PRELIMINARY SITE INVESTIGATION

GENERAL ELECTRIC COMPANY

STICKNEY WELL

WILMINGTON, MASSACHUSETTS

Prepared for:
General Electric Company
Wilmington, Massachusetts

Prepared by:
Goldberg-Zoino & Associates, Inc.
Newton Upper Falls, Massachusetts

September 1986
File No. A-7650

GZA
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September 15, 1986
File No. A-7650-C,PC

General Electric Company
50 Fordham Road
Wilmington, Massachusetts 01887

Attention: Mr. A. McSwiney

Re: Phase I Site Investigation
GE - Stickney Well

Gentlemen:

Goldberg-Zoino & Associates, Inc. (GZA) is pleased to submit this report, under the terms of our proposal of June 20, 1986. We believe the report meets the requirements of the Department of Environmental Quality Engineering (DEQE) letter of June 17, 1986 to investigate and document the use, storage, and disposal of hazardous materials at the GE Wilmington facility.

We appreciate the cooperation of the GE staff, particularly Mr. Arthur Gamache, during the course of this study, and we look forward to continuing to work with GE to further investigate the geohydrologic conditions in the vicinity of the plant.

Please contact the undersigned if you have any questions.

Very truly yours,

GOLDBERG-ZOINO & ASSOCIATES, INC.

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GZA

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GZA

1.00 INTRODUCTION

The following report presents the results of the Phase I preliminary site investigation, conducted by Goldberg-Zoino & Associates, Inc. (GZA), of the General Electric Company (GE) site in Wilmington, Massachusetts. The objective of the preliminary site investigation was to assess whether there is a possible link between the chlorinated hydrocarbon contamination of North Reading's Stickney Wellfield and the GE property. The site investigation was completed in accordance with a study plan submitted to the Massachusetts Department of Environmental Quality Engineering (DEQE). The study plan was developed in response to DEQE's letter, dated June 17, 1986, titled "Notice of Responsibility, Pursuant to Massachusetts General Laws Chapter 21E". This letter informed GE that a release of hazardous materials had occurred at the site and that "chlorinated solvents may have been used during facility operations dating back to 1971 when GE first occupied the site".

1.10 PROJECT SCOPE

In accordance with GZA's proposal and study plan dated June 20, 1986, this preliminary site investigation is Phase I of a phased approach to the Remedial Investigation outlined by DEQE. The initial phase of the study documented herein was designed to document the storage, usage, and disposal of hazardous materials, in particular chlorinated hydrocarbons, at the GE site and to identify in a preliminary manner the potential effect of these chlorinated hydrocarbons on the Stickney Wellfield. To accomplish these goals, GZA completed the following tasks:

1. Reviewed site history and past disposal practices by reviewing available records and conducting interviews with GE's plant management.

2. Reviewed geohydrologic data made available by North Reading's consultants, Camp, Dresser & McKee (CDM), and DEQE officials.

3. Conducted a water quality sampling round to:

    a. Confirm CDM's groundwater quality data that indicates the presence of tetrachloroethene and trichloroethene in monitoring wells located between the GE site and the Stickney Wellfield and,

    b. Assess the quality of the noncontact cooling water, wastewater effluent, and stormwater discharged from the GE facility.

Note that all analyses and conclusions presented in this report are subject to the standard limitations found in Appendix A.

1.20 SITE DESCRIPTION

The GE site consists of approximately 36 acres located at 50 Fordham Road. Refer to Figure 1 for a Locus Plan. The North Reading and Wilmington town line crosses the site. The portion of the site located in North Reading is either a parking lot or an undeveloped wooded wetland. The remaining balance of the site located in Wilmington is occupied by the three facility buildings, GE's domestic wastewater treatment plant, paved parking areas, and undeveloped land. The site is bounded by additional undeveloped land owned by North Reading and a private land owner to the east, two trucking facilities to the southeast, Eltra Corporation - Converse Rubber Division to the south, Volkswagen of America to the west, and undeveloped property to the north. The Stickney Wellfield is located approximately 1,000 feet northeast of GE's facility buildings. The GE and Stickney Wellfield study area is presented as Figure 2.

A drainage ditch is located along the eastern edge of GE's parking lot. Flow in the ditch is in a northerly direction. This drainage ditch receives stormwater runoff from GE's paved parking areas, and GE's noncontact cooling water discharges, and ultimately empties into the surrounding wetland. At the south end of the ditch near the GE/Converse property line, an additional culvert drains from Converse's property.

1.30 CLOSING OF THE STICKNEY WELLFIELD

In December 1978 North Reading's Stickney Wellfield, a public water supply, was shut down due to contamination by two volatile organic compounds. The detected concentrations of tetrachloroethene and trichloroethene in water samples collected by the DEQE exceeded water quality standards, in effect at that time, for these constituents. The wellfield is bounded by a number of industries located in the Fordham Road and Concord Street industrial park area.

Following the closing of the wellfield, DEQE contacted GE officials and a series of water samples from around the plant were analyzed in January 1979. The resulting analytical data revealed 1,100 ppb (parts per billion) of tetrachloroethene in the water sample taken from outfall 001.

More recent investigations of the Stickney Well contamination conducted by the DEQE and CDM further suggested that there may be a possible link between the GE property and the wellfield contamination. DEQE conducted an inspection of the GE site on

January 10, 1986, and in March 1986 collected groundwater samples from two CDM monitoring wells (MW-5 and MW-7), located east of the property line as shown on Figure 2. These samples contained elevated levels of tetrachloroethene and trichloroethene.

2.00 GEOHYDROLOGIC DATA REVIEW

As part of GZA's study, United States Geological Survey (USGS) topographical and surficial soil maps, CDM boring logs and records of monitoring wells installed in the study area, groundwater quality data, and CDM's preliminary plotting of groundwater flow patterns were reviewed. The objective of this task was to evaluate the apparent extent of chlorinated hydrocarbon contamination (relative to the GE site and Stickney Well) and characterize the site geology and hydrogeologic conditions in the GE-Stickney Wellfield study area.

2.10 SITE GEOLOGY

The geology of the GE site and surrounding areas is typical of eastern Massachusetts, and is primarily controlled by the effects of the most recent glaciation of the New England region. The wetland surrounding the GE site is underlain by a bedrock valley scoured by the glacier. This valley was filled with unconsolidated stratified glacial deposits by meltwater streams during the retreat of the glacier. The low hills flanking the wetland to the east and west are comprised of bedrock overlain by kame terrace deposits and/or glacial till. A kame terrace deposit is a terracelike body of stratified sand and gravel which was deposited wherever cavities happened to develop in the glacier ice. Glacial till is a dense, poorly sorted material deposited directly on top of the bedrock slope. The GE site is located on the approximate contact between the stratified glacial deposits filling the valley and the kame terrace deposits overlying the flanking valley walls.

The general subsurface profile of the wetland surrounding the GE site consists of swamp deposits underlain by the stratified glacial deposits. The swamp deposits, comprised of peat and organic silt, were reported by CDM to range from 5.5 to 26 feet in thickness. The stratified glacial deposits were reported to range in thickness from 10 to 60 feet. Underlying the glacial deposits a weathered bedrock was encountered at 55 feet in MW-1, located approximately 70 feet west of the Stickney Well. Although the configuration of the bedrock underlying the wetland is not known in detail, it is anticipated the bedrock is relatively shallow on the western portion of the GE site increasing in depth across the site and towards the center of the wetland.

The saturated thickness of the aquifer underlying the GE Stickney Wellfield study ranges from 10 to 60 feet. Based on CDM's subsurface data, the stratified glacial deposits underlying the wetland contain lenses of permeable sand and gravel which range in thickness from 25 feet at the Stickney Well to 5 feet at monitoring well MW-7 in the vicinity of GE's noncontact cooling water discharge point 001. The USGS surficial soils map indicates the site is also underlain by ice-channel fillings - permeable deposits of poorly sorted boulders, gravels, and sand. Ice-channel fillings, in addition to permeable lenses of sand and gravel, often constitute paths of least resistance for groundwater flow through an aquifer system.

2.20 GROUNDWATER FLOW

To develop a general evaluation of the hydrogeology of the GE-Stickney Wellfield study area, GZA reviewed USGS topographical maps and CDM's preliminary plan depicting groundwater contours in the study area (under non-pumping conditions). CDM's plan indicates a groundwater divide extends across the wetland along an east-west transect in the vicinity of the Stickney Well. In general terms, the groundwater divide is a regionally high groundwater table or contour. Thus groundwater south of the divide will flow in a generally south-southeasterly direction whereas the groundwater north of the divide will flow in a generally north-northwesterly direction. Groundwater flow direction is also partially controlled by the topographically higher ground flanking the swamp to the east and west. Thus, the localized groundwater flow direction from these hills is most generally towards the wetlands.

The GE-Stickney Wellfield is located within the basin of the Ipswich River which would be the ultimate point of discharge for surface water and groundwater originating from the GE property in the absence of pumping from water supply wells. Locally, a small tributary stream to Martin's Brook, located approximately one mile north of the GE site is anticipated to constitute the primary discharge area for groundwater flow leaving the site in a north-northwesterly direction. Likewise, the Ipswich River, located approximately one mile south of the GE site, is anticipated to constitute the primary discharge area for groundwater flow leaving the site in a south-southeasterly direction. Presently, a Wilmington public water supply well is located in the vicinity of the small tributary brook to the north and the town of Reading has two wellfields located along the Ipswich River.

2.30 GROUNDWATER QUALITY

CDM's groundwater quality data (3/86) detected groundwater contamination by chlorinated hydrocarbons at four primary locations. These locations include:

1. The immediate vicinity of the Stickney Well (as indicated by groundwater samples from monitoring wells MW-1, B-4, 4, and 7A-1).

2. An area between GE's noncontact cooling water discharge point 001 and the Stickney Well (as indicated by groundwater samples from monitoring wells MW-5 and MW-7) and

3. An area southeast of the Stickney Well (as indicated by groundwater samples from monitoring wells MW-4, B-1, and DLM-1).

4. An area northwest of the end of Fordham Road (as indicated by groundwater samples from monitoring well MW-6A, formerly B-4).

No chlorinated solvents were identified in the monitoring wells located between GE's wastewater treatment plant and the area to the north and northeast of the GE property. Table 1 summarizes CDM's groundwater quality data (refer to Figure 2 for monitoring well locations).

3.00 HAZARDOUS MATERIAL REVIEW

To delineate past storage, usage, and disposal of hazardous materials at the GE site, GZA reviewed records made available by GE personnel. The records since 1980 are thorough, a reflection of the company's awareness of RCRA regulations and in response to a DEQE approved (May 1, 1979) Spill Prevention Control and Countermeasure Plan. The information on conditions prior to 1980 was gleaned from various drawings and reports.

3.10 SITE HISTORY

GE's Aircraft Instruments Department occupies the Wilmington GE facility. Operations at the facility include development, design, testing, pre-production, and production of aircraft instruments and sensors. Manufacturing processes include machining, assembly, and testing.

GE presently leases the property from Wilmington Trust Co. The buildings were constructed on undeveloped land and were to house Barbo's Warehouse Furniture. However, plans changed and GE

occupied the buildings soon after construction in 1971. In 1984 and 1985 a portion of the GE facility was subleased to Hamilton Standard, manufacturers of hydrogen generators. Until recently, a portion of the facility was subleased to Converse starting in 1979.

Aerial photographs of building construction at the site in 1970 indicated a gravel road formerly allowed traffic access from Fordham Road to the Stickney Well. Presently this road has been overgrown by wetland vegetation and is no longer in use.

3.20 HAZARDOUS MATERIAL REVIEW 1971 - 1979

Although complete documentation of the use, storage, and disposal of trichloroethene and tetrachloroethene prior to 1979 is unavailable, it appears tetrachloroethene and trichloroethene were used at the plant in 1979. In 1979, DEQE and GE's consultants Dana E. Perkins collected numerous samples to assess the presence and/or potential discharge of the two compounds at the GE site. Samples were collected from GE's underground waste oils and solvents holding tanks in addition to GE's noncontact cooling water and wastewater discharges. Based on that 1979 analytical data, tetrachloroethene and trichloroethene were, at the time of sampling, present at the GE plant.

The analytical test data are summarized in Table 2. Solvents were detected in the wastewater effluent (tetrachloroethene at 6 ppb), GE's shop machine oil (tetrachloroethene at 930 ppb), GE's underground waste oil and solvent tank (trichloroethene 81,700 ppb, tetrachloroethene 968,000 ppb) GE's noncontact cooling water (tetrachloroethene 1,100 ppb), and three additional underground tanks at trace levels. Tetrachloroethene was also detected in the groundwater collected from four test pits excavated south of the wastewater treatment plant at a suspect former magnesium chip disposal area. Levels in the test pit groundwater ranged from 24 ppb to 89 ppb. Tanks which contained concentrations of tetrachloroethene exceeding 100,000 ppb, based on Dana F. Perkins 1979 analytical data, are highlighted on Figure 3. The Joseph App Company was contracted prior to 1979 to pick up and dispose hazardous materials, in particular waste oils and solvents stored in the underground tanks highlighted on Figure 3.

The suspect former magnesium chip disposal area located south of waste water treatment plan was excavated in 1979 under DEQE's supervision to assess the area for the possible presence of liquid solvents and waste metal. During the exploratory test pits magnesium chips were uncovered. Dana Perkins collected two sets of groundwater samples from the test pits. The first set of samples, collected on the day the test pits were excavated, was analyzed for trichloroethene. The second set of samples,

collected one week later, was analyzed for tetrachloroethene. The second set of samples was collected because the DEQE informed GE and Dana F. Perkins after the initial sampling round that tetrachloroethene, in addition to the primary contaminant trichloroethene, was present in the Stickney Well.

3.30 HAZARDOUS MATERIAL REVIEW 1979 - 1986

In response to DEQE's 1979 investigations, GE implemented a Spill Prevention Control and Countermeasure Plan to mitigate the potential release of on-site chemicals to the environment. The plan included the construction of a drum storage area and a Regulated Substance Storage Building, in addition to the installation of two new bermed above-ground waste oil and jet fuel storage tanks. The spill prevention and control facilities were constructed in 1983.

At present, all drummed chemicals delivered to the GE site are received and stored in the drum storage area, located north of Building 3 and depicted on Figure 3. Drums in this area are set on a storage pad encircled by a drainage trough. In case of a spill event, the material drains into the trough and dumps into a 1,000-gallon underground precast concrete oil and water separator. This device is overlain by a concrete pad. As shown on a preliminary design plan and verified by GE personnel, a 4-inch-diameter pipe connects the oil and water separator to a stormwater catch basin on line with the noncontact cooling water discharge line 001. This connection is via a vertical riser from the bottom of the sump which serves to separate the oils and drain the water which has entered the trough and collected in the bottom of the separator.

The Regulated Substances Storage Building is used for accumulation of waste oils and dispensing of hazardous materials from drums. All drums received and stored in the drum storage area are transferred to the Regulated Substance Storage Building prior to opening. Once opened, the drums are stored in the building until emptied and replaced. Also housed in the Regulated Substance Storage Building are storage tanks containing jet fuel and waste oil. These storage tanks are surrounded by concrete berms in case of overflow or spillage.

If required, overflow from the concrete berm around the waste oil accumulation tank and the jet fuel tank in the Regulated Substance Storage Building is conveyed to a 10,000 gallon underground tank located north of the building. This underground tank is one of four tanks comprising the underground tank farm located between Building 1 and 3. Should overflow occur, waste oil which has been conveyed to the 10,000-gallon tank is removed by pumping for proper disposal. No overflow to this tank has occurred since installation of the system.

Oil spills which occur during the flowmeter testing processes in Buildings 1 and 3 are conveyed from perimeter troughs to a sump located in the pump house situated between the two buildings. The sump pump transfers the substances to the accumulation tank in the Regulated Substance Storage Building.

Existing underground tanks at the GE site are summarized in Table 3. In addition to the tanks discussed in the previous paragraphs, two 3,500-gallon underground fiberglass tanks, encased in concrete vaults, three underground tanks located in the tank farm area, and one tank at the northeast corner of Building 1A completes the list of tanks existing at the site. One 3,500-gallon tank receives wastes from GE's metal finishing processes and one 3,500-gallon tank receives wastes from laboratory operations in Building 1A. The tank presently receiving wastes from Building 1A was first used by subleasee Hamilton Standard for their Direct Energy Conversion Operation (DECO). The three tanks located in the tank farm area have been out of service since approximately 1979.

Material descriptions of solvents presently used at the GE facilities are attached as Appendix B. Trichlorofluoroethane, dichloromethane (methylene chloride), trichlorotrifluoroethane, acetone, and nitromethane comprise the degreasing products used by GE. In addition, 1,1,1-trichloroethane is used for atomized spray cleaning beneath hoods vented to the atmosphere.

Suffolk Services is presently contracted by GE to transport hazardous waste materials generated at the site to licensed treatment facilities. As a licensed hazardous waste hauler, Suffolk Services, was retained by GE in 1979 after cancellation of services with Joseph App Company. Manifest records are on file and available for DEQE review upon request.

Estimated volumes of water generated as industrial waste during GE operations are summarized as follows. Approximately 2,000 gpd, 50 gpd, and 250 gpd of water is wasted from the metal finishing operation, chemical laboratory, and machine shop operation, respectively. The flows are directed to the on-site waste accumulation tanks for ultimate off-site disposal transported by Suffolk Services.

The balance of water utilized at the GE plant is for sanitary use and noncontact cooling water. The approximate 30,000 gpd of water used for sanitary purposes is treated at GE's on-site domestic wastewater treatment plant and discharged to the groundwater regime through sand filter beds. Approximately 68,000 gpd of noncontact cooling water is discharged from outfall 001 whereas approximately 34,000 gpd of noncontact cooling water is discharged from outfall 002.

4.00 WATER QUALITY SAMPLING ROUND

GZA conducted a water quality sampling round to confirm the presence of tetrachloroethene and trichloroethene in CDM's existing monitoring wells located between the GE facility and the Stickney Well and to assess the quality of water being discharged from the GE property to the adjacent wetland. GZA sampled the following:

1. GE's noncontact cooling water,

2. GE's sanitary wastewater effluent prior to discharge to the sand filter beds,

3. the stormwater runoff from the GE (and Converse) parking areas, and

4. Monitoring wells MW-5 and MW-7.

Sampling of additional monitoring wells, as proposed in the June 20, 1986 proposal and study plan, shall be conducted as part of the Phase II geohydrologic investigation.

Sample collection was conducted on July 31, 1986. Previously described sample locations are depicted on Figure 4. GE representative, Mr. A.R. Gamache, was present during sampling in addition to CDM representative Mr. Andrew Chapman. Mr. Chapman provided GZA access to monitoring wells MW-5 and MW-7 in addition to splitting groundwater samples from these wells with GZA. GZA's sampling protocol is presented in Appendix C. All samples were delivered to Energy Resources Company, Inc. (ERCO) for volatile organic compound analysis using EPA Method 624.

ERCO's analytical data is presented as Appendix D. These data generally substantiate CDM's results in that tetrachloroethene and trichloroethene were detected in monitoring well MW-5 at concentrations of 47 ppb and 130 ppb, respectively and at MW-7 at concentrations of 44 ppb and 74 ppb, respectively. In monitoring well MW-7, low levels (<20 ppb) of 1,1-dichloroethane, trans-1,2-dichloroethene, and toluene were also detected in these samples.

No volatile organic compounds were detected in: (1) the stormwater runoff (sample DD), (2) noncontact cooling water discharge 001, (sample D001), and (3) the stormwater catch basin (sample SCB). A trace concentration (3.7 ppb) of toluene was detected in the noncontact cooling water discharge 002 (sample D002) whereas toluene, chloroform, and bromodichloromethane were

GZA

detected in the wastewater effluent at trace concentrations (between 2.7 and 6 ppb). It is GZA's opinion that the presence of chloroform and bromodichloromethane in this sample is probably reflective of chlorination of the wastewater effluent prior to discharge.

5.00 SUMMARY AND CONCLUSIONS

The primary objective of GZA's study was to identify possible past and present sources of trichloroethene and tetrachloroethene at the GE site which may have been or are contributable to the existing groundwater contamination at the Stickney Well. Based on an investigation of site history and disposal practices, review of available geohydrologic data, and the collection of water samples, the following site conditions were identified:

1. Tetrachloroethene and trichloroethene were identified as present in the past at the following GE site locations:

    a. Underground Tanks
    b. Noncontact Cooling Water Discharge Point
    c. Wastewater Effluent Discharge Point
    d. Magnesium Chip Disposal Area

2. Tetrachloroethene and trichloroethene have been detected in samples from groundwater monitoring wells collected from the following areas:

    a. immediate vicinity of the Stickney Well,
    b. between GE's property and the Stickney Well,
    c. southeast of the Stickney Well, and
    d. northwest of the end of Fordham Road.

3. Potential migratory pathways within the sand and gravel deposits of the groundwater regime exist for the migration of tetrachloroethene and trichloroethene from GE towards the Stickney Wellfield and/or vicinities southeast of GE.

The identification of tetrachloroethene and trichloroethene in the past at four locations on the GE property is summarized as follows:

Underground Tanks

Waste liquids generated at the GE facility historically (and presently) have been accumulated in underground tanks as well as above-ground tanks. 1979 records indicated the presence of tetrachloroethene and trichloroethene in a number of these tanks. The integrity of these tanks (with respect to leaks) in 1979 is unknown. Underground accumulation tanks of particular concern include:

1. The 10,000-gallon underground tank located north of the Regulated Substance Storage Building and currently serving as an overflow for the above ground waste oil storage tank. In 1979 this tank contained waste oil and solvents.

2. The 10,000-gallon underground tank located in the tank farm, which in 1979 contained fuel oil and is presently out of service.

3. The 1,000-gallon underground tank located in the tank farm, which in 1979 contained JP-4, and is presently out of service.

Noncontact Cooling Water Discharge Point 001

Approximately 100,000 gpd of noncontact cooling water is discharged to the wetlands east of the GE facility. Analytical data from 1979 indicated the presence of tetrachloroethene in the water in the drain at discharge point 001. It is unknown why tetrachloroethene was present at discharge point 001 in 1979, however, GZA identified several stormwater catch basins which are on line with the noncontact cooling water drainage lines. Although available records had no documentation of chemical spills at the GE facility, accidental spillage in the chemical storage area could potentially enter the noncontact cooling water discharge lines through these stormwater catch basins.

Presently, tetrachloroethene and trichloroethene are not used at the GE facility as bulk degreasers. Recent analytical data did not indicate the presence of these solvents in the water at discharge point 001.

Wastewater Effluent

On average, approximately 30,000 gpd of sanitary wastewater effluent is released to the groundwater regime from the sand filters of GE's wastewater treatment plant. In 1979, 30 ppb of tetrachloroethene was detected in the wastewater influent whereas 6 ppb was detected in the wastewater effluent. Records indicate

that tetrachloroethene and trichloroethene were used in the GE plant in 1979. These compounds may therefore have been present in the wastewater influent periodically. Studies conducted on the persistence of chlorinated solvents through several wastewater treatment plants indicate influent concentrations are reduced significantly during treatment[1]. Thus it would be expected that occasional low concentrations of tetrachloroethene and trichloroethene in the wastewater influent would have most likely been reduced to trace (approaching non-detectable) concentrations at the discharge point.

Recent analytical data indicated GE's wastewater effluent was free of these contaminants. Additionally, tetrachloroethene and trichloroethene have not been recently detected in monitoring wells located between the wastewater treatment plant and the Stickney Well.

Magnesium Chip Disposal Area

In 1979, a magnesium chip disposal area near the wastewater treatment plant was excavated and groundwater samples collected to assess the possible presence of liquid solvents associated with the waste metal. Tetrachloroethene and trichloroethene were detected in the groundwater (48-89 ppb and 5 ppb, respectively) and waste metals were uncovered. The 1979 investigations did not identify the source of the chlorinated solvents at this location. Furthermore the distribution of the solvent in the aquifer system was not defined.

In summary, it is GZA's opinion that the presence of tetrachloroethene (and trichloroethene) have been identified at four locations at the GE site. Although potential migratory pathways within the groundwater regime exist for the migration of these compounds from the GE site towards the Stickney Wellfield and/or vicinities southeast of GE, at present there is no existing detailed analysis or documentation that links the Stickney Wellfield contamination to the GE site. However, it is GZA's further opinion that additional investigation is needed to assess three possible sources of solvent release to the environment. These areas are the possibility of accidental spillage to stormwater catch basins, the underground accumulation tanks, and the magnesium chip disposal area.

[1] Brown, D. Chlorinated Solvents in Sewage Works, Effluent and Water Treatment Journal, March 1978, Pg. 111-117.

TABLES

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TABLE 1

SUMMARY OF CDM'S GROUNDWATER QUALITY DATA
(all data in ppb)

Sample Location	Sample Date	Tetrachloro-ethene	Trichloro-ethene	1,1-dichloro-ethane	Trans-1,2-dichloroethane	Total Volatile Organic Compound Concentration
MW-1	02/04/86	11	9.3			21
	03/03/86	8.9	6.8			16
MW-2	03/03/86					
MW-3	03/03/86					
MW-4	03/03/86	70	75	1.6	9.6	160
MW-5	03/03/86	24	65			90
MW-6	03/03/86					
MW-7	03/03/86	54	99	4	18	170
MW-8	03/03/86					
MW-9	03/03/86					
MW-10	03/03/86					
MW-11	03/03/86					
MW-11A	03/03/86					
DLM-1	01/03/86	27	40			67
MW-4A (formerly B-1)	03/03/86	59	19			78
MW-6A (formerly B-4)	03/03/86	10	20			30
GE-6	11/20/85 03/03/86					
5	11/20/85	Present	5.9			6
3	11/20/85	8.4	21			29
7A-1	11/20/85	41	18			59
Stickney Well	01/03/86	Present	Present			

NOTES:

1. Analytical Method: VOA scan - EPA Method 624
2. Blank indicates compound was not detected.
3. Vinyl chloride was detected in sample MW-7, March 3 and 4, 1986 at a trace concentration of 1.6 ppb.
4. Chloroform was detected as present in sample GE-6, November 20, 1985.
5. Samples designated as 03/03/86 were collected on both 03/03/86 and 03/04/86.

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TABLE 2

SUMMARY OF DANA F. PERKINS WATER QUALITY DATA (1979)

Sample	Sample Date	Sample Location Description	Concentrations in ppb (parts per billion) Tetrachloroethene	Trichloroethene
Tank d[1]	1/15/79 1/17/79	10,000-gallon underground tank 1979 contained waste oil and solvents, presently overflow tank	968,000	81,700
Tank f[1]	1/15/79 1/17/79	3,500-gallon underground tank acid & caustic wastes	12	<4
Tank g[1]	1/17/79	10,000-gallon underground tank 1979 contained fuel oil presently out of service	331,000	--
Tank h[1]	1/17/79	1,000-gallon underground tank 1979 contained JP-4, presently out of service	117,000	--
Tank j[1]	1/15/79 1/17/79	5,000-gallon "DECO" tank 1979 received wastes from DECO	6	32
Water Soluble Oil	1/17/79	Shop area	930	--
Wastewater Influent	1/17/79	Raw sewage entering treatment plant	30	--
Wastewater Effluent	1/10/79 1/17/79	Effluent leaving treatment plant	6	<50[3]
Standing Water OGE-6	1/10/79	GE-6 located east of treatment plant	6	<50[3]
GE-6	1/10/79	GE-6 located east of treatment plant	--	<50[3]
002	1/10/79 1/17/79	Noncontact cooling water discharge pt. 002	10	<50[3]
001	1/10/79 1/17/79	Noncontact cooling water discharge pt. 001	1,100	<50[3]
Test Pit 1	1/10/79 1/17/79	Test pit excavated in magnesium chip disposal area	52	<50[3]
Test Pit 2	1/10/79 1/17/79	Test pit excavated in magnesium chip disposal area	48	<50[3]
Test Pit 3	1/17/79	Test pit excavated in magnesium chip disposal area	24	5
Test Pit 4	1/17/79	Test pit excavated in magnesium chip disposal area	89	<5
Stickney Well	1/17/79		28	110
Hypochlorite Solution	1/17/79	Hypochlorite stock at Stickney well	8	<5
Wilmington Water Supply	1/17/79	Water entering GE facility	10	<5
Surface Water-Concord St.	1/17/79	Stormwater drain ~ 2,000 ft. east of Concord St. & Fordham Rd. intersection	8	<5
Manufactured hypochlorite	1/10/79 1/17/79	Hypochlorite stock at wastewater treatment plant. Hypochlorite used during WW treatment	51	50

NOTES:

1. GZA tank designation, refer to Figure 3.
2. Analyses conducted by Arnold Greene Testing Laboratories, Inc.
3. Detection limit = 50 ppb.
4. -- indicates specific compound analysis was not conducted.

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File No. A-7650

TABLE 3

INVENTORY OF GE CHEMICAL ACCUMULATION TANKS

Tank Designation (as shown on Figure 3)	Tank Description
Tank a	5,000- to 6,000-gallon above-ground steel waste oil accumulation tank (located inside Regulated Substance Storage Building) installed 1983.
Tank b	5,000- to 6,000-gallon above-ground steel jet fuel storage tank (located inside Regulated Substance Storage Building) installed 1983.
"Tank" c	Concrete pit located inside pump house, receives any fuel spills from test processes in Buildings 1 and 3 and transfers them to Tank a.
Tank d	10,000-gallon underground accumulation tank. In 1979 contained waste oil and solvents, presently available for potential overflow for Tank a and Tank b bermed area.
Tank e	3,500-gallon underground accumulation tank in concrete vault. Constructed in 1981 to replace Tank j. Received wastes from DECO until 1985. Currently receives laboratory wastes from Building 1A.
Tank f	3,500-gallon underground accumulation tank in concrete vault, receives acid and caustic wastes from metal finishing processes.
Tank g	10,000-gallon underground storage tank. 1979 contained fuel oil, presently out of service.
Tank h	1,000-gallon underground storage tank. 1979 contained JP-4, presently out of service.
Tank i	500-gallon underground storage tank. 1979 contained methanol, presently out of service.
Tank j	5,000-gallon tank was used prior to 1981 for the DECO operation's waste. Was taken out of service when new tank (e) was installed.

SCOPE OF SERVICES

PHASE II GEOHYDROLOGIC INVESTIGATION

GENERAL ELECTRIC COMPANY
WILMINGTON, MASSACHUSETTS

OBJECTIVE OF STUDY

The objective of the study is to evaluate whether the past presence of tetrachloroethene and trichloroethene at the General Electric Company (GE) site in Wilmington/North Reading, Massachusetts has been or is contributable to the existing groundwater contamination at the Stickney Wellfield in North Reading, Massachusetts. As summarized in GZA's Phase I report entitled "Preliminary Site Investigation: General Electric Company - Stickney Well, Wilmington, Massachusetts" and dated September 12, 1986, GZAidentified the past presence of tetrachloroethene and trichloroethene at three primary locations at the GE site. These locations include:

1. Noncontact Cooling Water Discharge Point 001
2. Underground Tanks
3. Magnesium Chip Disposal Area

WORK TASKS

Task 1 Geohydrologic Report and Data Review

To better understand the hydrogeology and contaminant distribution in the study area, GZA shall review available geohydrologic reports and data. Camp, Dresser, & McKee (CDM) is preparing on behalf of the Town of North Reading a geohydrologic report for submission to the DEQE, summarizing their investigation of the Stickney Well contamination. The DEQE will issue a copy of the CDM report to GZA for detailed review. GZA shall also contact DEQE and/or North Reading officials to obtain historic data on the Stickney Wellfield, in particular pump test data and pumping records, if this data is not provided in the CDM report.

Task 2 Subsurface Exploration Program

GZA proposes to conduct an extensive subsurface exploration program to assess groundwater quality at the GE site. GZA recommends the performance of eight test borings and installation of eight monitoring wells on GE and Converse property, in addition to six monitoring wells (GZA 1-6) in the vicinity of GE's wastewater treatment plant. The latter six monitoring wells are scheduled to be installed in order to satisfy state groundwater discharge permit requirements. Their proposed locations have been approved by DEQE's Division of Water Pollution Control but installation has been postponed due to access problems in wetland areas.

Proposed boring and monitoring locations are depicted on the attached figure and discussed as follows:

1. A series of wells are to be located along GE's downgradient property line (GZA-1, GZA-6, GZA-9, GZA-10, and GZA-11). The purpose of these wells is to assess the quality of the groundwater as it leaves the GE site.

2. A series of wells (GZA-4, GZA-12, and GZA-13) are to be located along GE's upgradient property line to assess the quality of the groundwater as it enters the GE site. The final proposed location of GZA-12 and GZA-13 will be established by GZA after review of DEQE files documenting potential upgradient sources of contamination.

3. A multi-level well cluster (GZA-14 and GZA-14A) will be installed on the Converse property to further define the chlorinated hydrocarbon contamination in the vicinity of MW-5 and MW-7.

The presence of tetrachloroethene and trichloroethene were identified at three primary locations at the GE site in the past. GZA proposes to assess these locations as follows:

1. Two monitoring wells (GZA-7 and GZA-8) will be located downgradient of selected underground tanks.

2. Two monitoring wells (GZA-9 and GZA-10) will be located in the vicinity of GE's noncontact cooling water discharge points 001 and 002.

3. Three monitoring wells (GZA-1, GZA-6, and GZA-11) will be located along GE's property line approximately downgradient of the magnesium chip disposal area.

During the performance of the test borings, a GZA field engineer will collect soil samples and log exploration activity. These soil samples will be screened at GZA's Newton Water Quality Laboratory for volatile organic compounds. All testborings will be completed to refusal. If deemed necessary by the GZA field engineer (based on field conditions encountered during drilling), bedrock may be cored at selected locations.

Observation wells consisting of 1-1/2-inch-diameter PVC wellscreen and riser pipe will be installed in each borehole at the completion of drilling. A filter of clean silica sand will be placed in the annular space around each wellscreen, and a bentonite seal will be placed 2 feet above the top of wellscreen. Wellheads will be equipped with road boxes or protective casings.

Task 3 Survey of Groundwater Monitoring Wells

To develop groundwater contours for the study area, it will be necessary to survey the rim elevation of monitoring wells in the study area including those to be installed by GZA. The relative elevations of each wellhead with respect to the USGS datum shall be determined so that, in turn, groundwater level measurements may be converted to the appropriate groundwater elevations. Survey work shall be completed by a registered land surveyor.

Task 4 Groundwater Sampling Round

Groundwater samples will be collected from all GZA installed wells (including wells in the vicinity of GE's wastewater treatment plant), in addition to monitoring wells GE-6, 2, MW-5, and MW-7. Six groundwater samples will be screened for volatile organic compounds at GZA's Newton Water Quality Laboratory whereas twelve selected groundwater samples will be delivered to a contract laboratory for a quantitative volatile organic analysis using EPA Method 624.

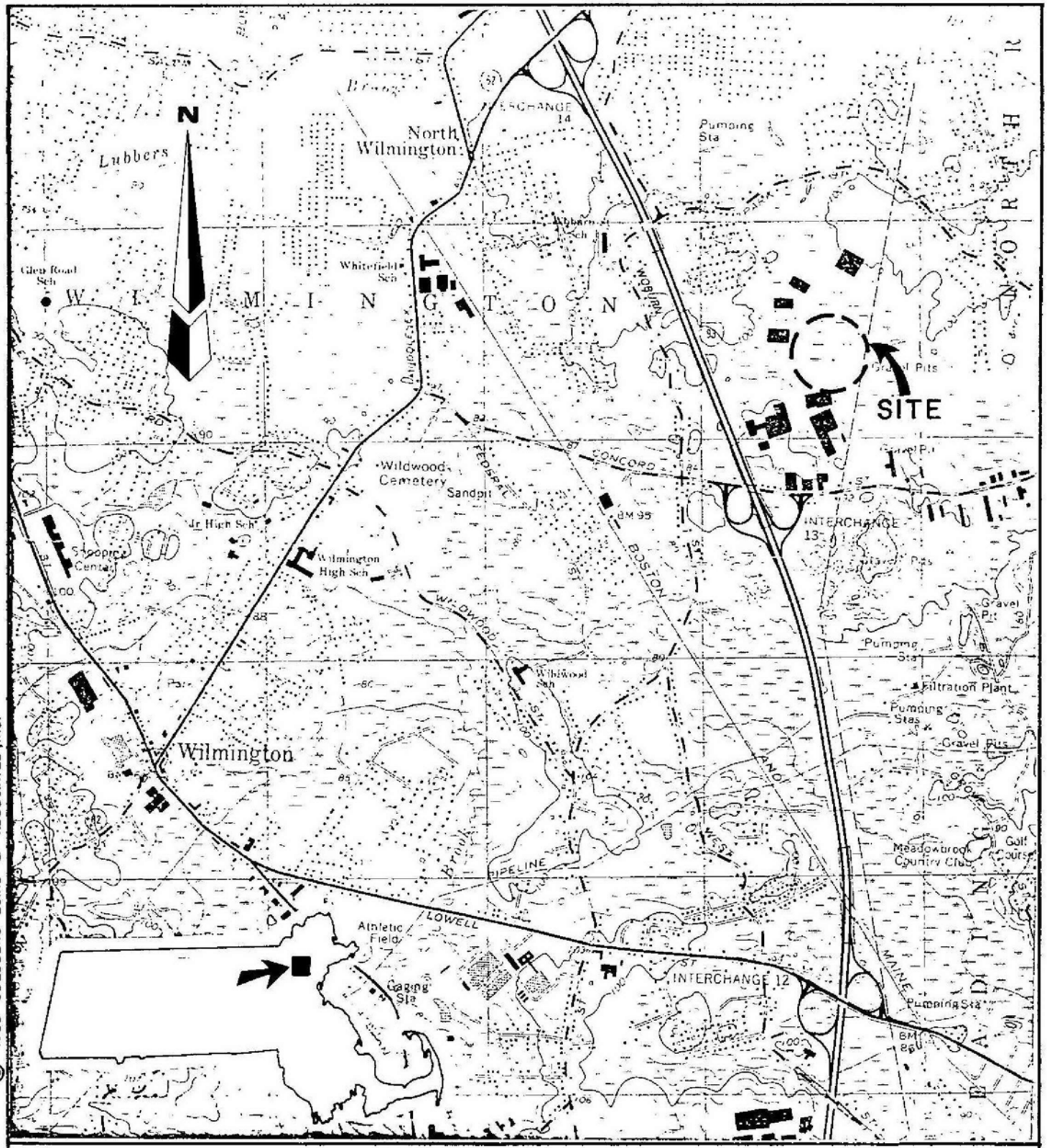
Task 5 Develop 2-Dimensional Groundwater Model

GZA will develop and apply a 2-dimensional groundwater model computer code to evaluate the aquifer response, under pumping and nonpumping conditions, in the GE-Stickney Wellfield Study area. The model will be used 1) to assess the groundwater flow field under pumping and non-pumping conditions, 2) to evaluate the distribution of contaminants as related to the estimated flow field and the Stickney Well contamination, and 3) to evaluate, if deemed necessary by the DEQE, remedial action alternatives.

Task 6 Report Preparation

A Phase II report will be prepared for submission to DEQE. This report will detail GZA's geohydrologic investigation, discuss the extent to which activities at the GE property may have been contributable to the Stickney Well contamination, and present, if appropriate, conceptual recommendations for remedial action.

FIGURES



FROM USGS WILMINGTON, MASS
QUADRANGLE MAP-1979

FILE No. A-7650

GZA

G.E. SITE
WILMINGTON MASS.

LOCUS PLAN

SEPTEMBER, 1986 FIGURE NO. 1

N

GORDON RD.

STICKNEY WELL

ROADWAY SERVICES, INC.

CONVERSE

GENERAL ELECTRIC CO.

APPROXIMATE LOCATION OF WASTEWATER TREATMENT PLANT

BLDG. 2

BLDG. 1A

BLDG. 1

BLDG. 3

FORDHAM ROAD

CONCORD STREET

NORTH READING
WILMINGTON
TOWN LINE

MW-1 MW-2 MW-3 MW-4 MW-4A MW-5 MW-6 MW-6A MW-7 MW-8 MW-9 MW-10 MW-11

DLM-1

7A-1 7A-2 7A-3

GZA-1 GZA-2 GZA-3 GZA-4 GZA-5 GZA-6 GZA-7 GZA-8 GZA-9 GZA-10 GZA-11 GZA-12 GZA-13 GZA-14 GZA-14A

GE-6

001 002

NOTES:

1) BASE MAP DEVELOPED FROM PLAN PROVIDED BY CAMP, DRESSER, & McKEE (CDM) ENTITLED "THE COMMONWEALTH OF MASSACHUSETTS DEPARTMENT OF PUBLIC WORKS - ROUTE 62 BURLINGTON TO MIDDLETON", DATED NOV. 21, 1967. PROPERTY LINES TRANSFERRED FROM TOWN OF N. READING & WILMINGTON ASSESSORS MAPS AND SHOULD BE CONSIDERED APPROXIMATE. APPROXIMATE LOCATION OF GE BUILDINGS FROM PLAN PROVIDED BY GE ENTITLED "BUILDING DIRECTORY, PLANT SITE, WILMINGTON, MA." ORIGINAL SCALE: 1"= 200'.

2) LOCATION OF BORINGS FROM SURVEY PROVIDED BY CDM

LEGEND:

- MW ⊙ MONITORING WELL BY CDM, 1986
- DLM ⊕ MONITORING WELL BY D.L. MAHER
- 7A ⊙ MONITORING WELL BY CDM, FEB. 1986
- I ⊕ MONITORING WELL BY INTERDISCIPLINARY ENVIRONMENTAL PLANNER 1978
- GE, 2 ● MONITORING WELL BY GE
- EXISTING WATER
- PROPOSED MONITORING WELL LOCATIONS. WELLS TO BE INSTALLED TO SATISFY STATE GROUNDWATER WASTEWATER DISCHARGE PERMIT REQUIREMENTS. LOCATIONS HAVE BEEN APPROVED BY DEQE'S DIVISION OF WATER POLLUTION CONTROL.
- PROPOSED MONITORING WELL LOCATIONS FOR PHASE II GEOHYDROLOGIC INVESTIGATION.

0 100' 200' 400' 600' 800'

FILE No. A-7650.1

GZA

GENERAL ELECTRIC CO. STICKNEY WELL FIELD
PHASE II GEOHYDROLOGICAL INVESTIGATION
WILMINGTON, MA.

SITE PLAN & PROPOSED MONITORING WELL LOCATIONS

SEPT. 1986

FIGURE No. 1

N

GORDON RD.

CONCORD STREET

NOTES:

1) BASE MAP DEVELOPED FROM PLAN PROVIDED BY CAMP, DRESSER, & McKEE (CDM) ENTITLED " THE COMMONWEALTH OF MASSACHUSETTS DEPARTMENT OF PUBLIC WORKS - ROUTE 62 BURLINGTON TO MIDDLETON ", DATED NOV. 21, 1967. PROPERTY LINES TRANSFERRED FROM TOWN OF N. READING & WILMINGTON ASSESSORS MAPS AND SHOULD BE CONSIDERED APPROXIMATE. APPROXIMATE LOCATION OF GE BUILDINGS FROM PLAN PROVIDED BY GE ENTITLED " BUILDING DIRECTORY, PLANT SITE, WILMINGTON, MA." ORIGINAL SCALE: 1" = 200'.

2) LOCATION OF BORINGS FROM SURVEY PROVIDED BY CDM

LEGEND:

- MW ⊙ MONITORING WELL BY CDM, 1986
- DLM ⌀ MONITORING WELL BY D.L. MAHER
- 7A ⊙ MONITORING WELL BY CDM, 1978
- 1 ⊕ MONITORING WELL BY INTERDISCIPLINARY ENVIRONMENTAL PLANNER 1978
- GE; 2 ● MONITORING WELL BY GE
- EXISTING WATER
- 001 NONCONTACT COOLING WATER DISCHARGE POINT

DLM-1
MW-4
MW-4A
STICKNEY WELL
7A-3
MW-1
3
7A-2
7A-1
MW-2
MW-5
ROADWAY SERVICES, INC.
MW-11
2
MW-7
002
001
CONVERSE
GE-6
GENERAL ELECTRIC CO.
APPROXIMATE LOCATION OF WASTEWATER TREATMENT PLANT
MW-10
MW-9
MW-8
MW-6A
MW-6
MW-3
BLDG. 2
BLDG. 1A
BLDG. 1
BLDG. 3
NORTH READING
WILMINGTON
TOWN LINE
FORDHAM ROAD

0 100' 200' 400' 600' 800'

FILE No. A-7650

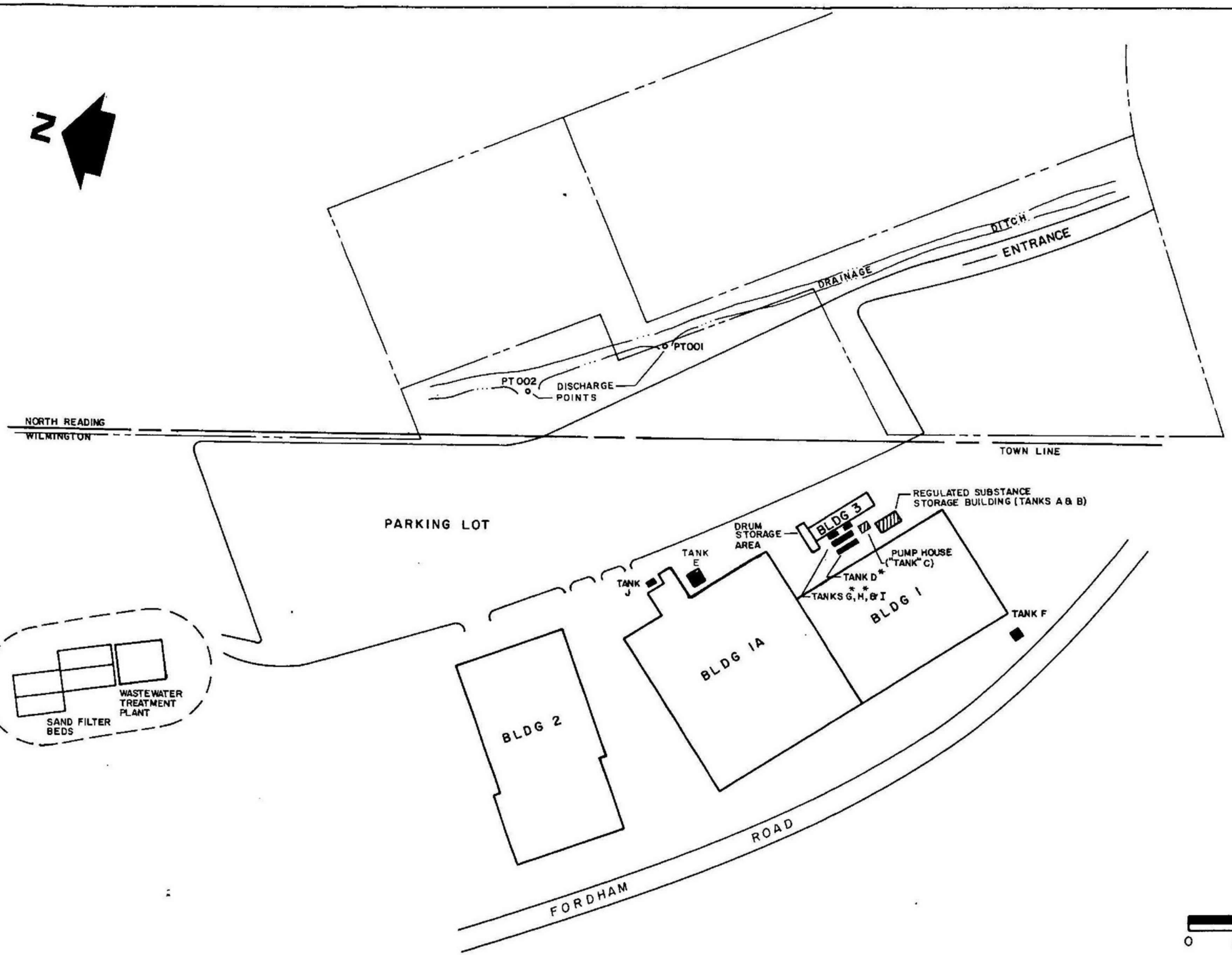
GZA

GENERAL ELECTRIC COMPANY
STICKNEY WELL STUDY
WILMINGTON, MA.

SITE PLAN & MONITORING WELL LOCATIONS

SEPT. 1986

FIGURE No. 2



NOTE:

1) BASE MAP DEVELOPED FROM PLAN PROVIDED BY THE GENERAL ELECTRIC COMPANY ENTITLED "BUILDING DIRECTORY PLANT SITE, WILMINGTON, MA.", UNDATED.
2) PROPERTY LINES MAY BE INACCURATE AS SHOWN.

STORAGE TANK DESCRIPTIONS:

TANKS A & B – ABOVEGROUND 5,000 gal. TANKS LOCATED IN THE REGULATED SUBSTANCE STORAGE BUILDING. CONTENTS: WASTE OIL AND JET FUEL

"TANK" C – SMALL CONCRETE PIT LOCATED IN PUMP HOUSE. RECEIVES WASTES FROM BUILDINGS 1 AND 3 PRIOR TO TRANSFER TO WASTE OIL TANK IN REGULATED SUBSTANCE STORAGE BUILDING

TANK D* – 10,000 gal. UNDERGROUND TANK. PRESENTLY OUT OF SERVICE; OVERFLOW FROM A & B

TANK E – 3,500 gal UNDERGROUND TANK. RECIEVES WASTE FROM CHEMICAL LABORATORY OPERATIONS IN BUILDING IA.

TANK F – 3,500 gal UNDERGROUND TANK. RECIEVES ACID & CAUSTIC WASTES FROM METAL FINISHES PROCESSES.

TANK G*, H*, & I – UNDERGROUND STORAGE TANKS TAKEN OUT OF SERVICE.

TANK J – 5,000 GALLON UNDERGROUND TANK. OUT OF SERVICE SINCE 1981.

* BASED ON DANA F. PERKINS 1979 ANALYTICAL DATA, TANK CONTAINED TETRACHLOROETHENE AT A CONCENTRATION EXCEEDING 100,000 ppb.

SCALE: APPROX.

0 100' 200' 400'

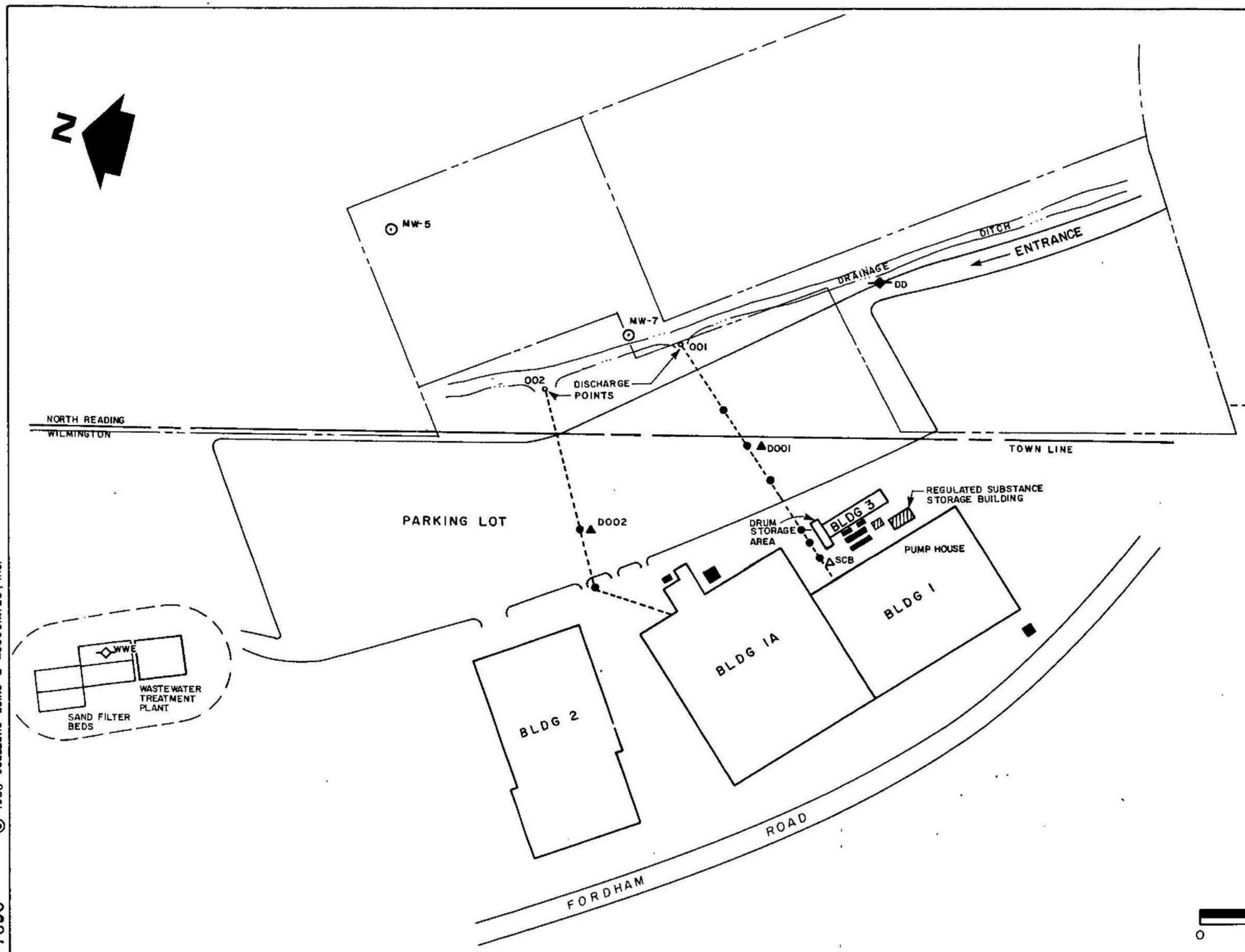
GENERAL ELECTRIC COMPANY
- STICKNEY WELL STUDY -
WILMINGTON, MA.

CHEMICAL STORAGE FACILITIES

SEPT. 1986 FIGURE No. 3

FILE No. A-7650

GZA



NOTES:

1) REFER TO FIGURE No. 3 FOR ADDITIONAL NOTES & LEGEND.
2) LOCATION OF CDM MONITORING WELLS DETERMINED BY SURVEY BY CDM.
3) LOCATION OF WATER SAMPLES DETERMINED BY LINE OF SIGHT, BY GZA PERSONNEL, FROM EXISTING TOPOGRAPHIC FEATURES. THIS DATA SHOULD BE CONSIDERED ACCURATE ONLY TO THE DEGREE IMPLIED BY THE METHOD USED.

LEGEND:

- ⊙ CDM MONITORING WELL – SAMPLED BY GZA ON 7/31/86
- APPROXIMATE LOCATION OF NONCONTACT COOLING WATER DISCHARGE LINE
- STORM WATER CATCH BASIN

WATER SAMPLE LOCATIONS
(COLLECTED BY GZA PERSONNEL - 7/31/86)

- ▲ NONCONTACT COOLING WATER - FROM CATCH BASIN
- △ STORMWATER CATCH BASIN - ON LINE WITH NONCONTACT COOLING WATER DISCHARGE 001
- ◇ WASTEWATER EFFLUENT
- ◆ STORMWATER DISCHARGE CULVERT
- o DISCHARGE POINTS 001 AND 002

SCALE: APPROX.
0 100' 200' 400'

GENERAL ELECTRIC COMPANY
- STICKNEY WELL STUDY -
WILMINGTON, MA.

WATER SAMPLING LOCATION PLAN

SEPT. 1986 FIGURE No. 4

FILE No. A-7630

GZA

APPENDIX A

LIMITATIONS

APPENDIX A

LIMITATIONS

Explorations

1. The analyses and recommendations submitted in this report are based in part upon the data obtained from subsurface explorations. The nature and extent of variations between these explorations may not become evident until further investigation. If variations then appear evident, it will be necessary to reevaluate the recommendations of this report.

2. The generalized soil profile described in the text is intended to convey trends in subsurface conditions. The boundaries between strata are approximate and idealized and have been developed by interpretations of widely spaced explorations performed by others. For specific information, refer to the boring logs available from others.

3. The analysis and conclusions submitted in this report are based in part upon chemical data and are contingent upon their validity. These data have been reviewed and interpretations made in the text and on the figures included with this report. It should also be noted that fluctuations in the types and levels of contaminants and variations in their flow paths may occur due to seasonal water table fluctuations, past practices used in disposal, as well as other factors.

4. This report has been prepared for the exclusive use of General Electric Company, Wilmington, Massachusetts, for specific application to their geohydrologic investigations in accordance with generally accepted hydrogeologic practices. No other warranty, express or implied, is made.

APPENDIX B

MATERIAL DESCRIPTIONS

1. DEGREASERS

U.S. DEPARTMENT OF LABOR
Occupational Safety & Health Administration
MATERIAL SAFETY DATA SHEET

SECTION I

MANUFACTURER'S NAME: E. I. DuPont de Nemours and Company, Inc.	EMERGENCY TELEPHONE NO.: (302) 774-2421
ADDRESS (Number, Street, City, State, and ZIP Code): Freon® Products Division, Wilmington, Delaware 19898	
CHEMICAL NAME AND SYNONYMS: Trichlorofluoroethane & Dichloromethane	TRADE NAME AND SYNONYMS: Freon® TMC
CHEMICAL FAMILY: Halogenated Hydrocarbon CAS# 76-13-1	FORMULA: CCl_2FCClF_2 and CH_2Cl_2

SECTION II HAZARDOUS INGREDIENTS

PAINTS, PRESERVATIVES, & SOLVENTS	%	TLV (Units)	ALLOYS AND METALLIC COATINGS	%	TLV (Units)
PIGMENTS			BASE METAL		
CATALYST			ALLOYS		
VEHICLE			METALLIC COATINGS		
SOLVENTS Dichloromethane CAS# 75-69-2	50	100* 200	FILLER METAL PLUS COATING OR CORE FLUX		
ADDITIVES			OTHERS		
OTHERS					

HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR GASES	%	TLV (Units)
*Intended change for 1978		

SECTION III PHYSICAL DATA

BOILING POINT (°F.)		97.7	SPECIFIC GRAVITY (H_2O=1)	77°F	1.42
VAPOR PRESSURE (mm Hg.)	77°F	500	PERCENT VOLATILE BY VOLUME (%)		100
VAPOR DENSITY (AIR=1)	77°F	2.7	EVAPORATION RATE (_____ =1)		0.3
SOLUBILITY IN WATER					
APPEARANCE AND ODOR					

SECTION IV FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (Method used)	None	FLAMMABLE LIMITS	Lel	Uel
		None		
EXTINGUISHING MEDIA	Nonflammable			
SPECIAL FIRE FIGHTING PROCEDURES				
UNUSUAL FIRE AND EXPLOSION HAZARDS	None			

NOTICE FROM DU PONT

The data in this Material Safety Data Sheet relates only to the specific material designated herein and does not relate to use in combination with any other material or in any process

Freon TMC

SECTION V HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE: 140 (Est'd)*, 270 (Est'd)**, TWA 600 (Est'd)***

EFFECTS OF OVEREXPOSURE: Light-headedness, giddiness, shortness of breath, possible narcosis; possible cardiac arrhythmias at high concentrations.

EMERGENCY AND FIRST AID PROCEDURES: Inhalation: Remove to fresh air, call a physician. Do not give epinephrine or similar drugs.

Skin or Eye Contact: Flush with water.

SECTION VI REACTIVITY DATA

STABILITY	UNSTABLE		CONDITIONS TO AVOID: Open flames or high temperatures.
	STABLE	X	

INCOMPATABILITY (Materials to avoid): Alkali or alkaline earth metals-powdered Aluminum, Zinc, Beryllium, etc.

HAZARDOUS DECOMPOSITION PRODUCTS: Hydrochloric and hydrofluoric acids - possible carbonyl halide.

HAZARDOUS POLYMERIZATION	MAY OCCUR		CONDITIONS TO AVOID
	WILL NOT OCCUR	X	

SECTION VII SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: Ventilate area-especially low places where heavy vapors might collect.

WASTE DISPOSAL METHOD: Reclaim by distillation

SECTION VIII SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (Specify type): Use air mask with independent supply in high concentrations.

VENTILATION	LOCAL EXHAUST: When large amounts are released	SPECIAL
	MECHANICAL (General): Especially in low places	OTHER

PROTECTIVE GLOVES: When handling liquid

EYE PROTECTION: When handling liquid

OTHER PROTECTIVE EQUIPMENT

SECTION IX SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING: Store containers in a clean, dry area. Do not heat above 125°F.

OTHER PRECAUTIONS: For further information, see Freon® Products Laboratory Bulletin S-16.

* ACGIH intended change for 1978 TLV-100 ppm.

** Present ACGIH TLV-200 ppm.

*** Federal Register Vol. 36 No. 105 May 29, 1971.

PETE RAVANESI
BOSTON H14-4600

U.S. DEPARTMENT OF LABOR

Occupational Safety & Health Administration

MATERIAL SAFETY DATA SHEET

Order thru
HILAND SALES CO
NEEDHAM, MASS. 02192
TEL 617 444-1600

SECTION I

MANUFACTURER'S NAME: E. I. duPont de Nemours & Company	EMERGENCY TELEPHONE NO.: (302) 774-2421
ADDRESS (Number, Street, City, State, and ZIP Code): Freon® Products Division, Wilmington, Delaware 19898	
CHEMICAL NAME AND SYNONYMS: Trichlorotrifluoroethane CAS# 76-13-1	TRADE NAME AND SYNONYMS: Freon® TF
CHEMICAL FAMILY: Halogenated Hydrocarbon	FORMULA: CCl_2FCClF_2

SECTION II HAZARDOUS INGREDIENTS

PAINTS, PRESERVATIVES, & SOLVENTS	%	TLV (Units)	ALLOYS AND METALLIC COATINGS	%	TLV (Units)
PIGMENTS	-		BASE METAL	-	
CATALYST	-		ALLOYS	-	
VEHICLE	-		METALLIC COATINGS	-	
SOLVENTS	-		FILLER METAL PLUS COATING OR CORE FLUX	-	
ADDITIVES	-		OTHERS	-	
OTHERS	-			-	

HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR GASES	%	TLV (Units)
None		

SECTION III PHYSICAL DATA

BOILING POINT (°F.)		117.6	SPECIFIC GRAVITY ($H_2O=1$)	77°F	1.57
VAPOR PRESSURE (mm Hg.)	77°F	334	PERCENT VOLATILE BY VOLUME (%)		100
VAPOR DENSITY (AIR=1)	77°F	2.9	EVAPORATION RATE (= CCl_4 =1)		0.3
SOLUBILITY IN WATER	77°F, % by wt.	0.02			
APPEARANCE AND ODOR	Colorless liquid - slight ethereal odor.				

SECTION IV FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (Method used)	None	FLAMMABLE LIMITS: None	Lel / Uel
EXTINGUISHING MEDIA	Nonflammable		
SPECIAL FIRE FIGHTING PROCEDURES			
UNUSUAL FIRE AND EXPLOSION HAZARDS	None		

NOTICE FROM DU PONT

The data in this Material Safety Data Sheet relates only to the specific material designated herein and does not relate to use in combination with any other material or in any process.

Freon TF

SECTION V HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE: 1000 ppm.

EFFECTS OF OVEREXPOSURE: Light-headedness, giddiness, shortness of breath, possible narcosis, possible cardiac arrhythmias at high concentrations.

EMERGENCY AND FIRST AID PROCEDURES: Inhalation: Remove to fresh air, call a physician. Do not give epinephrine or similar drugs.

Skin or eye contact: Flush with water.

SECTION VI REACTIVITY DATA

STABILITY			CONDITIONS TO AVOID
	UNSTABLE		Open flames or high temperatures.
	STABLE	X	

INCOMPATABILITY (Materials to avoid): Alkali or alkaline earch metals - powdered Al, Zinc, Beryllium, etc.

HAZARDOUS DECOMPOSITION PRODUCTS: Hydrochloric and hydrofluoric acids - possible carbonyl halides.

HAZARDOUS POLYMERIZATION			CONDITIONS TO AVOID
	MAY OCCUR		
	WILL NOT OCCUR	X	

SECTION VII SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: Ventilate area - especially low places where heavy vapors might collect. Remove open flames.

WASTE DISPOSAL METHOD: Reclaim by distillation

SECTION VIII SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (Specify type): Use air mask in high concentrations.

VENTILATION		
	LOCAL EXHAUST: When large amounts are released.	SPECIAL
	MECHANICAL (General): Especially in low places.	OTHER

PROTECTIVE GLOVES: When handling liquid.

EYE PROTECTION: When handling liquid.

OTHER PROTECTIVE EQUIPMENT

SECTION IX SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING: Store containers in a clean, dry, area. Do not heat above 125°F.

OTHER PRECAUTIONS: For further information see Freon® Products Bulletins FST-1, S-16, S-24, S-30.

Allied Chemical
An Allied Company

GENESOLV® DA Azeotrope

PRODUCT SAFETY DATA SHEET

A. GENERAL INFORMATION

TRADE NAME (COMMON NAME OR SYNONYM)	☐ C.A.S. NO. ☒ ALLIED PRODUCT CODE #
GENESOLV® DA Azeotrope (CAS #67-64-1, 76-13-1, 75-52-5	196-002678

CHEMICAL NAME
Blend of Acetone (9.4%), Trichlorotrifluroethane (90.3%) and Nitromethane (0.3%).

FORMULA	MOLECULAR WEIGHT
See section H	See section H

ADDRESS (No., STREET, CITY, STATE AND ZIP CODE)
ALLIED CHEMICAL
P.O. Box 1139R
Morristown, N.J. 07960

CONTACT	PHONE NUMBER	ISSUED DATE	REVISED DATE
Director, Product Safety	(201) 455-4157	March, 1980	Sept., 1982

B. FIRST AID MEASURES

EMERGENCY PHONE NUMBER
(201) 455-2000

Inhalation: Remove patient to fresh air. Give mouth-to-mouth resuscitation if breathing has stopped. Give oxygen as necessary if a qualified operator is available. Do not give adrenalin (epinephrine). Call a physician.
Eye Contact: Flush with large amounts of water, lifting eyelids occasionally. If eye symptoms persist, consult physician.
Skin Contact: Wash promptly with soap and water.
Ingestion: If conscious, induce vomiting immediately by giving 2 to 4 glasses of water and touching finger to back of throat. Call a physician.

C. HAZARDS INFORMATION

HEALTH

INHALATION
At low concentrations: headache, drowsiness, loss of concentration. At high levels: Intoxication, CNS depression and respiratory depression (possibly fatal). Can displace air, resulting in an asphyxiation hazard. Also, see section K.

INGESTION
Low oral toxicity. Similar symptoms as for inhalation. In large doses, fatal respiratory failure may occur.

SKIN
Irritant: excessive contact may cause defatting.

EYES
Vapor: mild irritant
Liquid contact: irritant

PERMISSIBLE CONCENTRATION: AIR (SEE SECTION J)	BIOLOGICAL
See section H	

UNUSUAL CHRONIC TOXICITY
None Known.

C. HAZARDS (Cont.)

FIRE AND EXPLOSION

FLASH POINT °C	AUTO IGNITION TEMPERATURE °C	FLAMMABLE LIMITS IN AIR (% BY VOL.)
Not flammable	N.A.	N.A.
☐ OPEN CUP ☐ CLOSED CUP		

UNUSUAL FIRE AND EXPLOSION HAZARDS

See hazardous decomposition products – Section G. See Section H for data on Acetone component.

D. PRECAUTIONS/PROCEDURES

FIRE EXTINGUISHING AGENTS RECOMMENDED

Not flammable

FIRE EXTINGUISHING AGENTS TO AVOID

No standard agent.

SPECIAL FIRE FIGHTING PRECAUTIONS

Wear self-contained breathing apparatus. Use water spray to keep containers cool.

VENTILATION

Local exhaust: At filling zones or where leakage is probable.
Mechanical (General): Adequate for storage areas.

NORMAL HANDLING

Avoid contact with eyes, skin, and clothing, keep away from heat and open flame. Use with adequate ventilation. Tank cleaning personnel should use only a formal tank entry procedure based on recognized safety principles, e.g. see reference in Section J. See precautions on label.

STORAGE

Cool, well-ventilated area of low fire risk. Protect containers from physical damage and keep closed. See precautions on label.

SPILL OR LEAK

Evacuate unprotected personnel. Protected personnel (see Section E) should remove sources of heat or flame and shut off leak. Then they should absorb liquid with non-combustible material, such as vermiculite, shovel into drums and close. Store as above. For large spills, dike with non-combustible material, pump into metal drums, and close, making sure pump does not overheat. Attempt to keep out of sewer. Any release to the environment of this product may be subject to Federal and/or state reporting requirements. Check with appropriate agencies.

SPECIAL: PRECAUTIONS/PROCEDURES/LABEL INSTRUCTIONS

Label signal word: WARNING.
Medical surveillance and employee training are recommended, see references, Section J. Tanks cannot be effectively flushed of vapor if sumps contain liquid.

E. PERSONAL PROTECTIVE EQUIPMENT

RESPIRATORY PROTECTION

None required for adequately vented work situations. Use self-contained or supplied-air respirators for emergencies and in situations where air may be displaced by vapors.

EYES AND FACE

Chemical safety goggles (contact lenses not to be worn) if there is any possibility of liquid contact with eye.

HANDS, ARMS, AND BODY

Protective gloves and full protective clothing if there is prolonged or repeated contact of liquid with skin.
Preferred materials: PVA or neoprene.

OTHER CLOTHING AND EQUIPMENT

For tank cleaning, see reference in Section J.

F. PHYSICAL DATA

MATERIAL IS (AT NORMAL CONDITIONS):	APPEARANCE AND ODOR	
☒ LIQUID ☐ SOLID ☐ GAS ☐ _____	Colorless liquid with ethereal and faint sweetish odor. 10, 60 or 600 lb. drum.	
BOILING POINT 44.9°C MELTING POINT <-35°C	SPECIFIC GRAVITY (H_2O = 1) 1.42 (liquid)	VAPOR DENSITY (AIR = 1) approx. 6.0
SOLUBILITY IN WATER (% by Weight) 0.25	pH Estimated to be neutral.	VAPOR PRESSURE (mm Hg at 20° C) ☒ (PSIG) ☐ approx. 385 (at 21.1°C)
EVAPORATION RATE (Butyl Acetate = 1) ☐ (Ether = 1) ☒ approx. 1.3	% VOLATILES BY VOLUME (At 20° C) 100	

G. REACTIVITY DATA

STABILITY	CONDITIONS TO AVOID
☐ UNSTABLE ☒ STABLE	Will decompose at temperatures above 250°F. Avoid sparks, hot spots, welding, flames, and cigarettes.

INCOMPATIBILITY (MATERIALS TO AVOID)

Strong oxidants including oleum; hot reactive metals e.g. powdered aluminum, magnesium, zinc, molten aluminum, barium and lithium shavings.

HAZARDOUS DECOMPOSITION PRODUCTS

Thermal Decomposition Products: Halogens, halogen acids, possibly carbonyl halides, CO and CO_2.

HAZARDOUS POLYMERIZATION	CONDITIONS TO AVOID
☐ MAY OCCUR ☒ WILL NOT OCCUR	

H. HAZARDOUS INGREDIENTS (Mixtures Only)

MATERIAL OR COMPONENT/C.A.S. #	WT. %	HAZARD DATA (SEE SECT. J)
Trichlorotrifluoroethane # 76-13-1 (Synonym: GENESOLV® D Solvent) $C_2Cl_3F_3$	90.3	OSHA TWA = 1000 ppm TLV = 1000 ppm CNS effect at high concentrations See sections C & K
Acetone # 67-64-1 CH_3COCH_3	9.4	OSHA TWA = 1000 ppm TLV = 750 ppm LD_{50} rat, oral : 9750 mg/kg Flash point: -17.8°C Flam. limits (air): Lower - 2.15% Upper - 13.30%
Nitromethane # 75-52-5 CH_3NO_2	0.3%	OSHA TWA = 100 ppm TLV = 100 ppm LD_{50} rat, oral : 1210 mg/kg Flash point: 35°C

I. ENVIRONMENTAL

DEGRADABILITY/AQUATIC TOXICITY

Acetone BOD. 1.84 for 20 days @ 20°C, 72% of theoretical after 10 days 20°C.

Fluorocarbon Component: Not considered biodegradable

OCTANOL/WATER PARTITION COEFFICIENT

Acetone: 0.55; Nitromethane: 0.17

EPA HAZARDOUS SUBSTANCE? ☐ YES ☒ NO IF SO, REPORTABLE QUANTITY: _____ #

40 CFR 116-117

WASTE DISPOSAL METHODS (DISPOSER MUST COMPLY WITH FEDERAL, STATE AND LOCAL DISPOSAL OR DISCHARGE LAWS)

GENESOLV® DA Azeotrope contains a halogenated Fluorocarbon. Wastes generated by use of this product regulated as a RCRA Hazardous Waste (F001 and/or F002). Dispose of unused product in accordance with all applicable regulations.

RCRA STATUS OF UNUSED MATERIAL:

Not a hazardous waste

40 CFR 261

J. REFERENCES

PERMISSIBLE CONCENTRATION REFERENCES

ACGIH "THRESHOLD LIMIT VALUES FOR CHEMICAL SUBSTANCES. . . .", 1982
OSHA Regulation 29 CFR 1910.1000

REGULATORY STANDARDS

D.O.T. CLASSIFICATION: Not Regulated

49 CFR

Tank entry stds: OSHA - 29 CFR 1910.94

GENERAL

NIOSH "Registry of Toxic Effects. . . . " 1980
Allied Chemical Company: Product Safety Data Sheets; Acetone, GENESOLV® D solvent.

K. ADDITIONAL INFORMATION

Exposure to Trichlorotrifluroethane:

Animal studies in various species have observed cardiac arrythmia at the following concentrations:

Monkey 25,000-50,000 ppm
Mouse 100,000 ppm

Myocardial depression was observed in the dog at 50,000 ppm.

Subacute data: Rats exposed at 2520 ppm, 7 hours/day, 5 days/wk, 30 days - no apparent effects.
At 5000 ppm and same time exposure, mild liver effects, prevention of weight gain.

2. ATOMIZED SPRAY CLEANING

Fisher Scientific Company
Chemical Manufacturing Division
P. O. Box 375, 1 Reagent Lane
Fair Lawn, NJ 07410

MATERIAL SAFETY DATA SHEET (Adapted from USDL Form LSD-005-4) (201) 796-710

SECTION I. IDENTIFICATION OF PRODUCT

CHEMICAL NAME	FORMULA
1,1,1-Trichloroethane	CH_3CCl_3 CAS 71-55-6

SYNONYM OR CROSS REFERENCE Methylchloroform
Chlorothene

SECTION II. HAZARDOUS INGREDIENTS

MATERIAL		NATURE OF HAZARD
1,1,1-Trichloroethane	79-00-5	Irritant

SECTION III. PHYSICAL DATA

BOILING POINT 74°C	MELTING POINT -38°C
VAPOR PRESSURE(mm Hg) 144	SPECIFIC GRAVITY 1.34
VAPOR DENSITY (AIR = 1) 4.55	PERCENT VOLATILE BY VOLUME (%) 100%
WATER SOLUBILITY insoluble	EVAPORATION RATE (ether = 1) greater than 1

APPEARANCE Clear, water-white liquid

SECTION IV. FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (method used) (°F)	FLAMMABLE LIMITS	Uel	Lel
NA		15	7.5

FIRE EXTINGUISHING MEDIA
NA

SPECIAL FIRE-FIGHTING PROCEDURES
Wear self-contained breathing apparatus.

UNUSUAL FIRE AND EXPLOSION HAZARD When heated to decomposition, emits toxic fumes of chlorine.

SECTION V. HEALTH HAZARD

THRESHOLD LIMIT VALUE
350 ppm

HEALTH HAZARDS Irritating to eyes, mucous membranes and in high concentration narcotic.

FIRST AID PROCEDURES If inhaled, remove to fresh air. Administer oxygen or artific espiration as necessary. Call a physician. In case of contact, flush eyes ith plenty of water for at least 15 minutes. Call a physician.

See Disclaimer on reverse side.

SECTION VI. REACTIVITY DATA

STABILITY			CONDITIONS TO AVOID
	UNSTABLE		
	STABLE	X	

INCOMPATABILITY (materials to avoid)

HAZARDOUS DECOMPOSITION PRODUCTS
When heated to decomposition, emits toxic fumes of chlorine.

HAZARDOUS POLYMERIZATION			CONDITIONS TO AVOID
	MAY OCCUR		
	WILL NOT OCCUR	X	

SECTION VII. SPILL AND DISPOSAL PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED
Absorb spill on vermiculite and place in a suitable container.

WASTE DISPOSAL METHOD
DISPOSE OF BY MEANS AS TO COMPLY WITH ALL LOCAL STATE AND FEDERAL REGULATIONS OR CONTACT AN APPROVED AND LICENSED DISPOSAL AGENCY

SECTION VIII. PROTECTION INFORMATION

RESPIRATORY PROTECTION (specify type)
respirator with organic vapor canister

VENTILATION		
	LOCAL	Acceptable
	MECHANICAL (gene	Acceptable

SPECIAL

OTHER

PROTECTIVE GLOVES
Rubber

EYE PROTECTION
Safety glasses

OTHER PROTECTIVE EQUIPMENT

SECTION IX. HANDLING AND STORAGE PRECAUTIONS

STORAGE AND HANDLING

SECTION X MISCELLANEOUS INFORMATION

INFORMATION FURNISHED BY
Gaston L. Pillori

Manager of Quality Assurance

The above information is believed [illegible] information currently available to us. However, WE MAKE NO WARRANTY OF MERCHANTABILITY EXPRESS OR IMPLIED, with respect to such information, and we assume no liability resulting from its [illegible] determinations to determine the suitability of the information for their particular purposes.

January 25, 1982

REV. NO. 1

Form No 11-79

3. WASTEWATER TREATMENT

Memo 8/11/86

from the desk of.. ARTHUR GAMACHE

HYPOCHLORITE SOLUTION IS USED TO TREAT EFFLUENT FROM WASTE WATER TREATMENT PLANT (SANITARY SEWAGE) PRIOR TO DISCHARGING EFFLUENT TO THE SAND FILTER BEDS. IT IS DILUTED & METERED SO AS TO KEEP THE RESIDUAL CHLORINE CONCENTRATION IN THE RANGE OF 1.0 TO 2.0 PPM.

DELIVERY TICKET & MSDS ARE ATTACHED.

MATERIAL SAFETY DATA SHEET

CORPORATE RESEARCH & DEVELOPMENT
120 ERIE BOULEVARD
SCHENECTADY, N.Y. 12305

MATERIALS INFORMATION SERVICES

NO. 115

SODIUM HYPOCHLORITE AQUEOUS SOLUTION (5-12%)

DATE February 1983

SECTION I. MATERIAL IDENTIFICATION

MATERIAL NAME: SODIUM HYPOCHLORITE, AQUEOUS SOLUTION (5-12%)
OTHER DESIGNATIONS: Soda Bleach Liquor Bleach Solution, Hypochlorite Solution NaOCl Solution, SUNNY SOL Bleach (Jones Chemicals), Household Bleach (i.e. CLOROX®, PUREX®,)
MANUFACTURER: Available from many suppliers, including:

Canadian Industries Limited Chemicals
Box 10
Montreal, Quebec H3C 2R3

Jones Chemicals, Inc.
100 Sunny Sol Blvd
Caladonia, NY 14423
Tel: (716) 538-2311

SECTION II. INGREDIENTS AND HAZARDS

	%	HAZARD DATA
Sodium hypochlorite (CAS #007 681 529)	ca 5-12	No TLV Established
Water, sodium chloride and sodium hydroxide (if present in excess). (Excess NaOH will pose an increased alkalinity hazard.)	Balance	Rat, Oral (12% Solution) LD_{50} ca 12 mg/kg
*Solution concentration can also be stated in terms of "available chlorine" which is about 95% of NaOCl content by weight.		*5% soln is reported to be much less toxic.

SECTION III. PHYSICAL DATA

Boiling point --- decomposes (see Sect V)
Vapor pressure, 20 C, mm Hg ------- 17.5
Water solubility ---------- complete
pH ("neutral" solution)* ---------- 9-10
Molecular weight ---------- 74.4

Specific gravity (20/4C):
5.25% (Household bleach) - 1.09
8.0% ---------- 1.15
12.0% ---------- 1.21
Freezing point, 12.0%, deg C - ca -25

Appearance & Odor: Clear, pale yellow or greenish liquid with a chlorine odor.
*Some products may contain an excess of NaOH and have a higher pH.

SECTION IV. FIRE AND EXPLOSION DATA

Flash Point and Method	Autoignition Temp.	Flammability Limits in Air	Lower	Upper
Nonflammable			--	--

Use extinguishing media that is appropriate for surrounding fire. Use water spray from a safe distance to cool fire-exposed containers, to dilute liquid, and control vapors. It is an oxidizing agent. Vigorous reactions can occur with oxidizable materials in a fire situation. It can be decomposed by heat. Chlorine liberated on contact with acid.
If safe, remove containers from fire area to prevent pressure rupture.
Firefighters should wear full protective clothing and self-contained breathing apparatus. (Protection is needed against corrosive fumes and liquid if released.)

SECTION V. REACTIVITY DATA

Anhydrous material is unstable, but these water solutions can be satisfactorily stable for months under proper storage conditions. Rate of decomposition increases with the concentration and with the temperature. (12% NaOCl solution decomposes slowly at 40 C to yield NaCl and $NaClO_3$). Exposure to sunlight accelerates decomposition.
It is incompatible with acids (liberates chlorine), ammonia, urea, oxidizable materials, and metals such as nickel, copper, tin, manganese and iron (which cause liberation of oxygen).

GENERAL ELECTRIC

NO. 115

SECTION VI. HEALTH HAZARD INFORMATION

TLV None Established

Toxicity due to alkalinity, possible chlorine generation, and the oxidant properties. Ingestion of a few ounces at 12% conc. can cause corrosion of mucous membranes, perforation of esophagus and stomach, and laryngeal edema; may lead to convulsion, coma, death. (At 5% conc. effects are much less damaging.) Inhalation of mist or fumes can cause bronchial irritation, cough, difficult breathing, stomatitis, nausea, and pulmonary edema. Additional effects have included circulatory collapse and delirium. Liquid contact can produce irritation of the the eyes or skin with blistering and eczema (especially at 12%).

FIRST AID:

Eye Contact: Irrigate eyes with running water for at least 15 minutes, including under eyelids. Then contact physician at once (ophthalmologist preferred).

Skin Contact: Remove contaminated clothing. Flush affected areas with copious amounts of water, or shower. If irritation persists or if large areas of body are affected, contact physician. Treat burns as needed.

Inhalation: Remove to fresh air and obtain medical help.

Ingestion: Have physician contacted immediately. Rinse mouth with water. Give large quantities of water or milk to drink. Induce vomiting. Repeat. Do not use acidic antidotes or sodium bicarbonate. An ounce of 1% sodium thiosulfate or milk of magnesia is helpful.

SECTION VII. SPILL, LEAK, AND DISPOSAL PROCEDURES

Notify safety personnel of major spill. Clean-up personnel need protection against contact with liquid and inhalation of mists and fumes. Contain spill and pick up when possible for recovery or disposal. Keep concentrated hypochlorite solutions out of sewers and waterways. Do not use combustible absorbants (such as sawdust) to pick up hypochlorite solutions.

Small spills and residues can usually be flushed to a suitable holding area, and then with high dilution to the sewer.

DISPOSAL: When necessary hypochlorite can be neutralized with weak reducing agents, and then the waste landfilled. Follow Federal, State and Local regulations.

EPA (CWA) RQ is 100 lb. (40 CFR 117). Hypochlorite can be harmful to aquatic life.

SECTION VIII. SPECIAL PROTECTION INFORMATION

Provide general and local exhaust ventilation in the workplace to maintain fumes and mists at a minimum. (Workers should not have irritation effects from exposure.) Respiratory devices should be available for use in non-routine or emergency situations. Use canister-type respirators suitable for chlorine (See MSDS 53) with mist filters.

Avoid eye contact by use of chemical safety goggles. Use rubber gloves, apron, and other protective clothing appropriate for the work situation to prevent skin contact. Clothing contaminated with liquid to be removed promptly and rinsed with water. Launder before reuse.

Eyewash fountains, washing facilities and safety showers should be available in areas of handling and use.

SECTION IX. SPECIAL PRECAUTIONS AND COMMENTS

Store in closed, vented containers in a cool, (below 85F), dry, well-ventilated area away from direct sunlight, heat and incompatible materials (see Sect V). Keep separate from acids and organics.

Use adequate ventilation. Protect containers from physical damage.

Do not mix with acidic cleaning agents which can liberate chlorine gas.+ Avoid inhalation of vapors, mists and fumes. Prevent eye and skin contact.

DOT Classification: <7% Available Chlorine,* ORM-B I.D. No. NA 1791 Label: None
(49 CFR 172.101) >7% Available Chlorine, CORROSIVE. I.D. No UN 1791 Label: CORROSIVE

*% Available Chlorine is about 7.35% NaOCl. +Incompatible with bowl cleaners containing bisulfates.

DATA SOURCE(S) CODE: 1,3-11,14,25,34,37,48,49

APPROVALS: MIS/CRD J. M. Nelson

INDUST. HYGIENE/SAFETY 2-22-83

MEDICAL REVIEW: 9 March 1983

E. & F. KING & CO., INCORPORATED

Norwood, Mass. 02062

Straight Bill of Lading

26503

B/L NO. B40198

TOMER'S ORDER NO.	DATE	SLSM	FROM
6GL95F103	7/14/86	TERMS NET 30	NORWOOD ASAP

LD TO- GENERAL ELECTRIC CO A/P
P.O. BOX 267
WILMINGTON MA 01817

SHIP TO- GENERAL ELECTRIC CO A/P
SEWERAGE PLANT
FORDHAM ROAD
WILMINGTON MA

	CAR NO.-INITIALS	ROUTE	INVOICE DATE
ST		OT PPD	

RODUCT NO.	DESCRIPTION	QUANTITY
	158-COORD HYPOCHLORITE SOLUTION CORROSIVE MATERIAL UN1791 KING CLOR LIQUID BLEACH TT	260 gals.

GROSS:
TARE:
NET:

Richard Dwyer

Received 7/16/86
C R Gamache

C J Flynn

JUL 15 P12:22

APPENDIX C

GZA SAMPLING PROTOCOL

SAMPLE COLLECTION - MONITORING WELLS

1. Purpose:

   To obtain groundwater samples for analysis to determine general quality of the groundwater at the sampling location.

2. Equipment and Materials

   - 40 ml glass sample vials
   - Precleaned stainless steel bailers
   - 100-foot steel tape with weighted end
   - Rags or terry cloth
   - Cooler and ice

3. Procedures

   A. Measure depth to groundwater to the nearest 0.01 foot using 100-foot tape or electric water level indicator.

   B. Prior to sample collection, three times the volume of standing water in the well will be removed using the following method:

      1. Measure depth to groundwater to nearest 0.01-foot form the top of the riser pipe using the 100-foot steel tape.

      2. Measure total well depth tot he nearest 0.1 foot form the top of the riser pipe using the 100-foot steel tape.

      3. Calculate the volume of standing water in the well using the above measurements and the inside diameter of the well.

      4. Using a precleaned stainless steel bailer of known volume, bail three times the volume of water calculated in (3) from the well.

      5. Allow sufficient time for well to recharge before initiating sampling.

   C. Using a precleaned stainless steel bailer, withdraw a sample from the well.

SAMPLE COLLECTION - MONITORING WELLS - (Continued)

D. Transfer the sample form the bailer directly into the sample container by pouring the liquid down the side of the container with minimum turbulence. This procedure is critical to minimize loss of volatile materials from the sample through aeration.

E. Cap and seal the sample container.

F. Wipe down the bailer with clean rags to dry it and store the bailer in a plastic bag separate from any stock of clean bailers.

G. Label, preserve, and store the sample in accordance with appropriate protocols.

4. Special Notes

Separate precleaned bailers will be used for each well sampled to preclude cross-contamination. Either separate bailer cables will be employed or cables will be decontaminated between samples using a methanol wash followed by a distilled water rinse.

APPENDIX D

ERCO'S ANALYTICAL DATA

ERCO
205 Alewife Brook Parkway, Cambridge, Massachusetts 02138 (617) 661-3111 Telex 650-256-7697 (MCI)

A DIVISION OF
ENSECO
INCORPORATED

August 21, 1986

Ms. Katrina Grundstrom
Goldberg-Zoino & Associates
The GEO Building
320 Needham Street
Newton Upper Falls, MA 02164

Dear Katrina:

Enclosed please find the results for the seven samples received on July 31, 1986, and analyzed for volatile organic compounds using the EPA 624 Method.

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

Sincerely,

Nancy Stewart

Nancy Stewart
Manager
Volatile Organics Laboratory

NS:jw
Encl.

Regional and International offices:
2400 West Loop South, Suite 300, Houston, Texas 77027 (713) 960-9411
423 Grove Avenue, Suite 110, Cedarhurst, New York 11516 (516) 295-1162
c/o Beetech Trading Co., Ltd., P.O. Box 101-41, Taipei, Taiwan, R.O.C. Tel: 5013908

CLIENT: Goldberg-Zoino & Associates
CLIENT ID: MW-5
ERCO ID: 34949
SAMPLE RECEIVED: 07/31/86
ANALYSIS COMPLETED: 08/08/86
RESULTS IN: µg/l (ppb)

SUMMARY OF ORGANIC PRIORITY POLLUTANT ANALYSIS VOLATILE ORGANIC COMPOUNDS

- Data Report -

Compound	Result	Compound	Result
Chloromethane	<5	1,2-Dichloropropane	<2
Bromomethane	<5	trans-1,3-Dichloropropene	<2
Vinyl chloride	<5	Trichloroethene	130
Chloroethane	<5	Dibromochloromethane	<2
Methylene chloride	<5	1,1,2-Trichloroethane	<2
Acetone	<50	Benzene	<2
Carbon disulfide	<2	cis-1,3-Dichloropropene	<2
1,1-Dichloroethene	<2	2-Chloroethylvinylether	<10
1,1-Dichloroethane	7.8	Bromoform	<2
trans-1,2-Dichloroethene	7.1	4-Methyl-2-pentanone	<10
Chloroform	<2	2-Hexanone	<10
1,2-Dichloroethane	<2	Tetrachloroethene	47
2-Butanone	<10	1,1,2,2-Tetrachloroethane	<2
1,1,1-Trichloroethane	<2	Toluene	3.0
Carbon tetrachloride	<2	Chlorobenzene	<2
Vinyl acetate	<10	Ethylbenzene	<2
Bromodichloromethane	<2	Styrene	<2
		Total xylenes	<2

Reported by: PA
Checked by: AS

ERCO/ A DIVISION OF ENSECO INCORPORATED

CLIENT: Goldberg-Zoino & Associates
CLIENT ID: MW-7
ERCO ID: 34950
SAMPLE RECEIVED: 07/31/86
ANALYSIS COMPLETED: 08/08/86
RESULTS IN: µg/l (ppb)

SUMMARY OF ORGANIC PRIORITY POLLUTANT ANALYSIS VOLATILE ORGANIC COMPOUNDS

- Data Report -

Compound	Result	Compound	Result
Chloromethane	<5	1,2-Dichloropropane	<2
Bromomethane	<5	trans-1,3-Dichloropropene	<2
Vinyl chloride	<5	Trichloroethene	74
Chloroethane	<5	Dibromochloromethane	<2
Methylene chloride	<5	1,1,2-Trichloroethane	<2
Acetone	<50	Benzene	<2
Carbon disulfide	<2	cis-1,3-Dichloropropene	<2
1,1-Dichloroethene	<2	2-Chloroethylvinylether	<10
1,1-Dichloroethane	<2	Bromoform	<2
trans-1,2-Dichloroethene	20	4-Methyl-2-pentanone	<10
Chloroform	<2	2-Hexanone	<10
1,2-Dichloroethane	<2	Tetrachloroethene	44
2-Butanone	<10	1,1,2,2-Tetrachloroethane	<2
1,1,1-Trichloroethane	<2	Toluene	2.3
Carbon tetrachloride	<2	Chlorobenzene	<2
Vinyl acetate	<10	Ethylbenzene	<2
Bromodichloromethane	<2	Styrene	<2
		Total xylenes	<2

Reported by: CA
Checked by: KS

ERCO/ A DIVISION OF ENSECO INCORPORATED

CLIENT: Goldberg-Zoino & Associates
CLIENT ID: DD
ERCO ID: 34951
SAMPLE RECEIVED: 07/31/86
ANALYSIS COMPLETED: 08/08/86
RESULTS IN: µg/l (ppb)

SUMMARY OF ORGANIC PRIORITY POLLUTANT ANALYSIS VOLATILE ORGANIC COMPOUNDS

- Data Report -

Compound	Result	Compound	Result
Chloromethane	<5	1,2-Dichloropropane	<2
Bromomethane	<5	trans-1,3-Dichloropropene	<2
Vinyl chloride	<5	Trichloroethene	<2
Chloroethane	<5	Dibromochloromethane	<2
Methylene chloride	<5	1,1,2-Trichloroethane	<2
Acetone	<50	Benzene	<2
Carbon disulfide	<2	cis-1,3-Dichloropropene	<2
1,1-Dichloroethene	<2	2-Chloroethylvinylether	<10
1,1-Dichloroethane	<2	Bromoform	<2
trans-1,2-Dichloroethene	<2	4-Methyl-2-pentanone	<10
Chloroform	<2	2-Hexanone	<10
1,2-Dichloroethane	<2	Tetrachloroethene	<2
2-Butanone	<10	1,1,2,2-Tetrachloroethane	<2
1,1,1-Trichloroethane	<2	Toluene	<2
Carbon tetrachloride	<2	Chlorobenzene	<2
Vinyl acetate	<10	Ethylbenzene	<2
Bromodichloromethane	<2	Styrene	<2
		Total xylenes	<2

Reported by: [signature]
Checked by: [signature]

CLIENT: Goldberg-Zoino & Associates
CLIENT ID: D-001
ERCO ID: 34952
SAMPLE RECEIVED: 07/31/86
ANALYSIS COMPLETED: 08/08/86
RESULTS IN: µg/l (ppb)

SUMMARY OF ORGANIC PRIORITY POLLUTANT ANALYSIS VOLATILE ORGANIC COMPOUNDS

- Data Report -

Compound	Result	Compound	Result
Chloromethane	<5	1,2-Dichloropropane	<2
Bromomethane	<5	trans-1,3-Dichloropropene	<2
Vinyl chloride	<5	Trichloroethene	<2
Chloroethane	<5	Dibromochloromethane	<2
Methylene chloride	<5	1,1,2-Trichloroethane	<2
Acetone	<50	Benzene	<2
Carbon disulfide	<2	cis-1,3-Dichloropropene	<2
1,1-Dichloroethene	<2	2-Chloroethylvinylether	<10
1,1-Dichloroethane	<2	Bromoform	<2
trans-1,2-Dichloroethene	<2	4-Methyl-2-pentanone	<10
Chloroform	<2	2-Hexanone	<10
1,2-Dichloroethane	<2	Tetrachloroethene	<2
2-Butanone	<10	1,1,2,2-Tetrachloroethane	<2
1,1,1-Trichloroethane	<2	Toluene	<2
Carbon tetrachloride	<2	Chlorobenzene	<2
Vinyl acetate	<10	Ethylbenzene	<2
Bromodichloromethane	<2	Styrene	<2
		Total xylenes	<2

Reported by: PA
Checked by: MS

CLIENT: Goldberg-Zoino & Associates
CLIENT ID: D-002
ERCO ID: 34954
SAMPLE RECEIVED: 07/31/86
ANALYSIS COMPLETED: 08/08/86
RESULTS IN: µg/l (ppb)

SUMMARY OF ORGANIC PRIORITY POLLUTANT ANALYSIS VOLATILE ORGANIC COMPOUNDS

- Data Report -

Compound	Result	Compound	Result
Chloromethane	<5	1,2-Dichloropropane	<2
Bromomethane	<5	trans-1,3-Dichloropropene	<2
Vinyl chloride	<5	Trichloroethene	<2
Chloroethane	<5	Dibromochloromethane	<2
Methylene chloride	<5	1,1,2-Trichloroethane	<2
Acetone	<50	Benzene	<2
Carbon disulfide	<2	cis-1,3-Dichloropropene	<2
1,1-Dichloroethene	<2	2-Chloroethylvinylether	<10
1,1-Dichloroethane	<2	Bromoform	<2
trans-1,2-Dichloroethene	<2	4-Methyl-2-pentanone	<10
Chloroform	<2	2-Hexanone	<10
1,2-Dichloroethane	<2	Tetrachloroethene	<2
2-Butanone	<10	1,1,2,2-Tetrachloroethane	<2
1,1,1-Trichloroethane	<2	Toluene	3.7
Carbon tetrachloride	<2	Chlorobenzene	<2
Vinyl acetate	<10	Ethylbenzene	<2
Bromodichloromethane	<2	Styrene	<2
		Total xylenes	<2

Reported by: PA
Checked by: MS

CLIENT: Goldberg-Zoino & Associates
CLIENT ID: WWE
ERCO ID: 34955
SAMPLE RECEIVED: 07/31/86
ANALYSIS COMPLETED: 08/08/86
RESULTS IN: µg/l (ppb)

SUMMARY OF ORGANIC PRIORITY POLLUTANT ANALYSIS VOLATILE ORGANIC COMPOUNDS

- Data Report -

Compound	Result	Compound	Result
Chloromethane	<5	1,2-Dichloropropane	<2
Bromomethane	<5	trans-1,3-Dichloropropene	<2
Vinyl chloride	<5	Trichloroethene	<2
Chloroethane	<5	Dibromochloromethane	<2
Methylene chloride	<5	1,1,2-Trichloroethane	<2
Acetone	<50	Benzene	<2
Carbon disulfide	<2	cis-1,3-Dichloropropene	<2
1,1-Dichloroethene	<2	2-Chloroethylvinylether	<10
1,1-Dichloroethane	<2	Bromoform	<2
trans-1,2-Dichloroethene	<2	4-Methyl-2-pentanone	<10
Chloroform	6	2-Hexanone	<10
1,2-Dichloroethane	<2	Tetrachloroethene	<2
2-Butanone	<10	1,1,2,2-Tetrachloroethane	<2
1,1,1-Trichloroethane	<2	Toluene	2.7
Carbon tetrachloride	<2	Chlorobenzene	<2
Vinyl acetate	<10	Ethylbenzene	<2
Bromodichloromethane	2.8	Styrene	<2
		Total xylenes	<2

Reported by: RA
Checked by: JS