REVISED REMEDIAL INVESTIGATION REPORT

City of Riverside Agricultural Park

Crest Avenue and Jurupa Avenue

Riverside, California

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Geomatrix

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This report was prepared by the staff of Geomatrix Consultants, Inc., under the supervision of the Engineer(s) and/or Geologist(s) whose signature(s) appear hereon.

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REMEDIAL INVESTIGATION REPORT
City of Riverside Agricultural Park
Crest Avenue and Jurupa Avenue
Riverside, California

1.0 INTRODUCTION

Geomatrix Consultants, Inc. (Geomatrix), has prepared this report on behalf of the City of Riverside (City) to present the findings of remedial investigation (RI) activities conducted at and in the vicinity of the City Agricultural Park located immediately east of the intersection of Crest and Jurupa Avenues (the Site; Figure 1). This report was revised to respond to comments made by California Environmental Protection Agency, Department of Toxic Substances Control (DTSC), from its review of our prior RI report dated April 29, 2005 (Geomatrix, 2005). The RI activities completed include demolition of a former treatment plant digester, consolidation of former treatment plant concrete debris, and sampling and analysis of soil. In conjunction with these RI activities, a preliminary human health risk assessment (HHRA) was conducted by Dr. Jill Powder of ENV America (a Board-certified toxicologist retained by the City). The results of the HHRA will be reported under separate cover. The RI activities described herein were performed in accordance with our June 15, 2004 Sampling, Analysis, Demolition, and Debris Consolidation Plan (Work Plan), which was submitted to the County of Riverside Community Health Agency, Department of Environmental Health (the County). The County approved the Work Plan in a letter to the City dated June 21, 2004, which is included in Appendix A.

This report also presents the results of sampling performed by Geomatrix and others prior to development and approval of the Work Plan. These additional sampling activities include sampling and analysis of concrete, rock, and soil.

1.1 PURPOSE

The purpose of the remedial investigation activities described in this report was to:

- characterize the concrete and rock debris from the digester and other treatment plant facilities for disposal purposes;
- complete demolition of the remaining portion of the former treatment plant digester and consolidate the eight existing concrete stockpiles to facilitate further soil assessment activities in these areas;

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- further assess the lateral and vertical extent of PCB-impacted soil;
- evaluate soils for additional potential contaminants;
- evaluate concentrations of potential contaminants, including PCBs, in the Site drainages; and
- assess the potential presence of PCBs in soil in the off-site northwest drainage and in residential backyards adjacent to the southern Site boundary.

The findings from the remedial investigation activities provide the basis for the preliminary HHRA and will be used to perform treatability and feasibility studies, and to prepare a remedial action plan.

1.2 SITE DESCRIPTION

The Site is located immediately east of the intersection of Crest and Jurupa Avenues in Riverside, California (Assessor's Parcel Numbers 155-040-004 and 155-040-005; Figure 1). The Site is generally level except where two north-trending drainages create up to 35 feet of relief (Figure 2). The north-trending drainages merge and extend off the northwest portion of the Site and merge with the Santa Ana River approximately 1000 feet northwest of the Site (Figure 2.1). Currently, the Site is almost entirely undeveloped, except for a roof structure in the central part of the Site (Figures 2 and 3). Bordering the east and south of the Site are residential neighborhoods. To the west of the Site are Crest Avenue and a residential neighborhood. The Santa Ana River is approximately 1000 feet north of the Site.

1.3 GEOLOGIC AND HYDROGEOLOGIC SETTING

The Site is located in the Upper Santa Ana River Drainage Area, which includes the Upper Santa Ana Valley, San Jacinto Valley, and Elsinore Valley. The boundaries of the Upper Santa Ana River Drainage Area are the San Gabriel, San Bernardino, and San Jacinto Mountains (northern and eastern boundaries), and the Chino Hills and the Santa Ana Mountains (western and southern boundaries; DWR, 1966). The bordering mountain ranges and basement rock include Mesozoic-age granitic, metamorphosed clastic and volcanic rocks. The Upper Santa Ana River Valley in the Site vicinity includes Recent-age alluvium, Pleistocene-age non-marine sedimentary rocks, and exposed area of Mesozoic-age granitic basement rocks (CDMG, 1986).

The Santa Ana River, located approximately 1000 feet north of the Site, is the principal surface water drainage feature in the area (Figure 2.1). The Santa Ana River begins in the San

Bernardino Mountains and flows to the southwest across the Upper Santa Ana River Valley to the Santa Ana Canyon below Prado Dam. The Santa Ana River then crosses the coastal plain of Orange County and discharges to the Pacific Ocean between Newport and Huntington Beaches (DWR, 1966).

The Site is located in the Riverside-Arlington sub-basin of the Upper Santa Ana Valley Groundwater Basin (Basin Number 8-2.03) as defined by the California Department of Water Resources (DWR, 2003). According to the California Regional Water Quality Control Board, Santa Ana Region (RWQCB), the Site is within the boundary of the Arlington and Chino Hydrologic Subarea of the Middle Santa Ana River Hydrologic Area of the Santa Ana River Hydrologic Unit (Units 801.21 and 801.26). According to the RWQCB (1995), groundwater within Units 801.21 and 801.26 is of beneficial use.

1.4 SITE HISTORY

A discussion of the Site history and previous environmental investigations is provided in the following subsections.

1.4.1 Site History and Use

The site is 59 acres and formerly was part of the United States Army Camp Anza. A former sewage treatment plant constructed by the Army in 1942 to treat wastes generated at Camp Anza occupied about 46 acres of the 59-acre site. The eastern-most 11 acres of the site and the northwestern-most 2 acres of the site, which are separated from the former treatment plant area by drainages, historically have been undeveloped. Based on information reviewed by Geomatrix, it appears the United States Army operated the sewage treatment plant at the Site from 1942 to 1947. Anza Realty Company operated the sewage treatment plant from about 1947 to 1953. The Anza Utility Company, later known as the Arlington Utility Company, operated the sewage treatment plant from 1953 to 1962. The City operated the sewage treatment plant from 1962 to 1965. At various times during the period of operation, the sewage treatment plant reportedly accepted waste from industrial, commercial, and residential customers. The treatment plant was decommissioned in 1965 when the City diverted this waste flow to its sewage treatment plant on Acorn Street in the City, which opened in 1942. The treatment plant at the Site included filters, clarifiers, a digester, sludge drying beds, and brine basins. The General Layout Plan of former Camp Anza in 1945, with the Site delineated, is included in Appendix B. An aerial photograph from 1963 with the treatment plant features identified is shown on Figure 4.

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Since 1965 the Site has remained undeveloped. At various times since 1965, there have been intermittent recreational uses of the Site. The recreational uses consisted of:

- a permitted bicycle motocross (BMX) track in the area immediately west of the currently existing roof structure during the period from August 1997 to January 2002;
- three permitted agricultural livestock shows were held in the area of the currently existing roof structure. The shows each occurred over a three-day period (Friday through Sunday) and were held between 1981 and 1986; and
- occasional non-permitted casual "trespasser" visits of the fenced Site by recreational BMX riders and pedestrians intermittently during various periods since 1965.

Access to the Site has been more diligently restricted since the discovery of PCBs at the Site in July 2003. A perimeter fence and locked entrance gate have been maintained since closure of the sewage treatment plant in 1965. In addition, regular, frequent patrols of the perimeter of the Site have been conducted since July 2003. Also, since at least August 2003, signs have been posted along the perimeter warning that public access to the Site is prohibited.

At various times, excavated materials from roadways were stored on site in areas of the Site not used for the sewage treatment plant operations. Further, between 1965 and the mid 1980s, the City converted the former waste water ponds into brine ponds, and permitted various industrial and commercial entities to dispose of brine waste at the Site. The brine ponds were decommissioned in the 1980s and the brine was tested and disposed of off site in licensed facilities. The results from testing of the brine did not indicate the presence of PCBs.

In June and July 2003, a contractor working on behalf of The Friends of the Riverside Airport, LLC, a residential developer (referred to herein as the Developer), began demolition of the remaining treatment plant structures and intended to remove the resultant demolition debris and assorted refuse as an initial phase of work for the planned residential development of the Site. During demolition activities in July 2003, the grading contractor punctured the sidewall of the lower chamber of the digester with a pneumatic breaker while excavating surrounding soil to determine the digester's below grade extent. When the digester was punctured, an unknown amount of sludge was released to the adjacent soil from the digester's below grade chamber. The City was notified by the Developer of the sludge release and the City immediately began preparing to remove the spilled sewage sludge.

From July 10 to 23, 2003, the City removed approximately 51,000 gallons of sludge from the spill and from within the digester and 30 cubic yards of sludge-impacted soil. The sludge and sludge-impacted soil was transported to the City's Water Quality Control Plant (WQCP) at 5950 Acorn Street for storage. On July 11, 2003, at the beginning of removal activities, the City notified the RWQCB of the spill.

A sample of the spilled sludge was collected during removal activities and submitted to Associated Laboratories of Orange, California (Associated) for pH, nitrate, cyanide, ammonia, total kjeldahl nitrogen, total organic nitrogen, metals, mercury, hexavalent chromium, organochlorine pesticides, PCBs, volatile organic compounds (VOCs), and semi-volatile organic compounds (SVOCs) analysis. Analytical results of the sludge sample indicated the released material contained elevated levels of:

- metals (1050 milligrams per kilogram [mg/kg] lead);
- PCBs (4930 mg/kg Aroclor-1242);
- VOCs (0.322 mg/kg tetrachloroethene [PCE], 28.7 mg/kg toluene, and 0.19 mg/kg trichloroethene [TCE]); and
- SVOCs (20 mg/kg 1,2,4-trichlorobenzene, 35 mg/kg 1,2-dichlorobenzene, 13.1 mg/kg 1,4-dichlorobenzene, and 212 mg/kg bis[2-ethylhexyl]phthalate).

Upon receipt of the analytical results of the sludge sample, the City notified the California Office of Emergency Services and the County Hazardous Materials Unit of the sludge release and results of analytical testing. The City also collected additional sludge, soil, and water samples of the material from the digester release that was stored at the City WQCP. The samples were submitted to Enviro-Chem, Inc. of Pomona, California (Enviro-Chem) for analytical testing for PCBs and lead. PCBs were reported in each of the sludge and soil samples at concentrations from 261 mg/kg to 1160 mg/kg and in a water sample at a concentration of 136 milligrams per liter (mg/L). Lead was reported in the soil and sludge samples from18 mg/kg to 176 mg/kg and in the water sample at 12.8 mg/L.

In addition, following the City's discovery that the released digester material contained PCBs, the City notified the developer to halt all Site demolition and Site work activities. In addition, upon the discovery of PCBs, the City immediately restricted any further access to the Site.

On August 8, 2003 a water sample of the WQCP discharge to the Santa Ana River was collected by the City and submitted to Enviro-Chem for PCB analysis. No PCBs were detected in this sample at or above the laboratory reporting limit of 0.001 mg/L. The City subsequently contacted the RWQCB to discuss the results of sludge, soil, and effluent water sampling. The RWQCB indicated that cleaning the WQCP drying bed where the material was stored would be sufficient; however, the City chose to remove the concrete walls and floor of the drying bed as a precaution.

On August 14, 2003 the material from the digester release that was stored at the WQCP, along with the concrete walls and floor of the drying bed were removed from the WQCP and transported by Island Environmental, Inc. (Island) to Chemical Waste Management's Kettleman Hills, California Class I disposal facility.

The RWQCB indicated in a November 10, 2003 letter to the California Department of Toxic Substances Control:

"We believe that the City has performed adequate cleanup activities at the wastewater reclamation plant and we have closed our files on this project."

Investigation activities subsequently were conducted at the Site as described below to characterize Site soil, groundwater, and concrete and rock debris resulting from the detection of PCBs in the digester sludge.

1.4.2 Previous Investigative Work

The following subsections describe sampling activities performed by the City and others prior to development of the Work Plan and its subsequent approval by the County.

1.4.2.1 Soil and Groundwater Sampling

EarthSafe was contracted by the City to investigate soil in the vicinity of the former Site treatment plant in response to the discovery of PCBs in the sludge. On August 15 and 18, 2003, EarthSafe collected 45 soil samples from 24 locations (B-1 through B-24) at depths up to five feet below ground surface (bgs). EarthSafe's sample locations are shown on Figure 2 and an electronic copy in portable document format (PDF) of EarthSafe's September 23, 2003 Site Investigation report is included on compact disc as Appendix C. Each of the 45 soil samples collected from these 24 locations were analyzed for total petroleum hydrocarbons (TPH), VOCs, SVOCs, metals, organochlorine pesticides, and PCBs. Organochlorine pesticides were

not detected in any of these soil samples. VOCs and SVOCs were not detected in the majority of the samples; One VOC was detected at a low concentration in one sample and two SVOCs were detected at low concentrations in one other sample. Acetone, a VOC, was detected at a concentration of 0.063 mg/kg in the sample collected from a depth of 3 feet bgs at B-23, which is located on the southern end of the western-sludge beds (Figure 2). No other VOCs were detected in any of the 45 samples. Flouranthene and phenanthrene were detected at concentrations of 0.69 mg/kg and 0.561 mg/kg, respectively, in the sample collected from a depth of 1 foot bgs at B-3, which is located approximately 10 feet north of the former digester in the treatment plant area (Figure 2). TPH quantified in the diesel range (carbon range C10 to C22) was detected at low concentrations in six of the 45 soil samples, all six of which are located in the former treatment plant area. TPH in the C10 to C22 carbon range was detected at the following concentrations (sample locations and former treatment plant features referenced below are shown on Figures 2 and 4, respectively):

- 10.1 mg/kg (B-7@9" in the former treatment plant area);
- 13.5 mg/kg (B-5@2' in the footprint of the former southeastern clarifier);
- 14.3 mg/kg (B-21@9" north of the former treatment plant area at the southern end of the central row of sludge drying beds);
- 87 mg/kg (B-1@6" approximately 20 feet west of the former digester);
- 40.9 mg/kg (B-21 @3'); and
- 483 mg/kg (B-3@1').

PCBs were detected in many of the soil samples. Aroclor 1248, which was the only PCB reported by Earthsafe, was detected in 38 of 45 samples analyzed for PCBs and the detected concentrations ranged from 0.012 to 499 mg/kg. The highest concentrations of PCBs were detected in soil samples collected near the digester (EarthSafe, 2003; Figure 4).

EarthSafe collected grab groundwater samples (no purging was performed prior to sample collection using disposable bailers) from four on-site groundwater monitoring wells on August 15, 2003. The four wells were installed in May 1989 by Ron Barto Ground Water Consultants (Barto) to monitor groundwater conditions in the vicinity of the brine basins

located approximately 240 feet east-southeast of the former treatment plant (Figure 2). An electronic copy in PDF format of the July 3, 1989 Brine Basin Soil and Groundwater Sampling and Monitoring Well Construction letter report by Barto is included on compact disc as Appendix C. Groundwater samples collected by EarthSafe were analyzed for TPH, VOCs, SVOCs, metals, organochlorine pesticides, PCBs and total dissolved solids (TDS). VOCs, SVOCs, PCBs, TPH, and organochlorine pesticides were not detected in any of the groundwater samples. TDS concentrations ranged from 1,030 mg/L to 1,560 mg/L. Groundwater was present in the wells at approximately 20 feet bgs in August 2003 (EarthSafe, 2003). The depth to groundwater in the monitoring wells in June 1989, following well development, ranged from approximately 15 to 33 feet bgs (Barto, 1989).

In December 2003, on behalf of The Friends of the Riverside Airport, LLC, Frey Environmental, Inc. (Frey) drilled 90 soil borings to depths between 3 and 10 feet bgs to further evaluate PCB concentrations in soil at the Site (Figure 2). Fifty-eight of the soil borings were advanced in the vicinity of the former treatment plant and associated sludge drying beds, Thirty-two borings were advanced at various locations outside the former treatment plant and sludge drying beds areas to depths of approximately 3 feet bgs. Soil samples collected from depths of 0.75, 1.5, and 3 feet bgs were analyzed for PCBs. At 73 of the 90 soil boring locations, if the soil sample collected from 3 feet bgs contained PCB concentrations greater than 0.22 mg/kg, the residential preliminary remediation goal (PRG[1]) established by the United State Environmental Protection Agency (U.S. EPA) for PCBs (U.S. EPA, 2004), then soil samples from greater depths also were analyzed for PCBs. Deeper samples were not collected from nine of the locations due to refusal and from two of the locations due to equipment limitations. At five locations, samples were only collected to a depth of 1.5 feet. At the remaining location, PCBs at 1.5 feet exceeded the residential PRG and samples were collected to a depth of 6 feet; however, samples below 1.5 feet were not analyzed. Selected soil samples also were analyzed for arsenic, organophosphorous pesticides, herbicides, and polynuclear aromatic hydrocarbons (PAHs). Pesticides and herbicides were not detected in soil samples submitted for analysis. PAHs either were not detected or were detected at concentrations well below their respective residential PRGs, except for dibenzo (a,h) anthracene, which was detected in two samples above its residential PRG of 0.62 mg/kg. Dibenzo (a,h) anthracene was also detected in the 0.75-foot sample from boring B41 (located in the former treatment plant area) at 0.072 mg/kg and in the 3-foot sample from boring B48 (located in the northern

[1] PRGs combine current EPA toxicity values with standard exposure factors to estimate concentrations in environmental media (e.g., soil) that are protective of human health, including sensitive subgroups, over a lifetime.

portion of the former western sludge beds) at 1.1 mg/kg. Arsenic was detected at concentrations ranging from 1.02 to 3.44 mg/kg (Frey, 2004).

Soil samples collected by Frey in December 2003 around the perimeter of the Site did not contain PCBs above the residential PRG of 0.22 mg/kg. Soil samples collected from the former treatment plant area and in some areas to the east and south of the treatment plant had reported PCB concentrations greater than 0.22 mg/kg. In general, PCB concentrations greater than 0.22 mg/kg were limited to depths shallower than 3 feet bgs. The highest PCB concentrations were detected in two soil samples collected beneath the former treatment plant and sludge drying beds area. At one location (B37), total PCBs were detected at concentrations of 3,877 mg/kg in the 0.75-foot sample, 1,092 mg/kg in the 1.5-foot sample, 0.432 mg/kg in the 3-foot sample, and 1.72 mg/kg in the 5-foot sample; deeper samples were not collected at this location because refusal to drilling was encountered below the 5-foot sample. At another location (B67), total PCBs were detected at concentrations of 9,560 mg/kg in the 0.75-foot sample, 57.6 mg/kg in the 1.5-foot sample, and were not detected at or above a concentration of 0.033 mg/kg in the 3-foot sample. The highest concentration of total PCBs detected at the remaining sampling locations was 457 mg/kg (Frey, 2004). Results of soil analytical testing by EarthSafe and Frey are included as Appendix D and the sample locations are shown on Figure 2.

In March and April 2004, prior to preparation of the Work Plan, Geomatrix collected surface soil samples (from ground surface to approximately 0.5 feet bgs) at 71 locations across the Site. Several of these samples were adjacent to locations where EarthSafe or Frey had collected samples (Figure 2). At each surface sample location (SS1-0.5 through SS71-0.5), Geomatrix personnel hand cleared loose vegetation using a clean nitrile glove and set a 6-inch long, 2.5-inch diameter sampling tube on the ground surface. Several layers of clean visqueen sheeting were placed on top of the sample tube and a wooden block was placed on top of the visqueen sheeting. The sample tube was then driven into the ground by Geomatrix and its subcontractor, American Integrated Services, Inc. (AIS) using a four pound sledge. A shovel was then used to loosen soil in an approximate 2-foot diameter around the sample tube, with the shovel only touching soil approximately 1 to 2 feet from the soil tube, never coming into contact with the tube or sampled soil. Using new nitrile gloves, Geomatrix personnel then removed the sample tube from the ground.

The ends of each sample tube were covered with Teflon sheets and plastic end caps. The caps were then sealed to the stainless steel tubes using an adhesive-free silicone-based tape and a

label was affixed to the sample tube. The sample identification, location, date, time, and sampler initials were then recorded on sample control logs and chain-of-custodies. The sample was placed in a resealable plastic bag and put in an ice-filled cooler. Samples were submitted by Geomatrix under chain-of-custody procedures to Calscience Environmental Laboratories, Inc. of Garden Grove, California (Calscience), which is certified by the State of California for the analyses performed. Each of the 71 surface soil samples was analyzed by Calscience for PCBs using EPA Method 8082.

Results of analytical testing of surface soil samples for PCBs are summarized in Table 1. Sixty-three of the 71 samples had reported detections of PCBs. Aroclor 1248 was reported in 61 of the 71 samples and Aroclor 1260 was reported in the other two samples. No other PCB Aroclors were detected in the soil samples collected and analyzed for PCBs. The highest reported concentration of PCBs was 720 mg/kg in the soil sample collected from Geomatrix location SS2, which is adjacent to Frey location B37 (3,877 mg/kg).

1.4.2.2 Concrete and Rock Debris Sampling

During site demolition activities by the residential developer, prior to discovery of the PCB-containing sludge, the contractor stockpiled the concrete debris into one large stockpile (Stockpile 1) and six smaller piles (Stockpiles 2, and 4 through 8). Rock from the inside of the digester also was stockpiled (Stockpile 3). The locations of these stockpiles are shown on Figure 3.

After the presence of PCBs was identified in the digester sludge, Frey, working on behalf of the developer, sampled the concrete and rock in Stockpiles 1 through 4 and the upper portion of the digester using a hand-held drill and concrete bit to remove the top approximate 0.5 centimeter (cm) of concrete surface that had been in contact with sludge associated with the former treatment plant (i.e., from the former inner surface of the clarifiers and upper portion of the intact digester). The former inner surface of the clarifier debris is easily recognized by the concrete form marks from its construction and its slightly darker color. These sampling activities were performed in accordance with Frey's December 2, 2003 Concrete Rubble Sampling plan (Frey, 2003a) submitted to, and approved by, Mr. Michael Shetler of the County.

Samples collected by Frey were submitted to Associated Laboratories of Orange, California for analysis of PCBs using EPA Method 8082. A total of 23 samples were collected by Frey on an approximate 25-foot grid from Stockpiles 1 through 4 and four additional samples were

collected by Frey from the upper portion of the digester (two from the wall and two from the floor). Only one of the stockpile samples collected by Frey had total PCBs exceeding 50 mg/kg (CS15, collected from Stockpile 1 with a reported total PCB concentration of 59 mg/kg). Three of the four samples collected by Frey from the digester exceeded 50 mg/kg, with reported concentrations of total PCBs of 61.8 mg/kg, 109.2 mg/kg, and 193.4 mg/kg (Figure 3; Frey, 2003b). Results of concrete and rock analytical testing by Frey are included as Appendix E.

In March 2004, in accordance with U.S. EPA methods, Geomatrix collected 77 samples of concrete and rock from the remaining portion of the digester and the eight piles of concrete and rock debris from the former treatment plant (Figures 3 and 5 through 10). Geomatrix used the core sampling method outlined in 40 CFR 761.286 to resample the locations with the highest reported concentrations of PCBs in each of the four stockpiles previously sampled by Frey (Stockpiles 1 through 4). In addition, Geomatrix collected samples from the upper and lower portions of the digester and the four stockpiles of concrete not previously sampled by Frey (Stockpiles 5 through 8). The 40 CRF 761.286 core sampling method was used to provide information suitable for waste characterization and disposal purposes. Geomatrix's core sample locations are shown on Figures 3 and 5 through 10. Frey's sampling locations are shown in their December 16, 2003 Concrete Rubble Sampling and Concrete Disposal letter (Frey, 2003b).

Under the direction of Geomatrix, a total of 77 samples of concrete or rock were cored by AIS on March 12, 13, and 22, 2004 as follows:

- 21 core samples from the upper portion of the digester;
- 20 core samples from the lower portion of the digester;
- 1 core sample each from Stockpiles 1 through 4;
- 18 cores samples from Stockpile 5;
- 4 core samples from Stockpile 6; and
- 5 core samples each from Stockpiles 7 and 8.

Each sample consisted of a 3-inch long by 0.5-inch diameter core of concrete collected using the following procedure. Prior to coring, all coring bits were washed with Alconox and deionized (DI) water and then rinsed twice with DI water. The bits were then attached to an

electric drill using clean nitrile gloves. After a core sample was drilled, the core sample was dropped into a clean resealable plastic bag held by a Geomatrix geologist wearing clean nitrile gloves. Geomatrix then transferred the samples into a glass jar and capped the jar. The sample identification, location, date, time, and sampler initials was then recorded on a label affixed to the sample jar as well as on a sample control log and chain-of-custody form. The sample jar was then placed in a resealable plastic bag and put in an ice-filled cooler.

Prior to analytical testing, each sample was removed from its sampling jar and placed in a plastic resealable bag inside two additional resealable bags, which were then wrapped in visqueen plastic sheeting and crushed using a hammer. The crushed concrete was then placed in glass jars. New resealable bags and visqueen were used to crush each sample. The crushed sample was then placed back into its sample jar and placed in a resealable plastic bag and put in an ice-filled cooler. The crushed core samples were then submitted under chain-of-custody procedures to Calscience, which is certified by the State of California for the analyses performed. All of the concrete and rock core samples were analyzed by Calscience for PCBs using EPA Method 8082.

Results of analytical testing of concrete and rock samples for PCBs are summarized in Table 2. Copies of the laboratory reports and chain-of-custody records are presented in Appendix F. Concrete and rock sampling locations are shown on Figures 3 and 5 though 10 and the results of analytical testing are summarized below.

- The highest detected concentration of total PCBs in concrete samples collected from the lower portion of the digester was 4.6 mg/kg (Aroclor 1248).
- The highest detected concentration of total PCBs in concrete samples collected from the upper portion of the digester was 5.4 mg/kg (Aroclor 1248).
- Aroclor 1248 was detected at a concentration of 6.1 mg/kg in the sample collected from Stockpile 1, adjacent to Frey sample location CS15 (59 mg/kg total PCBs in Frey's 0.5 cm deep sample).
- Aroclor 1248 was detected at a concentration of 0.060 mg/kg in the sample collected from Stockpile 2, adjacent to Frey sample location CS17 (7.4 mg/kg total PCBs in Frey's 0.5 cm deep sample).
- PCBs were not detected in the sample collected from Stockpile 3, adjacent to Frey sample location CS19 (0.5118 mg/kg total PCBs in Frey's 0.5 cm deep sample).

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- Aroclor 1248 was detected at a concentration of 0.180 mg/kg in the sample collected from Stockpile 4, adjacent to Frey sample location CS22 (2.377 mg/kg total PCBs in Frey's 0.5 cm deep sample).
- PCBs were not detected in any of the 18 samples collected from Stockpile 5.
- PCBs were not detected in any of the 4 samples collected from Stockpile 6.
- The highest detected concentration of total PCBs was 0.34 mg/kg (Aroclor 1248) in sample SP7-4 collected from Stockpile 7.
- PCBs were not detected in any of the 5 samples collected from Stockpile 8.

1.4.2.3 Rainwater and Sludge Sampling

In March 2004, prior to sampling concrete in the digester, Geomatrix collected a sample of rainwater that had accumulated in the lower portion of the digester. The sample was analyzed by Calscience for TPH, PCBs, and VOCs. TPH in the carbon range C17 to C28 was reported at a concentration of 516 micrograms per liter (µg/l), Aroclor 1242 was reported at a concentration of 18 µg/l, and no VOCs were reported at or above their respective detection limits between 0.5 and 10 µg/l. Based on these results, the water in the digester was pumped out and transported by AIS as non-hazardous waste to Demenno Kerdoon's facility in Compton, California for treatment and disposal.

During sampling of the concrete in the lower portion of the digester, a small amount of residual sludge was observed on the concrete at the base of the lower portion of the digester. The sludge was scraped into a sampling jar and analyzed by Calscience for PCBs. Aroclor 1242 was reported in the sludge sample at a concentration of 400 mg/kg. No other PCB Aroclors were reported above the laboratory reporting limit of 50 mg/kg in the sludge sample submitted for analysis.

Analytical laboratory reports for the rainwater and sludge samples are included in Appendix F with concrete and rock analytical data.

1.4.3 Treatment Plant Operations

Based upon historical records reviewed by Geomatrix, the original treatment plant was placed into service in 1942 as a part of Camp Anza. The plant was subjected to various improvements, expansions and process treatment modifications in the ensuing years. Regardless of these modifications and improvements it appears the plant's basic operations

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always relied on conventional process methods involving chemical and biological treatment of wastewater and its treatments byproducts.

Based upon review of available historical information, plans, and photographs it appears that influent flows were conveyed to the plant via a system of sewage collection pipelines and related facilities that generally transmitted waste water in a northerly direction terminating at the treatment plant headworks. Downstream of the headworks, various unit operations and methods were used to treat the wastewater creating several streams of treated wastewater and treatment product solids. The influent flows and subsequent treated wastewater streams and solids were routed through a variety of constructed facilities including filters, clarifiers and digesters, chemical contact facilities, holding ponds, and drying beds.

It should be expected that the consistent and successful operation of the plant required that all flows and solids be handled and managed with precise regularity using these constructed facilities. As a consequence, in the event that PCBs had been present within the influent wastewater stream, their residual presence in the locations of these treatment facilities and unit operations would be expected. Because PCBs are heavier than water and have a low solubility, it is expected that they would accumulate in the digester. Also, because PCBs generally bind to solids, it is expected that relatively higher concentrations of PCBs would be found in the sludge drying beds.

2.0 REMEDIAL INVESTIGATION ACTIVITIES

The following sections of this report describe the sampling and analysis activities performed by Geomatrix pursuant to our Work Plan dated June 15, 2004. The Work Plan was approved by the County on June 21, 2004 (a copy of the County's approval letter is included as Appendix A). Completed RI activities include demolition, debris consolidation, and sampling and analysis of soil. The demolition and debris consolidation were performed to enable soil sampling in and around the footprint of the former digester and clarifiers.

The RI soil sampling activities were completed in six phases of field work; the first two of which were described in the Work Plan. Demolition and debris consolidation occurred during the first phase of soil sampling. The subsequent four phases of soil sampling were performed to further investigate areas of the Site and off-site areas where sample results suggested the need for further investigation. For phases of work subsequent to the initial phase of sampling,

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the locations and rationale for sampling were provided to the County and their approval was obtained prior to performing the work. The six phases of investigation are described below.

Phase I of the field investigation took place between July 9 and 18, 2004. During this phase, 47 test pits (TP1 through TP47) were excavated and sampled to depths to 11 feet bgs (five test pits were advanced in on-site drainages to depths between 1 foot and 2.5 feet, nine test pits were advanced to depths between 6 feet and 9 feet where refusal to excavation was encountered in granitic bedrock, and 33 test pits were advanced to depths between 10 and 11 feet). Sampling locations were concentrated around the former treatment plant facilities, on-site drainages, and the perimeter of the Site.

Phase II sampling was performed on August 18 and 19, 2004. During this phase of work, 18 test pits (TP48 through TP63) were excavated and sampled to 2.5 feet bgs. These test pit locations were chosen to further delineate the extent of PCBs in soil in the on-site drainages and around the perimeter of the Site.

Phase III sampling was performed on September 15, 16, and 21, 2004. These test pit locations were chosen to further delineate the extent of PCBs in and around the south and southwestern portion of the Site, including four residential properties that border the southwest of the Site. During this phase of sampling, 18 test pits (TP64 through TP81) were excavated on site and two test pits were excavated from each of four residential properties (TP82 through TP89) to depths of 2.5 feet bgs, except TP64, which was excavated to 3 feet bgs.

Results of sample analysis from the first three phases of soil sampling suggested the need for additional sampling around the former treatment plant and in the off-site drainage northwest of the Site. The additional three phases included:

- Phase IV: October 1, 2004 (TP90 to TP97);
- Phase V: October 6 and 7, 2004 (TP98 to TP113); and
- Phase VI: October 13, 2004 (TP114 to TP121).

During Phase IV, eight test pits (TP90 to TP97) were excavated and sampled to depths between 0.5 feet and 2.5 feet bgs in the northwest off-site drainage. Test pits were located approximately every 100 feet in the bottom of the drainage.

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Phase V soil sampling was conducted to further delineate the distribution of PCBs in areas of the Site outside the former treatment plant. During this phase of sampling, 16 test pits (TP98 to TP113) were excavated and sampled to 2.5 feet bgs.

Based on the results of analytical testing from Phase IV, additional sampling was performed to further delineate the extent of PCBs in the off-site northwest drainage approximately 500 feet northwest and southeast of the terminus of the drainage. During this phase of sampling, eight test pits (TP114 to TP121) were excavated and sampled to depths between 0.5 feet and 2.5 feet bgs.

2.1 METHODS OF INVESTIGATION

The RI activities were performed between March 12 and December 22, 2004. A description of these activities is presented in the following subsections.

2.1.1 Pre-Field Activities

Prior to initiating field activities, Geomatrix prepared a Site Health and Safety Plan (HASP) and notified Underground Service Alert (USA) of the intent to perform subsurface sampling at the Site. Because this is private City property, City Engineering Division conducted a utility search for gas, telephone, cable, electric, and water. In addition, Geomatrix and AIS prepared the Site for field activities by:

- establishing an equipment staging area;
- establishing a work exclusion zone around the digester and debris piles;
- establishing a decontamination zone outside the exclusion zone adjacent to the equipment staging area; and
- establishing four dust monitoring stations (one upwind and three downwind) and collecting background data prior to commencement of field work.

2.1.2 Dust Control and Monitoring

To reduce fugitive dust emissions during demolition and other field activities, AIS implemented dust control measures including:

- sprinkling water to maintain soil moisture as needed;
- sprinkling water on demolition areas and materials as needed;
- applying water as needed on all unpaved roadways, parking areas, and staging areas;

- sweeping the paved access road as needed to prevent visible soil material from being carried onto adjacent public streets;
- sweeping the street in front of the Site as needed;
- restricting non-essential traffic to compacted roadways;
- limiting vehicle speeds to 5 miles per hour on unpaved portions of the Site; and
- minimizing drop heights while loading transportation vehicles.

To document the effectiveness of the dust control measures, Geomatrix monitored dust emissions in accordance with U.S. EPA requirements and South Coast Air Quality Management Board (SCAQMD) Rule 403 (Amended April 2, 2004). Geomatrix collected perimeter air monitoring data using direct-reading/data-logging instruments. Real-time, data-logging portable aerosol monitors (DataRAMs) were used to monitor dust levels at both upwind and downwind site boundaries. Monitoring stations for total dust were set up at four locations. The National Oceanic and Atmospheric Administration was contacted to evaluate seasonal wind direction and determine appropriate locations for upwind and downwind monitoring stations. At each air monitoring station, the monitoring devices were set with the air intake elevated 4 feet above the ground surface to collect a representative breathing zone sample. The dust monitoring stations were set up in the northwest (DR1; upwind), south (DR2; downwind), southeast (DR3; downwind), and east (DR4; downwind) areas of the Site, and are shown on Figure 2. The data recorder at each station was programmed to record a measurement every minute and was turned on prior to beginning field activities each day. Two days of background data were collected prior to beginning field activities to evaluate background concentrations of total particulates in the air in and around the work area. Dust emissions were monitored during the demolition and debris consolidation activities. In addition, dust monitoring was performed during excavation of all test pits where a backhoe was used to perform the excavation (TP1 through TP47).

Data from each dust monitor was downloaded by Geomatrix each night following field work and the results of the dust monitoring were plotted and compared to a risked-based action level determined from the highest concentrations of PCBs detected in the work area. The action level was established using the U.S. EPA PRG for ambient air direct contact exposure pathways (October 2002b). The ambient air PRG for PCBs is 3.4×10^{-3} micrograms per cubic meter ($\mu g/m^3$). PRGs based on carcinogenic risk are based on exposure for 30 years. To account for the shortened time of the proposed work, the PRG was increased by a factor of 60

to account for a shorter duration exposure (6 months out of 30 years) to establish the action level. In addition, the action level was based on the highest concentration of PCBs detected by Geomatrix in the work area prior to implementation of the Work Plan (720 mg/kg).

The action level for PCBs was calculated using the formula:

$$\text{PCB Perimeter Dust Action Level } (\mu g/m^3) = \frac{\text{PRG } (\mu g/m^3) \times 60 \times 10^6 \text{ (mg/kg)}}{\text{Maximum Concentration in Soil (mg/kg)}}$$

Using site-specific numbers in the above equation, a perimeter dust action level of 280 $\mu g/m^3$ is obtained.

Results of dust monitoring are presented in Section 3.2 of this report.

2.1.3 Digester Demolition and Debris Consolidation

Demolition and debris consolidation activities were conducted in July 2004. The remaining portion of the digester was demolished by AIS using a 45,000-pound excavator with a hydraulic hammer and hydraulic thumb. Following demolition, AIS loaded the debris from the digester with the excavator onto a 35-ton articulated dump truck and transported it to a designated stockpile area south and east of the former digester.

Consolidation of the remaining eight piles of treatment plant debris (Figure 3) was completed by AIS using a 980 loader with a 4-in-1 bucket that loaded directly into a 35-ton articulated dump truck. AIS transported the debris by dump truck to the designated stockpile area for consolidation.

During all demolition and debris consolidation activities AIS implemented dust control by misting the digester, debris piles, and soil using a water truck with a fire hose component and misting nozzle and Geomatrix performed dust monitoring as described in Section 2.1.2.

All demolition and debris consolidation work was performed within the designated work exclusion zone that was delineated by temporary fencing. All site workers wore personal protective equipment in accordance with the Geomatrix and/or AIS HASP.

2.1.4 Test Pit Sampling

Based on the results of the surface soil sampling described previously in Section 1.4.2.1 of this report, the Work Plan was prepared and submitted to the County for its review and approval.

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The work plan presented the rationale and locations for sampling soil from 60 test pits in two phases of field work. As described above in Section 2.0 of this report, results of these two phases of field investigation suggested the need for additional sampling, and four additional phases of field work were performed to evaluate the distribution of PCBs at and around the Site.

Soil sampling locations were chosen for the initial phase of field work based on Geomatrix's understanding of historical site use from review of historical site reports, maps, and aerial photographs and the distribution of PCBs reported by EarthSafe and Frey and from Geomatrix's surface soil sampling performed in March and April 2004.

During the first phase of field work, 47 test pits (TP1 through TP47) were excavated by AIS between July 6 and July 19, 2004. Test pit locations are shown on Figure 2. These test pits were excavated to depths between 1 and 11 feet bgs using an excavator. Five test pits were advanced in on-site drainages to depths between 1 foot and 2.5 feet, nine test pits were advanced to depths between 6 feet and 9 feet where refusal to excavation was encountered in granitic bedrock, and 33 test pits were advanced to depths between 10 and 11 feet. Soil samples for potential chemical analysis were collected from the test pits at approximately 2.5-foot increments from the ground surface to the bottom of excavation.

Prior to excavation of each test pit, 10-millimeter visqueen sheeting was laid on the ground adjacent to the test pit to isolate the spoils from surficial material around the test pit. All samples were collected directly from the center of the excavator bucket using new nitrile gloves and new, pre-cleaned, 6-inch long by 2-inch diameter, stainless steel tubes. An initial volume of soil was removed by the excavator and held in the bucket for the 0.5-foot sample. To collect the sample, a Geomatrix field geologist pushed the sample tube into the upper 0.5-foot column of soil in the excavator bucket. Excavation then resumed, removing soil until reaching the next sample depth (2.5, 5, 7.5, and 10 feet). The excavator then took a scoop of soil out of the test pit, and the Geomatrix field geologist donned new nitrile gloves, removed soil from the face of the column in the bucket with a gloved hand, and pushed the tube into the freshly exposed soil. These procedures were repeated until all the samples were collected.

Seventy-four additional test pits (TP48 through TP121) were sampled at depths of 0.5 and 2.5 feet bgs in August through October of 2004 during field work phases two through six. The 0.5-foot samples were collected in the same manner as the surface samples described above. To collect the 2.5-foot samples, AIS and Geomatrix personnel used a digging bar, shovel, and a

small electric jack hammer to excavate the 74 additional test pits to 2 feet bgs. The Geomatrix field geologist removed all loose soil from the bottom of the test pit wearing clean nitrile gloves and placed a sample tube onto the ground. The sample tube was then driven into the ground in the same manner as described in Section 1.4.2.1. The Geomatrix field geologist temporarily placed a plastic cap on the exposed (upper) end of the sample tube and AIS used the jack hammer to loosen the soil surrounding the sample tube, taking care to keep the jackhammer from touching the tube. Once the soil was loosened, the Geomatrix geologist donned clean nitrile gloves and removed the sample from the ground. The upper approximately 1-inch of material from the top of each sample was removed by hand to insure that no slough material was sampled. Each sample was packaged as described in Section 1.4.2.1.

Before backfilling each test pit, the Geomatrix field geologist described the soils using the Unified Soil Classification System (USCS). Geomatrix logged the test pits and recorded soil and rock types, Munsell colors, location and nature of contacts between lithologic units, and soil moisture on test pit logs (Appendix G). After logging was completed, each test pit was backfilled with its spoils and tamped with the excavator bucket, when used. Water was sprayed on the soil during this process to minimize airborne dust.

A total of 349 soil samples from the test pits were submitted for laboratory analysis. All of the 0.5-, 2.5-, and 5-foot samples collected from the Site were analyzed by Calscience for PCBs using EPA Method 8082. The 7.5- and 10-foot samples were submitted to Calscience on hold pending the results of the 0.5-, 2.5-, and 5-foot sample analyses. The 7.5-foot sample, and in some cases the 10-foot sample as well, subsequently was analyzed if PCBs were reported in the 5-foot sample.

Twelve of the 0.5-foot test pit samples also were analyzed by Calscience for:

- chlorinated pesticides using EPA Method 8081A;
- organophosphorous pesticides using EPA Method 8141A;
- chlorinated herbicides using EPA Method 8151A;
- Title 22 Metals using EPA Methods 6010B/7471A;
- PAHs using EPA Method 8270C; and
- VOCs using EPA Method 8260B (11 of 12 samples).

Theses twelve samples were chosen to evaluate soil conditions at the various historical use and geomorphic areas of the site as follows:

- southern property boundary (TP2 and TP4);
- eastern property boundary (TP17);
- northern property boundary (TP45);
- western property boundary (TP42);
- eastern site drainage channel (TP26);
- northern drainage between sludge beds (TP38);
- southern brine basin (TP19);
- sludge beds (TP22 and TP29);
- covered structure (TP28, the one sample that was not analyzed for VOCs); and
- treatment plant area (TP47).

Based on the former military use of the sewage treatment plant, ten additional test pit samples (0.5- and 2.5-foot samples from five locations; TP59 to TP63) also were analyzed by Calscience for:

- perchlorate using EPA Method 314.0;
- N-nitrosodimethylamine (NDMA) using EPA Method 8270 SIM; and
- nitroaromatics and nitramines using EPA Method 8330.

2.1.5 Surveying

On December 21 and 22, 2004, Dawson Surveying, Land Surveyors of Riverside, California (Dawson) surveyed the horizontal coordinates and ground surface elevation of Geomatrix sample locations. Geomatrix sample locations were marked with labeled stakes by Geomatrix during sampling activities. In addition, Dawson surveyed selected Frey sample locations that were staked, monitoring wells GMW-1, GMW-2, GMW-4, and GMW-5, and site features, including the roof structure and fire hydrant, to tie Geomatrix sample locations to historical sample locations. A copy of the December 21 and 22, 2004 survey data sheets are included as Appendix H.

Nine of the 121 test pit locations were not surveyed. Eight of these nine test pits (TP82 through TP89) are located in residential back yards south of the Site and were not entered during surveying. The one remaining test pit not surveyed (TP119) was not accessible during surveying activities due to dense vegetation growth. Sixteen of the 71 surface samples (SS2 through SS5, SS31, SS33, SS35, SS38, SS40, SS44, SS53, SS55, SS57, SS58, SS60, and SS67) were not surveyed. Each of the sample locations not surveyed had previously been mapped by a Geomatrix field geologist using site features and/or historically surveyed and staked sample locations as reference points.

The survey data are relative to mean sea level, and are based upon the City of Riverside Bench Mark No. UF 618. This bench mark has an elevation of 695.62 (based upon a January 1993 survey), and is referenced to National Geodetic Vertical Datum (NGVD) of 1988. The horizontal datum for this bench mark is the North American Datum of 1983, California State Plane Coordinate System, Zone 6.

3.0 FINDINGS

The findings of the RI activities are summarized in the following subsections.

3.1 SITE LITHOLOGY

The lithologic materials at the Site from ground surface to a depth of approximately 4 feet bgs are predominantly fine-grained, consisting of clay and silt and are reddish brown to brown. The fine-grained soil throughout the Site generally grades to severely weathered granite between 4 and 7 feet bgs, and is brownish yellow. From approximately 7 to 10 feet bgs the granite is very pale brown, less weathered, and more competent. In some places refusal to excavation was encountered between 5 and 9 feet bgs because of the competency of the granitic bedrock.

Along most of the on-site drainages, our test pits exposed deposits of yellowish brown clayey silt and decomposed granite from 5 to 10 feet thick. The off-site northwest drainage consists of approximately 6 inches to 3 feet of loose, coarse sand-sized weathered granite underlain by granite bedrock.

Some excavations in the southeastern part of the Site contained pieces of asphalt and plastic to depths of approximately 9.5 feet bgs, which is indicative of fill in this area. In addition, fill including asphalt, concrete, and metal pipes, is present in the upper several feet of material in

the former plant area and central and northern portions of the site. Trash and debris were present in shallow fill at some locations along the property boundaries.

Groundwater was not encountered during excavation activities. The depth to water in groundwater monitoring wells at the Site has been reported at depths from 15 to 32 feet bgs (Barto, 1989).

3.2 DUST MONITORING RESULTS

Dust monitoring was performed as described above in Section 2.1.2. Plots of the results of dust monitoring are included as Appendix I and show that background dust levels ranged from about 50 $\mu g/m^3$ to 200 $\mu g/m^3$, and typically ranged from about 50 $\mu g/m^3$ to 150 $\mu g/m^3$. On a few occasions the dust action level of 280 $\mu g/m^3$ was exceeded. Each of these instances resulted from a vehicle passing in close proximity to the monitoring station. These are shown and described on the air monitoring plots in Appendix I. It should be noted that the dust levels are not PCB concentrations but instead concentrations of particulate matter in the air.

3.3 SOIL ANALYTICAL RESULTS

Tables 1 and 2 present the results of PCB analysis performed on surface soil and concrete and rock samples collected by Geomatrix prior to preparation of the Work Plan. Analytical results of test pit samples are summarized in Table 3 (PCBs), Table 4 (metals), Table 5 (pesticides, herbicides, and VOCs), and Table 6 (perchlorate, NDMA, and nitroaromatics and nitramines). Copies of the laboratory reports and chain-of-custody records are presented in Appendix J. The results of analytical testing of soil samples are discussed in the following subsections.

3.3.1 PCBs

Analytical results for PCBs by depth are shown on Figure 11 (0 to 0.75 feet), Figure 11.1 (0 to 0.75 feet in the northwest off-site drainage area), Figure 12 (1.5 to 2 feet), Figure 12.1 (1.25 to 2 feet in the northwest off-site drainage area), Figure 13 (2.5 to 4 feet), Figure 13.1 (2.5 to 4 feet in the northwest off-site drainage area, Figure 14 (5 to 6 feet), Figure 15 (7.5 feet), and Figure 16 (10 feet). On these figures, PCB concentrations are color-coded into two categories:

- less than or equal to the residential PRG[2] for PCBs of 0.22 mg/kg (blue); and
- greater than 0.22 mg/kg (orange).

[2] The PRG is a health risk-based concentration calculated by the U.S. EPA to protect residents from exposures to chemicals above a safe level.

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As shown on Figures 11 to 16, the highest concentrations of PCBs detected at the Site are from the surface samples in the vicinity of the former treatment plant and sludge drying beds where total PCB concentrations as high as 3100 mg/kg were detected in samples collected by Geomatrix. In samples collected from depths to 2 feet (Figures 11, 11.1, 12, and 12.1) PCBs were detected above the residential PRG in the vicinity of the former treatment plant, the sludge drying beds, the brine ponds, the Site drainages, the northwest off-site drainage, in the southwestern portion of the Site, and at one location near the central-eastern Site boundary (SS70).

PCBs were not detected above the residential PRG along the Site boundary, except as described above in the southwestern portion of the Site and the isolated location near the central eastern Site boundary. In the latter case, three additional locations (Frey location B161 and Geomatrix locations TP17 and TP54) were sampled to evaluate the extent of impact around SS70, and at each of these three locations, PCBs were not detected above the residential PRG to depths of 1.5 feet (B161), 2.5 feet (TP54), and 5 feet (TP17). These data suggest the extent of impact is isolated in this area.

In general, the extent of soil impacted with PCBs above the residential PRG is limited to the upper 2.5 to 4 feet of soil. Locations where PCBs were detected above 0.22 mg/kg below a depth of 4 feet is in the immediate vicinity of the former treatment plant and sludge drying beds, and at one location in the eastern portion of the southern brine basin (Figure 14). PCBs were detected above 0.22 mg/kg at two locations from a depth of 7.5 feet (Figure 15): one adjacent to the former clarifiers (TP20), where a significant amount of soil was disturbed during historical demolition activities; and one in the former sludge drying beds (TP29). PCBs were not detected above the residential PRG below a depth of 7.5 feet. Of the five locations where samples from a depth of 10 feet were submitted for PCB analysis (Figure 16), three samples were below their respective laboratory reporting limits (B42, B43, and B81; Frey, 2004) and at the remaining two locations PCBs were detected at concentrations of 0.052 mg/kg (TP20) and 0.12 mg/kg (TP29).

In summary, the highest reported concentrations of PCBs are present in the former treatment plant operation areas at depths to 4 feet. In addition, low concentrations of PCBs are present to a depth of 10 feet in the former treatment plant operation areas.

PCBs were detected in surficial and shallow soils above the residential PRG (0.22 mg/kg) across much of the central portion of the Site; however, reported PCB concentrations were

either below the laboratory reporting limit or the residential PRG along the majority of the Site boundary. Along the south-southwestern Site boundary, PCBs were detected above the residential PRG in two areas. Reported concentrations of PCBs in samples collected from residential properties south of these areas, however, were either non-detect (11 of 16 samples) or below the residential PRG (5 of 16 samples).

3.3.2 Metals

A summary of the soil analytical results for metals is presented in Table 4. Metals are naturally occurring compounds in soil, and as expected, a variety of metals were found in the soil samples analyzed. To evaluate the significance of the results, metals concentrations in soil were compared to:

- the range of background concentrations of metals in soil in California (Kearney, 1996);
- the total threshold limit concentrations (TTLCs) for evaluating the classification of a waste for disposal purposes; and
- the PRGs.

As shown in Table 4, all reported metals concentrations were below their TTLC. The reported concentrations of metals at the Site are all within the range of concentrations indicative of background metals concentrations in California soil (Kearney, 1996) except for cadmium, copper, mercury, silver, and zinc in the 0.5-foot sample collected at TP29, and cadmium in the 0.5-foot sample collected at TP19. TP29 is located in the former sludge beds and is the sample where the highest concentration of PCBs was found in the samples collected by Geomatrix (Figures 2 and 11). TP19 is located in the western portion of the southern brine basin (Figure 2). All reported metals concentrations were below the residential PRG, except for arsenic (in ten of the 12 samples) and chromium (in one of the 12 samples; TP29@0.5'). Although arsenic was detected above the residential PRG, all arsenic concentrations are within the range indicative of background concentrations of arsenic in soil for California (Kearney, 1996).

3.3.3 Pesticides, Herbicides, PAHs, and VOCs

Analytical results for pesticides, herbicides, PAHs, and VOCs are provided in Table 5 and are summarized below.

Pesticides

The pesticides 4,4'-dichlorodiphenyldichloroethylene (DDE) and 4,4'-dichlorodiphenyltrichloroethane (DDT) were reported at low concentrations in one of the 12 samples analyzed using EPA Methods 8081A and 8141A. DDE and DDT were reported at concentrations of 0.035 mg/kg and 0.023 mg/kg, respectively in the 0.5-foot sample collected at TP26, which is located in the drainage in the central northeastern portion of the Site. These reported concentrations are well below the residential PRG for DDE and DDT of 1.7 mg/kg. No other pesticides were detected in any of the 12 samples submitted for pesticide analysis.

Herbicides

No herbicides were detected in any of the 12 samples analyzed using EPA Method 8151A.

PAHs

The PAH 4-chloroaniline was reported at 3.1 mg/kg in TP29@0.5'. This concentration is well below the residential PRG of this compound of 240 mg/kg.

VOCs

Eight of the eleven 0.5-foot soil samples analyzed for VOCs had low detections of acetone. In addition, TP2@0.5' had a low detection of 2-butanone and TP45@0.5' had a low detection of p-isopropyltoluene. The maximum reported detection of acetone was 0.290 mg/kg in the 0.5-foot sample collected at TP2, which is located in the south-southwestern area of the Site (Figure 2). This maximum reported detection is below the residential PRG for acetone of 14,000 mg/kg. 2-butanone also was detected in the 0.5-foot sample at TP2 at a concentration of 0.036 mg/kg. The U.S. EPA has not established a PRG for 2-butanone. At TP47, located in the western portion of the Site immediately southwest of the former treatment plant (Figure 2), p-isopropyltoluene was reported in the 0.5-foot sample at a concentration of 0.0021 mg/kg. The U.S. EPA has not established a PRG for p-isopropyltoluene.

3.3.4 Perchlorate, NDMA, and Nitroaromatics and Nitramines

Results of analyses for perchlorate, NDMA, and nitroaromatics and nitramines are provided in Table 6 and are summarized below.

Perchlorate

Perchlorate was reported in one of the ten samples analyzed using EPA Method 314.0 at a concentrations of 0.0922 mg/kg. This reported concentration is below the residential PRG of

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7.8 mg/kg and was reported in the 0.5-foot sample collected at TP61, which is located in the western portion of the sludge drying beds (Figure 2).

NDMA

NDMA was not detected in any of the ten samples analyzed using EPA Method 8270 SIM.

Nitroaromatics and Nitramines

No nitroaromatics or nitramines were detected in any of the ten samples analyzed using EPA Method 8330.

3.4 QUALITY ASSURANCE AND QUALITY CONTROL

During the period of March through October 2004, Geomatrix collected 420 soil samples, 77 concrete samples, and 2 water samples (municipal water used for dust control) during soil sampling, demolition, and debris consolidation activities at the Site. The analytical results for soil, concrete, and water samples collected during this sampling event were subject to a quality assurance/quality control (QA/QC) review.

This QA/QC review included evaluation of field and analytical representativeness, accuracy, precision, comparability, sensitivity, and completeness. Representativeness refers to the degree to which sample data accurately and precisely describe the characteristics of a population of samples, parameter variations at a sampling point, or environmental conditions, and in part is evaluated by examining chain-of-custody (COC) documentation and verifying that sample analyses were performed within allowable holding times. Accuracy is evaluated using the analytical results for blanks, surrogates, matrix spike/matrix spike duplicates (MS/MSD), and laboratory control samples (LCS), to determine analytical bias. Precision is evaluated by comparing results for primary, field duplicate, MS/MSD, and laboratory duplicate analyses. Comparability is a qualitative objective of the data, expressing the level of confidence with which one data set can be compared with another. Sensitivity is the capability of a method or instrument to discriminate between measurement responses representing different levels of a variable of interest. Sensitivity is determined from the value of the standard deviation at the concentration level of interest. It represents the minimum difference in concentration that can be distinguished between two samples with a high degree of confidence. Completeness is evaluated by calculating the percentage of acceptable data.

Samples were collected and analyzed according to the Work Plan. Calscience analyzed the samples. Samples analyzed for nitroaromatics and nitramines were subcontracted by

Calscience to Applied P & Ch Laboratory of Chino, California. Samples were analyzed for one or more of the following analyses:

- PCBs by EPA Method 8082;
- Chlorinated pesticides by EPA Method 8081A;
- Organophosphorous pesticides by EPA Method 8141A;
- Chlorinated herbicides by EPA Method 8151A;
- Title 22 Metals by EPA Methods 6010B/7471A;
- SVOCs by EPA Method 8270C;
- VOCs by EPA Method 8260B;
- Perchlorate by EPA Method 314.1;
- Nitroaromatics and nitramines by EPA Method 8330; and
- NDMA by EPA Method 8270 Select Ion Monitoring (SIM).

The data review was performed and data qualifier flags were added following the procedures specified in the U.S. EPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999), U.S. EPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (July 2002), and the QC criteria specified in the Work Plan.

Laboratory sample delivery groups (SDGs) associated with this sampling event are presented in the following table:

Laboratory SDG	Date(s) Collected
04-03-0901, 04-03-0902, 04-03-0903	March 12 and 13, 2004
04-03-1285, 04-03-1297, 04-03-1298	March 22, 2004
04-03-1466, 04-04-0324, 04-04-0388	March 23, 2004 April 6 through 7, 2004
04-07-0228, 04-07-0317, 04-07-0407, 04-07-0503, 04-07-0589, 04-07-0657, 04-07-0740, 04-07-0822, 04-07-0927, 04-07-1014	July 6 through July 19, 2004

Laboratory SDG	Date(s) Collected
04-08-1053, 04-08-1146, 04-09-0897, 04-09-0998	August 18 and 19, 2004 September 15 and 16, 2004
04-10-0045, 04-10-0295, 04-10-0380, 04-10-0763	October 1, 6, 7, and 13, 2004

3.4.1 Representativeness

Chain-of-Custody

The COC forms indicate that samples were maintained under proper custody. Forms were signed upon release from the field and receipt at the laboratory. Upon receipt of the samples at the laboratory, Calscience logged in the samples. No discrepancies were noted during the sample log-in. All coolers were received by the laboratory at temperatures within the acceptable range (4 degrees Celsius [°C] ± 2°C).

Holding Times

The U.S. EPA has established the maximum holding time that can elapse between sampling, preparation, and analysis of samples. The U.S. EPA has also defined the acceptable temperature range that samples must be stored to maintain sample preservation. Holding times and sample temperatures that exceed the U.S. EPA limits can negatively affect sample integrity (e.g., loss of volatile compounds, biodegradation), and samples may be qualified depending on the severity of the problem and the compounds of concern.

Each sample was reviewed for compliance with the method-prescribed preparation and analysis holding times. The sample preparations and analyses were preformed within the method prescribed holding times, with the exceptions that follow:

- Samples TP20@7.5' and TP20@10' were initially submitted to the laboratory on hold on 7/06/04. The request for PCB analysis was made on 7/26/04; the samples were extracted on 7/27/04 and analyzed on 7/28/04. The extraction occurred seven days past the holding time. The PCB results at or above the laboratory reporting limits for the affected samples were qualified as estimated and flagged with a "J".

- Sample TP30@7.5' was initially submitted to the laboratory on hold on 7/07/04. The request for PCB analysis was made on 7/26/04; the sample was extracted on 7/27/04 and analyzed on 7/28/04. The extraction occurred six days past the holding time. The PCB results at or above the laboratory reporting limits for the affected sample were qualified as estimated and flagged with a "J".

- Samples TP29@7.5' and TP29@10' were initially submitted to the laboratory on hold on 7/08/04. The request for analysis was made on 7/26/04; the samples were extracted on 7/27/04 and analyzed on 7/28/04. The extraction occurred five days past the holding time. The PCB results at or above the laboratory reporting limits for the affected samples were qualified as estimated and flagged with a "J".

3.4.2 Accuracy

Blanks

A blank sample that is theoretically contaminant free is prepared in the laboratory and carried through the analytical process. The purpose of a blank sample is to determine the presence and magnitude of contamination resulting from laboratory, shipping, or other sample-handling activities. Blank samples are analyzed and evaluated for detections of target compounds. If target compounds are detected in a blank sample that was initially intended to be contaminant free, these detections indicate some element of sample collection, transportation, preparation, or analysis activities has introduced contaminants not present in the original environmental sample aliquot. If target compounds are detected in a blank sample, then all associated data must be carefully evaluated to determine whether those results have been similarly impacted or if the blank problem is an isolated occurrence not representative of other data.

Method blank samples were prepared by the laboratory by taking an aliquot of environmental matrix through all preparation and analysis steps. A method blank was prepared and analyzed with each batch of environmental samples. Method blank samples monitor for potential contamination of sample from the laboratory.

The laboratory analyzed at least one method blank for each analytical batch, per method requirements. Target compounds of concern in the method blanks were below detection.

Two field blanks were collected. Target compounds of concern in the field blanks were below detection.

Surrogate Recovery

A surrogate spike is used in the organic analyses and is similar to the target compounds. A surrogate spike is used to assess interference from the sample matrix during the analysis. Each sample was spiked with surrogates (system monitoring compounds) prior to analysis. Surrogate recoveries were either within the laboratory specified control limits, or were not qualified because other associated QC data were acceptable with the following exceptions:

- PCBs by EPA Method 8082: The surrogate recovery for decachlorobiphenyl in sample D-30 (134 percent [%]) was greater than the control limits of 50-130%. Aroclor 1248 was detected in the sample, and the result was qualified as estimated and flagged "J".

Matrix Spike/Matrix Spike Duplicate

An MS/MSD sample pair consists of an aliquot of an environmental sample that is spiked with known concentrations of a subset of target compounds. MS/MSDs are used to monitor potential interference from the sample matrix for target compounds.

One MS/MSD was analyzed per analytical batch. MS/MSD results were either within the laboratory specified control limits, or were not qualified because associated QC data were within the control limits, with the exceptions that follow.

- Pesticides/PCBs by EPA Methods 8081/8082: all of the MS/MSD percent recoveries and Relative Percent Differences (RPDs) were greater than the control limits due to matrix interference from the extremely high concentration of Aroclor 1248 in the parent sample (TP29@0.5'). Since one of the surrogates was also greater than the control limit, the Aroclor 1248 detection was qualified as estimated and flagged with a "J".

- PCBs by EPA Method 8082: an MS/MSD was performed with sample TP10@0.5. The percent recoveries for Aroclor 1260 (179% in the MS and 203% in the MSD) were greater than the control limit of 50-135%. The detected results in the associated samples were qualified as estimated and flagged with a "J".

- PCBs by EPA Method 8082: an MS/MSD was performed with sample D-41. The percent recoveries for Aroclor 1260 (226% in the MS and 244% in the MSD) were greater than the control limit of 50-135%. The detected results in the associated samples were qualified as estimated and flagged with a "J".

- PCBs by EPA Method 8082: an MS/MSD was performed with sample SS16-0.5. The percent recoveries for Aroclor 1260 (18% in the MS and 31% in the MSD) were less than the control limit of 50-135%. The MS/MSD RPD was greater than the control limit of 25% at 52%. The recoveries for the MS/MSD performed with sample SS41-0.5 were greater than the control limits at 794% and 619%, respectively. The detected and non-detected results in samples associated with sample SS16-0.5 and the detected results in samples associated with SS41-0.5 were qualified as estimated and flagged with a "J".

- PCBs by EPA Method 8082: an MS/MSD was performed with sample TP90-0.5. The percent recoveries for Aroclor 1260 (239% in the MS and 209% in the MSD) were greater than the control limit of 50-135%. The detected results in the associated samples were qualified as estimated and flagged with a "J".

- PCBs by EPA Method 8082: an MS/MSD was performed with sample TP113-2.5. The percent recoveries for Aroclor 1260 (482% in the MS and 917% in the MSD) were greater than the control limit of 50-135%. The detected results in the associated samples were qualified as estimated and flagged with a "J".

Laboratory Control Sample

LCS samples are an environmental matrix that is spiked with known concentrations of a subset of target compounds. The LCS is used to monitor laboratory accuracy without the bias of a sample matrix.

At least one LCS and one LCS duplicate were analyzed per analytical batch. LCS data presented and reviewed for these sample delivery groups were within laboratory specified control limits.

3.4.3 Precision

Field Duplicate Review

Field precision cannot be assessed for soil or concrete samples due to the inherent inhomogeneity of the samples. Field duplicates were not collected during this sampling event; therefore precision is assessed by evaluating the laboratory duplicates as described below.

Laboratory Duplicate Review

The laboratory duplicate precision was assessed by reviewing the RPDs between MS/MSD and LCS/LCSD analyses. As stated above, at least one MS/MSD and one LCS/LCSD were analyzed per analytical batch. The MS/MSD and LCS/LCSD RPDs were within the laboratory specified control limits, with the exceptions noted in the MS/MSD section. Sample results were not qualified due to laboratory duplicate RPDs.

3.4.4 Comparability

The sample results from this sampling event are comparable because of the use of standard techniques to collect representative samples, consistent application of analytical method protocols, and reporting analytical results with appropriate units and reporting limits.

3.4.5 Sensitivity

The reporting limits provided by the laboratory met or exceed those provided in Table 1 of the Work Plan. For some samples, a smaller sample volume was used in order to quantify results within the linear range of calibration. Because the samples required dilution, the samples did

not always meet the project specific reporting limits. The laboratory reported the lowest possible reporting limit for compounds that did not require dilution.

3.4.6 Completeness

The laboratory reported all requested analyses and the deliverable data reports were complete. All data were determined to be usable. Completeness for this sampling event is 100 percent.

Based on the QA/QC review, data are either usable as reported or qualified as estimated (J). The "J" qualifier applied during this review process is defined as follows.

> J: the analyte was positively identified; the associated numerical value is an approximate concentration of the analyte in the sample. The detected sample result is considered estimated.
>
> UJ: the analyte was not detected above the reported sample quantitation limit; however, the reported quantitation limit was approximate and may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample and is considered estimated.

4.0 PUBLIC OUTREACH

The City has undertaken a public information and outreach program to advise the public, including, but not limited to, the residents of the Site vicinity about the presence of PCBs at the Site. Completed public outreach activities include:

- duly noticed City Council meetings;
- information letters to the public;
- two duly noticed public meetings held on April 15, 2004 and November 3, 2004 at schools in the Site vicinity;
- articles in the local newspaper (*The Press Enterprise*);
- distribution of an information sheet; and
- updates on the City web site.

At the public meetings, officials from the City, together with Geomatrix and Dr. Jill Powder of ENV America (a Board-certified toxicologist retained by the City) provided information and answered questions regarding the release of PCBs, the field activities, the remedial

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investigation results, and a preliminary HHRA (the results of which will be reported under separate cover).

5.0 SUMMARY AND CONCLUSIONS

PCBs were the primary constituents detected during the remedial investigation activities performed by Geomatrix and prior consultants' assessments at the Site and described herein. Although a few other target constituents were detected in some samples, these detections are low and/or below the residential PRG and within typical background levels. In addition the other constituents were detected at a low frequency.

The lateral and vertical distribution of PCBs at the Site suggests PCB-containing waste historically was discharged to the Site treatment plant. The highest concentrations of PCBs were detected in the area of the former treatment plant and sludge drying beds. PCBs above the residential PRG also are present in the former brine basins and the Site drainages, which historically were dammed and used for treatment plant wastewater discharge (Figure 4). Although PCBs were detected at low concentrations in some areas near the Site boundaries, the reported detections are below the residential PRG, except for the two areas near the southwestern Site boundary where PCBs above the residential PRG have been detected. Reported concentrations of PCBs in samples collected from residential properties south of these two areas, however, were either non-detect (11 of 16) or below the residential PRG (5 of 16). Reported detections of PCBs in the northwest drainage are above the residential PRG near the Site, but do not appear to persist further than approximately 1,000 feet from the northwest Site boundary.

We understand the Developer (The Friends of the Riverside Airport, LLC) and Frey are performing additional Site assessment activities under the purview of DTSC to support remedial planning for future development of the Site. We understand these activities include:

- additional soil sampling and analysis for other constituents, including dioxins and furans; and
- assessment of groundwater gradient and quality at the Site.

These additional assessment activities will be reported by Frey under separate cover.

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