GEOMATRIX

REMEDIAL ACTION WORK PLAN
PHASE 1 DEVELOPMENT AREA
SUNNYSIDE NURSERY

Hayward, California

Prepared for

The Plymouth Group
1616 N. Shoreline Boulevard
Mountain View, California

November 1991
Project No. 1886.01

Geomatrix Consultants

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21 November 1991
Project 1886.01

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Mr. Hugh Murphy
City of Hayward Fire Department
Hazardous Materials Office
22300 Foothill Boulevard
Hayward, California 94541

Subject: Remedial Action Work Plan
Phase I Development Area Sunnyside Nursery
23934 Mohr Avenue
Hayward, California

Dear Mr. Murphy:

On behalf of The Plymouth Group (Plymouth) of Mountain View, California, Geomatrix Consultants, Inc. (Geomatrix), is enclosing a remedial action work plan for the subject site. As we discussed in the 8 August 1991 meeting with you and Plymouth representatives, this remedial action work plan was based on the conditions described in the 6 November 1991 "Soil Investigation Report" prepared by Geomatrix for Plymouth.

The subject site is a 6.5-acre area (Phase I) of the 17-acre former Sunnyside Nursery parcel that Plymouth plans to prepare for development. This report presents the pesticide remediation approach and abstracts of similar successful remediation projects, and describes activities to be performed as part of the remedial soil excavation at the Phase I development area. Details regarding field methods and regulatory compliance are discussed as well.

Your continued participation on this project is appreciated. If you have any questions or wish to discuss the remedial action work plan, please contact either of the undersigned.

Sincerely yours,

GEOMATRIX CONSULTANTS, INC.

Elizabeth K. Wells

Elizabeth K. Wells, P.E.
Project Engineer

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Tom Graf, P.E.
Vice President

Enclosures
cc: Pamela Evans, ACHCSA
Scott Wolff, ERS
Curtis Peterson, Plymouth

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Hayward, California

1.0 INTRODUCTION

The Plymouth Group (Plymouth), retained Geomatrix Consultants, Inc. (Geomatrix), to develop this remedial action work plan for the Phase I development of the Sunnyside Nursery parcel. This work plan, which was prepared for review and approval by The City of Hayward Fire Department and the Alameda County Health Care Services Agency (ACHCSA), was performed in accordance with Geomatrix's scope of services submitted to Plymouth on 19 September 1991.

The Sunnyside Nursery parcel is an approximately 17-acre site located in the City of Hayward in Alameda County, California (Figure 1). The Phase I development involves approximately 6.5 acres of the 17-acre site. The Phase I area is shown on Figure 2. Prior to 1955, the site was used as agricultural land. In about 1955, the Sunnyside Nursery began growing ornamental plants. The nursery discontinued operations in the summer 1990. The Phase I area of the Sunnyside Nursery parcel currently is proposed for residential development.

2.0 PREVIOUS WORK

In January 1989, 24 near-surface soil samples were collected at the 17-acre site by Terratech, Inc. (Terratech), of San Jose, California. The soil samples were analyzed for metals (US Environmental Protection Agency [EPA] Method 6010); volatile organics (EPA Method 8240); oil and grease (EPA Method 413.1); benzene, toluene, ethylbenzene, and xylenes (BTEX, EPA Method 8020); and organochlorine pesticides and polychlorinated biphenyls (PCBs; EPA Method 8080). These soil samples included discrete and composite

samples. One groundwater sample also was obtained from the site during this investigation. Terratech's February 1989 report to Plymouth, entitled "Phase I, Environmental/Toxics Investigation, Sunnyside Nursery", summarizes this work. DDT-family, endrin, and endosulfan-family organochlorine pesticides were detected in soil samples taken from the Phase I development area. In addition, oil and grease was detected at concentrations that ranged from 40 to 380 mg/kg in the three samples analyzed.

The 22 June 1991 report entitled "Health Risk Assessment, Sunnyside Commons Project, Hayward, California" was prepared for Plymouth by Environmental Risk Sciences, Inc. (ERS), of San Francisco, California. In this report, ERS developed cleanup concentrations for DDT-family, endrin, and endosulfan-family pesticides for the Sunnyside Nursery parcel; these cleanup levels were used in developing the following work plan.

In December 1990 and February 1991, Terratech collected an additional 58 discrete near-surface soil samples from the 17-acre site. These samples were analyzed for organochlorine pesticides using EPA Method 8080 and were used to further characterize soil at specific locations. DDT-family, endrin, endosulfan-family, and chlordane pesticides were detected in samples collected in the Phase I area. Chlordane had not been detected before.

On 2 October 1991, Geomatrix collected 18 discrete and two composite near-surface soil samples in the Phase I development area. These samples were collected to further characterize the distribution of pesticides, evaluate the site for previously undetected pesticides, and evaluate the presence of diesel-affected soil. Thirteen of the discrete samples were analyzed for organochlorine pesticides using EPA Method 8080. Three of the discrete samples were analyzed for diesel and oil (EPA Method 3550). Two discrete samples were analyzed for both organochlorine pesticides and diesel and oil. The composite samples were analyzed for arsenic and lead (EPA Methods 7061 and 7420); organophosphates (EPA Method 8140); and carbamates (EPA Method 632).

DDT-family and chlordane pesticides were detected in some discrete soil samples from the Phase I development area. The carbamate pesticide diuron also was detected in one composite sample collected in the Phase I area. No other pesticides were detected. One discrete soil sample contained 400 mg/kg of diesel. The sampling activities and analytical results are summarized in Geomatrix's 6 November 1991 "Soil Investigation Report, Sunnyside Nursery-Phase I Development", submitted to Plymouth.

ERS developed cleanup concentrations for chlordane and diuron for the Sunnyside Nursery parcel. These cleanup concentrations are cited in their 14 November 1991 memorandum to Plymouth entitled "Safe Soil Levels for Chlordane and Diuron Detected in Surface Soil at the Sunnyside Nursery" and were used in developing this work plan.

3.0 PESTICIDE REMEDIATION APPROACH

Based on the site configuration, volume of affected soil, and available analytical data, we propose to perform pesticide remediation by blending. Soil containing pesticides at concentrations that exceed cleanup concentrations (pesticide-affected soil) will be blended with soil containing pesticides at concentrations less than cleanup concentrations or less than analytical method detection limits (less-affected soil). A follow-up sampling program will be performed to confirm that the resultant blended soil does not contain pesticides above cleanup concentrations. Soil that is not suitable for blending, i.e., soil that contains pesticides at concentrations that are more than roughly three times the respective cleanup concentrations (heavily-affected soil), will be stockpiled on site.

Soil blending as a remediation technique has been used successfully for pesticide-affected soil at several sites in the San Francisco Bay Area. Geomatrix abstracted three of these projects based on research of project files at the State of California Department of Toxic Substance Control (DTSC) (formerly the Department of Health Services [DHS]) in Berkeley, California. These abstracts, which include type of pesticide, cleanup concentrations, and volume of soil remediated, are presented below.

3.1 SHADOW WOOD SITE, SAN JOSE, CALIFORNIA

This 14-acre site proposed for residential development had been used for agricultural purposes and had contained both open fields and greenhouses. DDT-family pesticides at concentrations that exceeded the cleanup concentrations were identified in soil samples from four areas of the site. Two of these areas contained soil having DDT-family concentrations greater than 7.0 milligrams/kilograms (mg/kg). Soil having concentrations greater than approximately 2.0 mg/kg (roughly 1500 cubic yards) was excavated from these two areas and removed from the site. The two other areas contained soil that had mean DDT concentrations of 1.60 mg/kg and 2.45 mg/kg. The California Code of Regulations (CCR) Title 22 Total Threshold Limit Concentration (TTLC) of 1.00 mg/kg for DDT-family compounds was used as a target cleanup concentration for this project.

Remediation involved placing an approximate 1-foot layer of unaffected soil over the four identified areas. These areas were then scarified to a depth of approximately 3 feet and compacted to provide building pads for site development. Approximately 9000 cubic yards of pesticide-affected soil were remediated.

3.2 PARCEL 1, GREENBRIAR FUDENNA PROPERTY, FREMONT, CALIFORNIA

This project involved the remediation of soil on a 4.5-acre parcel that was planned for residential development. Endrin and DDT-family pesticides were detected in on-site soil at concentrations that exceeded TTLC. Analytical results indicated that there were small pockets of less-affected soil scattered among the zones of affected soil. For expediency, the entire site was remediated. Both pesticide-affected and less-affected soil was excavated and stockpiled on site. This soil was then placed in the excavated areas in loose lifts and thoroughly blended. Approximately 20,000 cubic yards of pesticide-affected soil was remediated.

Soil samples taken after blending revealed endrin concentrations that ranged from less than 0.01 to 0.03 mg/kg and summed DDT-family compounds that ranged from 0.01 to 0.617

mg/kg, below the established cleanup levels. The DHS concurred on this on-site remediation program.

3.3 PARCEL 2, GREENBRIAR FUDENNA PROPERTY, FREMONT, CALIFORNIA

This site, covering approximately 14.2 acres, was planned for residential development. Endrin and DDT-family compounds in concentrations that exceeded TTLCs were detected in soil samples from the site. Cleanup concentrations were developed based on DHS health risk evaluation guidelines. Approximately 250,000 cubic yards of pesticide-affected and less-affected soils were blended.

Confirmation sampling of the blended, compacted soil indicated that endrin levels generally were below method detection limits, except for two samples that contained concentrations of 0.03 and 0.05 mg/kg. DDT concentrations ranged from less than method detection limits to 0.22 mg/kg for most samples, except for two that contained 0.45 and 0.68 mg/kg of DDT. The DHS concurred that the removal action was adequately carried out as stated in the 26 April 1991 letter from Dick Jones of the DHS to Michael Meyer of Greenbriar Development.

4.0 REMEDIATON WORK PLAN

Plans for remediation of the 6.5-acre Phase I development area include the approach and tasks described below.

4.1 SITE HEALTH AND SAFETY PLAN

Before beginning field activities, the Geomatrix site health and safety plan (HSP) will be updated to reflect remediation activities. The HSP will address the chemical and physical hazards associated with excavating and soil sampling. Both the contractor and Geomatrix will be required to supply a health and safety plan for their respective personnel on the job site. Dust control by wetting surface soil will be required before and during excavation

activities. Water trucks are recommended for this procedure. Conditions may require ambient air monitoring during excavation activities.

4.2 PERMITS

If the site improvement plan is approved by the City of Hayward before remediation activities begin, and the remediation grading is included in the plan, no permits specific to the remediation will be required. However, a grading permit is required from the City of Hayward for the proposed remediation if the remediation work is not included in the site improvement plan, or if the site improvement plan is not approved before remediation activities begin. The grading permit will be applied for through the Permit Engineer in the Building Inspection Department of the City of Hayward. Based on our research, no other permits are required.

4.3 HYDROCARBON REMEDIATION

Initial remediation will consist of removing the diesel-affected soil from the Phase I development area and stockpiling it in another area of the Sunnyside Nursery parcel. Sampling of the bottom and sides of the excavation will be performed to confirm the removal of diesel-affected soil. These samples will be delivered under Geomatrix chain-of-custody protocols to a state-certified analytical laboratory for analysis by EPA Method 3550. If diesel concentrations in the soil samples exceed the method detection limit of 10 mg/kg, additional excavation will be performed, and confirmation samples again will be collected and analyzed. This process will be continued until confirmation results are below the detection limit of 10 mg/kg.

Four soil samples will be collected for each approximate 50 cubic yards of stockpiled soil. Each set of four samples will be composited into one by a state-certified analytical laboratory and analyzed for diesel using EPA Method 3550. Based on the analytical results of the composited samples, the stockpiled diesel-affected soil will be transported to a Class III disposal facility or bioremediated on site until diesel concentrations are acceptable for

disposal at a Class III facility. Additional analytical testing may be required for acceptance of the diesel-affected at Class III facilities.

4.4 PESTICIDE REMEDIATION

As mentioned above, ERS established soil cleanup concentrations for all pesticides detected in soil on the Phase I development area. These concentrations are as follows:

DDT-family compounds	-	1.00 mg/kg
Endrin	-	0.20 mg/kg
Endosulfan-family compounds	-	3.50 mg/kg
Chlordane	-	0.54 mg/kg
Diuron	-	140.00 mg/kg

4.4.1 Soil Removal and Confirmation Sampling

Six areas containing pesticide-affected soil have been identified in the Phase I development area. The estimated boundaries of these areas are shown on Figure 2. The pesticide-affected soil will be removed using a scraper, then stockpiled on site. Assuming that excavating to a depth of 18 inches is adequate to remove the pesticide-affected soil, the volume of pesticide-affected soil is estimated to be approximately 5500 cubic yards. Composite soil samples will be collected from the stockpiled pesticide-affected soil and analyzed for organochlorine by a state-certified analytical laboratory. Soil identified as unsuitable for blending, i.e., soil that contains pesticide concentrations at least three times greater than cleanup concentrations, will be segregated. Diuron was not detected above its cleanup concentration; therefore, confirmation analysis for diuron will not be required.

When the excavation is completed, soil samples will be collected to confirm the removal of pesticide-affected soil. Soil samples will be collected from the excavation bottom and sidewalls and delivered under Geomatrix chain-of-custody protocols to a state-certified analytical laboratory and analyzed for organochlorine pesticides using EPA Method 8080. If pesticide concentrations exceed cleanup levels, additional excavation will be performed. Excavation will continue until confirmation samples indicate that the soil containing pesticide concentrations above the stipulated cleanup concentrations has been removed.

After the pesticide-affected soil is removed, additional soil below and adjacent to the excavations will be removed by a scraper and stockpiled on site. The volume of additional soil excavated will be about three times that of the stockpiled pesticide-affected soil. Based on the previously cited Soil Investigation Report prepared by Geomatrix, we estimate that 5500 cubic yards of pesticide-affected soil and 17,000 cubic yards of additional blending soil will be excavated.

4.4.2 Blending

After completion of soil removal, the pesticide-affected soil will be placed between lifts of the less-affected blending soil as it is replaced in the excavation. The lifts will be loosely compacted not to exceed six inches. The lifts of soil will then be cut with discs and thoroughly blended using rototillers. After successful verification sampling (see Section 4.4.3), the soil will be compacted to at least 95% of maximum dry density, as measured in the laboratory using the ASTM D 1557 test method. Geomatrix will field check compaction using a nuclear density gauge. This process will be repeated until all of the stockpiled soil has been replaced and blended in the excavations. Backfilling using soil from other areas of the site may be required if a large volume of unblendable soil is removed from the site.

4.4.3 Verification Testing

Samples of the blended soil will be collected before final compaction to verify that the concentrations of pesticides are below cleanup concentrations established by ERS. Sample density will be at least one sample per blended lift sequence per acre. The soil samples will be analyzed by a state-certified analytical laboratory using EPA Method 8080. If analytical results of verification samples indicate that soil pesticide concentrations exceed minimum cleanup levels, additional grading and blending will be performed.

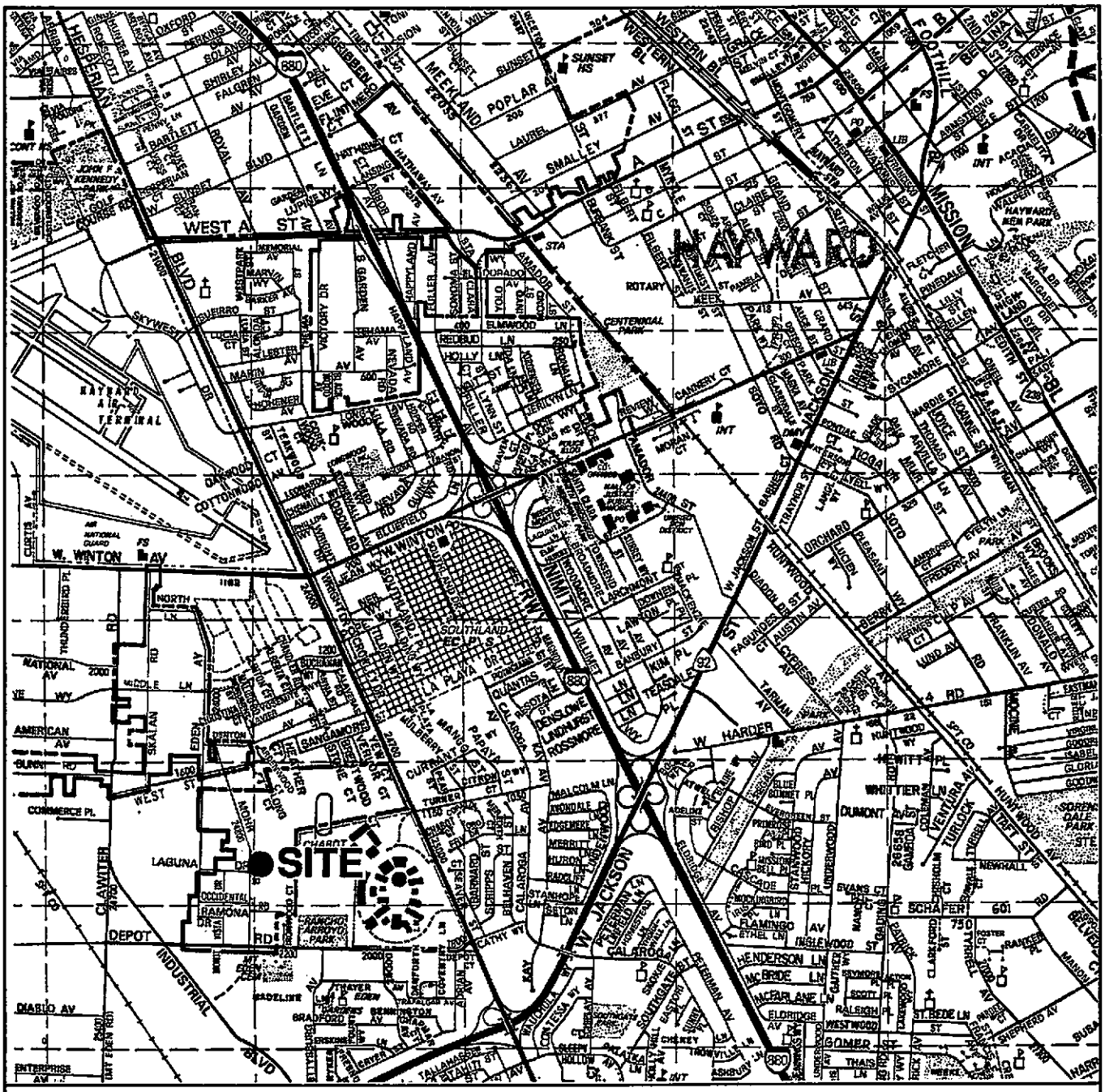
4.4.4 Confirmation Soil Sampling (Random)

Following final compaction, confirmation soil sampling will be performed on blended soil. To characterize the soil pesticide concentrations with a 95% confidence level, random

sampling will be performed following EPA Method SW-846. Surface and subsurface areas of the excavation will be subdivided into cells, and random confirmation sample numbers will be generated to identify sampling locations. Soil samples will be collected and delivered to a state-certified analytical laboratory for analysis by EPA Method 8080.

5.0 REPORTING

After remediation efforts have been completed, Geomatrix will prepare a technical report describing the remediation activities, soil sampling results, and site grading. This report will be submitted to the City of Hayward Fire Department and ACHCSA for final approval of remediation for the Phase I development area.



SITE LOCATION MAP
Phase I Development Area
Sunnyside Nursery
Hayward, California

Figure
1

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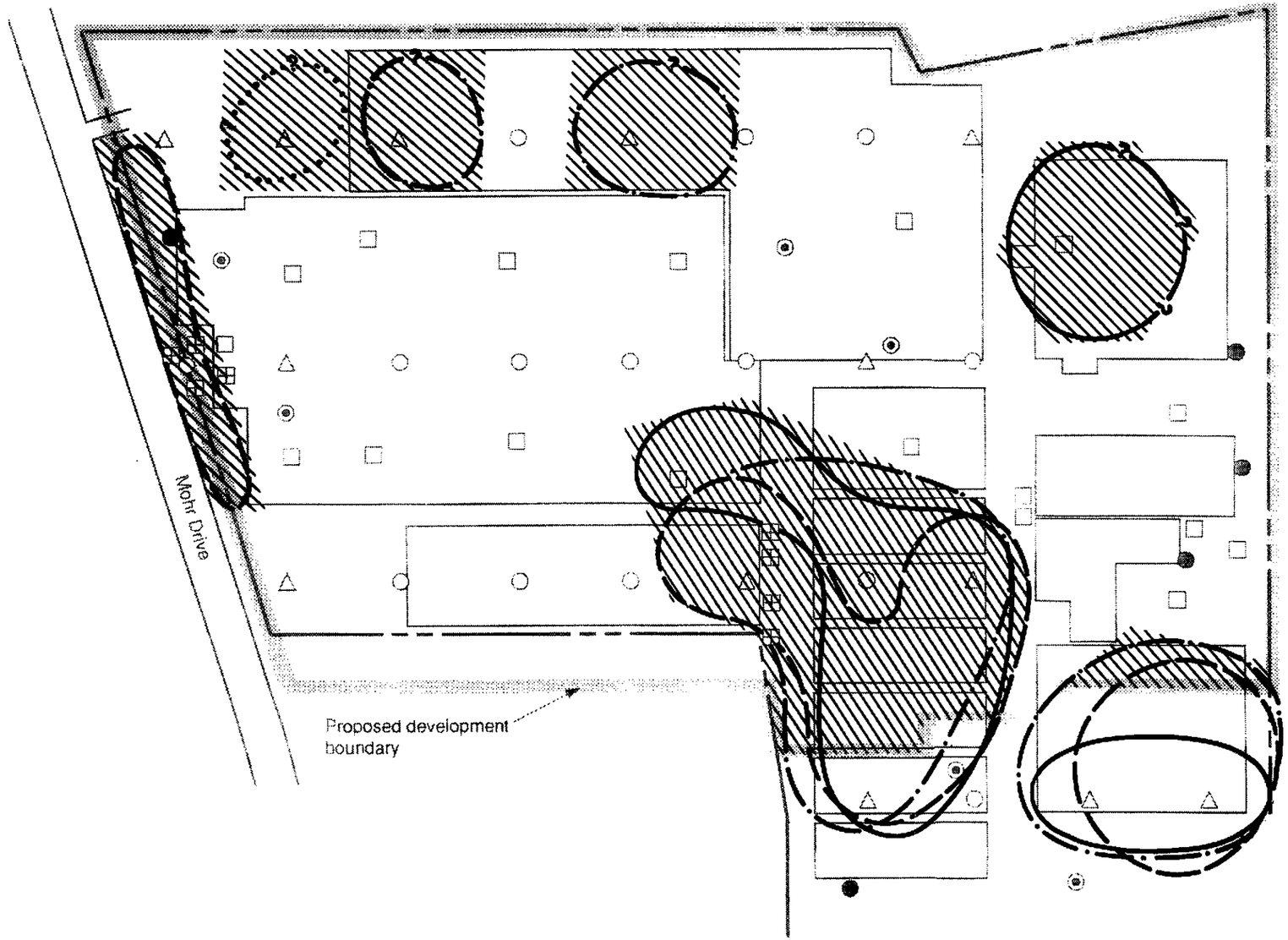

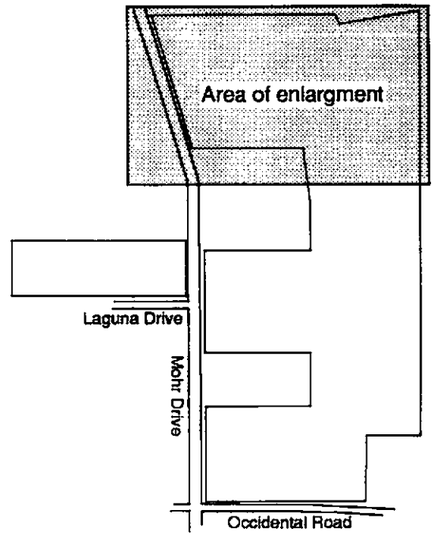

LOCATION MAP

EXPLANATION

- Estimated 1.0 mg/kg contour of DDT-family compounds
- Estimated 3.5 mg/kg contour of endosulfan-family compounds
- Estimated 0.2 mg/kg contour of endrin compounds
- Estimated 0.54 mg/kg contour of chlordane compounds
- Estimated area containing pesticide-affected soil to be remediated

Note

Contours based on analytical results of soil samples collected by Geomatrix Consultants, Inc. and others.

N

0 80 Feet

AREAS WHERE PESTICIDES IN SOIL EXCEED CLEANUP CONCENTRATIONS
Phase I Development Area
Sunnyside Nursery
Hayward, California

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