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From: Commander, Western Division, Naval Facilities Engineering Command
To: Distribution

Subj: ADDITIONAL SITE INVESTIGATION, SITE 5 PLATING SHOP, DRAFT FINAL
LETTER REPORT, REMEDIAL INVESTIGATION/FEASIBILITY STUDY
(RI/FS), NAVAL AIR STATION (NAS), ALAMEDA, CALIFORNIA

Encl: (1) Additional Site Investigation, Site 5 Plating Shop Draft Final Letter Report, NAS
Alameda

1. Enclosure (1) is the Draft Final Letter Report for the additional site investigation conducted at the Site 5 Plating shop at NAS Alameda. This Letter Report summarizes the results of the additional site investigation conducted on September 21 and 22, 1993, as part of the Installation Restoration Program (IRP). Site 5 is one of 23 IRP sites currently being studied under the RI/FS phase.

2. It is requested that you review and provide written comments to enclosure (1) within 30 calendar days from the date of this letter.

3. If you have any questions regarding this matter, the point of contact is Mr. Gary J. Munekawa, Code 09ER3GM, (415) 244-2524; FAX (415) 244-2553.

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**NAVAL AIR STATION, ALAMEDA
ALAMEDA, CALIFORNIA
ADDITIONAL SITE INVESTIGATION
SITE 5 PLATING SHOP
DRAFT FINAL**

This report summarizes the results of the additional site investigation conducted on September 21 and 22, 1993, as part of the Installation Restoration Program (IRP). Site 5 is one of 23 IRP sites as shown on Figure 1. Remedial investigations/feasibility studies (RI/FS) are currently being performed at these 23 IRP sites by PRC and Montgomery Watson, herein referred to as the PRC team. This letter report contains the following information:

- Background
- Current Investigation
- Geology/Hydrogeology
- Results of Chemical Analyses
- Conclusions

This report also incorporates written comments from Naval Aviation Depot, Alameda (NADEP), and verbal comments from the Base Closure Team (BCT) on the November 1, 1993 draft letter report.

BACKGROUND

Site 5 consists of Building 5 and is located between First and Second Streets, and Avenues C and F. The building, which covers approximately 18.5 acres, has been in operation since 1942. Operations conducted at this site included cleaning, reworking, and manufacturing of metal parts; tool maintenance; plating; and painting. The paint shop contained two paint bays and several smaller paint spray booths. Processes in the plating shop included degreasing; caustic and acid etching; metal stripping and cleaning; and chrome, nickel, silver, cadmium, and copper plating.

The plating shop is an area where aircraft parts were plated using both cyanide and chromium processes. It was closed in June 1990, when a replacement facility was opened in another part of the base.

The additional site investigation was conducted under Modification 01 of CTO No. 0121. The additional investigation included collection of soil and grab groundwater samples from these five areas for chemical analyses. The work plan proposed that at the plating shop, 10 soil borings be installed and sampled for chemical analyses from both the chromium and cyanide process areas. However, during the field work at the plating shop, the pump at the cyanide process line sump was inoperative. Approximately 6 inches of water and/or plating fluids were observed in the sump. The presence of the liquid in the sump prevented field sampling at the cyanide process sump area. Subsequently, the five proposed soil borings at the cyanide process sump area were not installed and sampled during this site investigation.

VOCs, SVOCs, cyanide, and metals were found in soil and groundwater samples collected from this site. Results of the additional investigation are summarized in the draft final DSR for background and tidal influence studies/additional work at Sites 4 and 5, August 1992 (PRC/JMM 1992b).

The objective of the current investigation performed under CTO No. 0252 is to complete the remaining site investigation at the cyanide process sump area of the plating shop in Site 5. This letter report summarizes results of this investigation, and serves as an addendum to the draft final DSR background and tidal influence studies/additional work at Sites 4 and 5 (PRC/JMM 1992b).

CURRENT INVESTIGATION

The current investigation was conducted in accordance with the March 13, 1992 work plan; no modifications were made during the investigation. The investigation included drilling five boreholes through the sub-floor at the cyanide process area. Four of the boreholes were drilled to a depth of approximately 5 feet. The remaining borehole was drilled to a depth of approximately 23 feet, and was located adjacent to an 18-foot sump used to drain the concrete sub-floor at the cyanide process side. Locations of these five borings are shown on Figure 3.

Thirteen soil samples (twelve soil samples and one duplicate) and six grab groundwater samples (five grab groundwater samples and one duplicate) were collected from the five borings for chemical analyses. A summary of the soil and groundwater samples and the laboratory analysis protocol are presented in Table 1.

GEOLOGY/HYDROGEOLOGY

Subsurface soil encountered during the current field investigation consists of fine- to medium-grained silty sand to sand, to a depth of approximately 22 feet. According to the boring log of boring B-05PS-08, the sand and silty sand was underlain by clay at approximately 22 feet in the deep boring. These units are consistent with geology observed at Site 5 during previous investigations. Groundwater was encountered at a depth of approximately 3.5 feet below ground surface (bgs) at all five boring locations. Copies of the boring logs are included in Attachment A of this report.

RESULTS OF CHEMICAL ANALYSES

As listed in Table 1, the soil samples were analyzed for metals, hexavalent chromium, VOCs, cyanide, percent moisture, pH, and total organic carbon (TOC). The grab groundwater samples were analyzed for metals, hexavalent chromium, VOC, total cyanide, and total dissolved solids (TDS). All groundwater samples were unfiltered. The chemical analyses were performed by a Navy CLEAN certified laboratory using Contract Laboratory Program (CLP) protocol.

The analytical data were reviewed by the PRC team using U.S. Environmental Protection Agency (EPA) national functional guidelines for organic data review (EPA 1991) and the functional guidelines for evaluating inorganic analyses (EPA 1988). A majority of the data were qualified as estimated (J) because the values reported are below the contract required quantitation limit (CRQL) but are considered usable. However, useable data are considered valid. Conclusions and recommendations, therefore, can be drawn from the data. Several metals, such as thallium, selenium, and arsenic, were qualified as estimates due to spike recoveries outside the control limits. The spike recoveries of these metals analyses outside the control limits is likely due to organic constituents in the soil samples. Both the organic and inorganic data for the soil and groundwater samples are found to be usable for the RI/FS evaluation.

Volatile Organic Compounds - Soil Samples

The results of VOC analyses of the soil samples are presented in Table 2 and on Figure 4. Only compounds that were detected in at least one of the samples are listed on the table and shown on Figure 4. Compounds that are not listed were not detected in any of the samples.

Carbon disulfide was detected in the 22-foot sample from boring B-05PS-08; the sample was from the bay mud at a concentration of 31 micrograms per kilogram ($\mu\text{g}/\text{kg}$). This compound is commonly found in organic-rich soils; the 22-foot sample also had the highest TOC value (4.9 mg/kg). 1,1-Dichloroethane (DCA) was detected in two samples, the 1.25-foot and 22-foot samples from boring B-05PS-08, at concentrations of 5 $\mu\text{g}/\text{kg}$ and 4,300 $\mu\text{g}/\text{kg}$, respectively. Trichloroethene (TCE) was detected in 1.25-foot samples from borings B-05PS-08 and B-05PS-09 at concentrations of 30 $\mu\text{g}/\text{kg}$ and 2 $\mu\text{g}/\text{kg}$, respectively. Chloroethane was only detected in the 17.5-foot sample from boring B-05PS-08, at a concentration of 31 $\mu\text{g}/\text{kg}$. Trichloroethane (TCA) was detected in nine of the soil samples (B-05PS-07 at 0.5 foot; B-05PS-08 at 1.25 feet, 2.5 feet, and 22 feet; B-05PS-DUP1 at 1.25 feet; B-05PS-09 at 1.25 feet and 2 feet; B-05PS-10 at 0.75 foot and 3 feet), at concentrations ranging from 3 $\mu\text{g}/\text{kg}$ to 1,100 $\mu\text{g}/\text{kg}$. The highest concentration was detected in the 1.25-foot sample from boring B-05PS-08; the duplicate sample was approximately an order of magnitude less (180 $\mu\text{g}/\text{kg}$).

Inorganic Constituents - Soil Samples

The results of inorganic analyses of soil samples collected from the Site 5 plating shop are presented in Table 3 and on Figure 5. All of the soil samples were analyzed for CLP metals, hexavalent chromium, cyanide, TOC, percent moisture, and pH.

The concentrations of metals in the soil samples from the Site 5 plating shop were compared to the upper limit of the 95%/95% statistical tolerance interval computed for the background soil samples as discussed in Section 2.6 of the CTO No. 0121 Mod 1 DSR (PRC/JMM 1992a). Samples with concentrations greater than the upper limit of the statistical tolerance interval may represent elevated concentration with respect to background. These metal constituents are as follows:

- Arsenic concentrations exceed the upper limit in the 22-foot samples from boring B-05PS-08.
- Cadmium concentrations exceed the upper limit in 11 of the samples. All samples collected from above the water table have a cadmium concentration that exceeds the limit. The highest cadmium concentration was detected in the 1.25-foot sample from boring B-05PS-09.

- Chromium concentrations exceed the upper limit in five samples. The highest concentration of chromium was detected in the 2-foot sample from B-05PS-09. Hexavalent chromium was detected in two soil samples. The highest concentration of hexavalent chromium was detected in the 0.75-foot sample from B-05PS-10.
- Cobalt concentrations exceed the upper limit in only one sample. The concentration of cobalt was detected in the 22-foot sample from B-05PS-08.
- Copper concentrations exceed the upper limit in six samples. The highest concentration of copper was detected in the 1.25-foot sample from B-05PS-08.
- Thallium concentrations exceed the upper limit in three samples. The concentration of thallium detected in all three samples is 0.6 mg/kg.
- Vanadium concentrations exceed the upper limit in only the 22-foot sample from boring B-05PS-08.

Cyanide was detected in 11 of the 13 samples at concentrations ranging from 0.36 milligrams per kilogram (mg/kg) to 27.2 mg/kg. TOC detected in the soil samples ranges from 0.2 to 4.9 mg/kg. Percent moisture ranges from 6 to 43 percent and pH ranges from 8.3 to 10.3. The significance of concentrations of these inorganic constituents found in the soil samples will be addressed in the risk assessment portion of the RI/FS evaluation.

Volatile Organic Compounds - Grab Groundwater Samples

Grab groundwater samples were collected from each of the five borings in the Site 5 plating shop. Additionally, a duplicate of sample B-05PS-08 was collected. The results of the organic analyses for groundwater samples are presented in Table 4 and on Figure 6. The table and the figure list only those compounds detected in at least one sample. Compounds that are not listed were not detected in any of the samples.

1,1-DCA and TCA were detected in groundwater samples from the Site 5 plating shop. 1,1-DCA was detected only in the duplicate sample from boring B-05PS-08 at a concentration of 35 micrograms per liter ($\mu\text{g/L}$). TCA was detected in all of the samples at concentrations ranging from 48 $\mu\text{g/L}$ to 8,800 $\mu\text{g/L}$. The lowest concentration of TCA was detected in the sample from B-05PS-09 and the highest concentration was detected in the sample from boring B-05PS-08.

Inorganic Constituents - Grab Groundwater Samples

The results for the inorganic analyses of the groundwater samples collected at the Site 5 plating shop are presented in Table 5 and on Figure 7. The groundwater samples were analyzed for TAL metals, cyanide, and TDS.

The concentration of metals detected in the groundwater beneath the Site 5 plating shop were compared to the upper limit of the 95%/95% statistical tolerance interval for background groundwater samples computed in Section 2.7 of the CTO No. 0121 Mod 1 DSR (PRC/JMM 1992b). Background concentrations were exceeded for aluminum, beryllium, cadmium, chromium, cobalt, copper, lead, mercury, nickel, vanadium, and zinc in all of the grab groundwater samples. Concentrations exceed the upper limit of the tolerance interval for barium in only one sample (B-05PS-08), manganese in two samples (B-05PS-08 and B-05PS-09), selenium in three samples (B-05PS-06, B-05PS-07, and B-05PS-10), and silver in four samples (B-05PS-08, B-05PS-DUP2, B-05PS-09, and B-05PS-10).

Cyanide was detected in all of the samples. The concentration ranged from 42.6 $\mu\text{g/L}$ in the sample from boring B-05PS-10 to 5,150 $\mu\text{g/L}$ in the sample from boring B-05PS-09.

In comparison to the State Water Resources Control Board's total dissolved solids (TDS) upper limit of 3,000 mg/L for potable water, the collected samples TDS concentration ranged from 132 mg/L in the sample from boring B-05PS-10 to 552 mg/L in the sample from boring B-05PS-06.

The significance of the metals and cyanide results will be addressed in the risk assessment of the RI/FS evaluation.

CONCLUSIONS

Moderate to high levels of solvents were detected in soils beneath the plating shop. Elevated levels ($> 1,000$ micrograms per kilogram [$\mu\text{g/kg}$]) of the VOC 1,1-dichloroethane (1,1-DCA) were detected at a depth of 22 feet bgs in boring B-05PS-08. However, the 4,300 $\mu\text{g/kg}$ of 1,1-DCA detected in soil at B-05PS-08 is below concentrations of total VOCs detected in samples collected from two locations outside of Building 5: 22,940 $\mu\text{g/kg}$ at B-05-03 on the south side of the building and 41,200

$\mu\text{g}/\text{kg}$ at B-05-11 on the east side of the building (PRC/Montgomery Watson 1993b). 1,1-DCA was not detected in soils at B-05-03 and B-05-11; however, this may be attributed to the elevated detection limits ($670 \mu\text{g}/\text{kg}$ and $1,500 \mu\text{g}/\text{kg}$, respectively) caused by the high concentrations of other constituents in the samples.

The metals arsenic, cadmium, chromium, cobalt, copper, thallium, and vanadium were detected in soils beneath the plating shop at levels in excess of the 95%/95% statistical tolerance interval. Hexavalent chromium was detected in two soil samples. These levels indicate that activities in the plating shop may have impacted soil beneath the shop.

Groundwater beneath the plating shop contained moderate to relatively high levels of common industrial solvents and their transformation products. 1,1,1-Trichloroethane (TCA) at $8,800 \mu\text{g}/\text{L}$ was detected in the grab groundwater sample from B-05PS-08. By comparison, an outside monitoring well, (M05-04, east of Building 5) showed only $36 \mu\text{g}/\text{L}$ of TCA but had concentrations as high as $920 \mu\text{g}/\text{L}$ of five other VOCs not detected in the samples collected beneath the plating shop (PRC/Montgomery Watson 1993b). These compounds were detected at higher concentrations in groundwater samples collected in the previous plating shop investigation (PRC/JMM 1992b). In addition, cyanide was detected in all groundwater samples collected from beneath the plating shop during the current investigation.

Aluminum, beryllium, cadmium, chromium, cobalt, copper, lead, mercury, nickel, vanadium, and zinc were identified at levels in excess of background concentrations in all grab groundwater samples collected beneath the plating shop. Barium, manganese, selenium, and silver were present in excess of background concentrations in one or more samples. The presence of metals and cyanide in groundwater beneath the plating shop is most likely related to past plating shop activities.

The significance of the presence of metals, cyanide, and VOCs in soil and groundwater underneath the plating shop will be addressed in the risk assessment task of the RI/FS evaluation. Based on the data collected during this investigation and the CTO No. 0121 Mod. 01 investigation at the plating shop, sufficient information has been collected at the plating shop for the RI/FS evaluation.

REFERENCES

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- Ecology and Environment, Inc. (E&E). 1983. "Initial Assessment Study Naval Air Station," Alameda, California. Prepared for NACIP and NEESA. April.
- EPA. 1988. "Laboratory Data Validation, Functional Guidelines for Evaluating Inorganic Analyses," prepared for the Hazardous Site Evaluation Division of the EPA. July 1.
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- PRC/JMM. 1992b. NAS Alameda, Alameda, California, Data Summary Report Background and Tidal Influence Studies and Additional Work at Sites 4 and 5 Draft Final. Prepared for NAVY-WESTDIV. August 4.
- PRC/Montgomery Watson (Montgomery). 1993a. NAS Alameda, Alameda, California, SWAT Report RI/FS Phases 5 and 6 Final. Prepared for Navy-WESTDIV. April.
- PRC/Montgomery. 1993b. NAS Alameda, Alameda, California, Data Summary Report RI/FS Phases 1 and 2A Final. Prepared for Navy-WESTDIV. August.

TABLE 1

SITE 5 - PLATING SHOP
 SUMMARY OF LABORATORY ANALYSES PERFORMED ON
 SOIL AND GROUNDWATER SAMPLES
 FOR SEPTEMBER 21 AND 22, 1993 INVESTIGATION

Boring	Depth (ft)	Matrix	CLP Metals	Hex Chrom	VOC	Total CN	% Moisture	pH	TOC	TDS
B-05PS-06	0.75-1.25	Soil	•	•	•	•	•	•	•	
B-05PS-06	3.0-3.5	Soil	•	•	•	•	•	•	•	
B-05PS-07	0.5-1.0	Soil	•	•	•	•	•	•	•	
B-05PS-07	2.5-3.0	Soil	•	•	•	•	•	•	•	
B-05PS-08	1.25-1.75	Soil	•	•	•	•	•	•	•	
B-05PS-DUP01	1.25-1.75	Soil	•	•	•	•	•	•	•	
B-05PS-08	2.5-3.0	Soil	•	•	•	•	•	•	•	
B-05PS-08	17.5-18.0	Soil	•	•	•	•	•	•	•	
B-05PS-08	22.0-22.5	Soil	•	•	•	•	•	•	•	
B-05PS-09	1.25-1.75	Soil	•	•	•	•	•	•	•	
B-05PS-09	2.0-2.5	Soil	•	•	•	•	•	•	•	
B-05PS-10	0.75-1.25	Soil	•	•	•	•	•	•	•	
B-05PS-10	3.0-3.5	Soil	•	•	•	•	•	•	•	
B-05PS-06	NA	Groundwater	•	•	•	•				•
B-05PS-07	NA	Groundwater	•	•	•	•				•
B-05PS-08	NA	Groundwater	•	•	•	•				•
B-05PS-DUP02	NA	Groundwater	•	•	•	•				•
B-05PS-09	NA	Groundwater	•	•	•	•				•
B-05PS-10	NA	Groundwater	•	•	•	•				•

Notes:

- CLP - contract laboratory program
- Hex Chrom - hexavalent chromium
- VOC - volatile organic compounds
- Total CN - total cyanide
- % Moisture - percent moisture
- TOC - total organic carbon
- TDS - total dissolved solids

TABLE 2
NAS ALAMEDA - SITE 5 PLATING SHOP
SOIL SAMPLE ANALYTICAL RESULTS - ORGANIC COMPOUNDS

Sample Number Depth (feet) Date Sampled	B-05PS-06 0.75 9/21/93			B-05PS-06 3.00 9/21/93			B-05PS-07 0.50 9/21/93			B-05PS-07 2.50 9/21/93		
	Results	DQF	Rtnl									
PARAMETER REPORTED												
Volatile Organic Compounds (µg/kg)												
Carbon Disulfide	53	U		11	U		60	U		12	U	
1,1-Dichloroethane	53	U		11	U		60	U		12	U	
Trichloroethene (TCE)	53	U		11	U		60	U		12	U	
Chloroethane	53	U		11	U		60	U		12	U	
1,1,1-Trichloroethane (TCA)	53	U		11	U		73			12	U	

Notes:

DQF = Data qualification flags, defined below
 U = Not detected, "Results" shows detection limit
 UJ = Qualified, estimated not detected
 J = Qualified, estimated value
 R = Qualified, not usable

Rtnl = Rationale for data qualification, defined below
 a = method blank e = laboratory control sample
 b = surrogate spike f = replicate
 c = matrix spike g = post-digestion spike recovery
 d = holding time h = serial dilution
 i = below contract required quantitation limit (CRQL)

TABLE 2
NAS ALAMEDA - SITE 5 PLATING SHOP
SOIL SAMPLE ANALYTICAL RESULTS - ORGANIC COMPOUNDS

Sample Number Depth (feet) Date Sampled	B-05PS-08 1.25 9/22/93			DUP of 08-1.25 B-05PS-DUP1 1.25 9/22/93			B-05PS-08 2.50 9/22/93			B-05PS-08 17.50 9/22/93		
	Results	DQF	Rtnl	Results	DQF	Rtnl	Results	DQF	Rtnl	Results	DQF	Rtnl
PARAMETER REPORTED												
Volatile Organic Compounds (µg/kg)												
Carbon Disulfide	11	U		23	U		56	U		13	U	
1,1-Dichloroethane	5	J	i	23	U		56	U		13	U	
Trichloroethene (TCE)	30			23	U		56	U		13	U	
Chloroethane	11	U		23	U		56	U		31		
1,1,1-Trichloroethane	1100	J	i	180			360			13	U	

Notes:

DQF = Data qualification flags, defined below
 U = Not detected, "Results" shows detection limit
 UJ = Qualified, estimated not detected
 J = Qualified, estimated value
 R = Qualified, not usable

Rtnl = Rationale for data qualification, defined below
 a = method blank e = laboratory control sample
 b = surrogate spike f = replicate
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 d = holding time h = serial dilution
 i = below contract required quantitation limit (CRQL)

TABLE 2
NAS ALAMEDA - SITE 5 PLATING SHOP
SOIL SAMPLE ANALYTICAL RESULTS - ORGANIC COMPOUNDS

Sample Number	B-05PS-08			B-05PS-09			B-05PS-09			B-05PS-10			B-05PS-10		
	Depth (feet)			Depth (feet)			Depth (feet)			Depth (feet)			Depth (feet)		
Date Sampled	22.00			1.25			2.00			0.75			3.00		
PARAMETER REPORTED	9/22/93			9/22/93			9/22/93			9/22/93			9/22/93		
	Results	DQF	Rtnl												
Volatile Organic Compounds (µg/kg)															
Carbon Disulfide	31			11	U		12	U		11	U		12	U	
1,1-Dichloroethane	4300			11	U		12	U		11	U		12	U	
Trichloroethene (TCE)	18	U		2	J	i	12	U		11	U		12	U	
Chloroethane	18	U		11	U		12	U		11	U		12	U	
1,1,1-Trichloroethane	5	J	i	190			16			84			3	J	i

Notes:

DQF = Data qualification flags, defined below
U = Not detected, "Results" shows detection limit
UJ = Qualified, estimated not detected
J = Qualified, estimated value
R = Qualified, not usable

Rtnl = Rationale for data qualification, defined below
a = method blank e = laboratory control sample
b = surrogate spike f = replicate
c = matrix spike g = post-digestion spike recovery
d = holding time h = serial dilution
i = below contract required quantitation limit (CRQL)

TABLE 3
NAS ALAMEDA - SITE 5 PLATING SHOP
SOIL SAMPLE ANALYTICAL RESULTS - INORGANIC CONSTITUENTS

Sample Number Depth (feet) Date Sampled	95%/95% Statistical Tolerance Level	B-05PS-06 0.75 09/21/93			B-05PS-06 3.00 09/21/93			B-05PS-07 0.50 09/21/93			B-05PS-07 2.50 09/21/93			B-05PS-08 1.25 09/22/93		
		Results	DQF	Rtnl												
Parameter Reported	Upper limit															
Metals (mg/kg)																
Aluminum	18925	4720			5020			2950			2650			2470		
Antimony	5.6	3	UJ	g	3	UJ	g	4	UJ	g	4	UJ	g	4	UJ	g
Arsenic	4.8	1.6	J	i	1.6	J	i	1.5	J	g,i	1.5	J	g,i	2.5		
Barium	110.5	33.7	J	i	24.8	J	i	35.2	J	i	25.4	J	i	15.9	J	i
Beryllium	0.873	0.12	J	i	0.11	J	i	0.1	J	i	0.1	U		0.1	U	
Cadmium	0.761	44.4			33.2			1.9			5.1			95.2		
Calcium	6744	2730.0			2420.0			1540.0			1230.0			2480.0		
Chromium, Total	64.35	23.8			21.6			22.5			22.0			186.0		
Chromium, Hexavalent		0.110	U		0.110	U		0.110	U		0.099	U		0.056	U	
Cobalt	10.870	6.8	J	i	5.7	J	i	4.4	J	i	4.4	J	i	4.9	J	i
Copper	33.01	32.6			22.1			24.7			18.1			78.6		
Iron	28017	10500.0			11800.0			6610.0			5870.0			5790.0		
Lead	61.15	10.2			4.7			2.1			2.0			17.5		
Magnesium	8614	3140.0			3500.0			1880.0			1600.0			1710.0		
Manganese	390	172			165			102			71			67		
Mercury	0.498	0.05	J	i	0.05	U		0.06	U		0.06			0.06	U	
Nickel	57.6	29.7			21.1			23.2			19.0			25.0		
Potassium	2386	799.0	J	i	449.0	J	i	546.0	J	i	469.0	J	i	540.0	J	i
Selenium	1.07	0.43	UJ	g	0.44	UJ	g	0.48	UJ	g	0.47	UJ	g	0.45	UJ	g
Silver	55.62	0.28	U		0.28	U		0.31	U		0.31	UJ	g	0.29	UJ	g
Sodium	1233	152.0	J	i	299.0	J	i	142.0	J	i	102.0	J	i	366.0	J	i
Thallium	0.25	0.58	U		0.59	U		0.65	UJ	g	0.64	UJ	g	0.61	UJ	g
Vanadium	59.7	20.8			23.3			14.6			13.4			12.1		
Zinc	257	27.3			28.1			19.4			18.8			31.1		
Total Organic Carbon (TOC) (mg/kg)		0.9			0.7			0.7			0.5			0.4		
Percent Moisture		6.0			8.0			16.0			15.0			11.0		
pH		9.2			9.4			9.0			9.2			9.2		
Cyanide (mg/kg)		0.78	J	i	5.2			0.73	J	i	0.36	J	i	23.7		

Notes:

DQF = Data qualification flags, defined below
U = Not detected, "Results" shows detection limit
UJ = Qualified, estimated not detected
J = Qualified, estimated value
R = Qualified, not usable

Rtnl = Rationale for data qualification, defined below
a = method blank
b = surrogate spike
c = matrix spike
d = holding time
e = laboratory control sample
f = replicate
g = spike recovery
h = serial dilution
i = below contract required quantitation limit (CRQL)

TABLE
NAS ALAMEDA - SITE 5 PLATING SHOP
SOIL SAMPLE ANALYTICAL RESULTS - INORGANIC CONSTITUENTS

Sample Number Depth (feet) Date Sampled Parameter Reported	DUP of 08-1.25 B-05PS-DUP1			B-05PS-08 2.50 09/22/93			B-05PS-08 17.50 09/22/93			B-05PS-08 22.00 09/22/93			B-05PS-09 1.25 09/22/93			
	95%/95% Statistical Tolerance Level	1.25 09/22/93			2.50 09/22/93			17.50 09/22/93			22.00 09/22/93			1.25 09/22/93		
		Upper limit	Results	DQF	Rtnl	Results	DQF	Rtnl	Results	DQF	Rtnl	Results	DQF	Rtnl	Results	DQF
Metals (mg/kg)																
Aluminum	18925	1880			3710			2790			17300			3410		
Antimony	5.6	3.5	UJ	g	4	UJ	g	3.9	UJ	g	5.4	UJ	g	4.4	J	g,i
Arsenic	4.8	2.2	J	i	1.4	J	i	2.5			5.8			3.3		
Barium	110.5	12.1	J	i	22.9	J	i	12.3	J	i	36.1	J	i	21.6	J	i
Beryllium	0.873	0.05	UJ	g	0.08	J	i	0.05	U		0.49	J	i	0.06	J	i
Cadmium	0.761	80.3			235.0			0.4	U		0.56	U		452		
Calcium	6744	2180			1390.0			1160	J	i	3490			3430		
Chromium, Total	64.35	48.6			104.0			17.1			64.4			91.9		
Chromium, Hexavalent		0.068	U		0.056	U		0.063	U		0.088	U		0.057	U	
Cobalt	10.870	4.4	J	i	5.9	J	i	4.7	J	i	17.7			5.7	J	i
Copper	33.01	58			69.4			14.8			44.4			36.1		
Iron	28017	4390			8690.0			6580			35400			7880		
Lead	61.15	4.1			17.1			2			16			20.3		
Magnesium	8614	1200			2730.0			1980			13200			2330		
Manganese	390	50.3			124			63.4			360			107		
Mercury	0.498	0.06	U		0.11			0.06	U		0.33			0.06	U	
Nickel	57.6	19			25.8			16.1			77.7			33.2		
Potassium	2386	546	J	i	641.0	J	i	740	J	i	3640			574	J	i
Selenium	1.07	0.45	UJ	g	0.45	UJ	g	0.50	UJ	g	0.70	UJ	g	0.46	UJ	g
Silver	55.62	0.29	U		0.29	UJ	g	0.33	U		0.46	U		0.30	U	
Sodium	1233	485	J	i	373.0	J	i	845	J	i	9430			407	J	i
Thallium	0.25	0.61	U		0.61	U		0.68	U		0.95	U		0.62	UJ	g
Vanadium	59.7	8.3	J	i	17.4			13.1			62.3			16.2		
Zinc	257	27.9			34.2			20.9			89.3			49.2		
Total Organic Carbon (TOC) (mg/kg)		0.4			1.6			0.9			4.9			1.4		
Percent Moisture		12			11.0			21			43			12		
pH		10			10.2			9.1			8.3			9.6		
Cyanide (mg/kg)		27.2			5.2			<0.08	U		<0.11	U		7.4		

Notes:

DQF = Data qualification flags, defined below
U = Not detected, "Results" shows detection limit
UJ = Qualified, estimated not detected
J = Qualified, estimated value
R = Qualified, not usable

Rtnl = Rationale for data qualification, defined below
a = method blank
b = surrogate spike
c = matrix spike
d = holding time
e = laboratory control sample
f = replicate
g = spike recovery
h = serial dilution
i = below contract required quantitation limit (CRQL)

TABLE 3
NAS ALAMEDA - SITE 5 PLATING SHOP
SOIL SAMPLE ANALYTICAL RESULTS - INORGANIC CONSTITUENTS

Sample Number Depth (feet) Date Sampled Parameter Reported	95%/95% Statistical Tolerance Level Upper limit	B-05PS-09 2.00 09/22/93			B-05PS-10 0.75 09/22/93			B-05PS-10 3.00 09/22/93		
		Results	DQF	Rtnl	Results	DQF	Rtnl	Results	DQF	Rtnl
Metals (mg/kg)										
Aluminum	18925	3760			4910			3150		
Antimony	5.6	3.6	UJ	g	3.4	UJ	g	3.7	UJ	g
Arsenic	4.8	1.2	J	g, i	1.6	J	i	2.4		
Barium	110.5	21.4	J	i	26.4	J	i	30.1	J	i
Beryllium	0.873	0.11	J	i	0.13	J	i	0.07	J	i
Cadmium	0.761	177			4.5			38.6		
Calcium	6744	1920			4840			1390		
Chromium, Total	64.35	244			37.2			33		
Chromium, Hexavalent		0.230			1.400			0.059	U	
Cobalt	10.870	5.1	J	i	8.8	J	i	4.5	J	i
Copper	33.01	133			23.5			19		
Iron	28017	8700			11900			6930		
Lead	61.15	11.4	J	g	15.0			2.5		
Magnesium	8614	2540			3680.0			1970		
Manganese	390	106			184			83.7		
Mercury	0.498	0.06	U		0.09	J	i	0.06	U	
Nickel	57.6	41.2			17.7			24.8		
Potassium	2386	640	J	i	610	J	i	535	J	i
Selenium	1.07	0.45	UJ	g	0.45	UJ	g	0.48	UJ	g
Silver	55.62	0.31	J	i	0.32	J	i	0.31	U	
Sodium	1233	359	J	i	714	J	i	83.1	J	i
Thallium	0.25	0.63	U		0.59	U		0.64	U	
Vanadium	59.7	17.4			26.2			15.3		
Zinc	257	60.1			86.5			21.8		
Total Organic Carbon (TOC) (mg/kg)		0.7			0.6			0.2		
Percent Moisture		14			9			16		
pH		9.6			10.3			9		
Cyanide (mg/kg)		0.73	J	i	0.47	J	i	1.2		

Notes:

DQF = Data qualification flags, defined below
U = Not detected, "Results" shows detection limit
UJ = Qualified, estimated not detected
J = Qualified, estimated value
R = Qualified, not usable

Rtnl = Rationale for data qualification, defined below
a = method blank
b = surrogate spike
c = matrix spike
d = holding time
e = laboratory control sample
f = replicate
g = spike recovery
h = serial dilution
i = below contract required quantitation limit (CRQL)

TABLE 4
NAS ALAMEDA - SITE 5 PLATING SHOP
GRAB GROUNDWATER ANALYTICAL RESULTS - ORGANIC COMPOUNDS

Sample Number Date Sampled	B-05PS-06 9/22/93			B-05PS-07 9/22/93			B-05PS-08 9/22/93			DUP of 08 B-05PS-DUP2 9/22/93		
	Results	DQF	Rtnl	Results	DQF	Rtnl	Results	DQF	Rtnl	Results	DQF	Rtnl
Volatile Organic Compounds (µg/L)												
1,1-Dichloroethane	100	U		50	U		1000	U		35	J	i
1,1,1-Trichloroethane	1000			990			8800			1300		

Notes:

DQF = Data qualification flags, defined below
 U = Not detected, "Results" shows detection limit
 UJ = Qualified, estimated not detected
 J = Qualified, estimated value
 R = Qualified, not usable

Rtnl = Rationale for data qualification, defined below
 a = method blank e = laboratory control sample
 b = surrogate spike f = replicate
 c = matrix spike g = spike recovery
 d = holding time h = serial dilution
 i = below contract required quantitation limit (CRQL)

TABLE 5
NAS ALAMEDA - SITE 5 PLATING SHOP
GRAB GROUNDWATER ANALYTICAL RESULTS - INORGANIC CONSTITUENTS

Sample Number Date Sampled PARAMETER REPORTED	95%/95% Statistical Tolerance Level Upper limit	B-05PS-06 09/22/93			B-05PS-07 09/22/93			B-05PS-08 09/22/93			DUP of 08 B-05PS-DUP2 09/22/93			B-05PS-09 09/22/93			B-05PS-10 09/22/93		
		Results	DQF	Rtnl	Results	DQF	Rtnl	Results	DQF	Rtnl	Results	DQF	Rtnl	Results	DQF	Rtnl	Results	DQF	Rtnl
Metals (µg/L)																			
Aluminum	152.1	186000			274000			664000			192000			231000			201000		
Antimony	84.5	42.2	J	i	15.4	UJ	g	77	UJ	g	15.4	UJ	g	15.5	J	g,i	38.4	J	g,i
Arsenic	36.3	7.4	J	i	5.1	J	g,i	25	UJ	g	12	J	g	11.9	J	g	12.7	J	g
Barium	2105	1630			1870			5410			1430			1190			1460		
Beryllium	1.3	3.8	J	i	5.3			16.5	J	i	3.7	J	i	4	J	i	3.6	J	i
Cadmium	2.0	697			791			130000			34000			18100			1280		
Calcium	336033	56200			74200			329000			63900			126000			89200		
Chromium, Total	3.2	2240			4430			35000			10500			18000			11700		
Chromium, Hexavalent		14.3	U		10	U		10	U		10	U		10	U		10	U	
Cobalt	8.6	146			198			432			115			197			186		
Copper	27.7	675			430			248			346			3250			580		
Iron	9211	310000			444000			1210000			292000			404000			318000	J	f
Lead	1.0	328			231			1080			124			841			191		
Magnesium	1052432	73100			10200			351000			77700			108000			87300		
Manganese	5239	3060			3730			19600			4460			5320			4450		
Mercury	0.1	2.5			4.5			13.1			9.2			8.1			4.3		
Nickel	6.6	1980			1830			2180			803			1950			2780		
Potassium	308767	22000			29500			68500			26200	J	k	20200	J	k	19700	J	k
Selenium	1.0	22.3	J	g,i	25.7	J	g,i	20	UJ	g	20	UJ	g	2	UJ	g	26.3	J	g,i
Silver	2.4	1.3	UJ	g	1.3	UJ	g	64.7			34.6			220			95.3		
Sodium	2373034	45800			41400			73900			34000			32300			33700		
Thallium	0.9	2.7	UJ	g	27	U		27	UJ	g	2.7	UJ	g	27	UJ	g	2.7	UJ	g
Vanadium	70.7	572			803			1790			621			810			712		
Zinc	25.7	868			1040			55400			15000			1780			709		
Cyanide (µg/L)		111			328			3610			4900			5150			42.6		
Total Dissolved Solids (mg/L)		552			214			200			163			158			132		

Notes:

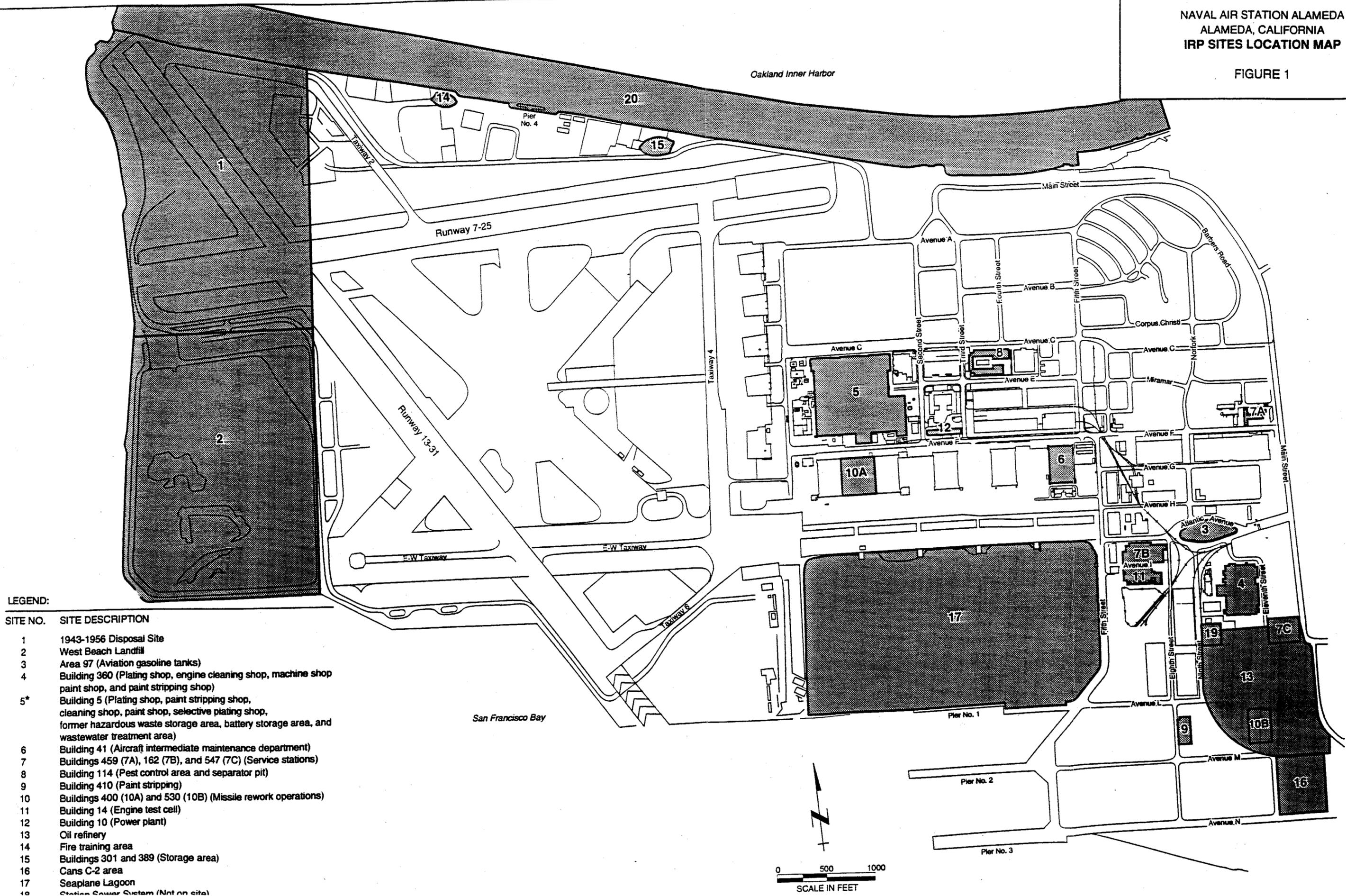
DQF = Data qualification flags, defined below
U = Not detected, "Results" shows detection limit
UJ = Qualified, estimated not detected
J = Qualified, estimated value
R = Qualified, not usable

Rtnl = Rationale for data qualification, defined below
a = method blank
b = surrogate spike
c = matrix spike
d = holding time
e = laboratory control sample
f = replicate
g = spike recovery
h = serial dilution
i = below contract required quantitation limit (CRQL)
k = value exceeds calibration range

NAVAL AIR STATION ALAMEDA
ALAMEDA, CALIFORNIA
IRP SITES LOCATION MAP

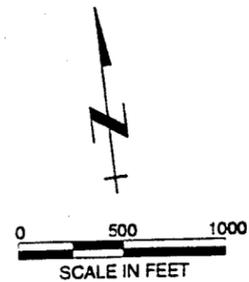
FIGURE 1

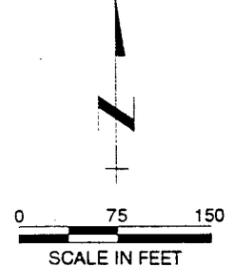
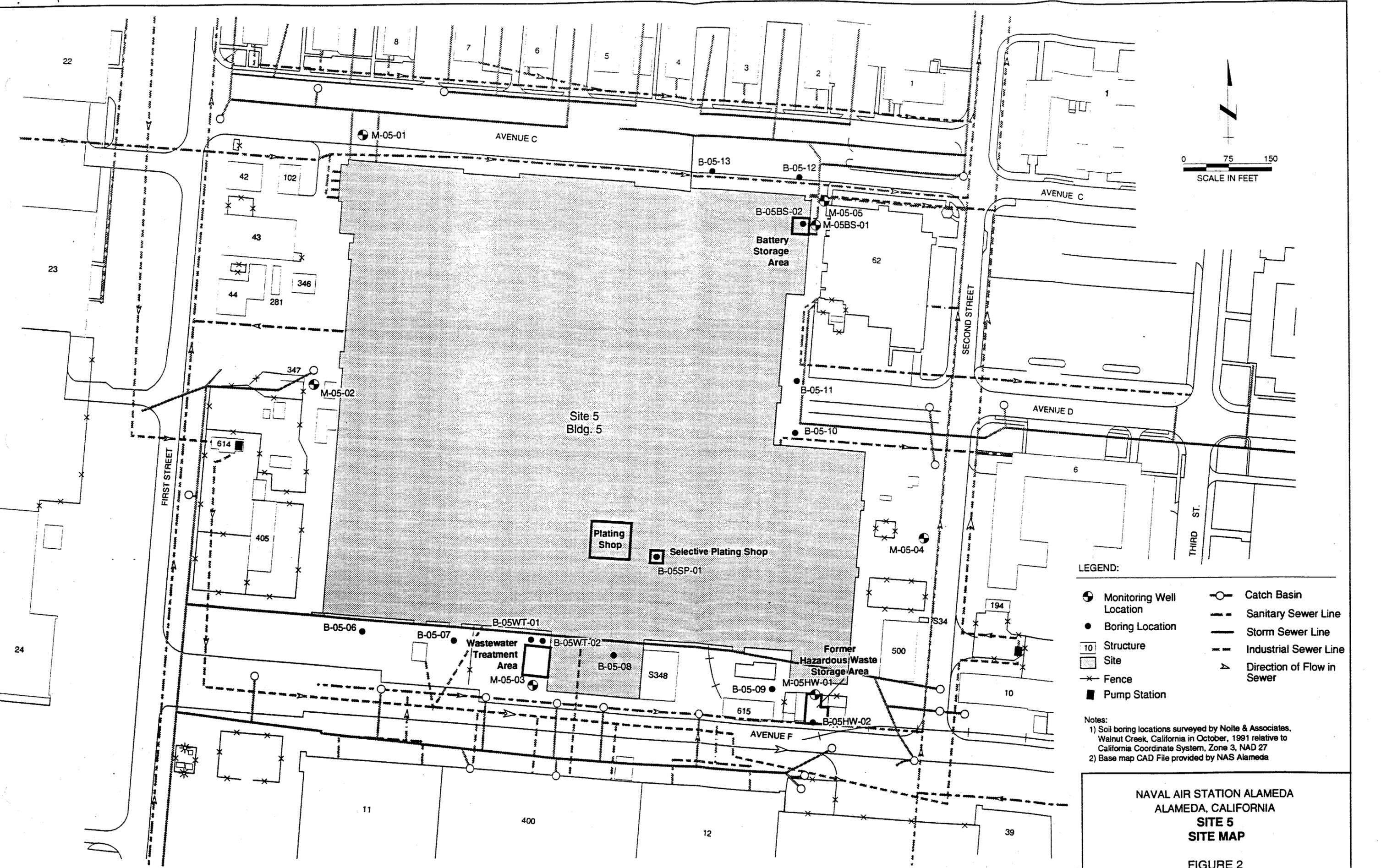
252.9/93.AL



LEGEND:

SITE NO.	SITE DESCRIPTION
1	1943-1956 Disposal Site
2	West Beach Landfill
3	Area 97 (Aviation gasoline tanks)
4	Building 360 (Plating shop, engine cleaning shop, machine shop paint shop, and paint stripping shop)
5*	Building 5 (Plating shop, paint stripping shop, cleaning shop, paint shop, selective plating shop, former hazardous waste storage area, battery storage area, and wastewater treatment area)
6	Building 41 (Aircraft intermediate maintenance department)
7	Buildings 459 (7A), 162 (7B), and 547 (7C) (Service stations)
8	Building 114 (Pest control area and separator pit)
9	Building 410 (Paint stripping)
10	Buildings 400 (10A) and 530 (10B) (Missile rework operations)
11	Building 14 (Engine test cell)
12	Building 10 (Power plant)
13	Oil refinery
14	Fire training area
15	Buildings 301 and 389 (Storage area)
16	Cans C-2 area
17	Seaplane Lagoon
19	Station Sewer System (Not on site)



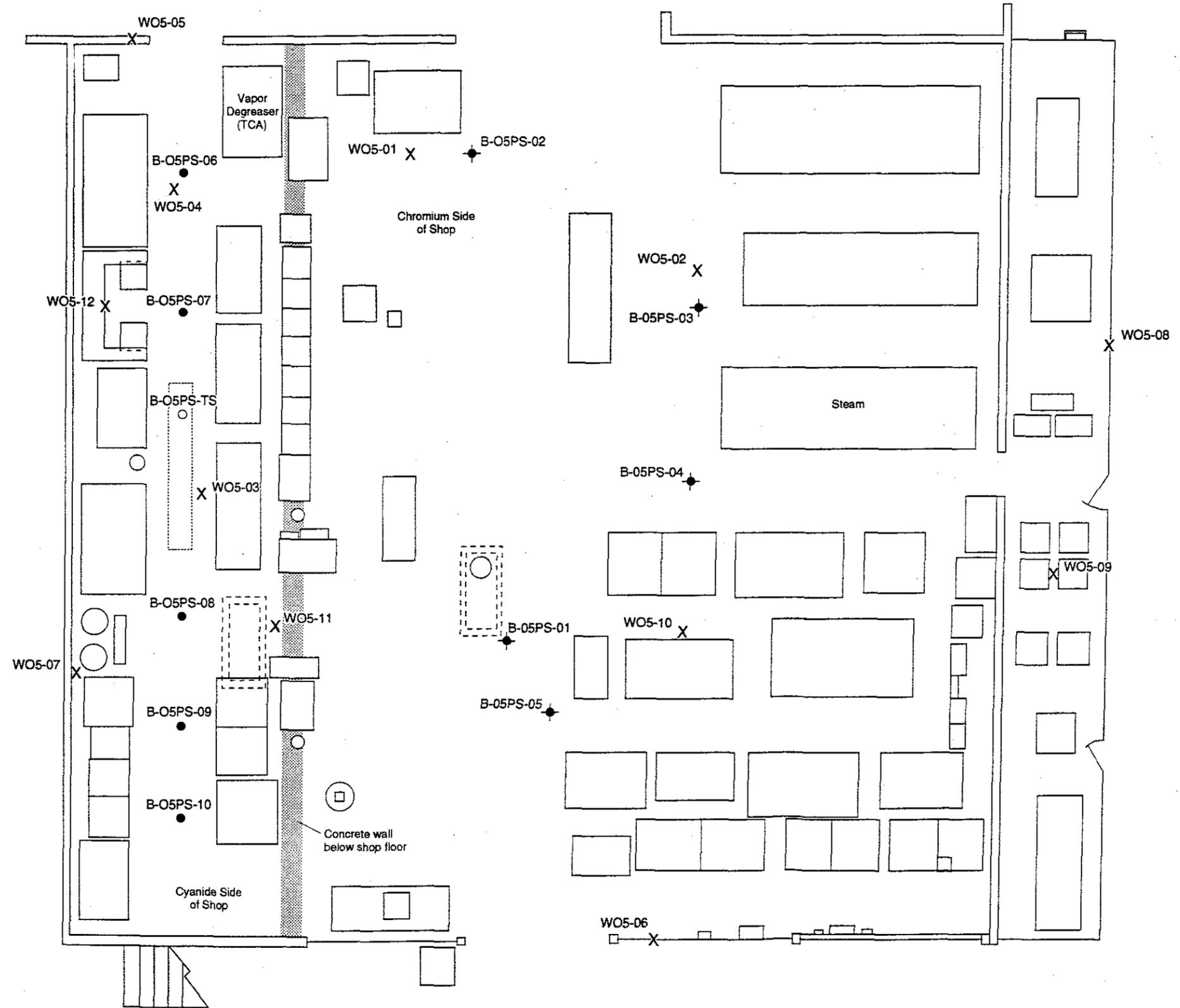


- LEGEND:**
- Monitoring Well Location
 - Boring Location
 - 10 Structure
 - Site
 - ✕ Fence
 - Pump Station
 - Catch Basin
 - - - Sanitary Sewer Line
 - Storm Sewer Line
 - - - Industrial Sewer Line
 - Direction of Flow in Sewer

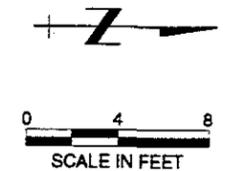
Notes:
 1) Soil boring locations surveyed by Nolte & Associates, Walnut Creek, California in October, 1991 relative to California Coordinate System, Zone 3, NAD 27
 2) Base map CAD File provided by NAS Alameda

**NAVAL AIR STATION ALAMEDA
 ALAMEDA, CALIFORNIA
 SITE 5
 SITE MAP
 FIGURE 2**

06/94.AL

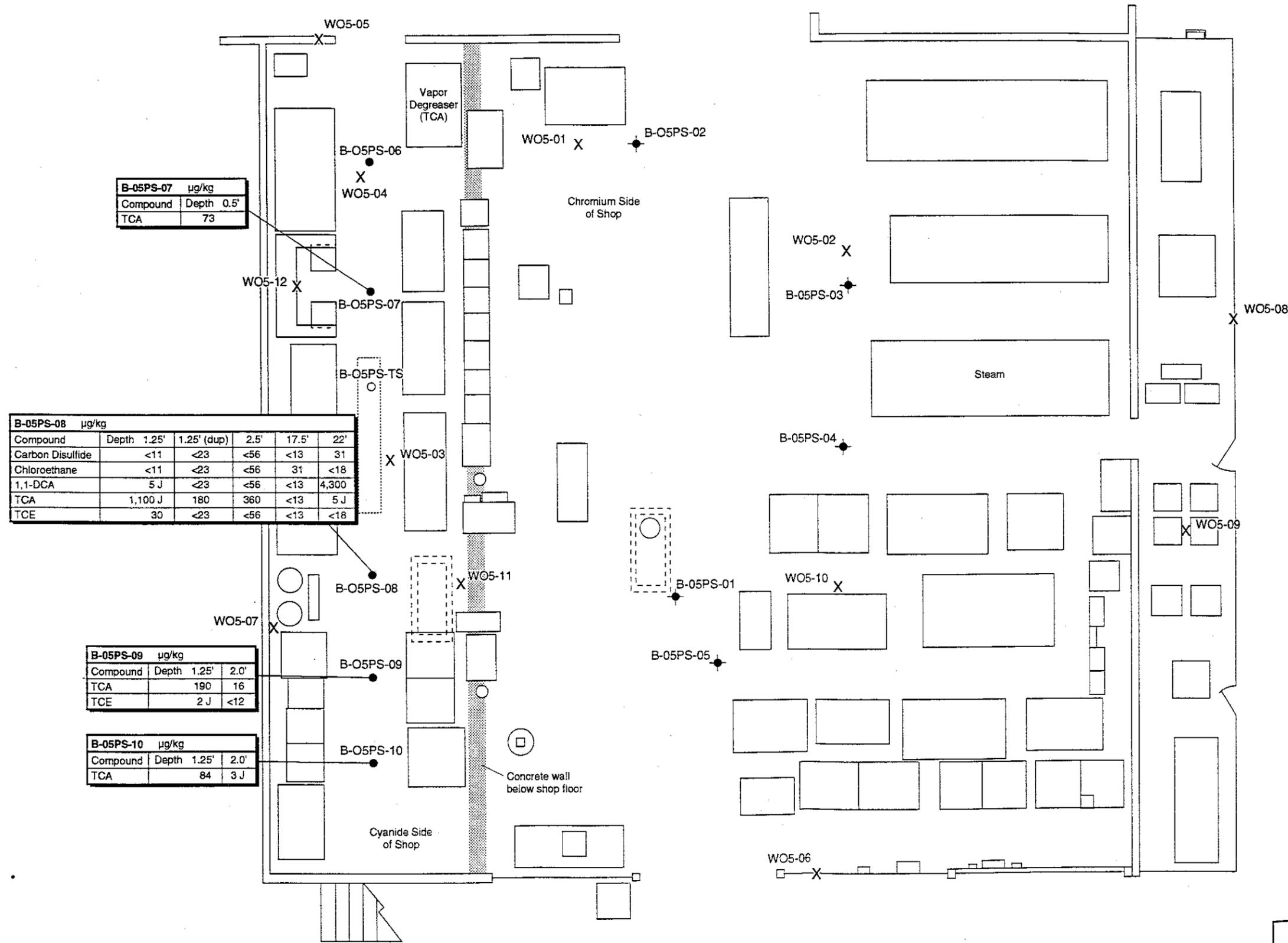


- LEGEND**
- B-05PS-06 ● Soil Boring Location This Investigation
 - B-05PS-TS ○ Trench Sample Location
 - B-05PS-01 ◆ Soil Boring Location Previous Investigation
 - WO5-01 X Wipe or Scrape Sample Location Previous Investigation
 - ⎓ Eductor Sump Location
 - ▭ Trench in Sub-Floor



NAVAL AIR STATION ALAMEDA
 ALAMEDA, CALIFORNIA
 SITE 5 PLATING SHOP
 SAMPLING LOCATIONS FOR THE
 SEPTEMBER 21 AND 22, 1993 INVESTIGATION

FIGURE 3



LEGEND

- B-05PS-06 ● Soil Boring Location This Investigation
- B-05PS-TS ○ Trench Sample Location
- B-05PS-01 ◆ Soil Boring Location Previous Investigation
- WO5-01 X Wipe or Scrape Sample Location Previous Investigation
- ⊠ Eductor Sump Location
- ⊞ Trench in Sub-Floor
- 1,1-DCA 1,1-Dichloroethane
- TCA 1,1,1-Trichloroethane
- TCE Trichloroethene
- J Qualified, estimated value



NAVAL AIR STATION ALAMEDA
ALAMEDA, CALIFORNIA
SITE 5 PLATING SHOP
ANALYTICAL RESULTS FOR
ORGANIC COMPOUNDS IN SOIL FOR
THE SEPTEMBER 21 AND 22, 1993 INVESTIGATION

FIGURE 4

B-05PS-06		
Depth (feet)	Cyanide (mg/kg)	pH
0.75	0.78 J	9.2
3.0	5.2	9.4

B-05PS-07		
Depth (feet)	Cyanide (mg/kg)	pH
0.5	0.73 J	9.0
2.5	0.36 J	9.2

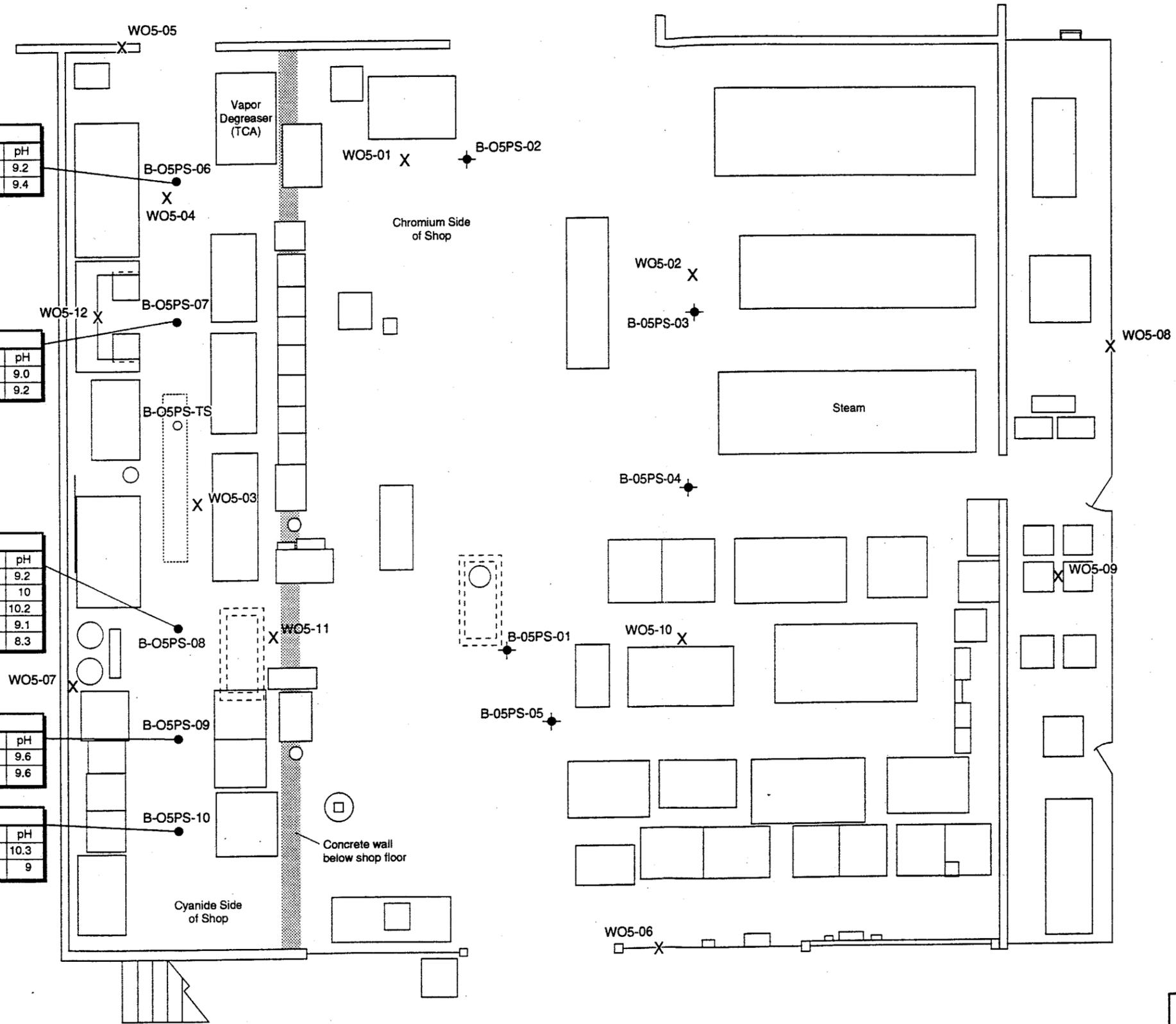
B-05PS-08		
Depth (feet)	Cyanide (mg/kg)	pH
1.25	23.7	9.2
1.25 (dup)	27.2	10
2.5	5.2	10.2
17.5	<0.8	9.1
22.0	<0.11	8.3

B-05PS-09		
Depth (feet)	Cyanide (mg/kg)	pH
1.25	7.4	9.6
2.00	0.73 J	9.6

B-05PS-10		
Depth (feet)	Cyanide (mg/kg)	pH
0.75	0.47 J	10.3
3.0	1.2	9

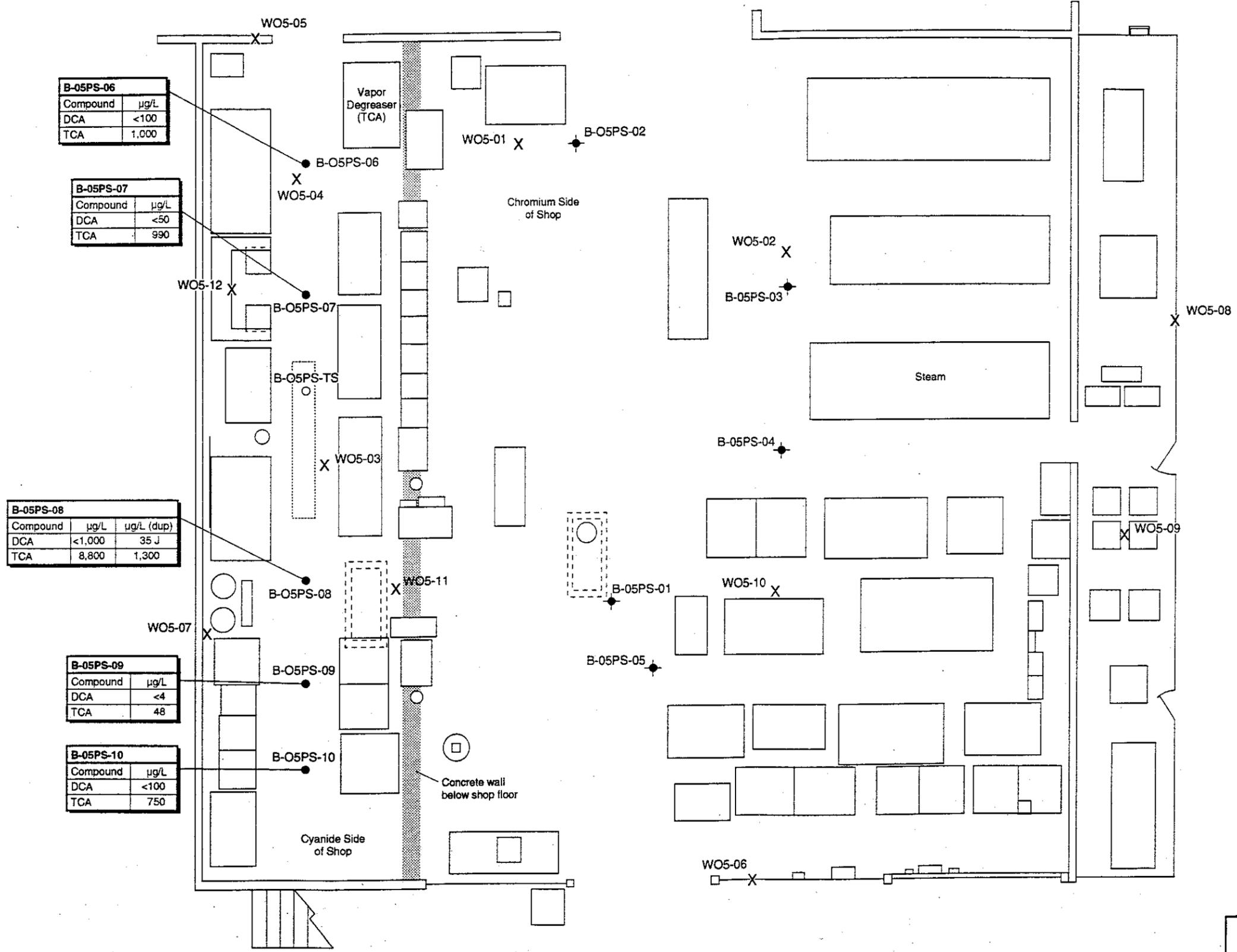
LEGEND

- B-05PS-06 ● Soil Boring Location This Investigation
- B-05PS-TS ○ Trench Sample Location
- B-05PS-01 ◆ Soil Boring Location Previous Investigation
- WO5-01 X Wipe or Scrape Sample Location Previous Investigation
- ⎓ Eductor Sump Location
- ⎓ Trench in Sub-Floor
- J Qualified, estimated value



NAVAL AIR STATION ALAMEDA
 ALAMEDA, CALIFORNIA
SITE 5 PLATING SHOP
 ANALYTICAL RESULTS FOR
 INORGANIC CONSTITUENTS IN SOIL FOR
 THE SEPTEMBER 21 AND 22, 1993 INVESTIGATION

FIGURE 5



B-05PS-06	
Compound	µg/L
DCA	<100
TCA	1,000

B-05PS-07	
Compound	µg/L
DCA	<50
TCA	990

B-05PS-08		
Compound	µg/L	µg/L (dup)
DCA	<1,000	35 J
TCA	8,800	1,300

B-05PS-09	
Compound	µg/L
DCA	<4
TCA	48

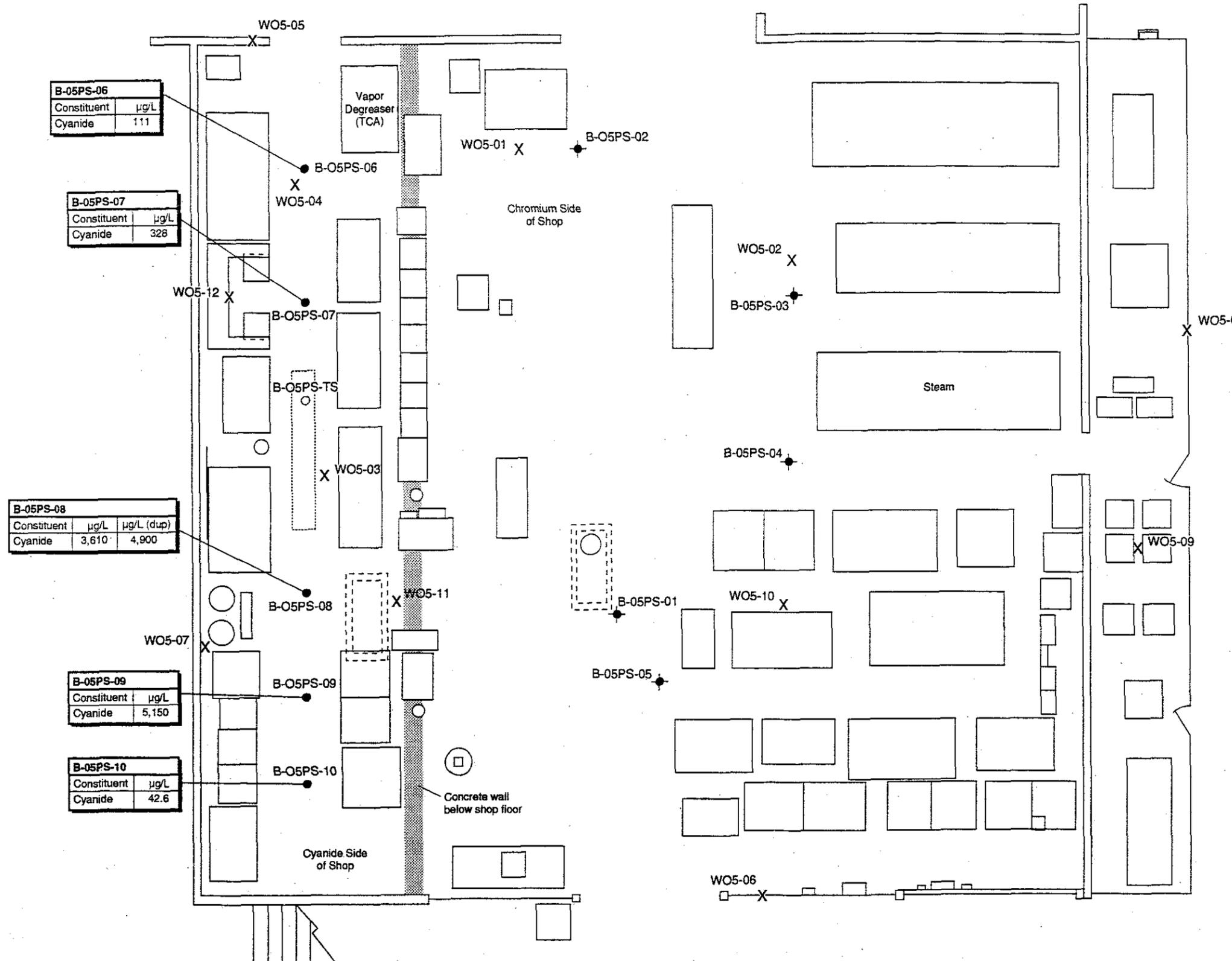
B-05PS-10	
Compound	µg/L
DCA	<100
TCA	750

- LEGEND**
- B-05PS-06 ● Soil Boring Location This Investigation
 - B-05PS-TS ○ Trench Sample Location
 - B-05PS-01 ◆ Soil Boring Location Previous Investigation
 - WO5-01 X Wipe or Scrape Sample Location Previous Investigation
 - ⋈ Eductor Sump Location
 - ⋈ Trench in Sub-Floor
 - DCA Dichloroethane
 - TCA Trichloroethane
 - TCE Trichloroethene
 - J Qualified, estimated value

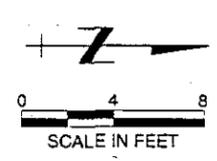


NAVAL AIR STATION ALAMEDA
 ALAMEDA, CALIFORNIA
 SITE 5 PLATING SHOP
 ANALYTICAL RESULTS FOR
 ORGANIC COMPOUNDS IN GROUNDWATER FOR
 THE SEPTEMBER 21 AND 22, 1993 INVESTIGATION

FIGURE 6



- LEGEND**
- B-05PS-06 ● Soil Boring Location This Investigation
 - B-05PS-TS ○ Trench Sample Location
 - B-05PS-01 ◆ Soil Boring Location Previous Investigation
 - WO5-01 X Wipe or Scrape Sample Location Previous Investigation
 - ⎓ Eductor Sump Location
 - ▭ Trench in Sub-Floor



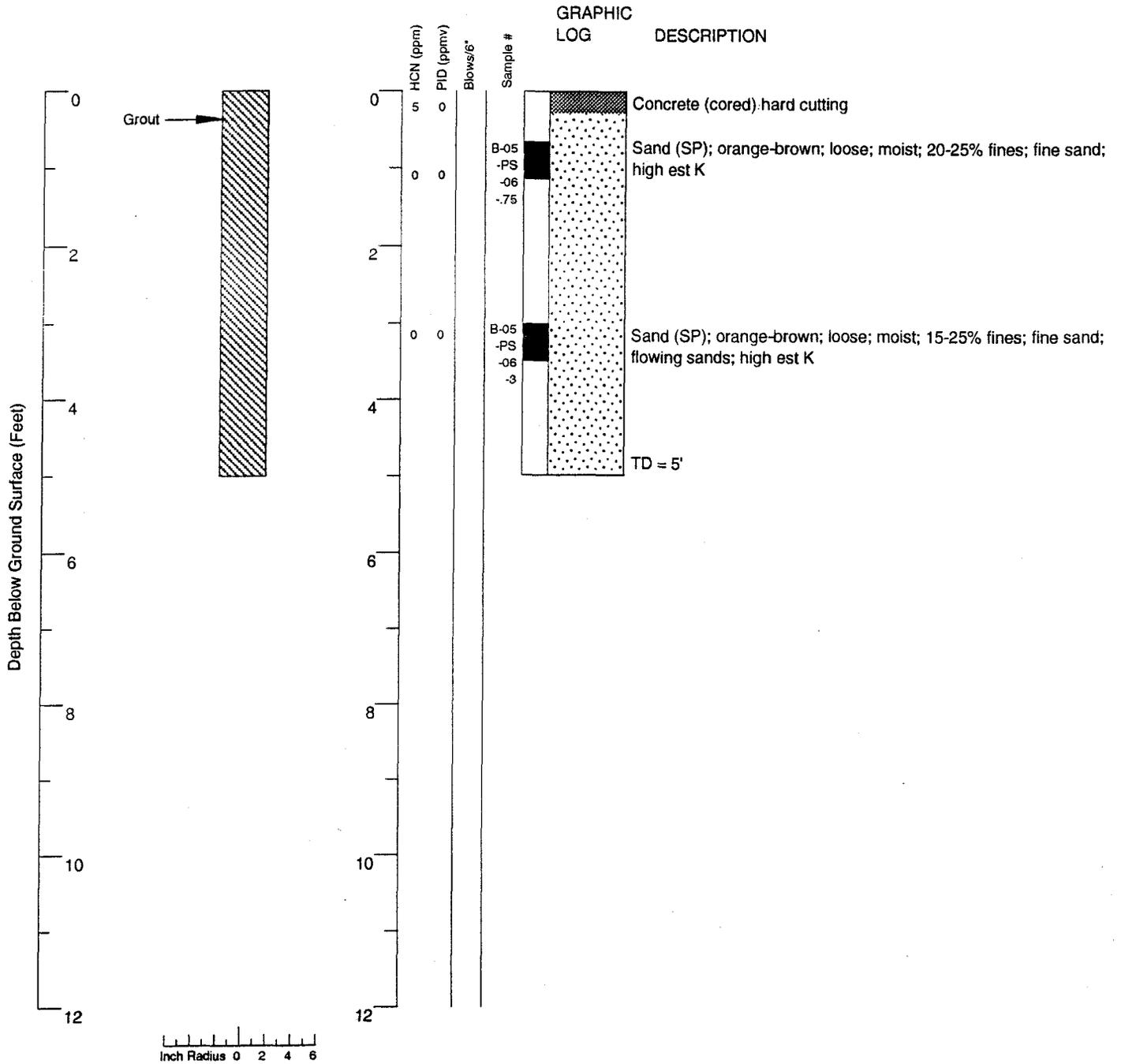
NAVAL AIR STATION ALAMEDA
 ALAMEDA, CALIFORNIA
 SITE 5 PLATING SHOP
 ANALYTICAL RESULTS FOR
 INORGANIC CONSTITUENTS IN GROUNDWATER FOR
 THE SEPTEMBER 21 AND 22, 1993 INVESTIGATION

FIGURE 7

ATTACHMENT A

BORING LOGS

(six pages)



Geologist: Scott Weber
 Project Mgr: Scott Weber
 Dates Drilled: 9/21/93

Drilling Company: Gregg Drilling
 Drilling Method: Hydraulic Ramset 1000
 Driller: Ted Hogan
 Drill Rig:

Well Head Completion: None
 Type of Sampler: 4" Push Point
 TD (Total Depth): 5.0 ft. below ground surface
 Top of Casing:

EXPLANATION

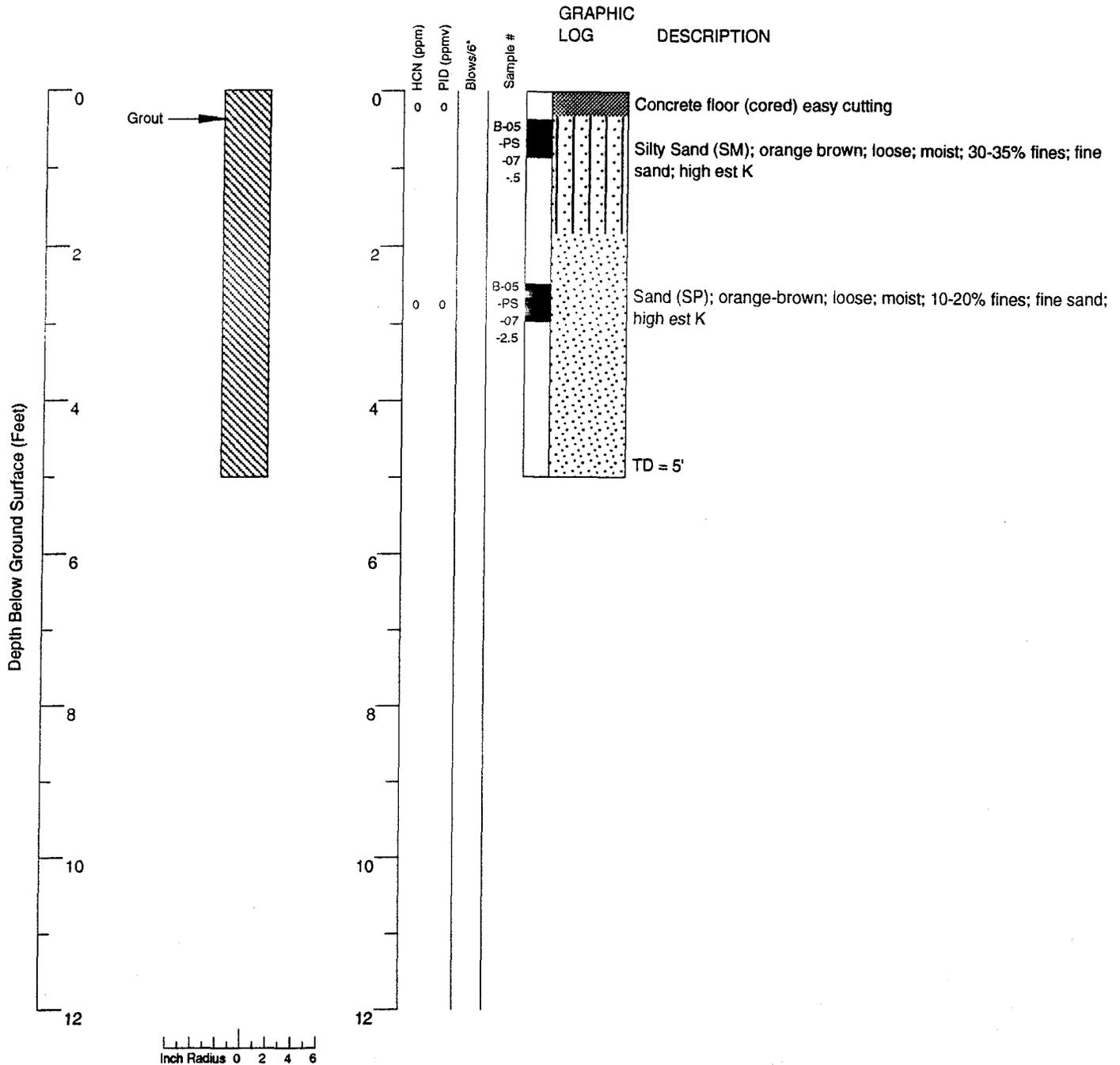
- Water level during drilling
- Water level in completed well
- Location of recovered core sample
- Location of sample sealed for chemical analysis
- Sieve sample
- Grab sample
- Contacts: Solid where certain
- Dotted where approximate
- Dashed where uncertain
- Hachured where gradational
- NR No recovery



Boring Log
 B-05PS-06
 NAS Alameda
 Site 5 Plating Shop
 Alameda, California

SOIL BORING

B-05PS-06



Geologist: Scott Weber
 Project Mgr: Scott Weber
 Dates Drilled: 9/21/93

Drilling Company: Gregg Drilling
 Drilling Method: Hydraulic Ramset 1000
 Driller: Ted Hogan
 Drill Rig:

Well Head Completion: None
 Type of Sampler: 4" Push Point
 TD (Total Depth): 5.0 ft. below ground surface
 Top of Casing:

EXPLANATION

- ☒ Water level during drilling
- ☒ Water level in completed well
- ☒ Location of recovered core sample
- ☒ Location of sample sealed for chemical analysis
- ☒ Sieve sample
- ☒ Grab sample
- Contacts: Solid where certain
- Dotted where approximate
- - - Dashed where uncertain
- ////// Hachured where gradational
- NR No recovery

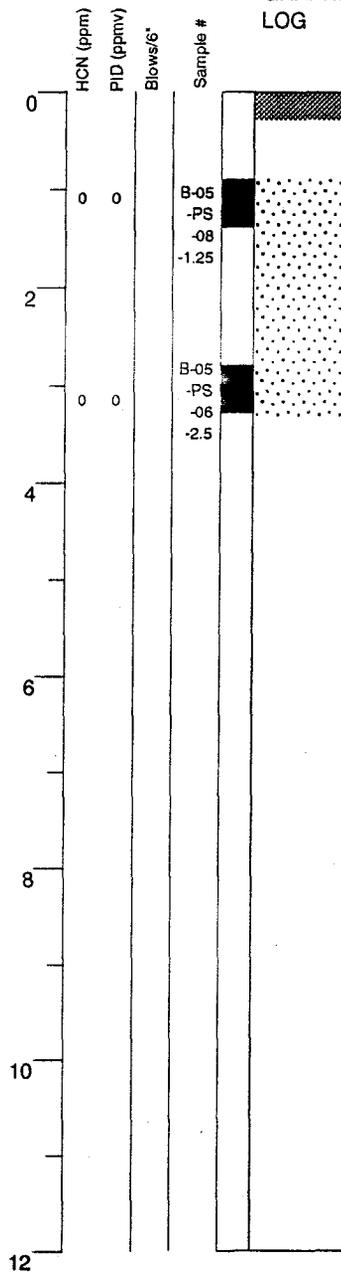
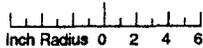
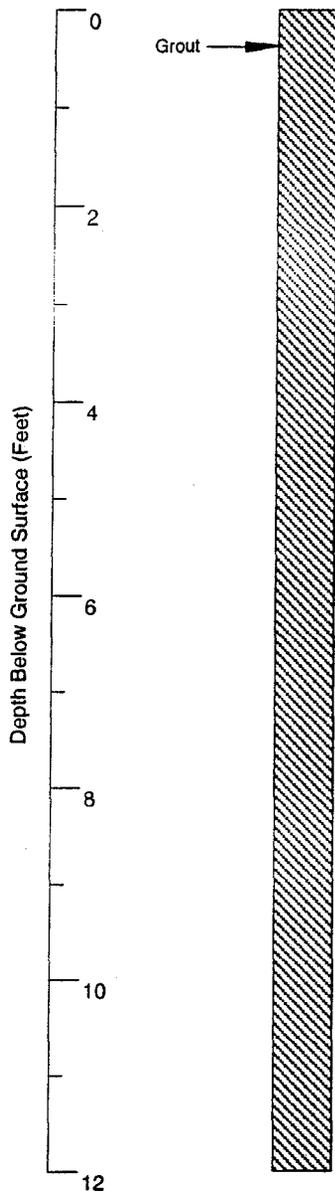


Boring Log
 B-05PS-07
 NAS Alameda
 Site 5 Plating Shop
 Alameda, California

SOIL BORING

B-05PS-07

GRAPHIC LOG DESCRIPTION



Concrete floor
Void space
Sand (SP) ; gray; moist; loose; 10% fines; fine sand to medium sand; trace gravel; high est K
Samples too soft; no recovery

Continues

Geologist: Scott Weber
Project Mgr: Scott Weber
Dates Drilled: 9/22/93

Drilling Company: Gregg Drilling
Drilling Method: Hydraulic Ramset 1000
Driller: Ted Hogan
Drill Rig:

Well Head Completion: None
Type of Sampler: 4" Push Point
TD (Total Depth): 24.0 ft. below ground surface
Top of Casing:

EXPLANATION

- Water level during drilling
- Water level in completed well
- Location of recovered core sample
- Location of sample sealed for chemical analysis
- Sieve sample
- Grab sample
- Contacts: Solid where certain
- Dotted where approximate
- Dashed where uncertain
- Hachured where gradational
- NR No recovery



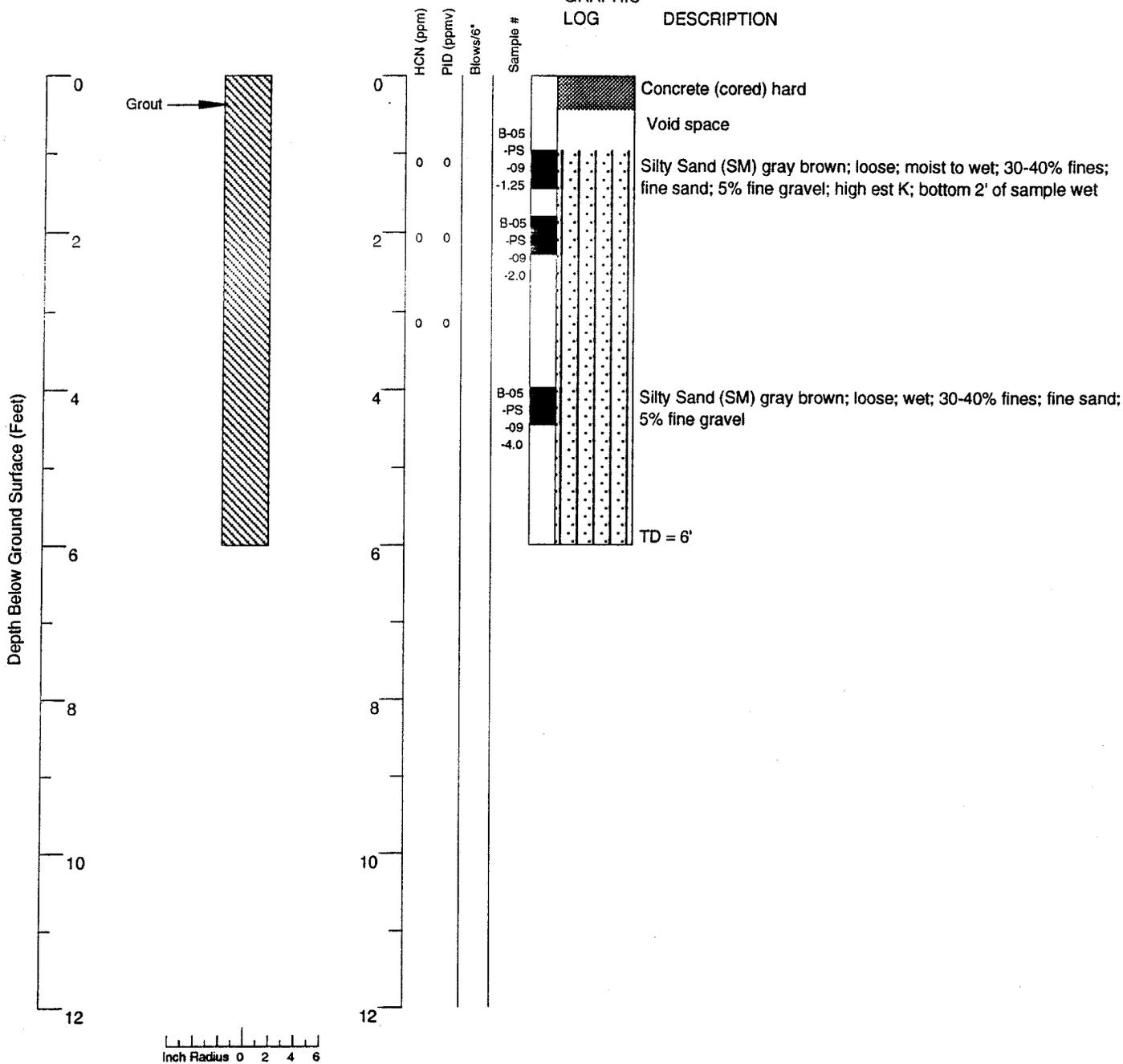
MONTGOMERY WATSON

Boring Log
B-05PS-08
NAS Alameda
Site 5 Plating Shop
Alameda, California

SOIL BORING

B-05PS-08

GRAPHIC LOG DESCRIPTION



Geologist: Scott Weber
 Project Mgr: Scott Weber
 Dates Drilled: 9/22/93

Drilling Company: Gregg Drilling
 Drilling Method: Hydraulic Ramset 1000
 Driller: Ted Hogan
 Drill Rig:

Well Head Completion: None
 Type of Sampler: 4" Push Point
 TD (Total Depth): 6.0 ft. below ground surface
 Top of Casing:

EXPLANATION

- Water level during drilling
- Water level in completed well
- Location of recovered core sample
- Location of sample sealed for chemical analysis
- Sieve sample
- Grab sample
- Contacts: Solid where certain
- Dotted where approximate
- Dashed where uncertain
- Hachured where gradational
- NR No recovery

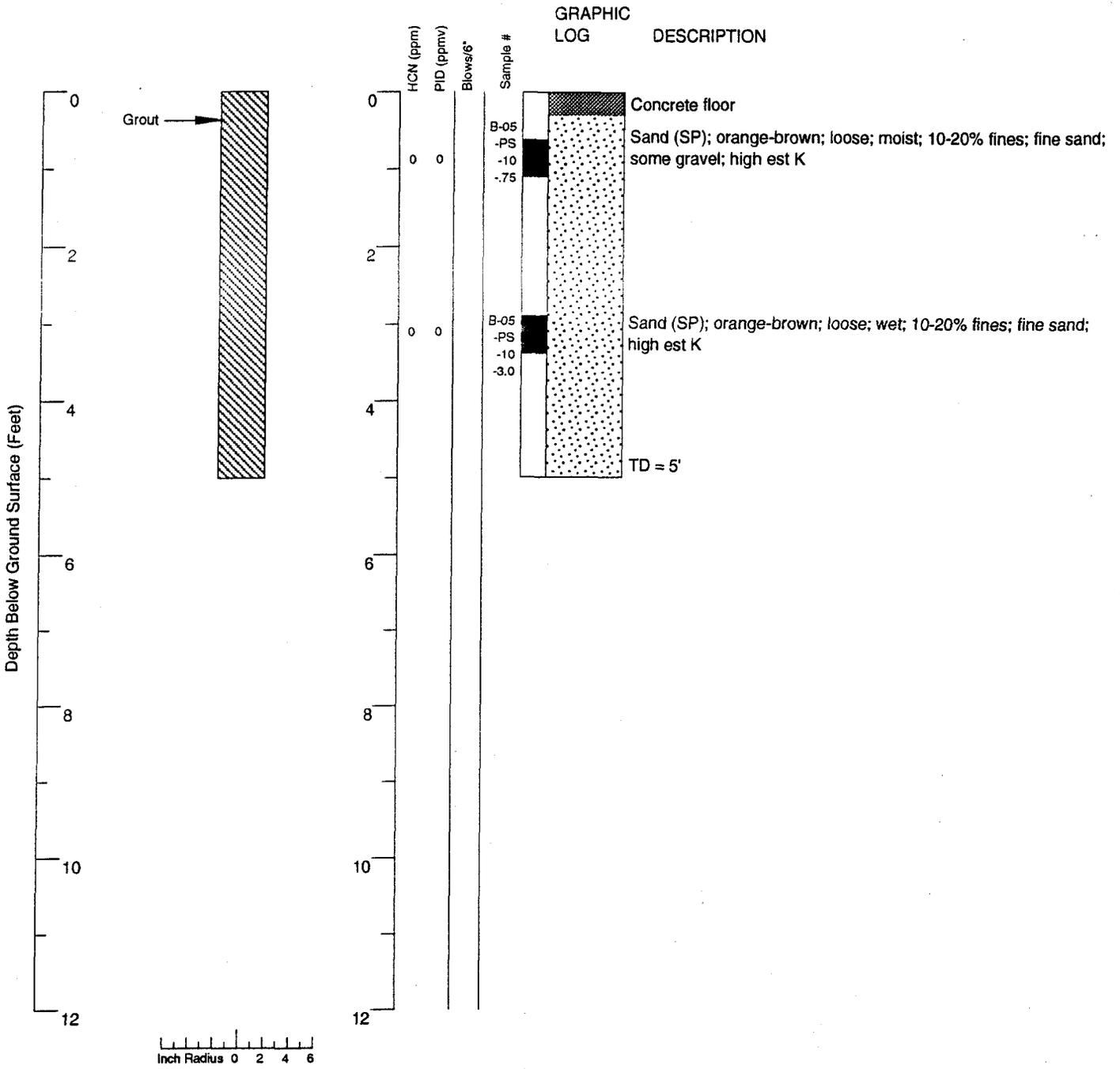


MONTGOMERY WATSON

Boring Log
 B-05PS-09
 NAS Alameda
 Site 5 Plating Shop
 Alameda, California

SOIL BORING

B-05PS-09



Geologist: Scott Weber
 Project Mgr: Scott Weber
 Dates Drilled: 9/22/93

Drilling Company: Gregg Drilling
 Drilling Method: Hydraulic Ramset 1000
 Driller: Ted Hogan
 Drill Rig:

Well Head Completion: None
 Type of Sampler: 4" Push Point
 TD (Total Depth): 5.0 ft. below ground surface
 Top of Casing:

EXPLANATION

- Water level during drilling
- Water level in completed well
- Location of recovered core sample
- Location of sample sealed for chemical analysis
- Sieve sample
- Grab sample
- Contacts: Solid where certain
- Dotted where approximate
- Dashed where uncertain
- Hachured where gradational
- NR No recovery



MONTGOMERY WATSON

Boring Log
 B-05PS-10
 NAS Alameda
 Site 5 Plating Shop
 Alameda, California

SOIL BORING

B-05PS-10