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GEOMATRIX

12 October 1993
Project 1886.03

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

Subject: Soil Sampling Work Plan
Sunnyside Nursery
Hayward, California

Dear Mr. Murphy:

Geomatrix Consultants, Inc. (Geomatrix), has developed a soil sampling work plan to supplement soil sampling programs previously performed at the remaining undeveloped portion of the Sunnyside Nursery site in Hayward, California. This letter presents a summary of previous soil investigations performed at Sunnyside Nursery site and regulatory approval for development of lots at the site. This soil sampling program will be used to develop a remedial action work plan for the subject site. The remedial action work plan will address health risk considerations raised by the City of Hayward Fire Department (HFD) and the Alameda County Health Care Services Agency (ACHCSA), and will describe remedial measures for both the HFD's and the ACHCSA's approval that are consistent with residential development of the site.

Geomatrix met with Dr. Ravi Arulanantham of the ACHCSA on 6 October 1993 to discuss health-based cleanup concentrations for pesticides that have been detected in surface soil within the Sunnyside Nursery site. During this meeting, Dr. Arulanantham also discussed his opinions regarding surface sampling coverage and analytical methods.

BACKGROUND

We understand that the TPG Development Group (TPG), of Mountain View, California, is planning to prepare approximately 15 acres of the Sunnyside Nursery parcel for residential development. The Plymouth Group (Plymouth) previously developed residential housing on approximately 3.3 acres of the site (Tracts 6078, 6260, and part of Tract 6391).

Initial Investigations

Terratech, Inc. - In January 1989, Terratech, Inc. (Terratech), of San Jose, California collected near-surface (3 to 6 inches below ground surface) soil samples at 24 locations within the Sunnyside Nursery parcel as part of a preliminary soil characterization study. The soil samples were analyzed for metals according to Environmental Protection Agency (EPA) Method 6010; volatile organic compounds (EPA Method 8240); oil and grease (Standard Method 413.1); benzene, toluene, ethylbenzene, and xylenes (EPA Method 8020); carbamates (EPA Method 632); and organochlorine pesticides and polychlorinated biphenyls (PCBs) according to EPA Method 8080. Analytical results from this soil sampling event indicated that organochlorine pesticides, including endosulfan-family compounds (endosulfan), DDT-family compounds (DDT), dieldrin, and endrin, were present in shallow soil throughout the site. No other pesticides were detected above laboratory detection limits. In addition, relatively low concentrations of oil and grease constituents were detected in 3 near-surface soil samples collected from the former shop and boiler room area located in the northeast corner of the site. Analytical results and discussions of these sampling activities are included in Terratech's February 1989 report entitled "Phase I, Environmental/Toxics Investigation, Sunnyside Nursery, Hayward California" prepared for Plymouth.

Health-based cleanup concentrations were developed for the pesticides detected in the study cited above by Environmental Risk Sciences, Inc. (ERS), of San Francisco, California. These cleanup concentrations are as follows: DDT-family compounds - 1.0 milligram/kilogram (mg/kg); endosulfan - 3.5 mg/kg; endrin - 0.2 mg/kg; dieldrin - 8.0 mg/kg. This work is discussed in the 22 June 1989 report entitled, "Health Risk Assessment, Sunnyside Commons Project, Hayward, California," prepared by ERS for Plymouth.

In the following discussion, concentrations of these pesticides that exceed these cleanup concentrations are referred to as "elevated concentrations". Elevated concentrations of endosulfan, DDT, and endrin were detected in soil samples collected during Terratech's January 1989 sampling event.

In December 1990 and February 1991, shortly after the nursery stopped operating, Terratech collected 58 additional near-surface samples from the Sunnyside Nursery parcel. These soil samples were analyzed for organochlorine pesticides and PCBs according to EPA Method 8080. DDT, endrin, and endosulfan were detected at elevated concentrations. Complete analytical results and discussions of these sampling activities are included in Terratech's 27 February letter report, "Status Report, Statistical

Characterization of Pesticide Concentrations, Sunnyside Nursery" and the 25 March 1991 letter report "Table Summary of Pesticide Results, Sunnyside Nursery," prepared for Plymouth.

Geomatrix - In October 1991, Geomatrix collected 13 additional near-surface soil samples within the northern 6.5 acres of the site; Plymouth originally intended to develop this portion of the Sunnyside Nursery site first. These samples were analyzed for organochlorine pesticides according to EPA Method 8080, carbamates (EPA Method 632), and organophosphate pesticides (EPA Method 8140), and arsenic and lead (EPA Methods 7061 and 7420, respectively). In addition, five near-surface soil samples were collected from the former shop and boiler room area located in the northeast corner of the site; these samples were analyzed for extractable hydrocarbons as diesel and oil according to EPA Method 3550/GCFID.

Analytical results from this sampling event indicated that DDT-family pesticides were present in surface soil at the site; endrin and endosulfan were not detected. The concentrations of arsenic and lead detected in the two soil samples are considered to be within background concentrations. Relatively low concentrations of extractable hydrocarbons as diesel were detected in three of the five soil samples; these concentrations were 2 mg/kg, 15 mg/kg, and 400 mg/kg.

The analytical results from the October 1991 soil sampling event are included in the 6 November 1991 report entitled "Soil Investigation Report, Sunnyside Nursery - Phase I Development, Sunnyside Nursery, Hayward, California" prepared for Plymouth.

Lots 1 through 12, Tract 6078

These lots are within a former residential area that borders Mohr Avenue and the western side of the Sunnyside Nursery facility and cover approximately 1.8 acres. Terratech collected three near-surface soil samples from within the Tract 6078 area; no pesticides were detected in these soil samples. In August 1992, Geomatrix collected ten soil samples from within the Tract 6078 area. Four soil samples were collected from 3 to 6 inches below ground surface, while six samples were collected from 12 to 18 inches below the ground surface. All ten soil samples were analyzed for organochlorine pesticides and PCBs according to EPA Method 8080, organophosphate pesticides (EPA Method 8140), carbamates and urea-based pesticides and herbicides (EPA Method 632). In addition, two soil samples were analyzed for California Code of Regulations Title 22 Metals (EPA Methods 6010 and 7000 series).

No EPA Method 8080 compounds were detected in nine of the samples; relatively low concentrations of DDT family compounds were detected in one sample. No organophosphate pesticides (EPA Method 8140) were detected in any of the samples. No EPA Method 632 compounds were detected in nine of the samples; a relatively low concentration of diuron (0.03 mg/kg) was detected in one sample. The concentrations of metals detected in the soil samples are considered to be within background concentrations.

The analytical results from the sampling event cited above are included in the 3 September 1992 letter report to Dr. Ravi Arulanantham of ACHCSA entitled "Results of Supplemental Sampling/Approval of Proposed Site Use, Sunnyside Nursery, Hayward, California." This Tract was cleared by the ACHCSA for development.

Lots 1 through 9, Tract 6260

These lots are within the former Sunnyside Commons II area that borders Mohr Drive and cover approximately 1.0 acres. Terratech's sampling in 1989-1991 included four near-surface soil samples in this area. An elevated concentration of aroclor 1254 (1.4 mg/kg) was detected in one of these samples. Plymouth reportedly removed soil in the vicinity of this sample location and conducted confirmation sampling.

In January 1993, Geomatrix collected 4 near-surface (6 to 12 inches below ground surface) statistically authoritative soil samples from the tract 6260 area. These samples were analyzed for organochlorine pesticides and PCBs according to EPA Method 8140 and organophosphate pesticides according to EPA Method 8140. No organophosphate pesticides were detected in the soil samples. Relatively low concentrations of organochlorine compounds were detected in the soil samples, including 4,4'-DDT at 0.017 and 0.062 mg/kg; 4,4'-DDE at 0.086 mg/kg; and, endrin at 0.110 mg/kg. Aroclor 1254 was detected at a concentration of 1.6 mg/kg in one of the soil samples; the source of the elevated concentration of aroclor is not known. In April 1993, approximately 17 cubic yards of soil was removed in the area where the soil sample that contained aroclor 1254 was collected; PCBs were not detected in the confirmation soil samples collected from within the excavation. The soil was transported under Non-Hazardous Waste Manifest to Forward, Inc., a state-licensed Class III disposal facility.

Details about the 1993 sampling, analytical results, and removal in this area are presented in the 12 May 1993 letter report to ACHCSA entitled "Results of Supplemental Soil Sampling and Removal of Soil Containing PCBs, Phase II Development Area, Sunnyside Nursery, Hayward, California." This Tract was cleared by the ACHCSA for development.

Lots 1 through 5, Tract 6391

These lots border Mohr Drive in the southwest corner of the Sunnyside Nursery site and cover approximately 0.5 acres. Terratech's sampling in 1989-1991 included 5 near-surface soil samples within this area. Elevated concentrations of endosulfan (26.7 and 11.4 mg/kg) were detected in two of the samples. In February 1993, Geomatrix collected both surface (3 to 6 inches below ground surface) and near-surface (6 to 12 inches below ground surface) soil samples at eight locations within this area; two samples were collected in the vicinity of the Terratech samples that contained elevated concentrations of endosulfan. These samples were analyzed for organochlorine pesticides and PCBs according to EPA Method 8080. Relatively low concentrations of dieldrin, endrin, and endosulfan were detected in three samples; no EPA Method 8080 compounds were detected in the other samples. Organophosphate pesticides (EPA Method 8140) were not detected in the three previous sampling events conducted by Geomatrix; therefore, this analysis was not conducted, as discussed in our 28 January 1993 letter to Dr. Ravi Arulanantham of the ACHCSA.

In March 1993, Geomatrix researched the environmental fate of endosulfan in surface soil. The results from this research indicated that endosulfan compounds break down in natural settings either biotically or abiotically, and have half-lives in soil of several days to a few months.

In April 1993, Geomatrix collected five additional soil samples near the two locations where Terratech had collected soil samples that contained elevated concentrations of endosulfan. Analytical results from these soil samples collected by Geomatrix confirmed the absence of endosulfan at these locations. Geomatrix discussed these findings with Dr. Arulanantham of ACHCSA, and Dr. Arulanantham cleared this area for residential development.

Both the memorandum summarizing Geomatrix's research on endosulfan-family compounds and the analytical results from the Tract 6391 sampling events also are included in the 12 May 1993 letter report to ACHCSA entitled "Results of Supplemental Soil Sampling and Removal of Soil Containing PCBs, Phase II Development Area, Sunnyside Nursery, Hayward, California."

PROPOSED SOIL SAMPLING WORK PLAN

Geomatrix proposes to collect surface and near-surface soil samples at 50 locations within the proposed development area. Soil samples will be collected to:

- confirm the absence of elevated concentrations of endosulfan (confirmation sampling)
- characterize the distribution of endrin and DDT in surface soil for remediation planning (characterization sampling)
- provide additional site coverage for identifying the presence of endrin, endosulfan, and DDT (supplemental sampling)
- further characterize the distribution of diesel in surface soils near the former shop and boiler room area (diesel characterization).

Soil samples will be collected from 3 to 6 inches below the ground surface (surface samples), and from 6 to 12 inches below the ground surface (near-surface) at each sampling location. The soil samples will be collected in accordance with local regulating agency requirements and Geomatrix protocols. Soil sampling activities are described in more detail below.

Confirmation Sampling

Terratech collected three soil samples that contained elevated concentrations of endosulfan within the proposed development area. Based on our research concerning the breakdown of endosulfan, Geomatrix believes that the absence of elevated concentrations of endosulfan in the proposed confirmation samples will indicate that the endosulfan detected in soil samples collected by Terratech has naturally degraded and is no longer present at significant concentrations at these locations. Geomatrix proposes to collect soil samples to confirm the absence of elevated concentrations of endosulfan in surface soil at these 3 locations (a total of 6 soil samples).

Characterization Sampling

Elevated concentrations of endrin and/or DDT were detected in surface soil samples collected by Geomatrix and Terratech at 17 former sampling locations within the proposed development area. Geomatrix proposes to collect surface and near-surface soil samples near these 17 locations (a total of 34 samples) to confirm current concentrations and

characterize the extent of elevated concentrations of endrin and/or DDT in these areas. The analytical results from these sampling locations will provide more information regarding the lateral and vertical extent of these pesticides in surface soils as well as confirm previous analytical results.

Supplemental Sampling
Soil samples will be collected from 25 locations within the proposed development area to further characterize the distribution of endrin and DDT in surface soil. The locations will be in areas where soil samples were not previously collected and will be intended to increase the surface coverage of previous sampling events. This additional soil sampling for pesticide analysis will increase the sampling coverage to approximately 8 pesticide sample locations per acre.

Diesel Characterization
Soil samples will collected from 5 locations within the area of the former shop and boiler room. These sample locations will be selected to evaluate current concentrations of diesel in surface soils and to supplement previous sampling events.

Laboratory Analysis
Geomatrix will deliver the samples, under Geomatrix chain-of-custody procedures to a state-certified analytical laboratory for chemical analysis. Confirmation, characterization, and supplemental soil samples will be analyzed for chlorinated pesticides and PCBs according to EPA Method 8080. In addition, Geomatrix will select a few of the 17 characterization soil samples to be analyzed for carbamates according to EPA Method 632. These samples will be selected from areas that previously had the highest concentrations of pesticides detected in surface soils. The diesel characterization soil samples will be analyzed for total petroleum hydrocarbons as diesel according to EPA Method 3550/GCFID.

Initially, soil samples collected from 3 to 6 inches below ground surface will be analyzed. If pesticides are detected at significant concentrations in the shallower sample, the deeper soil sample collected at this location will then be analyzed.

Organophosphate pesticides, volatile organic compounds, and elevated concentrations of metals have not been detected in surface soil within the site during previous soil sampling events; for this reason, we propose that the soil samples collected during this sampling plan not be analyzed for these constituents.

DEVELOPMENT OF REMEDIAL ACTION WORK PLAN

Based on the findings of the soil sampling work plan outline above, and work previously completed in the proposed development, Geomatrix will assess the extent of soil within the site that contains elevated concentrations of pesticides, and design a remedial action work plan. During preparation of the preliminary remedial action work plan, Geomatrix will meet with the HFD and the ACHCSA to discuss the analytical results and to refine remedial approaches. Based on discussions with the HFD and the ACHCSA, Geomatrix will prepare the final remedial action work plan for review by the ACHCSA and the HFD. The work plan will be a technical report that describes the findings of the soil sampling work plan, remedial activities to be performed, and the proposed time schedule. The plan will include a confirmation sampling program per HFD request.

Dr. Arulanantham has indicated that the ACHCSA can complete review of this soil sampling work plan within two weeks of receipt.

Due to the potential onset of winter rains, we would appreciate meeting with you and Dr. Arulanantham to discuss this soil sampling work plan as soon as it is convenient. We will contact you to arrange a meeting with you and Dr. Arulanantham.

Please contact either of the undersigned if you have any questions.

Sincerely,

GEOMATRIX CONSULTANTS, INC.

Jeffrey C. Nelson, P.E.
Project Engineer

Tom Graf, P.E.
Vice President

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cc: Dr. Ravi Arulanantham, ACHCSA