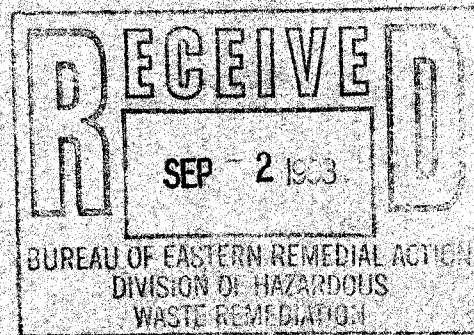


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**INTERIM REMEDIAL MEASURE  
PILOT TEST WORK PLAN  
GRUMMAN AEROSPACE CORPORATION  
BETHPAGE, NEW YORK**

August 1993



Prepared for

**Grumman Aerospace Corporation  
Bethpage, New York**

Prepared by

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**INTERIM REMEDIAL MEASURE  
PILOT TEST WORK PLAN  
GRUMMAN AEROSPACE CORPORATION  
BETHPAGE, NEW YORK**

September 1, 1993

Geraghty & Miller, Inc. is submitting this work plan to the Grumman Aerospace Corporation for work to be performed at the Grumman Aerospace Corporation, Bethpage, New York. The work plan was prepared in conformance with Geraghty & Miller's strict quality assurance/quality control procedures to ensure that the work plan meets industry standards in terms of the methods used and the information presented. If you have any questions or comments concerning this work plan, please contact one of the individuals listed below.

Respectfully submitted,

**GERAGHTY & MILLER, INC.**



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**INTERIM REMEDIAL MEASURE  
PILOT TEST WORK PLAN  
GRUMMAN AEROSPACE  
BETHPAGE, NEW YORK**

**INTRODUCTION**

Geraghty & Miller, Inc. has prepared this work plan to describe the procedures that will be used to conduct a pilot test for an Interim Remedial Measure (IRM) at the Grumman Aerospace facility in Bethpage, New York. A Remedial Investigation/Feasibility Study (RI/FS) is underway at the site, with Phase II of the RI currently being conducted.

Soil-gas and soil sampling results generated during Phase I of the RI indicated that an aboveground trichloroethylene (TCE) storage tank near Plant 2 may be a source of contamination to the soil and the ground water. In Phase II, additional sampling was conducted, including the collection of soil samples from a boring and the installation and sampling of a ground-water monitoring well. The results of the Phase II sampling indicated that soil near the tank had been impacted; the highest concentrations of TCE were detected in the sample from 8 to 10 feet below land surface. The ground-water sample indicated that ground water has also been impacted, but to a lesser extent than the soil.

Because of the TCE concentrations detected in soil and the possibility for ground water to be impacted to a greater extent in the future, Grumman has decided to undertake an IRM to mitigate the soil contamination. Ground-water contamination at this location and site-wide will be included in an overall remedy for the facility.

The IRM will be soil vapor extraction (SVE), which will be used to remove the contaminants from the soil. In its simplest form, SVE consists of applying a vacuum to an extraction well installed into the contaminated zone. Because TCE is relatively volatile, it will migrate with the extracted soil gases to the extraction well. The soil gases and vapors will then be treated to state standards (Air Guide 1) before they are discharged to the atmosphere.



The goal of the pilot test is to generate sufficient data to design the final SVE system. The pilot test will consist of applying different levels of vacuum to the extraction well and monitoring changes in performance parameters in the extraction and monitoring wells.

### **BACKGROUND**

In Phase I of the RI, soil-gas samples were taken at several locations around the TCE tank. The locations of these samples are shown on Figure 1, and the results are provided in Table 1. Three soil samples were also taken during Phase I, one from each of three borings, labelled B-1, B-2, and B-3. These samples were taken at three different locations around the tank, at depths of 0 to 2.5, 2 to 4, and 8 to 10 feet below land surface, and analyzed for volatile organic compounds (VOCs). The boring locations are shown on Figure 1 and the sample results are in Table 2.

To determine whether TCE detected in this area during Phase I is a contaminant source that would require remediation, a boring (B-5) was drilled to 10 feet below the water table during Phase II. This boring was then completed as a monitoring well (Well GM-32S). Three soil samples were collected during the drilling of B-5 and submitted for laboratory analysis for VOCs. The samples were selected based on analyses of the headspace in the soil samples using a portable gas chromatograph (GC). After the installation and development of Well GM-32S, a ground-water sample was collected and submitted to the laboratory for VOC analysis. The location of B-5/GM-32S is shown on Figure 1, and the analytical results of the soil and ground-water samples are in Table 3.

As indicated in Table 3, the soil, particularly the sample from the 8- to 10-foot interval, which contained 1,200,000 micrograms per kilogram (ug/kg) of TCE, has been impacted. TCE was also detected at 640 ug/kg in the 18- to 20-foot interval and in the ground-water sample at 140 micrograms per liter (ug/L). However, although this area has been shown to be a TCE source, most of the TCE has been detected at depths that are less than 20 feet.



## **REMEDIAL APPROACH**

Grumman has decided to undertake an IRM to mitigate the soil contamination associated with the TCE tank because it will serve as an ongoing source of ground-water contamination and will, therefore, be counterproductive to the overall ground-water remedy for the site. Soil vapor extraction was selected as the remedial technology for this area because of the favorable hydraulic properties of the formation (i.e., relatively high permeability) and the relatively localized distribution of contaminants. Prior to the design of the final SVE system, a pilot test must be conducted to determine the optimal operating parameters.

## **METHODOLOGY**

This section describes the methodology that will be employed to conduct the SVE pilot test. The parameters collected during the pilot test will be used to design the final SVE system.

### **EXTRACTION WELL INSTALLATION**

An extraction well will be installed at the location shown on Figure 2. This well will be installed in a boring drilled by the hollow-stem auger method. A 10-inch borehole will be advanced, with split-spoon samples collected at 5-foot intervals and at changes in lithology (especially when clay lenses are encountered). Split-spoon samples will be geologically logged by the on-site Geraghty & Miller engineer, and a portable GC will be used to analyze samples for TCE. The boring will be terminated when the TCE concentration is less than 0.1 parts per million (ppm) and/or the water table is reached. The 0.1 ppm value generally represents the lower end of achievable remediation with this technology (i.e., the best remediation that can be expected) and, therefore, the maximum depth at which the extraction well should be set. Based on a review of the data, the extraction well may be set at a shallower depth.



The extraction well will be constructed of 5-foot sections of 4-inch diameter polyvinyl chloride (PVC) well screen (0.020 inch slot) alternating with 4-inch diameter PVC casing. The upper 5 feet of the well will be casing. This upper section will be sealed in place with a 3-foot bentonite seal topped by a 2-foot concrete collar. The annulus around the lower screen/casing sections will be filled with an appropriate sand pack. A construction diagram for the proposed extraction well is shown on Figure 3.

## **EXTRACTION MONITORING WELLS**

Five extraction monitoring wells will be installed at the approximate locations shown on Figure 2. These wells will be constructed of 1.25-inch diameter PVC well screen (0.020 inch slot) and casing, installed in a drilled borehole. The annulus around the screen will be filled with an appropriately sized sand pack and 2 feet of bentonite will be emplaced above the sand pack to seal the well to land surface. Each well will be completed at the surface with a concrete collar. Three of the monitoring wells will be located approximately 10 feet from the extraction well; assuming that the extraction well will be 50 feet in depth, the screen settings for the three wells will be 10 to 30, 20 to 40, and 30 to 50 feet below land surface. If the extraction well is shallower, the monitoring well depths will be adjusted accordingly. The remaining two monitoring wells will be located approximately 20 feet from the extraction well, and each of these wells will be screened from 10 to 50 feet below land surface.

## **EQUIPMENT ARRANGEMENT**

A schematic of the equipment arrangement is shown on Figure 4. Ten feet of schedule 40 PVC pipe will be coupled to the wellhead and the influent port of a 2 horsepower EG & G Rotron Regenerative blower (Model DR505). A 1/8 inch stainless steel Pitot tube (Dwyer Instruments) will be installed approximately 6 feet from the wellhead on the influent line to measure the extracted soil gas flow rate. A dilution valve will be installed after the Pitot tube to regulate vacuum and to dilute the air process stream. The blower's effluent port will be directed to two 200 pound granular activated carbon canisters (Carbtrol G-2) arranged in series for vapor treatment prior to discharge to the atmosphere. Sample ports will be installed prior to, between and after the carbon canisters.



## PILOT TEST

The pilot test will consist of applying four different vacuum levels to the extraction well (5, 10, 15, and 20 inches of water column) and monitoring the operating parameters for the resulting air flow regimes. The following monitoring will be conducted in each of the air flow regimes:

- Vacuum will be measured at the blower inlet, the extraction wellhead, and the monitoring wellheads with a magnehelic gauge.
- Differential pressure will be monitored at the blower influent line with a pitot tube and a magnehelic gauge. (The differential pressure will be used in a mathematical equation to determine air flow rates.)
- VOCs will be measured from both the sampling port prior to the treatment system and from the treatment system discharge with a flame ionization detector (FID).
- Oxygen concentration will be measured from the influent and discharge of the treatment system with an oxygen meter.
- The lower explosive limit (LEL) will be measured from the influent and discharge of the treatment system with an LEL meter.

One sample will be collected from each of the four flow regimes for laboratory VOC analysis. The samples will be collected with a 60 cubic centimeter (cc) syringe and injected into an evacuated vial. The samples will be packaged and shipped to Microseeps LTD of Pittsburgh, Pennsylvania where they will be analyzed for a 624 scan. The compound list for a 624 scan is shown on Table 4.

Each of the tests will be run for roughly 2 hours. The main criteria for concluding testing at each level is that vacuum and air flow measurements generally become stable. Testing will be extended if field data indicates that stabilization has not occurred.





## REPORT

A report will be prepared which describes the results of the pilot test. The report will also discuss the radius of influence, contaminant removal rates and treatment options; the report will thus serve as the basis for the final design of the SVE.

## SCHEDULE

The SVE pilot test will be conducted within 4 weeks of receipt of approval by the New York State Department of Environmental Conservation (NYSDEC). Geraghty & Miller will prepare the pilot test report within 6 weeks after the test is concluded.

9F:IRM2WP.rpt



**TABLES**



Table 1. Results of Soil-Gas Survey by Plant 2, Phase I Remedial Investigation, Grumman Aerospace Corporation, Bethpage, New York.

Sample Identification	Date Sampled	Vinyl chloride (ppmv)	trans-1,2-Dichloroethene (ppmv)	cis-1,2-Dichloroethene (ppmv)	Trichloroethene (ppmv)	Tetrachloroethene (ppmv)	Total VOCs (ppmv)
SG-4A	4/29/91	<0.9	<0.3	9	100	0.5	109.5
SG-4B	4/29/91	<0.9	<0.3	10	100	<0.2	110
SG-4C	4/29/91	<0.9	<0.3	5	100	<0.2	105
SG-4D	4/29/91	<0.9	<0.3	10	60	<0.2	70

ppmv Parts per million by volume.  
 VOCs Volatile organic compounds.

All samples were analyzed using a portable gas chromatograph.

Table 2. Trichloroethene Detected in Soil Samples by Plant 2, Phase I Remedial Investigation, Grumman Aerospace Corporation, Bethpage, New York.

Parameter	Sample Designation:		Field Blank		Trip Blank	
	Sample Depth (feet bis):	Sample Date:	Field Blank	Field Blank	Trip Blank	Trip Blank
	B-1	B-2	B-3	B-3		
	8-10	2-4	0-2.5	0-2.5		
	6/20/91	6/20/91	6/20/91	6/20/91	8/25/92	8/25/92
	IEA	IEA	IEA	IEA		
	ug/kg	ug/kg	ug/kg	ug/kg	ug/L	ug/L
Chloromethane	<10	<10	<7,700 J	<7,700 J	<10	<10
Bromomethane	<10	<10	<7,700 J	<7,700 J	<10	<10
Vinyl chloride	<10	<10	<7,700 J	<7,700 J	<10	<10
Chloroethane	<10	<10	<7,700 J	<7,700 J	<10	<10
Methylene chloride	<5	3 J	<3,800 J	<3,800 J	<10	<10
Acetone	13	7 J	<7,700 J	<7,700 J	<10	<10
Carbon disulfide	<5	<5	<3,800 J	<3,800 J	<10	<10
1,1-Dichloroethene	<5	<5	<3,800 J	<3,800 J	<10	<10
1,1-Dichloroethane	<5	<5	<3,800 J	<3,800 J	<10	<10
1,2-Dichloroethene (total)	<5	5	<3,800 J	<3,800 J	<10	<10
Chloroform	<5	<5	<3,800 J	<3,800 J	<10	3 J
1,2-Dichloroethane	<5	<5	<3,800 J	<3,800 J	<10	<10
2-Butanone	<10	<10	R	R	<10	<10
1,1,1-Trichloroethane	<5	<5	<3,800 J	<3,800 J	<10	<10
Carbon tetrachloride	<5	<5	<3,800 J	<3,800 J	<10	<10
Vinyl acetate	<10	<10	<7,700 J	<7,700 J	<10	<10
Bromodichloromethane	<5	<5	<3,800 J	<3,800 J	<10	<10
1,2-Dichloropropane	<5	<5	<3,800 J	<3,800 J	<10	<10
cis-1,3-Dichloropropene	<5	<5	<3,800 J	<3,800 J	<10	<10
Trichloroethene	48	44	130,000 J	130,000 J	<10	<10
Dibromochloromethane	<5	<5	<3,800 J	<3,800 J	<10	<10
1,1,2-Trichloroethane	<5	<5	<3,800 J	<3,800 J	<10	<10
Benzene	<5	<5	<3,800 J	<3,800 J	<10	<10
trans-1,3-Dichloropropene	<5	<5	<3,800 J	<3,800 J	<10	<10
Bromoform	<5	<5	<3,800 J	<3,800 J	<10	<10
4-Methyl-2-pentanone	<10	<10	<7,700 J	<7,700 J	<10	<10
2-Hexanone	<10	<10	<7,700 J	<7,700 J	<10	<10
Tetrachloroethene	<5	<5	<3,800 J	<3,800 J	<10	<10
1,1,2,2-Tetrachloroethane	<5	<5	<3,800 J	<3,800 J	<10	<10
Toluene	<5	<5	<3,800 J	<3,800 J	<10	<10
Chlorobenzene	<5	<5	<3,800 J	<3,800 J	<10	<10
Ethylbenzene	<5	<5	<3,800 J	<3,800 J	<10	<10
Styrene	<5	<5	<3,800 J	<3,800 J	<10	<10
Xylene (total)	<5	<5	<3,800 J	<3,800 J	<10	<10
<b>Total VOCs:</b>	<b>61</b>	<b>59</b>	<b>130,000</b>	<b>130,000</b>	<b>0</b>	<b>3</b>

ug/kg Micrograms per kilogram.  
 ug/L Micrograms per liter.  
 VOCs Volatile organic compounds.  
 IEA Industrial Environmental Analysts, Monroe, Connecticut.  
 J Estimated value.  
 bis Below land surface.  
 B-1, B-2, B-3 Samples collected in shallow soil borings.

Table 3. Results of Soil Borings and Ground-Water Sampling by Plant 2, Phase II Remedial Investigation, Grumman Aerospace Corporation, Bethpage, New York.

Parameter	Sample Designation:		B-5		B-5		B-5		GM-32S		Field		Trip	
	Sample Depth (feet):	Sample Date:	0-2	8-10	18-20	NET	NET	NET	1/25/93	8/25/92	NET	NET	Blank	Blank
	Laboratory:	Units:	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	EcoTest	EcoTest	EcoTest	EcoTest	EcoTest	EcoTest
Chloromethane			<5500	<71000	<52	NA	<10	<10	NA	<10	<10	NA	<10	NA
Bromomethane			<5500	<71000	<52	NA	<10	<10	NA	<10	<10	NA	<10	NA
Vinyl chloride			<5500	<71000	<52	NA	<10	<10	NA	<10	<10	NA	<10	NA
Chloroethane			<5500	<71000	<52	NA	<10	<10	NA	<10	<10	NA	<10	NA
Methylene chloride			<5500	<71000	<52	NA	<10	<10	NA	<10	<10	NA	<10	NA
Acetone			<5500	<71000	<52	NA	<10	<10	NA	<10	<10	NA	<10	NA
Carbon disulfide			<5500	<71000	<52	NA	<10	<10	NA	<10	<10	NA	<10	NA
1,1-Dichloroethene			<5500	<71000	<52	NA	<10	<10	NA	<10	<10	NA	<10	NA
1,1-Dichloroethane			<5500	<71000	<52	NA	<10	<10	NA	<10	<10	NA	<10	NA
1,2-Dichloroethene (total)			1300 J	<71000	<52	NA	<10	<10	NA	<10	<10	NA	<10	NA
Chloroform			<5500	<71000	<52	NA	<10	<10	NA	<10	<10	NA	<10	NA
1,2-Dichloroethane			<5500	<71000	<52	NA	<10	<10	NA	<10	<10	NA	<10	NA
2-Butenone			R	R	<52	NA	<10	<10	NA	<10	<10	NA	<10	NA
1,1,1-Trichloroethane			<5500	<71000	<52	NA	<10	<10	NA	<10	<10	NA	<10	NA
Carbon tetrachloride			<5500	<71000	<52	NA	<10	<10	NA	<10	<10	NA	<10	NA
Bromodichloromethane			<5500	<71000	<52	NA	<10	<10	NA	<10	<10	NA	<10	NA
1,2-Dichloropropane			<5500	<71000	<52	NA	<10	<10	NA	<10	<10	NA	<10	NA
cis-1,3-Dichloropropene			<5500	<71000	<52	NA	<10	<10	NA	<10	<10	NA	<10	NA
Trichloroethene			36000	1200000	640	140	<10	<10	140	<10	<10	<1	<10	<1
Dibromochloromethane			<5500	<71000	<52	NA	<10	<10	NA	<10	<10	NA	<10	NA
1,1,2-Trichloroethane			<5500	<71000	<52	NA	<10	<10	NA	<10	<10	NA	<10	NA
Benzene			<5500	<71000	<52	NA	<10	<10	NA	<10	<10	NA	<10	NA
trans-1,3-Dichloropropene			<5500	<71000	<52	NA	<10	<10	NA	<10	<10	NA	<10	NA
Bromoform			<5500	<71000	<52	NA	<10	<10	NA	<10	<10	NA	<10	NA
4-Methyl-2-pentanone			<5500	<71000	<52	NA	<10	<10	NA	<10	<10	NA	<10	NA
2-Hexanone			<5500	<71000	<52	NA	<10	<10	NA	<10	<10	NA	<10	NA
Tetrachloroethene			<5500	<71000	<52	NA	<10	<10	NA	<10	<10	NA	<10	NA
1,1,2,2-Tetrachloroethane			<5500	<71000	<52	NA	<10	<10	NA	<10	<10	NA	<10	NA
Toluene			<5500	<71000	<52	NA	<10	<10	NA	<10	<10	NA	<10	NA
Chlorobenzene			<5500	<71000	<52	NA	<10	<10	NA	<10	<10	NA	<10	NA
Ethylbenzene			<5500	<71000	<52	NA	<10	<10	NA	<10	<10	NA	<10	NA
Styrene			<5500	<71000	<52	NA	<10	<10	NA	<10	<10	NA	<10	NA
Xylene (total)			<5500	<71000	<52	NA	<10	<10	NA	<10	<10	NA	<10	NA
<b>Total VOCs:</b>			<b>37300</b>	<b>1200000</b>	<b>640</b>	<b>140</b>	<b>0</b>	<b>0</b>	<b>140</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>0</b>

ug/L Micrograms per liter.  
 ug/kg Micrograms per kilogram.  
 VOCs Volatile organic compounds.  
 NET National Environmental Testing, Inc., Bedford, Massachusetts.  
 EcoTest EcoTest Laboratories, Inc., North Babylon, New York.

NA Not analyzed.  
 J Estimated value.  
 R Unusable value.  
 B-5 Soil sample.  
 GM- Ground-water sample.

GERAGHTY & MILLER, INC.

Table 4. 624 Scan Compound List, Grumman Aerospace Corporation, Bethpage, New York.

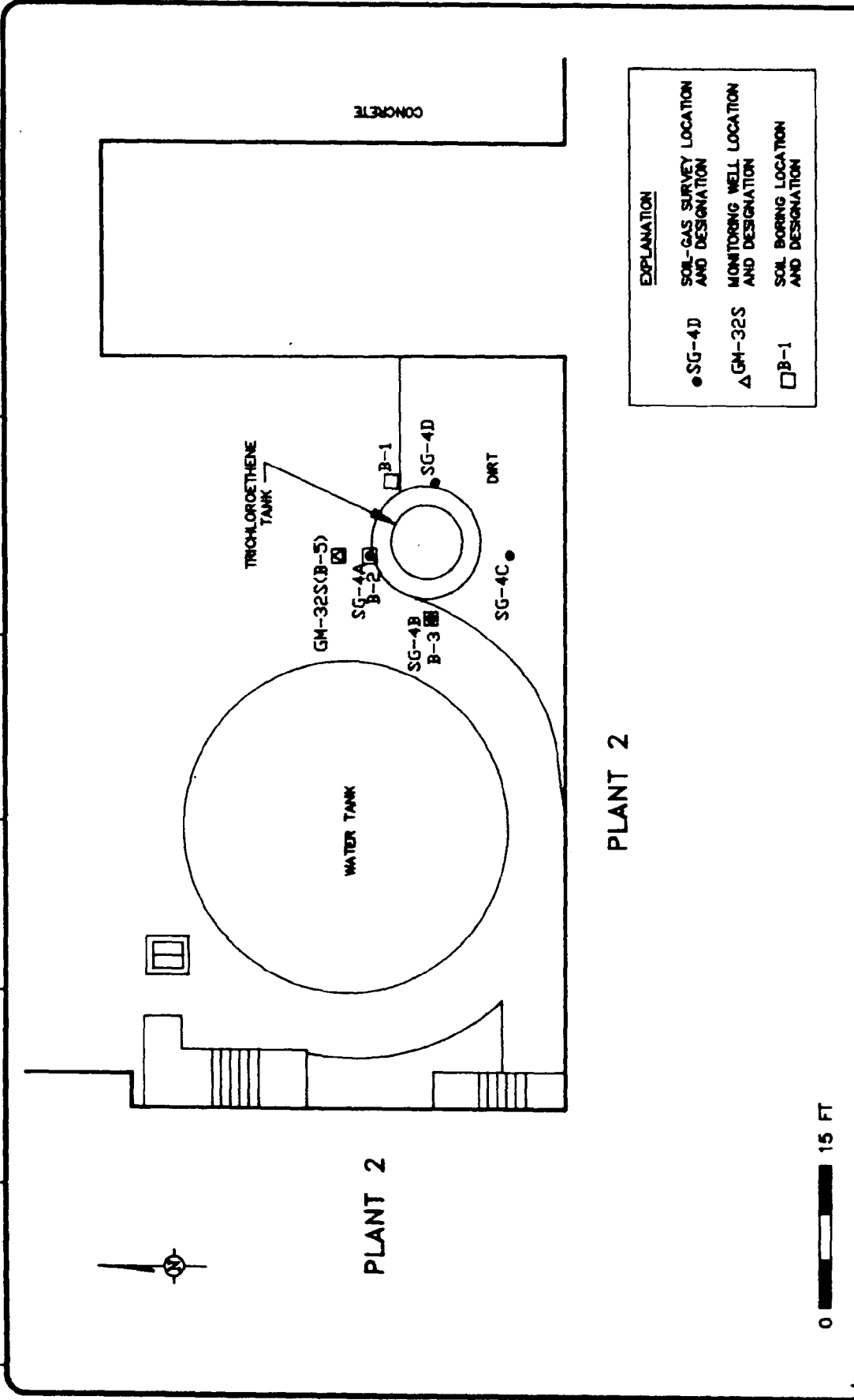
Compound	Blank	Lower Detection Limit
Chloromethane	ND	1
Vinyl Chloride	ND	1
Bromomethane/Chloroethane*	ND	1
Fluorotrichloromethane	ND	0.005
1,1 Dichloroethylene	ND	0.01
Methylene Chloride	ND	1.00
Trans-1,2 Dichloroethylene	ND	0.10
1,1 Dichloroethane	ND	0.01
Chloroform	ND	0.005
1,1,1 Trichloroethane	ND	0.005
Carbon Tetrachloride	ND	0.005
Benzene	ND	0.07
1,2 Dichloroethane	ND	0.01
Trichloroethylene	ND	0.005
1,2 Dichloropropane	ND	0.01
Bromodichloromethane	ND	0.005
Cis-1,3 Dichloropropylene	ND	0.01
Toulene	ND	0.07
Trans-1,3 Dichloropropylene	ND	0.01
1,1,2 Trichloroethane	ND	0.005
Tetrachloroethylene	ND	0.005
Chlorodibromoethane	ND	0.005
Chlorobenzene	ND	0.07
Ethyl Benzene	ND	0.07
Bromoform	ND	0.005
1,1,2,2 Tetrachloroethane	ND	0.005
1,3 Dichlorobenzene	ND	0.07
1,4 Dichlorobenzene	ND	0.07
1,2 Dichlorobenzene	ND	0.07

\* Compounds elute together on ECD - Values represent either or a combination of both.

\*\* Compounds elute together on FID - Value represents a combination of both.

**FIGURES**





EXPLANATION	
● SG-4D	SOIL-GAS SURVEY LOCATION AND DESIGNATION
▲ GM-32S	MONITORING WELL LOCATION AND DESIGNATION
□ B-1	SOIL BORING LOCATION AND DESIGNATION

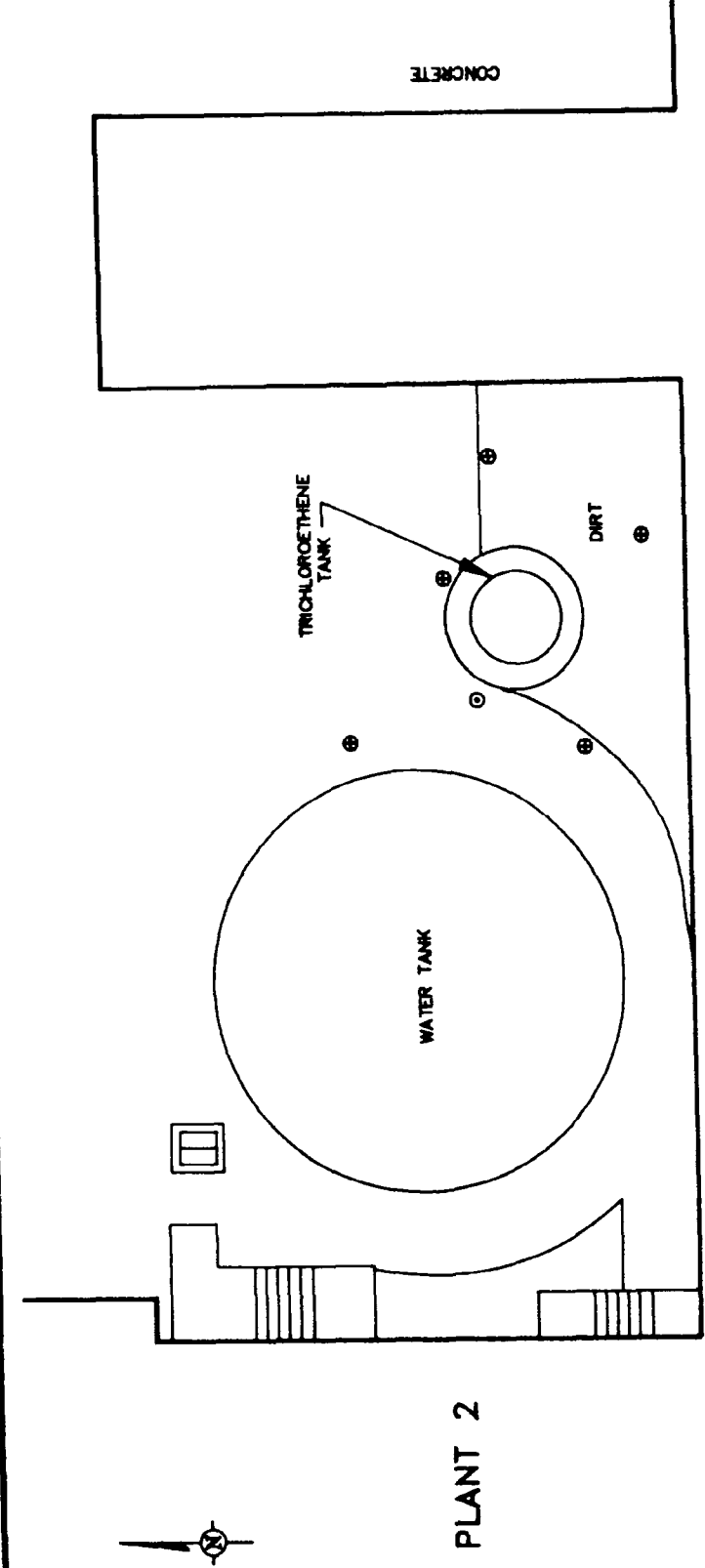
PLANT 2



**SOIL-GAS, SOIL BORING, AND MONITORING WELL LOCATIONS  
 BY THE TRICHLOROETHENE TANK AT PLANT 2**

GRUMMAN AEROSPACE CORPORATION  
 BETHPAGE, NEW YORK





PLANT 2

EXPLANATION	
⊙	PROPOSED EXTRACTION WELL LOCATION
⊕	PROPOSED EXTRACTION MONITORING WELL LOCATION

0 15 FT

FIGURE

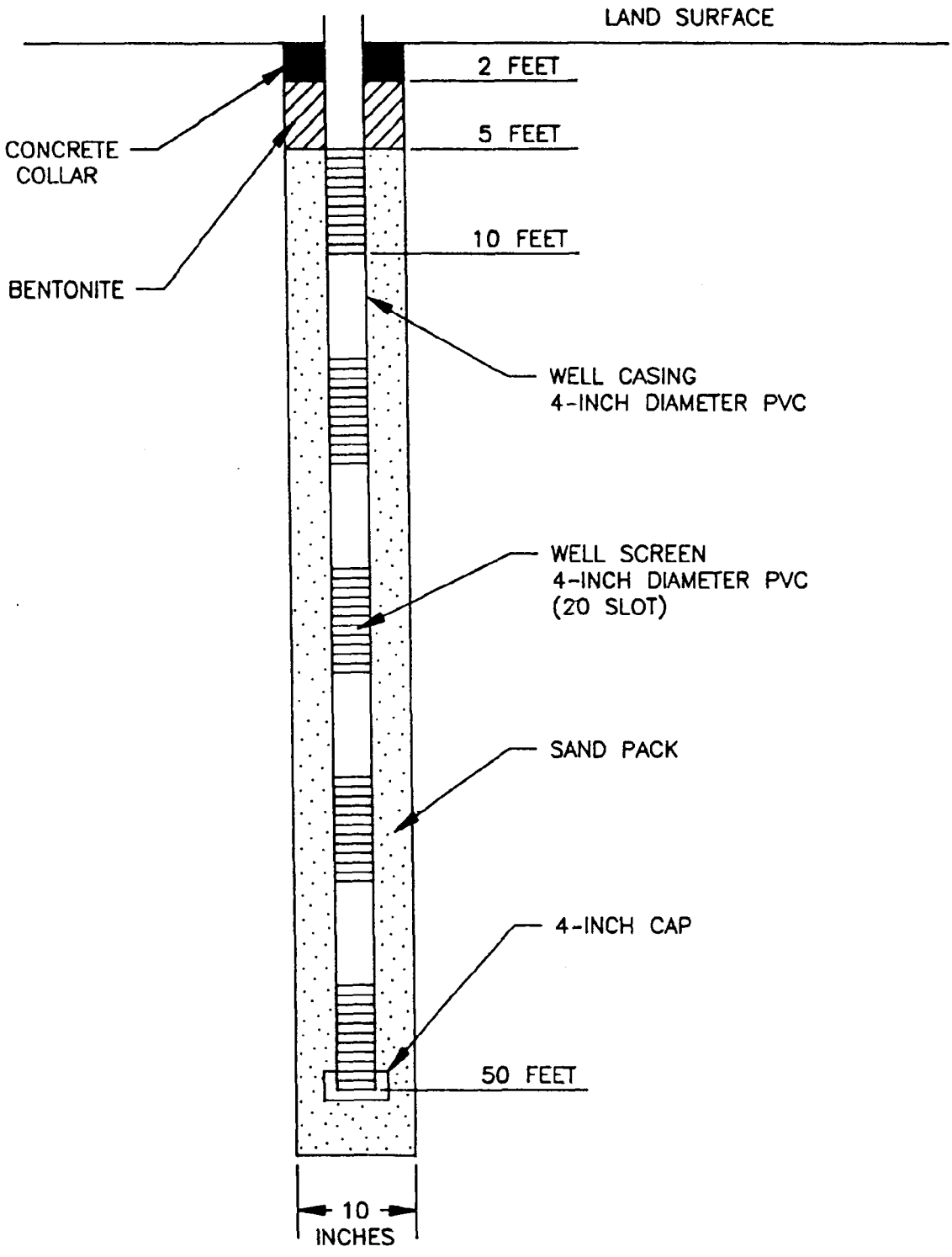
2

PROPOSED EXTRACTION WELL AND EXTRACTION MONITORING WELL LOCATIONS BY THE TRICHLOROETHENE TANK AT PLANT 2



GRUMMAN AEROSPACE CORPORATION  
BETHPAGE, NEW YORK

DWG DATE: MAY 1993 | PRJCT NO.: NY00631 | FILE NO.: - | DRAWING: G134 | CHECKED: S. DEVERNOE | APPROVED: A. BARBER | DRAFTER: TAD/FJF



 **GERAGHTY  
& MILLER, INC.**  
*Environmental Services*

### VAPOR EXTRACTION WELL CONSTRUCTION SCHEMATIC

GRUMMAN AEROSPACE CORPORATION  
BETHPAGE, NEW YORK

FIGURE  
**3**

DATE: AUG. 1993

PRJCT. NO.: NY00831

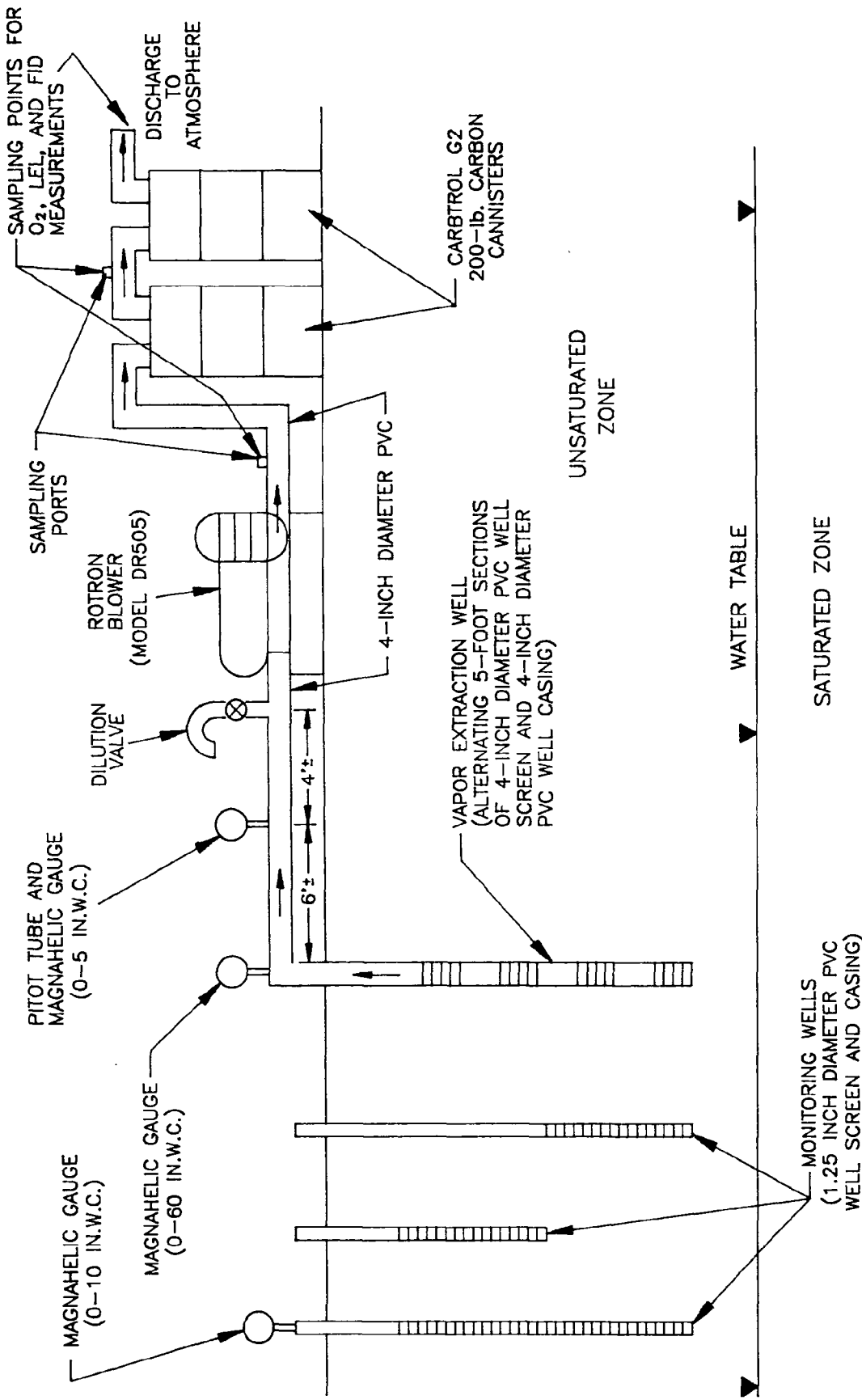
FILE NO.:

CAD FILE: G166

COMPILER: S. DEVERNOE

MGR.: A. BARBER

DRAFTER: TAD/FJF



SCALE: NONE



### VAPOR EXTRACTION PILOT TEST SCHEMATIC

**GRUMMAN AEROSPACE CORPORATION**  
**BETHPAGE, NEW YORK**

FIGURE

4