

VOLUME I

REMEDIATION INVESTIGATION REPORT

**GRUMMAN AEROSPACE CORPORATION
BETHPAGE, NEW YORK**

REVISED SEPTEMBER 1994

PREPARED FOR

**Grumman Aerospace Corporation
Bethpage, New York**



Table 3-1. Well Construction Details, Phase 2 Remedial Investigation, Grumman Aerospace Corporation, Bethpage, New York.

Well Designation	Well Diameter (inches)	Total Well Depth (feet below land surface)	Screen Interval (feet below land surface)	Gravel Pack Interval (feet below land surface)	Fine Sand Interval (feet below land surface)	Bentonite Seal Interval (feet below land surface)	Grout Interval (feet below land surface)	Drilling Methodology	Land Surface Elevation (feet relative to mean sea level)	Measuring Point Elevation (feet relative to mean sea level)
GM-11S	4	47	37-47 (1)	31-47	N/A	28-31	3-28	HSA	124.00	123.66
GM-22D	4	200	190-200 (1)	184-200	178-184	176-178	3-176	HSA, MR, RR	107.72	107.02
GM-31S	4	76	66-76 (1)	61-76	N/A	58-61	3-58	HSA	128.21	127.82
GM-32S	4	51	41-51 (1)	37-51	N/A	34-37	3-34	HSA	109.72	109.10
GM-33D2	4	520	500-520 (2)	488-520	474-488	470-474	3-474	MR, RR	107.51	106.85
GM-34D	2	324	309-319	N/I	N/I	N/I	N/I	RR	71.19	71.19
GM-34D2	4	525	510-520	N/I	N/I	N/I	N/I	RR	71.19	71.19
GM-35D2	4	530	510-530 (2)	505-530	498-505	496-498	3-496	HSA, MR	96.61	96.28
GM-36D	4	214	204-214 (1)	199-214	185-199	183-185	3-183	HSA, MR, RR	91.70	91.63
GM-36D2	4	540	520-540 (1)	515-540	508-515	506-508	3-506	HSA, MR, RR	91.64	91.60
GM-37D	4	262	242-262 (2)	237-262	222-237	220-222	3-220	MR	97.83	97.26
GM-37D2	4	390	370-390 (2)	360-390	345-340	343-345	3-343	HSA, MR	97.84	97.17
GM-38D	4	340	320-340 (2)	310-340	290-310	288-290	3-288	MR	92.07	91.75
GM-38D2	4	495	475-495 (2)	465-495	445-465	443-445	3-443	MR	92.18	91.56
10999	4	335	320-330	N/I	N/I	N/I	N/I	RR	83.80	83.80
11000	2	131	116-126	N/I	N/I	N/I	N/I	N/I	83.80	83.80

- N/A Not applicable.
- N/I No information
- HSA Hollow-stem auger.
- MR Mud rotary.
- RR Reverse rotary.
- (1) Screen constructed of Polyvinyl chloride, schedule 40, with slot size of 0.01 inches.
- (2) Screen constructed of stainless steel, wire-wrapped.

All well casings are constructed of PVC, schedule 40.

Table 4-17. Volatile Organic Compounds Detected in Groundwater Samples During the Phase 2 Remedial Investigation, Grumman Aerospace Corporation, Bethpage, New York.

Sample Designation:	GM-22D*	GM-23S*	GM-23I*	GM-31S	GM-32S	GM-33D2*	GM-34D
Sample Date:	8/24/93	8/23/93	8/24/93	9/1/93	9/1/93	8/24/93	8/30/93
Laboratory:	IEA	IEA	IEA	IEA	IEA	IEA	IEA
Units:	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Parameter							
Chloromethane	<10 J	<10	<10	<10	<10	<10	<10
Bromomethane	<10	<10	<10	<10	<10	<10	<10
Vinyl chloride	<10	<10	<10	<10	<10	<10	<10
Chloroethane	<10	<10	<10	<10	<10	<10	<10
Methylene chloride	<10	<10	<10	<10	<10	<10	<10
Acetone	<10 J	<10	<10	<10 J	<10 J	<10 J	<10
Carbon disulfide	<10	<10	<10	<10	<10	<10	<10
1,1-Dichloroethene	<10	<10	<10	<10	<10	<10	<10
1,1-Dichloroethane	<10	<10	<10	<10	<10	<10	4 J
1,2-Dichloroethene (total)	1 J	<10	3 J	<10	<10	<10	2 J
Chloroform	<10	<10	<10	<10	11	<10	2 J
1,2-Dichloroethane	<10	<10	<10	<10	<10	<10	<10
2-Butanone	<10	<10	<10	<10 J	<10 J	<10	<10
1,1,1-Trichloroethane	<10	<10	1 J	5 J	<10	<10	2 J
Carbon tetrachloride	<10	<10	<10	<10	<10	<10	<10
Bromodichloromethane	<10	<10	<10	<10	<10	<10	<10
1,2-Dichloropropane	<10	<10	<10	<10	<10	<10	<10
cis-1,3-Dichloropropene	<10	<10	<10	<10	<10	<10	<10
Trichloroethene	17	<10	20	<10	160	16	68
Dibromochloromethane	<10	<10	<10	<10	<10	<10	<10
1,2-Trichloroethane	<10	<10	<10	<10	<10	<10	<10
nzene	<10	<10	<10	<10	<10	<10	<10
trans-1,3-Dichloropropene	<10	<10	<10	<10	<10	<10	<10
Bromoform	<10	<10	<10	<10	<10	<10	<10
4-Methyl-2-pentanone	<10	<10	<10	<10	<10	<10	<10
2-Hexanone	<10	<10	<10	5 J	<10	<10	<10
Tetrachloroethene	5 J	<10	6 J	<10	<10	<10	<10
1,1,2,2-Tetrachloroethane	<10	<10	<10	<10	<10	6 J	5 J
Toluene	<10	<10	<10	<10	<10	<10	<10
Chlorobenzene	<10	<10	<10	<10	<10	<10	<10
Ethylbenzene	<10	<10	<10	<10	<10	<10	<10
Styrene	<10	<10	<10	<10	<10	<10	<10
Xylene (total)	<10	<10	<10	<10	<10	<10	<10
Total HVOCs:	23	0	30	5	171	22	83
Total VOCs:	23	0	30	10	171	22	83

HVOCs Halogenated volatile organic compounds.

VOCs Volatile organic compounds.

ug/L Micrograms per liter.

IEA Industrial and Environmental Analysts, Inc., Monroe, Connecticut.

J Estimated value.

* Groundwater sample split with New York State Department of Environmental Conservation.

** Analyzed by U.S. Environmental Protection Agency Method 502.2.

NA Not analyzed.

Eco Test Eco Test laboratories, Inc., North Babylon, New York.



Table 4-17. Volatile Organic Compounds Detected in Groundwater Samples During the Phase 2 Remedial Investigation, Grumman Aerospace Corporation, Bethpage, New York.

Parameter	Sample Designation: GM-34D2 Sample Date: 8/30/93 Laboratory: IEA Units: ug/L	GM-35D2 8/24/93 IEA ug/L	GM-36D* 8/23/93 IEA ug/L	GM-36D2* 8/23/93 IEA ug/L	GM-37D 8/25/93 IEA ug/L	GM-37D2 8/25/93 IEA ug/L	GM-38D 8/26/93 IEA ug/L
Chloromethane	<10	<10 J	<20 J	<10	<10	<10	<50
Bromomethane	<10	<10	<20	<10	<10	<10	<50
Vinyl chloride	<10	<10	<20 J	<10	<10	<10	<50
Chloroethane	<10	<10	<20	<10	<10	<10	<50
Methylene chloride	<10	<10	<20	<10	<10	<10	<50
Acetone	<10	<12 J	6 J	<10	<10	<10	<50
Carbon disulfide	<10	<10	<20	<10	<10	<10	<50
1,1-Dichloroethene	0.9 J	5 J	<20	<10	4 J	<10	<50
1,1-Dichloroethane	<10	<10	<20	<10	10	<10	<50
1,2-Dichloroethene (total)	<10	<10	<20	<10	<10	<10	5 J
Chloroform	<10	<10	<20	<10	<10	<10	<50
1,2-Dichloroethane	<10	<10	<20	<10	<10	<10	<50
2-Butanone	<10	<10	<20	<10	<10	<10	<50
1,1,1-Trichloroethane	<10	<10	3 J	<10	7 J	<10	<50
Carbon tetrachloride	<10	4 J	<20	<10	<10 J	<10 J	<50
Bromodichloromethane	<10	<10	<20	<10	<10	<10	<50
1,2-Dichloropropane	<10	<10	<20	<10	<10	<10	<50
cis-1,3-Dichloropropene	<10	<10	<20	<10	<10	<10	<50
Trichloroethene	35	29	220	<10	2 J	1 J	610
Dibromochloromethane	<10	<10	<20	<10	<10	<10	<50
2-Trichloroethane	<10	<10	<20	<10	<10	<10	<50
zene	<10	<10	<20	<10	<10	<10	<50
rans-1,3-Dichloropropene	<10	<10	<20	<10	<10	<10	<50
Bromoform	<10	<10	<20	<10	<10	<10	<50
4-Methyl-2-pentanone	<10	<10	<20	<10	<10	<10	<50
2-Hexanone	<10	<10	<20	<10	<10	<10	<50
Tetrachloroethene	2 J	<10	18 J	<10	<10	<10	<50
1,1,1,2-Tetrachloroethane	<10	<10	<20	<10	<10	<10	<50
Toluene	<10	<10	<20	0.5 J	<10	<10	<50
Chlorobenzene	<10	<10	<20	<10	<10	<10	<50
Ethylbenzene	<10	<10	<20	<10	<10	<10	<50
Styrene	<10	<10	<20	<10	<10	<10	<50
Xylene (total)	<10	<10	<20	<10	<10	<10	<50
Total HVOCs:	37.9	38	241	0	23	1	615
Total VOCs:	37.9	38	247	0.5	23	1	615

HVOCs Halogenated volatile organic compounds.

VOCs Volatile organic compounds.

ug/L Micrograms per liter.

IEA Industrial and Environmental Analysts, Inc., Monroe, Connecticut.

J Estimated value.

* Groundwater sample split with New York State Department of Environmental Conservation.

** Analyzed by U.S. Environmental Protection Agency Method 502.2.

NA Not analyzed.

Eco Test Eco Test laboratories, Inc., North Babylon, New York.



Table 4-17. Volatile Organic Compounds Detected in Groundwater Samples During the Phase 2 Remedial Investigation, Grumman Aerospace Corporation, Bethpage, New York.

Sample Designation:	GM-38D2	N-3876**	N-6915**	N-6916**	N-8004**	N-8767	N-8768
Sample Date:	8/26/93	9/2/93	9/2/93	9/2/93	9/2/93	9/2/93	9/20/93
Laboratory:	IEA	H2M	H2M	H2M	H2M	IEA	IEA
Units:	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Parameter							
Chloromethane	<50	<0.5	<0.5	<0.5	<0.5	<10 J	<10
Bromomethane	<50	<0.5	<0.5	<0.5	<0.5	<10	<10
Vinyl chloride	<50	<0.5	<0.5	<0.5	<0.5	<10 J	<10 J
Chloroethane	<50	<0.5	<0.5	<0.5	<0.5	<10	<10
Methylene chloride	<50	<0.5	<0.5	<0.5	<0.5	<10	<10
Acetone	<50	NA	NA	NA	NA	<10	<10
Carbon disulfide	<50	NA	NA	NA	NA	<10	<10 J
1,1-Dichloroethene	<50	4.2	<0.5	<0.5	<0.5	<10	<10
1,1-Dichloroethane	<50	<0.5	<0.5	<0.5	<0.5	<10	<10
1,2-Dichloroethene (total)	8 J	1.7	<1.0	<1.0	<1.0	<10	<10
Chloroform	<50	0.6	<0.5	<0.5	<0.5	<10	<10
1,2-Dichloroethane	<50	<0.5	<0.5	<0.5	<0.5	<10	<10
2-Butanone	<50	NA	NA	NA	NA	<10	<10
1,1,1-Trichloroethane	<50	2.4	<0.5	<0.5	<0.5	<10	<10
Carbon tetrachloride	<50	<0.5	<0.5	<0.5	<0.5	<10	<10
Bromodichloromethane	<50	<0.5	<0.5	<0.5	<0.5	<10	<10
1,2-Dichloropropane	<50	NA	NA	NA	NA	<10	<10
cis-1,3-Dichloropropene	<50	<0.5	<0.5	<0.5	<0.5	<10	<10
Trichloroethene	770	200	<0.5	<0.5	<0.5	<10	<10
Dibromochloromethane	<50	<0.5	<0.5	<0.5	<0.5	<10	<10
2-Trichloroethane	<50	<0.5	<0.5	<0.5	<0.5	<10	<10
zene	<50	<0.5	<0.5	<0.5	<0.5	<10	<10
rans-1,3-Dichloropropene	<50	<0.5	<0.5	<0.5	<0.5	<10	<10
Bromoform	<50	<0.5	<0.5	<0.5	<0.5	<10	<10
4-Methyl-2-pentanone	<50	NA	NA	NA	NA	<10	<10
2-Hexanone	<50	NA	NA	NA	NA	<10	<10
Tetrachloroethene	<50	6.5	<0.5	<0.5	<0.5	<10	<10
1,1,2,2-Tetrachloroethane	<50	<0.5	<0.5	<0.5	<0.5	<10	<10
Toluene	<50	<0.5	<0.5	<0.5	<0.5	<10	<10
Chlorobenzene	<50	<0.5	<0.5	<0.5	<0.5	<10	<10
Ethylbenzene	<50	<0.5	<0.5	<0.5	<0.5	<10	<10
Styrene	<50	<0.5	<0.5	<0.5	<0.5	<10	<10
Xylene (total)	<50	<1.5	<1.5	<1.5	<1.5	<10	<10
Total HVOCs:	778	215.4	0	0	0	0	0
Total VOCs:	778	215.4	0	0	0	0	0

HVOCs Halogenated volatile organic compounds.

VOCs Volatile organic compounds.

ug/L Micrograms per liter.

IEA Industrial and Environmental Analysts, Inc., Monroe, Connecticut.

J Estimated value.

* Groundwater sample split with New York State Department of Environmental Conservation.

** Analyzed by U.S. Environmental Protection Agency Method 502.2.

NA Not analyzed.

Eco Test Eco Test laboratories, Inc., North Babylon, New York.



VOLUME II

REMEDIAL INVESTIGATION REPORT

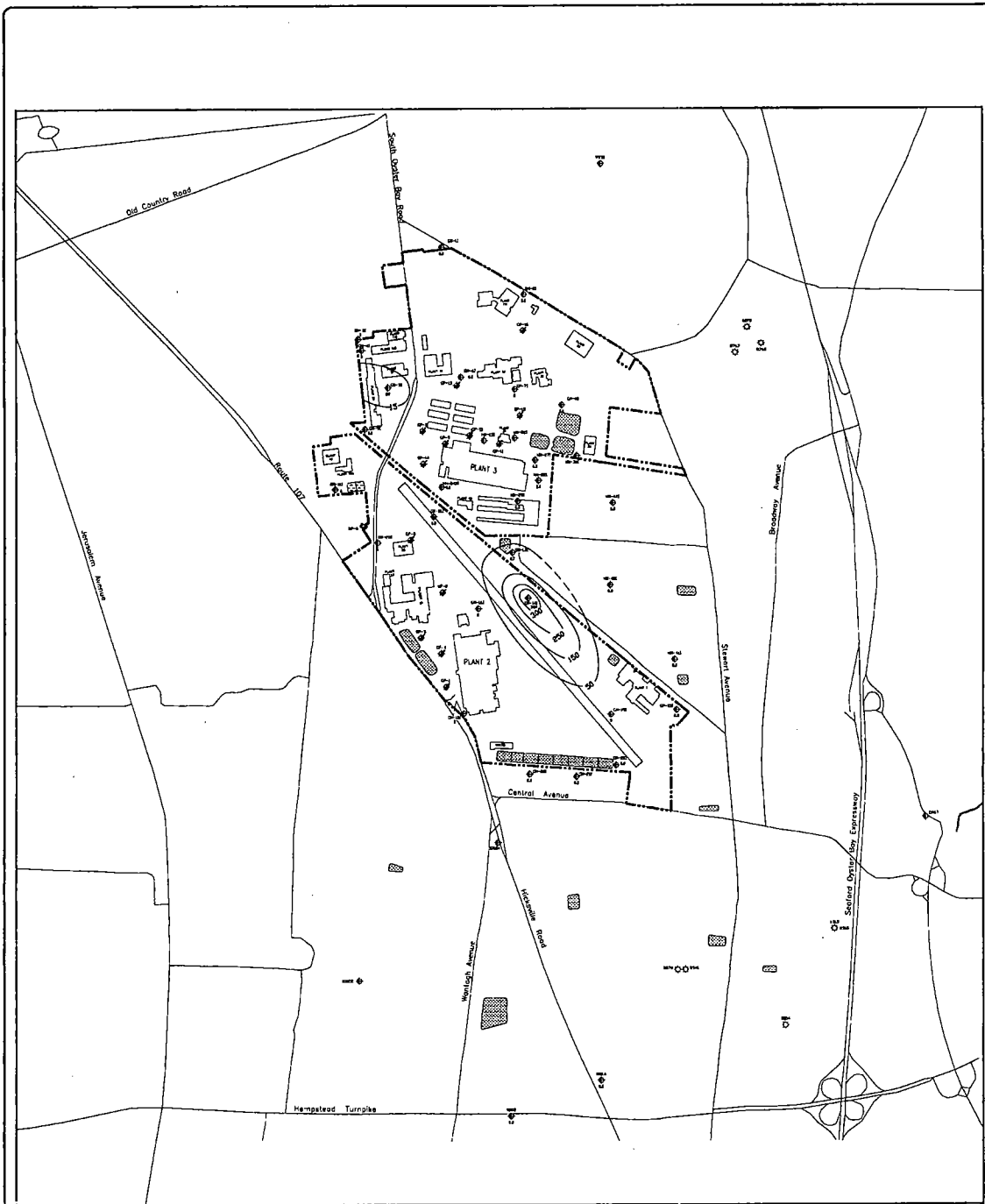
**GRUMMAN AEROSPACE CORPORATION
BETHPAGE, NEW YORK**

REVISED SEPTEMBER 1994

PREPARED FOR

**Grumman Aerospace Corporation
Bethpage, New York**





EXPLANATION

- PROPERTY BOUNDARY OF GRUWMAN AEROSPACE CORPORATION
- ▨ RECHARGE BASIN
- LOCATION AND DESIGNATION OF INTERMEDIATE MONITORING WELL
- LOCATION AND DESIGNATION OF DEEP GRUWMAN PRODUCTION WELL
- LOCATION AND DESIGNATION OF BETHPAGE WATER DISTRICT PUBLIC SUPPLY WELL

— 300 — LINE OF EQUAL TETRACHLOROETHENE CONCENTRATION (BASED WHERE APPROPRIATE)

1 TETRACHLOROETHENE CONCENTRATION IN MICROGRAMS PER LITER (µg/L)
(0.0 INDICATES CONCENTRATION LESS THAN METHOD DETECTION LIMIT)

U.S. NAVY WELLS SAMPLED DURING MARCH 1993
GRUWMAN WELLS SAMPLED FROM AUGUST 23 THROUGH SEPTEMBER 7, 1993

0 1000 FT



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TETRACHLOROETHENE CONCENTRATIONS IN THE INTERMEDIATE ZONE

FIGURE

4-21

GRUWMAN AEROSPACE CORPORATION
BETHPAGE, NEW YORK



EXPLANATION

- — — — — PROPERTY BOUNDARY OF GRUMMAN AEROSPACE CORPORATION
 - ☐ RECHARGE BASIN
 - ◻ LOCATION AND DESIGNATION OF INTERMEDIATE MONITORING WELL
 - ◐ LOCATION AND DESIGNATION OF DEEP GRUMMAN PRODUCTION WELL
 - ⊗ LOCATION AND DESIGNATION OF BETHPAGE WATER DISTRICT PUBLIC SUPPLY WELL
 - 30 — LINE OF EQUAL 1,1,1-TRICHLOROETHANE CONCENTRATION (DASHED WHERE APPROPRIATE)
 - 1,1,1-TRICHLOROETHANE CONCENTRATION IN MICROGRAMS PER LITER (μg/L) (0.0 INDICATES CONCENTRATION LESS THAN METHOD DETECTION LIMIT)
- U.S. NAVY WELLS SAMPLED DURING MARCH 1983
GRUMMAN WELLS SAMPLED FROM AUGUST 23 THROUGH SEPTEMBER 2, 1983

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APPROVED BY: CMB	DATE:

1,1,1-TRICHLOROETHANE CONCENTRATIONS IN THE INTERMEDIATE ZONE

FIGURE
4-22

GRUMMAN AEROSPACE CORPORATION
BETHPAGE, NEW YORK



EXPLANATION

- ▬▬▬▬ PROPERTY BOUNDARY OF GRUWAM AEROSPACE CORPORATION
- ☐ RECHARGE BASIN
- LOCATION AND DESIGNATION OF INTERMEDIATE MONITORING WELL
- ◻ LOCATION AND DESIGNATION OF DEEP GRUWAM PRODUCTION WELL
- ⊗ LOCATION AND DESIGNATION OF METHPAGE WATER DISTRICT PUBLIC SUPPLY WELL

— 60 — LINE OF EQUAL 1,2-DICHLOROETHENE CONCENTRATION (DASHED WHERE APPROPRIATE)

• 1,2-DICHLOROETHENE CONCENTRATION IN MICROGRAMS PER LITER (µg/L)
 ○ D INDICATES CONCENTRATION LEVELS "NEAR DETECTION LIMIT"

U.S. NAVY WELLS SAMPLED DURING MARCH 1993
 GRUWAM WELLS SAMPLED FROM AUGUST 23 THROUGH SEPTEMBER 2, 1993

0 1000 FT



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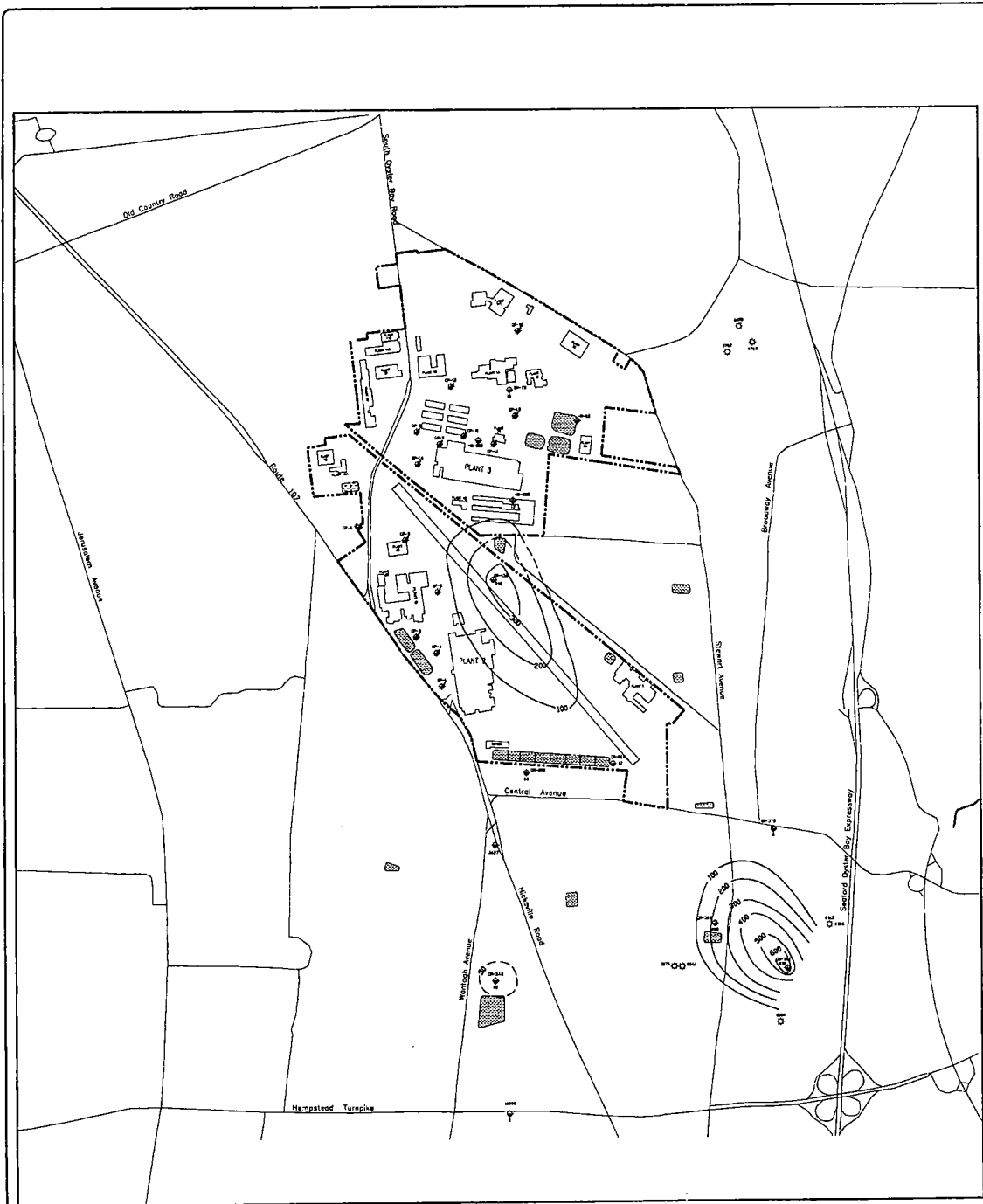
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APPROVED BY JG	DATE

1,2-DICHLOROETHENE CONCENTRATIONS IN THE INTERMEDIATE ZONE

GRUWAM AEROSPACE CORPORATION
 METHPAGE, NEW YORK

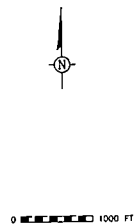
FIGURE

4-23



EXPLANATION

- PROPERTY BOUNDARY OF GRUMMAN AEROSPACE CORPORATION
 - ▣ RECHARGE BASIN
 - ⊕ LOCATION AND DESIGNATION OF DEEP MONITORING WELL
 - ⊕ LOCATION AND DESIGNATION OF DEEP GRUMMAN PRODUCTION WELL
 - ⊕ LOCATION AND DESIGNATION OF BEIRPAC-AFTER DISTRICT PUBLIC SUPPLY WELL
 - 400 — LINE OF EQUAL TRICHLOROETHENE CONCENTRATION (DASHED WHERE APPROXIMATE)
 - TRICHLOROETHENE CONCENTRATION IN MICROGRAMS PER LITER (UG/L) (0.0 INDICATES CONCENTRATION LESS THAN METHOD DETECTION LIMIT)
- U.S. NAVY WELLS SAMPLED DURING MARCH 1982
GRUMMAN WELLS SAMPLED FROM AUGUST 23 THROUGH SEPTEMBER 2, 1983



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TRICHLOROETHENE CONCENTRATIONS IN THE DEEP ZONE

GRUMMAN AEROSPACE CORPORATION
BETH-PAGE, NEW YORK



EXPLANATION

- — — — — PROPERTY BOUNDARY OF GRUBMAN AEROSPACE CORPORATION
- ▣ RECHARGE BASIN
- LOCATION AND DESIGNATION OF DEEP MONITORING WELL
- ◻ LOCATION AND DESIGNATION OF DEEP GRUBMAN PRODUCTION WELL
- ⊗ LOCATION AND DESIGNATION OF BETHPAGE WATER DISTRICT PUBLIC SUPPLY WELL

— 40 — LINE OF EQUAL TETRACHLOROETHENE CONCENTRATION (DASHED WHERE APPROPRIATE)

⊗ TETRACHLOROETHENE CONCENTRATION IN MICROGRAMS PER LITER (μg/L)
 (DASHED WHERE CONCENTRATION LESS THAN METHOD DETECTION LIMIT)

U.S. NAVY WELLS SAMPLED DURING MARCH 1983
 GRUBMAN WELLS SAMPLED FROM AUGUST 23 THROUGH SEPTEMBER 2, 1983

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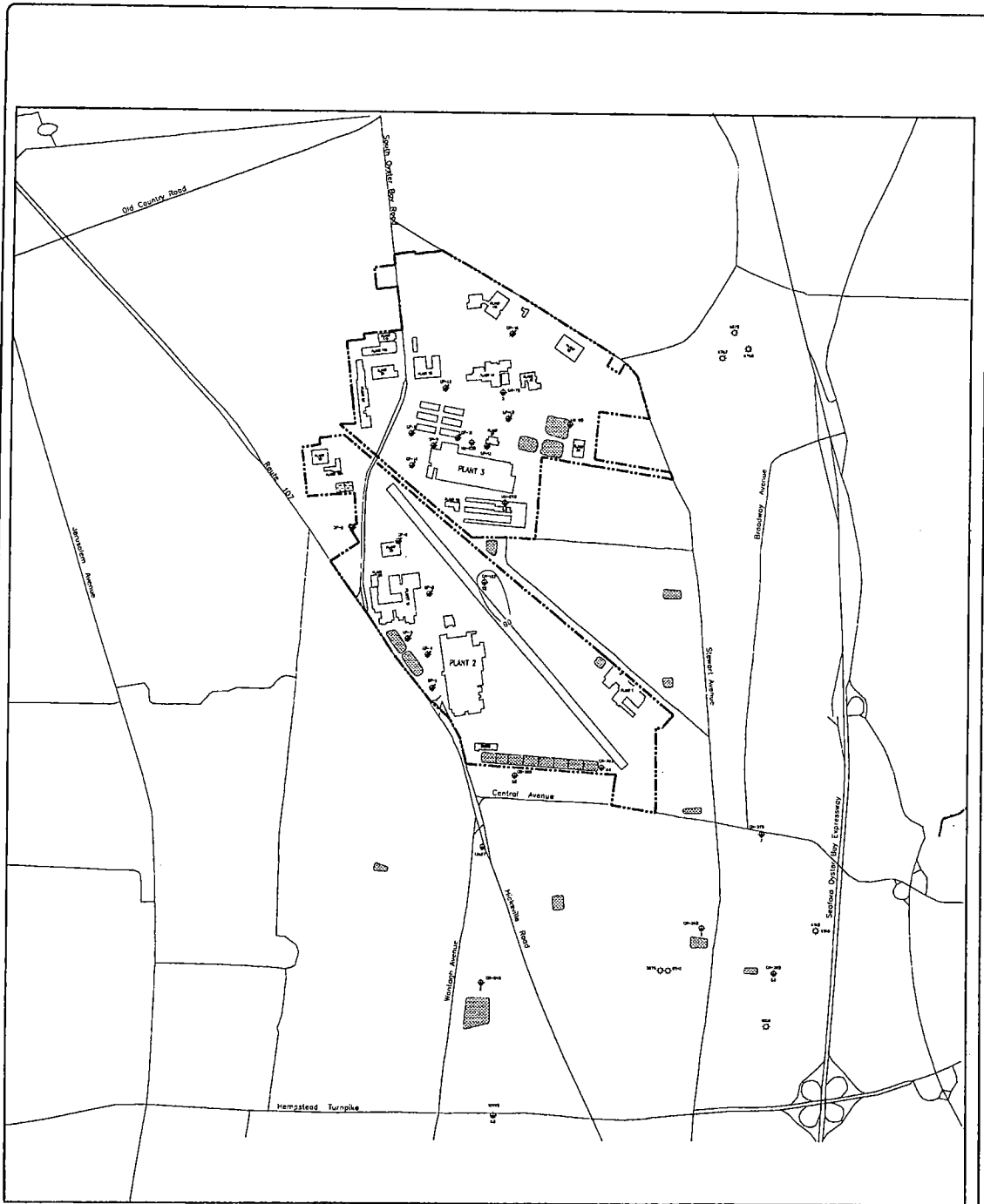
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TETRACHLOROETHENE CONCENTRATIONS IN THE DEEP ZONE

FIGURE
4-25

GRUBMAN AEROSPACE CORPORATION
 BETHPAGE, NEW YORK



EXPLANATION

- ▬▬▬▬▬▬ PROPERTY BOUNDARY OF GRUHAM AEROSPACE CORPORATION
- ▨ RECHARGE BASIN
- ⊕ LOCATION AND DESIGNATION OF DEEP MONITORING WELL
- ⊕ LOCATION AND DESIGNATION OF DEEP GRUHAM PRODUCTION WELL
- ⊕ LOCATION AND DESIGNATION OF SEWERAGE WATER DISTRICT PUBLIC SUPPLY WELL

— 50 — LINE OF EQUAL 1,1,1-TRICHLOROETHANE CONCENTRATION (DASHED INSIDE APPROXIMATE)

• 1,1,1-TRICHLOROETHANE CONCENTRATION IN MICROGRAMS PER LITER (μg/L) (0.0 μg/L INDICATES CONCENTRATION LESS THAN METHOD DETECTION LIMIT)

U.S. NAVY WELLS SAMPLED DURING MARCH 1993
GRUHAM WELLS SAMPLED FROM AUGUST 23 THROUGH SEPTEMBER 2, 1993

0 1000 FT



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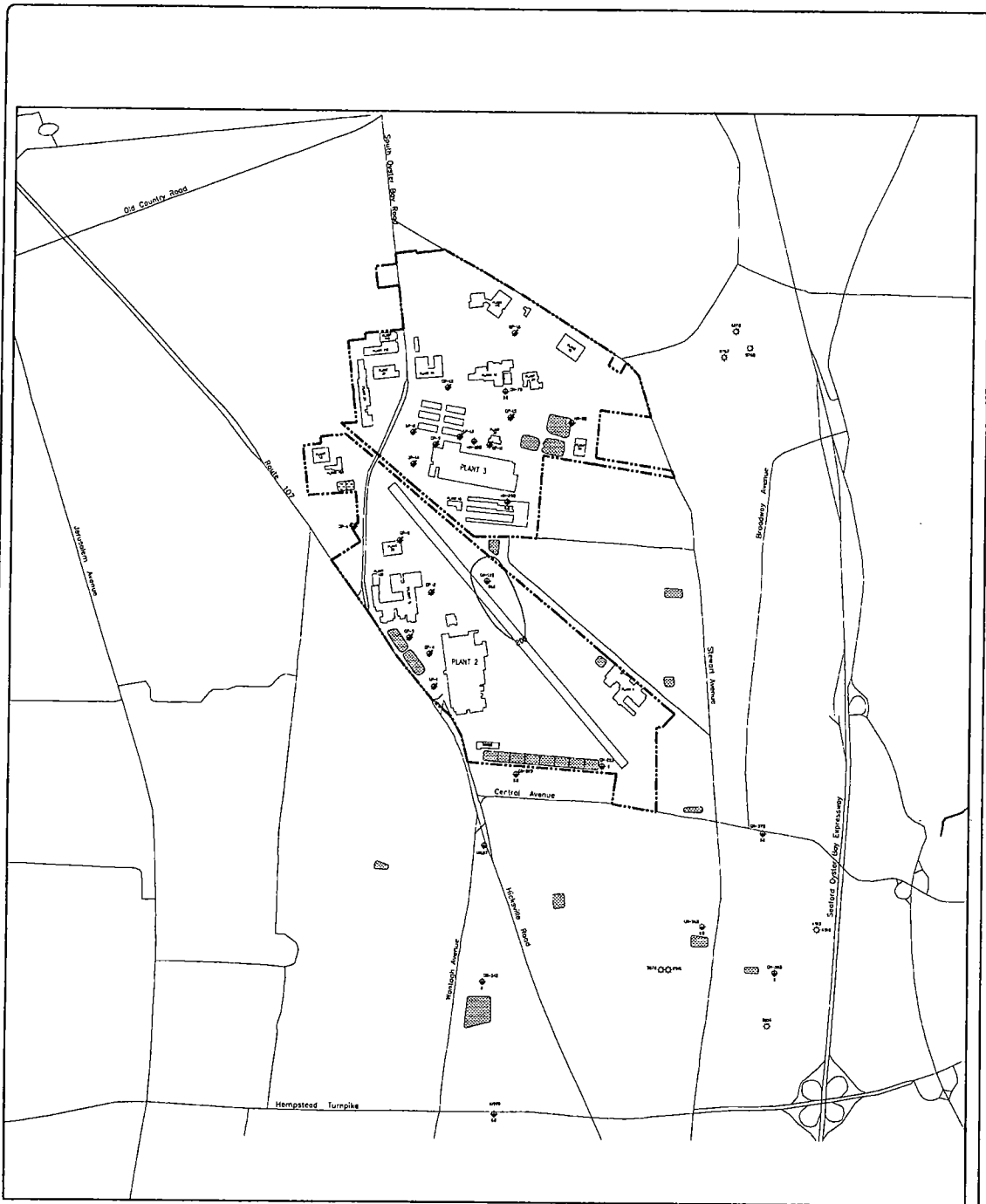
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DRAWING NO. 103-970	PLAT 970-1-200
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CHECKED BY: JCS	DATE:
DESIGNED BY: JCS	DATE:
APPROVED BY: JCS	DATE:

1,1,1-TRICHLOROETHANE CONCENTRATIONS IN THE DEEP ZONE

FIGURE 4-26

GRUHAM AEROSPACE CORPORATION
BETHPAGE, NEW YORK



EXPLANATION

▬▬▬▬▬ PROPERTY BOUNDARY OF GRANHAM AEROSPACE CORPORATION

▣ REC-A-RGE BASIN

○ LOCATION AND DESIGNATION OF DEEP MONITORING WELL

○ LOCATION AND DESIGNATION OF DEEP GRANHAM PRODUCTION WELL

○ LOCATION AND DESIGNATION OF BEHAPAGE WATER DISTRICT PUBLIC SUPPLY WELL

— 200 — LINE OF EQUAL 1,2-DICHLOROETHENE CONCENTRATION (DASHED WHERE APPROPRIATE)

■ 1,2-DICHLOROETHENE CONCENTRATION IN MICROGRAMS PER LITER (µg/L) (20 INDICATES CONCENTRATION LESS THAN METHOD DETECTION LIMIT)

U.S. NAVY WELLS SAMPLED DURING MARCH 1993
GRANHAM WELLS SAMPLED FROM AUGUST 23 THROUGH SEPTEMBER 2, 1993

0 1000 FT



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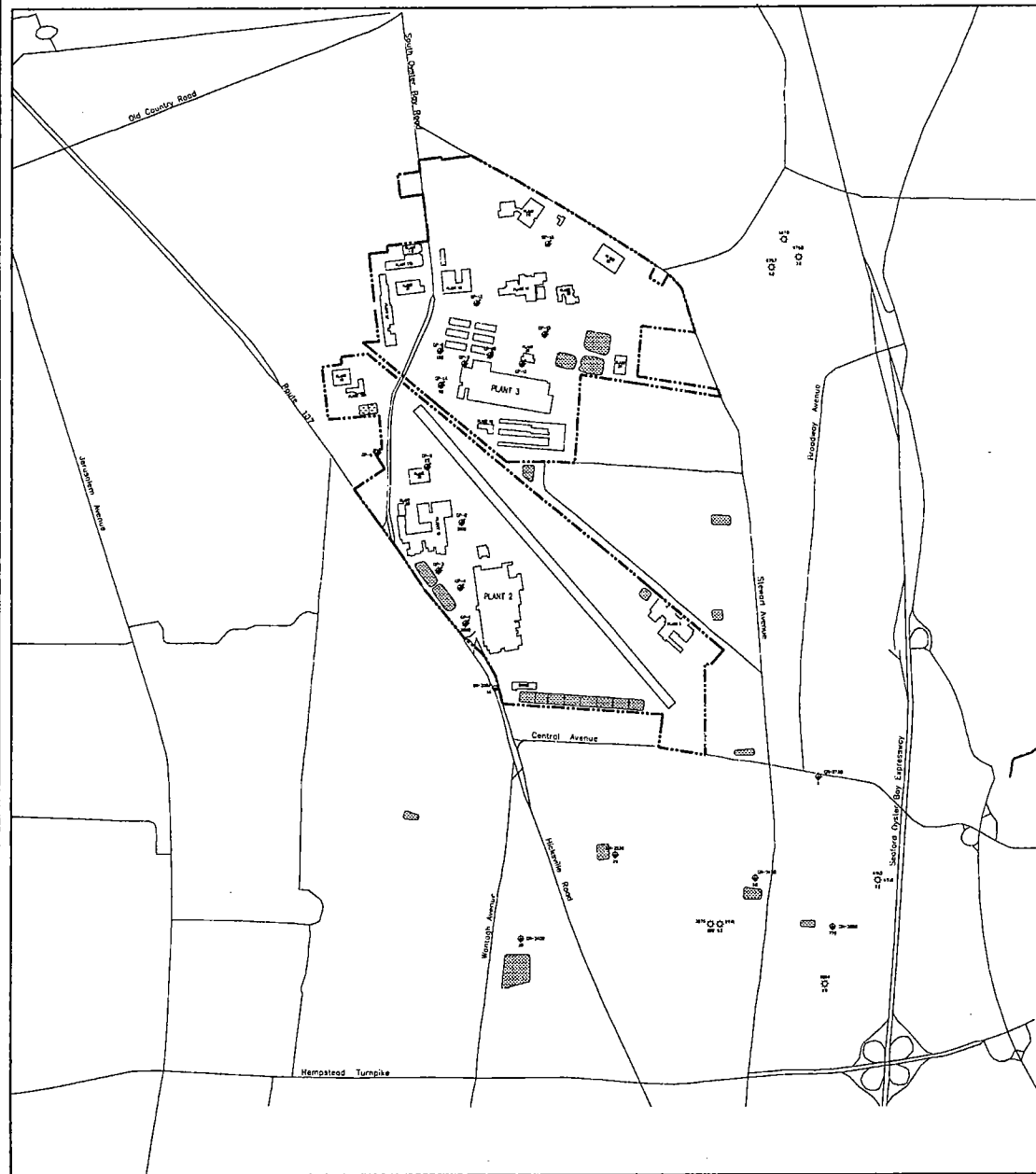
PROJECT NO. 13999904	FILE NO. 1487
DRAWING NO. 1399-113	PLC 825-1487
DRAWN BY: JGK	DATE: 6-12-94
CHECKED BY: JG	DATE:
APPROVED BY: JGK	DATE:

1,2-DICHLOROETHENE CONCENTRATIONS IN THE DEEP ZONE

FIGURE

4-27

GRANHAM AEROSPACE CORPORATION
BEHAPAGE, NEW YORK



EXPLANATION

- — — — — PROPERTY BOUNDARY OF GRUMMAN AEROSPACE CORPORATION
- ☐ RECHARGE BASIN
- ⊕ LOCATION AND DESIGNATION OF VERY DEEP MONITORING WELL
- ⊕ LOCATION AND DESIGNATION OF GRUMMAN PRODUCTION WELL
- ⊕ LOCATION AND DESIGNATION OF BETHPAGE WATER DISTRICT PUBLIC SUPPLY WELL

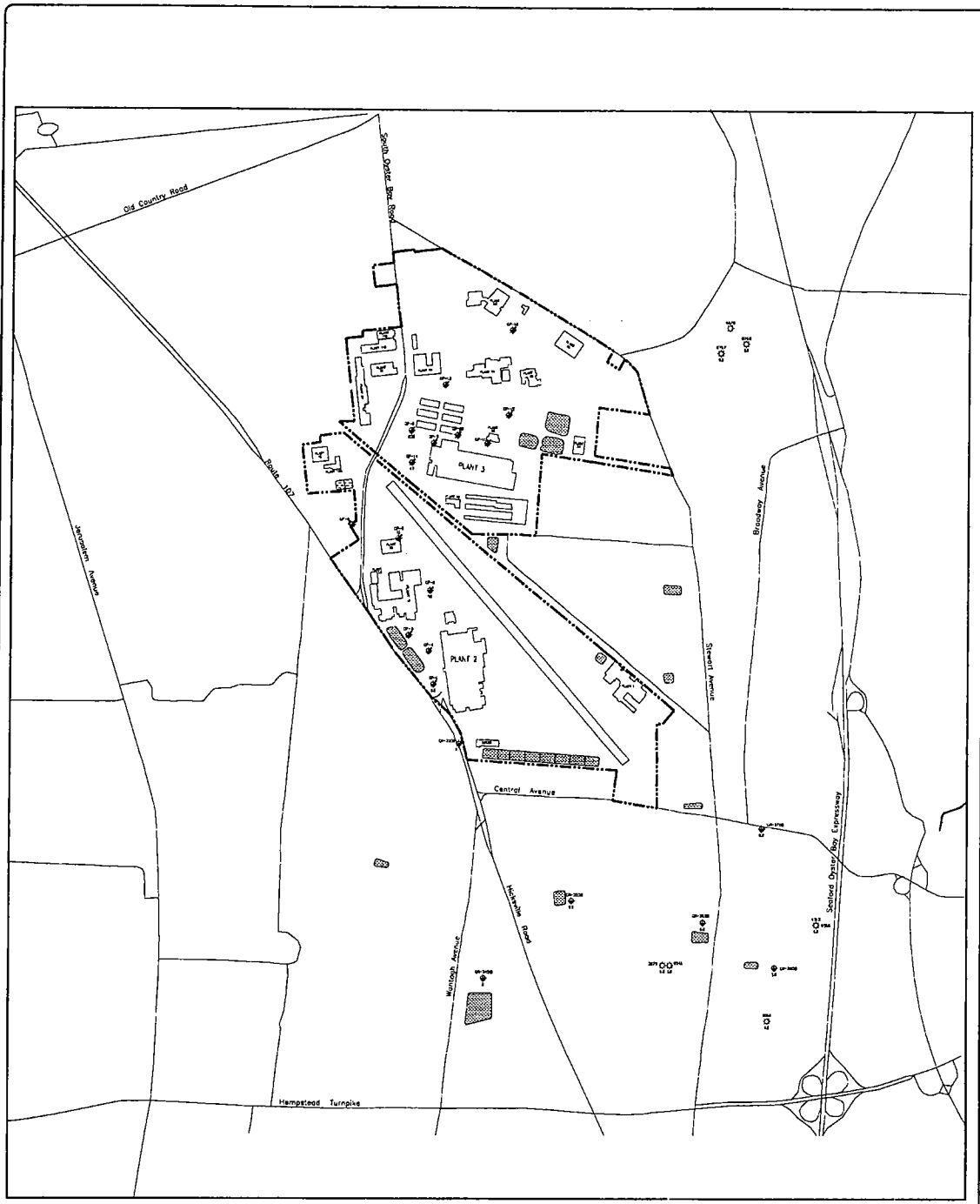
TRICHLOROETHENE CONCENTRATION IN MICROGRAMS PER LITER (ug/L)
 (0.0 INDICATES CONCENTRATION LESS THAN METHOD DETECTOR LIMIT)

BETHPAGE WATER DISTRICT PUBLIC SUPPLY WELLS SAMPLED ON SEPTEMBER 1 AND 30, 1993.
 GRUMMAN MONITORING AND PRODUCTION WELLS SAMPLED FROM AUGUST 23 THROUGH SEPTEMBER 2, 1993.

0 1000 FT



<p>SCALE VERIFICATION</p> <p>THE BAR REPRESENTS ONE INCH ON THE ORIGINAL DRAWING</p> <p>USE TO VERIFY FIGURE REPRODUCTION SCALE</p>	<p>PROJECT NO. 41000000</p> <p>DATE: 11-1-88</p> <p>DESIGNED BY: []</p> <p>CHECKED BY: []</p> <p>APPROVED BY: []</p>	<p>FILE NO. 149</p> <p>PLAT 826 1-889</p> <p>DATE: 5-12-11</p> <p>DATE: []</p> <p>DATE: []</p>	<p>TRICH-ORGE,THENE CONCENTRATIONS IN THE D2 ZONE</p>	<p>FIGURE</p> <p>4-28</p>
	<p>GRUMMAN AEROSPACE CORPORATION</p> <p>BETHPAGE, NEW YORK</p>			



EXPLANATION

- ▬▬▬▬▬▬ PROPERTY BOUNDARY OF GRUMMAN AEROSPACE CORPORATION
- ▣ RECHARGE BASIN
- ⊙ LOCATION AND DESIGNATION OF VERY DEEP MONITORING WELL
- ⊙ LOCATION AND DESIGNATION OF CULIVAN PRODUCTION WELL
- ⊙ LOCATION AND DESIGNATION OF BERGPAPE WATER DISTRICT PUBLIC SUPPLY WELL
- ⊙ TETRACHLOROETHENE CONCENTRATION IN MICROGRAMS PER LITER (μg/L)
(00 INDICATES CONCENTRATION LESS THAN METHOD DETECTION LIMIT)

BERGPAPE WATER DISTRICT PUBLIC SUPPLY WELLS SAMPLED ON SEPTEMBER 1 AND 20, 1983.
GRUMMAN MONITORING AND PRODUCTION WELLS SAMPLED FROM AUGUST 23 THROUGH SEPTEMBER 2, 1983.



0 1000 FT



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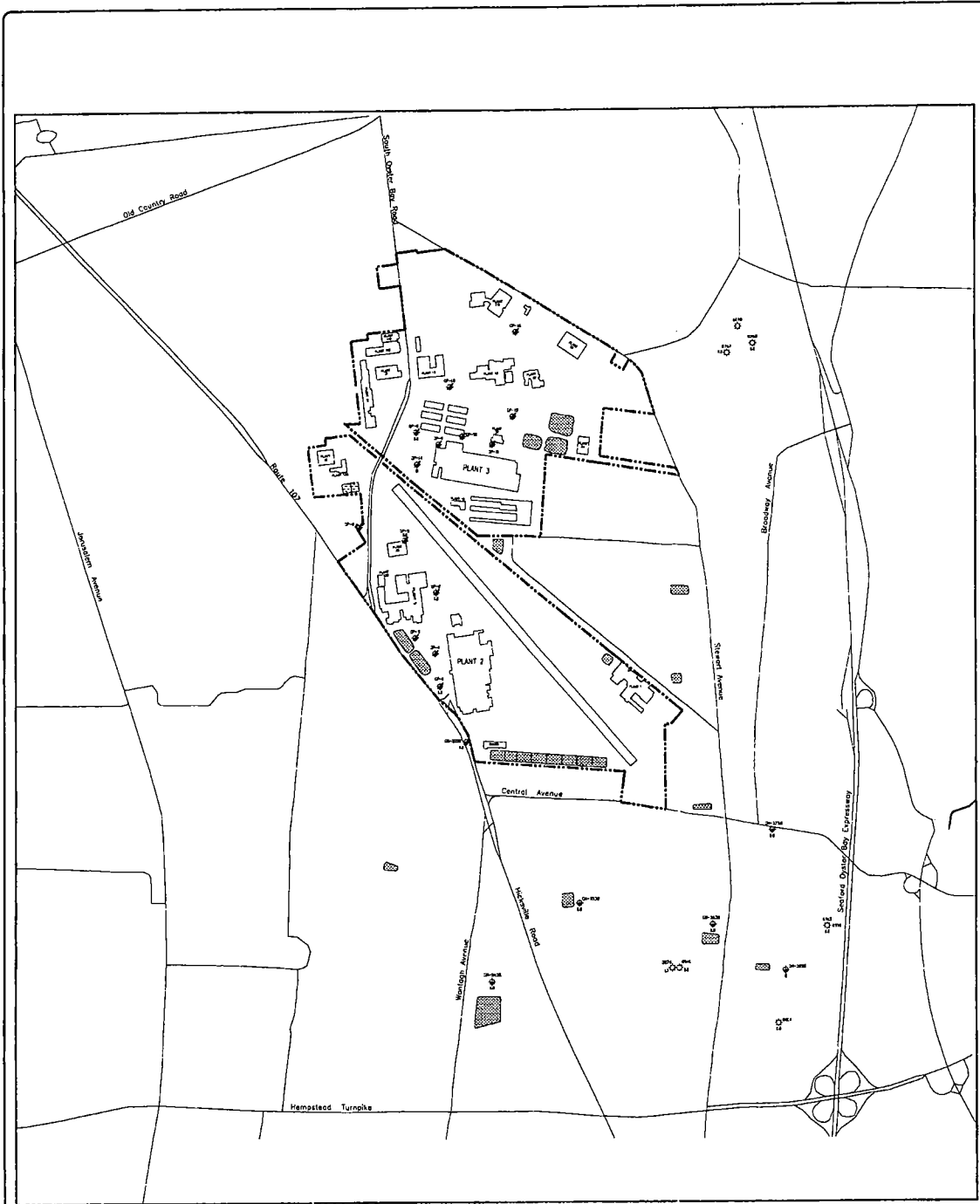
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APPROVED BY: JMS

PROJECT NO.	10000000	FILE NO.	1-000
DRAWING NO.	10000000	DATE	3-15-83
CHECKED BY	JMS	DATE	
DRAWN BY	JMS	DATE	
APPROVED BY	JMS	DATE	

TETRACHLOROETHENE CONCENTRATIONS IN THE D2 ZONE

FIGURE
4-29

GRUMMAN AEROSPACE CORPORATION
BETHPAGE, NEW YORK

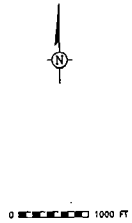


EXPLANATION

- ■ ■ ■ ■ ■ PROPERTY BOUNDARY OF GRUWAM AEROSPACE CORPORATION
- ▣ RECHARGE BASIN
- ⊙ LOCATION AND DESIGNATION OF VERY DEEP MONITORING WELL
- ⊙ LOCATION AND DESIGNATION OF GRUWAM PRODUCTION WELL
- ⊙ LOCATION AND DESIGNATION OF BETHPAGE WATER DISTRICT PUBLIC SUPPLY WELL

• 1,2-DICHLOROETHENE CONCENTRATION IN MICROGRAMS PER LITER (UG/L)
 (0.0 INDICATES CONCENTRATION LESS THAN METHOD OF DETECTION LIMIT)

BETHPAGE WATER DISTRICT PUBLIC SUPPLY WELLS SAMPLED
 ON SEPTEMBER 11 AND 20, 1988
 GRUWAM MONITORING AND PRODUCTION WELLS SAMPLED
 FROM AUGUST 23 THROUGH SEPTEMBER 2, 1988.



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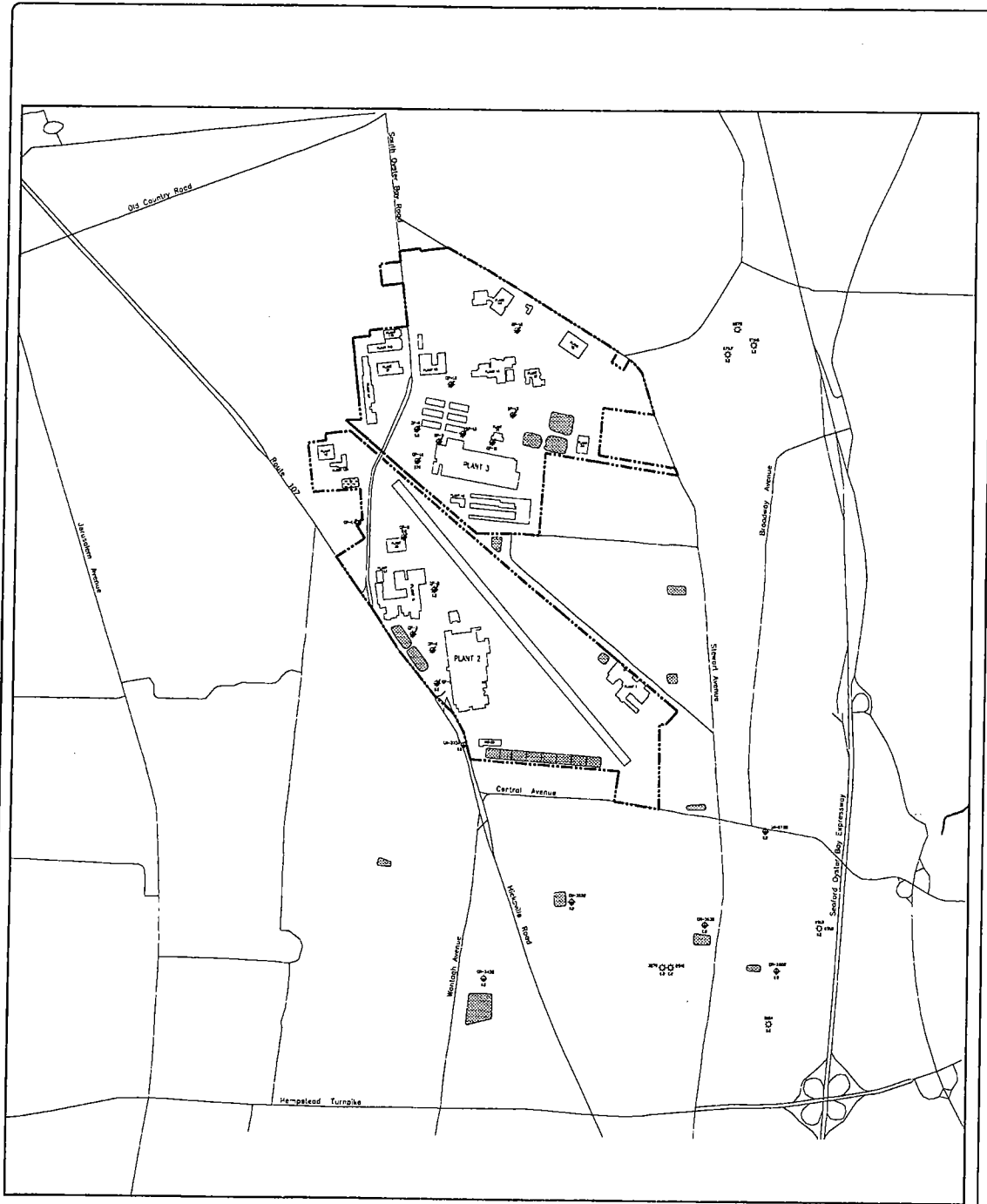
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DRAWING NO. 148877-02	PLOT NO. 11-008
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CHECKED BY: JH	DATE:
APPROVED BY: JH	DATE:

1,2-DICHLOROETHENE CONCENTRATIONS IN THE D2 ZONE

GRUWAM AEROSPACE CORPORATION
 BETHPAGE, NEW YORK

FIGURE
4-31



EXPLANATION

- ▬▬▬▬▬ PROPERTY BOUNDARY OF GRUMMAN AEROSPACE CORPORATION
- ▣ RECHARGE BASIN
- ⊕ LOCATION AND DESIGNATION OF VERY DEEP MONITORING WELL
- ⊙ LOCATION AND DESIGNATION OF GRUMMAN PRODUCTION WELL
- ⊖ LOCATION AND DESIGNATION OF BEHPAGE WATER DISTRICT PUBLIC SUPPLY WELL

20 VINYL CHLORIDE CONCENTRATION IN MICROGRAMS PER LITER (µg/L)
 210 INDICATES CONCENTRATION LESS THAN METHOD DETECTION LIMIT

BEHPAGE WATER DISTRICT PUBLIC SUPPLY WELLS SAMPLED ON SEPTEMBER 1 AND 20, 1988.
 GRUMMAN MONITORING AND PRODUCTION WELLS SAMPLED FROM AUGUST 23 THROUGH SEPTEMBER 2, 1988.

0 1000 FT



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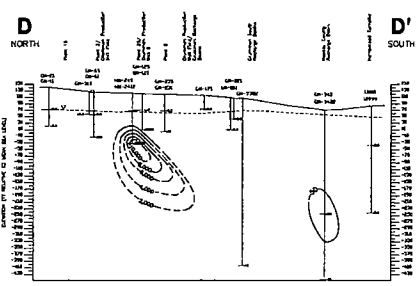
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DRAWING NO. VCP274	PART NO. 7-201
DRAWN BY: BC/CE	DATE: 4-28-88
CHECKED BY: JS	DATE:
DESIGNED BY: CDE	DATE:

VINYL CHLORIDE CONCENTRATIONS IN THE D2 ZONE

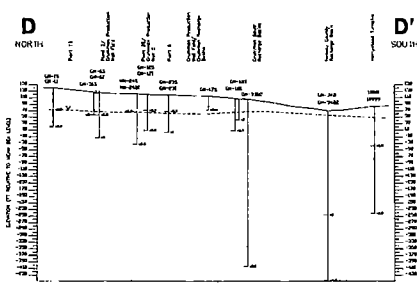
FIGURE

4-32

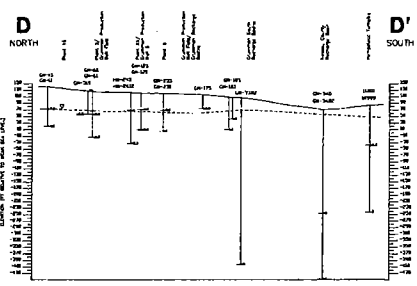
GRUMMAN AEROSPACE CORPORATION
 BETHPAGE, NEW YORK



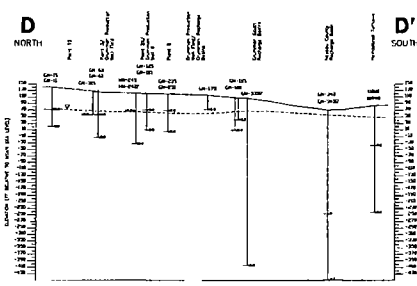
Trichloroethene Concentrations



1,1,1-Trichloroethane Concentrations



Tetrachloroethene Concentrations



1,2-Dichloroethene Concentrations

EXPLANATION

- Groundwater Table
- Contour Lines
- Concentration Contours
- 50 (ppb) Contour Line

ALL DATA WERE OBTAINED FROM MONTHLY MONITORING DATA FOR THE PERIOD 1992 THROUGH 1994. CONCENTRATIONS WERE AVERAGED FOR EACH MONITORING POINT.



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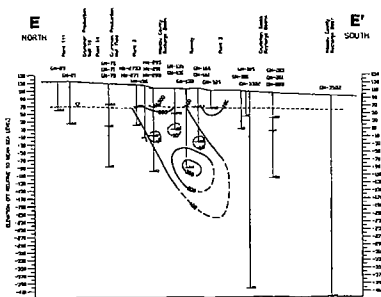
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PROJECT NO.	DATE	SCALE

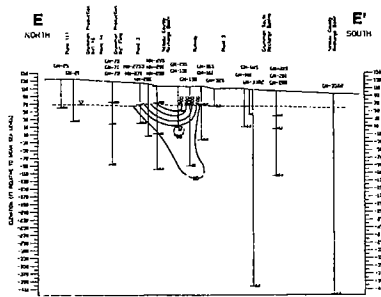
GENERALIZED CHEMICAL CROSS SECTION D-D'

GRUAMAN AEROSPACE CORPORATION
BLITZWAGE, NEW YORK

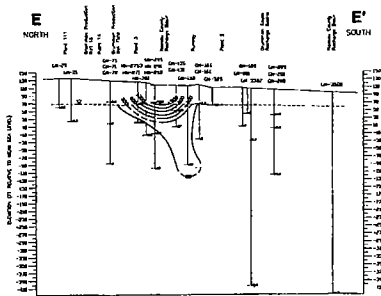
FIGURE
4-34



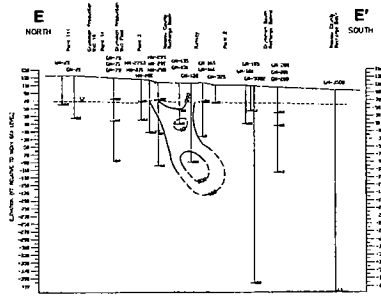
Trichloroethene Concentrations



1,1,1-Trichloroethane Concentrations

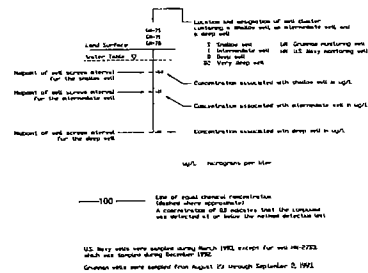


Tetrachloroethene Concentrations



1,2-Dichloroethene Concentrations

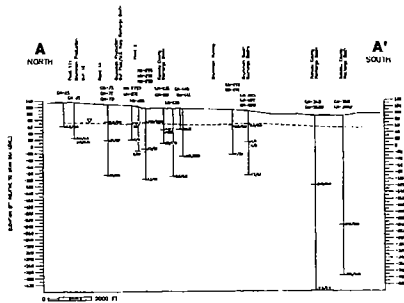
EXPLANATION



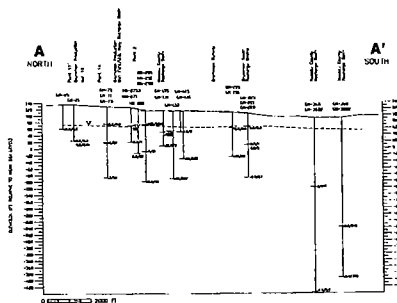
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SCALE	DATE	DESCRIPTION	BY	APP'D.
1" = 100'	10/1/82	GENERALIZED CHEMICAL CROSS SECTION E-E'	JSM	JSM

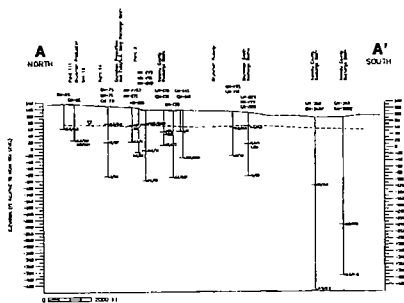
GENERALIZED CHEMICAL CROSS SECTION E-E'
 GRUMMAN AEROSPACE CORPORATION
 BETHPAGE, NEW YORK



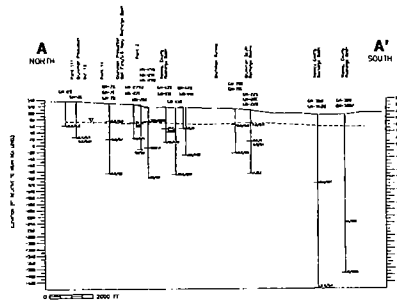
Trichloroethene Concentrations versus Total Volatile Halogenated Organic Compounds



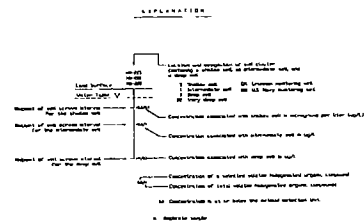
1,1,1-Trichloroethane Concentrations versus Total Volatile Halogenated Organic Compounds



Tetrachloroethene Concentrations versus Total Volatile Halogenated Organic Compounds



1,2-Dichloroethene Concentrations versus Total Volatile Halogenated Organic Compounds



U.S. GEOLOGICAL SURVEY, WATER RESOURCES DIVISION, WASHINGTON, D.C. 20506
 WATER RESOURCES DIVISION, WASHINGTON, D.C. 20506
 CONCENTRATION OF SELECTED VOLATILE HALOGENATED ORGANIC COMPOUNDS VERSUS CONCENTRATION OF TOTAL VOLATILE HALOGENATED ORGANIC COMPOUNDS DETECTED ALONG CROSS SECTION A-A'



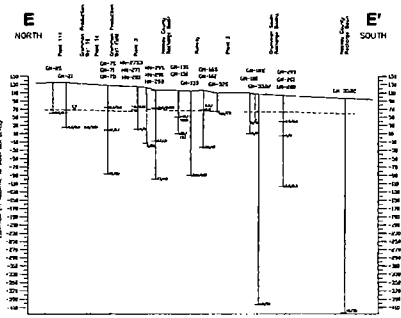
GERAGHTY & MILLER, INC.
 Environmental Services

DATE	DESCRIPTION	BY	APPV.

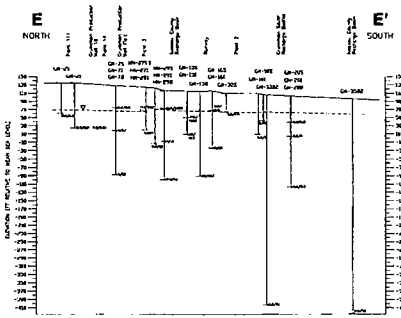
PROJECT NO.	DATE	SCALE

CONCENTRATION OF SELECTED VOLATILE HALOGENATED ORGANIC COMPOUNDS VERSUS CONCENTRATION OF TOTAL VOLATILE HALOGENATED ORGANIC COMPOUNDS DETECTED ALONG CROSS SECTION A-A'

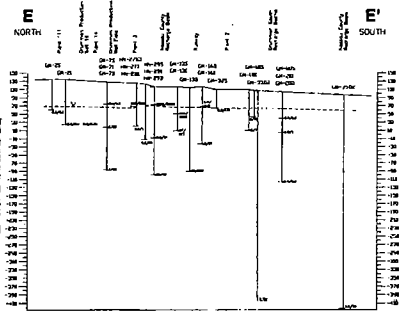
CRUIMAN AEROSPACE CORPORATION
 BETHPAGE, NEW YORK



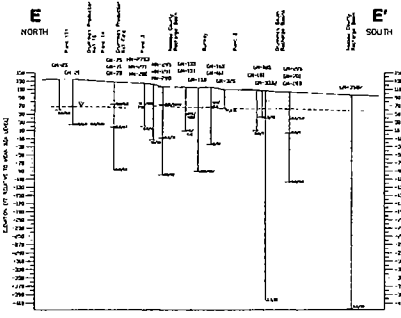
Trichloroethene Concentrations versus Total Volatile Halogenated Organic Compounds



1,1,1-Trichloroethane Concentrations versus Total Volatile Halogenated Organic Compounds



Tetrachloroethene Concentrations versus Total Volatile Halogenated Organic Compounds



1,2-Dichloroethene Concentrations versus Total Volatile Halogenated Organic Compounds

EXPLANATION

- Concentration of a specific volatile halogenated organic compound
- Concentration of total volatile halogenated organic compounds
- Concentration as a % of total volatile halogenated organic compounds
- Relative sample

ALL DATA WERE OBTAINED FROM THE REPORT OF THE GRUMMAN AEROSPACE CORPORATION, BETHESDA, MARYLAND, DATED 1978.



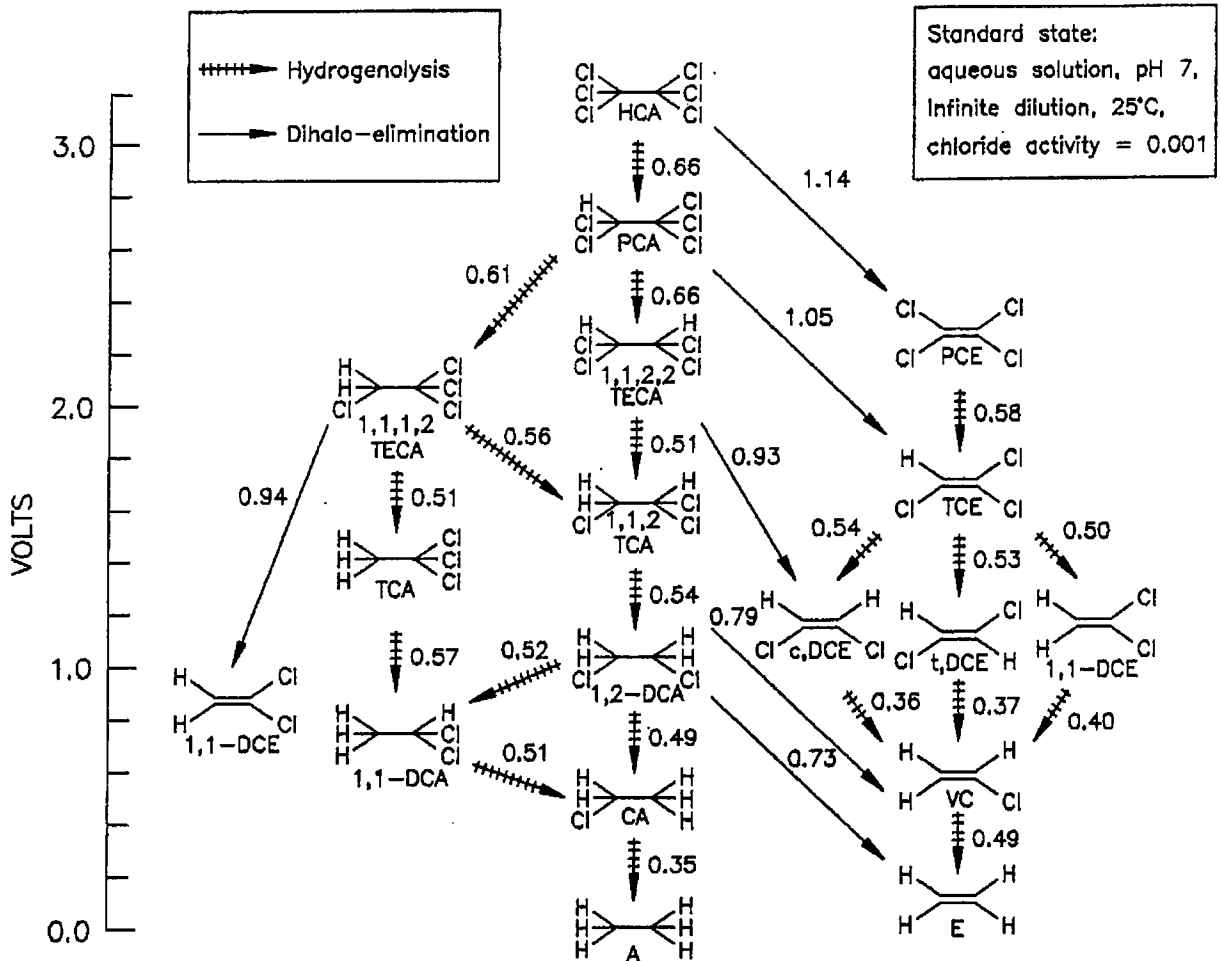
GERAGHTY & MILLER, INC.
Environmental Services

DATE	NO.	DESCRIPTION	BY	APPROVED	REVISIONS	DATE

CONCENTRATION OF SELECTED VOLATILE HALOGENATED ORGANIC COMPOUNDS VERSUS CONCENTRATION OF TOTAL VOLATILE HALOGENATED ORGANIC COMPOUNDS DETECTED ALONG CROSS SECTION 1-1'

GRUMMAN AEROSPACE CORPORATION
BETHESDA, NEW YORK

DWG DATE: 5-17-94 | PRCT NO.: NY0008041 | FILE NO.: 1695 | DRAWING: G205 | CHECKED: R. RASKIN | APPROVED: R. RASKIN | DRAFTER: TAD/rjf/GS



- | | |
|------------------------------------------|------------------------------|
| 1,1-DCE = 1,1-Dichloroethene | CA = Chloroethane |
| 1,1,1,2-TECA = 1,1,1,2-Tetrachloroethane | A = Ethane |
| TCA = Trichloroethane | PCE = Perchloroethene |
| 1,1-DCA = 1,1-Dichloroethane | TCE = Trichloroethene |
| HCA = Hexachloroethane | cDCE = Cis-dichloroethene |
| PCA = Pentachloroethane | tDCE = Trans-dichloroethene |
| 1,1,2,2-TECA = 1,1,2,2-Tetrachloroethane | 1,1-DCE = 1,1-dichloroethene |
| 1,1,2-TCA = 1,1,2-Trichloroethane | VC = Vinyl chloride |
| 1,2-DCA = 1,2-Dichloroethane | E = Ethylene |

MODIFIED FROM FETTER, (1993).



PATHWAYS OF CHLORINATED ETHANES AND ETHENES
 REDUCTION, AND ESTIMATED RELATIVE HALF-LIFE
 REDUCTION POTENTIALS IN VOLTS

FIGURE
5-1

GRUMMAN AEROSPACE CORPORATION
 BETHPAGE, NEW YORK



EXPLANATION

- PROPERTY BOUNDARY OF GRAMM AIRSPACE CORPORATION
- PROPERTY BOUNDARY OF THE U.S. NAVY SITE
- PROPERTY BOUNDARY OF THE OGD/RAVCO SITE
- RECHARGE BASIN
- LOCATION AND DESIGNATION OF SHALLOW MONITORING WELL
- LOCATION AND DESIGNATION OF INTERMEDIATE MONITORING WELL
- LOCATION AND DESIGNATION OF DEEP MONITORING WELL
- LOCATION AND DESIGNATION OF VERY DEEP MONITORING WELL
- LOCATION AND DESIGNATION OF BETHPAGE W/CO DISTRICT PUBLIC SUPPLY WELL
- LOCATION AND DESIGNATION OF ADDITIONAL WELL
- LOCATION AND DESIGNATION OF DEEP GRAMM PRODUCTION WELL
- PLUME ZONE 1
- PLUME ZONE 2
- PLUME ZONE 3
- BARRIER ZONE
- AREA OF OFFSITE IMPACT FROM GRAMM PRODUCTION WELLS AND RECHARGE BASINS

(PLUME ZONE 1 MODIFIED FROM MAY 19(1994))



0 1000 FT



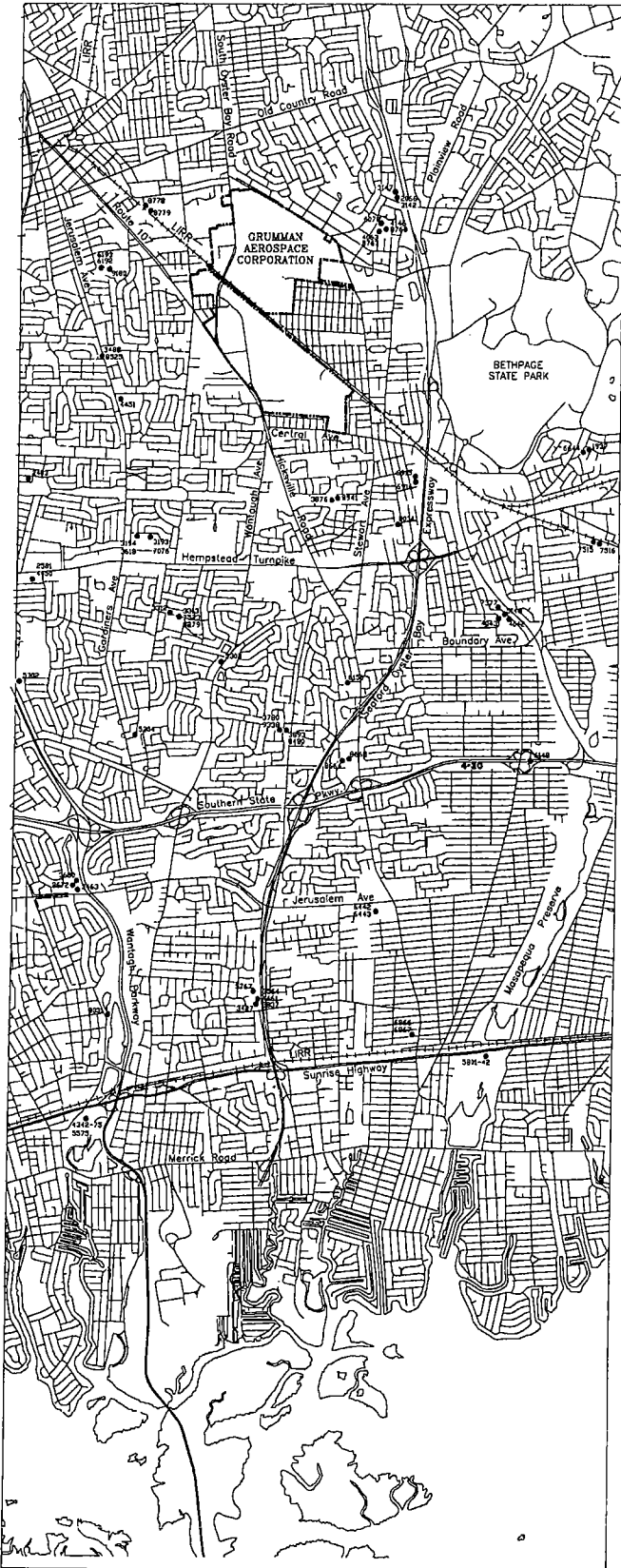
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PROJECT NO.	PROGRAM	TITLE AND DATE
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000000	PLUMES	PLUMES 10-20-94
000000	PLUMES	PLUMES 10-20-94
000000	PLUMES	PLUMES 10-20-94
000000	PLUMES	PLUMES 10-20-94

GENERALIZED AREAS OF IMPACT

GRAMM AIRSPACE CORPORATION
 BETHPAGE, NEW YORK



EXPLANATION

- 1927 LOCATION AND DESIGNATION OF NASSAU COUNTY PUBLIC SUPPLY WELLS (WELL NO. AND WELL NUMBERS INDICATE WELLS AT SAME LOCATION)
- GRUMMAN CORPORATION PROPERTY BOUNDARY

0 EQUALS 2,000 FT



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PROJECT NO.	41000000	FILE NO.	140
DRAWN BY	UNSUB	DATE	10/18/51
CHECKED BY	—	DATE	—
APPROVED BY	—	DATE	—

PUBLIC SUPPLY WELL LOCATIONS IN THE VICINITY OF AND SOUTH OF THE GRUMMAN AEROSPACE CORPORATION PROPERTY

GRUMMAN AEROSPACE CORPORATION
 BETHPAGE, NEW YORK

FIGURE
5-3