N/A		N/A				
N/A		N/A				

PARENT COMPANY (if applicable)

08 NAME	09 D+B NUMBER	10 STREET ADDRESS (P.O. Box, RFD #, etc.)	11 SIC CODE	12 CITY	13 STATE	14 ZIP CODE
N/A (incl)						
N/A						
N/A						
N/A						
N/A						

III. PREVIOUS OWNER(S) (List most recent first)

01 NAME	02 D+B NUMBER	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	05 CITY	06 STATE	07 ZIP CODE
NCR Corporation		P.O. Box 607 Mitchell Road	3471	Millsboro	DE	19966
N/A						
N/A						
N/A						
N/A						

IV. REALTY OWNER(S) (if applicable, list most recent first)

01 NAME	02 D+B NUMBER	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	05 CITY	06 STATE	07 ZIP CODE
N/A						
N/A						
N/A						
N/A						
N/A						

V. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

A Preliminary Assessment of NCR by E. Skernolis prepared by Delaware DNREC, Solid Waste Branch, June 1984

AR100370

EPA FORM 2070-13 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 8 - OPERATOR INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
DE	42

II. CURRENT OPERATOR (Provide if different from owner)

01 NAME	02 D+B NUMBER
See Owner	

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE

05 CITY	06 STATE	07 ZIP CODE

08 YEARS OF OPERATION	09 NAME OF OWNER

OPERATOR'S PARENT COMPANY (If applicable)

10 NAME	11 D+B NUMBER
N/A	

12 STREET ADDRESS (P.O. Box, RFD #, etc.)	13 SIC CODE

14 CITY	15 STATE	16 ZIP CODE

III. PREVIOUS OPERATOR(S) (List most recent first; provide only if different from owner)

01 NAME	02 D+B NUMBER
NCR Corporation	

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE
P.O. Box 607 Mitchell Road	3471

05 CITY	06 STATE	07 ZIP CODE
Millsboro	DE	19966

08 YEARS OF OPERATION	09 NAME OF OWNER DURING THIS PERIOD
1967-1974	NCR Corporation

PREVIOUS OPERATORS' PARENT COMPANIES (If applicable)

10 NAME	11 D+B NUMBER
N/A	

12 STREET ADDRESS (P.O. Box, RFD #, etc.)	13 SIC CODE

14 CITY	15 STATE	16 ZIP CODE

01 NAME	02 D+B NUMBER
N/A	

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE

05 CITY	06 STATE	07 ZIP CODE

08 YEARS OF OPERATION	09 NAME OF OWNER DURING THIS PERIOD

10 NAME	11 D+B NUMBER
N/A	

12 STREET ADDRESS (P.O. Box, RFD #, etc.)	13 SIC CODE

14 CITY	15 STATE	16 ZIP CODE

01 NAME	02 D+B NUMBER
N/A	

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE

05 CITY	06 STATE	07 ZIP CODE

08 YEARS OF OPERATION	09 NAME OF OWNER DURING THIS PERIOD

10 NAME	11 D+B NUMBER
N/A	

12 STREET ADDRESS (P.O. Box, RFD #, etc.)	13 SIC CODE

14 CITY	15 STATE	16 ZIP CODE

IV. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

AR100371

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 9 - GENERATOR/TRANSPORTER INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
DE	42

II. ON-SITE GENERATOR

01 NAME	02 D+B NUMBER
NCR Corporation	

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE
P.O. Box 607 Mitchell Road	3471

05 CITY	06 STATE	07 ZIP CODE
Millsboro	DE	19966

Original (hc)

III. OFF-SITE GENERATOR(S)

01 NAME	02 D+B NUMBER	01 NAME	02 D+B NUMBER
N/A		N/A	

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE

05 CITY	06 STATE	07 ZIP CODE	05 CITY	06 STATE	07 ZIP CODE

01 NAME	02 D+B NUMBER	01 NAME	02 D+B NUMBER
N/A		N/A	

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE

05 CITY	06 STATE	07 ZIP CODE	05 CITY	06 STATE	07 ZIP CODE

IV. TRANSPORTER(S)

01 NAME	02 D+B NUMBER	01 NAME	02 D+B NUMBER
N/A		N/A	

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE

05 CITY	06 STATE	07 ZIP CODE	05 CITY	06 STATE	07 ZIP CODE

01 NAME	02 D+B NUMBER	01 NAME	02 D+B NUMBER
N/A		N/A	

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE

05 CITY	06 STATE	07 ZIP CODE	05 CITY	06 STATE	07 ZIP CODE

V. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports.)

AR100372

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 10 - PAST RESPONSE ACTIVITIES

I. IDENTIFICATION
01 STATE: DE | 02 SITE NUMBER: 42

II. PAST RESPONSE ACTIVITIES

01 ☐ A. WATER SUPPLY CLOSED | 02 DATE | 03 AGENCY
04 DESCRIPTION
N/A

01 ☐ B. TEMPORARY WATER SUPPLY PROVIDED | 02 DATE | 03 AGENCY
04 DESCRIPTION
N/A

01 ☐ C. PERMANENT WATER SUPPLY PROVIDED | 02 DATE | 03 AGENCY
04 DESCRIPTION
N/A

01 ☐ D. SPILLED MATERIAL REMOVED | 02 DATE | 03 AGENCY
04 DESCRIPTION
N/A

01 ☒ E. CONTAMINATED SOIL REMOVED | 02 DATE 9/21/81 (INCORRECT) | 03 AGENCY
04 DESCRIPTION
Old disposal pit excavated

01 ☐ F. WASTE REPACKAGED | 02 DATE | 03 AGENCY
04 DESCRIPTION
N/A

01 ☒ G. WASTE DISPOSED ELSEWHERE | 02 DATE 7/81 & 9/81 | 03 AGENCY
04 DESCRIPTION
During July 1981, lagoons were cleaned and decontaminated. On September 2, 1981, drums were removed.

01 ☒ H. ON SITE BURIAL | 02 DATE 1967-74 | 03 AGENCY
04 DESCRIPTION
Bentonite-lined pits contained electroplating waste/sludge disposed in unlined pits.

01 ☐ I. IN SITU CHEMICAL TREATMENT | 02 DATE | 03 AGENCY
04 DESCRIPTION
N/A

01 ☐ J. IN SITU BIOLOGICAL TREATMENT | 02 DATE | 03 AGENCY
04 DESCRIPTION
N/A

01 ☒ K. IN SITU PHYSICAL TREATMENT | 02 DATE | 03 AGENCY
04 DESCRIPTION
Setting Lagoons

01 ☒ L. ENCAPSULATION | 02 DATE | 03 AGENCY
04 DESCRIPTION
Waste material stored in drums and above and below ground tanks.

01 ☐ M. EMERGENCY WASTE TREATMENT | 02 DATE | 03 AGENCY
04 DESCRIPTION
N/A

01 ☐ N. CUTOFF WALLS | 02 DATE | 03 AGENCY
04 DESCRIPTION
N/A

01 ☐ O. EMERGENCY DIKING/SURFACE WATER DIVERSION | 02 DATE | 03 AGENCY
04 DESCRIPTION
N/A

01 ☐ P. CUTOFF TRENCHES/SUMP | 02 DATE | 03 AGENCY
04 DESCRIPTION
N/A

01 ☐ Q. SUBSURFACE CUTOFF WALL | 02 DATE | 03 AGENCY
04 DESCRIPTION
N/A

AR100373

EPA FORM 2070-13 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 10 - PAST RESPONSE ACTIVITIES

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
DE	42

II PAST RESPONSE ACTIVITIES (Continued)

01 ☐ R. BARRIER WALLS CONSTRUCTED — 02 DATE ____ — 03 AGENCY ____
04 DESCRIPTION
N/A

01 ☐ S. CAPPING/COVERING — 02 DATE ____ — 03 AGENCY ____
04 DESCRIPTION
N/A

01 ☐ T. BULK TANKAGE REPAIRED — 02 DATE ____ — 03 AGENCY ____
04 DESCRIPTION
N/A

01 ☐ U. GROUT CURTAIN CONSTRUCTED — 02 DATE ____ — 03 AGENCY ____
04 DESCRIPTION
N/A

01 ☐ V. BOTTOM SEALED — 02 DATE ____ — 03 AGENCY ____
04 DESCRIPTION
N/A

01 ☐ W. GAS CONTROL — 02 DATE ____ — 03 AGENCY ____
04 DESCRIPTION
N/A

01 ☐ X. FIRE CONTROL — 02 DATE ____ — 03 AGENCY ____
04 DESCRIPTION
N/A

01 ☐ Y. LEACHATE TREATMENT — 02 DATE ____ — 03 AGENCY ____
04 DESCRIPTION
N/A

01 ☐ Z. AREA EVACUATED — 02 DATE ____ — 03 AGENCY ____
04 DESCRIPTION
N/A

01 ☐ 1. ACCESS TO SITE RESTRICTED — 02 DATE ____ — 03 AGENCY ____
04 DESCRIPTION
N/A

01 ☐ 2. POPULATION RELOCATED — 02 DATE ____ — 03 AGENCY ____
04 DESCRIPTION
N/A

01 ☐ 3. OTHER REMEDIAL ACTIVITIES — 02 DATE ____ — 03 AGENCY ____
04 DESCRIPTION

Storage area cleaned and decontaminated. Twenty wells installed to monitor groundwater. Betz, Converse, and Murdoch retained to oversee past "clean-up" actions and to determine and evaluate the extent of the contamination.

III. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

Groundwater Quality Investigation and Groundwater Quality Management Plan Interim Report for NCR Corp. by Richard E. Sacks of Betz, Converse, Murdoch Eastern, Inc., dated 3/22/84

A Preliminary Assessment of NCR by the Delaware DNREC, dated 6/84

AR100374

EPA FORM 2070-13 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 11 - ENFORCEMENT INFORMATION

I. IDENTIFICATION

01 STATE: DE | 02 SITE NUMBER: 42

II. ENFORCEMENT INFORMATION

01 PAST REGULATORY/ENFORCEMENT ACTION ☐ YES ☒ NO

02 DESCRIPTION OF FEDERAL, STATE, LOCAL REGULATORY/ENFORCEMENT ACTION

III. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

AR100375

EPA FORM 2070-13 (7-81)

ORIGINAL
(Red)

APPENDIX A

1. COST CENTER:	REM/FIT ZONE CONTRACT TECHNICAL DIRECTIVE DOCUMENT (TDD)			2. NO.:
ACCOUNT NO.:				F3-8409-14
3. PRIORITY: ☒ HIGH ☐ MEDIUM ☐ LOW	4. ESTIMATE OF TECHNICAL HOURS: 105 4A. ESTIMATE OF SUBCONTRACT COST:	5. EPA SITE ID: DE-042 5A. EPA SITE NAME: N.C.R. Millsboro, DE	6. COMPLETION DATE: 10/31/84	7. REFERENCE INFO.: ☒ YES ☐ NO ☐ ATTACHED ☒ PICK UP

8. GENERAL TASK DESCRIPTION: Perform site inspection and HRS of subject site using existing information and data.

9. SPECIFIC ELEMENTS:

1.) Review background information.
2.) Contact state and local agencies for relevant information.
3.) Visit state offices and review files.
4.) No site visit is required.
5.) Prepare and submit site inspection report and HRS under the same cover.

10. INTERIM DEADLINES:

11. DESIRED REPORT FORM: FORMAL REPORT ☒ LETTER REPORT ☐ FORMAL BRIEFING ☐

OTHER (SPECIFY):

12. COMMENTS:

13. AUTHORIZING RPO: Harold G. Byer (SIGNATURE) — 14. DATE: 10/16/84

15. RECEIVED BY: ☒ ACCEPTED ☐ ACCEPTED WITH EXCEPTIONS ☐ REJECTED
(CONTRACTOR RPM SIGNATURE) — 16. DATE: APR 10 0377

Sheet 1 White – FITL Copy
Sheet 2 Canary – DPO Copy
Sheet 3 Pink – Contracting Officer's Copy (Washington, D. C.)
Sheet 4 Goldenrod – Project Officer's Copy (Washington, D. C.)

F3-8409-14

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 1 - SITE LOCATION AND INSPECTION INFORMATION

I. IDENTIFICATION
01 STATE: DE | 02 SITE NUMBER: 42

II. SITE NAME AND LOCATION

01 SITE NAME (Legal, common, or descriptive name of site)	02 STREET, ROUTE NO., OR SPECIFIC LOCATION IDENTIFIER				
NCR Corporation	P.O. Box 607 Mitchell Road				
03 CITY	04 STATE	05 ZIP CODE	06 COUNTY	07 COUNTY CODE	08 CONG. DIST.
Millsboro	DE	19966	Sussex		

09 COORDINATES: LATITUDE 35° 35' 20" | LONGITUDE 75° 16' 44"

10 TYPE OF OWNERSHIP (Check one)
☒ A. PRIVATE ☐ B. FEDERAL _____ ☐ C. STATE ☐ D. COUNTY ☐ E. MUNICIPAL
☐ F. OTHER _____ ☐ G. UNKNOWN

III. INSPECTION INFORMATION

01 DATE OF INSPECTION	02 SITE STATUS	03 YEARS OF OPERATION
MONTH / DAY / YEAR	☐ ACTIVE ☒ INACTIVE	1967 (BEGINNING YEAR) / 1974 (ENDING YEAR) ___ UNKNOWN

04 AGENCY PERFORMING INSPECTION (Check all that apply)
☐ A. EPA ☒ B. EPA CONTRACTOR NUS Corp. (name of firm) ☐ C. MUNICIPAL ☐ D. MUNICIPAL CONTRACTOR _____ (name of firm)
☐ E. STATE ☐ F. STATE CONTRACTOR _____ (name of firm) ☐ G. OTHER _____ (specify)

05 CHIEF INSPECTOR	06 TITLE	07 ORGANIZATION	08 TELEPHONE NO.
N/A			( )

09 OTHER INSPECTORS	10 TITLE	11 ORGANIZATION	12 TELEPHONE NO.
			( )
DESK-TOP - NO ON-SITE INSPECTION MADE			( )
			( )
			( )
			( )

13 SITE REPRESENTATIVES INTERVIEWED	14 TITLE	15 ADDRESS	16 TELEPHONE NO.
N/A			( )
			( )
SEE ABOVE			( )
			( )
			( )
			( )

17 ACCESS GAINED BY (Check one)	18 TIME OF INSPECTION	19 WEATHER CONDITIONS
☐ PERMISSION ☐ WARRANT	N/A	N/A

IV. INFORMATION AVAILABLE FROM

01 CONTACT	02 OF (Agency/Organization)	03 TELEPHONE NO.
Robert Pickertt	State files DNREC	302 736-4761

04 PERSON RESPONSIBLE FOR SITE INSPECTION FORM	05 AGENCY	06 ORGANIZATION	07 TELEPHONE NO.	08 DATE
Stephen G. McMahon	FIT III	NUS Corp.	(215) 687-9510	09 09 84 (MONTH DAY YEAR)

EPA FORM 2070-13 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 2 - WASTE INFORMATION

I. IDENTIFICATION
01 STATE: [illegible] 02 SITE NUMBER: 42

II. WASTE STATES, QUANTITIES, AND CHARACTERISTICS

01 PHYSICAL STATES (Check all that apply)
- A SOLID
- B POWDER, FINES
- X C SLUDGE
- E SLURRY
- X F LIQUID
- G GAS
- D OTHER (Specify)

02 WASTE QUANTITY AT SITE (Measures of waste quantities must be independent)
- TONS
- CUBIC YARDS: unknown
- NO. OF DRUMS: 60

03 WASTE CHARACTERISTICS (Check all that apply)
- X A TOXIC
- B CORROSIVE
- C RADIOACTIVE
- D PERSISTENT
- E SOLUBLE
- F INFECTIOUS
- X G FLAMMABLE
- X H IGNITABLE
- I HIGHLY VOLATILE
- J EXPLOSIVE
- K REACTIVE
- L INCOMPATIBLE
- M NOT APPLICABLE

III. WASTE TYPE

CATEGORY	SUBSTANCE NAME	01 GROSS AMOUNT	02 UNIT OF MEASURE	03 COMMENTS
SLU	SLUDGE	55	gallons*	waste flux from solder machine
OLW	OILY WASTE	5	55 gals*	freon and cleaning solvents
SOL	SOLVENTS			undetermined amount of TCE
PSD	PESTICIDES			
OCC	OTHER ORGANIC CHEMICALS			
IOC	INORGANIC CHEMICALS			
ACD	ACIDS			* Note: Drums of waste have been
BAS	BASES			removed.
MES	HEAVY METALS			

ORIGINAL (RED)

IV. HAZARDOUS SUBSTANCES (See appendix for most frequently cited CAS Numbers)

01 CATEGORY	02 SUBSTANCE NAME	03 CAS NUMBER	04 STORAGE/DISPOSAL METHOD	05 CONCENTRATION	06 MEASURE OF CONCENTRATION
SOL	trichloroethylene (TCE)	79-01-6	above & below ground tanks	unknown	
SLU	hexavalent - chromium		lagoons, pits	unknown	

V. FEEDSTOCKS (See Appendix for CAS Numbers)

CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER	CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER
FDS			FDS		
FDS			FDS		
FDS			FDS		
FDS			FDS		

VI. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sampling results, etc.)

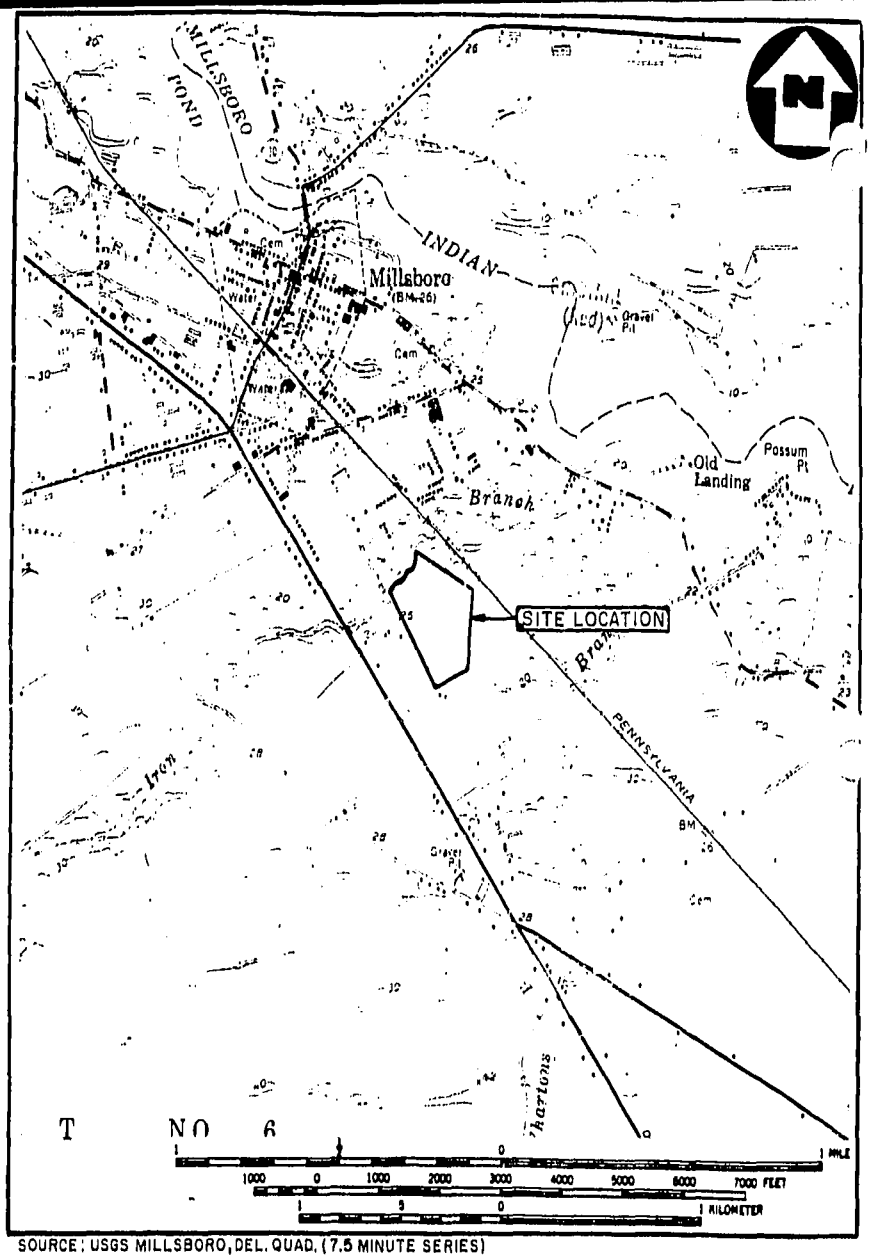
EPA Potential Hazardous Waste Site, Identification and Preliminary Assessment

AR100379

EPA FORM 2070-13 (7-81)

ORIGINAL
(Red)

APPENDIX B



SOURCE: USGS MILLSBORO, DEL. QUAD. (7.5 MINUTE SERIES)

SITE LOCATION MAP

NCR CORP. SITE, MILLSBORO, DEL.

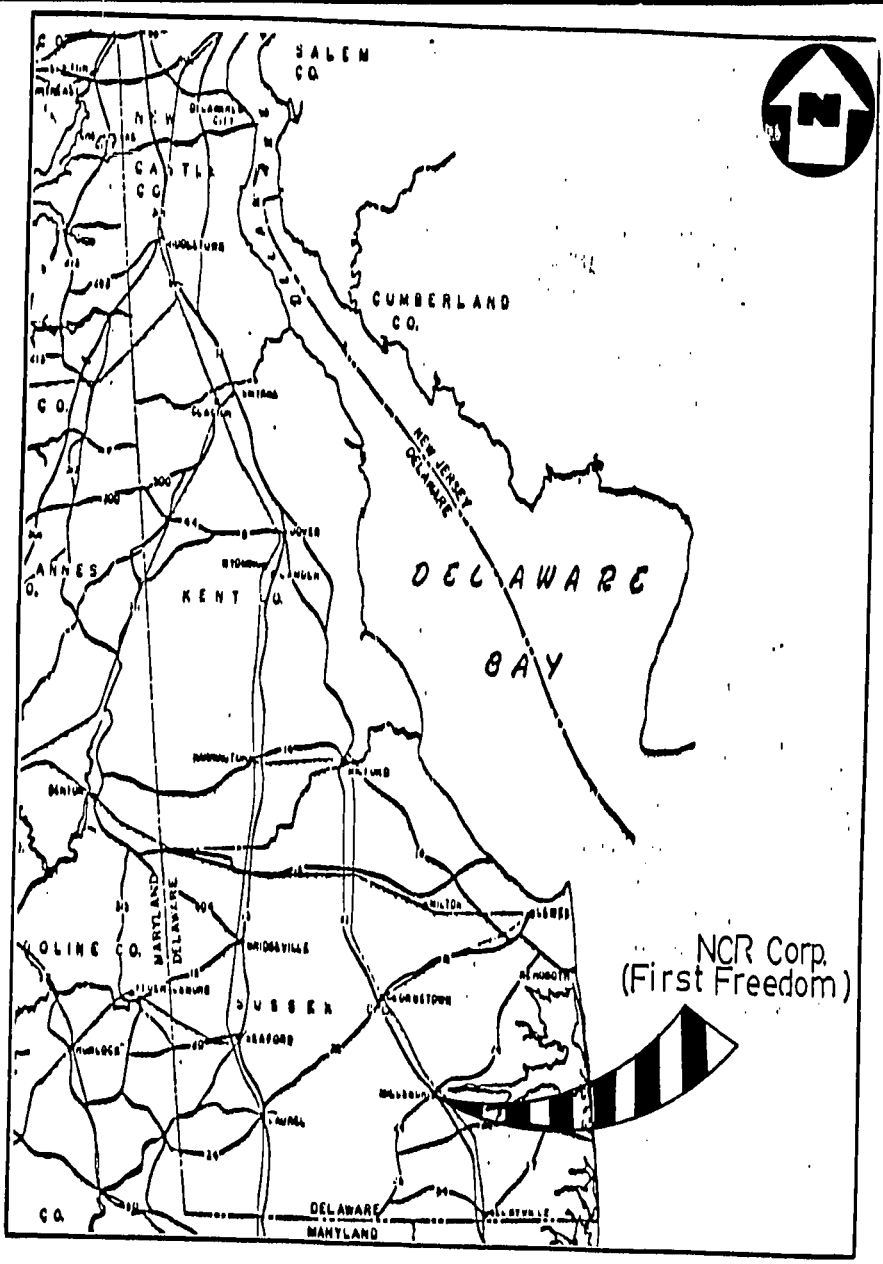
SCALE 1:24000

FIGURE 1

AR10038

NUS CORPORATION

A Halliburton Company



SITE LOCATION MAP

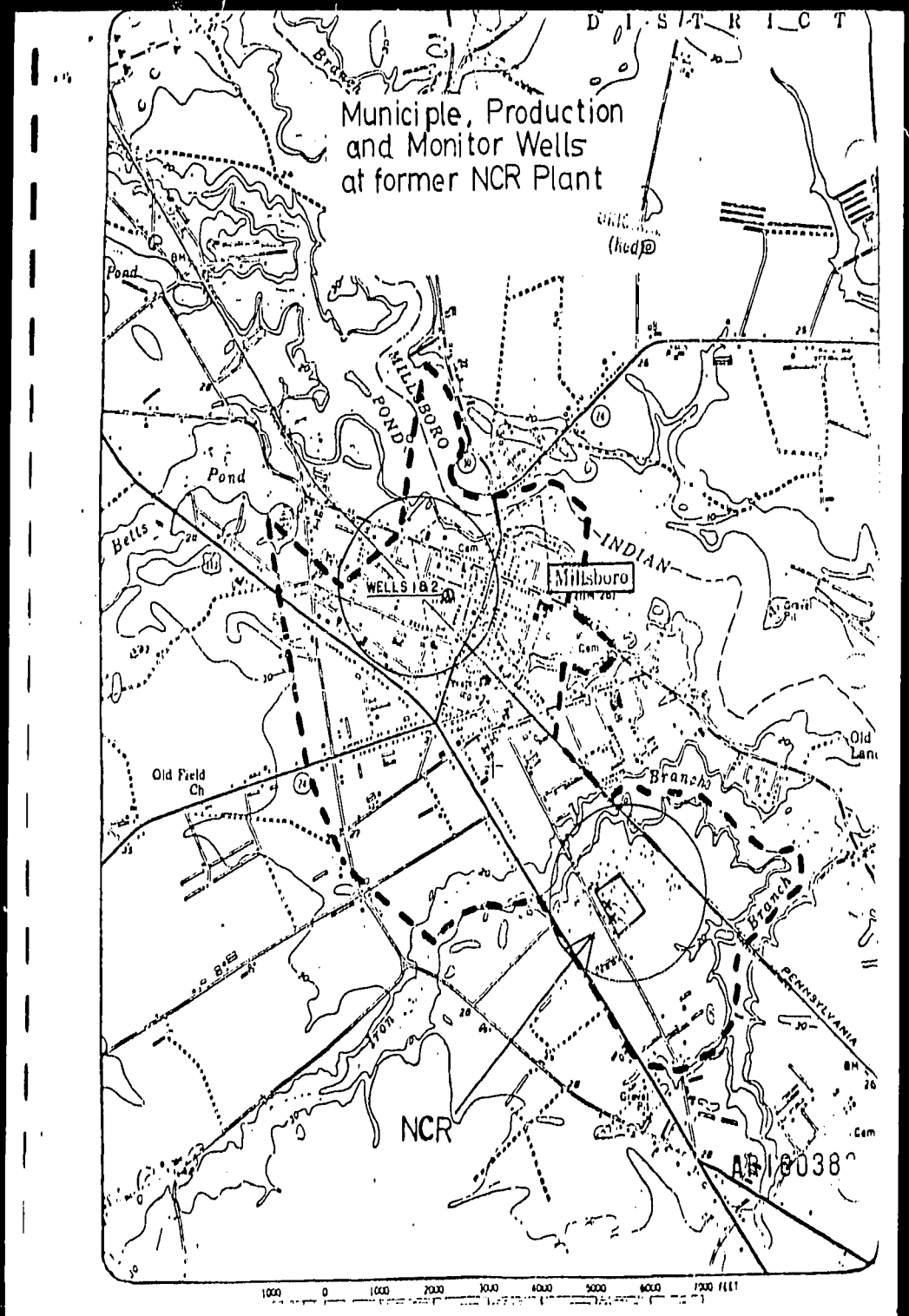
NCR CORP. SITE, MILLSBORO, DEL.

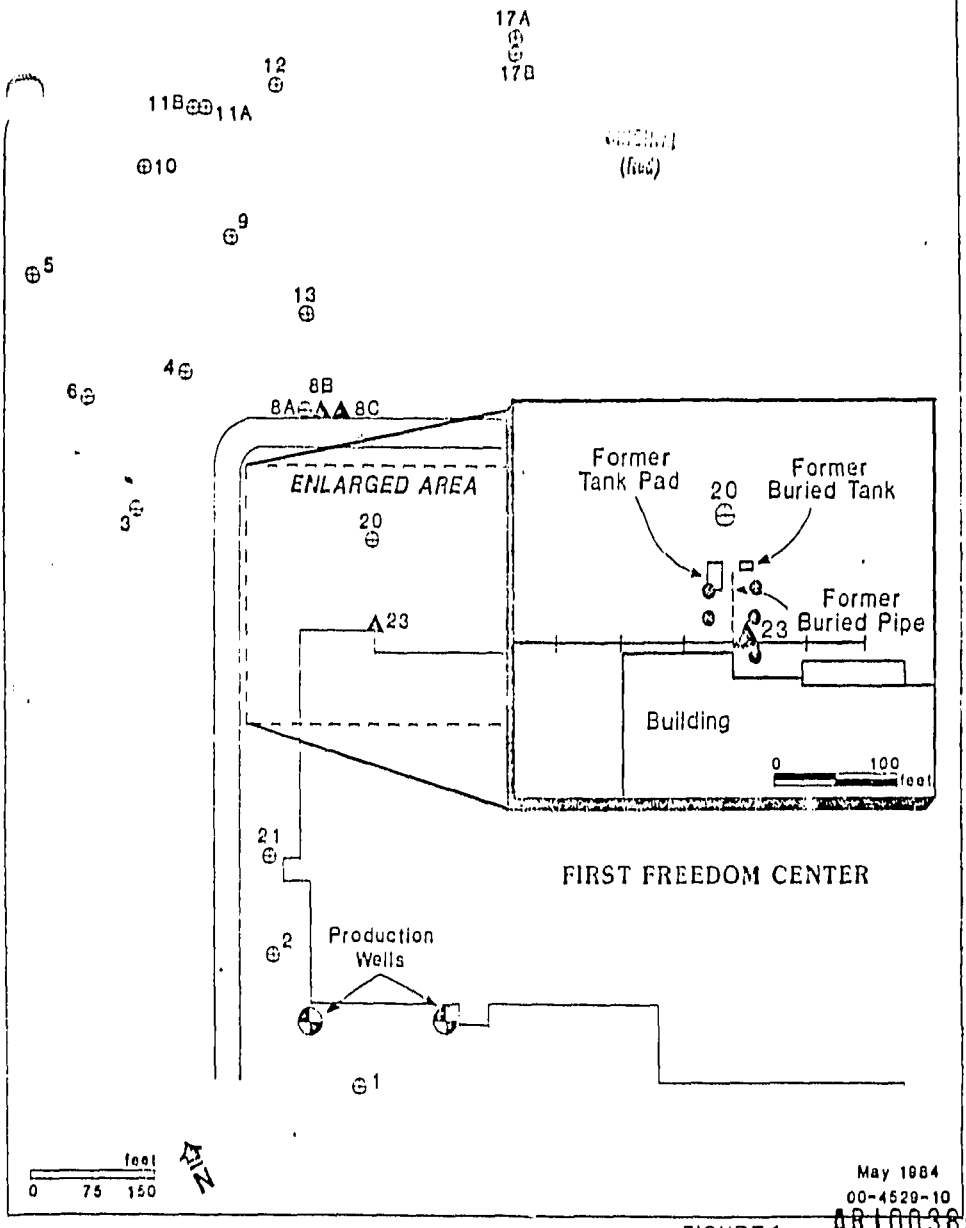
(SCALE UNKNOWN)

FIGURE 2

NUS CORPORATION

A Halliburton Company


Municiple, Production
and Monitor Wells
at former NCR Plant
D I S T R I C T
Millsboro
WELLS 1 & 2
INDIAN
MILLSBORO
POND
Pond
Bells
Old Field
Ch
Branch
PENNSYLVANIA
NCR
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET



LEGEND

- Existing Monitoring Well
- Proposed Monitoring Well
- Proposed Soil Boring

FIGURE 1

LOCATIONS OF EXISTING AND PROPOSED MONITORING WELLS
FIRST FREEDOM CENTER
(FORMER NCR FACILITY)
Millsboro, Delaware

AR100384

TABLE NO. 1

FIRST FREEDOM CENTER (FORMER NCR FACILITY)
MILLSBORO, DELAWARE
IRON BRANCH ANALYTICAL RESULTS

Parameter* Sample No.:	Stream 1 N400249	Stream 2 N400250	Stream 3 N400251	Stream 4 N400252	Stream 5 N400253	Stream 5A N400254	Stream 6 N400255	Stream 7 N400256	Stream 8 N400257	Stream 9 N400258	Stream 10 N400259	Trip Blank N400260
Methylene Chloride	8.8	<0.1	28.9	1.6	1.4	1.4	1.8	2.8	3.6	4.2	6.2	13.6
Vinyl Chloride	<0.1	<0.1	<0.1	<0.1	<0.1	1.3	<0.1	<0.1	<0.1	0.1	<0.1	<0.1
Trans 1,2-Dichloroethene	<0.1	5.3	4.5	31.2	1.0	103.	26.8	16.8	2.6	2.0	1.9	<0.1
Chloroform	0.2	<0.1	1.2	<0.1	0.1	1.8	0.5	<0.1	<0.1	<0.1	<0.1	<0.1
1,2-Dichloroethane	1.0	1.2	1.3	1.2	1.1	1.4	1.2	1.1	1.1	1.1	0.8	1.1
1,1,1-Trichloroethane	<0.1	<0.1	18.0	--- 0.5	<0.1	0.4	<0.1	<0.1	<0.5	<0.1	0.5	<0.1
Trichloroethene	3.6	3.3	2.8	482	25.3	886.	1400.	61.5	101	78.4	74.4	0.8
Tetrachloroethene	<0.1	0.7	<0.1	<0.1	<0.1	<0.1	<0.1	2.3	<0.1	<0.1	<0.1	<0.1

Sampled 1/4/84
* All results shown in ug/l
Source: BCM Eastern Inc.

TABLE NO. 2

FIRST FREEDOM CENTER (FORMER NCR FACILITY)
MILLSBORO, DELAWARE
GROUNDWATER ANALYTICAL RESULTS

Parameter	Sample No.:	Well #2 N400231	Well #4 N400232	Well #5 N400233	Well #6 N4002341	Well #8 N400235	Well #9 N400236	Well #10 N400237	Well #11 N400238	Well #11B N400239
Methylene Chloride ug/l		21.9		23.1		17.8	17.4	10.1	9.3	134
1,1 Dichloroethane ug/l		<0.1		<0.1		<0.1	<0.1	<0.1	<0.1	<0.1
Trans 1,2-Dichloroethene ug/l		3.2		1.5		125	54	1.1	8.8	<0.1
Chloroform ug/l		1.0		2.0		8.1	4.7	2.1	3.7	0.8
1,2-Dichloroethane ug/l		2.2		1.3		0.9	1.6	1.2	1.4	2.0
1,1,1-Trichloroethane ug/l		0.7	---	<0.1		1.1	0.8	0.7	1.0	<0.1
Carbon Tetrachloride ug/l		<0.1		<0.1		<0.1	<0.1	<0.1	<0.1	<0.1
Trichloroethene ug/l		11.6		2.7		1400	481	30.5	87.9	<0.1
Dibromochloroethane and/or 1,1,2-Trichloroethane and/or CIS-1,3-Dichloropropene ug/l		<0.1		<0.1		<0.1	<0.1	<0.1	<0.1	<0.1
1,1,2,2,-Tetrachloroethane and/or Tetrachloroethene ug/l		<0.1		<0.1		0.5	<0.1	<0.1	18.9	<0.1
Cyanide mg/l		<0.005	<0.005		<0.005		<0.005	<0.005	<0.005	
Chemical Oxygen Demand mg/l		48	40		8		16	16	40	
Chromium as Cr mg/l		<0.03	0.043		<0.03		0.34	0.043	0.14	
Hexavalent Chromium as Cr mg/l		0.01	0.043		0.01		0.34	0.043	0.14	
Chloride mg/l		5.86	5.46		8.24		8.83	4.57	5.46	
Dissolved Solids mg/l		125	115		52		117	55	47	
Specific Conductance (umhos)		117	141	112	94		160	95	95	
pH (standard units) mg/l		5.4	6.0	5.7	5.6		5.2	5.6	5.2	

TABLE NO. 2 (CONT)

Parameter / Sample No.:	Well #12 N400240	Well #13 N400241	Well #17A N400242	Well #17B N400243	Well #18 N400244	Well #19 N400245	Well #20 N400246	Well #21 N400247	Well #22 N400248
Methylene Chloride ug/l	8.0	<0.1	1.1	5.3	49.0	14.0	5.7	5.8	<0.1
1,1-Dichloroethane ug/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1.6	<0.1
Trans 1,2-Dichloroethene ug/l	69.6	1.5	3.3	<0.1	<0.1	<0.1	900	711	<0.1
Chloroform ug/l	1.7	<0.1	4.0	10.6	<0.1	<0.1	34.9	<0.1	<0.1
1,2-Dichloroethane ug/l	2.3	<0.1	0.1	1.3	1.0	1.2	1.1	0.8	1.1
1,1,1-Trichloroethane ug/l	0.3	<0.1	1.3	<0.1	<0.1	<0.1	0.6	<0.1	0.3
Carbon Tetrachloride ug/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	4.3	<0.1	<0.1
Trichloroethene ug/l	1400	125	1.0	17.7	12.6	38.8	115,000	222	10.3
Dibromochloroethane and/or 1,1,2-Trichloroethane and/or CIS-1,3-Dichloropropene ug/l	0.4	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
1,1,2,2,-Tetrachloroethane and/or Tetrachloroethene ug/l	6.8	<0.1	<0.1	<0.1	<0.1	<0.1	90.9	25.5	<0.1
Cyanide mg/l	0.076		<0.005	<0.005			<0.005		
Chemical Oxygen Demand mg/l			16	8			56		
Chromium as Cr	<0.03		<0.03	<0.03			<0.03		
Hexavalent Chromium as Cr mg/l	0.03								
Chloride mg/l									
Dissolved Solids mg/l									
Specific Conductance (umhos)	102								
pH (standard units) mg/l	5.5								

Sampled 1/3 - 1/5/84
Source: BCM Eastern, Inc.

BCM Engineers Planners and Scientists

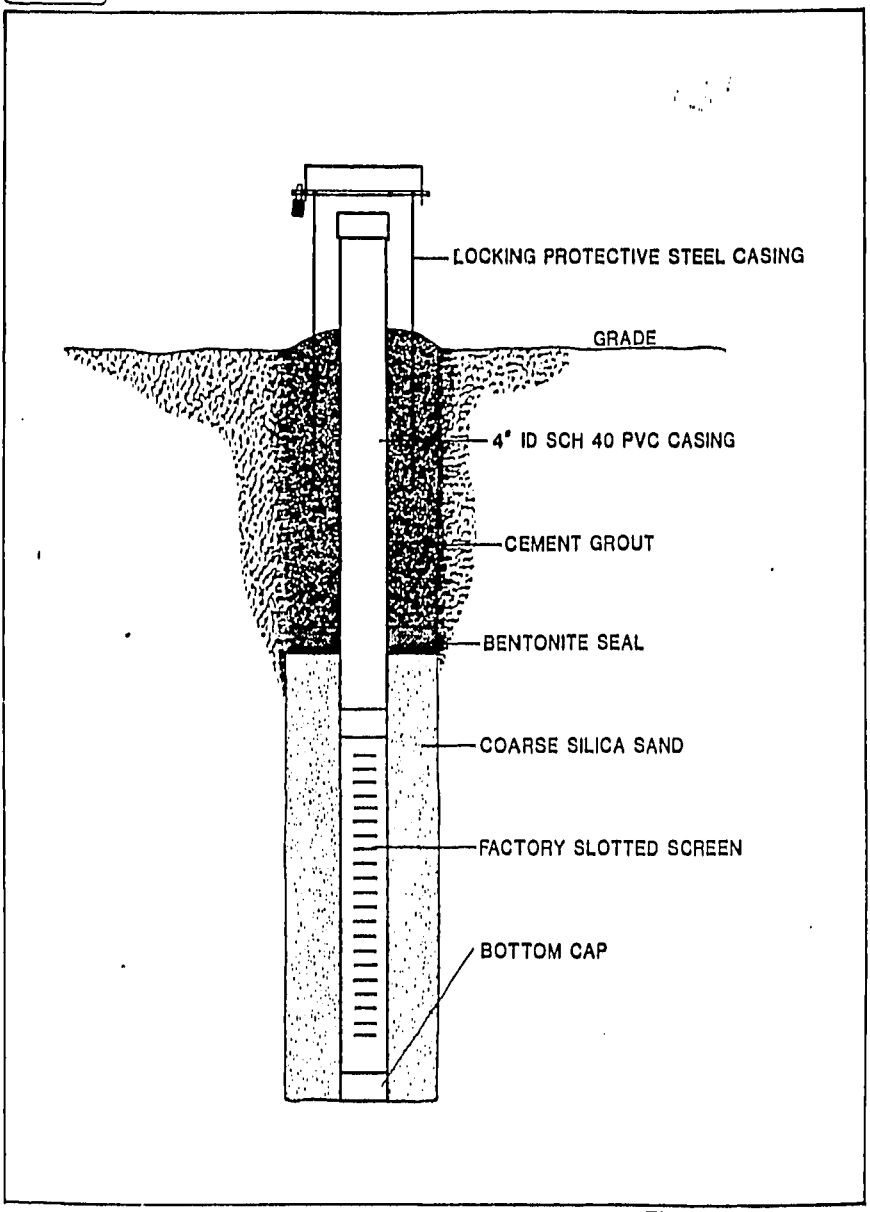


Figure 1
TYPICAL WELL DESIGN
FIRST FREEDOM CENTER
(FORMER NCR FACILITY)
Millsboro, Delaware

TABLE 3

FIRST FREEDOM CENTER (FORMER NCR FACILITY)
MONITORING WELL DIMENSIONS

Well	Completion Date	Well Diameter (inches)	Total Depth (feet)	Screened Interval (feet)	Cased Interval (feet)	Packed Interval (feet)	Grouted Interval (feet)
1	NA	2	50	NA	NA	NA	NA
2	NA	2	25	NA	NA	NA	NA
*3	NA	2	25	NA	NA	NA	NA
4	NA	2	25	NA	NA	NA	NA
5	NA	2	25	NA	NA	NA	NA
6	11/25/81	1.25	22	12-22	0-12	10.5-22	0-10.5
**7	11/24/81	3	24.5	14.5-24.5	0-14.5	13.5-24.5	0-13.5
8	11/25/81	3	25	15-25	0-15	14-25	0-14
9	11/25/81	3	22.5	12.5-22.5	0-12.5	10-22.5	0-10
10	3/09/82	3	24.5	14.5-24.5	0-14.5	12-24.5	0-12
11	3/09/82	3	24.5	14.5-24.5	0-14.5	12.5-24.5	0-12.5
11B	9/01/83	4	60	50-60	0-50	45-60	0-45
12	3/09/82	3	25	15-25	0-15	12.5-25	0-12.5
13	3/08/82	3	24	14-24	0-14	11.5-24	0-11.5
17A	12/05/83	4	60	50-60	0-50	45-60	0-45
17B	12/07/83	4	25	10-25	0-10	5-25	0-5
18	12/07/83	4	25	10-25	0-10	5-25	0-5
19	12/08/83	4	25	10-25	0-10	5-25	0-5
20	12/08/83	4	25	10-25	0-10	5-25	0-5
21	12/08/83	4	25	10-25	0-10	5-25	0-5
22	12/09/83	4	25	10-25	0-10	5-25	0-5
Piezometer A	8/30/83	2	25	15-25	0-15	14-25	0-14
Piezometer B	8/31/83	2	20	10-20	0-10	7-20	0-7
Piezometer C	8/31/83	2	20	10-20	0-10	7-20	0-7

* Well 3 is damaged
** Well 7 has been abandoned
NA Not available

Source: BCM Eastern, Inc.

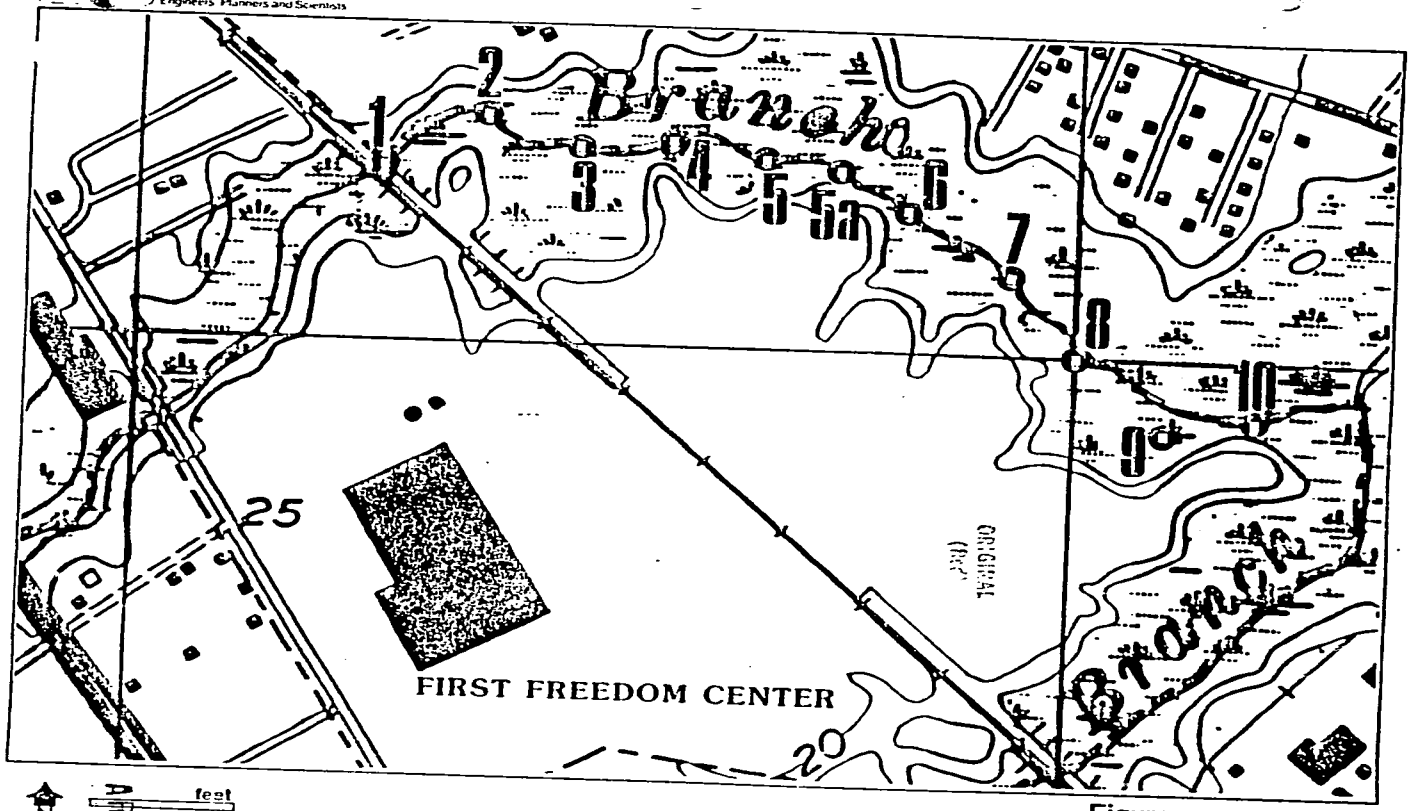


Figure 2
STREAM SAMPLING LOCATIONS
(SAMPLED 1/4/84)
FIRST FREEDOM CENTER
(FORMER NCR FACILITY)

ORIGINAL
(Red)

APPENDIX C

April 1984

Groundwater Quality Investigation and Groundwater Quality Management Plan Interim Report

for

NCR Corporation
former facility - Millsboro Delaware (First Freedom Center)

BCM
Engineers, Planners and Scientists
One Plymouth Meeting • Plymouth Meeting, PA 19462 • Phone: (215) 825-38[illegible]

GROUNDWATER QUALITY INVESTIGATION
AND
GROUNDWATER QUALITY MANAGEMENT PLAN
INTERIM REPORT

ORIGINAL
(Red)

FOR

NCR CORPORATION

MARCH 22, 1984

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1.0 EXECUTIVE SUMMARY

The NCR Corporation (NCR) operated a manufacturing plant in Millsboro, Delaware until November 1981, at which time the property was sold to the First National Bank of Maryland. BCM Eastern Inc. (BCM) was retained by NCR in 1982 to conduct routine quarterly groundwater monitoring as part of a plating waste disposal site closure. Samples collected in April 1983 as part of this program revealed the presence of trichloroethene (TCE) in the groundwater.

To determine the source and extent of the TCE, BCM installed additional monitoring wells, conducted soil borings at the facility, and sampled a segment of a stream (Iron Branch) northeast of the facility which is believed to be a discharge zone for groundwater flowing beneath the site. Although the precise location of the TCE source has not yet been determined, a high concentration was detected in the area of a former above ground TCE storage tank. The TCE-bearing groundwater is flowing northeast from this area and is the probable source of the TCE concentrations measured in Iron Branch.

The TCE concentrations in the groundwater are significant enough to warrant precise determination of the TCE source and the potential offsite impacts.

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2.0 INTRODUCTION

The First Freedom Center, Millsboro, Delaware, previously an NCR manufacturing plant, was sold to the First National Bank of Maryland in November 1981. BCM was retained by NCR to perform routine quarterly groundwater monitoring associated with the closure of a plating waste disposal site.

Samples collected as part of the quarterly monitoring program in April 1983 revealed the presence of elevated TCE concentrations in the groundwater at the northeast corner of the property. An investigation was begun to locate the source and determine the extent of the TCE in the groundwater. The NCR Corporation provided information regarding possible sources of the TCE. Based upon this information and data from the existing monitoring wells, a program involving installation of additional monitoring wells, soil sampling, and surface water sampling was initiated.

This report presents the investigation procedures and results.

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3.0 SITE DESCRIPTION

3.1 FACILITY DESCRIPTION AND ADJACENT LAND USE

The First Freedom Center (former NCR facility) is a large (approximately 300,000 sq ft) semi-rectangular, concrete block structure, situated near the approximate center of a 63-acre lot on the northeast side of Mitchell Street in Millsboro, Delaware.

The Freedom Center property is bordered by a small stream (Iron Branch) on the northwest, beyond which there is an area of low-density housing and the town of Millsboro (Figure 1). The area northeast of the site is occupied by a field used for agricultural purposes, Iron Branch, and an adjacent swamp. Conrail railroad tracks separate the former NCR facility from the field. Further from the site in this direction is a low density residential area located on a slight topographic rise and the Indian River. The area to the southeast is very similar to the northeast, with cultivated fields and a small stream (Wharton's Branch). The confluence of Iron Branch and Wharton's Branch is due east of the site, beyond which they flow northeast to the Indian River. Southeast of the site, there are a few scattered houses and a mobile home dealership between Mitchell Street and Route 113. Beyond Route 113, there are mostly open fields and wooded areas.

3.2 GEOLOGY

The site, located in the Atlantic Coastal Plain Province, is underlain by unconsolidated sediments of Quaternary, Tertiary, Cretaceous, and possibly Triassic age. These sediments rest on a basement complex of igneous and metamorphic rock composed of gneiss, schist, and gabbro, which occurs at a depth of between 4,200 and 7,800 feet (Sundstrom and Pickett, 1969).

The two uppermost series of sedimentary deposits, the Pleistocene Columbia Group and the Miocene Chesapeake Group, are of primary interest to this investigation. In the Millsboro area, the Columbia and the Chesapeake Groups are approximately 100 and 1,000 feet thick, respectively (Sundstrom and Pickett, 1969).

The Columbia Group, which is exposed at the site, unconformably overlies the Chesapeake Group, and is generally composed of fine-to-coarse, moderately sorted quartz sand, with considerable amounts of gravel. Thin interbeds of silt are present in some areas. Sediments of the Columbia Group are usually yellow to reddish-brown (Sundstrom and Pickett, 1969).

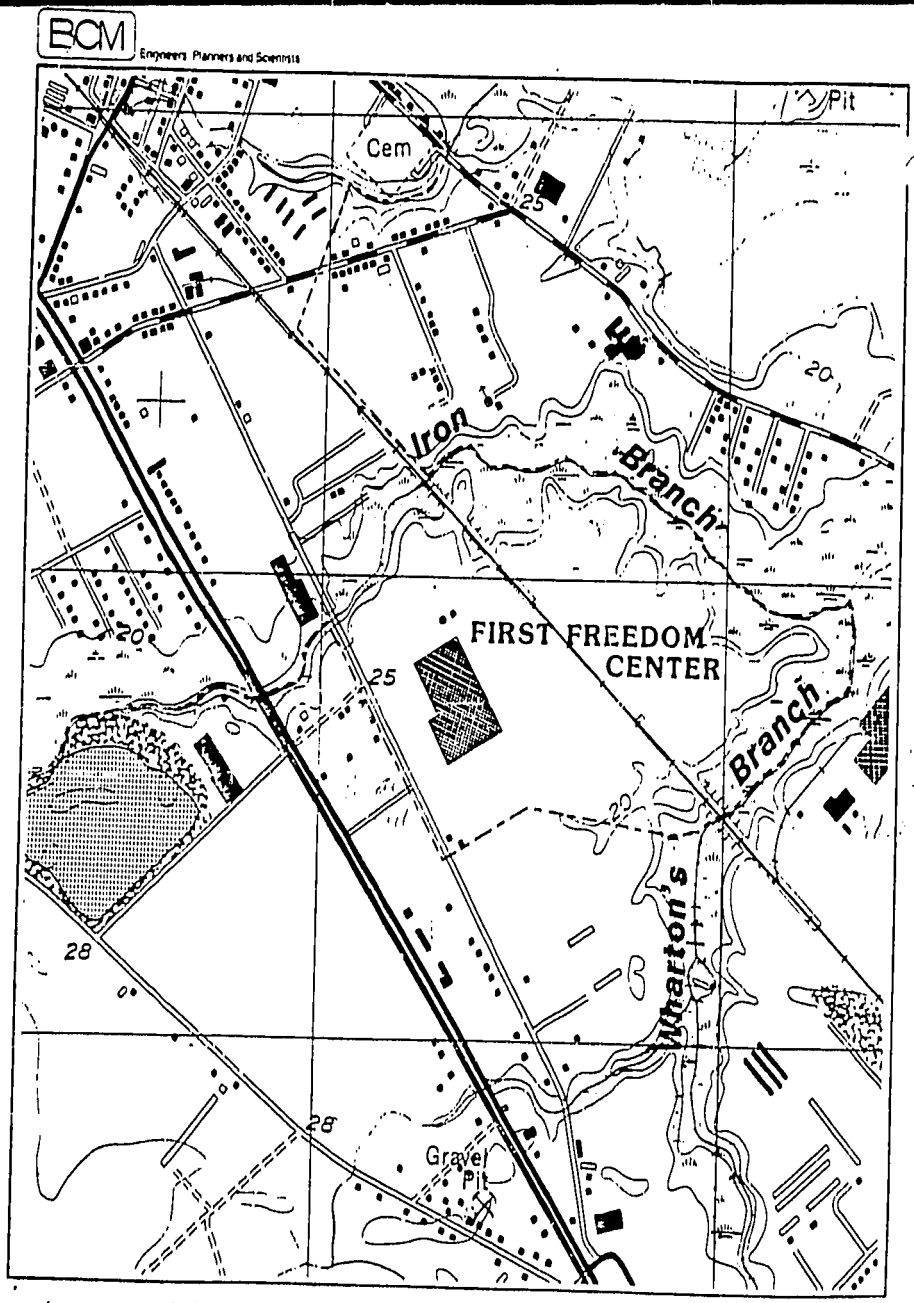


FIGURE 1

AR100399 **SITE LOCATION MAP**

FIRST FREEDOM CENTER

(FORMER NCR FACILITY)

Millsboro, Delaware

Miocene sediments from the Chesapeake group consist of predominantly gray and bluish-gray silt, containing beds of gray, fine-to-medium sand and some shell beds (Jordan 1962).

Borings for monitoring well installation and soil sampling at the site indicate that the property is underlain by fine-to-coarse sand and gravel of the Columbia Group. Detailed lithologic logs for the well borings are included in Appendix A. Clay layers of up to several feet in thickness were present in some borings. None of these borings were deep enough to encounter Chesapeake Group sediments.

3.3 HYDROGEOLOGY

Shallow groundwater beneath the site is contained in interconnected pores within the sand and gravel of the Columbia Group, and is under water table conditions. The water table does not remain at a fixed elevation, but fluctuates in response to seasonal changes in groundwater recharge. From the groundwater elevations shown in Table 1, it can be seen that there is an annual variation of approximately 2 to 4 feet. These elevations indicate an average depth of the water table at approximately 12 to 13 feet below grade.

Groundwater flows slowly downward and laterally toward areas of lower elevation or lower hydraulic potential. Groundwater elevations from the site monitoring wells were used to construct the groundwater contour map shown as Figure 2. Anomalous groundwater elevations in wells 4, 12, and 20 were not included in this map. The reason for these anomalies is not clear at this time. The map indicates that the shallow groundwater is generally flowing to the northeast. The shallow groundwater flowing beneath the site is apparently discharged to Iron Branch, a tributary of the Indian River, along a zone northeast of the former NCR facility. The confluence of Iron Branch and Wharton's Branch is approximately 1/4- to 1/2-mile downstream from this area, beyond which they flow northeasterly to the Indian River. A deeper component of the groundwater may flow beneath Iron Branch, directly to the Indian River.

Data from a pump test conducted on well 12 was used to calculate the transmissivity and storativity of the water table aquifer. These values were determined to be 3,820 gallons/day/foot, and 0.184 (dimensionless), respectively. With this information, the hydraulic conductivity was estimated from:

$$K = \frac{T}{b}$$

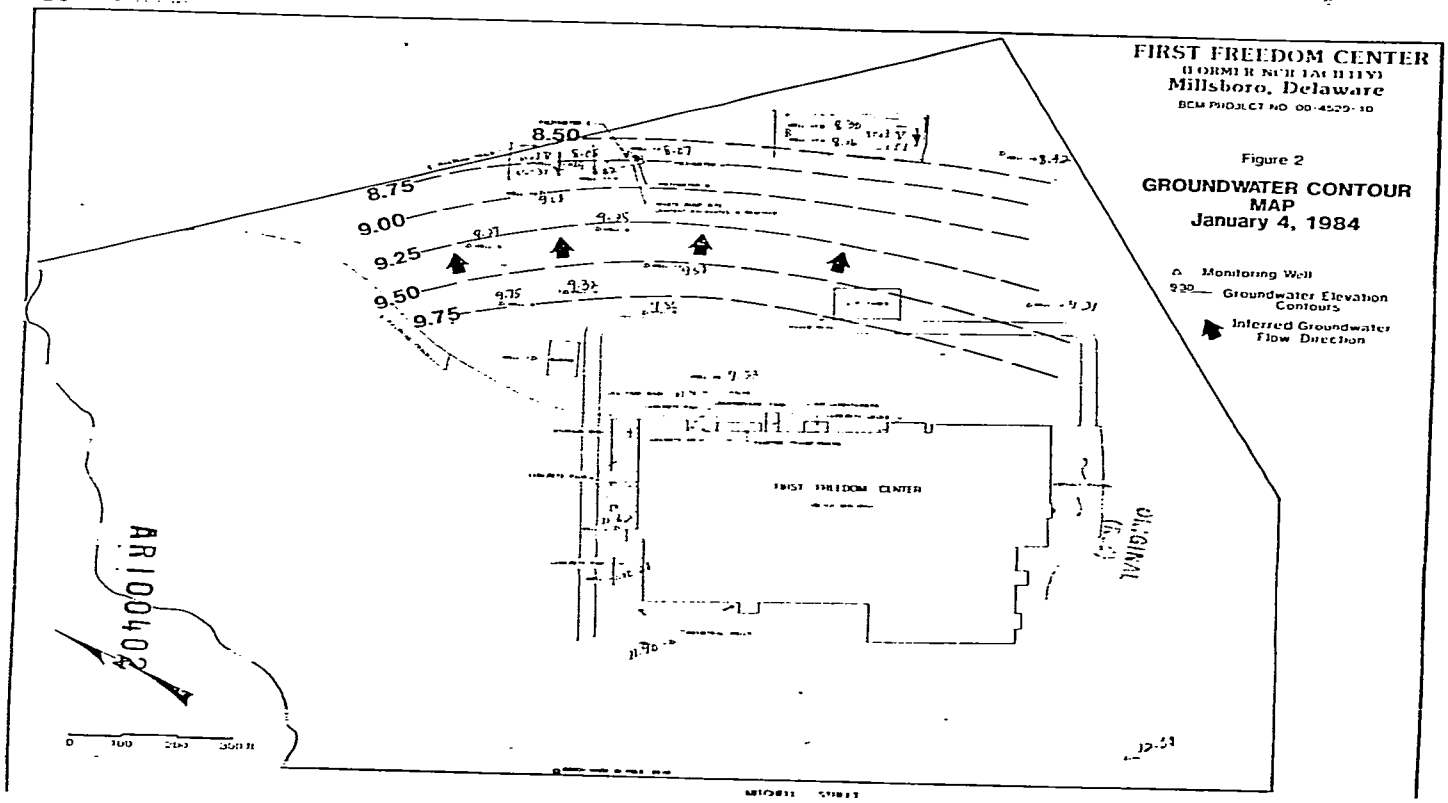
TABLE 1

FIRST FREEDOM CENTER (FORMER NCR FACILITY)
STATIC WATER ELEVATIONS
(Feet Above Sea Level)

Well	Datum (PVC)	11/28/81	6/30/82	9/21/82	12/15/82	3/23/83	5/12/83	8/30/83	9/1/83	1/4/84
1	25.73	9.61	10.69	9.93	10.36	12.88	13.50	11.06	11.19	11.90
2	25.24	9.59	10.20	9.32	9.62	12.16	13.07	10.49	10.61	10.24
* 3	21.92	7.94	8.75	7.92	8.32	11.05	--	--	--	--
4	23.78	7.57	8.45	7.68	8.18	10.74	11.57	9.20	9.28	9.32
5	21.85	7.23	7.39	6.69	7.29	10.31	10.64	9.10	9.14	9.27
6	22.50	5.00	8.63	6.86	8.33	11.86	11.33	9.58	9.46	9.75
** 7	23.73	7.77	8.86	8.17	8.56	--	--	--	--	--
8	24.78	6.66	8.64	7.78	8.20	10.78	11.74	8.24	9.20	9.86
9	24.45	7.20	7.74	7.10	7.53	10.03	11.08	8.58	8.49	9.28
10	22.79	--	7.79	7.06	7.62	10.00	10.67	8.46	8.54	9.04
11	23.82	--	7.74	7.05	7.55	9.82	10.57	8.28	8.30	8.82
11A	23.05	--	--	--	--	--	--	--	7.51	8.05
12	23.15	--	6.90	6.19	6.65	8.99	9.86	7.40	7.40	8.07
13	24.25	--	8.48	7.73	8.13	10.54	11.50	8.81	8.83	9.54
14A	24.58	--	--	--	--	--	--	--	--	8.16
14B	24.63	--	--	--	--	--	--	--	--	8.30
18	24.09	--	--	--	--	--	--	--	--	8.42
19	24.10	--	--	--	--	--	--	--	--	9.31
20	23.08	--	--	--	--	--	--	--	--	9.33
21	22.73	--	--	--	--	--	--	--	--	11.62
22	25.97	--	--	--	--	--	--	--	--	12.64
Piezometer A	--	--	--	--	--	--	--	--	7.46	--
Piezometer B	--	--	--	--	--	--	--	--	7.45	--
Piezometer C	--	--	--	--	--	--	--	--	7.39	--

* Well 3 is damaged
** Well 7 has been abandoned

Source: BCM Eastern, Inc.


BCM
FIRST FREEDOM CENTER
(FORMER NCR FACILITY)
Millsboro, Delaware
BCM PROJECT NO. 00-4529-10
Figure 2
GROUNDWATER CONTOUR MAP
January 4, 1984
Monitoring Well
Groundwater Elevation Contours
Inferred Groundwater Flow Direction
8.50
8.75
9.00
9.25
9.50
9.75
FIRST FREEDOM CENTER
ORIGINAL
AR I 004 02

where:

T = transmissivity, gal/day/ft (3,820 gal/day/ft)
b = saturated thickness of the aquifer, ft (30 ft)
K = hydraulic conductivity, cu ft/sq ft/day

The hydraulic conductivity which was determined to be 127 ft/day was then used to calculate the linear (seepage) velocity of groundwater flow from:

$$V = \frac{K\ i}{n}$$

where:

V = velocity, ft/day
K = hydraulic conductivity, cu ft/sq ft/day (127 ft/day)
i = hydraulic gradient, ft/ft
n = effective porosity, cu ft/cu ft

Assuming an effective porosity of 35 percent and a hydraulic gradient of 3.2×10^{-3}, linear velocity was estimated at 1.2 ft/day.

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4.0 INVESTIGATION PROGRAM

4.1 INTRODUCTION

The two primary objectives of this phase of the investigation were to locate the source of the TCE in the groundwater and more clearly define the area of elevated TCE concentrations (plume).

Several possible sources of TCE were considered:

1. Leakage from an underground TCE tank near the northeast corner of the building. (The presence of an underground TCE tank has not yet been confirmed and is considered doubtful.)

2. Past spillage at the filling valve, or leakage from a subsurface connector pipe for an above ground TCE tank that was located near the building's northeast corner.

3. Leakage from the above-mentioned TCE tank

4. Cutting oil tanks at the northwestern corner of the building

5. Area where suspected spillage from a parked tank truck occurred (near well No. 8)

6. Unknown source within or beneath building

7. Offsite source

Based upon information supplied by NCR that an underground TCE tank might be present in the vicinity of the TCE filling valve, the area was probed thoroughly, using a metal rod driven to a depth of approximately 5 feet. No underground TCE tank was found.

To determine the TCE source, soil borings and monitoring wells were located either in, or immediately downgradient of suspected areas. Most of the borings penetrated to a depth of approximately 12 feet, and most of the wells to a depth of 25 feet.

To more clearly define the lateral and vertical extent of the TCE plume present in the groundwater beneath the northeast section of the facility, monitoring wells and soil borings were placed at several locations around the property.

Iron Branch was sampled at several locations in order to identify the lateral extent of the plume at a distance from the site and/or the amount of downstream transport of TCE.

4.2 SOIL SAMPLING

4.2.1 Soil Boring Location Rationale

Sixteen soil borings were completed at several locations at the Freedom Center facility on November 16 and 17, 1983. Locations of these borings are shown on Figure 3.

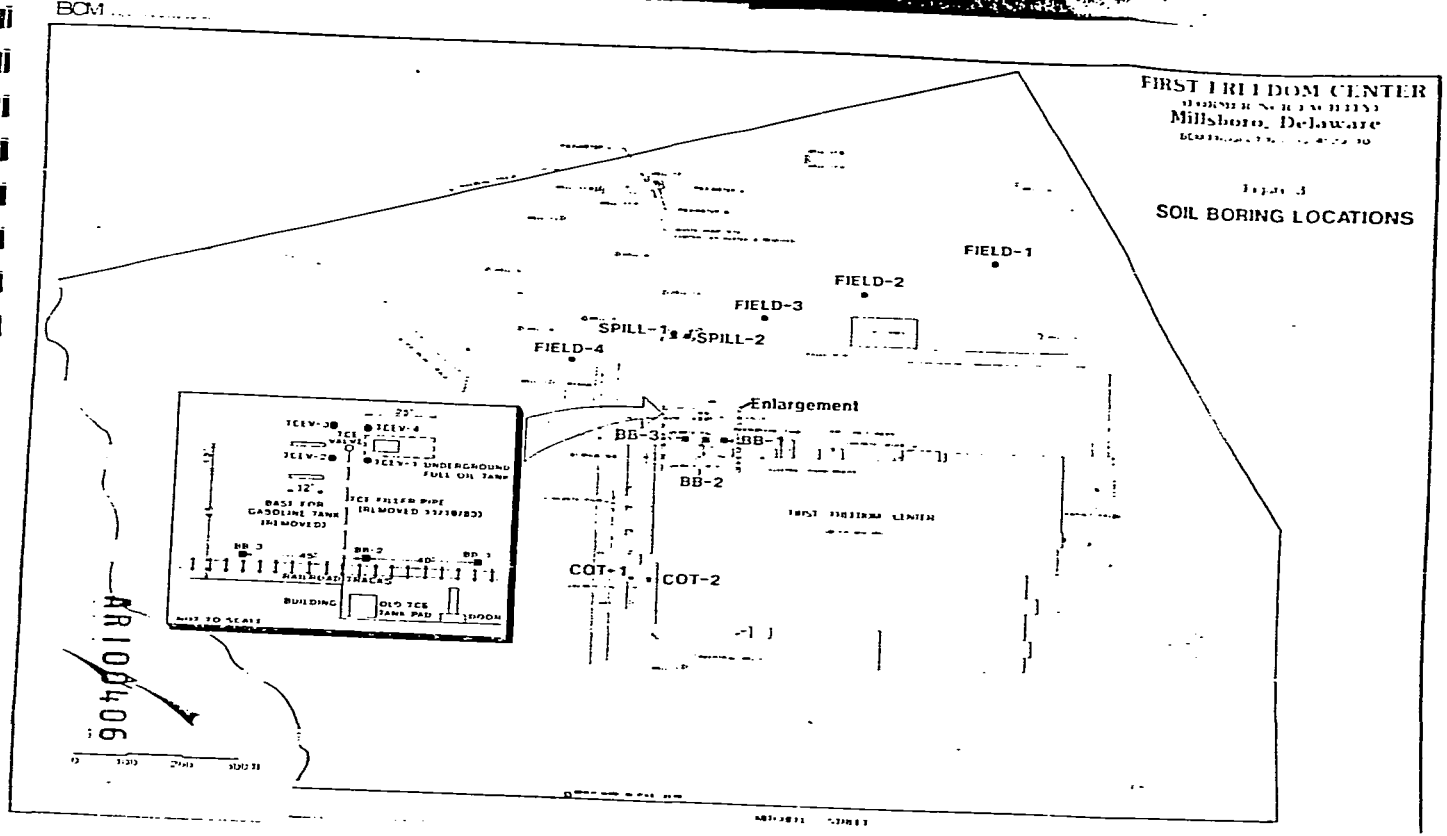
Four borings identified as TCEV-1 through TCEV-4 were placed around the site of the TCE filling valve. This valve, which was connected to the above ground TCE tank by an underground pipe, was considered a possible spillage source. Both the connecting pipe and the valve were removed on November 16, 1983 by employees of the first Freedom Center. At the time of removal, the pipe still contained TCE, indicating that there were no leaks.

Boring BB-2 was located several feet east of the railroad tracks at the rear of the building, directly in front of the site of the old above ground TCE tank. Borings BB-1 and BB-3 are located 40 to 45 feet southeast and northwest of BB-2, respectively, forming a line parallel to the railroad tracks. These borings which are located upgradient from the TCE filling valve were intended to determine if the above ground TCE tank or some other source inside the building was responsible for the TCE in the groundwater.

Used cutting oil was stored in two tanks buried beneath a concrete pad at the northwestern corner of the building. Due to the possibility of TCE having been present with the oil, two borings were placed downgradient from these tanks. These borings are identified as COT-1 and COT-2.

Information was provided by a former NCR employee that a tank truck containing waste material leaked an undetermined amount of liquid while parked southeast of well 8. Two soil borings identified as Spill-1 and Spill-2 were conducted in the approximate area where this spill occurred. It is not known whether TCE was present in the liquid which was spilled.

Four soil borings identified as Field 1 through Field 4 were conducted in a linear pattern across the eastern section of the former NCR facility to aid in determining the width of the TCE plume. The trend of this line runs approximately perpendicular to the general groundwater flow direction.


FIRST FREEDOM CENTER
Millsboro, Delaware
SOIL BORING LOCATIONS
FIELD-1
FIELD-2
FIELD-3
FIELD-4
SPILL-1
SPILL-2
Enlargement
BB-3
BB-1
BB-2
COT-1
COT-2
TCEV-3
TCEV-4
TCEV-2
TCEV-1 UNDERGROUND FUEL OIL TANK
TCE FILLER PIPE (REMOVED 3/27/87)
BASE FOR GASOLINE TANK (REMOVED)
BB-3
BB-2
BB-1
RAILROAD TRACKS
BUILDING
OLD TCE TANK PAD
DOOR
NOT TO SCALE
AR 10 0406

BCM

One boring was conducted near the edge of Iron Branch, in the area where the highest TCE concentration had been found in the surface water. This boring identified as SWAMP, served as a verification of the surface water analyses.

4.2.2 Soil Sampling Procedure

All soil borings were conducted with a 3-inch diameter, stainless steel hand auger. Samples were taken continuously to a depth of 12 feet in all of the borings, except TCEV-2 and SWAMP. Refusal occurred at 10 feet in boring TCEV-2 and a shallow water table restricted sampling to a depth of 6 feet in the boring identified as SWAMP. The samples were immediately placed in laboratory prepared jars with Teflon-lined lids. Between each of the samples, the auger was washed with a 50 percent methanol solution and rinsed with distilled, deionized water. Upon completion of sampling, the soil samples were returned to the BCM laboratory in Norristown, Pennsylvania, where selected samples were analyzed for TCE, perchloroethylene (PCE), and 1,1,1-trichloroethane. The results of the analyses are presented in Table 2.

4.3 MONITORING WELLS

4.3.1 Monitoring Well Placement

Seven new monitoring wells were installed at the former NCR facility between December 5 and December 9, 1983. These wells are numbered 17 to 22, with a couplet at 17 differentiated by an A and B designation. The locations of these wells are shown on Figure 4. These well locations were selected to provide information on the source and extent of the TCE in the groundwater. All of the wells are 25 feet deep, with the exception of 17A.

Well 17A is screened at a deeper aquifer interval to provide information, along with previously existing well 11B, on the vertical component of the TCE plume.

Monitoring wells 17B, 18, and 19 are located so as to further define the eastern edge of the TCE plume. Monitoring wells 20 and 21 were installed downgradient of the TCE filling valve area and cutting oil tanks, respectively, to determine if they were TCE sources. Considering the possibility of the TCE migrating from an offsite source, a background well, No. 22, was placed upgradient from the plant. The monitoring wells were sampled according to the protocol provided in Appendix B.

TABLE 2

FIRST FREEDOM CENTER (FORMER NCR FACILITY)
MILLSBORO, DELAWARE
SOIL ANALYTICAL RESULTS

Sample Location*	Sample Number	Trichloroethene MG/KG	Perchloroethylene MG/KG	1,1,1-Trichloroethan MG/KG
TCEV 1-2-4	N314782	0.06	0.5	<0.01
TCEV 1-6-8	N314783	0.05	0.4	<0.01
TCEV 1-10-12	N314784	0.04	0.3	<0.01
TCEV 3-2-4	N314785	<0.01	0.3	<0.01
TCEV 3-6-8	N314786	0.03	0.6	<0.01
TCEV 3-10-12	N314787	<0.01	0.2	<0.01
BB 1-7-9	N314788	<0.01	0.1	<0.01
BB 1-10-12	N314789	<0.01	0.2	<0.01
BB 2-4-6	N314790	0.45	2.5	<0.01
BB 2-10-12	N314791	1.1	5.8	0.11
SPILL 1-4-6	N314792	0.4	2.4	<0.01
SPILL 1-10-12	N314793	0.3	1.8	<0.01
SWAMP 2-4	N314794	0.3	1.7	<0.01
SWAMP 4-6	N314795	0.3	0.7	<0.01
FIELD 1-10-12	N314796	0.06	0.6	<0.01
FIELD 2-10-12	N314797	<0.01	0.3	<0.01
FIELD 3-10-12	N314798	<0.01	0.4	<0.01
FIELD 4-10-12	N314799	0.05	0.5	<0.01
COT 2-1-3	N314800	<0.01	0.06	<0.01
COT 2-4-6	N314801	0.01	0.1	<0.01
COT 2-10-12	N314802	<0.01	0.1	<0.01

Sampled 11/17/83

* Last two numbers represent depth in the boring (feet)

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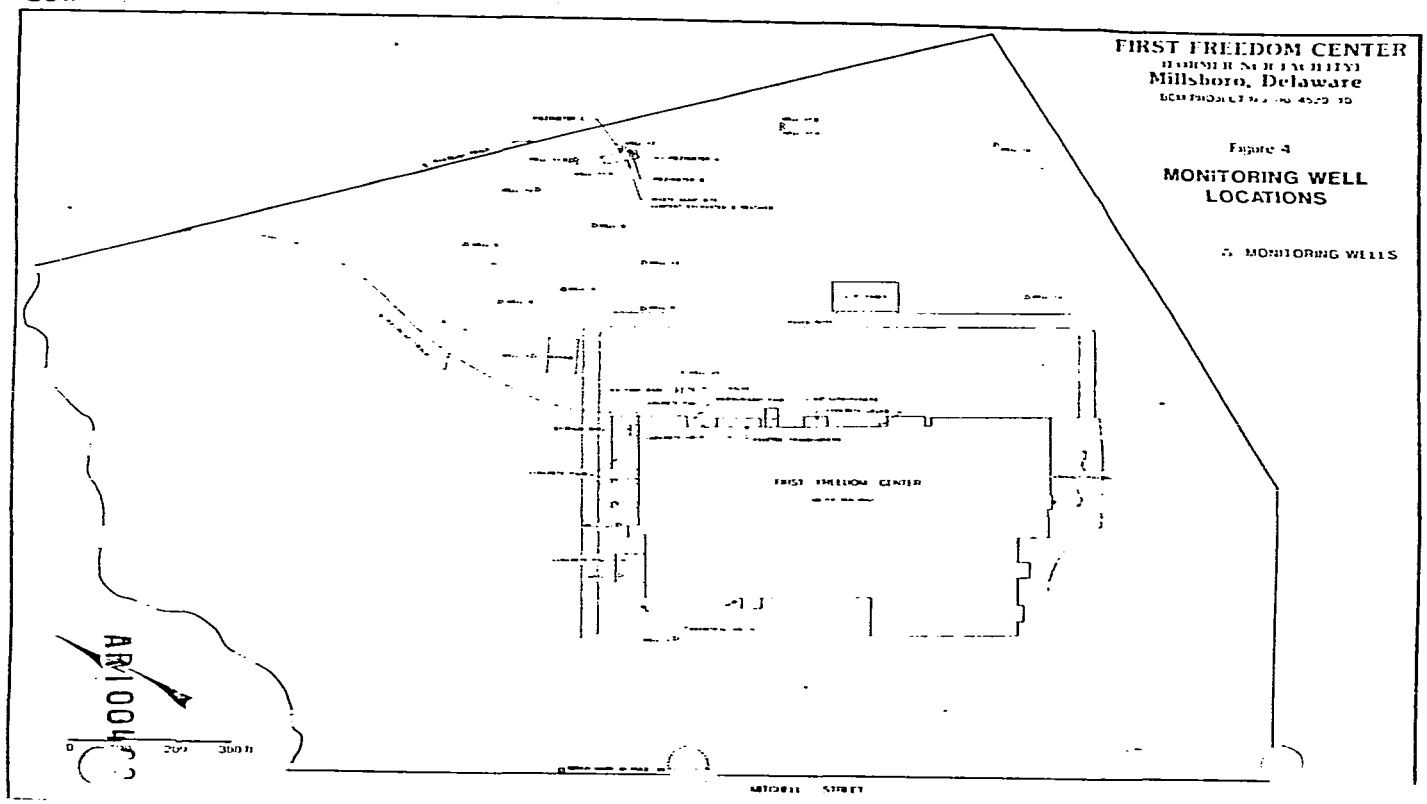
FIRST FREEDOM CENTER
Millsboro, Delaware
Figure 4
MONITORING WELL LOCATIONS
MONITORING WELLS
FIRST FREEDOM CENTER
0
200
300 ft

BCM

4.3.2 Monitoring Well Construction

A typical well design is illustrated in Figure 5. The monitoring wells were installed in 8-3/4-inch-diameter borings, which were drilled using the mud rotary method. Split spoon samples were taken at 5-foot intervals during the drilling process. All of the wells were constructed with 4-inch (inside diameter) schedule 40 PVC casing and screen. The screen was factory slotted with 0.016-inch slots. The casing and screen were attached with couplings held in place with stainless steel screws. No glues or other adhesives were used. The bottom plug also was attached with screws.

The shallow wells were installed to a depth of 25 feet and had 15 feet of screen placed in the bottom. Solid casing extended from the screen top to approximately 2 feet above grade. The annular space was packed with coarse silica sand to 5 feet below grade. This was followed by a 1-foot-thick bentonite pellet seal, above which cement grout extended up to grade. A steel protective casing with a locking cap was placed over the PVC casing and inserted 3 feet into the cement grout.

The deep well, Well 17A, was installed to a depth of 60 feet, with 10 feet of screen in the bottom of the hole. As in the other wells, solid casing was placed from the top of the screen to approximately 2 feet above grade. The annular space was packed with coarse silica sand to 5 feet above the top of the screen. A bentonite seal was placed on the top of the sand pack, above which the annular space was tremie grouted up to grade. A steel protective casing was emplaced in the same manner as in the shallow wells. Upon completion, each of the wells were air developed until clear water was obtained. Table 3 shows a summary of the construction for all of the monitoring wells.

4.4 STREAM SAMPLING

4.4.1 Stream Sampling Locations

On January 4, 1984, surface water samples were taken at 11 locations, extending from the railroad crossing behind the Freedom Center facility to approximately one-half mile downstream on Iron Branch. Stream sampling locations are shown on Figure 6. This area was chosen because it includes the discharge zone for groundwater flowing beneath the facility. It also includes several locations which were found to have elevated TCE concentrations in previous samplings.

4.4.2 Stream Sampling Methodology

Surface water samples were taken at approximately 100-yard intervals, except between samples 5 and 6, where the interval was 50 yards. These sampling sites were marked for future reference.

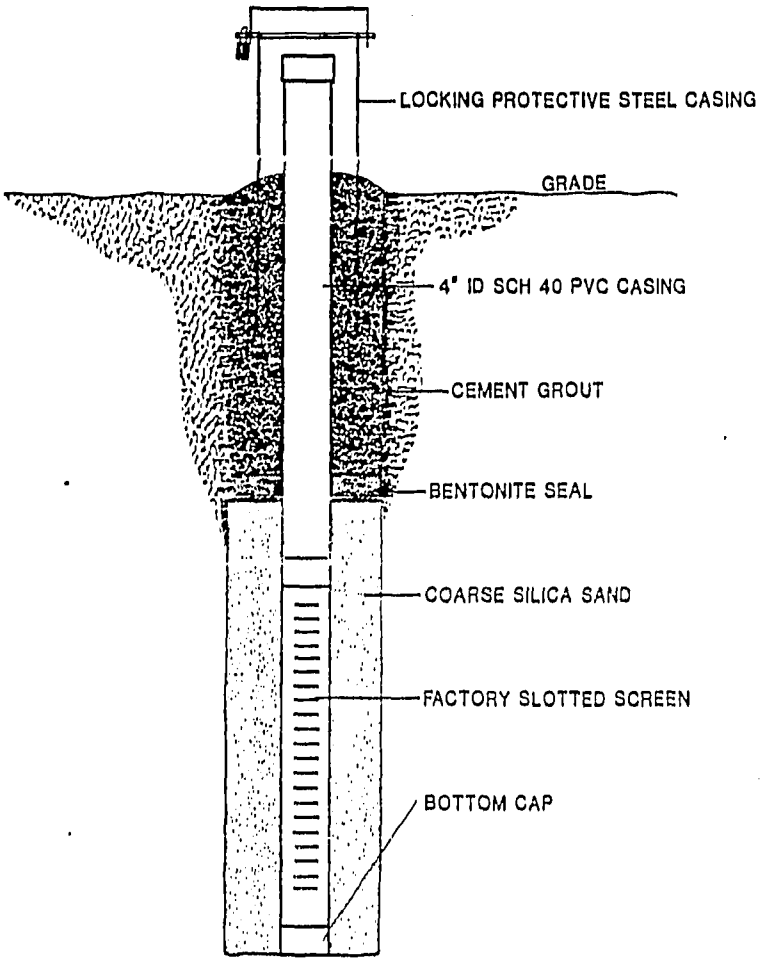

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Figure 5
TYPICAL WELL DESIGN
FIRST FREEDOM CENTER
(FORMER NCR FACILITY)
Millsboro, Delaware

TABLE 3

FIRST FREEDOM CENTER (FORMER NCR FACILITY)
MONITORING WELL DIMENSIONS

Well	Completion Date	Well Diameter (inches)	Total Depth (feet)	Screened Interval (feet)	Cased Interval (feet)	Packed Interval (feet)	Grouted Interval (feet)
1	NA	2	50	NA	NA	NA	NA
2	NA	2	25	NA	NA	NA	NA
*3	NA	2	25	NA	NA	NA	NA
4	NA	2	25	NA	NA	NA	NA
5	NA	2	25	NA	NA	NA	NA
6	11/25/81	1.25	22	12-22	0-12	10.5-22	0-10.5
**7	11/24/81	3	24.5	14.5-24.5	0-14.5	13.5-24.5	0-13.5
8	11/25/81	3	25	15-25	0-15	14-25	0-14
9	11/25/81	3	22.5	12.5-22.5	0-12.5	10-22.5	0-10
10	3/09/82	3	24.5	14.5-24.5	0-14.5	12-24.5	0-12
11	3/09/82	3	24.5	14.5-24.5	0-14.5	12.5-24.5	0-12.5
11B	9/01/83	4	60	50-60	0-50	45-60	0-45
12	3/09/82	3	25	15-25	0-15	12.5-25	0-12.5
13	3/08/82	3	24	14-24	0-14	11.5-24	0-11.5
17A	12/06/83	4	60	50-60	0-50	45-60	0-45
17B	12/07/83	4	25	10-25	0-10	5-25	0-5
18	12/07/83	4	25	10-25	0-10	5-25	0-5
19	12/08/83	4	25	10-25	0-10	5-25	0-5
20	12/08/83	4	25	10-25	0-10	5-25	0-5
21	12/08/83	4	25	10-25	0-10	5-25	0-5
22	12/09/83	4	25	10-25	0-10	5-25	0-5
Piezometer A	8/30/83	2	25	15-25	0-15	14-25	0-14
Piezometer B	8/31/83	2	20	10-20	0-10	7-20	0-7
Piezometer C	8/31/83	2	20	10-20	0-10	7-20	0-7

* Well 3 is damaged
** Well 7 has been abandoned
NA Not available

Source: BCM Eastern, Inc.

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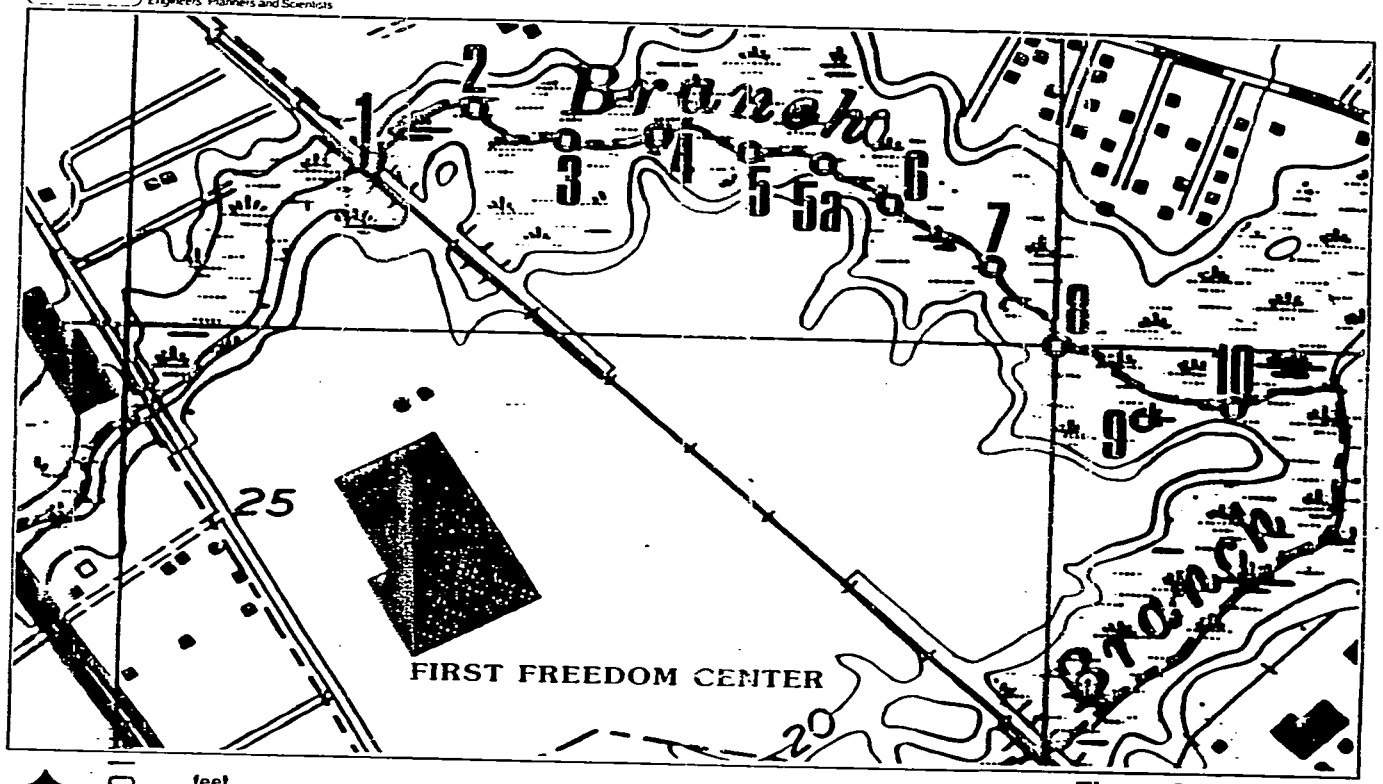

Figure 6
STREAM SAMPLING LOCATIONS
(SAMPLED 1/4/84)
FIRST FREEDOM CENT
(FORMER NCR FACILITY)

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All samples were obtained from a flowing area of the stream and were placed in laboratory-prepared bottles. The samples were returned to the BCM laboratory where they were analyzed for the 601 series of purgeable halocarbons.

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5.0 GROUNDWATER, SURFACE WATER, AND SOIL ANALYTICAL RESULTS

5.1 GROUNDWATER ANALYTICAL RESULTS

Groundwater samples taken on January 3 and 5, 1984, from 16 monitoring wells at the former NCR facility were analyzed for the 601 series of purgeable halocarbons. Results are shown in Table 4. Samples from wells 20, 8, and 12 were found to have TCE concentrations greater than 1,000 ug/l (ppb), with those from wells 9, 13, and 21 having concentrations between 100 and 1,000 ug/l. All other monitoring wells sampled had TCE concentrations less than 100 ug/l. Trans-1,2-dichloroethene was present in lesser amounts, with the highest concentrations occurring in wells 8, 20, and 21. Low concentrations of several other organic compounds also were found in some of the wells.

5.2 SURFACE WATER ANALYTICAL RESULTS

Surface water samples taken at 11 locations on Iron Branch also were analyzed for the 601 series of purgeable halocarbons (see Figure 6 for sampling locations). As shown in Table 5, sample 6 had the highest concentration of TCE with 1,400 ug/l. Samples 4, 5A, and 8 had concentrations between 100 and 1,000 ug/l, and all other samples had concentrations less than 100 ug/l. Trans-1,2-dichloroethene was present in all but one of the stream samples, but was greater than 100 ug/l in sample 5A only. Six other purgeable halocarbons were present at concentrations between the detection limit and 30 mg/l.

5.3 SOIL ANALYTICAL RESULTS

Selected soil samples from borings in the northern section of the former NCR facility were analyzed for TCE, perchloroethylene, and 1,1,1-trichloroethane. The results from these analyses, which are shown in Table 2, indicate that TCE and perchloroethylene are present in most of the samples at concentrations between 0.01 and 5.8 mg/kg (ppm). Borings BB-2, SPILL-1 and SWAMP had concentrations significantly higher than the other borings, with a range from 0.3 to 5.8 mg/kg. The perchloroethylene occurred at higher concentrations than the trichloroethene in all of the samples. The 10 to 12 foot sample in boring BB-2, which had a concentration of 0.11 mg/kg of 1,1,1-trichloroethane, was the only sample that contained this compound.

A map showing the distribution of TCE concentrations is presented as Figure 7 and a summary of the findings occurs in Section 6.0.

TABLE 4

FIRST FREEDOM CENTER (FORMER NCR FACILITY)
MILLSBORO, DELAWARE
GROUNDWATER ANALYTICAL RESULTS

Parameter	Sample No.:	Well #2 N400231	Well #4 N400232	Well #5 N400233	Well #6 N4002341	Well #8 N400235	Well #9 N400236	Well #10 N400237	Well #11 N400238	Well #11B N400239
Methylene Chloride ug/l		21.9		23.1		17.8	17.4	10.1	9.3	134
1,1 Dichloroethane ug/l		<0.1		<0.1		<0.1	<0.1	<0.1	<0.1	<0.1
Trans 1,2-Dichloroethene ug/l		3.2		1.5		125	54	1.1	8.8	<0.1
Chloroform ug/l		1.0		2.0		8.1	4.7	2.1	3.7	0.8
1,2-Dichloroethane ug/l		2.2		1.3		0.9	1.6	1.2	1.4	2.0
1,1,1-Trichloroethane ug/l		0.7	...	<0.1		1.1	0.8	0.7	1.0	<0.1
Carbon Tetrachloride ug/l		<0.1		<0.1		<0.1	<0.1	<0.1	<0.1	<0.1
Trichloroethene ug/l		11.6		2.7		1400	481	30.5	87.9	<0.1
Dibromochloroethane and/or 1,1,2-Trichloroethane and/or CIS-1,3-Dichloropropene ug/l		<0.1		<0.1		<0.1	<0.1	<0.1	<0.1	<0.1
1,1,2,2,-Tetrachloroethane and/or Tetrachloroethene ug/l		<0.1		<0.1		0.5	<0.1	<0.1	18.9	<0.1
Cyanide mg/l		<0.005	<0.005		<0.005		<0.005	<0.005	<0.005	
Chemical Oxygen Demand mg/l		48	40		8		16	16	40	
Chromium as Cr mg/l		<0.03	0.043		<0.03		0.34	0.043	0.14	
Hexavalent Chromium as Cr mg/l		0.01	0.043		0.01		0.34	0.043	0.14	
Chloride mg/l		5.86	5.46		8.24		8.83	4.57	5.46	
Dissolved Solids mg/l		125	115		52		117	55	47	
Specific Conductance (umhos)		117	141	112	93		160	95	95	
pH (standard units) mg/l		5.4	6.0	5.7	5.6		5.2	5.6	5.2	

TABLE 4 (Cont'd)

Parameter	Sample No.:	Well #12 N400240	Well #13 N400241	Well #17A N400242	Well #17B N400243	Well #18 N400244	Well #19 N400245	Well #20 N400246	Well #21 N400247	Well #22 N400248
Methylene Chloride ug/l		8.0	<0.1	1.1	5.3	49.0	14.0	5.7	5.8	<0.1
1,1-Dichloroethane ug/l		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1.6	<0.1
Trans 1,2-Dichloroethene ug/l		69.6	1.5	3.3	<0.1	<0.1	<0.1	900	711	<0.1
Chloroform ug/l		1.7	<0.1	4.0	10.5	<0.1	<0.1	34.9	<0.1	<0.1
1,2-Dichloroethane ug/l		2.3	<0.1	0.1	1.1	1.0	1.2	1.1	0.8	1.1
1,1,1-Trichloroethane ug/l		0.3	<0.1	1.3	<0.1	<0.1	<0.1	0.6	<0.1	0.3
Carbon Tetrachloride ug/l		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	4.3	<0.1	<0.1
Trichloroethene ug/l		1400	125	1.0	17.2	12.6	38.8	115,000	222	10.3
Dibromochloroethane and/or 1,1,2-Trichloroethane and/or CIS-1,3-Dichloropropene ug/l		0.4	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
1,1,2,2,-Tetrachloroethane and/or Tetrachloroethene ug/l		6.8	<0.1	<0.1	<0.1	<0.1	<0.1	90.9	25.5	<0.1
Cyanide mg/l		0.076		<0.005	<0.005			<0.005		
Chemical Oxygen Demand mg/l				16	8			56		
Chromium as Cr		<0.03		<0.03	<0.03			<0.03		
Hexavalent Chromium as Cr mg/l		0.03								
Chloride mg/l										
Dissolved Solids mg/l										
Specific Conductance (umhos)		102								
pH (standard units) mg/l		5.5								

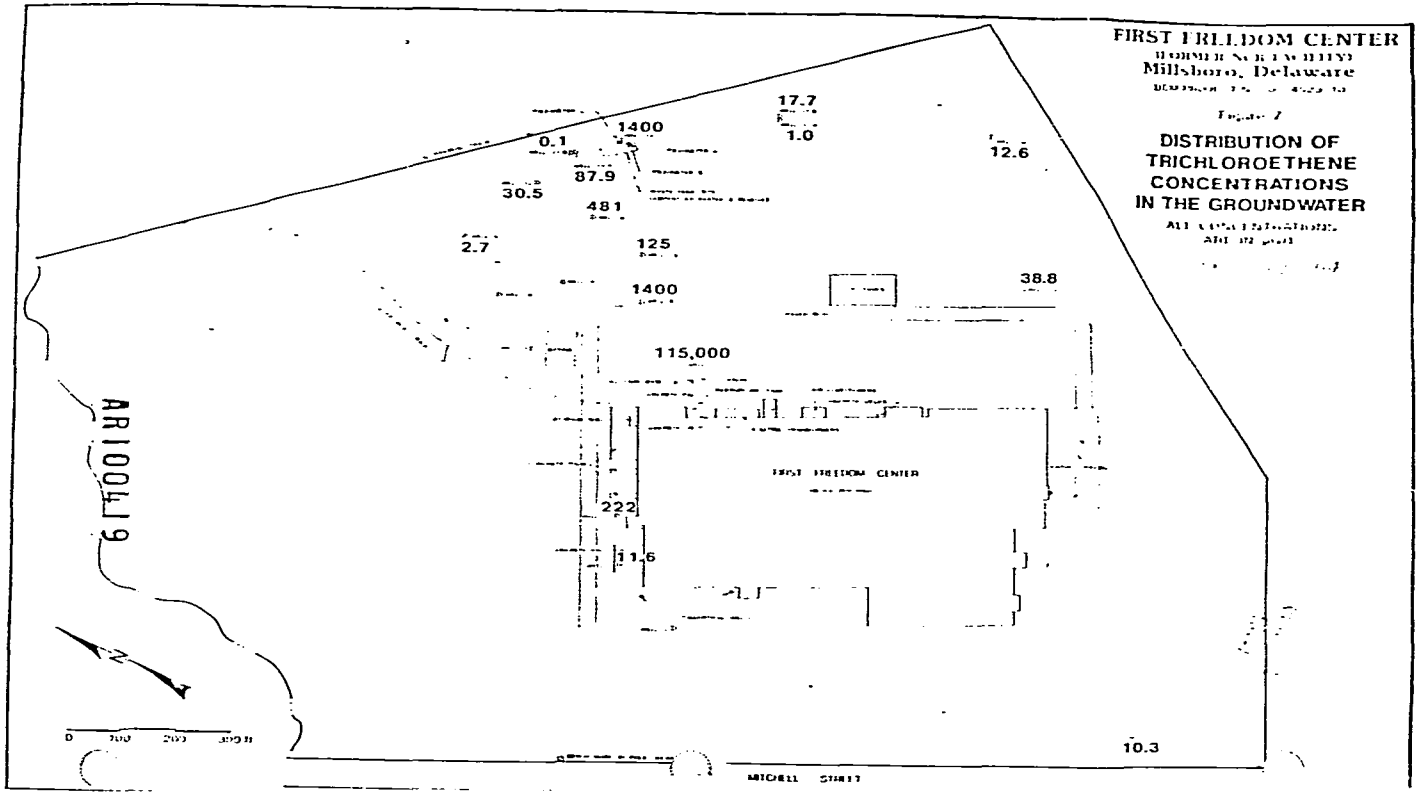
Sampled 1/3 - 1/5/84
Source: BCM Eastern, Inc.

TABLE 5

FIRST FREEDOM CENTER (FORMER NCR FACILITY)
MILLSBORO, DELAWARE
IRON BRANCH ANALYTICAL RESULTS

Parameter* Sample No.:	Stream 1 N400249	Stream 2 N400250	Stream 3 N400251	Stream 4 N400252	Stream 5 N400253	Stream 5A N400254	Stream 6 N400255	Stream 7 N400256	Stream 8 N400257	Stream 9 N400258	Stream 10 N400259	Trip Blank N400260
Methylene Chloride	8.8	<0.1	28.9	1.6	1.4	1.4	1.8	2.8	3.6	4.2	6.2	13.6
Vinyl Chloride	<0.1	<0.1	<0.1	<0.1	<0.1	1.3	<0.1	<0.1	<0.1	0.1	<0.1	<0.1
Trans 1,2-Dichloroethene	<0.1	5.3	4.5	31.2	1.0	103.	26.8	16.8	2.6	2.0	1.9	<0.1
Chloroform	0.2	<0.1	1.2	<0.1	0.1	1.8	0.5	<0.1	<0.1	<0.1	<0.1	<0.1
1,2-Dichloroethane	1.0	1.2	1.3	1.2	1.1	1.4	1.2	1.1	1.1	1.1	0.8	1.1
1,1,1-Trichloroethane	<0.1	<0.1	18.0	-- 0.5	<0.1	0.4	<0.1	<0.1	<0.5	<0.1	0.5	<0.1
Trichloroethene	3.6	3.3	2.8	482	25.3	886.	1400.	61.5	101	78.4	74.4	0.8
Tetrachloroethene	<0.1	0.7	<0.1	<0.1	<0.1	<0.1	<0.1	2.3	<0.1	<0.1	<0.1	<0.1

Sampled 1/4/84
* All results shown in ug/l
Source: BCM Eastern Inc.


BCM
FIRST FREEDOM CENTER
Millsboro, Delaware
DISTRIBUTION OF
TRICHLOROETHENE
CONCENTRATIONS
IN THE GROUNDWATER
17.7
1.0
1400
0.1
12.6
87.9
30.5
481
2.7
125
1400
38.8
115,000
FIRST FREEDOM CENTER
222
11.6
10.3
AR 00419
MITCHELL STREET

BCM

6.0 SUMMARY OF FINDINGS

1. Elevated TCE concentrations have been detected in the groundwater beneath the northwest corner of the former NCR (now Freedom Center) Millsboro property. The highest concentrations occur along a linear zone which trends approximately northeast-southwest and appears to originate at the northeast corner of the building.

2. Elevated TCE concentrations have also been detected in Iron Branch, a tributary to Indian River, northeast of the property.

3. The groundwater flow direction at the site is to the northeast towards Iron Branch.

4. Several homes, which use private wells as a source of drinking water, are located on the opposite side of Iron Branch from the property.

5. The pattern of TCE concentrations in Iron Branch indicates that the stream is a linear discharge zone for TCE-bearing groundwater. Data from the existing monitoring wells do not enable a determination whether any TCE-bearing groundwater flows under Iron Branch for eventual discharge into the Indian River.

6. The precise source of the TCE has not yet been located, but the highest groundwater TCE concentration (115,000 ug/l) was detected in monitoring well 20, located 100 feet downgradient from the former site of an above-ground TCE storage tank.

7. Soil probing and a review of plant records could not locate any subsurface TCE storage tanks at the northeast corner of the building. A subsurface tank at the northwest corner of the building was used to store waste cutting oil which also contained TCE. Monitoring immediately downgradient from this tank revealed TCE, but not at levels associated with the plume to the northeast.

8. The elevated TCE concentrations are not related to the elevated chromium concentrations detected in some of the onsite monitoring wells.

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7.0 CONCLUSIONS AND RECOMMENDATIONS

The investigations completed to date have defined the plume's sides and have located the general area of its source. The data also indicate that:

1. There is most likely one discontinued contamination source.

2. A portion of the shallow (recharge) aquifer is contaminated with TCE but the extent, if any, of deeper aquifer contamination is not known.

3. The contaminated plume is moving in a Northeasterly direction at a rate of approximately 1.2 ft/day and appears to be discharging into Iron Branch Creek.

Since the depth of the plume and its precise source have yet to be determined, the potential environmental impact of the TCE cannot be fully assessed. Due to this uncertainty, an additional investigatory phase will be implemented to determine the following:

1. The contaminant source.

2. The vertical extent of TCE migration.

3. The concentration profile of the TCE plume in order to verify the observed data and to estimate the temporal characteristics of the plume.

4. The migration and discharge pattern of the TCE plume.

5. Once this investigation phase has been completed, the data will be analyzed to determine appropriate management actions.

BCM

8.0 REFERENCES

Jordan, R.R. 1962. Stratigraphy of the Sedimentary Rocks of Delaware: Delaware Geological Survey, Bulletin 9, p.51.

Sundstrom, R.W., and Pickett, T.E. 1969. The Availability of Groundwater in Eastern Sussex County, Delaware: Water Resources Center, University of Delaware.

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APPENDIX A

WELL LOGS

Betz·Converse·Murdoch·Inc. BCM

ORIGINAL (Red)

Drilling Log

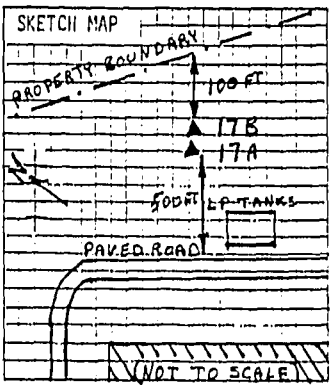
Well Number 17A

Client NCR Millsboro, Delaware — Project No. 00-4529-10
Well Location North corner of baseball field
Driller/Company Ed Kelley & Calvin Wallace/Delmarva Drilling Co.
Drilling Method Mud rotary — Hole Diameter 8 3/4" — Date(s) Drilled 12/5/83
Sample Type split spoons — Sample Interval 5' — No. Samples Retained 11
Surface Elevation 22.96 — Casing Top Elevation 24.48 Steel — Total Well Depth 60'
Casing Material and Size 4" ID Sch 40 PVC — Cased Interval(s) 0 - 50'
Grouting Type Portland Cement — Grouted Interval 0 - 44'
Screening Material and Size 4" ID Sch 40 .016" slotted PVC — Screened Interval(s) 50 - 60'
Packing Material and Size Coarse grained silica sand — Packed Interval 45 - 60'
Depth to Static Water 16.42' PVC — Date 1/5/84 — Approx Well Yield 30 gpm
Development Method Compressed air — Development Time 2 hours
Logged by: ~~Richard E. Sacks~~

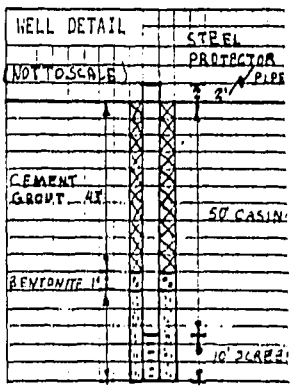
Comments The water used in the drilling process was chlorinated.

Quik-gel was used after 20'

SKETCH MAP



WELL DETAIL (NOT TO SCALE)



Depth Scale	Sample	Spoon Blows	Description of Materials
0' - 4.5'	5'	50/6" 50/6"	Tan, fine to medium grained SAND
4.5' - 8'	10'	48/6" 50/6"	Tan-grey sandy CLAY; sand is fine - medium grained
8' - 19'	15'	95/6" 44/6"	Tan, fine - medium grained SAND with some coarse sand and fine gravel
	20'	50/12" 70/3"	
19' - 25'			Tan, slightly clayey, fine - coarse SAND and fine gravel
	25'	50/5" 50/6"	
25' - 35'	30'	48/12"	Tan, medium to coarse grained SAND and fine gravel
35' - 49'	31'	80/10"	Orange-tan, medium - coarse grained, slightly silty SAND and fine gravel
	35'	40/6"	
49' - 50'			Orange-tan, medium grained, slightly silty SAND
	40'	78/6"	
55' - 99'			Orange-tan, medium - coarse grained, slightly silty SA
	45'	NS	
59' - 65'	50'	80/3"	Orange, fine grained GRAVEL with some orange-tan,
	55'	NS	medium - coarse grained sand
65' - 70'	60'	83/6"	Orange-tan, coarse grained SAND
70'			End of hole

AR100424

Betz·Converse·Murdoch·Inc. BCM

ORIGINAL (Red)

Drilling Log

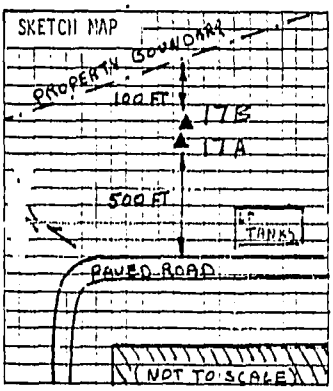
Well Number 17B

Client NCR Millsboro, Delaware — Project No. 00-4529-10
Well Location North corner of baseball field
Driller/Company Ed Kelley & Calvin Wallace/Delmarva Drilling Co.
Drilling Method Mud rotary — Hole Diameter 8 3/4" — Date(s) Drilled 12/7/83
Sample Type Cuttings — Sample Interval Continuous — No. Samples Retained None
Surface Elevation 22.81' — Casing Top Elevation 24.85' steel — Total Well Depth 25'
Casing Material and Size 4" ID Sch 40 .016"slotted PVC — Cased Interval(s) 0 - 10'
Grouting Type Portland Cement — Grouted Interval 0 - 5'
Screening Material and Size 4" ID Sch 40 .016slotted PVC — Screened Interval(s) 10 - 25'
Packing Material and Size Coarse silica sand — Packed Interval 5 - 25'
Depth to Static Water 16.33' PVC — Date 1/5/84 — Approx Well Yield 20 gpm
Development Method Compressed air — Development Time 1 hour
Logged by: P.A. Coppock

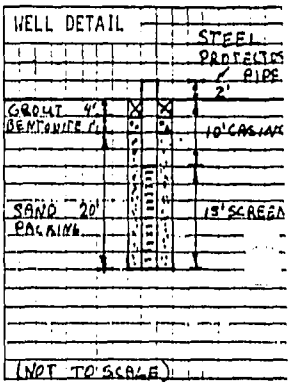
Comments No drilling mud used

Quik-gel used only for bentonite seal

SKETCH MAP



WELL DETAIL



Depth Scale	Sample	Spoon Blows	Description of Materials
0 - 5'			Tan, fine-medium grained SAND, some grey clay
5 - 10'			Tan-yellow, medium-coarse grained SAND
10 - 20'			Tan, medium-coarse grained SAND with fine gravel
20 - 25'			Tan-orange, medium-coarse SAND with fine gravel
25'			End of hole

AR100425

Betz·Converse·Murdoch·Inc. BCM

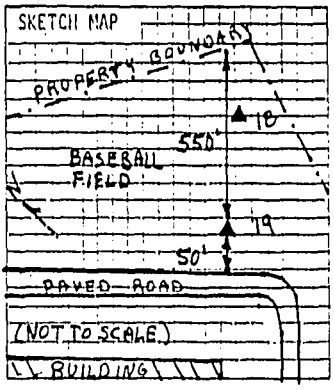
Drilling Log

Well Number 18

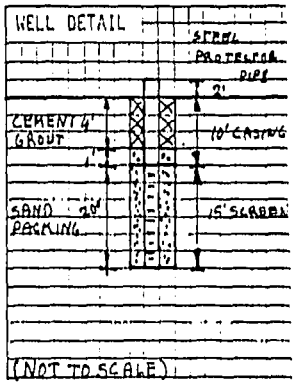
Client NCR Millsboro, Delaware — Project No. 00-4529-10
Well Location East corner of NCR property, south of baseball field
Driller/Company Ed Kelley & Calvin Wallace/Delmarva Drilling Co.
Drilling Method Mud rotary — Hole Diameter 8-3/4" — Date(s) Drilled 12/7/83
Sample Type split spoon — Sample Interval 5' — No. Samples Retained 4
Surface Elevation 22.32' — Casing Top Elevation 24.53' steel — Total Well Depth 25'
Casing Material and Size 4" ID Sch 40 PVC — Cased Interval(s) 0 - 10'
Grouting Type Portland cement — Grouted Interval 0 - 5'
Screening Material and Size 4" ID Sch 40 .016slotted PVC — Screened Interval(s) 10 - 25'
Packing Material and Size Coarse grained, silica sand — Packed Interval 5 - 25'
Depth to Static Water 15.67' PVC — Date 1/5/84 — Approx Well Yield 20 gpm
Development Method Compressed air — Development Time 1 hour
Logged by: P.A. Coppock

Comments Drilling mud was not necessary

SKETCH MAP



WELL DETAIL



Depth Scale	Sample	Spoon Blows	Description of Materials
0 - 5'	5'	40/6"	Tan, fine to medium grained, slightly silty SAND
	10'	48/8"	
5 - 9'			Black and grey CLAY with a trace of fine gravel
	15'	60/6"	
9 - 11'	20'	NS	Tan, fine to medium grained, slightly silty SAND
	25'	80/3"	
11 - 20'			Orange-tan, medium to coarse grained SAND with a trace of grey, fine grained gravel
20 - 25'			Tan, medium to coarse grained SAND
25'			End of hole

AR100426

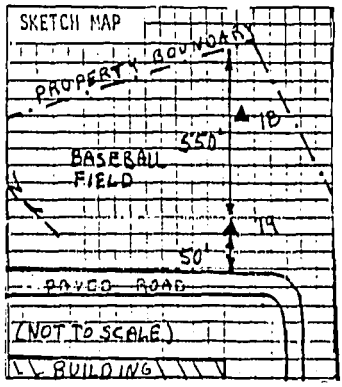
Betz·Converse·Murdoch·Inc. BCM

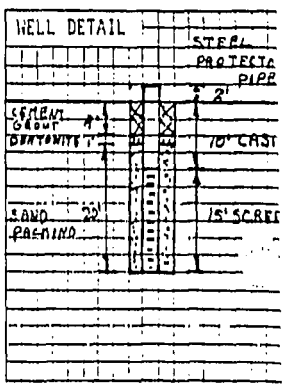
Drilling Log

Well Number 19

Client NCR Millsboro, Delaware
Project No. 00-4529-10
Well Location Southeast corner of building across road
Driller/Company Ed Kelley & Calvin Wallace/Delmarva Drilling Co.
Drilling Method Mud rotary Hole Diameter 8 3/4" Date(s) Drilled 12/7-8/83
Sample Type Split spoons Sample Interval 5' No. Samples Retained 5
Surface Elevation 22.39' Casing Top Elevation 24.35' steel Total Well Depth 25'
Casing Material and Size 4" ID Sch 40 PVC Cased Interval(s) 0 - 10'
Grouting Type Portland cement Grouted Interval 0 - 5'
Screening Material and Size 4" ID Sch 40 .016" slotted PVC Screened Interval(s) 10 - 25'
Packing Material and Size Coarse grained, silica sand Packed Interval 5 - 25'
Depth to Static Water 14.79' PVC Date 1/4/84 Approx Well Yield 20 gpm
Development Method Compressed air Development Time 1hour
Logged by: P. A. Coppock

Comments Drilling mud was not necessary





Depth Scale	Sample	Spoon Blows	Description of Materials
0 - 3'	5'	20/12"	Yellowish tan, fine to medium grained, silty SAND
	10'	53/9"	
3 - 9'			Grey CLAY
	15'	63/9"	
9 - 12'			Grey CLAY with a trace of fine sand
	20'	55/5"	
12 - 15			Yellowish tan, fine to medium grained silty
	25'	43/6"	SAND interbedded with gray sandy CLAY (one at 15' clay at the top and sand at the bottom)
15 - 20'			Yellowish tan, medium to coarse grained SAND with fine gravel
20 - 22'			White, medium to coarse grained SAND; matrix is milky whi
22 - 25'			Tan, medium to coarse grained SAND with a trace of fine gravel
25'			End of hole

AR100427

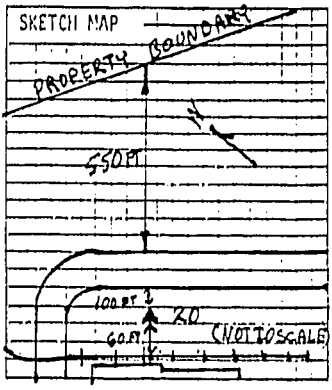
Betz·Converse·Murdoch·Inc. BCM

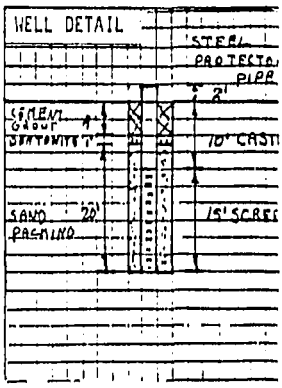
Drilling Log

Well Number 20

Client NCR Millsboro, Delaware — Project No. 00-4529-10
Well Location 50' east of building near maintenance entrance
Driller/Company Ed Kelley & Calvin Wallace/Delmarva Drilling Co.
Drilling Method Mud rotary — Hole Diameter 6 3/4" — Date(s) Drilled 12/8/83
Sample Type Split spoons — Sample Interval 5' — No. Samples Retained 6
Surface Elevation 21.37' — Casing Top Elevation 25.70' steel — Total Well Depth 25'
Casing Material and Size 4" ID Sch 40 PVC — Cased Interval(s) 0 - 10'
Grouting Type Portland cement — Grouted Interval 0 - 5'
Screening Material and Size 4" ID Sch 40.016 slotted PVC — Screened Interval(s) 10 - 25'
Packing Material and Size Coarse grained, silica sand — Packed Interval 5 - 25'
Depth to Static Water 13.75' PVC — Date 1/5/84 — Approx Well Yield 5 gpm
Development Method Compressed air — Development Time 1.5 hr.
Logged by: P.A. Coppock

Comments Drilling mud was not necessary





Depth Scale	Sample	Spoon Blows	Description of Materials
0 - 5	5'	61/12"	Tan, brown, grey, fine to medium grained, silty SAND
	10'	34/6"	
5 - 12'			Tan, brown, white, medium - coarse grained silty SAND
	15'	30/6"	Colors are interbedded.
12 - 18'	20'	24/6"	White-gray, fine grained SAND with black grains. Tan
			fine to medium SAND interbedded with the grey to
	25'	21/12"	white sand
18 - 23'			White to gray, fine to medium grained SAND
23 - 25'			White to gray, fine grained, clayey SAND with a trace
			fine to medium grained GRAVEL
25'			End of hole

AR100428

Betz·Converse·Murdoch·Inc. BCM

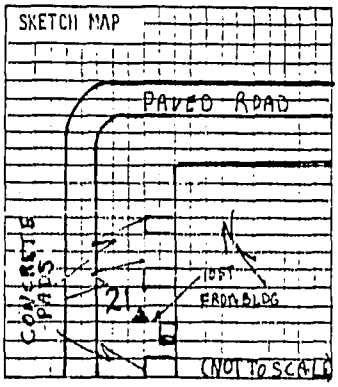
Drilling Log

Well Number 21

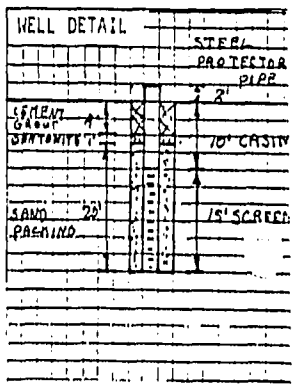
Client NCR Millsboro, Delaware — Project No. 00-4529-10
Well Location North side of building
Driller/Company Ed Kelley & Calvin Wallace/Delmarva Drilling Co.
Drilling Method Mud rotary — Hole Diameter 8 3/4" — Date(s) Drilled 12/8/83
Sample Type Split spoons — Sample Interval 5' — No. Samples Retained 5
Surface Elevation 21.01' — Casing Top Elevation 82.95' Steel — Total Well Depth 25'
Casing Material and Size 4" ID Sch 40 PVC — Cased Interval(s) 0 - 10'
Grouting Type Portland cement — Grouted Interval 0 - 5'
Screening Material and Size 4" ID Sch 40 .016" slotted PVC — Screened Interval(s) 10 - 25'
Packing Material and Size Coarse grained, silica sand — Packed Interval 5 - 25'
Depth to Static Water 11.11' PVC — Date 1/5/84 — Approx Well Yield 30 gpm
Development Method Compressed air — Development Time 1 hour
Logged by: P.A. Coppock

Comments

SKETCH MAP



WELL DETAIL



Depth Scale	Sample	Spoon Blows	Description of Materials
0 - 5'	5'	31/6"	Tan-brown, fine grained, silty SAND and grey, medium grained, clayey SAND
	10'	25/12"	
5 - 25'			Tan-grey, fine-medium-coarse grained, silty SAND
	15'	21/3 31/6"	and fine grained GRAVEL
23 - 25'	20'	86/6"	Tan-grey, fine-medium-coarse grained SAND interbedded
	25'	35/8"	with tan-gray, sandy CLAY
25'			End of hole

AR100429

Betz·Converse·Murdoch·Inc. BCM

ORIGINAL (Red)

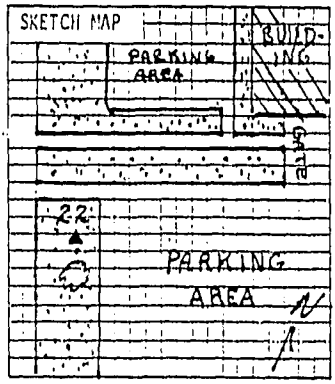
Drilling Log

Well Number 22

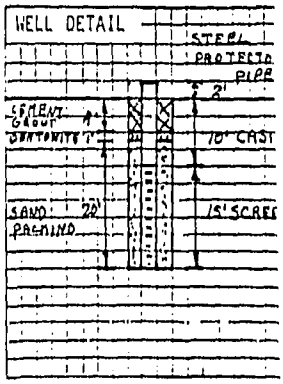
Client NCR Millsboro, Delaware — Project No. 00-4529-10
Well Location Front lawn - south-west of building
Driller/Company Ed Kelley & Calvin Wallace, Delmarva Drilling Co.
Drilling Method Mud rotary — Hole Diameter 8 3/4" — Date(s) Drilled 12/9/83
Sample Type Split spoons — Sample Interval 5' — No. Samples Retained 5
Surface Elevation 24.39' — Casing Top Elevation 26.39' steel — Total Well Depth 25'
Casing Material and Size 4" ID Sch 40 PVC — Cased Interval(s) 0 - 10'
Grouting Type Portland cement — Grouted Interval 0 - 5'
Screening Material and Size 4" ID Sch 40 .016 slotted PVC — Screened Interval(s) 10 - 25'
Packing Material and Size Coarse grained, silica sand — Packed Interval 5 - 25'
Depth to Static Water 13.33' PVC — Date 1/5/84 — Approx Well Yield 20 gpm
Development Method Compressed air — Development Time 1 hour
Logged by: P.A. Coppock

Comments

SKETCH MAP



WELL DETAIL



Depth Scale	Sample	Spoon Blows	Description of Materials
0 - 2.5'	5'	21/6"	Grey-tan, fine to medium grained SAND
2.5 - 8'	10'	30/6"	Grey-tan, sandy CLAY
8 - 23'	15'	49/9"	Grey-tan, medium to coarse grained, silty SAND with traces of fine grained gravel
23 - 24'	20'	61/9"	Grey-tan, medium to coarse grained SAND with fine-medium grained gravel
	25'	41/9"	
24 - 25'			Grey-tan, medium to coarse SAND with a trace of fine grained gravel
25'			End of hole

AR100430

BCM

APPENDIX B

SAMPLING PROTOCOL

SAMPLING PROTOCOL

ORIGINAL (Red)

Samples were obtained from the monitoring wells using the following protocol:

1. Static water level in the well was measured using an electric well probe and tape measure.

2. The volume of standing water contained in the well was calculated.

3. If well yield permitted, five times the volume of water contained in the well was pumped with a gasoline-powered suction pump. Otherwise, the well was pumped dry three times.

4. The bailer used for obtaining the sample was cleaned using the following procedures:

   a. Washed with soap and water and rinsed with distilled, deionized water.

   b. Washed with a 50 percent methanol and 50 percent distilled, deionized water solution.

   c. Washed with distilled, deionized water.

5. The first bail of sample retrieved from the well was discarded.

6. The sample was placed in an appropriate laboratory prepared sample container.

7. The sample containers were then rinsed, labelled and placed in a chilled environment for shipment to the BCM laboratory.

This process was repeated for each well sampled.

ORIGINAL
(Red)

APPENDIX D

April 1984

Excavated Sludge Disposal Site Post Closure Monitoring & Groundwater Quality Assessment

for

NCR Corporation
former facility - Millsboro Delaware
(First Freedom Center)

BCM
Engineers Planners and Scientists
One Plymouth Meeting • Plymouth Meeting, PA 19462 • Phone: (215) 825-3800

EXCAVATED SLUDGE DISPOSAL SITE
POSTCLOSURE MONITORING AND GROUNDWATER QUALITY ASSESSMENT

FOR (Final)

NCR CORPORATION

APRIL 1984

PREPARED BY:

RICHARD E. SACKS, GEOLOGIST

REVIEWED BY:

ROBERT D. BULLER
DELAWARE REGISTRATION NO. 306

ALAN M. ROBINSON
SECTION MANAGER

APPROVED BY:

RICHARD J. GRZYWINSKI, P.E.
VICE PRESIDENT

BCM EASTERN INC.
ONE PLYMOUTH MEETING MALL
PLYMOUTH MEETING, PENNSYLVANIA 19462

BCM

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1.0 EXECUTIVE SUMMARY 1

2.0 INTRODUCTION AND BACKGROUND 2

3.0 DISCUSSION OF GROUNDWATER MONITORING ANALYTICAL DATA 4

4.0 SUMMARY OF FINDINGS AND RECOMMENDATIONS 8

FIGURES

Figure 1 Monitoring Well Locations 3

TABLES

Table 1 Summary of Groundwater Monitoring Analytical Data
Table 2 Static Water Elevations

BCM

ORIGINAL
(RED)

1.0 EXECUTIVE SUMMARY

The NCR Corporation (NCR) operated a manufacturing plant in Millsboro, Delaware until November 1981, at which time the property was sold to the First National Bank of Maryland. BCM Eastern Inc. (BCM) was retained by NCR to conduct routine quarterly groundwater monitoring as part of a plating waste disposal site closure. The quarterly groundwater monitoring was initiated by BCM in November 1981 and has continued to the present.

During early monitoring, hexavalent and total chromium levels were found to exceed the Delaware State drinking water standard of 0.05 mg/l in four wells (4, 9, 10, 11A). More recent data indicates that the chromium concentrations have either stabilized or decreased in all of the wells and that the drinking water standard is now exceeded in only two of the wells (9, 11A).

Based upon this information it is recommended that quarterly monitoring continue in four (4, 9, 10, 11A) of the eight wells currently monitored and that the parameter list be reduced to total chromium, chloride, pH, and specific conductance.

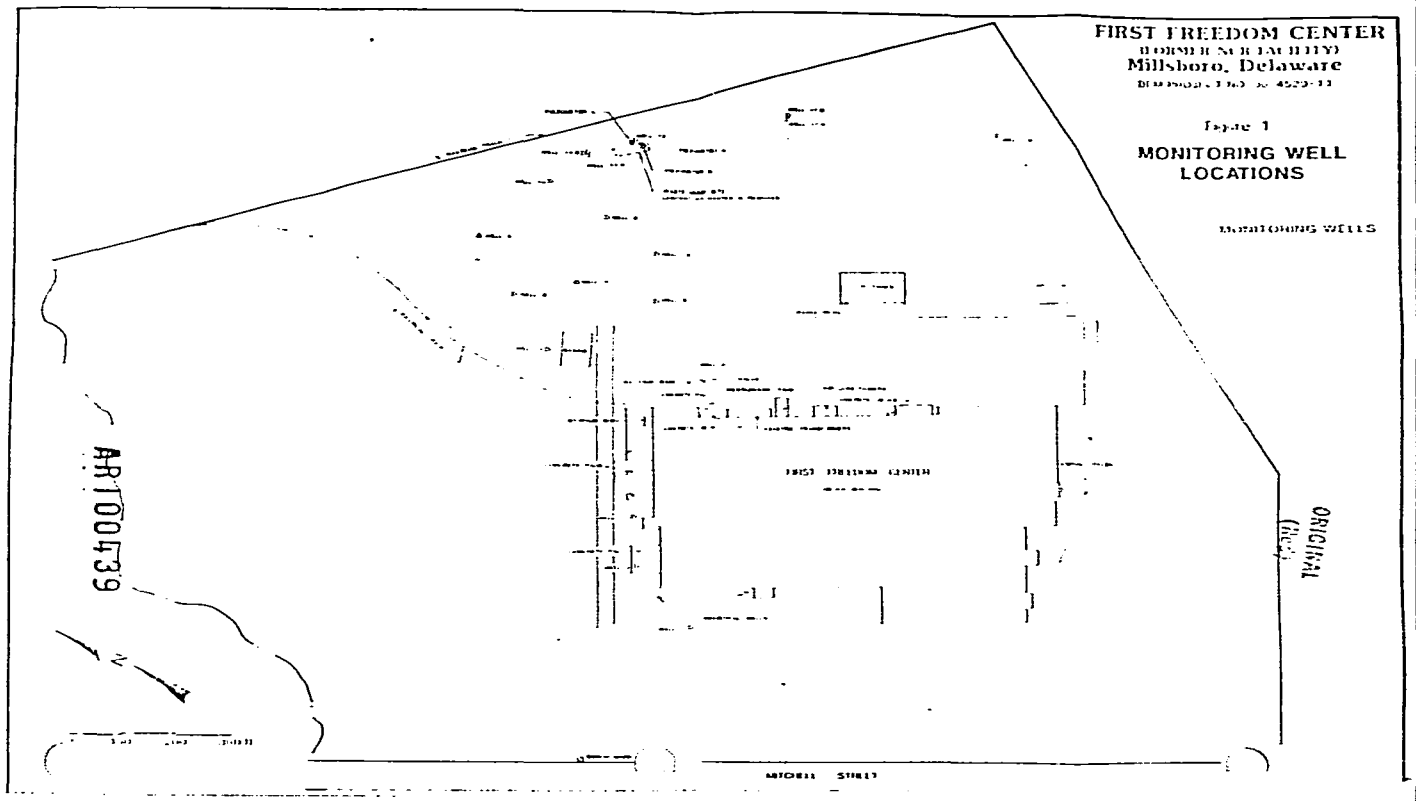
BCM

2.0 INTRODUCTION AND BACKGROUND

The NCR Corporation (NCR) operated a manufacturing plant in Millsboro, Delaware until November 1981, at which time the property was sold to the First National Bank of Maryland and converted to its present use (First Freedom Center).

A plating process which was part of the NCR operation produced a chromium-bearing wastewater which was treated onsite near the northeast corner of the plant. Sludge produced by this treatment was disposed of in an unlined pit near the center of the northeastern property line (Figure 1). This material was subsequently excavated and removed under BCM's direction as documented in the October 1981 Engineer's Certification of RCRA Closure Plan and the October 1981 Hazardous Waste Investigation Report both prepared by BCM.

In order to comply with post-closure requirements, groundwater monitoring wells were installed to assess the groundwater quality near the wastewater treatment and sludge disposal areas. On behalf of NCR, BCM initiated a quarterly groundwater monitoring program in November 1981 which has continued to the present (analytical data is presented in Table 1). This report provides a summary of the results of that monitoring program.


FIRST FREEDOM CENTER
Millsboro, Delaware
Figure 1
MONITORING WELL LOCATIONS
MONITORING WELLS
ORIGINAL
AR100439

BCM

3.0 DISCUSSION OF GROUNDWATER MONITORING ANALYTICAL DATA

The groundwater monitoring data indicates that, aside from chromium concentrations slightly above the drinking water standard of 0.05 mg/l in wells 4, 9, 10 and 11A, the site groundwater has not been impacted by the excavated sludge disposal site. Trichloroethylene (TCE) detected in the groundwater is unrelated to the sludge disposal site and is addressed in a separate report by BCM entitled "Groundwater Quality Investigation and Groundwater Quality Management Plan Interim Report," dated April 1984.

A summary of the analytical data collected by BCM during the groundwater monitoring program from November 1981 through March 1984 is presented in Table 1. The data is discussed by parameter in the following paragraphs.

Chromium, Total

The total chromium levels slightly exceeded the Delaware State primary drinking water standard of 0.05 mg/l in wells 4, 9, 10 and 11A during much of the completed phase of groundwater monitoring (Figure 4). The maximum concentrations detected in these wells were 0.26, 0.49, 0.19 and 0.78 mg/l respectively. However, concentrations in wells 4 and 10 have been below the drinking water standard in the more recent samplings and all of the wells show a generally stable or decreasing trend with time. The decreases in the chromium concentrations from the maximum levels to the most recent levels were 0.24, 0.15, 0.15, and 0.66 mg/l for wells 4, 9, 10 and 11A respectively. Very low concentrations of total chromium were detected in wells 2, 5, 6, 7, 12 and 13 (maximum levels 0.02, 0.01, 0.02, 0.01, 0.028, and 0.002 mg/l, respectively), and none was detected in wells 1, 3, 8, 11B, 17A, 17B, and 20, illustrating the limited areal extent of the elevated chromium concentrations.

Chromium, Hexavalent

Hexavalent chromium concentrations slightly exceeded the Delaware State primary drinking water standard in four of the monitoring wells for at least a portion of the time since monitoring began. These wells, 4, 9, 10 and 11A, had maximum concentrations of 0.149, 0.43, 0.123, and 0.658 mg/l respectively. Hexavalent chromium concentrations generally exhibited the same patterns and trends as the total chromium.

Lead

The highest lead concentration detected in the groundwater was 0.034 mg/l in well 10. This level, which is below the Delaware State primary drinking water standard of 0.05 mg/l, occurred in the June 30, 1982 sampling. Since that time, the lead concentration has not exceeded 0.004 mg/l in well 10. Lead concentrations were less than 0.01 mg/l in all of the other wells.

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Cadmium

Groundwater samples were analyzed once for cadmium in May 1983. No cadmium was detected in any of the samples (detection limit 0.005 mg/l).

Mercury

Groundwater samples were analyzed once for mercury in May 1983. Mercury was either not detected or was below the Delaware State primary drinking water standard of 0.002 mg/l in all of the wells. The maximum concentration detected was 0.0012 mg/l in well 11A, with concentrations of either 0.0009 mg/l or below in the other wells.

Chloride

Chloride levels were all below the Delaware State secondary drinking water standard of 250 mg/l. The highest concentration detected, 64.7 mg/l, occurred in well 2 in the May 12, 1983 sampling. Since that time the chloride concentration has not exceeded 7.4 mg/l in that well. Chloride levels were below 20 mg/l in the other wells.

Nitrate as N

Groundwater samples were analyzed twice for nitrate, in March 1982 and May 1983. Nitrate levels did not exceed the Delaware State secondary drinking water standard of 10 mg/l in any of the wells. The highest concentration detected, 7.35 mg/l, occurred in well 12. The average nitrate concentration for all of the wells tested was 3.91 mg/l.

Ammonia

Groundwater samples were analyzed once for ammonia in May 1983. The sample from well 2, which had a concentration of 0.139 mg/l, was the only one in which ammonia was detected (detection limit 0.05 mg/l).

Cyanide

Groundwater samples were analyzed once for cyanide in January 1984. None was detected in any of the wells except well 12, which contained 0.076 mg/l (detection limit 0.005 mg/l).

Nickel

Groundwater samples were analyzed for nickel once in May 1983. No nickel was detected in any of the wells tested (detection limit 0.1 mg/l).

Iron

Groundwater samples were analyzed for iron once in March 1982. Well 7, which had an iron concentration of 2.63 mg/l was the only well which exceeded the Delaware State secondary drinking water standard of 0.3 mg/l. Concentrations in the other wells were all below 0.08 mg/l.

Manganese

Groundwater samples were analyzed for manganese once in March 1982. Manganese concentrations exceeded the Delaware State secondary drinking water standard of 0.05 mg/l in wells 2 and 13 with 0.110 and 0.126 mg/l respectively. All of the other wells had concentrations at or below 0.032 mg/l.

Zinc

Groundwater samples were analyzed for zinc once in May 1983. All of the wells were below the Delaware State secondary drinking water standard of 5.0 mg/l for zinc. The maximum concentration detected, 0.151 mg/l, occurred in well 4. Wells 2, 10, 11A and 12 also had low levels of zinc, with 0.030, 0.120, 0.007 and 0.120 mg/l respectively. No zinc was detected in wells 1 and 9.

pH

The pH in the wells tested ranges from 4.5 to 6.9 indicating slightly acidic to neutral conditions. There is no discernible trend to the pH values, which are relatively constant, with only a slight, apparently random variation.

Specific Conductance

The specific conductance was consistently highest in well 9 with a maximum value of 260 umhos. Six of the eight monitoring wells tested (4, 5, 9, 10, 11, 12) show decreases in specific conductance with the other two wells (2, 6) remaining fairly constant. The values from all of the wells are within the normal range for groundwater. Trends in specific conductance values show a general correlation with the chromium concentrations.

Chemical Oxygen Demand (COD)

The COD has typically been highest in wells 2 and 6, reaching maximum values of 350 mg/l and 540 mg/l respectively. All of the other wells have COD concentrations less than or equal to 100 mg/l. All of the wells exhibit either decreasing or stable COD levels, with the lowest values occurring in the March 7, 1984 sampling where none exceeded 12 mg/l. There does not appear to be a relationship between the COD levels and the chromium concentrations.

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Total Dissolved Solids (TDS)

TDS levels were highest in well 6 with a maximum value of 688 mg/l. The majority of the TDS levels in the other wells were below 200 mg/l. Several of the wells (4, 6, 10, 11A) exhibit a generally decreasing pattern of TDS levels, while others (2, 9) show an apparently random variation. There is apparently a slight, if any, relationship between the TDS and chromium concentrations.

BCM

4.0 SUMMARY OF FINDINGS AND RECOMMENDATIONS

Post-closure groundwater monitoring analytical results indicate that chromium concentrations at the former NCR facility are decreasing and that the other parameters currently included in the monitoring program, occur either at low levels or not at all.

Based on these results, BCM proposes that quarterly groundwater quality monitoring continue for four of the eight wells currently monitored (4, 9, 10, and 11A). Additionally, we recommend that the parameter list be reduced to total chromium, chloride, pH, and specific conductance. We believe that this program will satisfactorily monitor the gradual decline of chromium in the groundwater beneath the facility.

BCM

TABLES

TABLE 1A

FIRST FREEDOM (FORMERLY NCR) FACILITY
MILLSBORO, DELAWARE
SUMMARY OF GROUNDWATER MONITORING ANALYTICAL DATA
(Wells 1 through 6)

Parameter	Sample Date	Well 1	Well 2	Well 3 *	Well 4 *	Well 5	Well 6	Interim National Primary Drinking Water Standards
Groundwater Elevations (feet above sea level)	11/28/81	9.61	9.59	7.94	7.57	7.23	5.00	
	3/11/82	---	---	---	---	---	---	
	6/30/82	10.69	10.20	8.75	8.45	7.39	8.63	
	9/21/82	9.93	9.32	7.92	7.68	6.69	6.86	
	12/15/82	10.36	9.62	8.32	8.18	7.29	8.33	
	3/23/83	12.88	12.16	11.05	10.74	10.31	11.86	
	5/12/83	13.5	13.07	---	11.57	10.64	11.33	
	8/30/83	11.06	10.49	---	9.20	9.10	9.58	
	1/4/84	11.50	10.74	---	9.32	9.27	9.75	
	3/7/84	12.87	12.24	---	10.78	10.35	9.54	
pH** (standard units)	3/11/82	5.2	5.4	5.5	5.9	5.9	---	
	6/30/82	---	5.7/5.33	---	6.9/6.33	/6.34	5.7/6.07	
	9/21/82	---	5.2/5.4	---	6.7/6.1	6.7/6.3	6.9/6.4	
	12/15/82	---	4.7	---	5.7	---	6.2	
	3/23/83	---	5.2/4.5	---	6.7/5	5.9/5	5.5/4.9	
	5/12/83	5.5	5.5	---	6.2	5.8	---	
	8/30/83	---	5.3	---	5.9	5.8	5.7	
	1/4/84	---	5.4	---	6.0	5.7	5.6	
	3/7/84	---	6.1	---	6.4	5.6	5.5	
Specific** Conductance (micromhos)	3/11/82	88	93	97	169	150	---	
	6/30/82	---	107/80	---	177/200	/150	84/80	
	9/21/82	---	93/93	---	180/161	123/109	180/130	
	12/15/82	---	95	---	180	---	122	
	3/23/83	---	107/120		167/176	121/130	69/68	
	5/12/83	98	133	---	130	108	---	
	8/30/83	---	NA	---	NA	NA	---	
	1/4/84	---	117	---	141	112	91	
	3/7/84	---	107	---	130	118	113	
COD	3/11/82	12	160	36	<4	20	---	
	6/30/82	---	<4	---	4	---	12	
	9/21/82	---	8	---	8	---	133	
	12/15/82	---	---	---	48	---	8	
	3/23/83	---	350	---	24	28	530	
	5/12/83	---	125	---	33	60	68	
	8/30/83	---	4	---	79	---	21	
	1/4/84	---	48	---	40	---	8	
	3/7/84	---	8	---	4	---	<4	
TOC	3/11/82	97	110	76	140	143	---	
	6/30/82	---	127	---	230	---	66	
	9/21/82	---	140	---	130	---	460	
	12/15/82	---	83	---	177	---	208	
	3/23/83	---	133	---	178	142	628	
	5/12/83	92	96	---	85	---	---	
	8/30/83	---	153	---	91	---	---	
	1/4/84	---	125	---	115	---	57	
	3/7/84	---	89	---	111	---	80	

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Table 1A - Summary of Groundwater Monitoring Analytical Data (Continued)

Parameter	Sample Date	Well 1	Well 2	Well 3	Well 4	Well 5	Well 6	Interim National Primary Drinking Water Standards
Nitrate/N	3/11/82	5.71	3.22	0.67	8.15	1.78	---	10
	5/12/83	4.61	3.32	---	7.67	---	---	
Chlorides	3/11/82	8.9	4.9	6.9	10.2	6.7	---	
	6/30/82	---	6.0	---	6.5	---	4.4	
	9/21/82	---	4.9	---	8.2	---	8.9	
	12/15/82	---	3.8	---	8.5	---	5.0	
	3/23/83	---	5.6	---	5.7	5.5	17.0	
	5/12/83	---	69.7	---	5.1	---	6.3	
	8/30/83	---	6.4	---	6.0	---	6.6	
	1/4/84	---	5.86	---	5.46	---	8.24	
	3/7/84	---	7.4	---	5.9	---	17.2	
Ammonia	5/12/83	<0.05	0.139	---	<0.05	---	---	
Cadmium	5/12/83	<0.005	<0.005	---	<0.005	---	---	
Chromium, hexavalent	11/28/81	<0.0002	<0.0002	<0.0002	0.003	<0.002	<0.0002	0.05
	3/11/82	---	---	---	---	---	---	
	6/30/82	---	<0.001	---	<0.01	<0.001	<0.001	
	9/21/82	---	<0.005	---	0.149	<0.005	<0.005	
	12/15/82	---	<0.010	---	0.053	---	<0.010	
	3/23/83	---	<0.02	---	<0.02	<0.02	<0.02	
	5/12/83	<0.02	<0.02	---	<0.02	<0.02	---	
	8/30/83	---	<0.02	---	0.03	<0.02	<0.02	
	1/4/84	---	0.01	---	0.043	---	0.01	
	3/7/84	---	<0.02	---	0.02	---	<0.02	
Chromium, total	11/28/81	<0.0002	<0.0002	<0.0002	0.125	0.002	<0.0002	0.05
	3/11/82	---	---	---	---	---	---	
	6/30/82	---	0.001	---	0.074	0.009	<0.001	
	9/21/82	---	0.005	---	0.26	0.010	0.008	
	12/15/82	---	0.020	---	0.105	---	0.022	
	3/23/83	---	0.002	---	0.064	0.002	0.002	
	5/12/83	<0.002	<0.002	---	<0.02	<0.02	---	
	8/30/83	---	<0.002	---	0.03	<0.02	<0.02	
	1/4/84	---	<0.03	---	0.043	---	<0.03	
	3/7/84	---	<0.02	---	0.02	---	<0.02	
Iron	3/11/82	0.010	0.052	0.019	0.006	0.018	---	0.3
Lead	6/30/82	---	0.010	---	<0.003	---	0.008	0.05
	9/21/82	---	0.006	---	<0.002	---	<0.002	
	12/15/82	---	<0.002	---	<0.002	---	<0.002	
	3/23/83	---	0.005	---	0.002	0.003	0.002	
	5/12/83	<0.10	<0.10	---	<0.10	---	---	
	8/30/83	---	<0.002	---	<0.002	---	<0.002	
	1/4/84	---	<0.15	---	<0.15	---	<0.15	
	3/7/84	---	0.003	---	0.003	---	0.005	
Manganese	3/11/82	0.023	0.110	0.029	0.009	0.020	---	
Mercury	5/12/83	<0.0001	0.0001	---	0.0009	---	---	
Nickel	5/12/83	<0.100	<0.100	---	0.100	---	---	

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Table 1A - Summary of Groundwater Monitoring Analytical Data (Continued)

Parameter	Sample Date	Well 1	Well 2	Well 3	Well 4	Well 5	Well 6	Interim National Primary Drinking Water Standards
Zinc	5/12/83	<0.004	0.030	---	0.151	---	---	
Cyanide	1/4/84	---	<0.005	---	<0.005	---	<0.005	

* Well damaged by construction vehicle

** Lab/field analysis

--- Not analyzed

NA = Data rejected due to equipment malfunction

Note: Results in mg/l unless otherwise specified. Metals analyzed for dissolved metals.

Source: BCM Eastern Inc. (BCM)

TABLE 1B

FIRST FREEDOM (FORMERLY MCR) FACILITY
MILLSBORO, DELAWARE
SUMMARY OF GROUNDWATER MONITORING ANALYTICAL DATA
(Wells 7 through 13)

Parameter	Sample Date	Well 7 *	Well 8	Well 9	Well 10	Well 11A	Well 11B	Well 12	Well 13	Interim National Primary Drinking Water Standards
Groundwater Elevations (feet above sea level)	11/28/81	7.77	6.66	7.20	---	---		---	---	
	3/11/82	---	---	---	---	---		---	---	
	6/30/82	8.86	8.64	7.74	7.79	7.74		6.90	8.48	
	9/21/82	8.17	7.78	7.10	7.06	7.05		6.19	7.23	
	12/15/82	8.56	8.20	7.53	7.67	7.55		6.65	8.13	
	3/23/83	---	10.78	10.03	10.00	9.87		8.99	10.58	
	5/12/83	---	11.74	11.08	10.67	10.57		9.86	11.50	
	8/30/83	---	8.24	8.58	8.46	8.28		7.40	8.81	
	1/4/84	---	9.86	9.28	9.04	8.82	8.05	8.07	9.58	
	3/7/84	---	10.88	10.22	9.62	9.76	8.97	8.98	10.52	
pH** (standard units)	3/11/82	6.1	5.3	6.7	5.4	5.2		5.4	6.1	
	6/30/82	---	---	6.3/6.6	5.4/7.3	5.5/6.0		/5.75	---	
	9/21/82	6.8/6.5	---	5.9/5.6	6.0/5.7	5.8/5.5		5.7/5.5	---	
	12/15/82	---	---	5.5	5.2	4.8		4.8	---	
	3/23/83	---	---	5.4/4.9	5.3/4.8	5.2/4.8		5.2/4.75	---	
	5/12/83	---	---	5.9	5.5	5.3		5.9	---	
	8/30/83	---	---	5.4	5.4	5.2	5.9	5.4	---	
	1/4/84	---	---	5.2	5.6	5.2	---	5.5	---	
	3/7/84	---	---	5.6	5.7	5.4	---	5.4	---	
Specific** Conductance (uS/cm)	3/11/82	208	122	229	109	158		97	104	
	6/30/82	---	---	213/260	149/140	177/200		/100	---	
	9/21/82	149/147	---	180/174	123/107	193/170		93/81	---	
	12/15/82	---	---	195	120	154		107	---	
	3/23/83	---	---	213/221	121/115	141/136		132/147	---	
	5/12/83	---	---	139	114	131		186	---	
	8/30/83	---	---	NA	NA	NA		NA	---	
	1/4/84	---	---	160	95	95	---	102	---	
	3/7/84	---	---	151	97	91.4	---	96.5	---	
COD	3/11/82	40	<4	12	12	12		4	12	
	6/30/82	---	---	20	4	4		---	---	
	9/21/82	---	---	28	12	12		---	---	
	12/15/82	---	---	24	16	16		---	---	
	3/23/83	---	---	56	<4	18		---	---	
	5/12/83	---	---	16	12	100		60	---	
	8/30/83	---	---	12	21	95		32	---	
	1/4/84	---	---	16	16	40	---	---	---	
	3/7/84	---	---	12	<4	12	---	---	---	
TOC	3/11/82	259	100	169	90	175		97	86	
	6/30/82	---	---	136	122	138		---	---	
	9/21/82	---	---	176	89	172		---	---	
	12/15/82	---	---	240	102	170		---	---	
	3/23/83	---	---	293	216	198		---	---	
	5/12/83	---	---	93	73	87		116	---	
	8/30/83	---	---	89	70	90		82	---	
	1/4/84	---	---	117	55	47	---	---	---	
	3/7/84	---	---	115	63	66	---	---	---	

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AR100449

Table 1B - Summary of Groundwater Monitoring Analytical Data (Continued)

Parameter	Sample Date	Well 7 *	Well 8	Well 9	Well 10	Well 11A	Well 11B	Well 12	Well 13	Interim National Primary Drinking Water Standards
Nitrate/N	3/11/82	5.16	4.94	5.61	2.80	4.21		3.74	3.51	10
	5/12/83	---	---	2.04	1.78	2.93		7.35	---	
	6/30/82	---	---	12.2	8.3	11.0		---	---	
	9/21/82	---	---	11.1	6.6	10.6		---	---	
	12/15/82	---	---	11.0	6.0	7.3		---	---	
	3/23/83	---	---	11.9	8.6	7.2		---	---	
	5/12/83	---	---	8.5	6.1	7.0		---	---	
	8/30/83	---	---	7.0	4.9	7.2		5.2	---	
	1/4/84	---	---	8.83	4.57	5.46	---	---	---	
	3/7/84	---	---	9.9	6.4	6.4	---	---	---	
Ammonia	5/12/83	---	---	<0.05	<0.05	<0.05		<0.05	---	
Cadmium	05/12/83	---	---	<0.005	<0.005	<0.005		<0.005	---	
Chromium, hexavalent	11/28/81	<0.002	<0.0002	0.054	---	---		---	---	0.05
	3/11/82	---	---	---	0.048	0.133		<0.0002	<0.002	
	6/30/82	<0.012	---	0.329	0.064	0.585		<0.001	---	
	9/21/82	<0.005	---	0.331	0.123	0.64		<0.005	---	
	12/15/82	---	---	0.107	0.075	0.482/0.414/0.656***		<0.010	---	
	3/23/83	---	---	0.43	0.12	0.35		---	---	
	5/12/83	---	---	0.19	0.02	0.44		<0.02		
	8/30/83	---	---	0.23	0.07	0.23	<0.02	<0.02	---	
	1/4/84	---	---	0.34	0.043	0.14	---	0.03	---	
	3/7/84	---	---	0.34	0.04	0.12	---	<0.02	---	
Chromium, total	11/28/81	0.003	<0.0002	0.113	---	---		---	---	0.05
	3/11/82	---	---	---	0.098	0.180		0.003	0.002	
	6/30/82	0.012	---	0.372	0.117	0.585		0.001	---	
	9/21/82	0.007	---	0.49	0.19	0.64		0.019	---	
	12/15/82	---	---	0.125	0.075	0.568/0.482/0.788***		0.028	---	
	3/23/83	---	---	0.43	0.12	0.35		---	---	
	5/12/83	---	---	0.192	0.02	0.437		<0.02	---	
	8/30/83	---	---	0.24	0.07	0.32	<0.02	<0.02	---	
	1/4/84	---	---	0.34	0.043	0.14	---	<0.03	---	
	3/7/84	---	---	0.34	0.04	0.12	---	<0.02	---	
Iron	11/28/81	---	---	---	---	---		---	---	
	3/11/82	2.63	0.006	0.009	0.017	0.003		0.006	0.079	
Lead	3/11/82	---	---	---	<0.002	<0.002		<0.002	<0.002	0.05
	6/30/82	---	---	0.002	0.034	0.003		---	---	
	9/21/82	---	---	0.002	<0.002	0.003		---	---	
	12/15/82	---	---	<0.002	<0.002	<0.002		---	---	
	3/23/83	---	---	0.003	0.003	---		---	---	
	5/12/83	---	---	<0.10	<0.10	<0.10		<0.10	---	
	8/30/83	---	---	<0.002	<0.002	<0.002		---	---	
	1/4/84	---	---	<0.15	<0.15	<0.15		<0.15	---	
	3/7/84	---	---	0.004	0.003	0.003	---	<0.004	---	
Manganese	3/11/82	0.012	0.024	0.037	0.022	0.013		0.073	0.126	
Mercury	12/12/83	---	---	0.00007	0.00009	0.0001		0.00016	---	

Table 1B - Summary of Groundwater Monitoring Analytical Data (Continued)

Parameter	Sample Date	Well 7 *	Well 8	Well 9	Well 10	Well 11A	Well 11B	Well 12	Well 13	Interim National Primary Drinking Water Standards
Nickel	05/12/83	---	---	<0.100	<0.100	<0.100		<0.100	---	
Zinc	05/12/83	---	---	<0.004	0.120	0.007		0.120	---	
Cyanide	1/4/84	---	---	<0.005	<0.005	<0.005	---	0.076	<0.005	

* Well No. 7 grouted closed March 23, 1983

** Lab/field analysis

*** Evacuated 4/7/15 well volumes before sampling

--- Not analyzed

Note: Results in mg/l unless otherwise specified. Metals analyzed for dissolved metals.

Source: BFM Eastern Inc. (BCM)

BCM

TABLE 1C

FIRST FREEDOM (FORMERLY NCR) FACILITY
MILLSBORO, DELAWARE

SUMMARY OF GROUNDWATER MONITORING ANALYTICAL DATA
(Wells 17A, 17B, and 20)

Parameter	Sample Date	Well 17A	Well 17B	Well 20
Total Chromium	1/4/84	<0.03	<0.03	<0.03
Chemical Oxygen Demand	1/4/84	16	8	56
Cyanide	1/4/84	<0.005	<0.005	<0.005

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Sussex County mum on economic plans, p.[illegible]
6/16/81 (NCR)

Sussex may have found backup for NCR plant, p
7/15/81 (NCR)

Maryland Bank will buy NCR facility, p.1 7/
(NCR)

N.C.R. Corp.
[illegible]
[illegible] (N.C.R.)

A tenant for NCR plant? Bank may use site fo
credit card operation p 1 (*NCR*) 1/28/81
NCR plant sale still up in air
4/16/81 P9 (*NCR*)
NCR family happy with decision Enjoying the l
in South Carolina after company move
Fate of Millsboro NCR plant should be known
p 11 (*NCR*) 6/14/81

National Cash Register
NCR definite about plans to move 3/21/80 p
(*NCR*)
Boston firm eyes NCR engineers p.11 4/1
(*National cahs register*)
NCR move means relocation for couple 5/4/80 p
(*NCR*)
State hopes ad campaign will draw new industry
p.11 6/18/80 (*NCR*)
Japan may focus on Millsboro site p.1 6/18/80
(NCR)*
NCR search bill quickly enacted p.13 6/19/80
(*NCR*)
officials are confident NCR replacement p.13
6/19/80 (*NCR*)
Du Pont signs bill launching NCR ad campaign
p 14 7/3/80 (*NCR*)

National Cash Register Co.
NCRC to replace Dennis-Mitchell 8/2/6
to begin interviews for plant p 3 10
gets applicants for jobs p 19 10-19-6
article about its growth ed. p 9
UAW knocking on NCR's door p
Millsboro - Workers vote today on Union p9 6/
" plant rejects UAW offer p10
no layoffs or retire p9 7/
millsboro plant to make all
cash registers 8-30-73 p 3

National Cash Register
Slates full operation pg. 1 6/2/69
NCR cut workforce by 600 at [illegible]
ex-NCR workers plant applicants 1/7/76 p 15
NCR cash register marketed 7/14/76 p 24
NCR paving way to new ideas 7/1/79 p 1 (*NCR*)
This employee is glad he came 7/1/79 p 1
(*NCR*)
Evans 'burned' by NCR move 3/16/80 p 1
(*NCR*)
State officials to make NCR plea p.9 3/19/80
(*NCR*)

National Cash Register Co.
Hiring date unsure 6/3/67 pg. 21
Expecting new personnel 8/14/72 p
NCR expects data entry device 7/22/76 p 14

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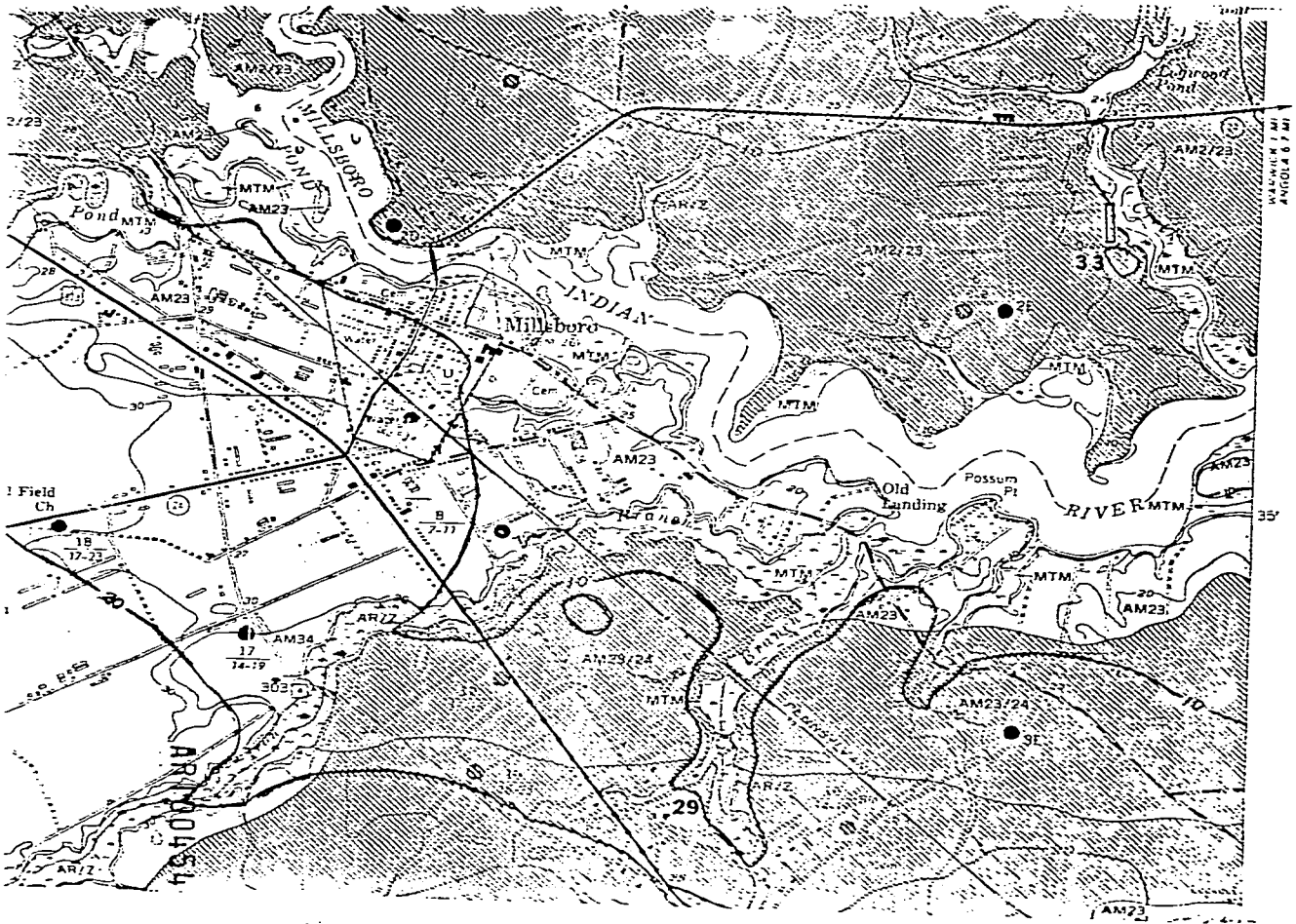
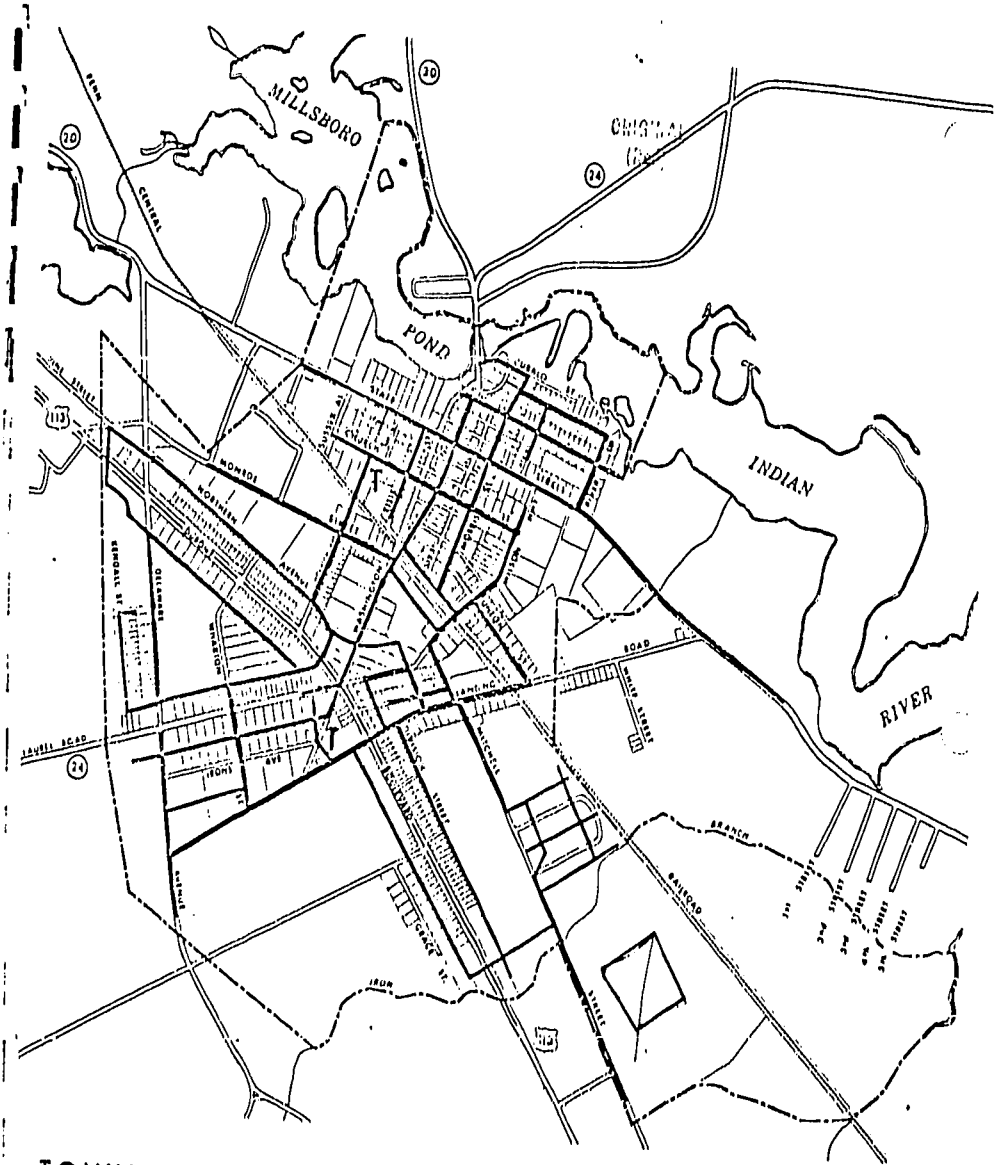

MILLSBORO POND
Millsboro
Old Landing
Possum Pt
RIVER
Pond
Field
Ch
AM23
AM23/24
AM34
MTM
ARIZ
29
35
1:24000



TOWN OF MILLSBORO PLANNING COMMISSION

SUSSEX COUNTY, DELAWARE

The preparation of this map was financed in part through a planning grant from the Department of Housing and Urban Development, under the provisions of Section 701 of the Housing Act of 1954, as amended, administered by the Delaware State Planning Office. The matching funds were provided by local funds with the balance of the cost being absorbed by the State and Federal Governments.

0 400 800 1600 2400 3200

plate 5

LOCATION OF EXISTING WATER LINES

AR1001 5

T WATER TOWER

WATER LINES

MILLSBORO

LOCATION: Southeastern Sussex County

POPULATION: 1300

NUMBER MAJOR INDUSTRIAL CUSTOMERS: ---

WATER USE:

Estimated	Average day	.5 mgd
	Average day in peak month	---
	Peak day	---

DISTRIBUTION MAIN SIZES: 4" - 10"

STORAGE: 1 - 100,000 Gallon Elevated Tank
1 - 25,000 Gallon Elevated Tank

WATER QUALITY: ---

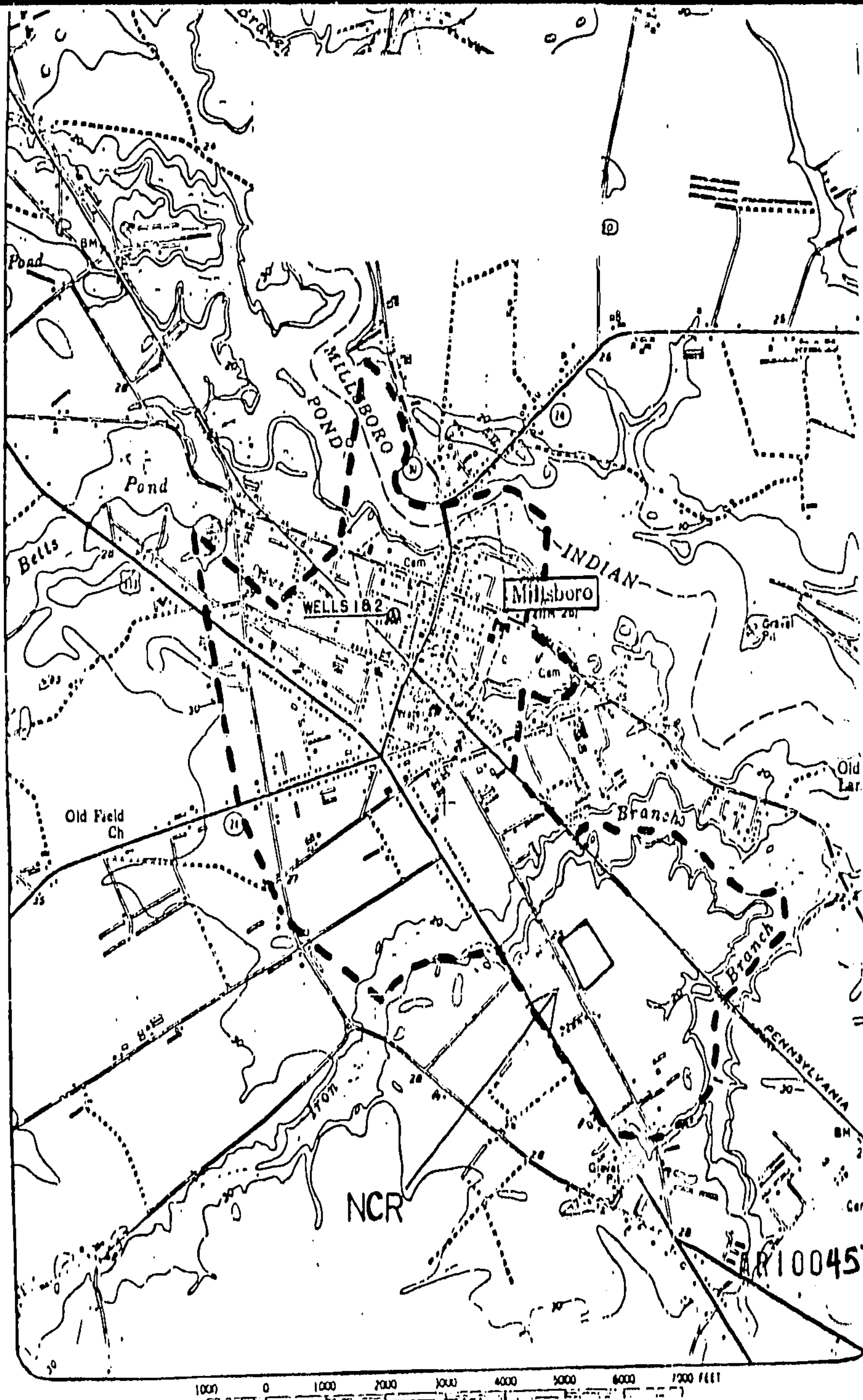
WATER TREATMENT: ---

SUSTAINABLE PUMPING CAPACITY: --- 300 gpm

COMMENTS: Nitrate Nitrogen concentrations at both wells about 10 mg/l.

WATER SOURCES:

Well #	Date Drilled	Depth (feet)	Diameter (inch)	Screen Interval (feet)	Aquifer	Pumping Capacity (gpm)
1	1953	90	8	75-85	Columbia	250 Unused
2	1973	94	8	74-94	Columbia	350


Pond
Bells
Pond
MILLSBORO
POND
INDIAN
Millsboro
WELLS 1 & 2
Cem
Old Field
Ch
Branch
Branch
PENNSYLVANIA
Gravel Pit
NCR
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

AR100457

LIST OF ALL WELLS IN A SPECIFIED AREA BY CONFIGURATION

07/05/84
13:36

ID	LOCALID	STATIS	WELLUSE	INTERUSE	GLOUNIT	HYDUNIT	OPENTOP	OPENBOT	BASIN	MODGRID
	1	C	P	I	Qal;	cl4	74.00	90.00	308	17000760
	2	A	P	I	Qal;	cl4	82.00	97.50	308	17000760
	TW-5	C	P	I	Qal;	cl;	10.00	24.00	308	17000760
	TW-11	C	P	I	Qal;	cl;	14.50	24.50	308	17000760
	TW-3	C	P	I	Qal;	cl;	10.00	24.00	308	17000760
	TW-8	C	P	I	Qal;	cl4	15.00	25.00	308	17000760
	TW-2	C	P	I	Qal;	cl;	17.00	22.00	308	17000760
	TW-13	C	P	I	Qal;	cl4	14.00	24.00	308	17000760
	TW-4	C	P	I	Qal;	cl;	10.00	24.00	308	17000760
	TW-6	C	P	I	Qal;	cl4	12.00	22.00	308	17000760
	TW-12	C	P	I	Qal;	cl;	15.00	25.00	308	17000760
	TW-9	C	P	I	Qal;	cl;	12.50	22.50	308	17000760
	2 R	C	P	I	Qal;	cl4	73.00	93.00	308	17000760
	TW-7	C	P	I	Qal;	cl4	14.50	24.50	308	17000760
	TW-10	C	P	I	Qal;	cl;	14.50	24.50	308	17000760
	MW3-MW3	C	P	I	Qal;	cl;	20.00	130.00	308	17000760
	03 #1	I	P	I	Qal;	cl4	50.00	70.00	308	17000760
	WELL#2	C	P	I	Qal;	cl;	70.00	90.00	308	17000760
	1-5	C	P	I	Qal;	cl4	24.00	35.00	308	17000760
	WELL#4	C	P	I	Qal;	cl4	73.00	96.00	308	17000760
	WELL#5	C	P	I	Qal;	cl;	47.00	70.00	308	17000760
	1-4	C	P	I	Qal;	cl4	24.00	50.00	308	17000760
	Well3R	C	P	I	Qal;	cl;	50.00	70.00	308	17000760
	1-6	C	P	I	Qal;	cl4	21.00	50.00	308	17000760
	03 #2	I	P	I	Qal;	cl;	50.00	70.00	308	17000760

ORIGINAL
(Red)

AR100458

PARTING REPORT

LISTING OF ALL WELLS IN A MODIFIED GRID BY CURONNERID
07/05/04
13:35

WCID	WLAST	CURONNERID	LOCALID	STATIS	WELLUSE	WATERUSE	GEOUNIT	HYDUNIT	OPENTOP	OPENBOT	BASIN
0395	NATIONAL CASH	966NATCAR	1	C	P	I	Del;	clg	74.00	90.00	308
0363	NATIONAL CASH	966NATCAR	2	A	P	I	Del;	clg	82.00	97.50	308
0279	NATIONAL CASH	966NATCAR	TW-5	C	P	I	Del;	clg	10.00	24.00	308
0437	NATIONAL CASH	966NATCAR	TW-11	C	P	I	Del;	clg	14.50	24.50	308
0277	NATIONAL CASH	966NATCAR	TW-3	C	P	I	Del;	clg	19.00	24.00	308
0351	NATIONAL CASH	966NATCAR	TW-8	C	P	I	Del;	clg	15.00	25.00	308
0276	NATIONAL CASH	966NATCAR	TW-2	C	P	I	Del;	clg	17.00	22.00	308
0439	NATIONAL CASH	966NATCAR	TW-13	C	P	I	Del;	clg	14.00	24.00	308
0278	NATIONAL CASH	966NATCAR	TW-4	C	P	I	Del;	clg	19.00	24.00	308
0353	NATIONAL CASH	966NATCAR	TW-6	C	P	I	Del;	clg	12.00	22.00	308
0438	NATIONAL CASH	966NATCAR	TW-12	C	P	I	Del;	clg	15.00	25.00	308
0353	NATIONAL CASH	966NATCAR	TW-9	C	P	I	Del;	clg	12.50	22.50	308
0381	NATIONAL CASH	966NATCAR	2 R	C	P	I	Del;	clg	73.00	93.00	308
0352	NATIONAL CASH	966NATCAR	TW-7	C	P	I	Del;	clg	14.50	24.50	308
0435	NATIONAL CASH	966NATCAR	TW-10	C	P	I	Del;	clg	14.50	24.50	308
0340	VLASIC FOOD, IN	966VLASIC	MW-13	C	P	I	Del;	clg	20.00	131.00	308
0160	VLASIC FOOD, IN	966VLASIC	83 #1	I	P	I	Del;	clg	50.00	70.00	308
0348	VLASIC FOOD, IN	966VLASIC	JELL#2	C	P	I	Del;	clg	70.00	90.00	308
0358	VLASIC FOOD, IN	966VLASIC	JW-5	C	P	I	Del;	clg	24.00	32.00	308
0350	VLASIC FOOD, IN	966VLASIC	JELL#4	C	P	I	Del;	clg	73.00	96.00	308
3958	VLASIC FOOD, IN	966VLASIC	JELL#5	C	P	I	Del;	clg	47.00	70.00	308
0357	VLASIC FOOD, IN	966VLASIC	JW-4	C	P	I	Del;	clg	24.00	30.00	308
0349	VLASIC FOOD, IN	966VLASIC	Jell13.2	C	P	I	Del;	clg	50.00	70.00	308
0359	VLASIC FOOD, IN	966VLASIC	JW-5	C	P	I	Del;	clg	24.00	30.00	308
0179	VLASIC FOOD, IN	966VLASIC	83 #2	I	P	I	Del;	clg	50.00	70.00	308

REPORT COMPLETED

ORIGINAL
(Red)

AR100459

LISTING OF ALL WELLS FOR A SINGLE COORDINATE GRID

07/25/84
13:32

ATIS	WELLUSE	WATERUSE	HYDUNIT	BASIN	MODGRID	WATUSEPRES	ALLOCAPRES	OLOGPRES	WATLEVPRES
	P	I	clg	308	1730376J	J	J	J	J
	P	I	clg	308	1730376J	1	1	J	1
	P	I	clg	308	1730376J	1	1	J	1
	P	I	clg	308	1730376J	J	J	J	J
	P	I	clg	308	1730376J	J	J	J	J
	P	I	clg	308	1730376J	J	J	J	J
	P	I	clg	308	1730376J	J	J	J	J
	P	I	clg	308	1730376J	J	J	J	J
	P	I	clg	308	1730376J	J	J	J	J
	P	I	clg	308	1730376J	J	J	J	J
	P	I	clg	308	1730376J	J	J	J	J
	P	I	clg	308	1730376J	J	J	J	J
	P	I	clg	308	1730376J	J	J	J	J

CHECKCORNER (CONTINUED)

BOT	OPENTOP	OPENBOT	OPENTOP	OPENBOT	OPENTOP	OPENBOT	ALTITUDE	ALTMETH
50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
00	0.00	0.00	0.00	0.00	0.00	0.00	25.73	L
00	0.00	0.00	0.00	0.00	0.00	0.00	25.28	L
00	0.00	0.00	0.00	0.00	0.00	0.00	21.92	L
00	0.00	0.00	0.00	0.00	0.00	0.00	23.78	L
00	0.00	0.00	0.00	0.00	0.00	0.00	21.85	L
00	0.00	0.00	0.00	0.00	0.00	0.00	22.50	L
00	0.00	0.00	0.00	0.00	0.00	0.00	24.78	L
50	0.00	0.00	0.00	0.00	0.00	0.00	23.73	L
50	0.00	0.00	0.00	0.00	0.00	0.00	24.46	L
50	0.00	0.00	0.00	0.00	0.00	0.00	22.79	L
50	0.00	0.00	0.00	0.00	0.00	0.00	23.82	L
00	0.00	0.00	0.00	0.00	0.00	0.00	25.15	L
00	0.00	0.00	0.00	0.00	0.00	0.00	24.25	L

AR100460

1353	NATIONAL CASH	2	9013353	A	P	I	clg	308	17JJJ76J		0	0	
1355	NATIONAL CASH	1	9013355	C	P	I	clg	308	17JJJ76J		1	1	
1381	NATIONAL CASH	2 R	9013381	C	P	I	clg	308	17JJJ76J		1	1	
1276	NATIONAL CASH	TW-2	9013276	C	P	I	clg	308	17JJJ76J		1	1	
1277	NATIONAL CASH	TW-3	9013277	C	P	I	clg	308	17JJJ76J		0	0	
1278	NATIONAL CASH	TW-4	9013278	C	P	I	clg	308	17JJJ76J		0	0	
1279	NATIONAL CASH	TW-5	9013279	C	P	I	clg	308	17JJJ76J		0	0	
1353	NATIONAL CASH	TW-6	9013353	C	P	I	clg	308	17JJJ76J		0	0	
1351	NATIONAL CASH	TW-8	9013351	C	P	I	clg	308	17JJJ76J		0	0	
1352	NATIONAL CASH	TW-7	9013352	C	P	I	clg	308	17JJJ76J		0	0	
1353	NATIONAL CASH	TW-9	9013353	C	P	I	clg	308	17JJJ76J		0	0	
1435	NATIONAL CASH	TW-10	9013435	C	P	I	clg	308	17JJJ76J		0	0	
1437	NATIONAL CASH	TW-11	9013437	C	P	I	clg	308	17JJJ76J		0	0	
1438	NATIONAL CASH	TW-12	9013438	C	P	I	clg	308	17JJJ76J		0	0	
1439	NATIONAL CASH	TW-13	9013439	C	P	I	clg	308	17JJJ76J		0	0	

REPORT COMPLETED
WAITING REPORT

LOCID	LOCALID	HOLEBOT	OPENTOP	OPENBOT	CHECKCORNER (CONTINUED) OPENTOP	OPENBOT	OPENTOP	OPENBOT	OPENTOP	OPENBOT	ALTI
1353	2	97.50	82.00	97.50	0.00	0.00	0.00	0.00	0.00	0.00	
1355	1	80.00	74.00	80.00	0.00	0.00	0.00	0.00	0.00	0.00	
1381	2 R	129.00	73.00	93.00	0.00	0.00	0.00	0.00	0.00	0.00	
1276	TW-2	22.00	17.00	22.00	0.00	0.00	0.00	0.00	0.00	0.00	2
1277	TW-3	24.00	19.00	24.00	0.00	0.00	0.00	0.00	0.00	0.00	2
1278	TW-4	24.00	19.00	24.00	0.00	0.00	0.00	0.00	0.00	0.00	2
1279	TW-5	24.00	19.00	24.00	0.00	0.00	0.00	0.00	0.00	0.00	2
1353	TW-6	22.00	12.00	22.00	0.00	0.00	0.00	0.00	0.00	0.00	2
1351	TW-8	25.00	15.00	25.00	0.00	0.00	0.00	0.00	0.00	0.00	2
1352	TW-7	24.50	14.50	24.50	0.00	0.00	0.00	0.00	0.00	0.00	2
1353	TW-9	22.50	12.50	22.50	0.00	0.00	0.00	0.00	0.00	0.00	2
1435	TW-10	24.50	14.50	24.50	0.00	0.00	0.00	0.00	0.00	0.00	2
1437	TW-11	24.50	14.50	24.50	0.00	0.00	0.00	0.00	0.00	0.00	2
1438	TW-12	25.00	15.00	25.00	0.00	0.00	0.00	0.00	0.00	0.00	2
1439	TW-13	24.00	14.00	24.00	0.00	0.00	0.00	0.00	0.00	0.00	2

REPORT COMPLETED

LOGGRID(17JJJ76J)

ARIOOA61

ORIGINAL
(Red)

BCM Eastern Inc.
Engineers, Planners and Scientists

One Plymouth Meeting • Plymouth Meeting, PA 19462 • Phone: (215) 825-3800

ORIGINAL
(Red)

February 21, 1984

First National Bank of Maryland
P.O. BOX 1596
Baltimore, Maryland 21203

Attention: Mr. D. Richardson

Subject: Transmittal of Quarterly Groundwater Monitoring Report
First Freedom (Former NCR) Facility, Millsboro, DE
Post-Closure Monitoring
BCM Project No. 00-4529-09

Gentlemen:

Enclosed please find two (2) copies of the laboratory analytical results and groundwater elevation information for the above-referenced facility. Please forward one copy of this report to the Delaware Department of Natural Resources and Environmental Control.

The Tables, entitled "Summary of Groundwater Monitoring Analytical Data", contain data from the final 1983 quarterly sampling along with all past BCM monitoring data. The final 1983 quarterly sampling which had been postponed due to inclement weather was performed on January 3-5, 1984. Should you have any questions, please call.

Very truly yours,

Richard E. Sacks

Richard E. Sacks
Geologist

/jmk
Enclosure
cc: D. Thomas, NCR
J. Wirth, RK&K
A. M. Robinson, BCM
R. Buller

TABLE 1A

FIRST FREEDOM (FORMERLY NCR) FACILITY
MILLSBORO, DELAWARE
SUMMARY OF GROUNDWATER MONITORING ANALYTICAL DATA
(Wells 1 through 6)

Parameter	Sample Date	Well 1	Well 2	Well 3 *	Well 4	Well 5	Well 6	Interim National Primary Drinking Water Standards
Groundwater Elevations (feet above sea level)	11/28/81	9.61	9.59	7.94	7.57	7.23	5.00	
	3/11/82	---	---	---	---	---	---	
	6/30/82	10.69	10.20	8.75	8.45	7.39	8.63	
	9/21/82	9.93	9.32	7.92	7.68	6.69	6.86	
	12/15/82	10.36	9.62	8.32	8.18	7.29	8.33	
	3/23/83	12.88	12.16	11.05	10.74	10.31	11.86	
	5/12/83	13.5	13.07	---	11.57	10.64	11.33	
	8/30/83	11.06	10.49	---	9.20	9.10	9.58	
	1/4/84	11.90	10.24	---	9.32	9.27	9.75	
pH** (standard units)	3/11/82	5.2	5.4	5.5	5.9	5.9	---	
	6/30/82	---	5.7/5.33	---	6.9/6.33	/6.34	5.7/6.07	
	9/21/82	---	5.2/5.4	---	6.7/6.1	6.7/6.3	6.9/6.4	
	12/15/82	---	4.7	---	5.7	---	6.2	
	3/23/83	---	5.2/4.5	---	6.2/5	5.9/5	5.5/4.9	
	5/12/83	5.5	5.5	---	6.2	5.8	---	
	8/30/83	---	5.3	---	5.9	5.8	5.7	
	1/4/84	---	5.4	---	6.0	5.7	5.6	
Specific** Conductance (uS/cm)	3/11/82	88	93	97	169	150	---	
	6/30/82	---	107/80	---	177/200	/150	84/80	
	9/21/82	---	98/93	---	180/161	123/108	180/130	
	12/15/82	---	95	---	180	---	122	
	3/23/83	---	107/120		162/176	121/130	64/68	
	5/12/83	98	133	---	130	108	---	
	8/30/83	---	NA	---	NA	NA	---	
	1/4/84	---	117	---	141	112	94	
COD	3/11/82	12	160	36	<4	20	---	
	6/30/82	---	<4	---	4	---	12	
	9/21/82	---	8	---	8	---	133	
	12/15/82	---	---	---	48	---	8	
	3/23/83	---	350	---	24	24	540	
	5/12/83	---	125	---	33	60	68	
	8/30/83	---	4	---	79	---	71	
	1/4/84	---	48	---	40	---	8	
TDS	3/11/82	97	110	76	140	123	---	
	6/30/82	---	122	---	230	---	66	
	9/21/82	---	100	---	130	---	460	
	12/15/82	---	83	---	177	---	208	
	3/23/83	---	113	---	178	147	688	
	5/12/83	92	96	---	85	---	---	
	8/30/83	---	153	---	93	---	---	
	1/4/84	---	125	---	115	---	52	

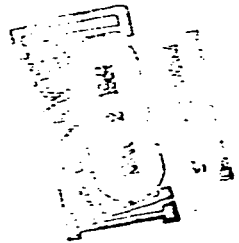


Table A - Summary of Groundwater Monitoring Analytical Data (Continue

Parameter	Sample Date	Well 1	Well 2	Well 3	Well 4	Well 5	Well 6	Interim National Primary Drinking Water Standards
Nitrate/N	3/11/82	5.71	3.22	0.67	8.19	1.78	---	10
	5/12/83	4.61	3.32	---	2.67	---	---	
Chlorides	3/11/82	8.9	4.9	6.9	10.2	6.7	---	
	6/30/82	---	6.0	---	6.5	---	4.4	
	9/21/82	---	4.9	---	8.2	---	8.9	
	12/15/82	---	3.8	---	8.5	---	5.0	
	3/23/83	---	5.6	---	5.7	5.5	17.0	
	5/12/83	---	69.7	---	5.1	---	6.3	
	8/30/83	---	6.4	---	6.0	---	6.6	
	1/4/84	---	5.86	---	5.46	---	8.24	
Ammonia	5/12/83	<0.05	0.139	---	<0.05	---	---	
Cadmium	5/12/83	<0.005	<0.005	---	<0.005	---	---	
Chromium, hexavalent	11/28/81	<0.0002	<0.0002	<0.0002	0.089	<0.002	<0.0002	0.05
	3/11/82	---	---	---	---	---	---	
	6/30/82	---	<0.001	---	<0.01	<0.001	<0.001	
	9/21/82	---	<0.005	---	0.149	<0.0005	<0.005	
	12/15/82	---	<0.010	---	0.080	---	<0.010	
	3/23/83	---	<0.02	---	<0.02	<0.02	<0.02	
	5/12/83	<0.02	<0.02	---	<0.02	<0.02	---	
	8/30/83	---	<0.02	---	0.03	<0.02	<0.02	
	1/4/84	---	0.01	---	0.043	---	0.01	
Chromium, total	11/28/81	<0.0002	<0.0002	<0.0002	0.125	0.002	<0.0002	0.05
	3/11/82	---	---	---	---	---	---	
	6/30/82	---	0.001	---	0.074	0.009	<0.001	
	9/21/82	---	0.005	---	0.26	0.010	0.008	
	12/15/82	---	0.020	---	0.105	---	0.022	
	3/23/83	---	0.002	---	0.064	0.002	0.002	
	5/12/83	<0.002	<0.002	---	<0.02	<0.02	---	
	8/30/83	---	<0.002	---	0.03	<0.02	<0.02	
	1/4/84	---	<0.03	---	0.043	---	<0.03	
Iron	3/11/82	0.010	0.052	0.019	0.006	0.018	---	0.3
Lead	6/30/82	---	0.010	---	<0.003	---	0.004	0.05
	9/21/82	---	0.006	---	<0.002	---	<0.002	
	12/15/82	---	<0.002	---	<0.002	---	<0.002	
	3/23/83	---	0.005	---	0.002	0.003	0.002	
	5/12/83	<0.10	<0.10	---	<0.10	---	---	
	8/30/83	---	<0.002	---	<0.002	---	<0.002	
	1/4/84	---	<0.15	---	0.15	---	<0.15	
Manganese	3/11/82	0.023	0.110	0.029	0.009	0.020	---	
Mercury	5/12/83	<0.0001	0.0001	---	0.0009	---	---	
Nickel	5/12/83	<0.100	<0.100	---	<0.100	---	---	

Table 1A - Summary of Groundwater Monitoring Analytical Data (Continued)

Parameter	Sample Date	Well 1	Well 2	Well 3	Well 4	Well 5	Well 6	Interim National Primary Drinking Water Standards
Zinc	5/12/83	<0.004	0.030	---	0.151	---	---	
Cyanide	1/4/84	---	<0.005	---	<0.005	---	<0.005	

* Well damaged by construction vehicle.

** Lab/field analysis

--- Not analyzed

NA = Data rejected due to equipment malfunction

Note: Results in mg/l unless otherwise specified. Metals analyzed for dissolved metals.

Source: BCM Eastern Inc. (BCM)

TABLE 1B

FIRST FREEDOM (FORMERLY NCR) FACILITY
MILLSBORO, DELAWARE
SUMMARY OF GROUNDWATER MONITORING ANALYTICAL DATA
(Wells 7 through 13)

Parameter	Sample Date	Well 7 *	Well 8	Well 9	Well 10	Well 11A	Well 11B	Well 12	Well 13	Interim National Primary Drinking Water Standards
Groundwater Elevations (feet above sea level)	11/28/81	7.77	6.66	7.20	---	---		---	---	
	3/11/82	---	---	---	---	---		---	---	
	6/30/82	8.86	8.64	7.74	7.79	7.74		6.90	8.48	
	9/21/82	8.17	7.78	7.10	7.06	7.05		6.19	7.73	
	12/15/82	8.56	8.20	7.53	7.62	7.55		6.65	8.13	
	3/23/83	---	10.78	10.03	10.00	9.82		8.99	10.54	
	5/12/83	---	11.74	11.08	10.67	10.57		9.86	11.50	
	8/30/83	---	8.24	8.58	8.46	8.28		7.40	8.81	
	1/4/84	---	9.86	9.28	9.04	8.82	8.05	8.07	9.54	
pH** (standard units)	3/11/82	6.1	5.3	6.7	5.4	5.2		5.4	6.1	
	6/30/82	---	---	6.3/6.6	5.4/7.3	5.5/6.0		/5.75	---	
	9/21/82	6.8/6.5	---	5.9/5.6	6.0/5.7	5.8/5.5		5.7/5.5	---	
	12/15/82	---	---	5.5	5.2	4.8		4.8	---	
	3/23/83	---	---	5.4/4.9	5.3/4.8	5.2/4.8		5.2/4.75	---	
	5/12/83	---	---	5.9	5.5	5.3		5.9	---	
	8/30/83	---	---	5.4	5.4	5.2	5.9	5.4	---	
	1/4/84	---	---	5.2	5.6	5.2	---	5.5	---	
Specific** Conductance (uS/cm)	3/11/82	208	122	229	109	158		97	104	
	6/30/82	---	---	213/260	149/140	177/200		/100	---	
	9/21/82	149/147	---	180/174	123/107	194/170		93/81	---	
	12/15/82	---	---	195	120	154		107	---	
	3/23/83	---	---	213/221	121/115	141/136		132/147	---	
	5/12/83	---	---	139	114	131		166	---	
	8/30/83	---	---	NA	NA	NA		NA	---	
	1/4/84	---	---	160	95	95	---	102	---	
COD	3/11/82	48	<4	12	12	12		4	12	
	6/30/82	---	---	20	4	4		---	---	
	9/21/82	---	---	28	12	12		---	---	
	12/15/82	---	---	24	16	16		---	---	
	3/23/83	---	---	56	<4	18		---	---	
	5/12/83	---	---	16	12	100		60	---	
	8/30/83	---	---	12	21	95		32	---	
	1/4/84	---	---	16	16	40	---	---	---	
	3/11/82	259	100	169	90	125		97	86	
	6/30/82	---	---	136	122	134		---	---	
	9/21/82	---	---	176	89	129		---	---	
	12/15/82	---	---	208	107	120		---	---	
	3/23/83	---	---	293	216	148		---	---	
	5/12/83	---	---	90	73	87		116	---	
	8/30/83	---	---	88	70	98		62	---	
	1/4/84	---	---	117	55	47	---	---	---	

ORIGINAL (Red)

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Table 1B - Summary of Groundwater Monitoring Analytical Data (Continued)

Parameter	Sample Date	Well 7 *	Well 8	Well 9	Well 10	Well 11A	Well 11B	Well 12	Well 13	Interim National Primary Drinking Water Standards
Nitrate/N	3/11/82	5.16	4.94	5.61	2.80	4.21		3.74	3.51	10
	5/12/83	---	---	2.04	1.78	2.94		7.35	---	
Chlorides	3/11/82	10.0	9.7	15.0	7.0	10.1		9.4	8.8	
	6/30/82	---	---	12.2	8.3	11.0		---	---	
	9/21/82	---	---	11.1	6.6	10.6		---	---	
	12/15/82	---	---	11.0	6.0	7.3		---	---	
	3/23/83	---	---	11.9	8.6	7.2		---	---	
	5/12/83	---	---	8.5	6.1	7.0		---	---	
	8/30/83	---	---	7.0	4.9	7.2		5.2	---	
	1/4/84	---	---	8.83	4.57	5.46	---	---	---	
Ammonia	5/12/83	---	---	<0.05	<0.05	<0.05		<0.05	---	
Cadmium	05/12/83	---	---	<0.005	<0.005	<0.005		<0.005	---	
Chromium, hexavalent	11/28/81	<0.002	<0.0002	0.054	---	---		---	---	0.05
	3/11/82	---	---	---	0.048	0.133		<0.0002	<0.002	
	6/30/82	<0.012	---	0.329	0.064	0.585		<0.001	---	
	9/21/82	<0.005	---	0.331	0.123	0.64		<0.005	---	
	12/15/82	---	---	0.107	0.075	0.482/0.414/ 0.658**		<0.010	---	
	3/23/83	---	---	0.43	0.12	0.35		---	---	
	5/12/83	---	---	0.19	0.02	0.44		<0.02		
	8/30/83	---	---	0.23	0.07	0.23	<0.02	<0.02	---	
	1/4/84	---	---	0.34	0.043	0.14	---	0.03	---	
Chromium, total	11/28/81	0.003	<0.0002	0.113	---	---		---	---	0.05
	3/11/82	---	---	---	0.094	0.130		0.003	0.002	
	6/30/82	0.012	---	0.372	0.117	0.585		0.001	---	
	9/21/82	0.007	---	0.49	0.19	0.64		0.019	---	
	12/15/82	---	---	0.125	0.075	0.568/0.452/ 0.780**		0.028	---	
	3/23/83	---	---	0.43	0.12	0.35		---	---	
	5/12/83	---	---	0.192	0.02	0.437		<0.02	---	
	8/30/83	---	---	0.24	0.07	0.32	<0.02	<0.02	---	
	1/4/84	---	---	0.34	0.043	0.14	---	<0.03	---	
Iron	11/28/81	---	---	---	---	---		---	---	
	3/11/82	2.63	0.006	0.009	0.017	0.003		0.006	0.079	
Lead	3/11/82	---	---	---	<0.002	<0.002		<0.002	<0.002	0.05
	6/30/82	---	---	0.002	0.034	0.004		---	---	
	9/21/82	---	---	0.002	<0.002	0.002		---	---	
	12/15/82	---	---	<0.002	<0.002	<0.002		---	---	
	3/23/83	---	---	0.002	0.003	---		---	---	
	5/12/83	---	---	<0.10	<0.10	<0.10		<0.10	---	
	8/30/83	---	---	<0.002	<0.002	<0.002		---	---	
	1/4/84	---	---	<0.15	<0.15	<0.15	---	<0.15	---	
Manganese	3/11/82	0.012	0.024	0.032	0.022	0.014		0.023	0.126	
Mercu	05/12/83	---	---	0.0007	.0009	0.0012				

ORIGINAL (Red)

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Table - Summary of Groundwater Monitoring Analytical Data (Continue

Parameter	Sample Date	Well 7 *	Well 8	Well 9	Well 10	Well 11A	Well 11B	Well 12	Well 13	Interim National Primary Drinking Water Standards
Nickel	05/12/83	---	---	<0.100	<0.100	<0.100		<0.100	---	
Zinc	05/12/83	---	---	<0.004	0.120	0.007		0.120	---	
Cyanide	1/4/84	---	---	<0.005	<0.005	<0.005	---	0.076	<0.005	

* Well No. 7 grouted closed March 23, 1983

** Lab/field analysis

*** Evacuated 4/7/15 well volumes before sampling

--- Not analyzed

Note: Results in mg/l unless otherwise specified. Metals analyzed for dissolved metals.

Source: BCM Eastern Inc. (BCM)

ORIGINAL
(Red)

APPENDIX E

DRAFT

A Preliminary Assessment

of

N.C.R.

EPA No. DE-42

Emergency and Remedial Response Information System

Grant No. X-003282-01-0

June, 1984

Presented to: Mr. E. Skernolis, Acting Chief, Site Investigation and Support Section, U. S. EPA, Region III

Prepared by: Delaware Department of Natural Resources and Environmental Control, Solid Waste Branch

Andrew Leitzinger, ERRIS Investigator

Robert Pickert, ERRIS Coordinator

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I. Introduction

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Inquiry Source

The site was identified through a RCRA State Notification on July 27, 1981.

General Summary

N.C.R., National Cash Register, operated a manufacturing plant southeast of Millsboro, Delaware until closure in November, 1981. The company had an electroplating facility which used heavy metals, (including chromium and lead), as well as degreasing material such as Trichloroethylene (T.C.E.).[1] The operation started up in October, 1967. It changed from manufacturing to assembly only, starting in 1974 and lasting until 1979. The electroplating operation was subsequently discontinued.

The plating process which was part of the NCR operation produced a chromium bearing wastewater, which was treated on-site near the northeast corner of the plant. Sludge produced by this treatment was disposed of in an unlined pit near the center of the northeastern property line. This material was subsequently excavated and removed under the direction of BCM (Betz, Converse and Murdoch) as documented in the October, 1981 "Engineers Certification of RCRA Closure Plan and the October, 1981 Hazardous Waste Investigation Report, both prepared by BCM".[1]

There existed three cement lined storage lagoons on site. Two contained toxic materials, presumably chromium, and a third did not. The toxic material was drained and shipped to American Recovery.[2] Only one lagoon had been used for the collection and discharge of cooling water since 1978.[3]

In November 1981, the property was sold to First National Bank of Maryland. The building and property are presently referred to as First Freedom. NCR agreed to be responsible for groundwater monitoring, testing and for any existing contaminants produced by their manufacturing facility.[1] BCM was retained by NCR to perform the quarterly groundwater monitoring associated with a closure of the plant.[4]

The initial causes for concern were the results of the groundwater monitoring which showed high chromium levels in one of the monitoring wells in February and October 1981.[3]

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After April 1983 the main concern at the site shifted (Red) the presence of elevated TCE concentrations in the groundwater at the northeast corner of the property.[4] BCM continued an investigation of the possible sources and extent of TCE contamination in the groundwater. They have currently (April 1984) issued detailed reports on the TCE and chromium contamination in the groundwater at the site. The monitoring wells contain significant amounts of two chlorinated ethylenes, trans 1, 2,-di-chloroethylene TDE and tri chloroethylene TCE.[4]

At present there are 22 monitoring wells on the site, from which BCM has collected much of their data for the reports. From these they have been able to track the location, and to some degree the extent of the TCE Plume. The plume is presently moving northeast from the northeast corner of the bulding where concentrations have been found to been highest.[4] W. Richard Calhoun, Facilities Manager at First Freedom and a former NCR employee believes the TCE contamination is a result of careless actions by TCE transport truck operators, who periodically allowed the chemical to spill on the ground while refilling an above ground TCE storage tank.[5] TCE contaminated groundwater has reached to and is flowing into Iron Branch, as revealed by stream sampling there. BCM's next move is to try to pinpoint the exact source of the TCE contamination, the vertical extent of TCE migration, the migration and discharge pattern of the TCE plume, and to make a concentration profile of the TCE plume in order to verify the observed data.[4]

Recommendations

Due to NCR's cooperation and Betz, Converse and Murdochs' detailed groundwater monitoring investigation it is recommended that this action continue until the full scope of the problem is revealed, i.e. (possible deep water contamination and movement of the plume toward Indian River under Iron Branch). DNREC also recommends a "desk top" site investigation possibly followed by a draft Hazardous Ranking Score developed by DNREC through a state cooperation agreement.

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II. Site History

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Permits

1980 NPDES Permit #0000353 renewal, Process changed.

1981 NPDES Permit #0000353 Void - Plant Closure. RCRA Permit closed October 1981.[7]

Well Permit #30081/1973 Industrial.[6]

Site Owner - Site is presently owned by First National Bank of Maryland, P. O. Box 1596, Baltimore, Maryland 21203. (301) 244-4480.

Local Population - No one could be contacted.

Media Coverage - Delaware State News

3/21/80 NCR definite about plans to move

7/24/81 Maryland Bank will buy NCR facility.

Other Background - See BCM Summary of Findings - see chronology.

Enforcement Status - None

BCM

ORIGINAL
(Red)

6.0 SUMMARY OF FINDINGS

1. Elevated TCE concentrations have been detected in the groundwater beneath the northwest corner of the former NCR (now Freedom Center) Millsboro property. The highest concentrations occur along a linear zone which trends approximately northeast-southwest and appears to originate at the northeast corner of the building.

2. Elevated TCE concentrations have also been detected in Iron Branch, a tributary to Indian River, northeast of the property.

3. The groundwater flow direction at the site is to the northeast towards Iron Branch.

4. Several homes, which use private wells as a source of drinking water, are located on the opposite side of Iron Branch from the property.

5. The pattern of TCE concentrations in Iron Branch indicates that the stream is a linear discharge zone for TCE-bearing groundwater. Data from the existing monitoring wells do not enable a determination whether any TCE-bearing groundwater flows under Iron Branch for eventual discharge into the Indian River.

6. The precise source of the TCE has not yet been located, but the highest groundwater TCE concentration (115,000 ug/l) was detected in monitoring well 20, located 100 feet downgradient from the former site of an above-ground TCE storage tank.

7. Soil probing and a review of plant records could not locate any subsurface TCE storage tanks at the northeast corner of the building. A subsurface tank at the northwest corner of the building was used to store waste cutting oil which also contained TCE. Monitoring immediately downgradient from this tank revealed TCE, but not at levels associated with the plume to the northeast.

8. The elevated TCE concentrations are not related to the elevated chromium concentrations detected in some of the onsite monitoring wells.

BCM

ORIGINAL
(Red)

7.0 CONCLUSIONS AND RECOMMENDATIONS

The investigations completed to date have defined the plume's sides and have located the general area of its source. The data also indicate that:

1. There is most likely one discontinued contamination source.

2. A portion of the shallow (recharge) aquifer is contaminated with TCE but the extent, if any, of deeper aquifer contamination is not known.

3. The contaminated plume is moving in a Northeasterly direction at a rate of approximately 1.2 ft/day and appears to be discharging into Iron Branch Creek.

Since the depth of the plume and its precise source have yet to be determined, the potential environmental impact of the TCE cannot be fully assessed. Due to this uncertainty, an additional investigatory phase will be implemented to determine the following:

1. The contaminant source.

2. The vertical extent of TCE migration.

3. The concentration profile of the TCE plume in order to verify the observed data and to estimate the temporal characteristics of the plume.

4. The migration and discharge pattern of the TCE plume.

5. Once this investigation phase has been completed, the data will be analyzed to determine appropriate management actions.

NCR Corporation

ORIGINAL
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Chronology

October, 1967	Plant opened using electroplating process.
1967 - 1974	Electroplating wastes buried on-site in bentonite-lined pits.
1974 - 1979	Electroplating discontinued.
January 26, 1981	Received notification of hazardous waste activities.
February & March, 1981	Well monitoring shows high levels of chromium.
July, 1981	Lagoons cleaned and decontaminated.
August 10, 1981	Site inspection under the Uncontrolled Site Program and RCRA.
August 12, 1981	Received "Closure Plan" from NCR.
September 2, 1981	Drums removed.
September 21, 1981	Old disposal pit excavated.
September 25, 1981	Storage area cleaned and decontaminated.
October 21, 1981	Received "Professional Engineer's Certification of Closure" and "Hazardous Waste Site Investigation Report".
November 12, 1981	Four new groundwater monitoring wells installed.
November 30, 1981	Initiation of groundwater monitoring program.
December 9, 1981	Plant Closed.
March, 1982	Four new groundwater monitoring wells installed (total of 13 wells).
April, 1983	TCE concentrations become a concern.
November, 1983	Soil sampling conducted by BCM.
December, 1983	7 new monitoring wells installed to study TCE Plume.
January, 1984	Stream sampling conducted in Iron Branch by BCM. TCE contamination is found.
April, 1984	BCM issues reports on TCE and chromium contamination testing to continue.
July 3, 1984	DNREC site visit to NCR facility.

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III. Environmental Setting

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Geology and Soils

The Columbia Formation is exposed at the site and is approximately 100 feet thick. It is composed of fine to coarse, moderately sorted quartz sands, and gravels. The Pleistocene Columbia Formation lies unconformably on top of the Miocene Chesapeake Group.[10]

Chesapeake Group

The Chesapeake Group is 1,000 feet thick and consists of predominantly gray to bluish gray silts containing beds of gray, fine to medium sand and some shell beds.[10]

Soils

The soil underlying the NCR site is classified as Evesboro loamy sand, EVa 0.2 percent slope. It is very deep excessively drained and sandy.[11]

Groundwater

The shallow groundwater beneath the site exists in the Columbia Formation and is subject to fluctuations between 2 and 4 feet. The water table has an average depth of 12-13 feet below grade.[4] The shallow groundwater flows generally northeast. There is also a vertical component which flows downward and laterally towards areas of lower hydrologic potential. The shallow groundwater is apparently discharging into Iron Branch. A deeper component of the groundwater may flow beneath Iron Branch directly to the Indian River.[4]

Surface Water

Iron Branch, the closest source of fresh surface water flows on the northwest, north and northeast edges of the NCR site. Iron Branch has an 8 square mile watershed.[6] Iron Branch joins Wharton's Branch and flows to Indian River, a tidal estuary. The section of Iron Branch near the plant site receives groundwater discharge from the direction of the plant. Recent stream sampling by BCM, (January 4, 1984) revealed high concentrations of TCE in Iron Branch northeast of the facility.[4] High

ORIGINAL (Red)

quality problems exist in Indian River with severe fecal coliform exceedences and minor D.O. depressions.[9]

Land Use

To the north of the NCR site are the Conrail tracks, Iron Branch, agricultural areas, woodlands, and 1/2 mile away, low density housing. Northwest 1/2 to 1 mile is the town of Millsboro, Delaware. To the west is Route 113, Iron Branch and low density housing. To the south is Route 113 and roadside business district. To the east are the Contrail tracks, agricultural areas and Whartons Branch.

Population Distribution

The site lies just south and east of Millsboro, Delaware which had a population of 1,233 in 1980.[12]

Water Supply

NCR utilized 3 production wells. One was not used afer 1969. Well #3 was inoperative after 1978. Presently, First Freedom Corporation is using Millsboro municipal water for their drinking water. Water is being drawn from one of the operating productions wells to be used in the cooling unit. It comes in no contact with the drinking water.[5] DNREC currently has no information available concerning domestic wells in the immediate area. Areas adjacent to the site receive Millsboro Municipal water. Millsboro's supply wells are located 2 miles northeast of the NCR site near the center of town.

Critical Environments

Indian River located 1/2 mile north of the NCR site is considered a state wetland. TCE contaminated groundwater could potentially reach this area. Iron Branch is recognized by the federal government as a wetlands area.[14]

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IV. Preliminary Assessment Form

EPA

POTENTIAL HAZARDOUS WASTE SITE
IDENTIFICATION AND PRELIMINARY ASSESSMENT

REGION	SITE NUMBER (To be assigned by Hq)
III	DE-42

NOTE: This form is completed for each potential hazardous waste site to help set priorities for site inspection. The inform submitted on this form is based on available records and may be updated on subsequent forms as a result of additional inquir and on-site inspections.

GENERAL INSTRUCTIONS: Complete Sections I and III through X as completely as possible before Section II (*Preliminary Assessment*). File this form in the Regional Hazardous Waste Log File and submit a copy to: U.S. Environmental Protection Agency; Site Tracking System; Hazardous Waste Enforcement Task Force (*EN-335*); 401 M St., SW; Washington, DC 20460.

I. SITE IDENTIFICATION

A. SITE NAME: NCR CORPORATION

B. STREET (*or other identifier*): P.O. BOX 607 Mitchell Rd.

C. CITY: Millsboro

D. STATE: DE

E. ZIP CODE: 19966

F. COUNTY NAME: SUSSEX

G. OWNER/OPERATOR (*If known*)

1. NAME: FIRST FREEDOM, FIRST NATIONAL BANK OF MARYLAND

2. TELEPHONE NUMBER: 301-244-4488

H. TYPE OF OWNERSHIP

☐ 1. FEDERAL ☐ 2. STATE ☐ 3. COUNTY ☐ 4. MUNICIPAL ☒ 5. PRIVATE ☐ 6. UNKNOWN

I. SITE DESCRIPTION

Past electroplating facility with 3 settling lagoons, past disposal pit.

J. HOW IDENTIFIED (*i.e., citizen's complaints, OSHA citations, etc.*): RCRA STATE NOTIFICATION

K. DATE IDENTIFIED (*mo., day, & yr.*): 7/27/81

L. PRINCIPAL STATE CONTACT

1. NAME: DNREC SOLID WASTE BRANCH

2. TELEPHONE NUMBER: 302-736-4781

II. PRELIMINARY ASSESSMENT (*complete this section last*)

A. APPARENT SERIOUSNESS OF PROBLEM

☐ 1. HIGH ☒ 2. MEDIUM ☐ 3. LOW ☐ 4. NONE ☐ 5. UNKNOWN

B. RECOMMENDATION

☐ 1. NO ACTION NEEDED (*no hazard*)

☐ 2. IMMEDIATE SITE INSPECTION NEEDED
a. TENTATIVELY SCHEDULED FOR:
b. WILL BE PERFORMED BY:

☒ 3. SITE INSPECTION NEEDED
a. TENTATIVELY SCHEDULED FOR: (DESK TOP)
b. WILL BE PERFORMED BY: DNREC

☐ 4. SITE INSPECTION NEEDED (*low priority*)

C. PREPARER INFORMATION

1. NAME: Andrew H. Leitzinger

2. TELEPHONE NUMBER: 302-736-4781

3. DATE (*mo., day, & yr.*): 8/1/84

III. SITE INFORMATION

A. SITE STATUS

☐ 1. ACTIVE (*Those industrial or municipal sites which are being used for waste treatment, storage, or disposal on a continuing basis, even if infrequently.*)

☒ 2. INACTIVE (*Those sites which no longer receive wastes.*)

☐ 3. OTHER (*specify*): (*Those sites that include such incidents like "midnight dumping" where no regular or continuing use of the site for waste disposal has occurred.*)

B. IS GENERATOR ON SITE?

☒ 1. NO ☐ 2. YES (*specify generator's four-digit SIC Code*):

C. AREA OF SITE (*in acres*): 58 acres

D. IF APPARENT SERIOUSNESS OF SITE IS HIGH, SPECIFY COORDINATES

1. LATITUDE (*deg.-min.-sec.*): 38°35'20"

2. LONGITUDE (*deg.-min.-sec.*): 75°16'44"

AR1-0048

E. ARE THERE BUILDINGS ON THE SITE?

☐ 1. NO ☒ 2. YES (*specify*): FORMER NCR FACILITY CURRENTLY FIRST FREEDOM CENTER.

Continue On Reverse

IV. CHARACTERIZATION OF SITE ACTIVITY

Indicate the major site activity(ies) and details relating to each activity by marking 'X' in the appropriate boxes.

	A. TRANSPORTER		B. STORER		C. TREATER		D. DISPOSER
	1. RAIL		1. PILE		1. FILTRATION	X	1. LANDFILL
	2. SHIP		2. SURFACE IMPOUNDMENT		2. INCINERATION		2. LANDFARM
	3. BARGE		3. DRUMS		3. VOLUME REDUCTION		3. OPEN DUMP
	4. TRUCK	X	4. TANK, ABOVE GROUND		4. RECYCLING/RECOVERY	X	4. SURFACE IMPOUNDMENT
	5. PIPELINE	X	5. TANK, BELOW GROUND		5. CHEM./PHYS. TREATMENT		5. MIDNIGHT DUMPING
	6. OTHER (specify):		6. OTHER (specify): FORMER		6. BIOLOGICAL TREATMENT		6. INCINERATION
					7. WASTE OIL REPROCESSING		7. UNDERGROUND INJECTION
					8. SOLVENT RECOVERY		8. OTHER (specify): FORMER
					9. OTHER (specify):		

E. SPECIFY DETAILS OF SITE ACTIVITIES AS NEEDED

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V. WASTE RELATED INFORMATION

A. WASTE TYPE

☐ 1. UNKNOWN ☒ 2. LIQUID ☐ 3. SOLID ☒ 4. SLUDGE ☐ 5. GAS

B. WASTE CHARACTERISTICS

☐ 1. UNKNOWN ☐ 2. CORROSIVE ☒ 3. IGNITABLE ☐ 4. RADIOACTIVE ☐ 5. HIGHLY VOLATILE
☒ 6. TOXIC ☐ 7. REACTIVE ☐ 8. INERT ☐ 9. FLAMMABLE

☐ 10. OTHER (specify): Presently not active

C. WASTE CATEGORIES

1. Are records of wastes available? Specify items such as manifests, inventories, etc. below.

2. Estimate the amount (specify unit of measure) of waste by category; mark 'X' to indicate which wastes are present.

a. SLUDGE	b. OIL	c. SOLVENTS	d. CHEMICALS	e. SOLIDS	f. OTHER
AMOUNT	AMOUNT	AMOUNT UNKNOWN	AMOUNT	AMOUNT	AMOUNT
UNIT OF MEASURE	UNIT OF MEASURE	UNIT OF MEASURE	UNIT OF MEASURE	UNIT OF MEASURE	UNIT OF MEASURE
X (1) PAINT, PIGMENTS	X (1) OILY WASTES	X (1) HALOGENATED SOLVENTS	X (1) ACIDS	X (1) FLYASH	X (1) LABORATORY PHARMACEUT.
(2) METALS SLUDGES	(2) OTHER (specify):	(2) NON-HALOGNTD. SOLVENTS	(2) PICKLING LIQUORS	(2) ASBESTOS	(2) HOSPITAL
(3) POTW		(3) OTHER (specify): TCE IN GROUND WATER	(3) CAUSTICS	(3) MILLING/ MINE TAILINGS	(3) RADIOACTIVE
(4) ALUMINUM SLUDGE			(4) PESTICIDES	(4) FERROUS SMLTG. WASTES	(4) MUNICIPAL
(5) OTHER (specify):			(5) DYES/INKS.	(5) NON-FERROUS SMLTG. WASTES	(5) OTHER (specify):
			(6) CYANIDE	(6) OTHER (specify):	
			(7) PHENOLS		
			(8) HALOGENS		
			(9) PCB		
			(10) METALS		
			(11) OTHER (specify)		

AR100485

Continue On Page 3

Continued From Page 2

V. WASTE RELATED INFORMATION (continued)

3. LIST SUBSTANCES OF GREATEST CONCERN WHICH MAY BE ON THE SITE (place in descending order of hazard):

TCE TRICHLOROETHYLENE
Cr^{+6} Hexavalent Chromium
Hg

4. ADDITIONAL COMMENTS OR NARRATIVE DESCRIPTION OF SITUATION KNOWN OR REPORTED TO EXIST AT THE SITE.

TCE plume has been documented by BCM. It extends from the northeast corner of the building, moving northeast and discharging into Iron Branch.

VI. HAZARD DESCRIPTION

A. TYPE OF HAZARD	B. POTENTIAL HAZARD (mark 'X')	C. ALLEGED INCIDENT (mark 'X')	D. DATE OF INCIDENT (mo., day, yr.)	E. REMARKS
1. NO HAZARD				
2. HUMAN HEALTH				
3. NON-WORKER INJURY/EXPOSURE				
4. WORKER INJURY				
5. CONTAMINATION OF WATER SUPPLY	X			TCE IS IN THE GROUNDWATER, IT MAY AFFECT LOCAL DRINKING WATER SUPPLY.
6. CONTAMINATION OF FOOD CHAIN	X			TCE FOUND IN FISH IN IRON BRANCH.
7. CONTAMINATION OF GROUND WATER		X		TCE PLUME DOCUMENTED BY BCM
8. CONTAMINATION OF SURFACE WATER		X		GROUND WATER DISCHARGE INTO IRON BRANCH.
9. DAMAGE TO FLORA/FAUNA				
10. FISH KILL				
11. CONTAMINATION OF AIR				
12. NOTICEABLE ODORS				
13. CONTAMINATION OF SOIL				
14. PROPERTY DAMAGE				
15. FIRE OR EXPLOSION				
16. SPILLS/LEAKING CONTAINERS/ RUNOFF/STANDING LIQUIDS		X		TCE SPILLED PERIODICALLY.
17. SEWER, STORM DRAIN PROBLEMS				
18. EROSION PROBLEMS				
19. INADEQUATE SECURITY				
20. INCOMPATIBLE WASTES				
21. MIDNIGHT DUMPING				
22. OTHER (specify):				

AR100486

VII. PERMIT INFORMATION

A. INDICATE ALL APPLICABLE PERMITS HELD BY THE SITE:

☒ 1. NPDES PERMIT ☐ 2. SPCC PLAN ☒ 3. STATE PERMIT (specify): WPCC3118 A/74 discharge permit
☐ 4. AIR PERMITS ☐ 5. LOCAL PERMIT ☐ 6. RCRA TRANSPORTER
☐ 7. RCRA STORER ☐ 8. RCRA TREATER ☐ 9. RCRA DISPOSER

☐ 10. OTHER (specify): All permits are void.

B. IN COMPLIANCE?

☒ 1. YES ☐ 2. NO ☐ 3. UNKNOWN

4. WITH RESPECT TO (list regulation name & number): PAST

VIII. PAST REGULATORY ACTIONS

☒ A. NONE ☐ B. YES (summarize below)

IX. INSPECTION ACTIVITY (past or ongoing)

☐ A. NONE ☐ B. YES (complete items 1, 2, 3, & 4 below)

ORIGINAL (Red)

1. TYPE OF ACTIVITY	2. DATE OF PAST ACTION (mo., day, & yr.)	3. PERFORMED BY: (EPA/State)	4. DESCRIPTION
preliminary assessment	8/81	E&E	
site investigation	5/82	DNREC	

X. REMEDIAL ACTIVITY (past or ongoing)

☐ A. NONE ☒ B. YES (complete items 1, 2, 3, & 4 below)

1. TYPE OF ACTIVITY	2. DATE OF PAST ACTION (mo., day, & yr.)	3. PERFORMED BY: (EPA/State)	4. DESCRIPTION
GROUNDWATER TESTING	1981-7/84	BCM	A continuing investigation following NCR's closure.

NOTE: Based on the information in Sections III through X, fill out the Preliminary Assessment (Section II) information on the first page of this form.

V. Field Trip Summary Report

FIELD TRIP SUMMARY REPORT

This summary should be prepared in conjunction with the Preliminary Assessment Form, (EPA Form T2070-2), so that a proper site rating can be assigned.

Name of Site NCR(PRESENTLY FIRST FREEDOM CENTER)

EPA Case Number DE-42

TDD Number

I. If site is active, has owner/operator notified EPA in accordance with Section 3010 of RCRA. Yes___ No___

If Yes: a) Note EPA I.D. No.
b) Is the site a generator, storer, treater or disposer of hazardous waste? (CIRCLE ONE).

II. If the answers submitted in Part VI (Hazard Description) of EPA Form T2070-2 or observations warrant a more thorough site investigation/sampling, please attach a sketch map showing those areas of concern. (i.e.: lagoons, leachate seeps, drum storage, monitoring wells, etc.).

III. Please list site contacts and accompanying inspectors; include name, title and phone numbers: W. Richard Calhoun, Facilities Manager, First Delaware Land Holdi Corporation(302)-934-2390 Andrew Leitzinger, Brad Smith, Nancy Camp, ERRIS investigat (302)-736-4781

IV. Site observations: (attach a topo map).

A. Population within 1000 ft. of the site is (CIRCLE ONE)

1. 0-10 people
2. 10-100 people
3. greater than 100 people

B. List surrounding land use: (wood lot, agricultural, playground, industrial, etc.).

North: IRON BRANCH CONRAIL TRACKS, MEDIUM DENSITY HOUSING, AGRICULTURAL AREAS, WOO

South: Route 113, business district

East: FIELD, CONRAIL TRACKS, WHARTON'S BRANCH.

West: ROUTE 113, IRON BRANCH, LOW DENSITY HOUSING.

C. Water supply for area. (CIRCLE ONE) ORIGINAL (red)

1. Surface intakes (locate on attached map) NONE
2. (Municipal wells) (locate on map) SEE MAP
3. Domestic wells:
   a. Approximate number within 1/4 mile. NONE WITHIN ¼ MILE.
   b. Locate a minimum of 3 wells on attached map and list below:

Property owner	_____	_____	_____
Address	_____	_____	_____
Phone No.	_____	_____	_____
Well records	YES___ NO___	YES___ NO___	YES___ NO___
Odor Problems	YES___ NO___	YES___ NO___	YES___ NO___
Taste Problems	YES___ NO___	YES___ NO___	YES___ NO___

   c. If odor or taste problems are reported please elaborate: _____

D. Are surface or subsurface, (leachate), drainage areas from site apparent? YES___ NO X. If yes:

1. Were unusual odors or stains noted? YES___ NO X
2. Was stressed vegetation noted? YES___ NO X

E. Are streams or receiving waters adjacent to site? YES X NO___
If yes, list observations: (i.e. - change in benthic community, change in plant density/diversity, change in color, siltation, etc.). _____

NO CHANGE SEEN IN THE STREAM. STREAM IS IN A WELL VEGETATED FLOODPLAIN AREA.

F. Site topography: (i.e. - plateau, strip mine ravines, etc.). _____

FLAT LYING COASTAL PLAIN, SANDY SOIL.

G. Other observations: (i.e. - erosion, located in flood plain, etc.). _____

AR100490

FIELD TRIP SUMMARY REPORT TDD Number _____ Page 3

V. Were photographs taken? YES X NO ___
If yes: Who has custody of photographs?

Name: ANDREW H. LEITZINGER

Agency: DNREC

Phone No.: (302)-736-4781

ORIGINAL (Red)

VI. Is a hydrogeological survey for this site attached? YES X NO ___
If no, Section III D of EPA Form T2070-2 must be completed.

VII. Please attach pertinent copies of reports or data reviewed by inspector: (i.e. - State monitoring data, consultant reports, etc.).

VIII. Name of Inspector: ANDREW H. LEITZINGER

Agency: DNREC

Phone No.: (302)-736-4781

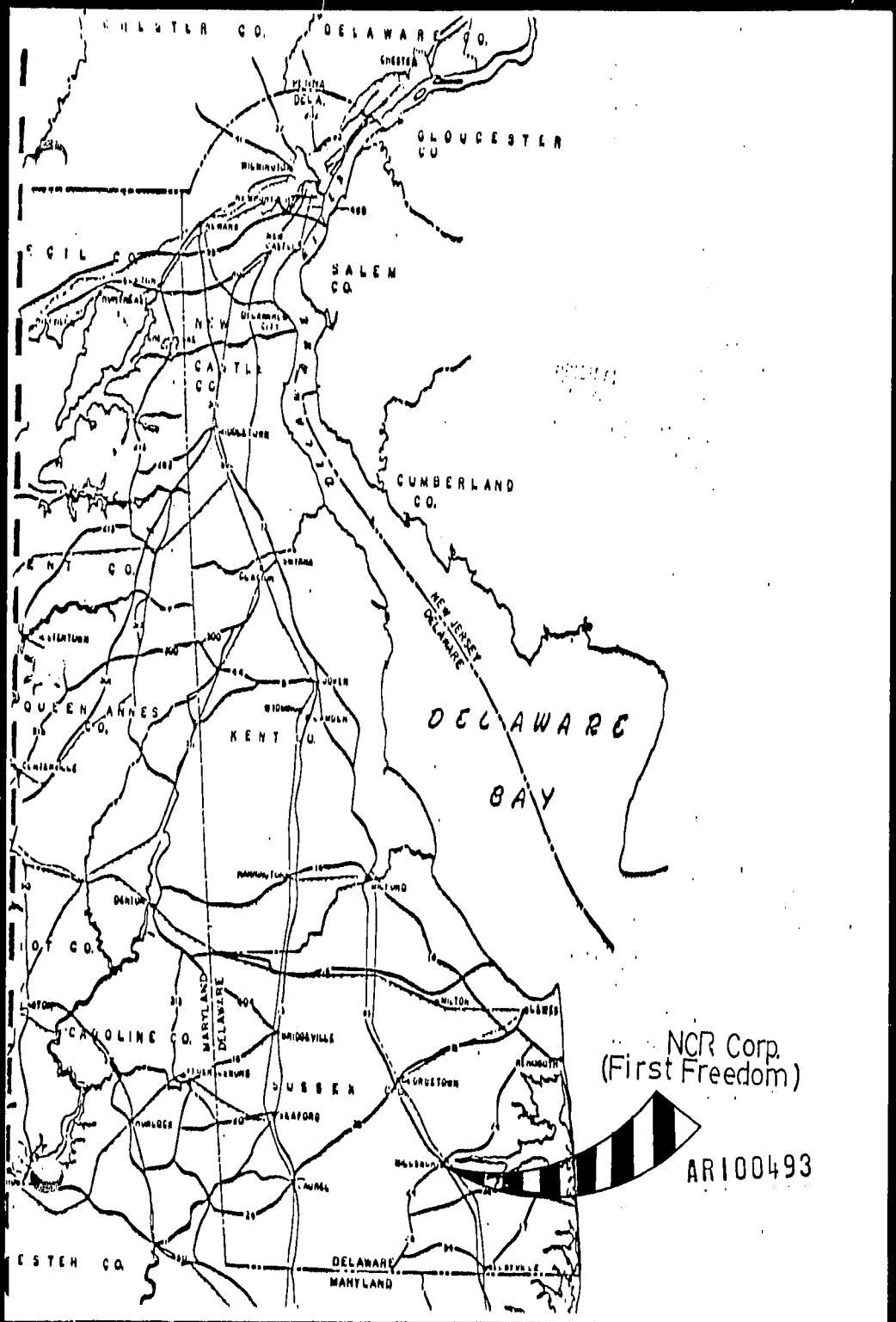
Time on Site: 9:30 AM July 3, 1984

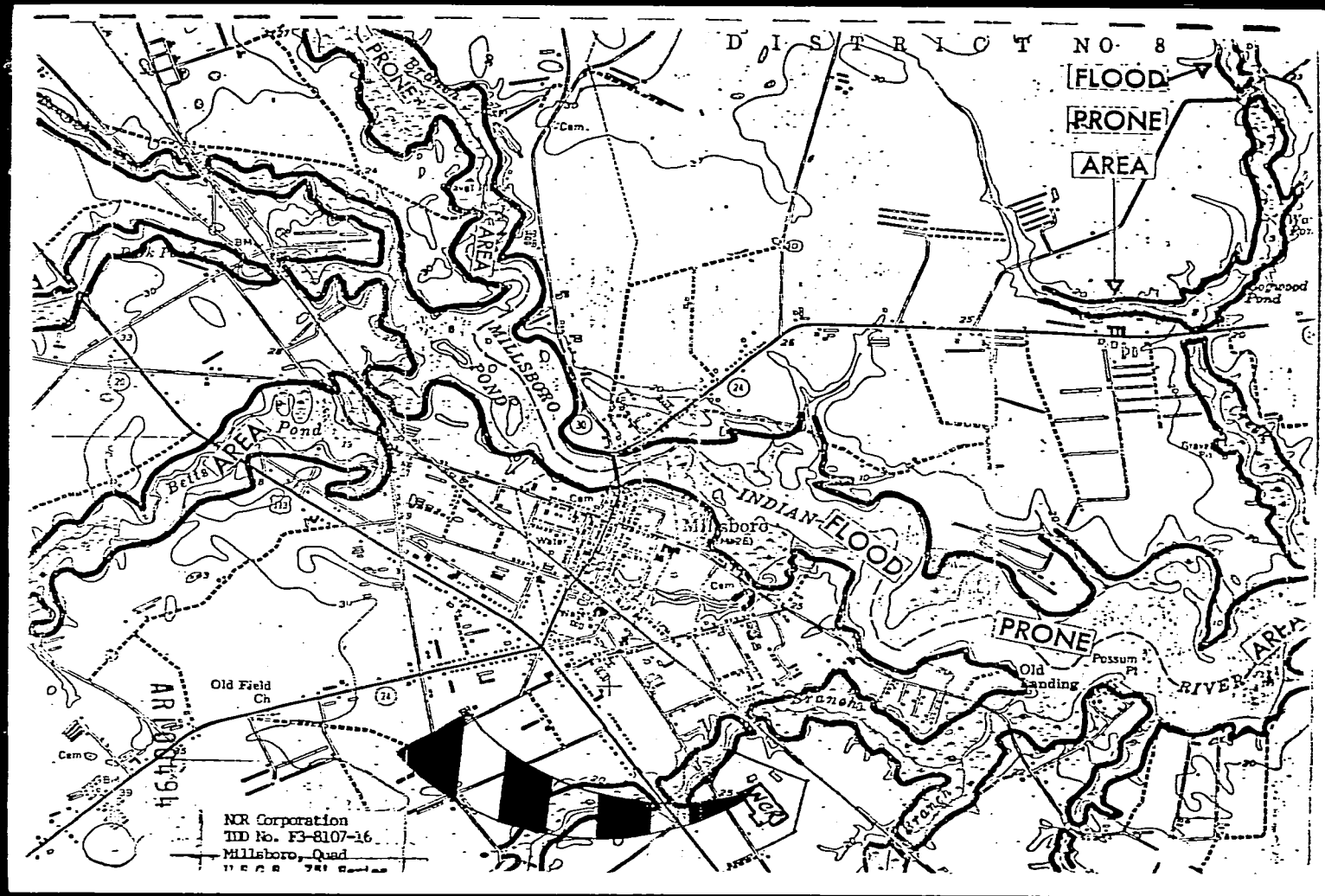
Weather Conditions: Warm sunny and humid. 85°F

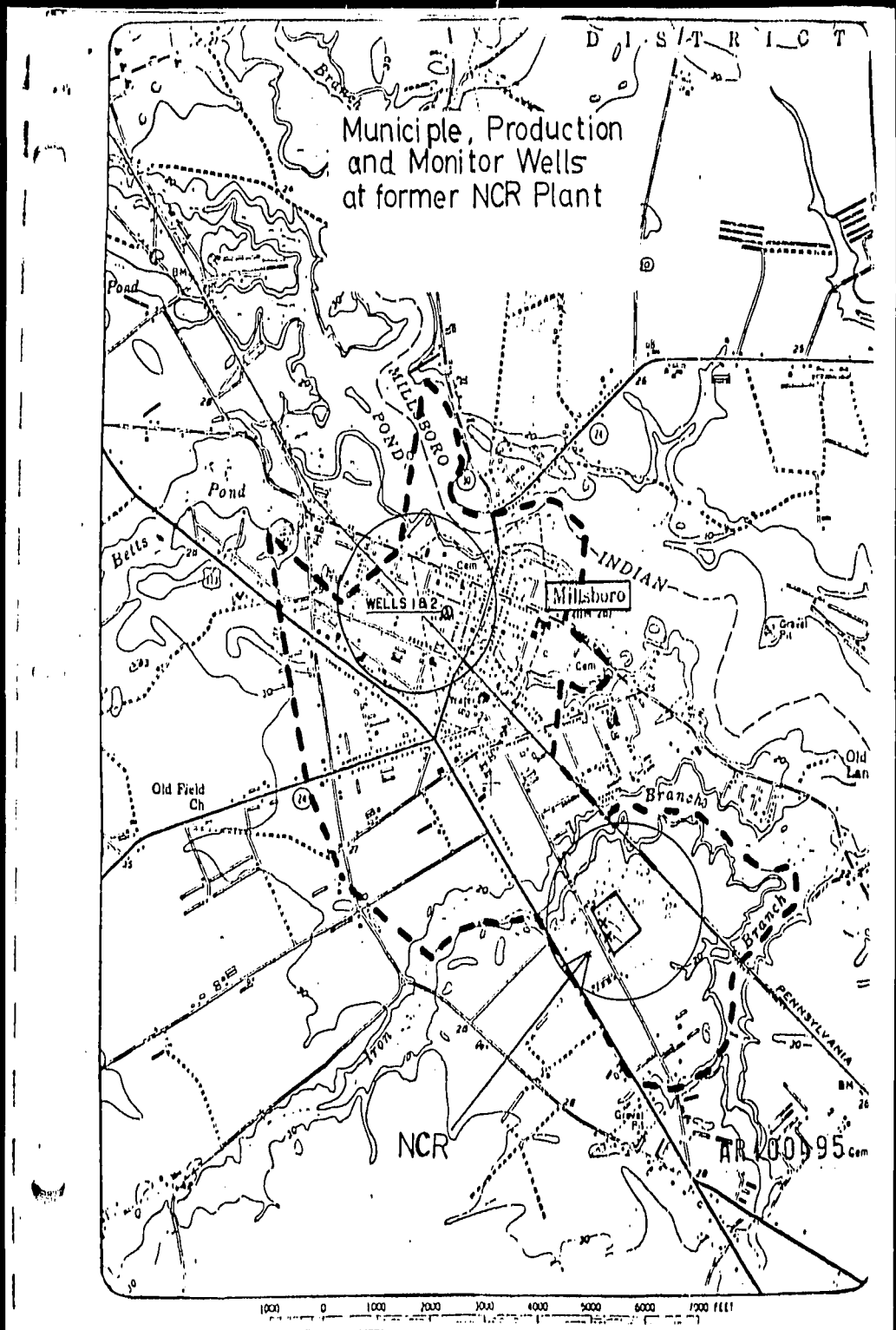
AR100491

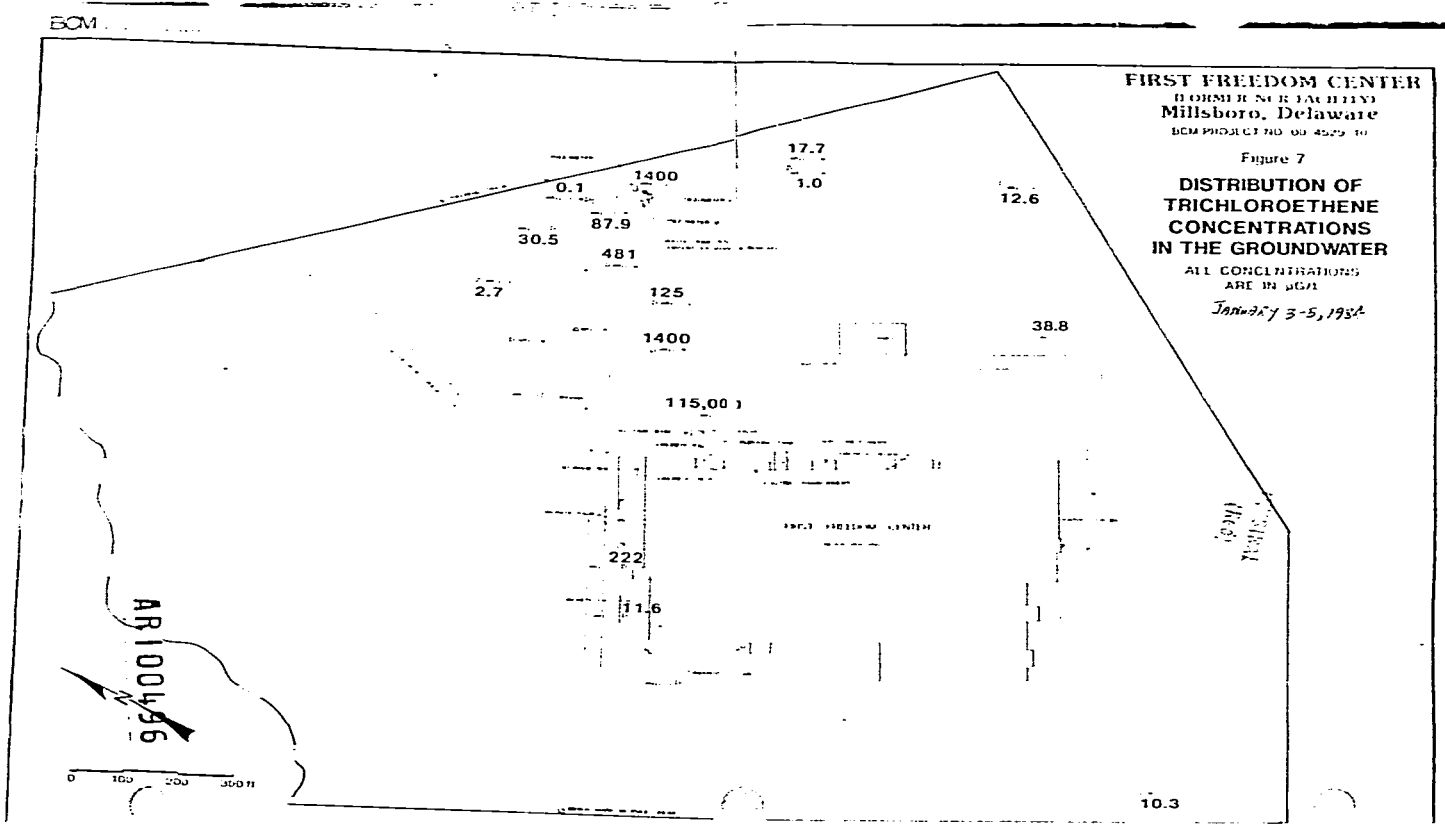
ORIGINAL
(Red)

VI. Maps and Drawings


DELAWARE CO.
GLOUCESTER CO
SALEM CO.
CUMBERLAND CO.
NEW JERSEY
DELAWARE
DELAWARE BAY
KENT CO.
QUEEN ANNES CO.
CAROLINE CO.
MARYLAND
DELAWARE
SUSSEX
DELAWARE
MARYLAND
NCR Corp.
(First Freedom)
AR100493


DISTRICT NO. 8
FLOOD
PRONE
AREA
PRONE AREA
MILLSBORO POND
Millsboro Pond
Millsboro
INDIAN FLOOD
PRONE
Old Landing
Possum Pt
RIVER
Old Field Ch
Cem
NCR
NCR Corporation
TID No. F3-8107-16
Millsboro, Quad


Municiple, Production
and Monitor Wells
at former NCR Plant
DISTRICT
Pond
MILLSBORO
POND
Pond
Bells
INDIAN
WELLS 1&2
Millsboro
Old Field
Ch
Branch
Branch
PENNSYLVANIA
NCR
AR 000195
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET



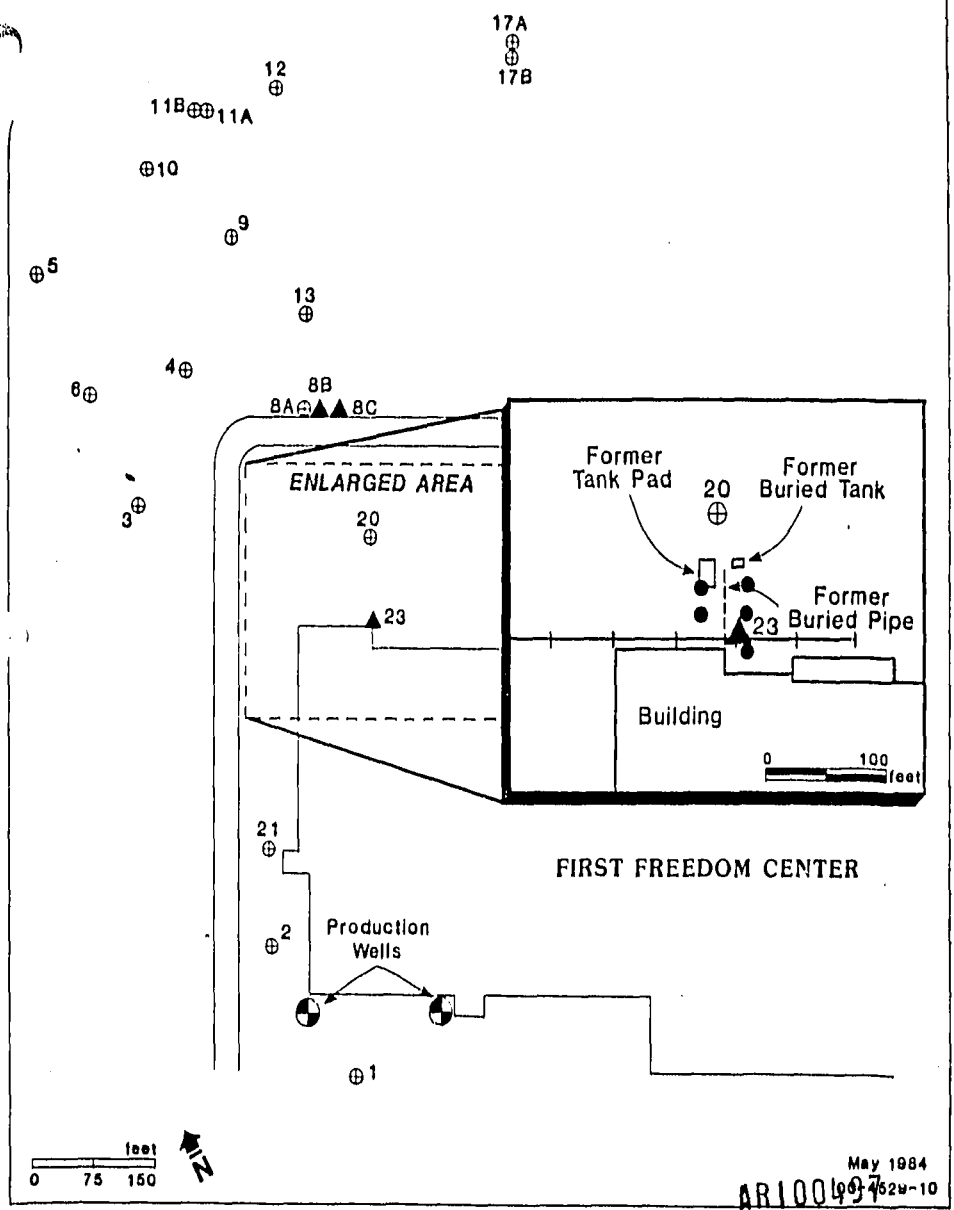
FIRST FREEDOM CENTER
FORMER NCR FACILITY
Millsboro, Delaware
BCM PROJECT NO 90 4529 10

Figure 7

DISTRIBUTION OF TRICHLOROETHENE CONCENTRATIONS IN THE GROUNDWATER

ALL CONCENTRATIONS ARE IN µG/L

January 3-5, 1994



AR100497

LEGEND

- ⊕ Existing Monitoring Well
- ▲ Proposed Monitoring Well
- ● Proposed Soil Boring

FIGURE 1

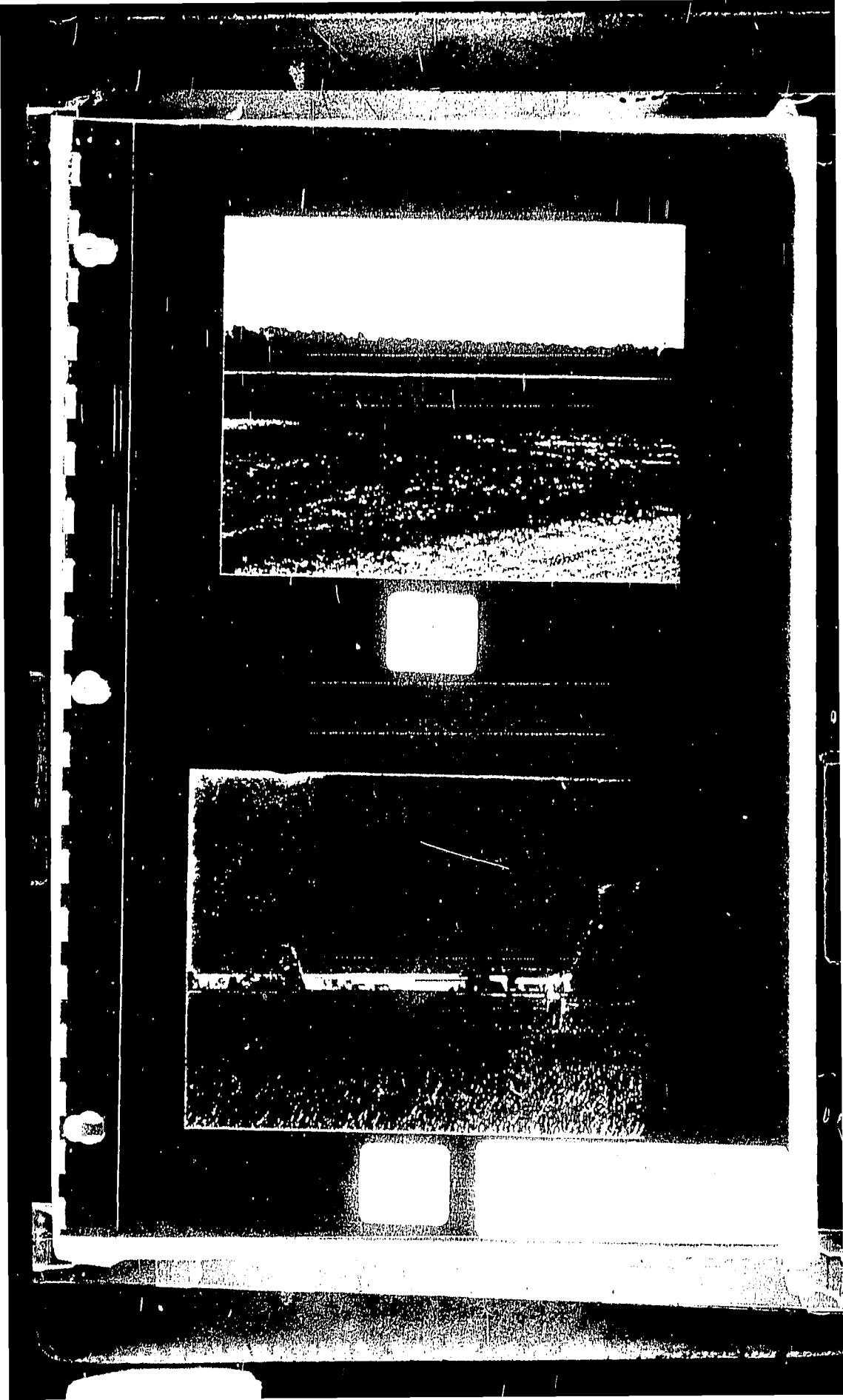
LOCATIONS OF EXISTING AND PROPOSED MONITORING WELLS FIRST FREEDOM CENTER

(FORMER NCR FACILITY)

Millsboro, Delaware

ORIGINAL
(Red)

VII. Photographs



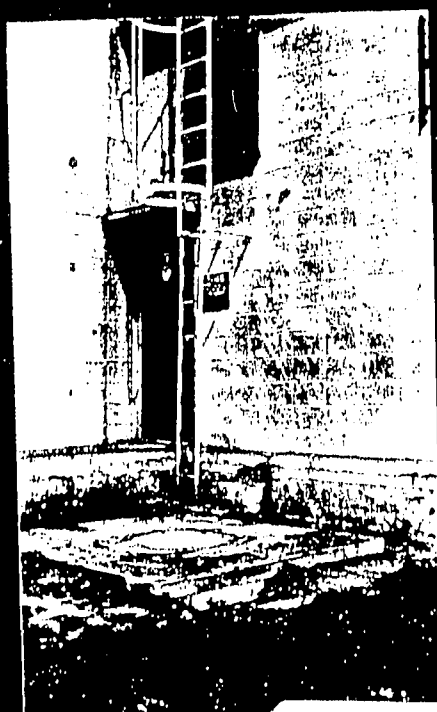
1

VIEW FROM NEAR THE SOURCE OF THE TCE CONTAMINATION PLUME TOWARDS THE NORTHEAST.

2

VIEW FROM BEHIND THE RAILROAD TRACKS TOWARD NCR(FIRST FREEDOM). THE CONTAMINATION PLUME EXTENDS FROM THE BUILDING SHOWN, PAST THE PHOTOGRAPHER AND TOWARD IRON BRANCH.

3



AR100501

3

VIEW TOWARD THE NORTHEAST. SHOWS MONITOR WELLS #11,12. THIS IS THE APPROXIMATE AREA OF THE OLD WASTE LANDFILL.

4

POSITION WHERE TCE TANK STOOD NEAR THE NORTHEAST CORNER OF THE BUILDING.

ORIGINAL
(Red)

VIII. References

1. Excavated Sludge Disposal Site Post Closure Monitoring and Groundwater Quality Assessment for NCR Corporation former facility - Millsboro, Delaware (First Freedom Center) BCM, April, 1984.

2. EPA Bulletin, Landfill files August 20, 1981.

3. Field Investigations of Uncontrolled Hazardous Waste Sites F.I.T. Project. Preliminary Assessment of NCR Corporation. Ecology and Environment Inc.

4. Groundwater Quality Investigation and Groundwater Quality Management Plan Interim Report for NCR Corporation former facility - Millsboro, Delaware (First Freedom Center), April, 1984.

5. Conversation with W. Richard Calhoun, Facilities Manager, First Delaware Land Holdings Corporation, July 3, 1984.

6. Well permit files DNREC.

7. NPDES Files - Void, DNREC.

8. Delaware State News Library.

9. Delaware Stream Water Quality Update Report #4, March, 1984, DNREC.

10. The Availability of Groundwater in Eastern Sussex County, Delaware. R. W. Sundstrom and T. E. Pickett, June, 1969.

11. Soil Survey, Sussex County Delaware, May, 1974.

12. Census figure 1980.

13. TCE Investigation Expanded Groundwater Assessment Program First Freedom Center Former NCR Corporation Plant, Millsboro, Delaware.

14. Conversation with Bill Moyer, Wetlands Section, DNREC, July 11, 1984.

ORIGINAL
(Red)

APPENDIX F

FIELD INVESTIGATIONS OF UNCONTROLLED HAZARDOUS WASTE SITES

FIT PROJECT

TASK REPORT TO THE
ENVIRONMENTAL PROTECTION AGENCY
CONTRACT NO. 68-01-6056

FIELD INVESTIGATIONS OF UNCONTROLLED HAZARDOUS WASTE SITES

FIT PROJECT

TASK REPORT TO THE
ENVIRONMENTAL PROTECTION AGENCY
CONTRACT NO. 68-01-6056

Preliminary Assessment
of

NCR Corporation
Millsboro, DE
TDD No. F3-8107-16
EPA No. DE-42

Presented to: Bruce Smith
EPA Region III

Prepared by: Elizabeth Gross
FIT Region III

ecology and environment, inc.
International Specialists in the Environmental Sciences

NCR Corporation
Millsboro, DE
TDD No. F3-8107-16
EPA No. DE-42

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Section 1 Summary and Recommendations

Section 2 Preliminary Assessment Form

Section 3 Field Trip Summary Report

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Section 5 Photographic Log

Section 6 Maps

Section 7 Attachments

- o Monitoring Well Results (4/30/74 and 8/10/81)
- o Chronology (State Files)
- o Correspondence

ORIGINAL
(Red)

SECTION I

NCR Corporation
TDD No. F3-8107-16
EPA No. DE-42

Summary and Recommendations

Summary

The National Cash Register (NCR) Corporation started up their Millsboro, DE facility in October 1967 and are closing down the facility in September, 1981. The plant originally was a manufacturing facility of point of sale terminals using electroplating operations. Between the years of 1974 and 1979, the operations changed from manufacturing to assembly only and consequently shut down the electroplating operations. Prior to 1973-74 the electroplating wastes were diluted, treated with caustic soda and passed through a series of settling lagoons before discharge to a drainage ditch. The ditch emptied into Iron Branch Creek, then into Indian River.

The sludge produced was buried on NCR property in bentonite-lined pits with the approval of Delaware Department of Natural Resources and Environmental Control (DNREC). A violation in 1973 of the NPDES permit resulted in the addition of monitoring wells on-site in the vicinity of the disposal pits. With the change of operations and the reduction of sludge production the pits were sealed and covered. Only one lagoon has been used for the collection and discharge of cooling water since 1978. The two lagoons used for settling, as of July, 1981, were cleaned and decontaminated by Clean America. The remaining wastes were hauled away by AT and T and disposed of at the Baltimore facilityu of American Recovery. Other wastes that were on-site at the time of the plant visit consisted of sixty drums of waste flux from the wave solder machine, some freon and other solvents used for cleaning.

The results of the sampling done on August 10, 1981 show Cr contamination of monitoring well #1 of 180 ppb. (See Map Section 6 of the report for locations of Well #1).

Summary (continued)

A RCRA inspection was performed by Jay Mortwani of the Delaware DNREC on August 10, 1981 in conjunction with the FIT Preliminary Assessment. Although there were RCRA violations noted during the inspection, the state would prefer not to issue a Notice of Violation but monitor the plant's closure plans instead.

Recommendations

Due to the state's cooperation with NCR in the closing of the plant, Delaware Department of Natural Resources and Environmental Control (DNREC) should keep the lead on this site. The state agency, DNREC, has expressed their intent to follow the closure procedures of the facility and to ensure that responsibility for sampling and analysis of the groundwater monitoring wells is assumed. Remedial action with respect to the bentonite-lined pits will depend on the groundwater monitoring. The responsibility for this action should also be designated before the sale of the property.

SECTION 2

F3-8107-16

EPA POTENTIAL HAZARDOUS WASTE SITE IDENTIFICATION AND PRELIMINARY ASSESSMENT

REGION: III | SITE NUMBER (to be assigned by Reg.): 16

NOTE: This form is completed for each potential hazardous waste site to help set priorities for site inspection. The information submitted on this form is based on available records and may be updated on subsequent forms as a result of additional inquiries and on-site inspections.

GENERAL INSTRUCTIONS: Complete Sections I and III through X as completely as possible before Section II (Preliminary Assessment). File this form in the Regional Hazardous Waste Log File and submit a copy to: U.S. Environmental Protection Agency; Site Tracking System; Hazardous Waste Enforcement Task Force (EN-335); 401 M St., SW; Washington, DC 20460.

I. SITE IDENTIFICATION

A. SITE NAME: NCR Corporation

B. STREET (or other identifier): P.O. Box 607, Mitchell Road

C. CITY: Millsboro

D. STATE: DE

E. ZIP CODE: 19966

F. COUNTY NAME: Sussex

G. OWNER/OPERATOR (If known)

1. NAME: NCR Corporation

2. TELEPHONE NUMBER: (302) 934-8111

H. TYPE OF OWNERSHIP

☐ 1. FEDERAL ☐ 2. STATE ☐ 3. COUNTY ☐ 4. MUNICIPAL ☒ 5. PRIVATE ☐ 6. UNKNOWN

I. SITE DESCRIPTION: Engineering/Manufacturing facility for Assembly of point of sale terminals - past disposal pit for electroplating waste

J. HOW IDENTIFIED (i.e., citizen's complaints, OSHA citations, etc.): RCRA; state notification

K. DATE IDENTIFIED (mo., day, & yr.): 7/27/81

L. PRINCIPAL STATE CONTACT

1. NAME: Ken Weiss

2. TELEPHONE NUMBER: (302) 736-5061

II. PRELIMINARY ASSESSMENT (complete this section last)

A. APPARENT SERIOUSNESS OF PROBLEM

☐ 1. HIGH ☐ 2. MEDIUM ☒ 3. LOW ☐ 4. NONE ☐ 5. UNKNOWN

B. RECOMMENDATION

☐ 1. NO ACTION NEEDED (no hazard)

☐ 2. IMMEDIATE SITE INSPECTION NEEDED
a. TENTATIVELY SCHEDULED FOR:
b. WILL BE PERFORMED BY:

☐ 3. SITE INSPECTION NEEDED
a. TENTATIVELY SCHEDULED FOR: Let DE DNREC keep the lead.
b. WILL BE PERFORMED BY:

☐ 4. SITE INSPECTION NEEDED (low priority)

C. PREPARER INFORMATION

1. NAME: Elizabeth Gross

2. TELEPHONE NUMBER: (609) 665-1515

3. DATE (mo., day, & yr.): 8/10/81

III. SITE INFORMATION

A. SITE STATUS

☒ 1. ACTIVE (Those industrial or municipal sites which are being used for waste treatment, storage, or disposal on a continuing basis, even if intermittently.) To close Aug 28, 1981

☐ 2. INACTIVE (Those sites which no longer receive wastes.)

☐ 3. OTHER (specify): (Those sites that include such incidents like "midnight dumping" where no regular or continuing use of the site for waste disposal has occurred.)

B. IS GENERATOR ON SITE?

☐ 1. NO ☒ 2. YES (specify generator's four-digit SIC Code): 3574

C. AREA OF SITE (in acres): 58

D. IF APPARENT SERIOUSNESS OF SITE IS HIGH, SPECIFY COORDINATES

1. LATITUDE (deg.-min.-sec.): 38° 35' 20"

2. LONGITUDE (deg.-min.-sec.): 75° 16' 44"

AR100513

E. ARE THERE BUILDINGS ON THE SITE?

☐ 1. NO ☒ 2. YES (specify): Plant building

T2070-2 (10-79)

Continue On Reverse

F3-8107-16

Continued From Front

IV. CHARACTERIZATION OF SITE ACTIVITY

Indicate the major site activity(ies) and details relating to each activity by marking 'X' in the appropriate boxes.

X	A. TRANSPORTER	X	B. STORER	X	C. TREATER	X	D. DISPOSER
	1. RAIL		1. PILE		1. FILTRATION		1. LANDFILL
	2. SHIP		2. SURFACE IMPOUNDMENT		2. INCINERATION		2. LANDFARM
	3. BARGE	X	3. DRUMS		3. VOLUME REDUCTION		3. OPEN DUMP
	4. TRUCK		4. TANK, ABOVE GROUND		4. RECYCLING/RECOVERY	X	4. SURFACE IMPOUNDMENT
	5. PIPELINE	X	5. TANK, BELOW GROUND		5. CHEM./PHYS. TREATMENT		5. MIDNIGHT DUMPING
	6. OTHER (specify):		6. OTHER (specify):		6. BIOLOGICAL TREATMENT		6. INCINERATION
					7. WASTE OIL REPROCESSING		7. UNDERGROUND INJECTION
					8. SOLVENT RECOVERY		8. OTHER (specify):
					9. OTHER (specify): (Red)		

E. SPECIFY DETAILS OF SITE ACTIVITIES AS NEEDED

Electroplating operation shut down; changed over to new operations 1974-1979; lagoons cleaned out and sludge buried in pit and covered/monitoring wells installed. Presently, one lagoon is being used to collect and discharge air conditioning unit cooling water. Also, approx. 60 drums of waste flux and cleaning solvents being stored in plant.

V. WASTE RELATED INFORMATION

A. WASTE TYPE

☐ 1. UNKNOWN ☒ 2. LIQUID ☐ 3. SOLID ☒ 4. SLUDGE ☐ 5. GAS

B. WASTE CHARACTERISTICS

☐ 1. UNKNOWN ☐ 2. CORROSIVE ☒ 3. IGNITABLE ☐ 4. RADIOACTIVE ☒ 5. HIGHLY VOLATILE
☒ 6. TOXIC ☐ 7. REACTIVE ☐ 8. INERT ☒ 9. FLAMMABLE

☐ 10. OTHER (specify):

C. WASTE CATEGORIES

1. Are records of wastes available? Specify items such as manifests, inventories, etc. below.

Yes, since November 19th, 1980

2. Estimate the amount(specify unit of measure) of waste by category; mark 'X' to indicate which wastes are present.

a. SLUDGE	b. OIL	c. SOLVENTS	d. CHEMICALS	e. SOLIDS	f. OTHER
AMOUNT: 55	AMOUNT:	AMOUNT: 5	AMOUNT:	AMOUNT:	AMOUNT:
UNIT OF MEASURE: 55 gal	UNIT OF MEASURE:	UNIT OF MEASURE: 55 gal	UNIT OF MEASURE:	UNIT OF MEASURE:	UNIT OF MEASURE:
☐ (1) PAINT, PIGMENTS	☐ (1) OILY WASTES	☒ (1) HALOGENATED SOLVENTS	☐ (1) ACIDS	☐ (1) FLYASH	☐ (1) LABORATORY PHARMACEUT.
☐ (2) METALS SLUDGES	☐ (2) OTHER(specify):	☐ (2) NON-HALOGNTD. SOLVENTS	☐ (2) PICKLING LIQUORS	☐ (2) ASBESTOS	☐ (2) HOSPITAL
☐ (3) POTW		☐ (3) OTHER(specify): Freon	☐ (3) CAUSTICS	☐ (3) MILLING/ MINE TAILINGS	☐ (3) RADIOACTIVE
☐ (4) ALUMINUM SLUDGE			☐ (4) PESTICIDES	☐ (4) FERROUS SMLTG. WASTES	☐ (4) MUNICIPAL
☒ (5) OTHER(specify): Wave length bolder mach. flux			☐ (5) DYES/INKS	☐ (5) NON-FERROUS SMLTG. WASTES	☐ (5) OTHER(specify):
solvent compatable wastes (bulked)			☐ (6) CYANIDE	☐ (6) OTHER(specify):	
			☐ (7) PHENOLS		
			☐ (8) HALOGENS		
			☐ (9) PCB		
			☐ (10) METALS		
			☐ (11) OTHER(specify)		

AR10051

Continued From Page 2

V. WASTE RELATED INFORMATION (continued)

3. LIST SUBSTANCES OF GREATEST CONCERN WHICH MAY BE ON THE SITE (place in descending order of hazard).

Cr+6
Hg

(Red)

4. ADDITIONAL COMMENTS OR NARRATIVE DESCRIPTION OF SITUATION KNOWN OR REPORTED TO EXIST AT THE SITE.

In monitoring well #4 - Cr levels found in Feb & March 1981

VI. HAZARD DESCRIPTION

A. TYPE OF HAZARD	B. POTENTIAL HAZARD (mark 'X')	C. ALLEGED INCIDENT (mark 'X')	D. DATE OF INCIDENT (mo., day, yr.)	E. REMARKS
1. NO HAZARD				
2. HUMAN HEALTH				
3. NON-WORKER INJURY/EXPOSURE				
4. WORKER INJURY				
5. CONTAMINATION OF WATER SUPPLY				
6. CONTAMINATION OF FOOD CHAIN				
7. CONTAMINATION OF GROUND WATER		X	2/81 - 3/81	Cr levels found in monitoring wells.
8. CONTAMINATION OF SURFACE WATER				
9. DAMAGE TO FLORA/FAUNA				
10. FISH KILL				
11. CONTAMINATION OF AIR				
12. NOTICEABLE ODORS				
13. CONTAMINATION OF SOIL				
14. PROPERTY DAMAGE				
15. FIRE OR EXPLOSION				
16. SPILLS/LEAKING CONTAINERS/ RUNOFF/STANDING LIQUIDS				
17. SEWER, STORM DRAIN PROBLEMS				
18. EROSION PROBLEMS				
19. INADEQUATE SECURITY				
20. INCOMPATIBLE WASTES				
21. MIDNIGHT DUMPING				
22. OTHER (specify)				

Continue On Reverse

VII. PERMIT INFORMATION

A. INDICATE ALL APPLICABLE PERMITS HELD BY THE SITE.

☒ 1. NPDES PERMIT ☐ 2. SPCC PLAN ☒ 3. STATE PERMIT (specify): DE-52

☐ 4. AIR PERMITS ☐ 5. LOCAL PERMIT ☐ 6. RCRA TRANSPORTER

☐ 7. RCRA STORER ☐ 8. RCRA TREATER ☐ 9. RCRA DISPOSER

☐ 10. OTHER (specify): WPCC 3118 A/74 State Permit - Discharge to Surface Water

B. IN COMPLIANCE?

☒ 1. YES ☐ 2. NO ☐ 3. UNKNOWN

4. WITH RESPECT TO (list regulation name & number):

VIII. PAST REGULATORY ACTIONS

☒ A. NONE ☐ B. YES (summarize below)

ORIGINAL (Red)

IX. INSPECTION ACTIVITY (past or on-going)

☐ A. NONE ☐ B. YES (complete items 1, 2, 3, & 4 below)

1. TYPE OF ACTIVITY	2. DATE OF PAST ACTION (mo., day, & yr.)	3. PERFORMED BY: (EPA/State)	4. DESCRIPTION
Sampling	8/81	State	Compliance monitoring

X. REMEDIAL ACTIVITY (past or on-going)

☐ A. NONE ☐ B. YES (complete items 1, 2, 3, & 4 below)

1. TYPE OF ACTIVITY	2. DATE OF PAST ACTION (mo., day, & yr.)	3. PERFORMED BY: (EPA/State)	4. DESCRIPTION
RCRA		State	Post closure procedure

NOTE: Based on the information in Sections III through X, fill out the Preliminary Assessment (Section II) information on the first page of this form.

Closing August 28, 1981

SECTION 3

FIELD TRIP SUMMARY REPORT

This summary should be prepared in conjunction with the Preliminary Assessment Form, (EPA Form T2070-2), so that a proper site rating can be assigned.

Name of Site NCR Corporation

EPA Case Number DE-42

I. If site is active, has owner/operator notified EPA in accordance with Section 3010 of RCRA. Yes X No

If Yes: a) Note EPA I.D. No. DED043958388

b) Is the site a (generator) storer, treater or disposer of hazardous waste? (CIRCLE ONE).

II. If the answers submitted in Part VI (Hazard Description) of EPA Form T2070-2 or observations warrant a more thorough site investigation/sampling, please attach a sketch map showing those areas of concern. (i.e.: lagoons, leachate seeps, drum storage, monitoring wells, etc.).

III. Please list site contacts and accompanying inspectors; include name, title and phone numbers.

Jay Motwani, Lisa Hamilton : DNREC 302/736-5061
Richard Calhoun, Manager-Facilities Management; Larry Schaffer, Industrial Engineer III : NCR 302/934-8111
Beth Gross, Stan Bumble : E+E FIT III : 609/665-1515

IV. Site observations: (attach a topo map).

A. Population within 1000 ft. of the site is (CHECK ONE)

1. 0-10 people
(2). 10-100 people
3. greater than 100 people

B. List surrounding land use: (woodlot, agricultrual, playground, industrial,etc.)

North: residential
South: agricultural
East: agricultural
West: agricultural

AR100518

V. Were photographs taken? YES X NO ___
If yes: Who has custody of photos?

Name: File F3-8107-16

Agency: Ecology and Environment, Inc.

Phone No.: 609/665-1515

VI. Is a hydrogeological survey for this site attached? YES ___ NO X
If no, Section III D of EPA Form T2070-2 must be completed.
Contamination Potential has been requested.

VII. Please attach pertinent copies of reports or data reviewed by inspector:
(i.e.-State monitoring data, consultant reports, etc.).

VIII. Name of Inspector: Elizabeth Gross / Stanley Bumble

Agency: Ecology and Environment, Inc.

Phone No.: 609/665-1515

Time on Site: 1005 - 1330

Weather Conditions: high 80's, sunny

ORIGINAL (red)

C. Water supply for area. (CHECK ONE)

1. Surface intakes (locate on attached map)
(2) Municipal wells (locate on attached map)
(3) Domestic wells:

a. Approximate number within ¼ mile. one well located 100'
b. Locate a minimum of 3 wells on attached map and list below: south NCR property line

Property owner			depth ~ 60-65 fee
Address			owner's name - unkn address - Mitchell R
Phone No.			well located on ma
Well records	YES NO	YES NO	YES NO
Odor problems	YES NO	YES NO	YES NO
Taste problems	YES NO	YES NO	YES NO

c. If odor or taste problems are reported please elaborate:

D. Are surface or subsurface, (leachate), drainage areas from site apparent? YES ___ NO X. If yes:

1. Were unusual odors or stains noted? YES ___ NO ___
2. Was stressed vegetation noted? YES ___ NO ___
a. If yes please note area on map.

E. Are streams or receiving waters adjacent to site? YES X NO ___
If yes, list observations: (i.e.-change in benthic community, change in plant density/diversity, change in color, siltation, etc.). wetlands to the north and east of site. Vegetation was lush and overgrown - no signs of stress or leachate

F. Site topography: (i.e.-plateau, strip mine ravines, etc.).
flat coastal plain

G. Other observations: (i.e.-erosion, located in flood plain, etc.) [illegible]
one area where solid wastes (iron tailings, cinder b & construction debris) were disposed of then removed.

SECTION 4

NCR Corporation
TDD No. F3-8107-16
EPA No. DE-42

ORIGINAL

Fact Sheet

Fact	Source
1. NCR facility started up in Millsboro in October, 1967.	1. RCRA notification.
2. Electroplating wastes prior to 1973 were diluted and had caustic soda added to the waste stream then settled in the three 30,000 gallon lagoons (physical/chemical treatment). The supernatant was discharged to a drainage ditch which emptied into Iron Branch Creek. Electroplating operations shut down and changed over to new operations (the plant became an assembly plant rather than a manufacturing plant) between 1974 and 1979.	2. Conversation with Dick Calhoun and Larry Shaffer, NCR August 10, 1981.
3. The electroplating sludge lagoons were cleaned out in 1974 and contents disposed of in a 10' x 20' bentonite and polyutethane lined pit on-site. The lining is 1 foot thick on the bottom. There were a total of five monitoring wells installed on-site. A typical analysis of the sludge consisted of: pH - 8.5 solids - 2.1% H_2O - 97.9% Cu - 900 ppm Ni - 40 ppm Cr - 30 ppm Fe - 20 ppm Zn - 800 ppm Pb - 15 ppm Hg - 5.5 ppm As - 0.02 ppm Se - <1 ppm PO_4 - 1500 ppm Free Cyanide - none metals are present as hydroxides.	3. DNREC file chronology. Conversation with Richard Calhoun August 31, 1981.

Fact	Source
4. The electroplating lagoons have been idle since 1978. The end of July, 1981 the lagoons were decontaminated and cleaned by Clean America the wastes hauled by AT & T to the Baltimore facility of American Recovery. The manifests were in order for these transactions. Since 1978, only one lagoon has been used to discharge 7-8,000 gpd of cooling water generated by the air conditioning units.	4. Conversation with Larry Schaffer; August 10, 1981.
5. In February and March, 1981, monitoring well #4 sampled by Goel Associates for NCR showed chromium levels of 0.21 ppm and 0.17 ppm respectively.	5. DNREC files.
6. Other waste on-site consists of sixty drums of waste flux from the wave solder machine, some liquid freon and other solvents used for cleaning. These wastes have since been removed.	6. Conversation with Larry Schaffer.
7. RCRA violations included: flammable wastes stored inside with inadequate space for emergency equipment movement; and records for waste analysis, contingency plans and closure plans incomplete or not up-to-date.	7. Jay Motwani - Delaware DNREC.
8. No leachate was evident from the area where the bentonite pit was located. There was no depression of the land to indicated subsidence. Some demolition debris and iron tailings were noted in one area partially covered over. (The bulk of the wastes had been removed and these were left as fill). Due to high electromagnetic interference - no HNU readings could be obtained at the cleaned lagoons. No HNU readings noted in the area of the old disposal site or in the plant itself.	8. FIT observations on August 10, 1981.

SECTION 5

NCR Corporation
TDD No. F3-8107-16
EPA No. DE-42
August 10, 1981

Photographic Log

Photo No.	Description
1	Only lagoon still in use for cooling water discharge only. Drainage ditch in background by row of trees.
2	Middle lagoon - cleaned and capped off. Monitoring well #3 in background.
3	Eastern most lagoon - cleaned and capped off. (Water residual from rain).
4	Looking west over the lagoon system. Vehicle storage area in background.
5	Northwest view over lagoons - includes oil skimmer (clean), drainage ditch and monitoring well #3.
6	Monitoring well #5.
7	View of past disposal site approximate location.
8	Looking northeast from past disposal area towards direction of Iron Branch Creek.
9	Looking east of the past disposal area primarily agricultural.
10	Looking northwest of the property - wetlands in background, construction debris removed and area leveled; monitoring well #4 in foreground (water from rain).

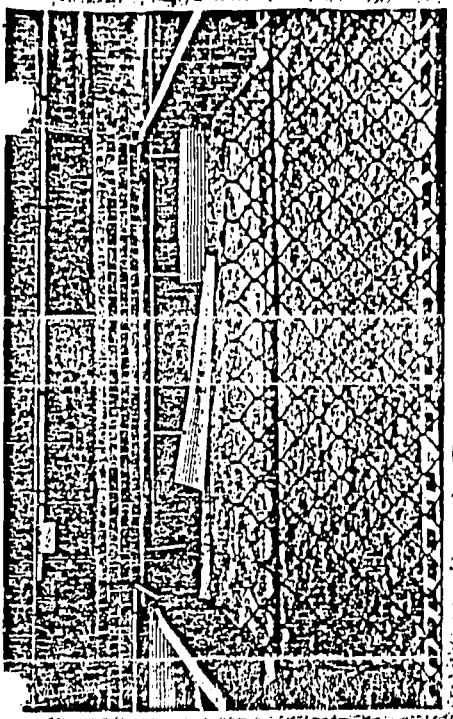
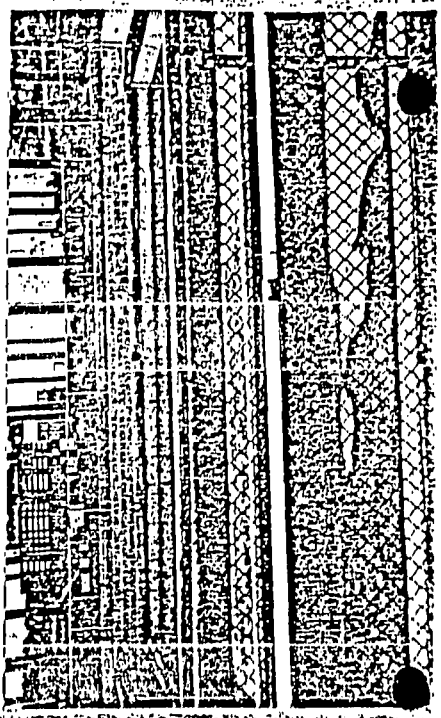


PHOTO 2



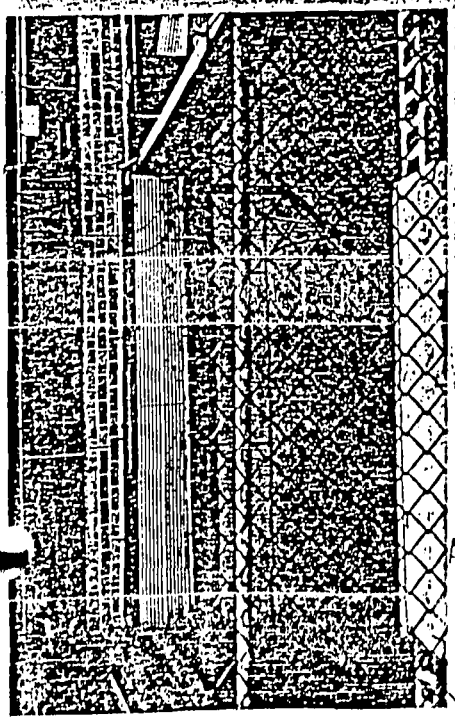
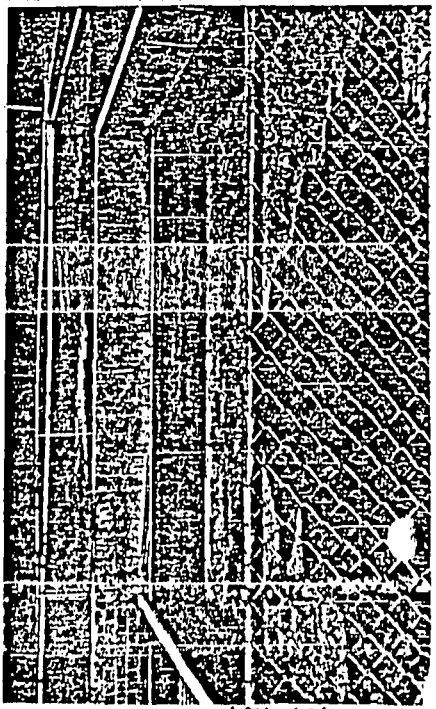


PHOTO 1

AR100



AR100526

Aug. 10, 1951 NCL 1
73 S107-16

Lagoon - only one in use containing cooling water from air conditioning. Drainage ditch in background by trees.

Stan Bumble

8/10/51 NCL 2
73-S107-16

Middle lagoon cleaned and capped off. Monitoring well in background.

Stan Bumble

8/10/51 3
73-S107-16
NCL

Eastern most lagoon - cleaned and capped off. (water residue from rain)

Stan Bumble

8/10/51 4
73-S107-16

Looking west over the lagoon system. Vehicle storage area in background.

Stan Bumble

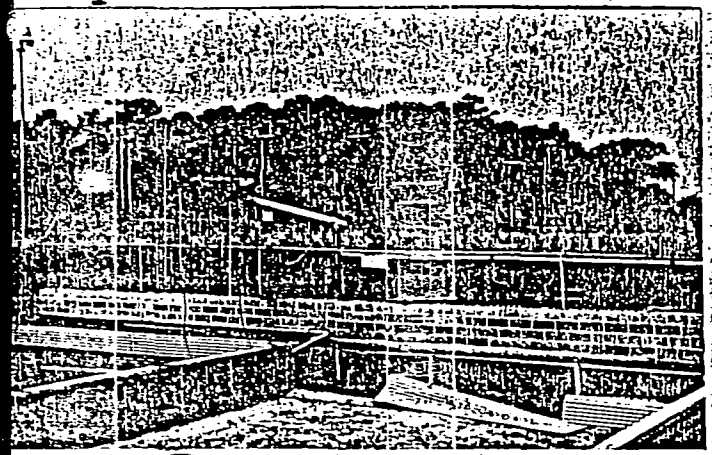


PHOTO 5

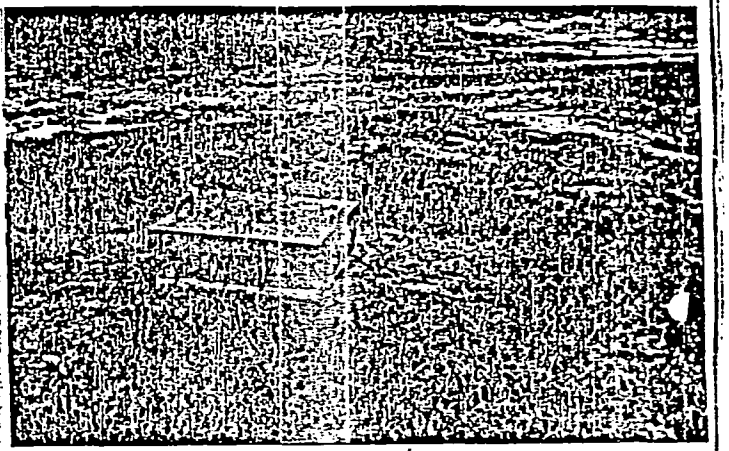
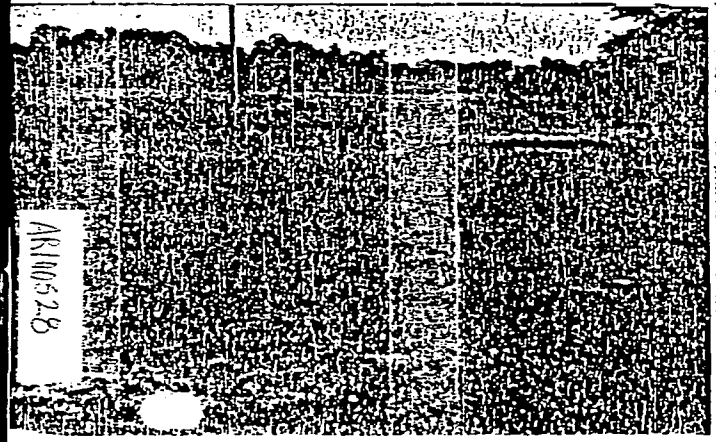
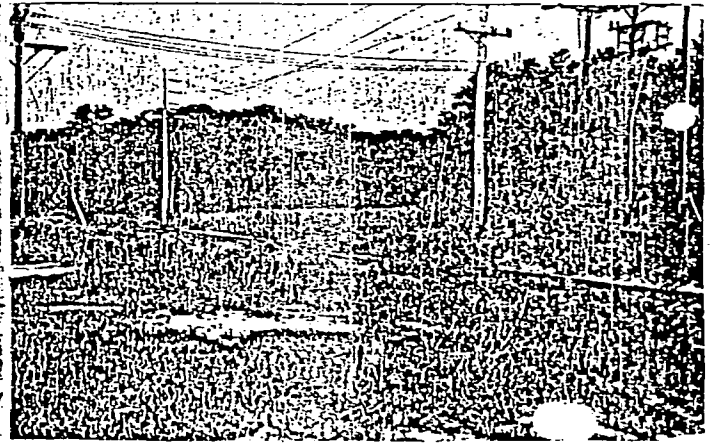
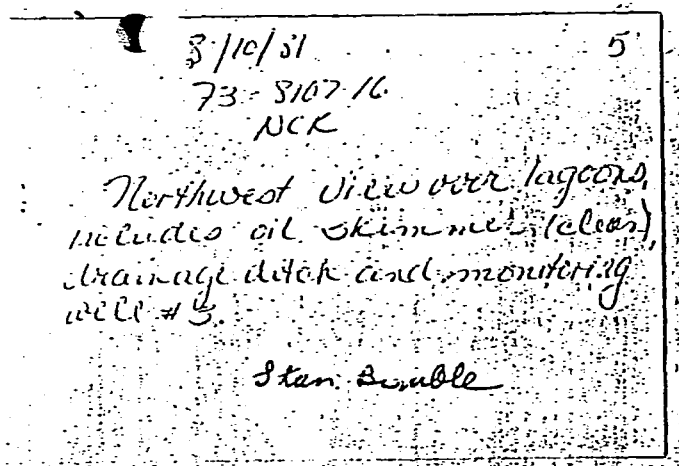


PHOTO 6



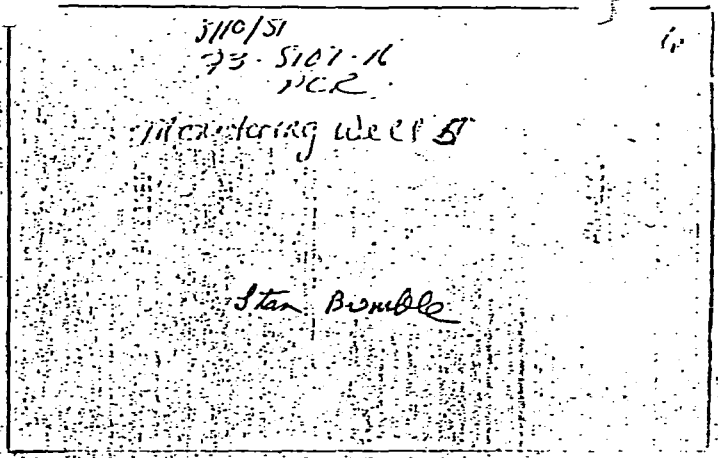




5
8/10/31
73-5107-16
NCR

Northwest view over lagoons, includes oil skimmer (clean), drainage ditch and monitoring well #5.

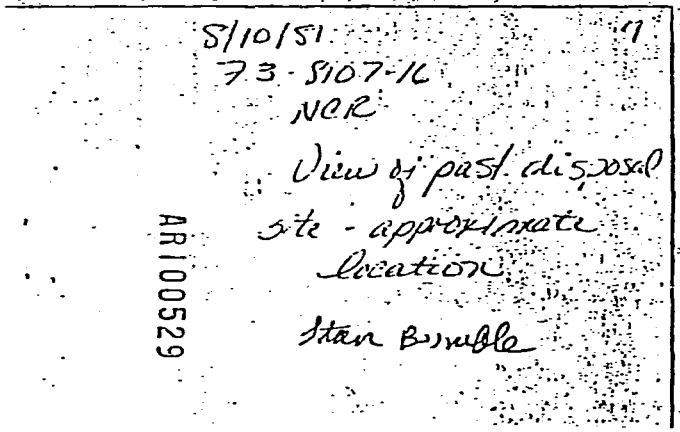
Stan Bumble



6
8/10/31
73-5107-16
NCR

Monitoring well #5

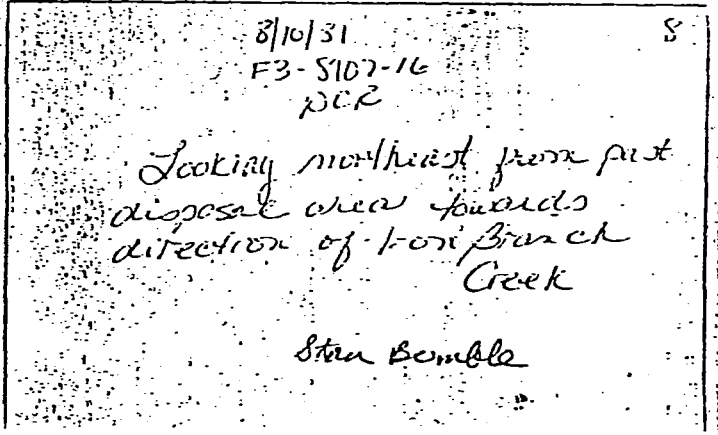
Stan Bumble



7
8/10/31
73-5107-16
NCR

View of past disposal site - approximate location

Stan Bumble



8
8/10/31
F3-5107-16
NCR

Looking northeast from past disposal area towards direction of Lost Branch Creek

Stan Bumble

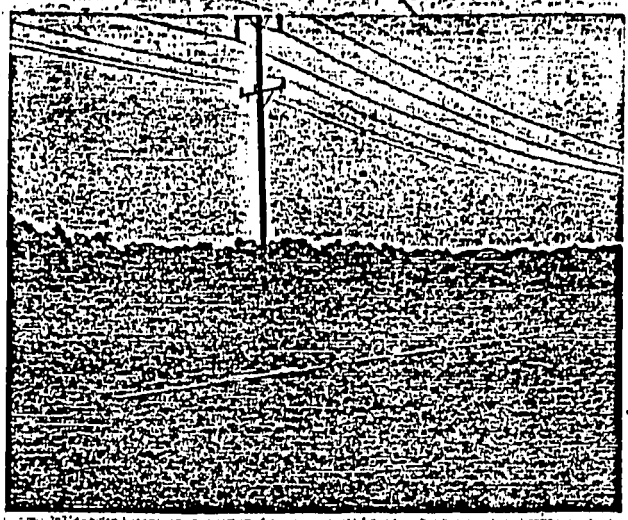


PHOTO 9

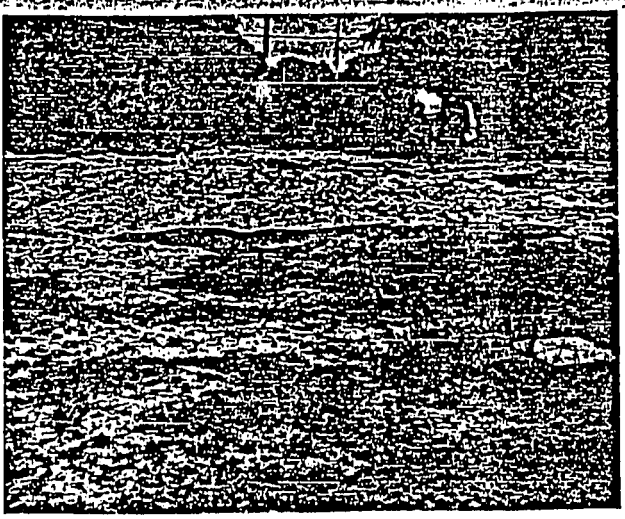


PHOTO 10

F3-8107-16 8/10/81 9b

NCR

Looking east of the prot disposal area - primarily agricultural

Stan Bumble

8/10/81 10

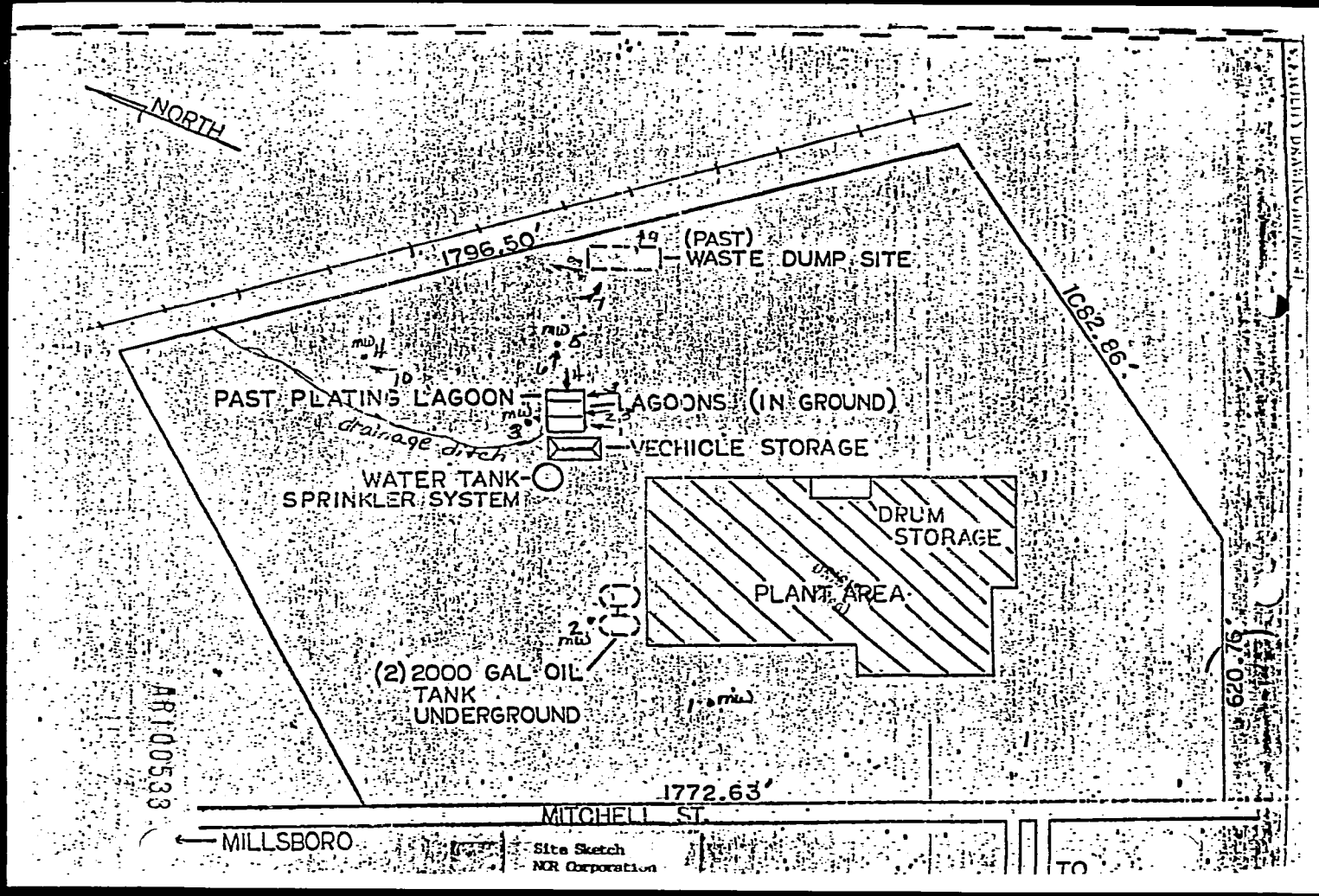
73-8107-16

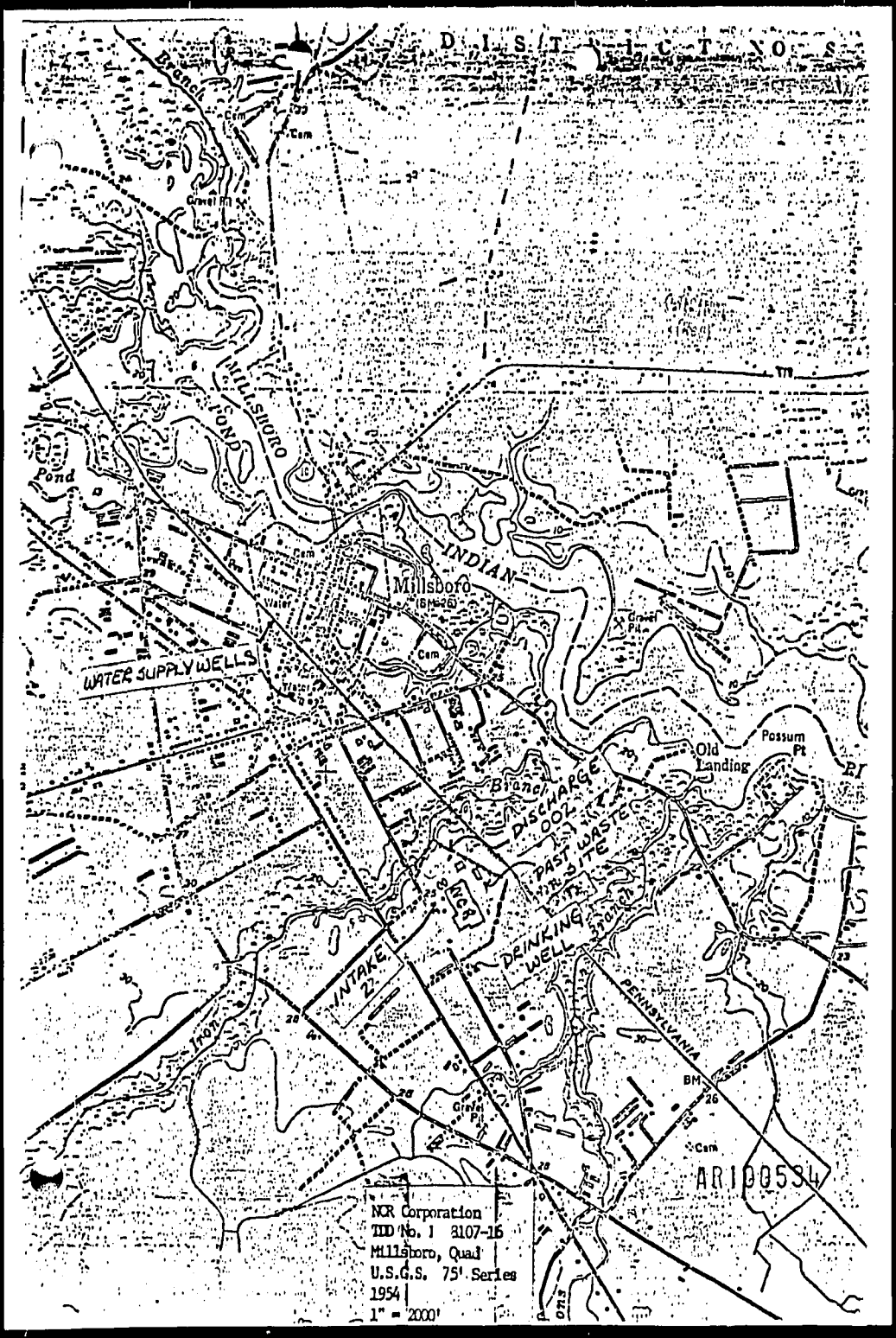
NCR

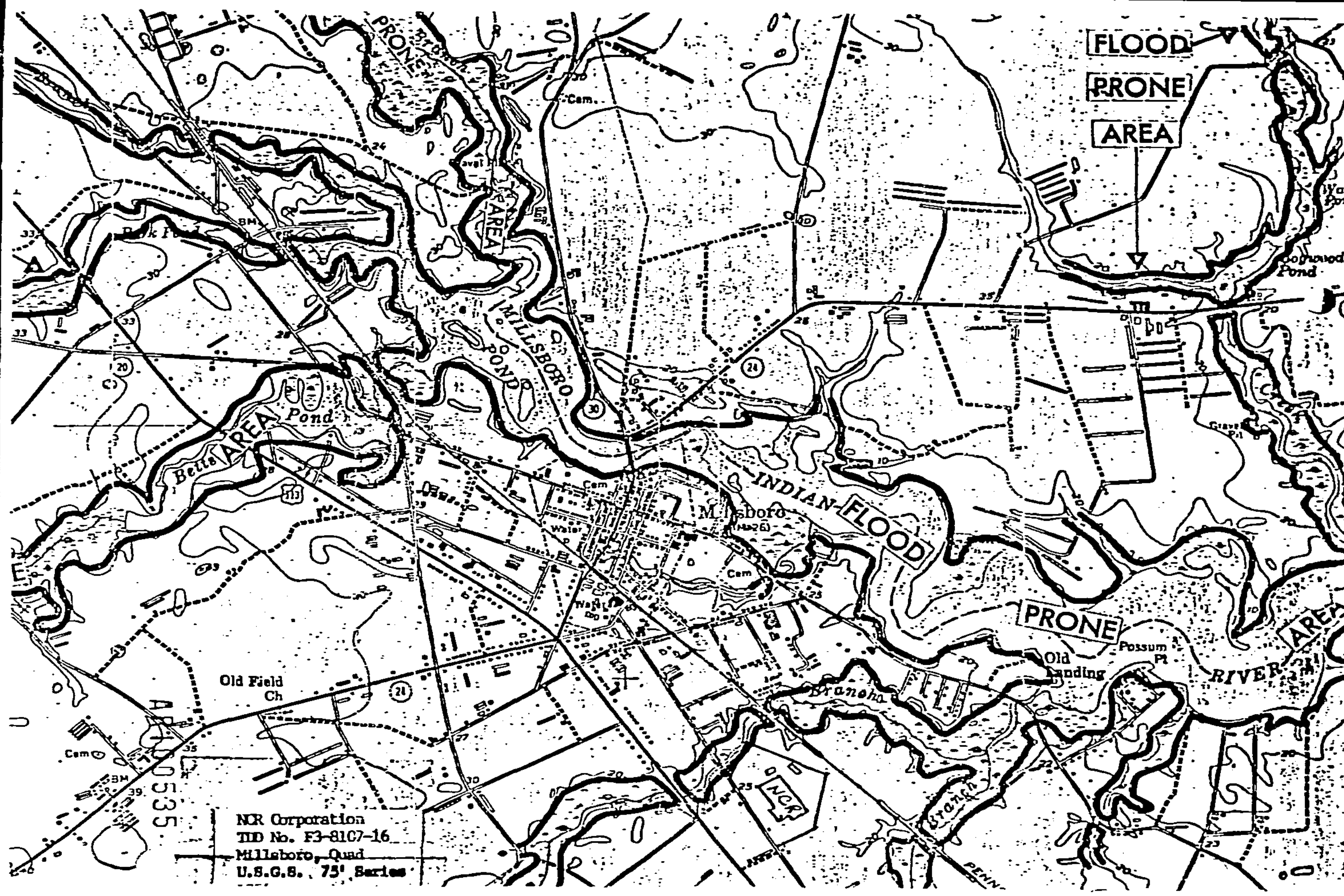
Looking northwest of the property - wetlands in background, construction debris and covered area in foreground - monitoring well 4 in foreground

Stan Bumble

SECTION 6


NORTH
1796.50'
(PAST)
WASTE DUMP SITE
1082.86'
PAST PLATING LAGOON
LAGOONS (IN GROUND)
drainage ditch
VECHICLE STORAGE
WATER TANK-
SPRINKLER SYSTEM
DRUM
STORAGE
PLANT AREA
(2) 2000 GAL OIL
TANK
UNDERGROUND
620.76'
1772.63'
MITCHELL ST.
MILLSBORO
Site Sketch
NCR Corporation
AR100533


D I S T R I C T N O S
Branch
Millsboro Pond
Millsboro
INDIAN
WATER SUPPLY WELLS
Old Landing
Possum Pt
Branch
DISCHARGE
PAST WASTE SITE
NCR
DRINKING WELL
INTAKE 22
PENNSYLVANIA
BM 26
Cem
Gravel Pit
ARI00534
NCR Corporation
TDD No. 1 3107-16
Millsboro, Quad
U.S.G.S. 75' Series
1954
1" = 2000'


FLOOD
PRONE
AREA
MILLSBORO
POND
INDIAN
FLOOD
PRONE
RIVER
AREA
Millsboro
Betts
Pond
AREA
PRONE
AREA
Old Landing
Possum Pt
Old Field Ch
NCR
Cem.
AR100535
NCR Corporation
TDD No. F3-8107-16
Millsboro, Quad
U.S.G.S. 7.5' Series

SECTION 7

DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL

REQUEST FOR LABORATORY ANALYSIS

Date Sampled 4/30/74 Sampled By PAUL WILLIAMS

Request By P. WILLIAMS Results To WAT. RESOURCES

Frequency of Sampling ______ Projected Completion Date ______

Sample Type: Stream ______ Well X Domestic Waste ______ Industrial ______

Air ______ Biological ______ Sludge ______ Boring ______ Other ______

Location of Samples NCR - MILLSBORO

Comments/Instructions Petroleum - GC on sample from Well #2 only.

ORIGINAL (Red)

Streams ______ Basin ______

Aquifer ______ Mode of Sampling ______

Tide ______ Air Temp. ______

Chlorine Residual ______ Thio Added [ ] Yes [ ] No

Log No.	Sample Description	Flow	Time	Temp.
~~[illegible]~~				
1659 to 1662	MON. WELL 2, 3, 4, 5			
1663	PROD. WELL 1 ~~[illegible]~~ OLD WELL			
1664	" " 2 NEW WELL			
1665	Petroleum sample @ Well 2			

Date Accepted 4/30/74 Date Completed 30 June 74

Time Accepted 4:00 PM Accepted By C.J. Anthony

AR200534

TSS 103 (a) (Revised 6/73)

No.		1659	1660	1661	16	1663	1664	1665
ration								
olved Oxygen, mg/l								
mg/l								
g/l								
units								
rbidity, FTU								
P, mv								
pec. Cond., micromhos/cm	X	130	202	316	650	126	124	
	X	5.1	6.6	6.3	6.4	6.2	5.9	
lkalinity, mg/l $CaCO_3$	X	5	69	50	56	9	5	
idity, mg/l $CaCO_3$	X	24	21	29	30	9	10	
rdness, mg/l	X	52	10	10	10	20	30	
nloride, mg/l	X	<1.5	<15	26	111	<1.5	<15	
luoride, mg/l								
tal Nitrogen, mg/l N								
rganic Nitrogen, mg/l N								
monia Nitrogen, mg/l N								
trite Nitrogen, mg/l N	X	3.0	5.9	3.9	6.4	3.9	6.3	
trate Nitrogen, mg/l N	X	19	9	50	82	<5.0	<5.0	
tal Phosphate, mg/l PO_4								
AS, mg/l								
benol, ppb	X	<10						
ease, mg/l								
anide, mg/l Organic CN	X	<.05	<.05	<.05	<.05	<.05		
ettleable Solids, ml/l								
t Susp. Solids, mg/l								
l Susp. Solids, mg/l								
ol. Susp. Solids, mg/l								
tal Solids, mg/l	X	109	205	222	441	100	115	
nVol Tot. Solids, mg/l		57	134	140	36	60	61	
ol. Tot. Solids, mg/l		52	71	82	81	40	54	
Moisture								
ion, mg/l	X	0.26	0.27	0.15	0.11	5.24	0.20	
opper, mg/l								
nganese, mg/l								
romium, mg/l	X	<.10	<.10	0.83	<.10	<.10	<.10	
ilver, mg/l								
lcium, mg/l	X	1.4	<.20	0.80	10.30	1.4	2.3	
nc, mg/l	X	0.10	<.10	<.10	<.10	<.10	<.10	
ead, mg/l								
ckel, mg/l	X	<.10	<.10	<.10	<.10	<.10	<.10	
dmium, mg/l								
ercury, mg/l	X	<.0005	<.0005	<.0005	<.0015	<.0005	<.0005	
dium, mg/l	X	5.1	18.1	77.5	128.1	9.1	9.3	
senic, mg/l								
elenium, mg/l								
tal Coliform #/100 ml								
cal Coliform #/100 ml								
er Strep #/100 ml								
								AR10
Petroleum	#2	well	only.					

TSS - 103 (b) (Revised 6/73)

J.A.S.

TECHNICAL SERVICES SECTION
DIVISION OF ENVIRONMENTAL CONTROL
DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL
REQUEST FOR LABORATORY ANALYSIS

DATE SAMPLED 8-10-81 SAMPLER MBCoster CAR/✓/ BOAT/ / SPLIT/ /

REQUESTER Solid Waste RESULTS TO K. Weiss - Solid Waste

SAMPLE TYPE: STREAM / / WELL /✓/ DOMESTIC WASTE / / INDUSTRIAL / / AIR / /

BIOLOGICAL / / SLUDGE / / BORING / / STP / / OTHER / / ORIGINAL (Red)

SOURCE NAME National Cash Register NPDES DE

ADDRESS Millsboro DE

COMMENTS/INSTRUCTION

NPDES / / AMBIENT /✓/ INTENSIVE / / CONTRACT / / OTHER / /

SAMPLING MODE GRAB /✓/ COMPOSITE: MFG. S/N

FROM: YR MO DAY HR

BASIN TO: YR MO DAY HR

TIDE THIO ADDED TO

OBSERVATIONS/COMMENTS

LOG. NO.	SAMPLE IDENTIFICATION	TIME	TEMP. °C WTR	TEMP. °C AIR	CHLOR RES.	FLOW	DEPTH FT.
3239	Well 5						
3240	Well 3						
3241	Well 4						
3242	Well - 2						
3243	Well 1						

DATE ACCEPTED 8/10 DATE COMPLETED 8/21/81

TIME ACCEPTED 13:30 ACCEPTED BY John Trogh

AR100539

COST CENTER				
AP	RC	PE	FF	
WP	RD	UN	FW	

DOCUMENT 40 08/28/81

5 3 4 2

ANALYSIS REQUEST

LAB. LOG NO.	3239	3240	3241	3242	3243			
% SAT.								
DIS. OXYGEN, mg/l								
BOD, mg/l								
COD, mg/l JT	11.6	3.9	7.8	23.3	0			
COLOR, UNITS								
TURBIDITY, FTU								
SPEC, COND. umhos/cm	200	176	130	124	104			
pH JT	4.6	6.4	5.9	5.4	5.5			
ALK. mg/l $CaCO_3$								
ACIDITY mg/l $CaCO_3$								
HARDNESS, mg/l								
CHLORIDE, mg/l MH	9	9	8	9	8			
T. NITROGEN, mg/l								
ORGANIC N. mg/l								
AMMONIA N. mg/l MK	<0.10	<0.10	<0.10	<0.10	<0.10			
NITRITE N. mg/l								
NITRATE N. mg/l								
SULFATE, mg/l SO_4								
TOTAL PO4 mg/l								
SET. SOLIDS, ml/l								
T. SUSP. SLDS. mg/l								
N.V. SUSP. SLDS. mg/l								
V. SUSP. SLDS. mg/l								
T. SLDS. mg/l								
N. V. T. SLDS. mg/l								
VOL. TOTAL SLDS.mg/l								
T. DIS. SLDS. mg/l MH	141	180	154	127	136			
% MOISTURE								
MBAS mg/l								
GREASE, mg/l								
PHENOL, ug/l								
TOC, mg/l to follow								
IRON, ug/l JS	300	490	240	260	380			
COPPER, ug/l	<100	<100	<100	<100	<100			
MANGANESE, ug/l	<100	<100	<100	<100	<100			
CHROMIUM, ug/l	<100	<100	<100	<100	180			
SILVER, ug/l								
CALCIUM, ug/l JS								
ZINC, ug/l	<100	<100	<100	<100	<100			
LEAD, ug/l	<100	<100	<100	<100	<100			
NICKEL, ug/l	<100	<100	<100	<100	<100			
CADMIUM, ug/l	<100	<100	<100	<100	<100			
MERCURY, ug/l	<1.5	<1.5	<1.5	<1.5	<1.5			
ARSENIC, ug/l	<5	<5	<5	<5	<5			
SELENIUM ug/l								
Barium, mg/l	<100	<100	<100	<100	<100			
T. COLIFORM 0/100 ml								
F. COLIFORM 0/100 ml								
F. STREP 0/100 ml								

ORIGINAL (RED)

AR100540

NCR

#4

#5

ORIGINAL
(Red)

#6 proposed

#3

BLDG

#2

new production well

#1

letter nos. #

RECEIVED
NOV 23 1973
U.S. GEOLOGICAL SURVEY
DOVER, DELAWARE

AR 10054

NATIONAL CASH REGISTER CO.

Chronology

1973 — Required to improve wastewater treatment process to meet NPDES standards ⟶ sludge produced.

1-23-73 — Letter from R.L. Harris (NCR) to Pat Canzano
Typical chem. comp. of sludge.

pH	8.5	
solids	2.1%	
H_2O	97.9%	- metals are present as hydroxides
Cu	900 ppm	
Ni	40 ppm	
Cr	30 ppm	
Fe	20 ppm	
Zn	800 ppm	
PO_4	1500 ppm	
Free Cyanide	none	

"In previous years, with the approval of the DNR, we have buried this material on our property in bentonite lined pits".

ORIGINAL (Red)

2-13-73 — Letter from Pat Canzano to R.L. Harris
- requesting analyses of As, Pb, Hg & Se in sludge
- also states that lined pits (synthetic liner) will be required and leachate collection system

5-8-73 — Letter from R.L. Harris to Pat Canzano
Additional Metals in Sludge:

Pb	15 ppm
Hg	5.5 ppm
As	0.02 ppm
Se	<1 ppm

7-11-73 — Letter from Pat Canzano to R.L. Harris
- proposes sludge drying beds with liner, due to water content of sludge
- if concentrations in leachate do not exceed concentrations in letters dated 1-23-73 and 5-8-73, may consider taking sludge to conventional landfill.

7-19-73 — Letter from Frank Moorshead to J.N. Holmes (NCR)
- requiring installation of monitoring wells

8-73 — Monitor wells installed.

8-3-73 — Memo from Frank Moorshead to Pat Canzano
- NCR site hydrogeologically unsuitable for disposal without liner.

AR100542

1-15-74 — Letter from Frank Moorshead to F. Browne (BETZ)
- additional monitor well required

1-24-74	Letter from Pat Canzano to J.N. Holmes - approval to dispose of sludge
7-24-74	Change in process - result in reduction of metals discharge (NPDES)
1980	NPDES permit renewal - process changed; no longer use wastewater treatment plant for electroplating wastes.

ORIGINAL
(Re

AR100543

MEMORANDUM

TO: Robert J. Touhey June 16, 1981

THRU: Michael A. Apgar

FROM: Lisa A. Hamilton

RE: Addition of National Cash Register, Co. (NCR) to EPA's Uncontrolled Dumpsite List

NCR disposed of its wastewater treatment sludges on-site in bentonite lined pits. This waste could now be considered hazardous since it had a chromium concentration of 30 ppm, a lead concentration of 15 ppm and a mercury concentration of 5.5 ppm. The bentonite liners may not have been sufficient to hold the waste, without leakage, over long periods of time.

As far as I can judge from a review of the files, the pits are still there, probably overgrown. Recently, someone from Richardson Associates spoke with Bill Osburn and implied that he had found high chromium concentrati in the ground water at the site.

I feel that this site should be added to the Uncontrolled Dumpsite List due to the nature of the waste, the lack of recent information and the consultant's implication.

RECEIVED
JUN 16 1981
WATER SUPPLY

/tj

RECEIVED
JUN 29 1981
STATE OF DELAWARE
NATURAL RESOURCES SECTION
HOWARD'S CREEK

AR100544

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region III – 6th & Walnut Sts.
Philadelphia, Pa. 19106

SUBJECT: Update on the NCR Facility
Route 113 Millsboro, Delaware

DATE: August 20, 19

FROM: Chris Hladchuk, Environmental Scientist Chris
Environmental Emergency Branch

TO: Stanley L. Laskowski, Acting Director
Surveillance & Analysis Division

THRU: Bruce P. Smith, Chief
Environmental Emergency Branch

I. Background

The National Cash Register Inc. (NCR) has announced the September closing of their facility in Millsboro, Delaware. This facility has notified under RCRA as a handler of Hazardous Waste. At this time a Maryland Bank is negotiating the purchase of the plant and properties. Delaware is very interested in this purchase and perspective job opportunities that may be offered to Sussex County.

A Preliminary Assessment and RCRA Inspection were conducted by EPA-FIT and Delaware DNREC on August 10, 1981 to insure compliance with the RCRA regulations, and to evaluate any potential impact.

Groundwater monitoring samples were taken and these analytical results are due in September.

Attendance:

FIT	Stan Bumble
	Beth Gross
DNREC	Lisa Hamilton
	Jay Motwani
NCR	Mr. Calhoun
	Larry Shaffer
Delaware Economics Board	

II. Topics Addressed

a) There are three cement lined storage lagoons on-site. Two contained toxic materials which were drained and shipped to American Recovery (all manifests were in order). The third lagoon contains a non-toxic cooling water.

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b) Sixty drums containing flammable waste are stored inside the plant. Adequate aisle space was not available, and the movement of any emergency equipment would be obstructed.

c) The NCR records for waste analysis, contingency plans, and closure plans are not updated or complete.

d) Prior to 1978 an old pit was used for the disposal of various industrial wastes. Records were not available, but these materials may have included degreasing solvents and plating wastes. There is a 1 foot clay lining along the bottom, and 3 monitoring wells installed around the area. Recent samples from these wells showed evidence of contamination (.21 ppm chromium, mercury and lead).

III. Recommended Actions

a) Both the FIT and DNREC agreed that proper procedures were followed to clean and close the storage lagoons on site.

b) NCR has agreed to contract a firm to remove the waste drums from the plant as soon as possible.

c) Jay Motwani of DNREC has stated that the NCR facility has been very cooperative about getting the necessary records and plans in order. In addition, DNREC does not wish to bring enforcement action against NCR if this will delay the purchase transactions. For these reasons the State does not wish to issue a Notice of Violation to the facility. However, the State is reviewing the closure plans and they will insure that these actions are completed.

d) The old pit that was closed in 1978 requires periodic groundwater monitoring to record the contamination levels. Possible remedial action may also be required for this disposal pit, i.e. excavation and removal. These measures may not be enforced under RCRA because of the closure date of the pit.

Enforcement action to control this site may be taken under 7003 if it is deemed necessary. Before the NCR facility vacates the property, a document should be signed which designates a responsible party, and the availability of funds for monitoring and perhaps remedial action.

cc: Paul Ambrose (3IR40)
Ralph Siskind (3EN32)
Ruthanne Gordon (3EN33)
Wayne Naylor (3AH31)
Ken Weiss, Delaware DNREC

CH:lav

APPENDIX G

STATE OF DELAWARE
UNIVERSITY OF DELAWARE

DELAWARE GEOLOGICAL SURVEY

Robert R. Jordan, State Geologist

ORIGINAL
(Red)

BULLETIN No. 14

HYDROLOGY OF THE COLUMBIA (PLEISTOCENE) DEPOSITS OF DELAWARE: AN APPRAISAL OF A REGIONAL WATER-TABLE AQUIFER

BY

RICHARD H. JOHNSTON
HYDROLOGIST, U. S. GEOLOGICAL SURVEY

PREPARED BY THE UNITED STATES GEOLOGICAL SURVEY
IN COOPERATION WITH THE
DELAWARE GEOLOGICAL SURVEY

NEWARK, DELAWARE

JUNE, 1973

RASMUSSEN AND OTHERS (1960) SUSSEX CO., DELAWARE		JORDAN (1962) DELAWARE				HANSEN (1966) SALISBURY, MD. AREA		OWENS (ORAL COMMUNICATION, OCTOBER, 1972)			THIS REPORT DELAWARE	
SERIES	FORMATION	SERIES	FORMATION OR GROUP			SERIES	FORMATION OR 'FACIES'	SERIES	FORMATION OR 'FACIES'		SERIES	AQUIFER
			N. DELAWARE	S. DELAWARE					N. DELAWARE	S. DELAWARE		
PLEISTOCENE	PARSONBURG SAND	PLEISTOCENE	COLUMBIA FORMATION	COLUMBIA GROUP	OMAR FORMATION	PLEISTOCENE (COLUMBIA GROUP)	WALSTON CLAY	PLEISTOCENE	PENSAUKEN FORMATION	UNNAMED 'BLACK-BARRIER FACIES'	PLEISTOCENE	COLUMBIA (PLEISTOCENE) DEPOSITS
	PAMLICO FORMATION						PARSONBURG SAND					
	WALSTON SILT											
	BEAVERDAM SAND				BEAVERDAM FORMATION		SALISBURY FORMATION — BEAVERDAM FACIES			BEAVERDAM FORMATION		
PLIOCENE ?	BRANDYWINE FORMATION	(?)	BRANDYWINE FORMATION (?)				"RED GRAVELLY FACIES"					

TABLE I. CORRELATION CHART SHOWING STRATIGRAPHIC NOMENCLATURE USED FOR THE PLEISTOCENE DEPOSITS OF DELAWARE AND ADJACENT MARYLAND.

The Columbia deposits are composed principally of sands which occur in channel fillings in northern Delaware and as a broad sheet across central and southern Delaware. In addition to sand, the Columbia sediments contain subordinate amounts of gravel, clay, and silt. In central and southern Delaware, where the Columbia deposits constitute a major regional aquifer, the deposits are composed mostly of fine to coarse moderately well sorted quartz sand. As noted by Jordan (1964), the mass of the Pleistocene sediment may be "accurately described as a medium sand." Evidence presented later in the report will show that, hydrologically, the Columbia deposits are effectively acting as a medium to coarse sand aquifer.

In the areas of highest transmissivity (for example at Smyrna and near Houston, as shown in Figure 9), the Columbia deposits consist of well sorted coarse sand with or without bands of gravel. Locally gravel may constitute a sizable fraction of the sediments. Spoljaric and Woodruff (1970) determined that gravel constitutes 30 percent of the sediments in the Middletown-Odessa area. However, the presence of gravel does not necessarily indicate maximum transmissivity. For example, a 110-foot thick section of gravel, with interbedded fine to coarse sand (apparently poorly sorted), near Milton has lower transmissivity than 90-foot sections of predominantly coarse sand at Smyrna and Houston (see Table 2).

The Columbia deposits differ widely in color, ranging from reddish brown and purplish black through shades of brown to tan, yellow, or light gray. The color of the sediments is related to the amount of iron present, as shown by Spoljaric (1971). According to Spoljaric, dark brown sand contains greater than 4 percent ferric iron, whereas the yellow and light gray sand contains less than 1 percent ferric iron. The purplish black color occasionally seen in ironstone beds is probably due to manganese oxides.

The differentiation of the Columbia deposits from underlying units can be made on a lithologic basis in much of northern and central Delaware. However, in southern Delaware, where Miocene sands may directly underlie Pleistocene sands, the differentiation is often difficult. This is particularly true in the case of the Miocene Manokin aquifer, which underlies the Pleistocene throughout a 7-mile-wide belt extending southwest across Delaware from Milton to Laurel (see Figure 2, Sundstrom and Pickett, 1970). The difficulty arises because of the similarity of the white fine to coarse sand of the Beaverdam Sand (Pleistocene) and the gray medium-coarse sand of the underlying Miocene age Manokin aquifer. As pointed out by

Sundstrom and Pickett (1970), the Manokin sands are generally grayer and better sorted than the Pleistocene sands. This rather subjective criterion was used by the writer in identifying the base of the Columbia deposits from well logs in southern Delaware. In central Delaware, the subcropping Miocene beds often consist of gray silty clay or sand with abundant shell material, and the base of the Pleistocene can be identified with more confidence. However, drillers' logs occasionally report thick sections of "white or tannish gray sand." In such cases, the base of the Pleistocene was arbitrarily placed at the uppermost occurrence of a thick gray or "blue" clay bed. Thus, some of the upper Miocene sands, particularly in the Manokin aquifer, may have been included with the Columbia deposits. However, hydrologically the sands are acting as an aquifer unit. Microfossils are often useful in identifying the Miocene-Pleistocene contact; however, geologists of the Delaware Geological Survey report that good index fossils are difficult to obtain from cores and drill cuttings.

Areal Extent and Saturated Thickness

The Columbia (Pleistocene) deposits occur as channel fillings and thin isolated patches in New Castle County and as a broad sheet across most of Kent and Sussex Counties (Figure 3). The Pleistocene sediments are generally considered to be fluvial in origin and, according to Jordan (1964), were deposited by streams entering Delaware from the northeast and spreading south and southeast across Delaware. The narrow channels of northern New Castle County coalesce into a system of braided channels in the southern part of the county (Spoljaric, 1967). From the Kent-New Castle County line south, the Columbia deposits are basically a sheet of sand, which thickens southward across Kent and Sussex Counties. In extreme southern Delaware, these deposits were probably reworked by transgressing-regressing seas (Jordan, 1964). Jordan describes beach, dune, estuarine, offshore bar, and lagoonal facies within the area of marine transgression. These facies of the Columbia sediments, as well as the configuration of the channels, are related to the aquifer transmissivity as will be discussed later.

Figure 2 shows a structure contour map of the base of the Columbia deposits in Delaware (except for northern New Castle County). The map is intended to show the basal configuration of the Pleistocene sediments where they constitute an important regional aquifer - namely central and southern Delaware. For a description of the Pleistocene channels of northern Delaware, see Spoljaric (1967).

ORIGINAL
(Red)

APPENDIX H

Site Name: NCR Corporation
TDD No.: F3-8409-14

REFERENCES

1. Groundwater Quality Investigation and Groundwater Quality Management Plan Interim Report for NCR Corporation's former facility in Millsboro, Delaware (presently First Freedom Center) by Richard E. Sacks, Geologist for Betz, Converse, Murdock Eastern, Inc. (One Plymouth Meeting Mall, Plymouth Meeting, Pennsylvania 19462).

2. A Preliminary Assessment of NCR, EPA No. DE-42, Emergency and Remedial Response Information System Prepared by the Delaware Department of Natural Resources and Environmental Control, Solid Waste Branch; Andrew Leitzinger, ERRIS Investigator and Robert Pickert, ERRIS Coordinator, 1984.

3. Field Investigations of Uncontrolled Hazardous Waste Sites, FIT Project, Preliminary Assessment of NCR Corporation, Millsboro, Delaware, Prepared by Elizabeth Gross, FIT Region III, Ecology and Environment, Inc., 1981.

4. Soil Survey, Sussex County, Delaware, dated May 1974.

5. Excavated Sludge Disposal Site Post Closure Monitoring and Groundwater Quality Assessment for the NCR Corporation's former facility in Millsboro, Delaware (presently First Freedom Center) by Richard E. Sacks, Geologist for Betz, Converse, Murdock Eastern, Inc. (One Plymouth Meeting Mall, Plymouth Meeting, Pennsylvania 19462).

6. Telephone Conversation with Official (name unknown) of Millsboro Municipal Water Company, dated October 15, 1984.

7. Map and Partial Text from Hydrology of the Columbia (Pleistocene) Deposits of Delaware: An Appraisal of a Regional Water Table Aquifer, by Richard Johnston Hydrologist, U.S. Geological Survey. Newark, Delaware. June 1973.