GeoStrategies Inc.
2140 WEST WINTON AVENUE
HAYWARD, CALIFORNIA 94545
(510) 352-4800

July 17, 1992

Alameda County Health Agency
Division of Hazardous Materials
Department of Environmental Health
80 Swan Way, Room 200
Oakland, California 94521

Attention: Ms. Pamela Evans

Certified Mail

Reference: ARCO Service Station No. 5387
20200 Hesperian Blvd.
Hayward, California 94541

Ms. Evans:

As requested by ARCO Products Company, we are forwarding a copy of the Work Plan dated July 17, 1992 for the above referenced location.

If you have any questions, please call.

Sincerely,

Robert C. Mallory

FOR
John F. Vargas
Senior Geologist

JFV/rcm

Enlosure

cc: Mr. Michael Whelan, ARCO Products Company
Mr. H.C. Winsor, ARCO Products Company
Mr. Lester Feldman, RWQCB, San Francisco Bay Region
(Certified Mail)

GeoStrategies Inc.

WORK PLAN

ARCO Service Station No. 5387
20200 Hesperian Boulevard
Hayward, California

792604-5

July 14, 1992

GeoStrategies Inc.
2140 WEST WINTON AVENUE
HAYWARD, CALIFORNIA 94545
(510) 352-4800

July 14, 1991

ARCO Products Company
P.O. Box 5811
San Mateo, California 94402

Attn: Mr. Michael Whelan

Re: WORK PLAN
ARCO Service Station No. 5387
20200 Hesperian Boulevard
Hayward, California

Gentlemen:

This Work Plan by GeoStrategies Inc. (GSI), in response to the July 1, 1992 letter from Alameda County Health Care Services, Department of Environmental Health, describes the next phase of work at the above referenced site (Plate 1). The proposed work is intended to further delineate the hydrocarbon plume extent beneath the site, assess the feasibility of groundwater extraction as a remedial option and to facilitate the design of an appropriate remediation system. This scope of work was prepared at the request of ARCO Products Company in order to meet implementation of the previously submitted Remedial System Time line. Field work and laboratory analysis methods will be performed to comply with current State of California Water Resources Control Board (SWRCB) and Alameda County Water District guidelines. Gettler-Ryan Inc. and GSI Field Methods and Procedures were presented in a GSI Work Plan dated April 26, 1991.

SITE BACKGROUND

In August 1986, ARCO Products Company (ARCO) retained Groundwater Technology Inc. (GTI) to conduct an environmental investigation at the site. GTI drilled seven soil borings designated SB-1 through SB-4 and converted three of the seven borings into groundwater monitoring wells designated MW-1 through MW-3. Petroleum hydrocarbons were detected in soil in borings SB-2, SB-3, and SB-4 at concentrations of 49 parts per million (ppm), 42 ppm, and 20 ppm, respectively. Petroleum hydrocarbons were detected in groundwater samples from the three wells ranging from 2.9 to 14 ppm. Results were presented in a GTI report dated August 21, 1986.

In October and December, 1991, GSI installed four additional groundwater wells designated A-4 through A-7. Petroleum hydrocarbons were detected in soil only from boring A-4. Groundwater samples collected from the entire monitoring network detected petroleum hydrocarbons in six of the seven wells ranging in concentrations from 1,600 ppb to 23,000 ppb. Results were presented in a GSI report dated March 6, 1992.

HYDROGEOLOGIC CONDITIONS AND SITE GEOLOGY

The site is located within the San Francisco bay plain approximately 2.5 miles east of the San Francisco Bay and approximately 0.2 miles north of Sulphur Creek. The area is underlain by Holocene-age alluvial deposits consisting of unconsolidated, moderately sorted, fine grain sand and silt, with clayey silt and occasional thin beds of coarse sand (Helley, E. J. and others., 1972).

Based on the exploratory boring logs, the lithology beneath the site consists of clay, silts, and sandy silts to approximately 21 feet below grade. These units grade into coarser grain material consisting of silty sand, sand, and gravelly sand in Borings A-4 through A-6 to the total explored depth of 35 feet. Fine grain material consisting of silts and sandy silts were observed in Boring A-7 to the total explored depth of 35 feet. The unsaturated (vadose) zone consists of clay and silt. The aquifer material consist of clay and silt which grade into sand and silty sand and occasional gravel. A distinct basal aquitard unit was not observed in any of the borings. Saturated soil with "free water" was first observed in the exploratory borings between 17 and 18.5 feet below grade. Historical groundwater flow direction is variable ranging from the northwest to the southwest. The groundwater flow direction on March, 1992 was to the southwest at a calculated gradient of 0.005.

HYDROCARBON DISTRIBUTION

There are currently six groundwater monitoring wells on - site and one groundwater monitoring well off-site. Analysis of groundwater samples collected in March of 1992 found detectable levels of TPH-Gasoline at concentration ranging from 320 ppb (Well A-7) to 210,000 ppb (Well MW-2). Well A-6, which is upgradient of the tank complex and service islands, was reported as none detected (ND) for TPH-Gasoline. Petroleum hydrocarbons have not been observed in Well A-6 since it was installed in October 1991. Petroleum hydrocarbons generally occurs in wells located downgradient and crossgradient of the Fuel Tanks and Service islands. The highest TPH-Gasoline and Benzene concentrations were detected in Well MW-2, which is adjacent to the product islands, at concentrations of 210,000 ppb and 44,000 ppb, respectively. TPH-Gasoline and benzene isoconcentration maps are presented as Plate 3 and 4.

OFF-SITE ENVIRONMENTAL INVESTIGATIONS

Four former service stations are located in the immediate vicinity of the ARCO service station. Kaprelian Engineering Inc. (KEI) is currently investigating groundwater conditions at the former Unocal Service Station located at 20501 Hesperian Boulevard. Harding Lawson Associates (HLA) is currently studying groundwater conditions at the former Texaco Service Station located at 20499 Hesperian Boulevard, in Hayward, California. This site was recently operated by Exxon, but is now closed. Research at the Regional Water Quality Control Board did not reveal information on the former Shell Service station, located at 20500 Hesperian Boulevard, or the recently closed Alliance (formerly Beacon) Service Station, located at 20450 Hesperian Boulevard. Published technical environmental reports indicate that floating product is present in groundwater monitoring wells located at the Exxon Service Station and to the south and southwest of the ARCO Service Station (HLA, December, 1991). Floating product was observed in Well MW-4J, located south of the ARCO site greater than 10-inches in measured thickness. It is HLA's opinion that the presence of floating product in these wells is contributed to by an off-site source, possibly the Alliance Service Station. The Alliance Service Station is located south of the ARCO Service station. TPH-Gasoline and BTEX distribution maps, from the HLA report dated December 17, 1991, are included in Appendix A. These maps illustrate the conclusions made by HLA.

TECHNICAL RATIONALE

Additional groundwater monitoring wells may further delineate the extent of the hydrocarbon plume. The current monitoring network has identified petroleum hydrocarbons primarily at the west side of the ARCO Service Station (see Plate 3). A crossgradient well (A-4) and downgradient well (A-10) should further delineate the extent of petroleum hydrocarbons. These well locations are shown on Plate 2. In addition, the well to the southeast (A-8) may be used to assess the potential impact of contaminants from off-site sources. In addition, this well will be used to monitor the long term pumping effects of a groundwater remediation system.

Previous on-site investigations indicate that the primary impact of petroleum hydrocarbons is to groundwater beneath the site. An aquifer test will be performed, using a newly installed groundwater extraction well (AR-1) to assess the feasibility of groundwater extraction as a remedial option.

SCOPE OF WORK

The following tasks are proposed:

TASK 1. Four 8-inch-diameter exploratory borings will be drilled to an anticipated depth of approximately 35 feet below ground surface. Conventional hollow-stem auger techniques will be used to advance the borings. The recovery well boring will be enlarged using 12-inch-diameter hollow stem augers.

TASK 2. The monitoring wells will be constructed using 2-inch-diameter, precleaned Schedule 40 PVC well casing with 0.02-inch machine slotted well screen. The interim groundwater extraction well will be constructed using 6-inch diameter precleaned schedule 40 PVC well casing and 0.02-inch continuously wrapped carbon steel well screen. The well screens will extend a minimum of 5 feet above the first encountered water-level. The annular sandpack will extend from total depth to a minimum of 1-foot above the well screen. A minimum 1-foot bentonite seal, followed by a cement grout seal to ground surface, will be placed above the sandpack. The well screens will be placed so that well designs are compatible with subsurface geologic conditions. No well screens will be installed that potentially may permit cross-contamination of adjacent aquifers.

TASK 3. Soil samples will be collected using a Modified California split-barrel sampler equipped with either pre-cleaned stainless steel or brass liners advanced ahead of the drill bit. Soil samples will be collected at five - foot intervals and at significant lithologic changes, at a minimum, for lithologic identification, field head-space analysis, physical testing, and laboratory chemical analysis. The borings will be logged by a GSI geologist using the Unified Soil Classification System (ASTM-D2488-84) and the Munsell Soil Color Chart.

Selected soil samples collected above the saturated zone will be retained for chemical analysis for the specific chemical parameters discussed in Task 5. Soil samples will be collected in clean stainless steel liners, covered on both ends with aluminum foil and plastic end caps. Soil samples will then be labeled, placed in a cooler with blue ice and transported, under Chain-of-Custody to a California State-certified analytical laboratory.

TASK 4. The monitoring wells will be properly developed prior to collecting ground-water samples. Following well development, the wells will be sampled for parameters listed in Task 5.

TASK 5. Soil and ground-water samples will be analyzed for TPH-Gasoline using EPA Method 8015 (Modified); and Benzene, Toluene, Ethylbenzene, Xylenes (BTEX) using EPA Method 8020/602.

TASK 6. An aquifer test will be conducted using Well AR-1 to assess the feasibility of groundwater extraction as a remedial option. This well has been located adjacent to Well MW-2 which historically has been reported as containing the highest hydrocarbon concentrations.

TASK 7. Upon completion of field work and receipt of chemical analytical data, a report will be prepared presenting the field and laboratory data, including copies of the exploratory borings logs, certified analytical reports, a brief site history a summary of off - site investigations, a one-half mile well survey, and environmental record review and the results of the aquifer test. This report will be prepared under the supervision of a State of California Registered Geologist.

If you have any questions, please call.

GeoStrategies Inc. by,

for Randall S. Young
Geologist

John F. Vargas
Senior Geologist
R.G. 5046

RSY/JFV/shl

Plate 1. Vicinity Map
Plate 2. Site Plan/Potentiometric Map
Plate 3. TPH-Gasoline Isoconcentration Map
Plate 4. Benzene Isoconcentration Map

Appendix A: HLA TPH-Gasoline and BTEX Distribution Maps

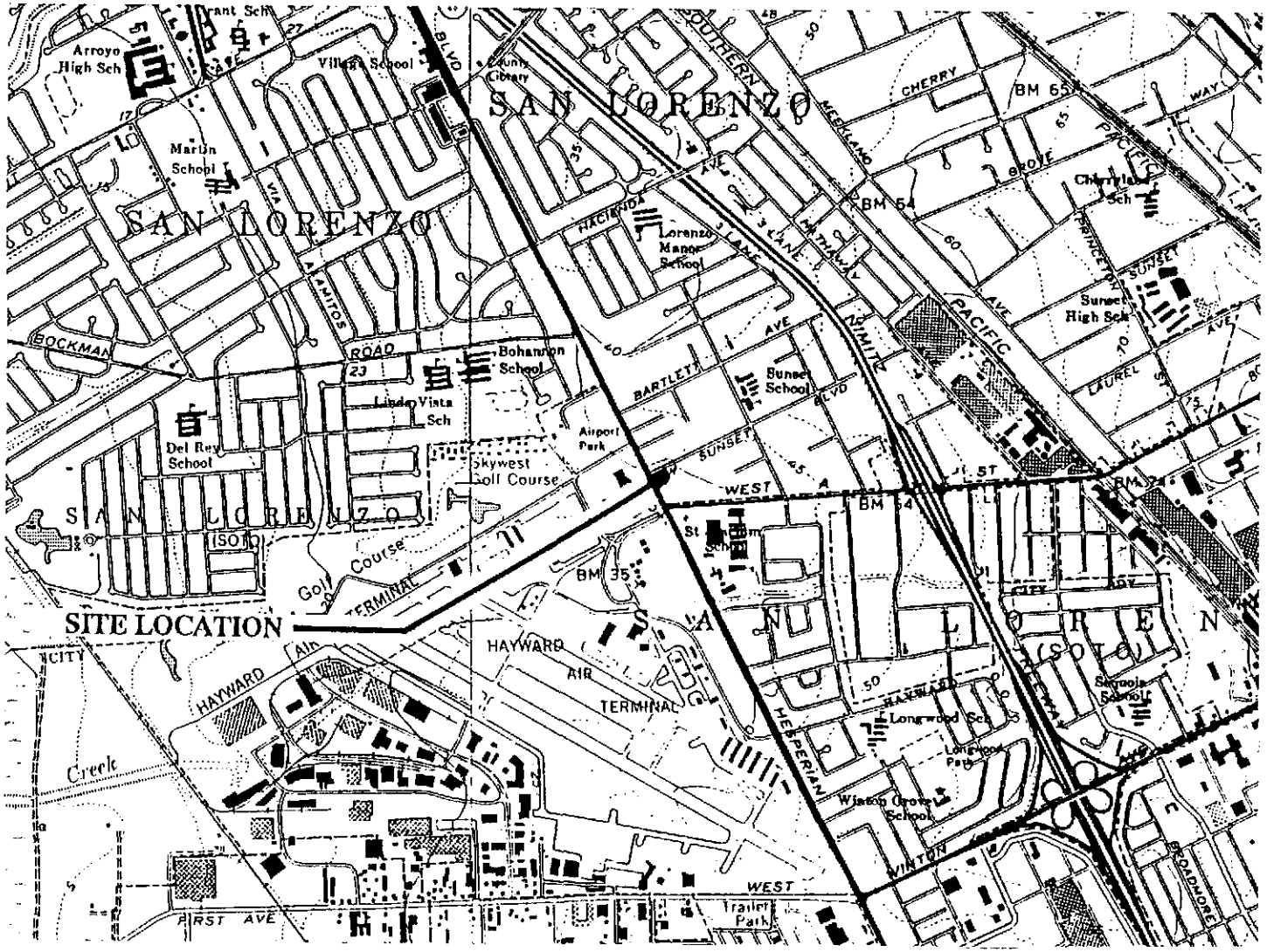
QC Review: MCC

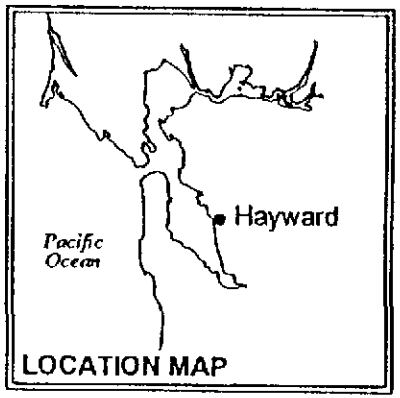
References Cited

Groundwater Technology, 1986. Report describing the results of four soil borings and three groundwater monitoring wells; August 21, 1986.

Harding Lawson Associates, 1991. Report describing the result of third quarter groundwater sampling: December 17, 1991.

GeoStrategies Inc. 1992. Well Installation Report: dated March 6, 1992.





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Scale in Feet

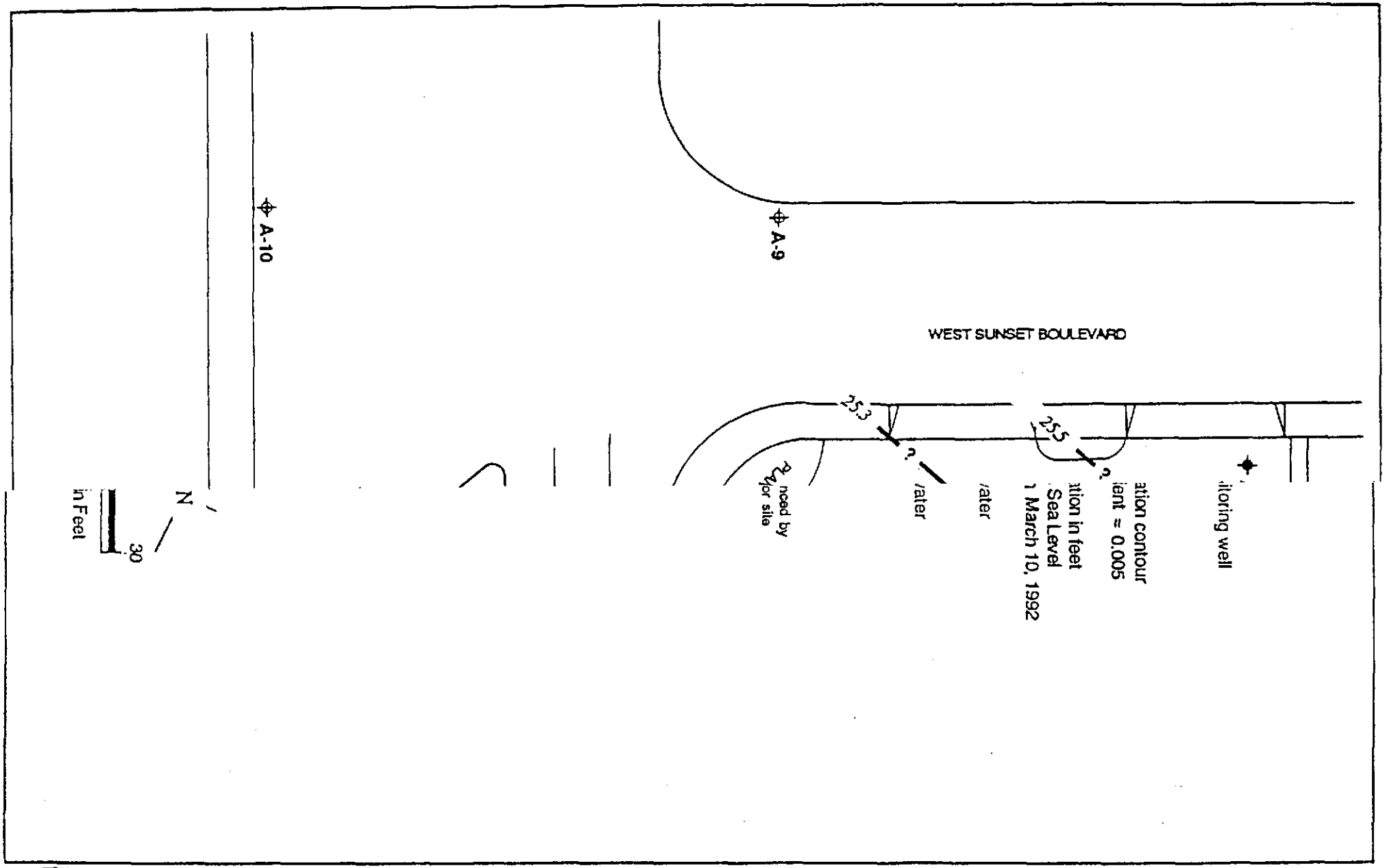
Base Map: USGS Topographic Map

GeoStrategies Inc.

VICINITY MAP
ARCO Service Station #5387
20200 Hesperian Boulevard
Hayward, California

PLATE 1

JOB NUMBER	REVIEWED BY	DATE	REVISED DATE
7926		11/91	

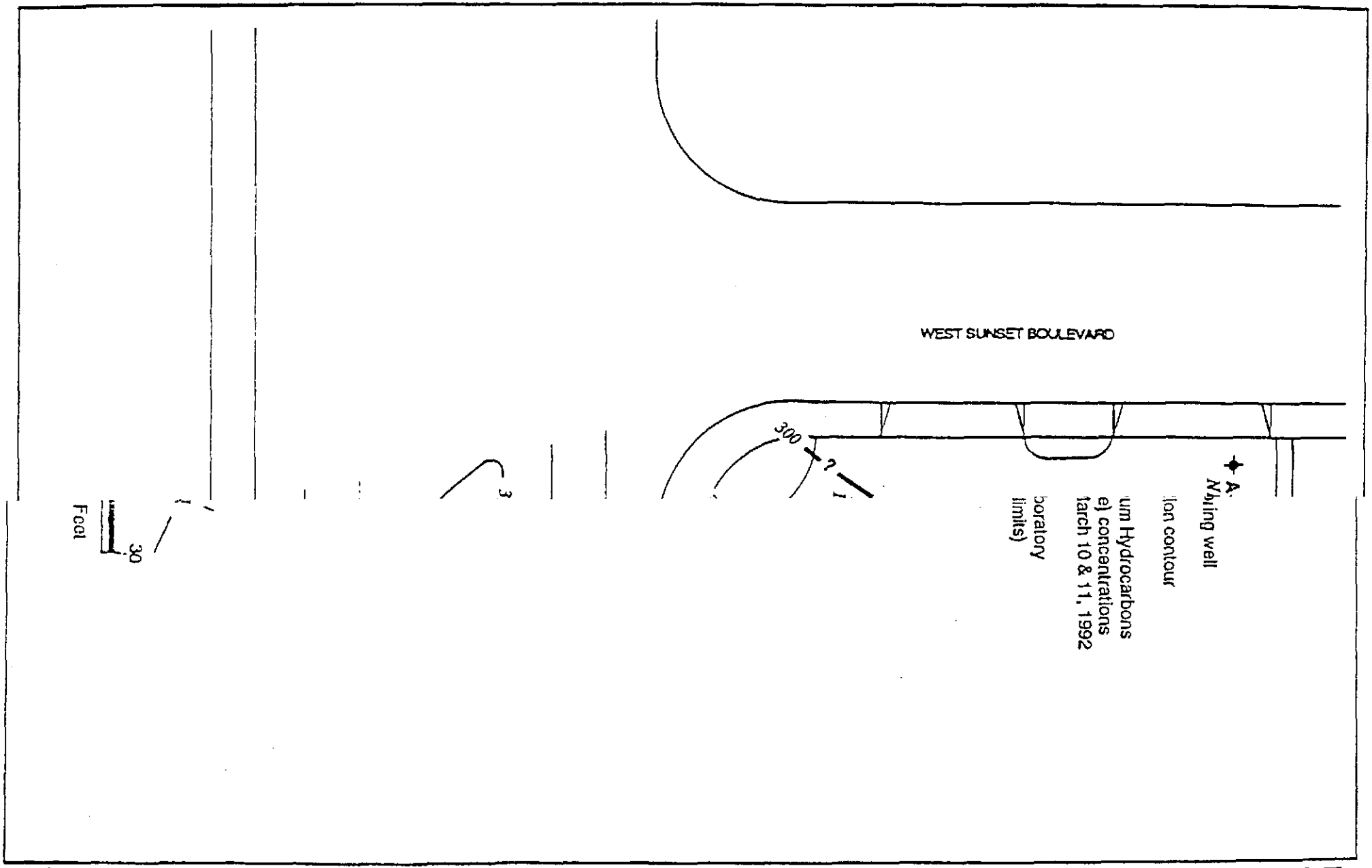


GeoStrategies Inc.

SITE PLAN/POTENTIOMETRIC MAP
ARCO Service Station #5387
20200 Hesperian Boulevard
Hayward, California

PLATE 2

JOB NUMBER	REVIEWED BY	DATE	REVISED DATE	REVISED DATE
792604-6		6/92	7/92	

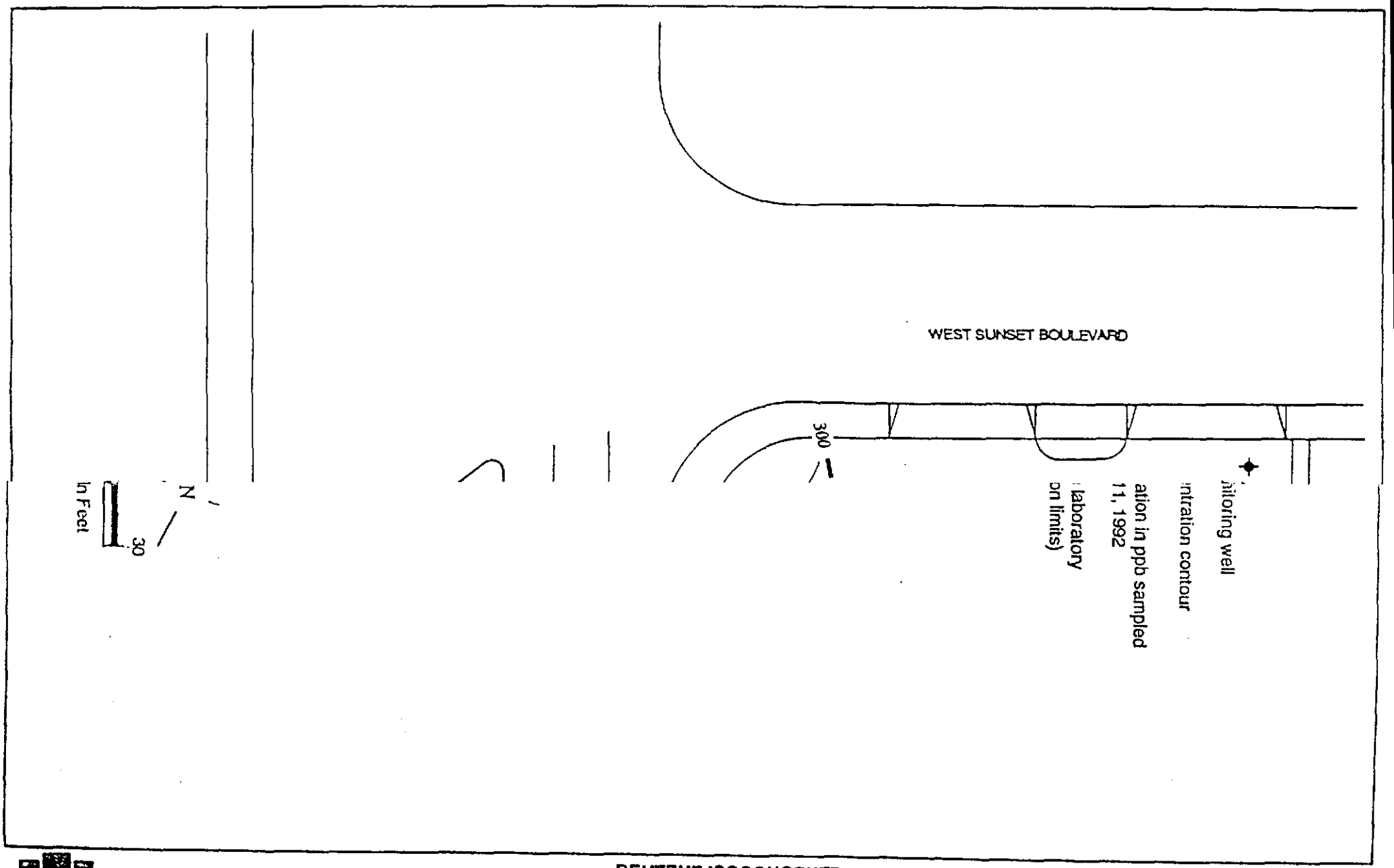


GeoStrategies Inc.

TPH-G ISOCONCENTRATION MAP
ARCO Service Station #5387
20200 Hesperian Boulevard
Hayward, California

PLATE
3

JOB NUMBER	REVIEWED BY	DATE	REVISED DATE	REVISED DATE
792604-6	KCM	6/92		



GeoStrategies Inc.

BENZENE ISOCONCENTRATION MAP
ARCO Service Station #5387
20200 Hesperian Boulevard
Hayward, California

PLATE
4

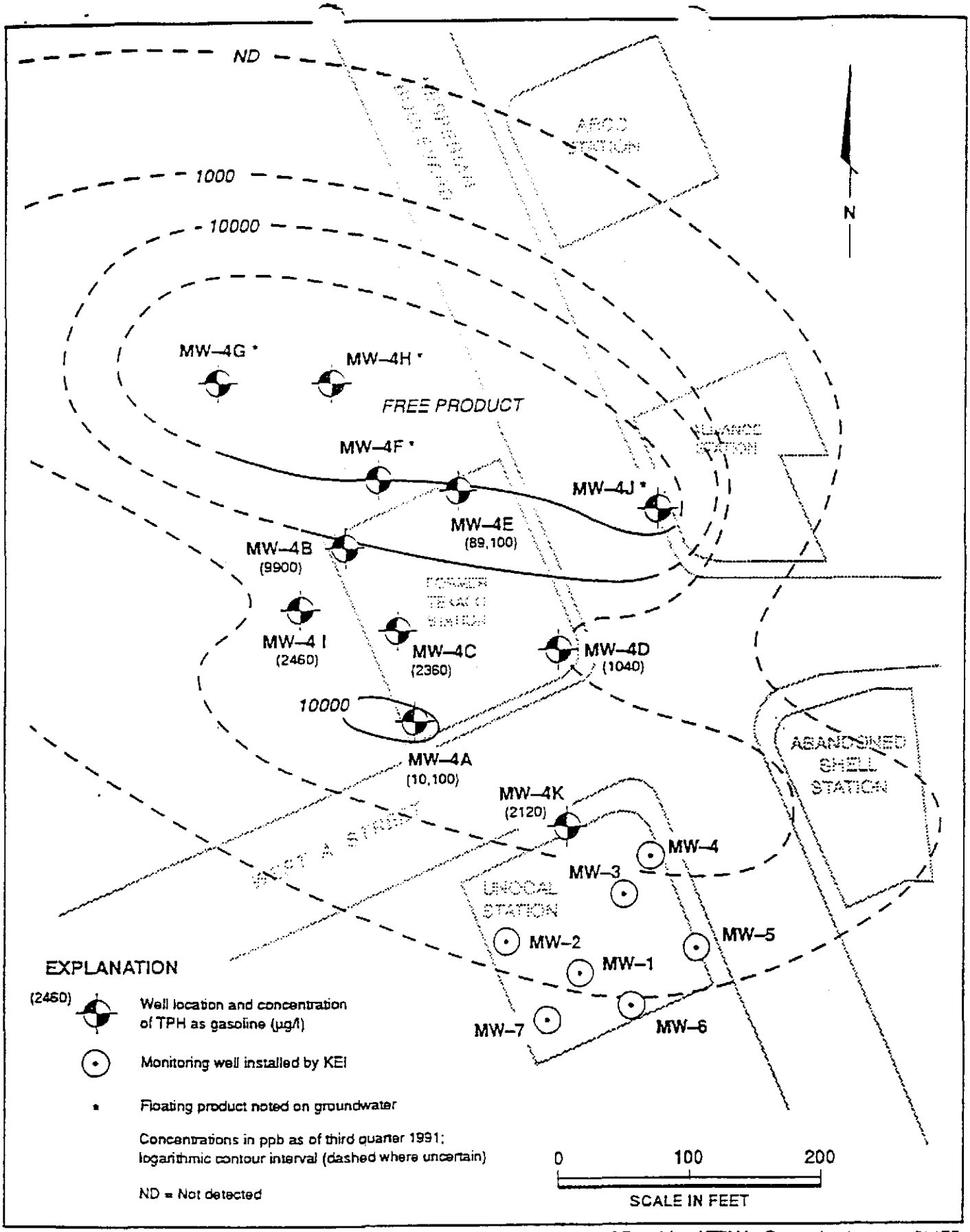
JOB NUMBER
792604-6

REVIEWED BY

DATE
6/92

REVISED DATE

REVISED DATE

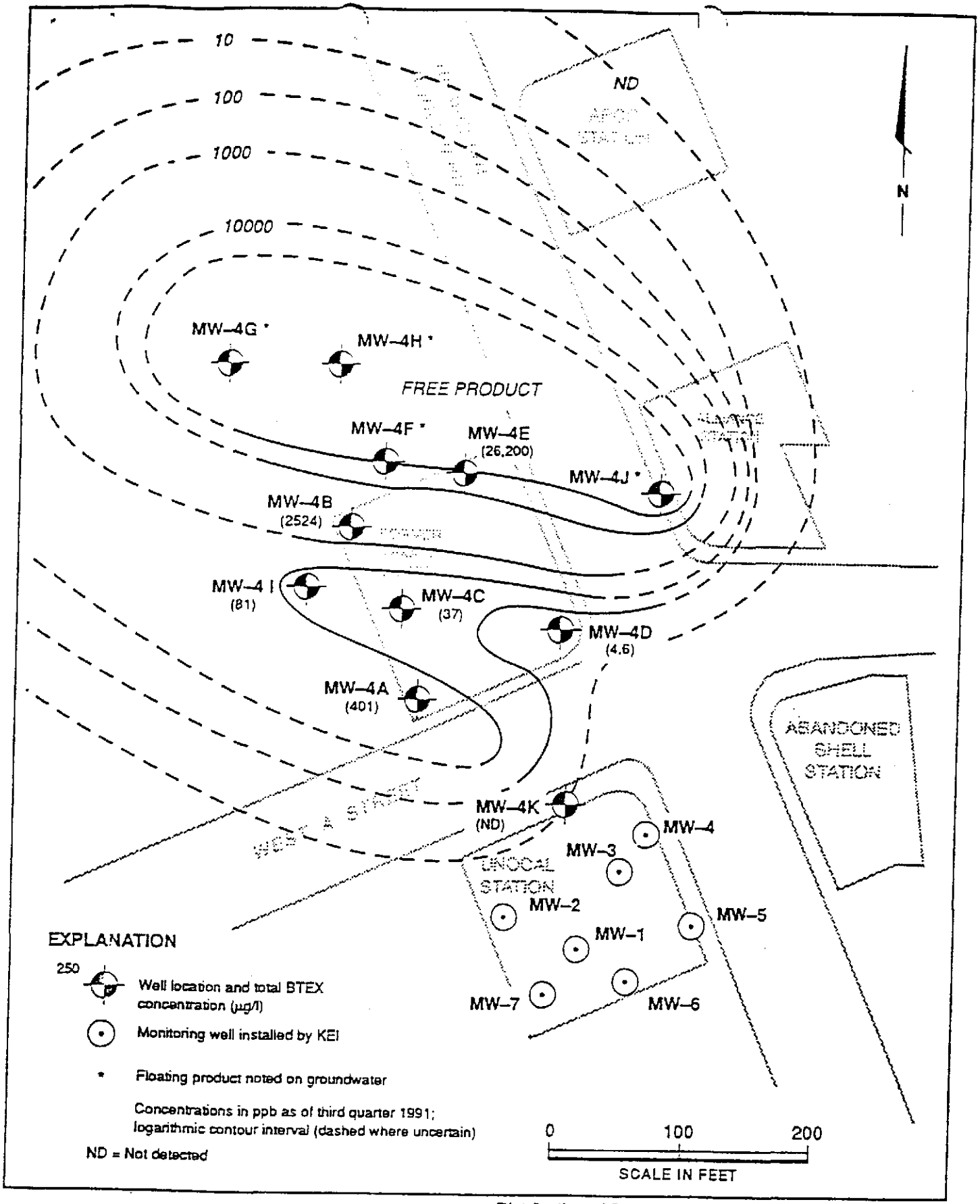


Harding Lawson Associates
Engineering and Environmental Services

Distribution of Combined TPH in Groundwater
Former Texaco Station
20499 Hesperian Boulevard
Hayward, California

PLATE 5

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
S. Patel	2251.176.03		12/12/91	



Harding Lawson Associates
Engineering and Environmental Services

Distribution of Combined BTEX in Groundwater
Former Texaco Station
20499 Hesperian Boulevard
Hayward, California

PLATE 6

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
S. Patel	2251.176.03		12/12/91	