N00217.001640
HUNTERS POINT
SSIC NO. 5090.3

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Ser 1811RC/00534

28 NOV 1990

Mr. Mark Malinowski
Department of Health Services
State of California
Toxic Substances Control Division
Region 2
700 Heinz Avenue, Bldg. F, Suite 200
Berkelely, CA 94710

Dear Mr. Malinowski:

Enclosed please find a copy of the Draft Aquifer Testing and Tidal Influence Monitoring Plan for Group II Sites proposed for Naval Station, Treasure Island, Hunters Point Annex (HPA). This draft of the site-specific plan is being forwarded for your review and comments. A site-wide Draft Tidal Influence Monitoring Plan will be submitted to your office for review under separate cover.

Should you have any questions regarding this matter, the point of contact is Commander, Western Division, Naval Facilities Engineering Command (Attn: Raymond K. Chiang, Code 1811RC, (415) 244-2554.)

Submit written comments if any to Mr. Eddie Sarmiento, Commanding Officer, Naval Station Treasure Island, Building I (Code 84), San Francisco, CA 94130, with a copy to Western Division, Naval Facilities Engineering Command (Raymond K. Chiang, Code 1811RC, 900 Commodore Drive, San Bruno, CA 94066).

By copy of this letter, this documentation is also being submitted to other concerned regulatory agencies for their review.

Sincerely,

Original signed by:
MICHAEL A. MIGUEL
Head, Environmental Restoration Branch

Encl:
(1) Draft Tidal Influence Monitoring Plan for Group II Sites, dated Sept 90

Copy to:
Regional Wat er Quality Control Board (Attn: Steve Ritchie)
Bay Area Air Quality Management District (Attn: Scott Lutz)
U.S. Environmental Protection Agency (Attn: Chuck Flippo)
California Dept. of Fish & Game (Attn: Mike Rugg)
U.S. Fish & Wildlife Service (Attn: Steve Schwarzback)

5090
Ser 1811RC/00544

Copy to: (cont'd)
National Oceanic & Atomospheric Administration (Attn: Chip Demarest)
Hunters Point Technical Review Committee Public Member (Attn: Rev. Arelious Walker)
City and County of San Francisco (Attn: David Wells)
San Francisco District Attorney (Attn: Steve Castleman)

Blind copy to: (w/o encl) 09C9, 202, 09A2A.20, 24
181, 1811, 1811RP, 1811JC, 1811RC
Harding Lawson Associates (Attn: Mary Lucas)
PRC (Attn: Gary Welshans)
PWC S.F. BAY (Code 420)

(w/encl) Admin. Record
COMNAVBASE S.F.
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NAVSTA Treasure Island
COMNAVSEASYSCOM (ATTN: Robert Milner)

Writer: R. Chiang, Code 1811RC, x2554
Typist: B.Palmer, 20 Nov 90, Draft TIMP 2 ltr
File: HP/DOHS

Recommendations for Aquifer Testing and Tidal Influence Studies at Group II Sites
Hunters Point Annex
02176,259.02
September 5, 1990

This plan presents recommendations for aquifer testing and tidal influence studies at the 4 Hunters Point Annex group II sites (IR-6, IR-8, IR-9, and IR-10). Although site IR-11 is in the newly formulated Group V, aquifer testing at this site is also addressed in this letter because it was originally included in Group II.

The recommendations presented in this plan are based on available data and represent the first phase of aquifer testing and tidal influence monitoring. The results of the first phase of testing will provide information on the hydraulic properties of the fill materials. These results will be used in development of additional aquifer testing, if necessary.

Aquifer tests are primarily designed to estimate aquifer hydraulic properties of saturated geologic sediments. These hydraulic properties include hydraulic conductivity (K), transmississivity (T) and storage coefficient (S) and are necessary to evaluate groundwater flow velocities and potential contaminant migration at a site. In addition, hydraulic properties are necessary for groundwater extraction system design and evaluation of remediation effectiveness. Aquifer testing is generally conducted by performing slug or pumping tests on a well hereas tidal influence monitoring is conducted by measuring water-level responses to tidal changes. A brief description of slug testing, pumping tests, and tidal influence monitoring are provided below. This description is followed by recommendations for aquifer testing and tidal influence monitoring.

Slug Testing

Slug testing is performed by either applying (slug injection) or removing (slug withdrawal) a known volume of solid or fluid to or from a well and monitoring the response of the aquifer to the induced water-level change. The results of slug testing can be used to obtain K and T values. Slug tests require less time to perform, than pumping tests and are generally of shorter duration. These tests are generally most useful for evaluating low permeability aquifers. However, the K value obtained is generally estimated within an order of magnitude and S can not be obtained.

Pumping Testing

Pumping tests generally consist of pumping one well and recording the drawdown in the pumping well and in one or more nearby observation wells. Pumping tests evaluate a greater portion of the aquifer than slug tests because the pumping of a well creates a larger cone of depression around the well than a slug test, consequently pumping tests provide more reliable and representative data on aquifer hydraulic properties than those obtained from slug tests. Pumping tests require continuous pumping of a well for several days and therefore potentially generate large volumes of water. In addition, pumping tests may require the installation of an observation wells if water-level monitoring locations are not located within the expected radius of influence of the pumping well.

Tidal Influence Monitoring

Tidal influence monitoring is performed where groundwater levels may be influenced by tidal fluctuations. Monitoring generally consists of measuring changes in groundwater levels within wells during 1 or more tidal cycles. This information is necessary to evaluate changes in hydraulic gradient, groundwater flow directions, and influences on potential contaminant transport at sites where water levels may be variable due to tidal influence.

The remaining sections of this attachment 1) present a summary of the status of the RIs at sites IR-6, IR-8, IR-9, IR-10, and IR-11, 2) recommendations for aquifer testing at each site, and 3) the proposed methodology for conducting aquifer testing or tidal influence studies.

Status of Remedial Investigation.

Primary Phase Remedial Investigations (RIs) at sites IR-6, IR-8, IR-9, IR-10, and IR-11 including soil sampling, well installation and development, and the first round of groundwater sampling have been completed. All soil and groundwater data for sites IR-6, IR-9, and IR-10 have been received from the laboratory. Data from groundwater sampling at IR-8, and elevation survey data for wells at sites IR-6, IR-8, and IR-9 have not yet been received. Preliminary survey data from site IR-8 however is available for 3 wells.

Recommendations for Aquifer Testing and Tidal Influence Monitoring

Recommendations for the first phase of aquifer testing and tidal influence monitoring are based on existing data. Additional testing may be recommended after the results of the first phase of testing have been evaluated. Data from the first round of groundwater sampling were reviewed to evaluate the need for aquifer testing at each site. If groundwater contamination was observed based on available groundwater chemical data, aquifer testing was recommended.

Well development and geologic information obtained from boring logs were used to evaluate the anticipated aquifer characteristics at each site (Tables 1 through 4) and determine the appropriate testing method for each site. Historic pumping data were reviewed to estimate the maximum discharge rate from wells at each site (Tables 1 through 4). From this information the expected radius of influence after 48 hours of pumping was estimated. In addition, well development data and data from aquifer testing performed on wells at IR-8 by ERM West, were used to estimate the radius of influence of pumping wells screened in similar fill material at sites IR-6, IR-9, and IR-10. These radius of influence estimates indicate that observation wells are not located within the expected radius of influence of any potential pumping wells. Therefore pumping tests are not feasible without the installation of additional wells for water-level monitoring. Consequently, it is recommended that slug tests be performed at each site.

On the basis of slug test results and additional groundwater sampling, the need for, and feasibility of pumping tests will be evaluated, and further recommendations will be made if appropriate.

The following criteria were used to select areas for the recommendation of tidal influence monitoring:

- Proximity to the Bay
- Fluctuation in water levels
- Fluctuation in hydraulic gradients

The following recommendations for slug testing and tidal influence monitoring, based on the above criteria, are suggested for each site:

- IR-6 (Tank Farm) - Slug testing is recommended at site IR-6 because groundwater contamination has been confirmed (Figure 1). Diesel, benzene, trichloroethene (TCE), 1,2 dichloroethene (1,2-DCE), xylenes, toluene and ethylbenzene were detected in groundwater samples from several wells during the first round of groundwater sampling. Slug testing is the recommended testing method because radius of influence estimates indicate that pumping tests would require the installation of observation wells as described above. Slug tests are recommended on all wells to evaluate the variability in hydraulic conductivities for the fill material at the site. Because water-level evaluation data are not yet available for this site, the need for tidal influence monitoring cannot be evaluated at this time. After well elevation data are available the need for tidal influence monitoring will be evaluated and recommendations will be made as appropriate.

- IR-8 (Building 505 - PCB Spill Area) - No aquifer tests are recommended at site IR-8 at this time because groundwater contamination has not been identified. If contamination of groundwater at IR-8 is indicated by results of the groundwater sampling, aquifer testing will be recommended.

A tidal study is recommended at IR-8 because variations in water levels and hydraulic gradients are evident, based on several rounds of water-level measurements collected by HLA and ERM West. The tidal study would evaluate the significance of changes in the magnitude and direction of groundwater flow due to tidal variations.

- IR-9 (Pickling and Plate Yard) - Slug testing is recommended on two wells at site IR-9 on the basis of soil sampling results and the first round of groundwater sampling (Figure 2). Groundwater from several wells contained metals above detection limits including nickel, total chromium, hexavalent chromium, and zinc. However, only hexavalent chromium which was detected at 100 ug/L in the sample from Well PPY-1 and 560 ug/L in the sample from Well IR09MW35 exceeds primary drinking water standards. The concentrations of metals in other wells were below levels of available water quality criteria from *The Designated Level Methodology For Waste Classification and Cleanup Level Determination, Jon B. Marshack, D. Env., California Regional Water Quality Control Board, Central Valley Region, September 1988.* Slug testing may be performed on additional wells at this site if geologic information indicated the presance of permeable lithologies that may act as preferential flow paths.

  Water-level elevation data will not be available for site IR-9 until well elevation survey data are available and the need for tidal influence monitoring can be evaluated. After well elevation data are available the need for tidal influence monitoring will be evaluated and recommendations will be made as appropriate.

- IR-10 (Battery and Electroplating Shop) - Slug testing is recommended at all 5 wells at IR-10 on the basis of the results of the first round of groundwater sampling and geologic conditions. Preliminary review of boring logs at site IR-10 indicate that it is underlain by a bedrock ravine which may influence the flow of groundwater, and subsequently the flow of contaminants beneath the site. Groundwater samples from wells IR10MW13A and IR10MW13B, located within the ravine contain elevated levels of 1,2-DCE. Groundwater from well IR10MW13A also contains TCE (3 ppb) and Vinyl Chloride (3 ppb) (Figure 3). Slug testing of these wells is recommended to evaluate the aquifer hydraulic properties within the ravine. Slug testing is also recommended for well IR10MW12 located outside the ravine because the sample from this well contained hexavalent chromium at 400 ug/L. In addition, slug tests are recommended for wells IR10MW14 and IR10MW15 outside of the suspected bedrock ravine. The relationship between hydraulic properties within and outside the ravine will be useful in evaluating the importance of the bedrock ravine in relation to groundwater flow.

  A tidal influence study is also recommended at this site because variations in water levels and hydraulic gradients are evident based on several rounds of water-level measurements.

- IR-11 (Power Plant) - No aquifer tests are recommended at site IR-11 at this time because the results of the first round of groundwater sampling do not confirm groundwater contamination at the site. Water from a duplicate sample at well IR11MW27 contained Diesel concentrations of 120 ug/L, the other sample indicated no contamination. In the event that diesel contamination is confirmed at this location, aquifer testing will be recommended as appropriate.

  A tidal study is recommended at IR-11 because variations in water levels and hydraulic gradients are evident on the basis of several rounds of water-level measurements collected by HLA. The tidal study would evaluate the significance of changes in the magnitude and direction of groundwater flow due to tidal variations.

Aquifer Testing and Tidal Influence Study Methods

Slug testing and tidal influence monitoring will be conducted as described in *Work Plan - Volume 3 Quality Assurance Project Plan, Remedial Investigation/Feasibility Study, Naval Station, Treasure Island, Hunters Point Annex, San Francisco, California*, dated May 27, 1988 (QAPP). The QAPP does not contain specific methods for slug testing and therefore are described below. Slug tests will be conducted by (1) installing a pressure transducer connected to a computerized data logger, and (2) recording the water level in the well prior to and after the addition or removal of a solid slug. Water-level measurements will be obtained at a log cycle rate beginning with measurements taken at 0.2 second intervals increasing in spacing to every 2 minutes after 10 minutes, until the water level has returned to at least 80% of its initial static level. Manual measurements will also be obtained with an electrical sounder to verify transducer measurements. The specifications for water levels obtained with pressure transducers, steel tapes, and electrical sounders are contained in Section 9.1 of the QAPP. Calibration of both transducers and electrical sounders is also described in Section 9.1 of the QAPP. The aquifer test data will be recorded as described in Section 9.2 of the QAPP.

Tidal influence monitoring will be conducted as described in Section 9.3 of the QAPP and as further specified below. Tidal studies will be conducted over a period of at least 72 hours during predicted low low or high high ocean tide levels. A stilling tube will be installed in the Bay and surface water levels will be monitored during the same monitoring period. Barometric pressure measurements will also be obtained during both aquifer testing and tidal influence monitoring. These data will be used to evaluate changes in barometric pressure on water-levels allowing for better evaluation of slug test and tidal responses.

The recommendations for aquifer testing and tidal influence monitoring described in this attachment are based on data that are currently available. If additional data suggests the need for additional aquifer and/or tidal influence monitoring testing, recommendations will be made as appropriate.

Schedule

All testing planned for the first phase of aquifer testing should be completed by December 1, 1990. Results from this phase of testing will be evaluated, and if needed, additional testing will be completed by the middle of February 1991.

BP/JJR/GLO/js/BP-1/002

Table 1 Tank Farm IR-6, Well Data

WELL	WATER LEVEL BTOC (feet)	APPROXIMATE MAXIMUM PUMPING RATE	DISTANCE TO CLOSEST MONITORING POINT	SATURATED THICKNESS	LITHOLOGY (MOST PERMEABLE)
IR06MW35	5.44	<0.5 gpm	150 ft	9.25 ft	sandy clay, sandy gravel
IR06MW22	4.83	<0.5 gpm	75 ft	3 ft	silty sand
IR06MW30	5.14	<1 gpm	50 ft	11.5	well-graded gravel
IR06MW23	4.75	<1 gpm	50 ft	8 ft	fine grained sand
IR06MW32	5.20	<1 gpm	50 ft	8.75 ft	sandy silt
IR06MW27	6.90	<0.5 gpm	65 ft	2.5 ft	silty sand
IR06MW40	7.96	<1 gpm	75 ft	12 ft	fine-grained sand
IR06MW41	7.54	<0.5 gpm	75 ft	9 ft	fine-grained sand
IR06MW42	10.38	<0.5 gpm	50 ft	3 ft	silt
IR06MW34	8.88	<0.5 gpm	50 ft	3 ft	silt

BTOC = Below Top of Casing
gpm = galons per minute

Table 2 PCB Spill Area IR-8, Well Data

WELL	WATER LEVEL BTOC (feet)	APPROXIMATE MAXIMUM PUMPING RATE	DISTANCE TO CLOSEST MONITORING POINT	SATURATED THICKNESS	LITHOLOGY (MOST PERMEABLE)
IR08MW37	5.02	4.5 gpm	100 ft	14 ft	fine-grained sand
IR08MW38	7.41	9 gpm	100 ft	10 ft	fine-grained sand
IR08MW39	5.83	5 gpm	160 ft	12.5	fine-grained sand
IR08MW40	6.29	2 gpm	145 ft	25 ft	well-graded gravel
IR08MW41	7.50	2 gpm	145 ft	12.5 ft	fine-grained sand

BTOC = Below Top of Casing
gpm = gallons per minute

Table 3 Pickling Yard IR-9, Well Data

WELL	WATER LEVEL BTOC (feet)	APPROXIMATE MAXIMUN PUMPING RATE	DISTANCE TO CLOSEST MONITORING POINT	SATURATED THICKNESS	LITHOLOGY (MOST PERMEABLE)
IR09MW35	8.35	0.5 gpm	150 ft	11 ft	sand with clay
IR09MW36	8.83	0.25 gpm	150 ft	11 ft	silty gravel
IR09MW31	8.82	0.5 gpm	160 ft	3 ft	sandy clay
IR09MW37	9.68	0.5 gpm	120 ft	4 ft	silty sand and gravel
IR09MW38	9.03	0.25 gpm	85 ft	3 ft	sand with gravel
PPY-1	8.12	0.25 gpm	85 ft	11 ft	gravelly sand

BTOC = Below Top of Casing
gpm = gallons per minute

Table 4 Battery shop IR10, Well Data

WELL	WATER LEVEL BTOC (feet)	APPROXIMATE MAXIMUN PUMPING RATE	DISTANCE TO CLOSEST MONITORING POINT	SATURATED THICKNESS	LITHOLOGY (MOST PERMEABLE)
IR10MW12	6.06	1 gpm	220 ft	13 ft	gravel with sand
IR10MW13A	7.57	2 gpm	-	15 ft	poorly-graded gravel
IR10MW13B	7.47	2 gpm	220 ft	12.5 ft	gravel with sand
IR10MW14	7.82	3 gpm	275 ft	13.5 ft	silty gravel
IR10MW15	5.84	3 gpm	225 ft	12 ft	silty sand

BTOC = Below Top of Casing
gpm = gallons per minute

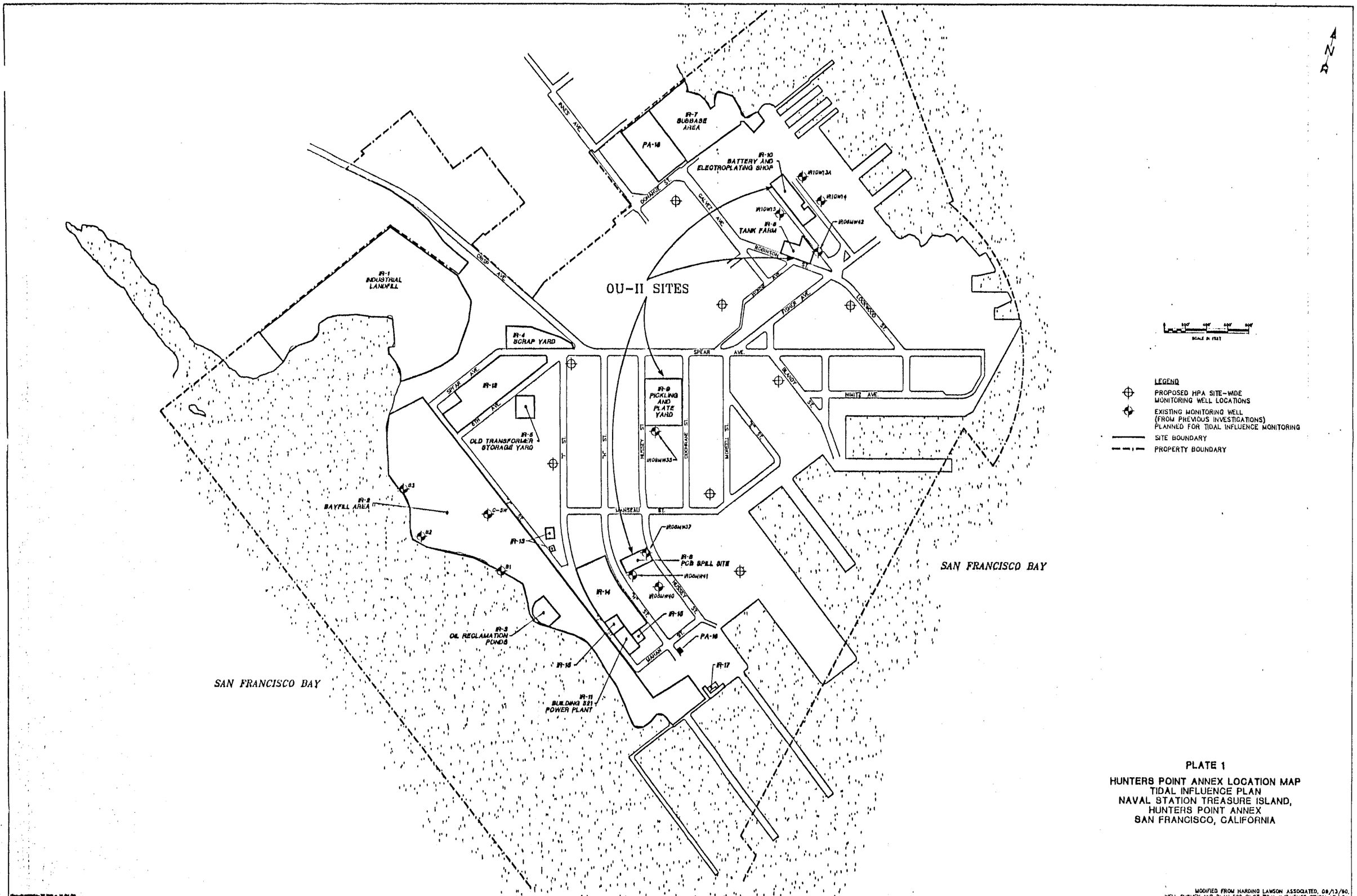
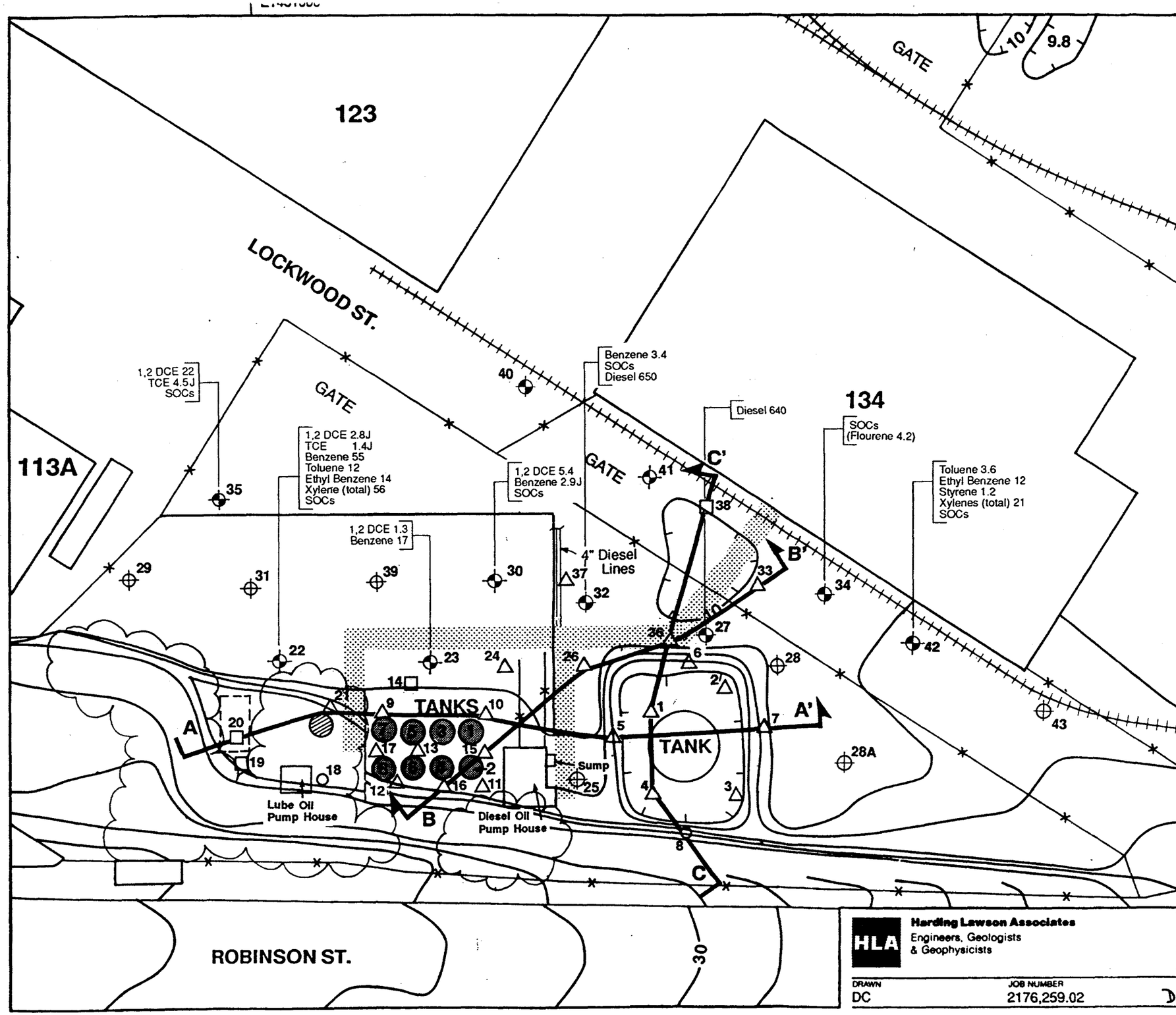


PLATE 1

HUNTERS POINT ANNEX LOCATION MAP
TIDAL INFLUENCE PLAN
NAVAL STATION TREASURE ISLAND,
HUNTERS POINT ANNEX
SAN FRANCISCO, CALIFORNIA

MODIFIED FROM HARDING LAWSON ASSOCIATED, 08/13/90.
WELL SURVEY AND PLAN FOR PILOT TIDAL INFLUENCE STUDY AT HPA.



Reference:
Western Division, Naval Facilities Engineering Command, Hunters Point, Naval Shipyard Topographic/Base Map, Dec. 1986, Scale 1" = 100'.
Horizontal control based on the California Coordinate System, Zone 3.
Vertical Datum is Mean Sea Level.

DRAFT

EXPLANATION

- Cross section location
- 18 ○ Boring location where oil and grease and TPH as diesel were not detected
- 22 □ Boring location where oil and grease were detected
- 19 △ Boring location where oil and grease and TPH as diesel were detected
- Completed test boring
- Completed monitoring well
- Approximate location of subsurface corridor containing steam piping and formerly, diesel and water piping.
- Lube Oil Tank Support Area
- Diesel Oil Tank
- Lube Oil Tank

Note: Boring locations are approximate, pending completion of borehole survey now in progress.

Benzene 3.4 — Results from first round of groundwater sampling. Detected inorganics are not reported on this figure. Results are in ug/l.

J — Result is detected below the reporting limit or is an estimated concentration.

N

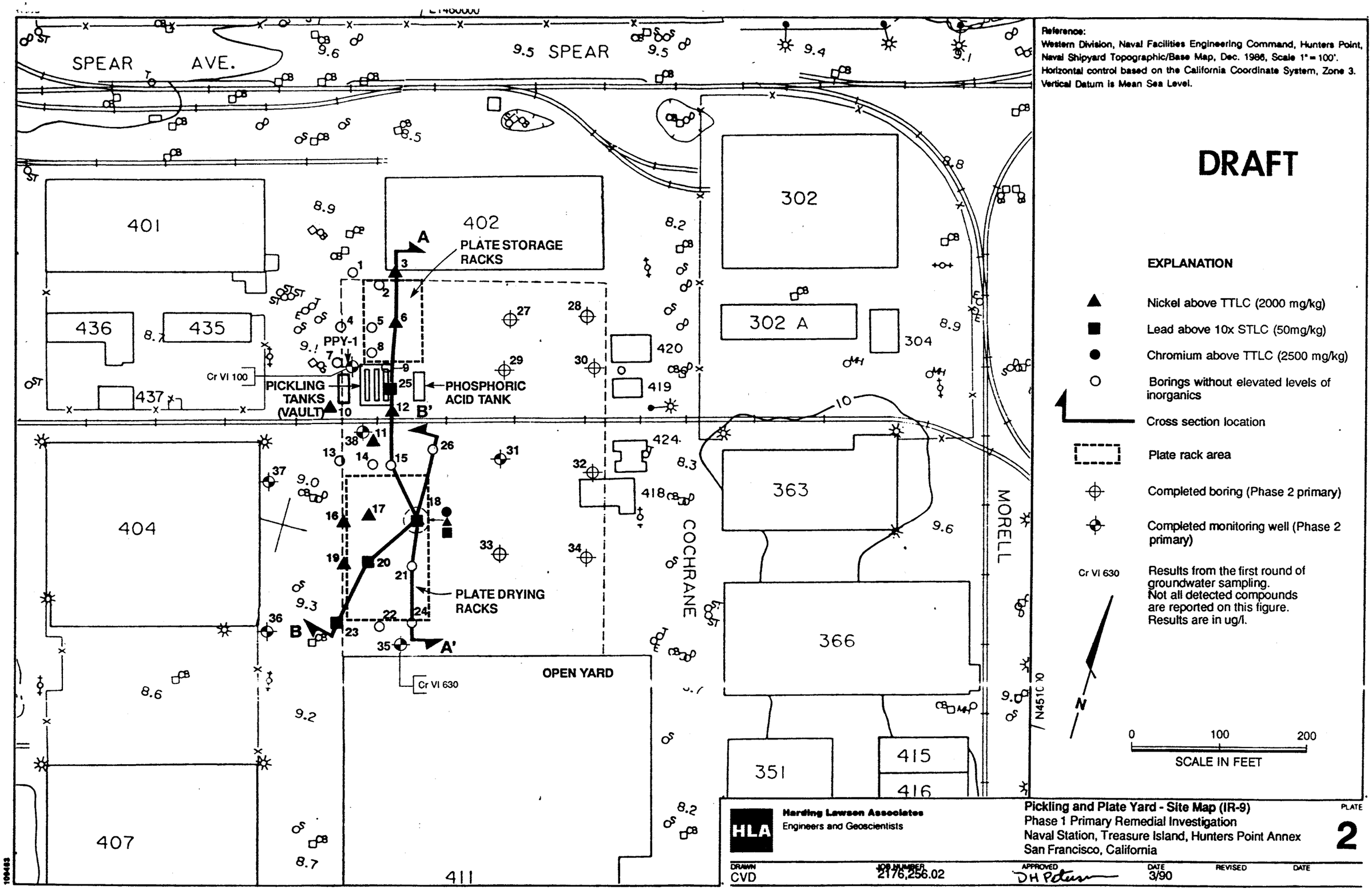
0 50 100
SCALE IN FEET

Harding Lawson Associates
Engineers, Geologists & Geophysicists

Tank Farm - Site Map (IR-6)
Primary Remedial Investigation, Revised Boring Locations
Naval Station, Treasure Island, Hunters Point Annex
San Francisco, California

PLATE **2**

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
DC	2176,259.02	DH Peterson	9/90		

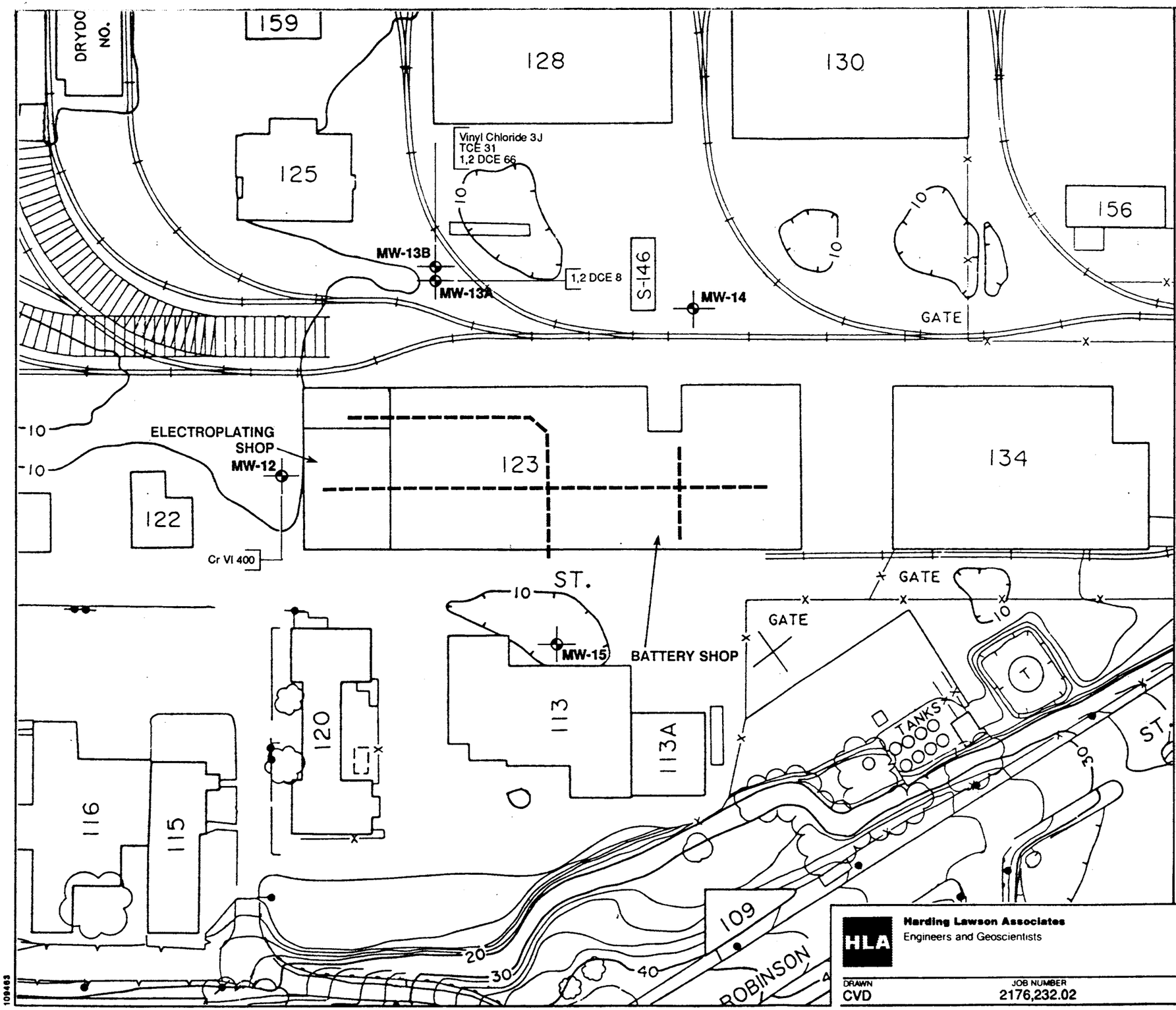


Harding Lawson Associates
Engineers and Geoscientists

Pickling and Plate Yard - Site Map (IR-9)
Phase 1 Primary Remedial Investigation
Naval Station, Treasure Island, Hunters Point Annex
San Francisco, California

PLATE **2**

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
CVD	2176,256.02	DH Peterson	3/90		



Reference:
Western Division, Naval Facilities Engineering Command, Hunters Point, Naval Shipyard Topographic/Base Map, Dec. 1986, Scale 1" = 100'.
Horizontal control based on the California Coordinate System, Zone 3.
Vertical Datum is Mean Sea Level.

DRAFT

EXPLANATION

MW-14 — Monitoring well location

Main trunk line of acid drain system

TCE 31 — Results from the first round of groundwater sampling. Not all detected compounds are reported on this figure. Results are in ug/l.

N

0 100 200
SCALE IN FEET

Harding Lawson Associates
Engineers and Geoscientists

Monitoring Well Locations
Battery and Electroplating Shop, IR-10
Primary Phase Remedial Investigation
Hunters Point Annex
San Francisco, California

PLATE **2**

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
CVD	2176,232.02	CJM	11/89		

109463