1-30-003B-001

01-27-03

HISTORY OF VOC INVESTIGATION
NEAR EAST END OF PLANT 3
NWIRP BETHPAGE, NEW YORK

1991 – Soil gas investigation at adjacent Installation Restoration Site 1, identifies potential source of VOCs at Site 1. Some evidence that soil gas detections may extend under concrete roadway and Plant 3 (Sheets A-1 to A-4).

Also in 1991 investigation, groundwater monitoring well to the southwest of Plant 3 (HN24) was found to contain chlorinated solvents at 58,000 ug/l. This finding launched an investigation within Plant 3 to search for a source of this contamination. The likely source of this contamination was later identified (1997) within building near the HN24 area, and was excavated by Northrop Grumman in the 1997/98 time frame. Concentration of solvents in this well is currently about 270 ug/l.

1992/1993 – A soil gas survey within Plant 3 was conducted. Initial program (Stage 1) was conducted with hand probe and OVA meter. This investigation limited further testing (Stage 2) to Heat Treat Area and east end of Plant (Honeycomb Pretreatment Area and Flow Coat Area). Stage 2 investigation used GC methods for individual solvents and found relatively high concentrations under the floor at Honeycomb Pretreatment (5000 ug/l PCE) and Flow Coat Area (570 ug/l PCE)(Sheets B-1 to B-8).

1994 - Navy/New York State determined that there was sufficient data to proceed with a cleanup at Site 1. At the time, the need for soil cleanup under Plant 3 was uncertain. Rather than delay cleanup and conduct a Phase 3 remedial investigation, it was decided to proceed with a record of decision and leave some details to the remedial design.

1995 – Navy/New York State sign a record of decision (ROD) that identifies cleanup levels for solvents in soils (Sheets C-1 to C-3).

1995 – Conducted predesign soil sampling in Plant 3 to determine the extent of AS/SVE system. 120 soil samples collected for field screening with a photoionization detector (PID) in

nine borings. Samples were collected on 5 foot centers from near surface to 62 feet below ground surface. PID readings ranged from 0 (non detect) to 50 ppm, (Sheets D-1 to D-12).

27 samples with the highest PID readings were analyzed for VOCs. Maximum detection of PCE was 20 ug/kg and maximum detection of trichloroethene was 6 ug/kg, which are less than ROD levels of 81 ug/kg and 30 ug/kg, respectively. These detections are also significantly less than NYSDEC TAGM values of 1,400 ug/kg and 700 ug/kg, respectively.

Based on this data, it was concluded that significant sources of VOCs were not present in this area under Plant No. 3 and that extension of the AS/SVE system to this area was not required. This recommendation was included in the Navy's 1997 Design Analysis Report and concurred with by NYSDEC. As a result, design of the AS/SVE system was focused beneath Site 1 only.

1997/2002 – Navy operated an AS/SVE system at Site 1. Removed 4,500 pounds of VOCs through spring of 2002. Groundwater concentrations in area have decreased from approximately 19,000 ug/l in 1991 to less than 50 ug/l in 2002.

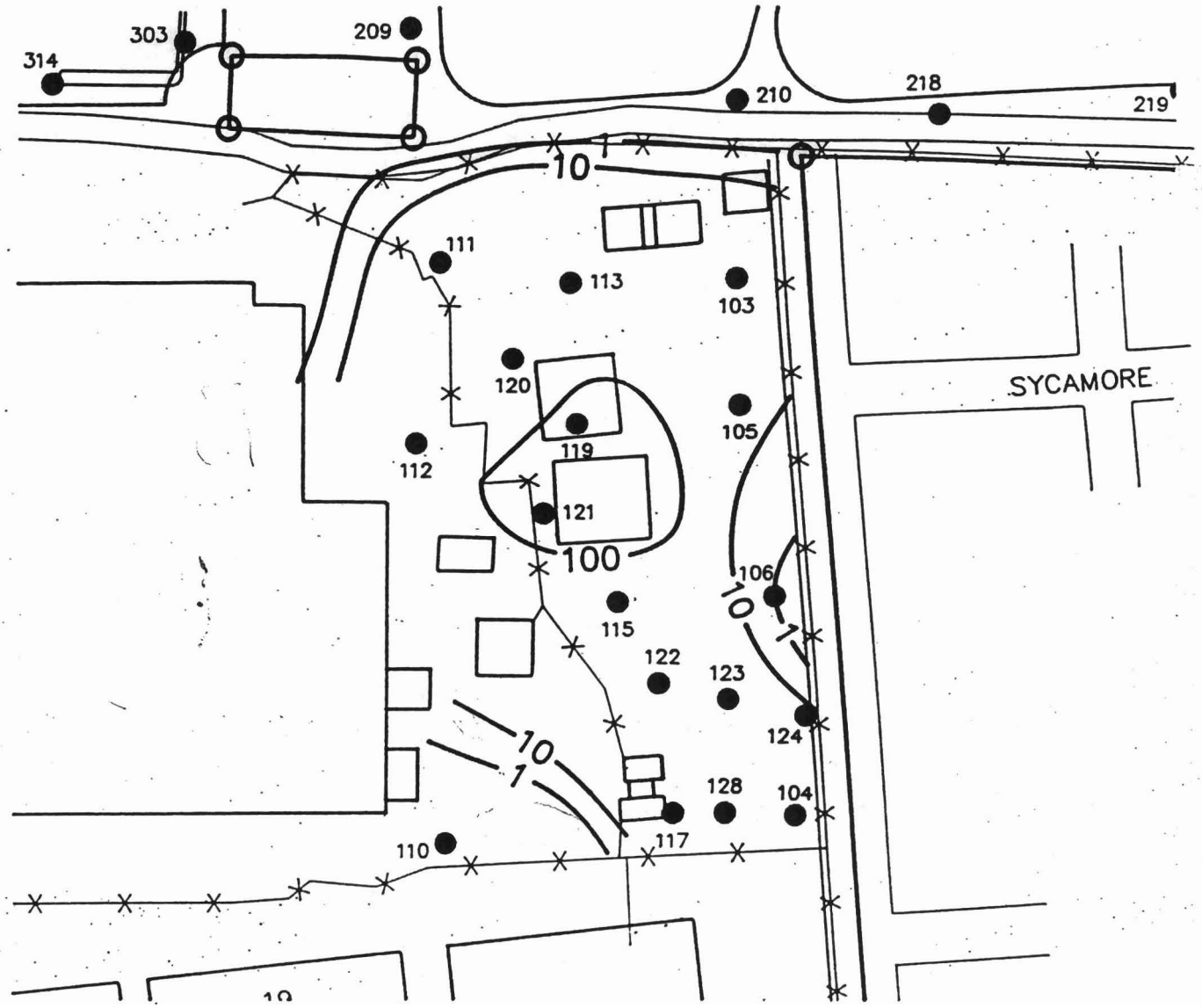
2001 – Navy conducted indoor air sampling within Plant 3 in response to a comment made by NYSDOH regarding Navy's FOST for Bethpage. Relevant maximum detections and applicable industrial standards are as follows, (see Sheets E-1 and E-2).

Parameter	Maximum Detected Indoor Air Concentration (ug/m^3)	OSHA Standards (ug/m^3)
1,1,1- Trichloroethane	2.8	1,900,000
Trichloroethene	15.3	537,000
Tetrachloroethene	2.8	678,000
Freon 113	16.2	7,664,000

Results of air testing found indoor air quality to be significantly less than applicable standards for an industrial setting. These results were submitted to NYSDOH and NYSDEC at a meeting

held in Albany, New York on April 11, 2001. Since then, no other correspondence regarding the results of this indoor air sampling program was received by the Navy. As such, the Navy concluded that indoor air quality was no longer an issue with regards to transfer of the property and proceeded with finalization of the Bethpage FOST.

ACAD: 3281\B200A.DWG PS-AV3 05/19/92 MJJ SG-SHALLAY



LEGEND

● SOIL GAS LOCATIONS

—10— TCE AND PCE (ug/l)

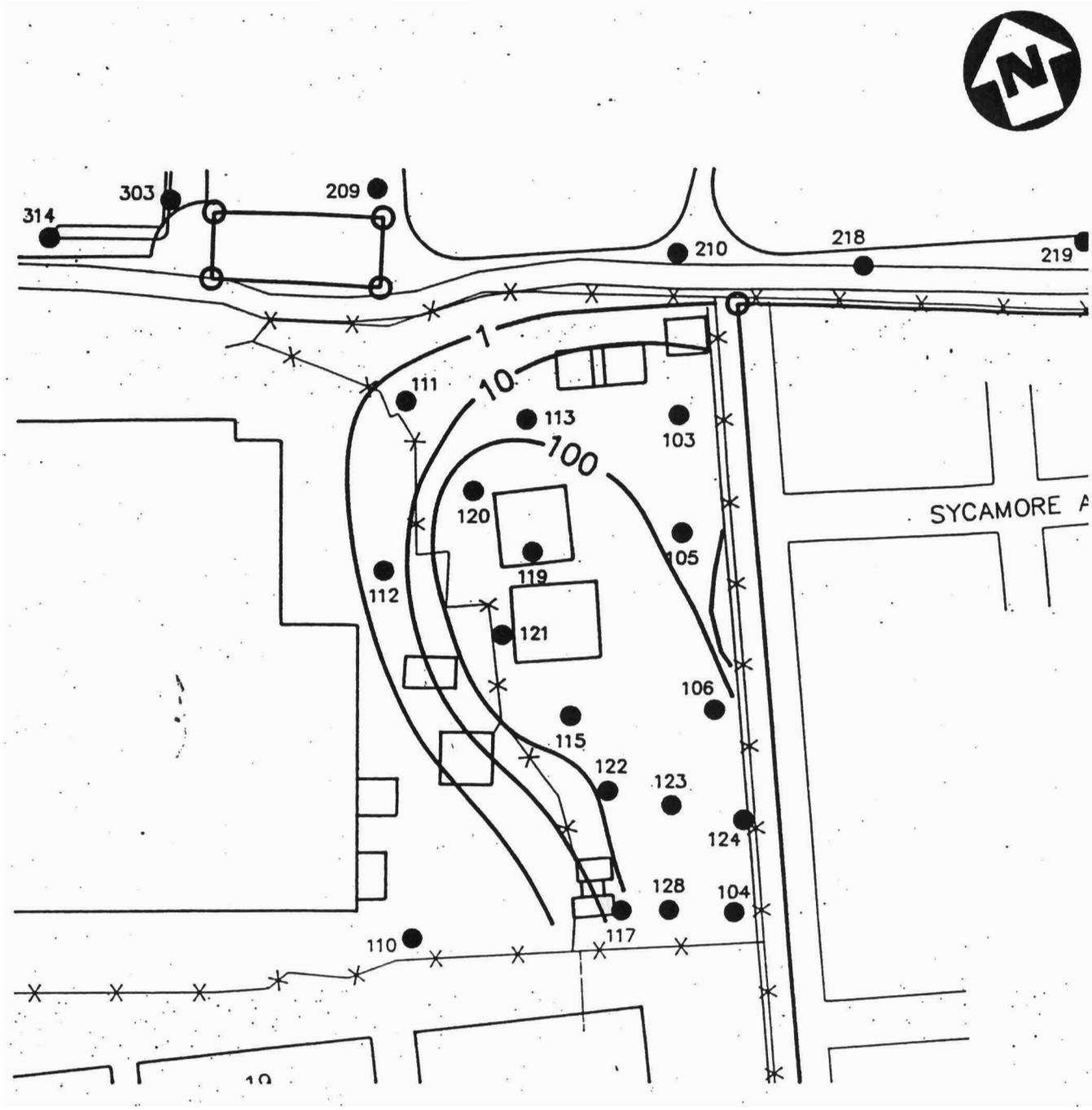
FIGURE 4-1

SOIL GAS RESULTS - SHALLOW
REMEDIAL INVESTIGATION
NWIRP, BETHPAGE, NEW YORK

HALLIBURTON NUS
Environmental Corporation

4-2

A-1



LEGEND

● SOIL GAS LOCATIONS

—10— TCE AND PCE (ug/l)

0 150 300

SCALE IN FEET

FIGURE 4-2

SOIL GAS RESULTS – DEEP
REMEDIAL INVESTIGATION
NWIRP, BETHPAGE, NEW YORK

HALLIBURTON NUS
Environmental Corporation

A-2

TABLE 4-1
SOIL-GAS RESULTS - SITE 1 (ug/l)
NWIRP, BETHPAGE, NY

Sample	11DCE	t12DCE	11DCA	c12DCE	111TCA	TCE	PCE
103D	192	<1.0	2.7	1.6	18	15	11
103S	44	<1.0	<1.0	3.6	5.6	13	9.6
104D	7.4	<1.0	3.7	<1.0	89	143	5.7
104S	<1.0	<1.0	<1.0	<1.0	0.31	0.68	<0.05
105D	244	<1.0	<1.0	<1.0	14	9.7	27
105S	187	<1.0	<1.0	<1.0	9.9	7.7	19
106D	<1.0	<1.0	<1.0	<1.0	0.22	1.2	0.12
106S	6.1	<1.0	<1.0	<1.0	1.6	3.5	3.5
110D	3.6	<1.0	<1.0	<1.0	0.11	<0.10	0.78
110S	<1.0	<1.0	<1.0	<1.0	<1.0	<0.10	0.65
111D	59	<1.0	<1.0	<1.0	6.4	6.7	3.6
111S	125	<1.0	<1.0	<1.0	8.8	7.8	1.9
112D	85	<1.0	1.7	<1.0	9.0	4.9	6.7
112S	61	<1.0	<1.0	<1.0	9.4	3.7	9.4
113D	174	<1.0	<1.0	<1.0	15	11	16
113S	131	<1.0	<1.0	<1.0	8.3	15	12
115D*	80	<1.0	2.4	4.4	8.8	18	<0.05
115S	20	<1.0	<1.0	<1.0	9.5	14	70
117D	14	<1.0	<1.0	<1.0	26	40	21
117S	7.4	<1.0	<1.0	<1.0	10	18	14
119D	165	<1.0	3.1	26	24	21	70
119S	626	<1.0	6.9	37	70	63	138
120D	728	<1.0	18	16	107	45	174
120S	832	<1.0	30	48	122	68	479
121D	558	<1.0	19	50	101	96	617
121S	568	<1.0	21	48	125	159	765
122D	46	<1.0	<1.0	<1.0	19	19	77
122S	8.6	<1.0	<1.0	<1.0	6.4	17	35
123D	11	<1.0	3.9	<1.0	78	139	19
123S	4.9	<1.0	<1.0	<1.0	39	56	14
124D	11	<1.0	<1.0	<1.0	13	16	20
124S	2.7	<1.0	<1.0	<1.0	2.4	1.2	4.8

A-3

TABLE 4-1
SOIL-GAS RESULTS - SITE 1 (ug/l)
PAGE TWO

Sample	11DCE	t12DCE	11DCA	c12DCE	111TCA	TCE	PCE
FIELD CONTROL SAMPLES							
101	<1.0	<1.0	<1.0	<1.0	<0.10	<0.10	<0.05
102	<1.0	<1.0	<1.0	<1.0	<0.10	0.14	<0.05
107	<1.0	<1.0	<1.0	<1.0	<0.10	0.11	<0.05
108	<1.0	<1.0	<1.0	<1.0	<0.10	<0.10	<0.05
109	<1.0	<1.0	<1.0	<1.0	<0.10	<0.10	<0.05
114	<1.0	<1.0	<1.0	<1.0	<0.10	<0.1	0.09
125	<1.0	<1.0	<1.0	<1.0	<0.10	<0.10	0.40
LABORATORY DUPLICATE ANALYSES							
106D	<1.0	<1.0	<1.0	<1.0	0.22	1.2	0.12
106DR	<1.0	<1.0	<1.0	<1.0	0.20	1.3	0.13
110D	3.6	<1.0	<1.0.	<1.0	0.11	<0.10	0.78
110DR	3.1	<1.0	<1.0	<1.0	<0.10	<0.10	0.47
113D	174	<1.0	<1.0	<1.0	15	11	16
113DR	165	<1.0	<1.0	<1.0	14	7.4	15
LABORATORY BLANKS							
106DB	<1.0	<1.0	<1.0	<1.0	<0.10	<0.10	<0.05
110DB	<1.0	<1.0	<1.0	<1.0	<0.10	<0.10	<0.05
113DB	<1.0	<1.0	<1.0	<1.0	<0.10	<0.10	<0.05

* = SAMPLES MAY CONTAIN HIGHER CONCENTRATIONS OF 111TCA, TCE, AND/OR PCE

11DCE = 1,1-dichloroethene
t12DCE = trans-1,2-dichloroethene
11DCA = 1,1-dichloroethane
c12DCE = cis-1,2-dichloroethene
111TCA = 1,1,1-trichloroethane
TCE = trichloroethene
PCE = tetrachloroethene

S = Shallow
D = Deep

A-4

4.4.4 Summary

TCE is a significant groundwater contaminant in this area and is associated with a dense clay layer at a depth of approximately 135 feet bgs. However, direct sampling and analysis of this clay did not find similar levels of contamination. The source of the TCE contamination is not likely to be Site 1, the former coal pile area, Plant No. 10, or the Hooker/RUCO Superfund Site. Potential sources include Plant No. 3 and the drum area near the northern warehouses. These areas are discussed in Sections 4.5 and 4.6.

Solvent contamination was found in the NWIRP and Grumman production wells. Contamination of the NWIRP wells has likely been caused by a combination of Site 1 sources, recharge basin water, and the Hooker/RUCO Superfund Site.

4.5 PLANT NO. 3

4.5.1 Soil Gas Survey

A two stage soil gas program was conducted to determine if there are sources of solvent contamination in Plant No. 3. Additionally, this data was used to supplement the Phase 1 RI soil gas survey and determine the need for remediation of soils under and near Plant No. 3. The first stage of the Phase 2 soil gas program was semi-quantitative using an OVA to provide real-time readings of the concentration of total organic compounds in the soil gas at each sampling location. This soil gas survey was designed to be a relatively non-intrusive, preliminary field screening technique. The second stage soil gas program was quantitative with a field GC used to determine chemical-specific soil gas concentrations.

First Stage Soil Gas Program

A total of 32 soil gas readings were obtained in or near each of the known or suspected areas where solvents were used and/or stored in Plant No. 3. Sampling locations are shown on Figure 4-10. To determine the relative significance of positive soil gas detections, the readings were compared to background OVA readings obtained from presumably clean areas of Plant No. 3. Of the 32 sampling locations, five points were used to determine background soil gas levels in Plant No. 3. The background soil gas samples were obtained in roughly the four corners of the plant, the north central portion of the plant, and at least 100 feet away from any potential source area.

During the testing it was reported that currently the structures at the honeycomb cleaning area are significantly different than those present during historic operations. At this time, the area is an open bay with no significant surface features. It was reported that the area used to consist of processing equipment in a recessed area, approximately 8 feet deep. During the dismantling of this unit, the recessed area was filled with soil and a concrete cap (current plant floor) was placed over it. The soil

B-1

gas results obtained were from within this capped area and therefore may not reflect conditions below the sump area.

The results of the soil gas survey are presented on Table 4-9 and Figure 4-10. Areas of highest soil gas readings included the former honeycomb cleaning area (29 to 88 ppm), paint tunnel number 4 (18 ppm), paint tunnel number 6 (30 ppm), the zyglo inspection area (11 ppm), the flo-coat line (>100 ppm), and the tetrachloroethene (PCE) recovery area (2.4 to 12 ppm). Readings of greater than 10 ppm were obtained from all of these areas. Readings of about 10 ppm or less were not considered significant, because of natural organics such as methane and offgasing from contaminated groundwater in this area.

The evaluation of the soil gas results includes a comparison of the chemicals used at each area versus the chemical TCE found in HN-24I, the volume and method of solvent use, and the soil-gas result obtained relative to background conditions.

The paint tunnels use non-chlorinated solvents such a toluene and methyl ethyl ketone as a paint thinner. The paints are sprayed onto parts and allowed to dry. A water-based spray curtain is used to treat the paint overspray and air for the ventilation system. Solvents are present in this area in 55-gallon drums.

The zyglo process may use a 1,1,1-trichloroethane-based or a non-chlorinated based solution, (TCE and PCE are not believed to be used in this process). Parts are dipped into the solution and then visually evaluated for surface defects under specific light conditions.

The former honeycomb cleaning area is reported to have used significant quantities of TCE (13,000 gallons per year). The exact process and configuration is uncertain.

The flo-coat area and PCE recovery area currently use and recover PCE, respectively. Parts are dipped into tanks containing the flo-coat material. The flo-coat material consists of a mixture of PCE and a rubbery material. The mixture is a thick viscous semi-fluid. Excess material is allowed in drip off back into the tank as well as onto the concrete floor adjacent to the tank. The coating is allowed to dry (PCE is volatilized) and baked. The PCE recovery system treats the off gas from the flo-coat line.

The findings from the Stage 1 soil gas program are as follows.

1) Based on the history of the facility and soil gas results, most areas of Plant No. 3 can be eliminated as potential sources of the contamination at HN-24I. These areas are as follows.

- Alodine, Former Heat Treat, and Plating Shop Area
- Wash and Degrease Area
- Former Printed Circuit Area
- Zyglo Inspection Area

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- Paint Tunnels
- Former Paint Tunnels
- Former Chem Mill Area
- PCE Recovery and Former Sulfuric Acid Anodize Area

2) The only potential source area of HN-24I contamination from within Plant No. 3 identified during this study is the Former Honeycomb Cleaning Area. The testing in this area did not penetrate a reported sump and as a result it is uncertain if contamination exists underneath the sump.

3) Final conclusions cannot be developed for the Heat Treat Area, because testing was not conducted. However, soil gas results from an area within 50 feet and hydraulically downgradient of the Heat Treat Area sump were 0.5 ppm and less. This indicates that the Heat Treat Area sump may not be a potential source of HN-24I contamination.

4) The elevated soil gas readings at the Flo-Coat Area may result from PCE used in the process. Also note that this area is immediately adjacent to Site 1, which was found to have similar elevated soil gas results.

5) The stage 2 soil gas program will be used to resolve these issues.

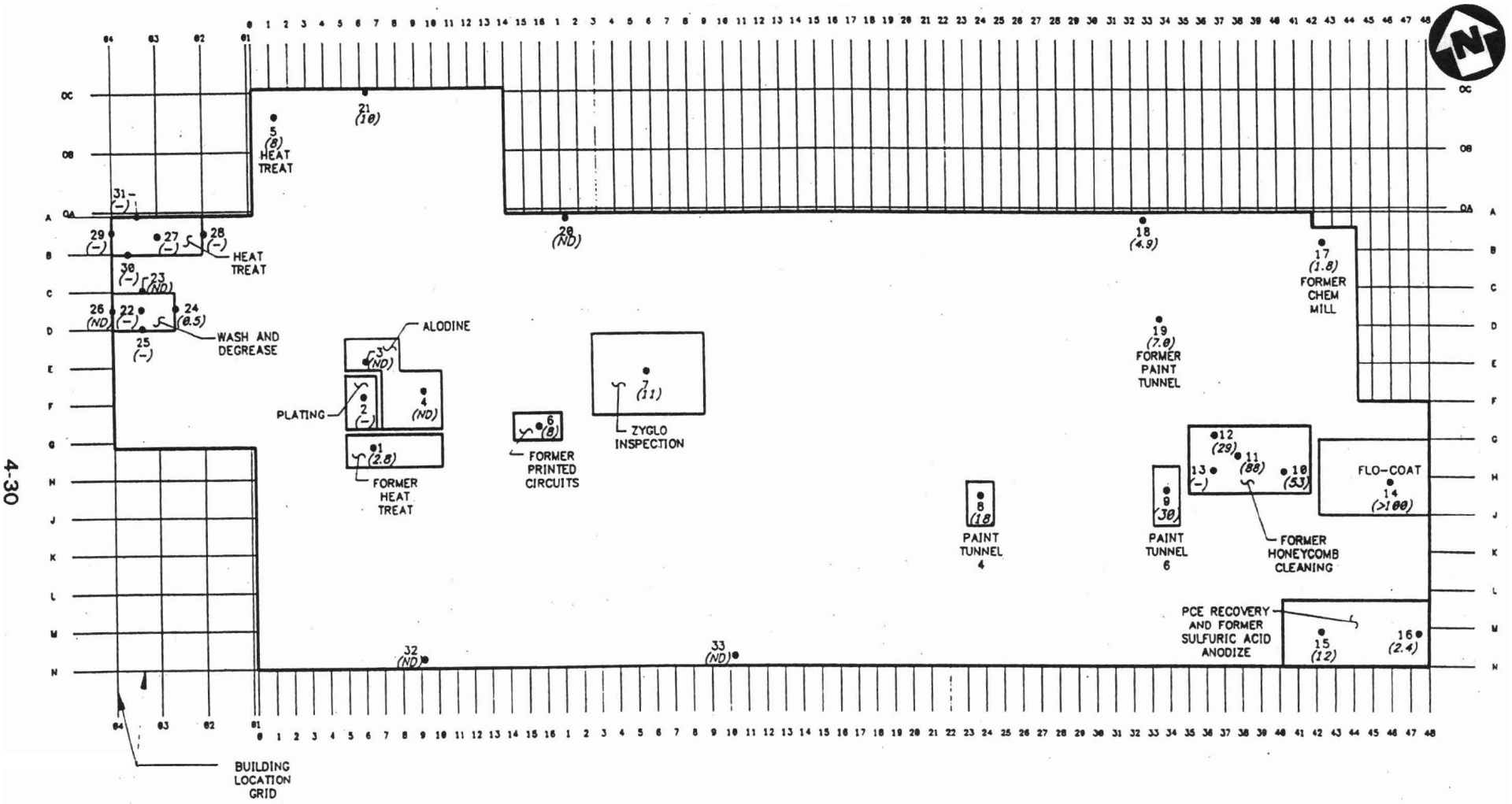
Second Stage Soil Gas Program

A total of 7 soil gas readings were obtained within and immediately outside of Plant No. 3. Sampling locations are shown on Figure 4-11. The samples located within Plant No. 3 were taken to quantify the nature of the contamination that was discovered during the first stage soil gas program. The samples located immediately outside of the plant were taken to either identify or eliminate two former TCE tank areas as sources of volatile organic contamination; these areas were not investigated during the first stage soil gas program.

The results of the second stage soil gas program are presented in Table 4-10. Significant volatile organic contamination was detected at the honeycomb cleaning area. Sample SG-11, located in the southeastern corner of the former sump area, contained PCE at 5,000 ug/l, TCE at 280 ug/l, and TCA at 120 ug/l. Sample SG-10, located in the north-central portion of the former sump, contained PCE at 490 ug/l and TCA at 13 ug/l. Samples SG-38 and SG-39 were taken outside (south) of the former sump. These samples contained PCE at 240 ug/l and 990 ug/l, respectively, and TCA at 14 ug/l and 120 ug/l, respectively. Neither of these samples contained TCE at detectable levels.

The soil gas results indicate that the honeycomb cleaning area is a probable source area of volatile organic contamination. The high levels of contamination detected outside of the former sump area apparently indicate that not all of the volatile organic compounds used during this process were captured or contained by the sump. However, because the honeycomb cleaning area is located

B-3



12-4

LEGEND

- ● 20 — SAMPLING LOCATION
- (4.2) — OVA READING – ppm
- (-) — NOT MEASURED
- (ND) — NON DETECT

STAGE 1 – SOIL GAS RESULTS
PLANT 3
PHASE 2 – REMEDIAL INVESTIGATION/FEASIBILITY STUDY
NWIRP, BETHPAGE, NEW YORK

APPROXIMATE SCALE
0 100 200
SCALE IN FEET

FIGURE 4-10

HALLIBURTON NUS
Environmental Corporation

TABLE 4-9

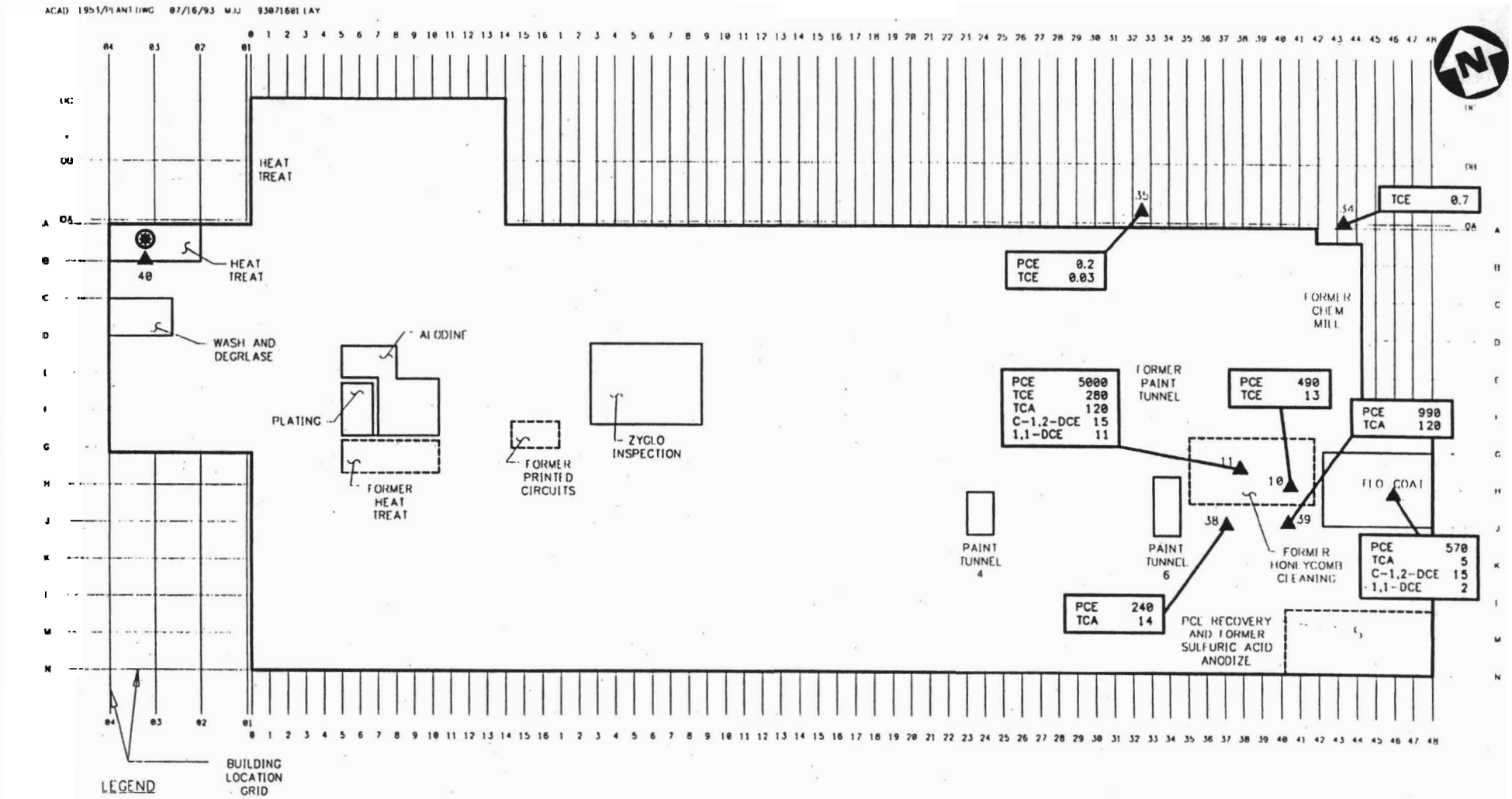
FIRST STAGE SOIL GAS SURVEY RESULTS - PLANT NO. 3
NWIRP BETHPAGE, NEW YORK

SAMPLE LOCATION	BUILDING COORDINATE	OVA (ppm)	DEPTH (ft)	COMMENTS
1	G6	2.8	2.5	Former heat treat area
2	F6	--	--	Concrete >18 inches thick, no sample taken
3	E6	ND	2.5	Alodine area
4	F9	ND	2.5	Alodine area
5	OC1	8.0	3.0	Adjacent to heat treat area; above ground tanks located outside
6	G14	8.0	3.0	Former printed circuits area, adjacent to paint locker
7	E6	11.0	2.5	Zyglo inspection area
8	H23	18	3.0	Paint tunnel #4; methyl ethyl ketone (MEK)
9	H32	30.0	3.0	Paint tunnel #6; MEK; zeroed out 5 ppm background in air
10	H40	53.0	3.0	Former honeycomb cleaning area; backfilled containment unit
11	H38	88.0	2.5	Same as above; obstruction at 2.5 feet
12	G36	29.0	3.0	Same as above; thin concrete (4-inches)
13	--	--	--	Same as above; no sample taken
14	H45	>100 [60]	3.0	Chem mill, flo-coat line; drilled through the drip-dry floor; 60 ppm sustained reading (100 ppm peak); 6 ppm background in air
15	M42	12.0	3.0	Former sulfuric acid anodize area; current PCE recovery area
16	M48	2.4	3.0	Same as above
17	B42	1.8	2.5	Former chem mill, current shot peen area
18	A32	4.9	3.0	Background sample taken in machine shop near Permasol-60 drum
19	D33	7.0	3.0	Machine shop, flammable waste drum marshalling area
20	A1	ND	3.0	Background sample; near outside doors
21	OC6	10.0	3.0	Background sample; machine shop
22	A04	--	--	TCE solvent tanks; wash and degrease pit; floor; concrete >18 inches thick;no sample
23	A04	ND	3.0	Same as above; south wall
24	A04	0.5	3.0	Same as above, east wall
25	A04	--	--	Same as above; north wall; concrete >18 inches thick; no sample
26	A04	ND	3.0	Same as above; west wall
27	A02	--	--	Heat treat area; pit floor; concrete >18 inches thick; no sample

TABLE 4-9 (Continued)
FIRST STAGE SOIL GAS SURVEY - PLANT NO. 3
PAGE 2

SAMPLE LOCATION	BUILDING COORDINATE	OVA (ppm)	DEPTH (ft)	COMMENTS
28	A02	--	--	Same as above; wall; no sample
29	A02	--	--	Same as above; wall; no sample
30	A02	--	--	Same as above; wall; no sample
31	A02	--	--	Same as above; wall; no sample
32	N9	ND	3.0	Background sample; behind stairwell near outside doors
33	N10	ND	3.0	Background sample; drill and rivet shop

B-6



SOIL GAS SURVEY SAMPLE LOCATIONS AND RESULTS (µg/l)
INSIDE PLANT No. 3
PHASE 2 REMEDIAL INVESTIGATION/FEASIBILITY STUDY
NWIRP, BETHPAGE, NEW YORK

APPROXIMATE SCALE
0 100 200
SCALE IN FEET

FIGURE 4-11

HALLIBURTON NUS
Environmental Corporation

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TABLE 4-10

SECOND STAGE SOIL GAS SURVEY RESULTS - PLANT NO. 3
NWIRP BETHPAGE, NEW YORK
(ug/l)

SAMPLE	DEPTH (FEET)	1,1-DCE	1,1-DCA	C-1,2-DCE	1,2-DCA	TCA	TCE	PCE	VINYL CHLORIDE	COMMENTS
SG-10	3	<96	<510	<280	<180	13	<3	490	<1	Honeycomb area; within former sump.
SG-11	3	11	<1	15	<140	120	280	5000	<1	Honeycomb area; within former sump.
SG-38	6	<96	<510	<280	<180	14	<3	240	<1	Honeycomb area; south of sump; general plant floor.
SG-39	6	<96	<510	<280	<180	120	<3	990	<1	Honeycomb area; south of sump; concrete "pad".
SG-FC	2.5	2	<3	15	<180	5	<3	570	<1	Active Flo-Coat area.
SG-40					--	--		--	--	Active TCE containment sump. No sample taken.
SG-34	3	<0.5	<3	<1	<0.9	<0.01	0.7	<0.02	<1	Former TCE tank area.
SG-35	3	<0.5	<3	<1	<0.9	<0.01	0.03	0.2	<1	Former TCE tank area.
N_2 Blank	---	<0.02	<0.1	<0.07	<0.05	<0.0006	<0.0008	<0.001	<0.5	---
H_2O Blank	---	<5	<26	<14	<9	<0.1	<0.2	<0.2	<110	---
System Blank	---	<0.02	<0.1	<0.07	<0.05	<0.0006	<0.0008	<0.001	<0.5	---
Air	---	<0.02	<0.1	<0.07	<0.05	<0.0006	<0.0008	<0.001	<0.5	---
Air	---	<0.05	<0.3	<0.1	<0.09	<0.001	<0.002	0.02	<0.5	---

DECLARATION FOR THE RECORD OF DECISION

SITE NAME AND LOCATION

Naval Weapons Industrial Reserve Plant (NWIRP), Bethpage
Town of Oyster Bay
Nassau County, New York
New York Registry Number: 1-30-003B
Funding Source: Defense Environmental Restoration Account (DERA)

STATEMENT OF BASIS AND PURPOSE

The selected remedial action for the NWIRP Bethpage site is presented in this decision document. The selection was made in accordance with the New York State Environmental Conservation Law (ECL), and is consistent with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986. The factual and legal bases for selecting the remedy for this site is summarized in this decision document.

A list of documents that comprise the Administrative Record for the site is presented in Exhibit A. The documents in the Administrative Record provide the bases of this Record of Decision.

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action described in this Record of Decision (ROD), present a current or potential threat to human health and the environment.

DESCRIPTION OF THE SELECTED REMEDY

Major components of the selected remedy include the following:

1. A **remedial design** to verify the components and provide the details necessary for the construction and implementation of a soil excavation and disposal program as well as a vapor extraction and air sparging (VE/AS) program. This will include delineation of the arsenic-contaminated soil area and the PCB-contaminated soil area. During the design process, an appropriate off-site incineration facility will be chosen which will accept that volume of soil contaminated with PCBs at concentrations in excess of 500 ppm. Also, an appropriate landfill will be chosen which will accept that volume of soil contaminated with PCBs at concentrations between 10 ppm and 500 ppm.

   The design will also provide for the development and implementation of an Operation and Maintenance Plan for the VE/AS system.

2. **Active remediation of the contaminated soils** by (1) excavating the arsenic-contaminated soils and fixating them either on-site or off-site and then disposing of the fixated product in an appropriate off-site landfill; (2) excavating the PCB-contaminated soils and incinerating (off-site) those soils with concentrations above 500 ppm and landfilling (off-site) those soils with concentrations between 10 ppm and 500 ppm. The Navy, at its discretion, may elect to incinerate PCB-contaminated soils with concentrations that are below 500 ppm, depending upon the volume. Pre-excavation sampling and analysis will be conducted to try and initially determine the volume of soils which should be included into each of the different disposal categories. During excavation, adjustments to the initial volumes may be made by using field screening kits. Confirmatory sampling will be conducted to determine when the excavation of soils is complete.

Active remediation of the VOC-contaminated soils will be accomplished by using a vapor extraction/air sparging (VE/AS) technology. This technology will address the VOC-contaminated vapor plume which exists in the unsaturated soils beneath portions of both Site 1 and Plant 3. The areas to be treated will have VOC concentrations equal to or greater than those shown in Table 3. Confirmatory sampling will be conducted to determine when these levels have been achieved. Please note that these levels are equal to three times the preliminary remediation goals (PRGs) for VOCs found in Table 1. The concentrations for VOCs which are to remain in place which exceed the PRGs are not expected to recontaminate the groundwater in excess of Federal or State standards and will eventually be flushed out of the unsaturated soils over a period of years via natural attenuation.

3. **Indirect remediation of groundwater** will be achieved by excavation and treatment of the sources of groundwater contamination, namely, the contaminated soils. In addition, the upper layers of the aquifer will be partially remediated via the air sparging technology.

4. The following **institutional controls** will be implemented:

   a. A 6-inch permeable gravel and/or vegetated soil cover will be installed on top of those areas where residual metal and organic contamination is expected to remain in place. This will ensure that the exposure pathways are eliminated from contact with the residual contamination. The permeability is required in order to promote rain water infiltration and natural attenuation of the residual VOCs.

   b. Deed restrictions will have to be invoked to restrict certain types of activities in areas where the residual contamination is expected to remain.

5. This Record of Decision also provides for an **interim remedial measure (IRM)**. Specifically, the Navy will reimburse the Bethpage Water District (BWD) for costs that have been determined to be fair and reasonable which are associated with providing a groundwater treatment system to the public water supply wells located at the Bethpage Water District's Plant #5. This treatment system is required to address anticipated future impact to BWD Plant #5 as a result of past VOC contamination emanating from the Navy's property. It will be the decision of the Bethpage Water District as to the type of treatment which will be provided to Plant #5. A determination of what is considered fair and reasonable will be made after a Navy review of the treatment system's plans and specifications and subsequent negotiations with the Bethpage Water District. The expenditure of funds associated with the reimbursement process is what will be considered as the Navy's IRM.

DECLARATION

The selected remedy is protective of human health and the environment, complies with State and Federal requirements that are legally applicable or relevant and appropriate to the remedial action to the extent practicable, and is cost effective. This remedy utilizes permanent solutions and alternative treatment to the maximum extent practicable. Because this remedy will not allow for unlimited use and unrestricted exposure within five years after commencement of remedial action, a five year policy review will be conducted. This evaluation will be conducted within five years after completion of the construction of the remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

CAPTAIN S. R. BEATTIE
by direction of the
Commander, Naval Air Systems Command

7/5/95
Date

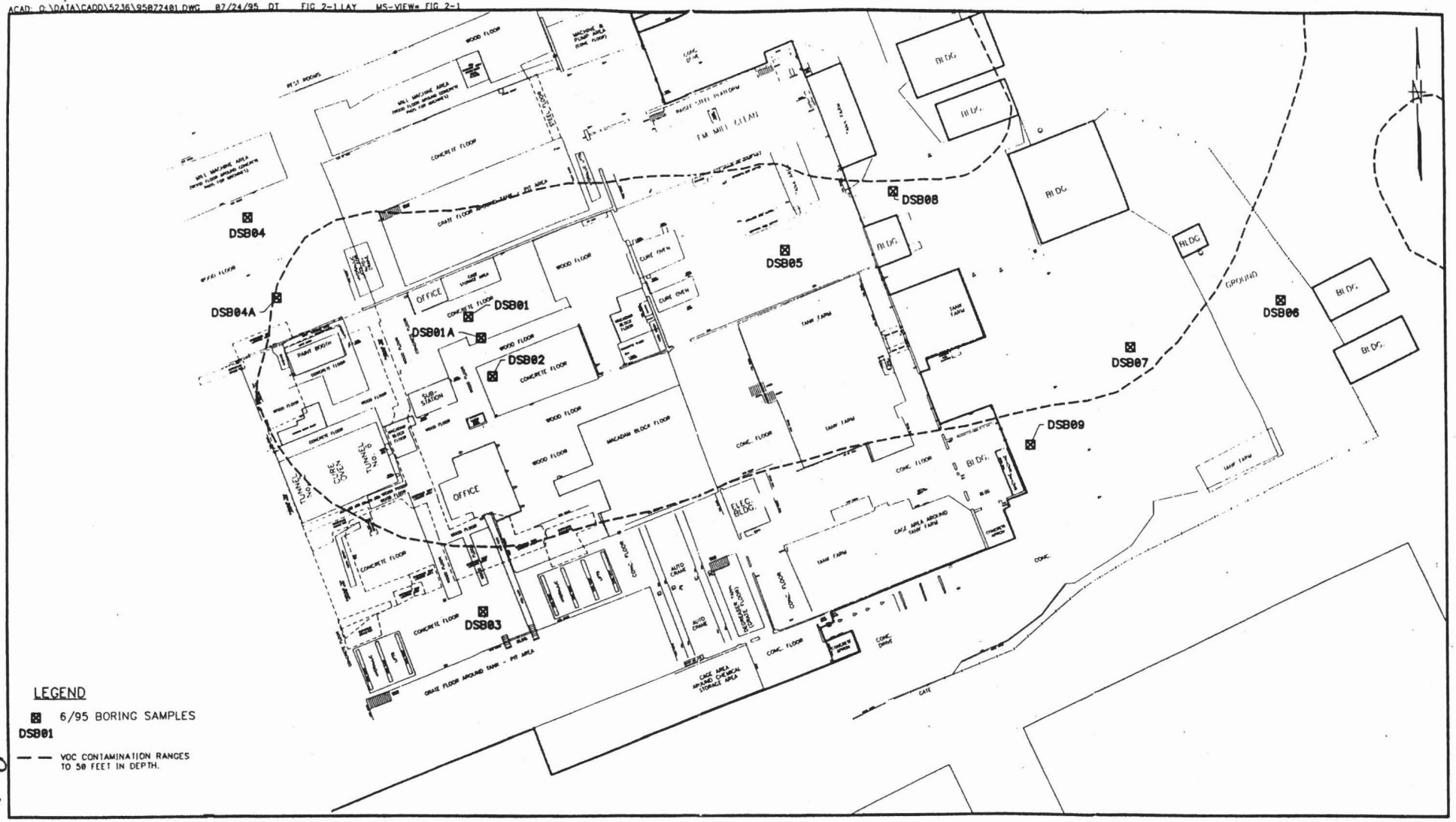
Michael J. O'Toole, Jr.
Director, Division of Hazardous Waste Remediation
New York State Department of Environmental Conservation

C-2

PROPOSED REMEDIAL ACTIONS
NWIRP CALVERTON, NY

SITE 1 - SOILS

Chemical of Concern	Proposed Remedial Action					
	Fixation/Offsite Landfilling	Offsite Incineration	Vapor Extraction	Offsite Landfilling	Natural Flushing[1]	Permeable Cover and Deed Restrictions
Trichloroethene			>0.030 mg/kg		0.01 to 0.03 mg/kg	0.01 to 0.03 mg/kg
Tetrachloroethene			>0.081 mg/kg		0.027 to 0.081 mg/kg	0.027 to 0.081 mg/kg
1,1,1-Trichloroethane			>0.030 mg/kg		0.01 to 0.03 mg/kg	0.01 to 0.03 mg/kg
Chlordane						>0.206 mg/kg
Total Aroclors		>500 mg/kg		10 to 500 mg/kg		1 to 10 mg/kg
Benzo(a)anthracene						>0.33 mg/kg
Chrysene						>0.33 mg/kg
Benzo(b)fluoranthene						>0.33 mg/kg
Benzo(k)fluoranthene						>0.33 mg/kg
Benzo(a)pyrene						>0.33 mg/kg
Indeno(1,2,3-cd)pyrene						>0.33 mg/kg
Dibenzo(a,h)anthracene						>0.33 mg/kg
Arsenic	TCLP As > 5 mg/l in the CCWE[2].					>5.4 mg/kg
Manganese						>142 mg/kg



1-0

FIGURE 2-1

BORING LOCATIONS
NWIRP, BETHPAGE, NEW YORK

C.F. BRAUN
ENGINEERING CORP.

TABLE 3-1

HNu READINGS FROM JUNE 1995 SAMPLING EVENT
NWIRP BETHPAGE, NEW YORK

Soil Boring	Depth of Sample (feet)	HNu Reading (ppm)	
		Split Spoon	Head Space
DSB01	0.5 to 2.5	6	0
	5.0 to 5.5	16	NR
DSB01A	5.0 to 7.0	12	5
	10 to 12	4	1
	15 to 17	4	4
	20 to 22	8	18
	25 to 27	20	50
	30 to 32	9	7
	35 to 37	3	5
	40 to 42	5	5
	45 to 47	4	4
	50 to 52	3	4
	55 to 57	40	20
	60 to 62	0	0
DSB02	0.5 to 2.5	4	0
	5.0 to 7.0	0	0
	10 to 12	0	0
	15 to 17	0	1
	20 to 22	0	0
	25 to 27	0	1
	30 to 32	1	0
	35 to 37	0	0
	40 to 42	0	0
	45 to 47	0	0
	50 to 52	0	0
	55 to 57	0	0
	60 to 62	0	NR

10-2

TABLE 3-1 (Continued)
HNu READINGS FROM JUNE 1995 SAMPLING EVENT
NWIRP BETHPAGE, NEW YORK

Soil Boring	Depth of Sample (feet)	HNu Reading (ppm)	
		Split Spoon	Head Space
DSB03	0.5 to 2.5	0	0
	5.0 to 7.0	0	0
	10 to 12	0	0
	15 to 17	0	1
	20 to 22	0	0
	25 to 27	0	0
	30 to 32	0	0
	35 to 37	2	2
	40 to 42	0	0
	45 to 47	0	0
	50 to 52	0	0
	55 to 57	0	0
	60 to 62	2	NR
DSB04	1.0 to 3.0	0	0
	5.0 to 6.5	0	1
DSB04A	5.0 to 7.0	0	0
	10 to 12	0	1
	15 to 17	0	0
	20 to 22	0	2
	25 to 27	NR	NR
	30 to 32	18	10
	35 to 37	10	7
	40 to 42	2	3
	45 to 47	0	2
	50 to 52	2	4
	55 to 57	4	8
	60 to 62	0	2.5

D-3

TABLE 3-1 (Continued)
HNu READINGS FROM JUNE 1995 SAMPLING EVENT
NWIRP BETHPAGE, NEW YORK

Soil Boring	Depth of Sample (feet)	HNu Reading (ppm)	
		Split Spoon	Head Space
DSB05	0 to 2	3	6
	5 to 7	0	1.5
	10 to 12	2	4
	15 to 17	13	24
	20 to 22	10	12
	25 to 27	6	1
	30 to 32	6	0
	35 to 37	6	6
	40 to 42	3	1
	45 to 47	5	4
	50 to 52	3	3
	55 to 57	16	3
	57 to 59	0	NR
	60 to 62	0	NR
DSB06	0 to 2	0	0
	5 to 7	0	1
	10 to 12	0	0
	15 to 17	0	0
	20 to 22	19	20
	25 to 27	1	5
	30 to 32	0	0
	35 to 37	0	0
	40 to 42	0	0
	45 to 47	0	4.8
	50 to 52	0	2
	55 to 57	6	15
	60 to 62	0	NR

D-4

TABLE 3-1 (Continued)
HNu READINGS FROM JUNE 1995 SAMPLING EVENT
NWIRP BETHPAGE, NEW YORK

Soil Boring	Depth of Sample (feet)	HNu Reading (ppm)	
		Split Spoon	Head Space
DSB07	1.0 to 2.5	1	0
	5.0 to 7.0	NR	1
	10 to 12	NR	NR
	15 to 17	0	1
	20 to 22	5	25
	26 to 28	1.4	7
	30 to 32	1	5
	35 to 37	5	6
	40 to 42	4	11
	45 to 47	5	6
	50 to 52	7	6
	55 to 57	5	10.6
	60 to 62	0	NR
DSB08	1.0 to 3.0	1	2
	5.0 to 7.0	5	2.5
	10 to 12	1	1
	15 to 17	7	14
	20 to 22	4	3
	25 to 27	1	4
	30 to 32	0	4.6
	35 to 37	0	7
	40 to 42	0	3
	45 to 47	1.8	2.5
	50 to 52	NR	NR
	55 to 57	4	5
	60 to 62	NR	NR

D-5

TABLE 3-1 (Continued)
HNu READINGS FROM JUNE 1995 SAMPLING EVENT
NWIRP BETHPAGE, NEW YORK

Soil Boring	Depth of Sample (feet)	HNu Reading (ppm)	
		Split Spoon	Head Space
DSB09	1.3 to 2.8	0	0
	5.0 to 6.5	0	0
	10 to 11.5	0	0
	15 to 16.5	0	0
	20 to 21.5	0	14.5
	25 to 26.5	14	4
	30 to 31.5	1	2
	35 to 36.5	2	10
	40 to 41.5	0.8	1.8
	45 to 46.5	1	6
	50 to 51.5	0	0
	55 to 56.5	3	1
	60 to 61.5	0	NR

NR - No Reading Taken

D-6

TABLE 3-3

SOIL SAMPLE ANALYTICAL RESULTS
JUNE, 1995 SAMPLING EVENT
NWIRP BETHPAGE, NEW YORK

	Acetone	Trichloroethene (TCE)	Tetrachloroethene (PCE)
Soil Boring #1 (DSB01)			
0.5' to 2.5'	BDL	BDL	BDL
Soil Boring #1A (DSB01A)			
25' to 27'	BDL	BDL	BDL
55' to 57'	BDL	BDL	BDL
Soil Boring #2 (DSB02)			
0.5' to 2.5'	BDL	BDL	BDL
15' to 17'	BDL	BDL	BDL
60' to 62'	BDL	BDL	BDL
Soil Boring #3 (DSB03)			
5' to 7'	BDL	BDL	BDL
35' to 37'	BDL	BDL	BDL
55' to 57'	BDL	BDL	BDL
Soil Boring #4 (DSB04)			
1' to 3'	BDL	BDL	BDL
Soil Boring #4A (DSB04A)			
30' to 32'	BDL	BDL	BDL
55' to 57'	BDL	BDL	BDL
Soil Boring #5 (DSB05)			
0' to 2'	BDL	6 µg/Kg	20 µg/Kg
15' to 17'	BDL	BDL	BDL
55' to 57'	BDL	BDL	BDL
Soil Boring #6 (DSB06)			
0' to 2'	BDL	BDL	BDL
20' to 22'	BDL	BDL	BDL
55' to 57'	BDL	BDL	BDL
Soil Boring #7 (DSB07)			
1.0' to 2.5'	BDL	BDL	BDL
20' to 22'	BDL	BDL	BDL
55' to 57'	BDL	BDL	BDL

D-7

TABLE 3-3 (Continued)
SOIL SAMPLE ANALYTICAL RESULTS
JUNE, 1995 SAMPLING EVENT
NWIRP BETHPAGE, NEW YORK

	Acetone	Trichloroethene (TCE)	Tetrachloroethene (PCE)
Soil Boring #8 (DSB08)			
1' to 3'	BDL	BDL	19 µg/Kg
15' to 17'	BDL	BDL	BDL
55' to 57'	37 µg/Kg	BDL	BDL
Soil Boring #9 (DSB09)			
1.3' to 2.8'	BDL	BDL	BDL
35' to 37'	BDL	BDL	BDL
55' to 57'	25 J µg/Kg	BDL	BDL

BDL Below Detection Limit
J Estimated Value

D-8

2.0 FIELD INVESTIGATION

This section describes the field investigation activities conducted at Site 1 - Former Drum Marshaling Area, NWIRP, Bethpage, New York. The field investigation activities included the drilling of nine soil borings to groundwater, three soil borings to refusal at six feet deep, and the collection and analysis of 39 subsurface soil samples.

2.1 SOIL BORINGS AND SUBSURFACE SOIL SAMPLING

The soil boring locations for the pre-design investigation are shown in Figure 2-1. The borings locations were selected to verify levels of contamination under Plant Number 3 and in the area to the east of Plant Number 3. The borings within Plant Number 3 were selected to verify soil gas samples collected during the Phase II RI and also to verify the extent of the VOC contamination shown previously in Figure 1-3. The high soil gas reading collected during the Phase II RI were in an area referred to as the former Honeycomb Cleaning Area. This area was decommissioned, backfilled with soil and a concrete floor was installed to match the existing Plant Number 3 floor. This area used a high volume of solvents and is a potential VOC contamination source. Based on this information, boring DSB01 was proposed to be drilled within the former Honeycomb Cleaning Area.

A total of nine soil borings (DSB01 through DSB09) were proposed during this investigation. In the attempt to drill in the locations of boring number 1 (DSB01) and boring number 4 (DSB04), which were located inside of Building Number 3, subsurface concrete was encountered at a depth of approximately six feet. Attempts to penetrate the subsurface concrete were unsuccessful because of the presences of reinforcing steel, therefore new locations for these borings were selected in the field. A soil sample was collected from both of these original locations between the subsurface concrete and the building's concrete floor. DSB01 was located in the area of the former Honeycomb Cleaning Area. The dimensions of the Honeycomb Cleaning Area were approximately 20 feet by 40 feet and could be visually distinguished via breaks in the building floor. The alternate location for the boring (labeled DSB01A) was relocated directly outside and down gradient of the former Honeycomb Cleaning Area. DSB04 was not located in an area expected to have subsurface concrete. An attempt to move the boring three feet from the initial boring attempt also hit subsurface concrete. After the necessary utility clearances were performed the boring was relocated approximately forty five feet down gradient of the original location. This boring, labeled DSB04A, was successfully drilled to the water table.

D-9

The soil borings were drilled with 3¼-inch inside diameter hollow stem augers. Soil samples were collected at 5-foot intervals with 2-inch outside diameter split-barrel samplers. Physical characteristics (density, color, lithology, and moisture content) of each sample were recorded on boring logs maintained by Halliburton NUS. Boring logs are provided in Appendix A. The headspace from each soil sample was field screened with an HNu organic vapor monitor, and the readings were recorded on the boring logs.

A total of 39 soil samples were collected for analysis. Three soil samples from each soil boring (27 total) were collected and analyzed for Target Compound List (TCL) volatile organic compounds (VOC). One sample was collected from the first two feet below the ground surface and another sample was collected in the middle of each boring in the location which had the highest headspace reading; the third sample from each boring was collected from immediately above the soil/groundwater interface. Three soil samples from four soil borings (12 total) were collected for geotechnical parameters (Soil Classification-ASTM D2487). These samples were selected in order to provide representative data of the subsurface lithology. A record of the samples collected is provided in Appendix B and the chain of custody form associated with these samples are provided in Appendix C.

All down hole drilling equipment and the rear of the drilling rig were decontaminated with pressurized steam prior to drilling, between boreholes, and prior to leaving the site. Decontamination was conducted at a decontamination pad. All sampling equipment (split-barrel samplers and stainless steel trowels) were decontaminated in accordance with the Field and Sampling Plan. All decontamination fluids were collected and disposed on site at the Waste Water Disposal Facility. All boreholes were backfilled with the soil cuttings. Any remaining soil cuttings were containerized in 55-gallon, DOT-approved drums and stored on site. A record of the daily activities were recorded and a copy of these forms are provided in Appendix D.

D-10

sieve sizes range from 1 inch openings to the number 200 sieve (0.0029 inch openings). This sieve analysis is used to perform the classification analysis.

- Sand is defined as; particles of rock that pass the No. 4 sieve but are retained on the number 200 sieve. The results indicate medium to fine grained sand.

- Gravel is defined as particles of rock that pass the 3 inch sieve but are retained on a No. 4 sieve. The results of these samples indicate some areas contain fine grained gravel but most do not.

The Atterberg Limits test (ASTM 4318) determines the plasticity of soils. The plasticity of soils is the relationship between water content and soil behavior is defined as the amount of deformation a soil can withstand without breaking. Plastic soils contain fines such as silt and clay which fill the voids between grains. Sandy soils typically break or crack under minor stress and are non-plastic. The results of the tests indicate the soils are non-plastic. This is consistent with sandy soils.

The results of the soil analysis indicate that sandy soil is typical for the Site 1 area and is usually well drained due to the voids present between the grains of sand. The use of air sparging/vapor extraction is well suited to sandy soils, due to these associated void spaces.

3.2.2 Chemical Results

Soil samples were collected from the 11 soil boring locations as shown on Figure 3-1. Two of the locations (DSB01 and DSB04) were only sampled from the top interval due to difficulties in drilling through subsurface concrete. The subsurface concrete contained re-bar and could not be penetrated with the available equipment, therefore the drill rig was relocated down gradient and drilling continued at the new locations. Samples from the two new locations (DSB01A and DSB04A) were collected from the middle and bottom intervals of these borings.

The results of all the chemical testing are provided in Table 3-3. As shown in Table 3-3 there was minimal contamination was found at the locations sampled. Only two borings (DSB05 and DSB08) contained chlorinated organics at concentrations above detection limits. Both samples were collected from the top interval just below the Plant Number 3 Floor. The concentrations detected at these locations are below the Remedial Action Levels identified in Table 1-1. DSB08 and DSB09 detected the presence of acetone in the bottom (55 to 57 feet) interval. Currently, there is no remedial action level for acetone in soil.

D-11

The sample for DSB08 was analyzed eight days after collection which is one day over the required holding time for VOCs, according to the New York State Department of Environmental Conservation (NYSDEC) Regulation. The first analysis of the sample had a low internal standard and had to be rerun, therefore the second time the sample was analyzed it was out of compliance. The result of the first analysis with a low internal standard was 41 μg/kg for PCE. The result of the second analysis was 19 μg/kg for PCE. The value of 19 μg/kg would receive a J qualifier if the data was validated and would be considered an estimated value due to the missed holding time. Complete analytical information provided from the laboratory is provided in Appendix G.

During the collection of the samples, field readings using an HNu were recorded (see Table 3-1). Field readings were minimal and correlate with the laboratory data indicating that no major source of contamination was located.

The results of the Site 1, Remedial Design, Phase II sampling effort are summarized on Figure 3-1 along with historic data above action levels. The soil samples collected inside of Plant Number 3 were collected from the general area from which elevated soil gas samples had been collected during previous investigations. The soil samples do not confirm that a VOC source is present in the area. DSB01 was placed within the honeycomb cleaning area where the elevated soil gas readings were obtained. The results of DSB01 were below detection limits for the VOCs. DSB01A was located immediately down gradient of the former honeycomb cleaning area and did not detect any VOC contamination. Additionally, the sample collected at the bottom of DSB01A was collected at the groundwater interface and contained a moisture content of 16 percent. This sample would be expected to contain VOCs if the former Honeycomb cleaning area is a significant source and is impacting the groundwater.

D-12

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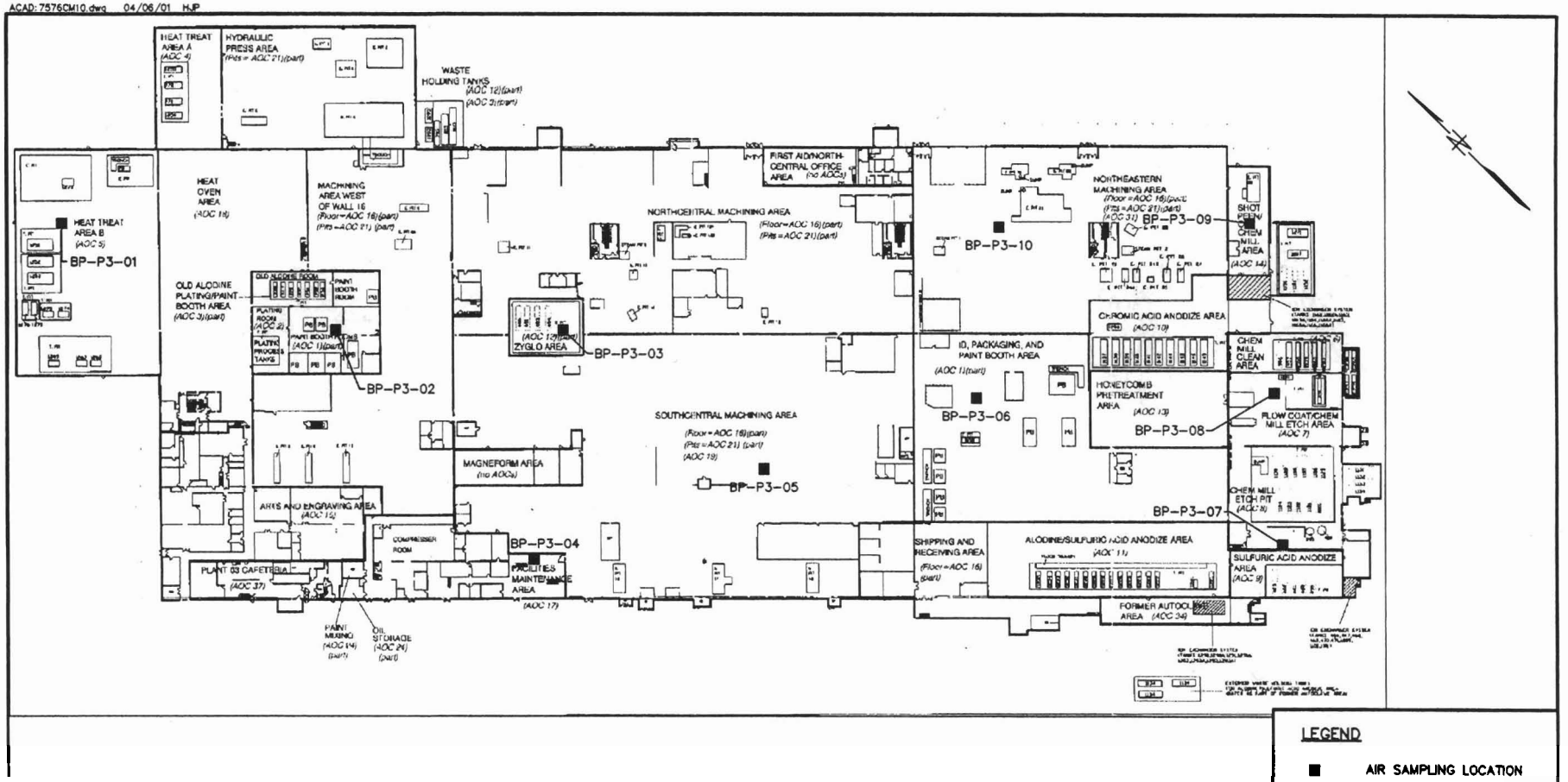

LEGEND

■ AIR SAMPLING LOCATION

0 110 220

APPROXIMATE SCALE IN FEET

NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

DRAWN BY HJP DATE 3/19/01

CHECKED BY DATE

COST/SCHED-AREA

SCALE AS NOTED

Tetra Tech NUS, Inc.

INTERIOR AIR SAMPLING LOCATIONS
PLANT 3 – BUILDING 03-01
NWIRP BETHPAGE, NEW YORK

CONTRACT NO. 7576

OWNER NO.

APPROVED BY DATE

APPROVED BY DATE

DRAWING NO. FIGURE 2-1

REV. 0

TABLE 3-1

AIR SAMPLING ANALYTICAL RESULTS
PLANT 3
NWIRP BETHPAGE, NEW YORK

PARAMETER	BP-P3-01 (AVG)	BP-P3-02	BP-P3-03	BP-P3-04	BP-P3-05	BP-P3-06	BP-P3-07	BP-P3-08 (AVG)	BP-P3-09	BP-P3-10	BP-P3-11	BP-P3-12	BP-P3-13	BP-P3-14
Volatile Organic Compounds ($\mu g/m^3$)														
1,1,1-TRICHLOROETHANE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.8 J	ND	ND
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	ND	ND	ND	ND	ND	ND	16.2	ND	ND	ND	ND	ND	ND	ND
ACETONE	13.2	ND	8.1 J	6.9 J	10.7 J	7.1 J	7.4 J	6.4 J	7.4 J	8.3 J	ND	ND	ND	ND
CIS-1,2-DICHLOROETHENE	ND	ND	ND	ND	ND	ND	4 J	ND	ND	ND	ND	ND	ND	ND
METHYLENE CHLORIDE	5 J	13.4	5.9 J	5.9 J	6.2 J	5.5 J	8.3	5 J	6.2 J	5.5 J	4.1 J	3.8 J	3.4 J	3.8 J
TETRACHLOROETHENE	0.49	ND	ND	ND	ND	ND	2.8	0.93	0.98 J	0.68 J	ND	ND	ND	ND
TOLUENE	6.9	4.4 J	3.7 J	3.5 J	4.1 J	3.7 J	3.5 J	3	3.6 J	4.4 J	ND	3.2 J	ND	ND
TRICHLOROETHENE	4.6 J	6.8 J	6.3 J	6.3 J	6.8 J	6.8 J	15.3	6.1 J	12.6	6.8 J	ND	6.3 J	ND	ND
TRICHLOROFLUOROMETHANE	6.9	10.6 J	3.9 J	3.2 J	3.5 J	3.2 J	2.9 J	ND	3.1 J	3.3 J	ND	6.1 J	ND	ND
XYLENES (TOTAL)	2.8	ND	ND	ND	ND	ND	ND	ND	ND	4.8 J	ND	ND	ND	ND

Notes:
Only detected analytes are shown.
J = Estimated value.
ND = Not detected.