CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

ORDER R2-2005-0033

ADOPTION OF FINAL SITE CLEANUP REQUIREMENTS FOR:
STARLINK LOGISTICS, INC. (FORMERLY RHONE-POULENC, INC.)

WETLAND OPERABLE UNIT
1990 BAY ROAD
EAST PALO ALTO
SAN MATEO COUNTY

The California Regional Water Quality Control Board, San Francisco Bay Region (hereinafter Water Board), finds that:

1. **Site Location:** Soil and groundwater pollution exist on a site in and adjacent to 1990 Bay Road, East Palo Alto (hereinafter "Site" – see Figure 1). The entire Site is approximately 26-acres and is defined to include areas with arsenic concentrations in soil greater than 20 milligrams per kilogram (mg/kg). The Site has been divided into Upland and Wetland Operable Units, as described in section 2.1 below. The Site is located about 2000 feet west of San Francisco Bay. A tidal wetland borders the Site on the east. This Order addresses the approximate 2 acre portion of this tidal wetland, defined as Wetland Operable Unit (OU) of the Site (see Figure 4) .

2. **Site History:** Arsenic is the primary contaminant of concern at the Site, although other metals have been found at elevated concentrations, as well. Arsenic is also found in shallow groundwater at the Site, but in an area smaller than the affected soil area. No arsenic has been found in deeper groundwater aquifers.

   The Site includes the 5-acre property, the location of the former operating facility at 1990 Bay Road. The remainder of the Site includes partly developed commercial properties to the north, south and west; residential and mixed-use properties to the south; and the 2 acres of the Wetland OU located beyond a levee east of the 1990 Bay Road property.

   The 1990 Bay Road property was used to formulate agricultural chemicals for more than 70 years. From the 1920s until 1964, the property was owned by Chipman Chemical Company and used for manufacturing arsenic-based products, such as weed control compounds. In 1964, Rhodia Inc., acquired Chipman and continued operations at the property until the late 1960s. In 1971, Rhodia sold the property to Zoecon Corporation, which began manufacturing operations in 1972, after expanding site facilities. Zoecon (which later became Sandoz Agro Inc.) manufactured biorational insect controls at the

facility. In 1994, Rhône-Poulenc Inc. (Rhodia's successor) repurchased the property, and then leased the plant to Catalytica, Inc., which manufactured chemicals and pharmaceutical intermediates there until 2001. The plant and office facilities were demolished in the spring of 2002 to facilitate site cleanup work. The 1990 Bay Road property is now vacant, except for an empty warehouse structure adjacent to Bay Road. In 1999, Rhône-Poulenc became Aventis CropScience, Inc. When Aventis CropScience was sold in 2002, the property was transferred to StarLink Logistics, Inc. (SLLI), an indirect, wholly owned subsidiary of Aventis SA.

Investigation and cleanup activities have been taking place at the Site since the early 1980s. Remedial activities are essentially completed for the Upland OU portion of the Site. Actions taken to address contaminants in these areas have included a combination of soil removal, on-site soil treatment, capping and deed restrictions, construction of an underground barrier wall and phytoremediation (the planting of trees to control groundwater movement) (Figure 3).

3. **Operable Unit Designation:** For purposes of remedy selection and remedial planning, the Site, pursuant to Site Cleanup Requirements Order No. 91-016, was divided into "Upland" and "Wetland" "Operable Units" within the meaning of section 300.430(a)(ii) of the National Contingency Plan (NCP), 40 C.F.R. Part 300 (Figure 4). Site Cleanup Requirements Order No. 94-042, adopted by the Water Board, amended the boundary of the Upland OU to include the Torres and Pacific Gas & Electric (PG&E) properties. This portion is referred to as the Upland OU Annex. Site Cleanup Requirements Order No. 97-095 expanded the Upland OU Annex to include affected properties south of Weeks Street referred to as the South of Weeks Street Upland OU Annex Subarea (South of Weeks Subarea). The tidal wetland comprises the Wetland OU, which is approximately 2 acres. Site Cleanup Requirements Order No. 97-095 addressed a portion of the drainage canal south of Runnymede Street owned by the City of Palo Alto in the Wetland OU. Since that time, extensive sampling on this property indicated that arsenic concentrations in soil are less than 20 mg/kg. Therefore, this area is no longer considered part of the Wetland OU. The installation of the underground barrier wall was originally considered a part of the Wetland OU. The underground barrier wall was installed in 2001 pursuant to a letter issued by the Executive Officer on February 18, 2000, pursuant to Water Code Section 13267 and is no longer considered a part of the Wetland OU.

4. **Named Dischargers**: StarLink Logistics, Inc. (SLLI) is the successor in interest to Chipman Chemical and Rhodia, which from 1926 to 1971 were known to have produced arsenic-based pesticides at the 1990 Bay Road facility and is the probable source of some of the pollutants found in soil and groundwater, both at 1990 Bay Road and on adjacent properties. SLLI is a discharger because it is the successor in interest of Chipman and Rhodia and is responsible for any discharges which they may have caused.

5. **Regulatory Status**: In 1985, the U.S. Environmental Protection Agency (U.S. EPA) proposed the Site for inclusion on the National Priorities List (NPL) under authority of

the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as later amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986. From 1987 to early 1991, the Site was under the lead agency jurisdiction of the Department of Toxic Substance Control (DTSC) pursuant to a Consent Order. In 1989, U.S. EPA formally removed the Site from consideration for the NPL under U.S. EPA's Resource Conservation and Recovery Act (RCRA) deferral policy. Lead agency status changed in January 1991, from DTSC to the Water Board. The parties vacated all provisions of the Consent Order by stipulation in February 1991, except for those referencing cost recovery. The Water Board is currently the lead agency overseeing investigation and cleanup of the Site. The Water Board has continued to regulate the Site consistent with the National Contingency Plan (NCP) under the South Bay Multiple Site Cooperative Agreement (MSCA) with U.S. EPA. The MSCA terminated in July 1996. U.S. EPA has informed the Water Board that the federal program most appropriate to the Site would be the RCRA Corrective Action program, in light of the status of the Site as a RCRA deferral site. This Order is intended to meet the requirements of RCRA Corrective Action and the California Water Code as well as Water Board policies and procedures for Orders issued under the authority of Water Code Section 13304. The Water Board will continue to be the lead agency and will regulate the Site as it has in the past.

6. **Board Orders:** The following Orders have been adopted by the Water Board for the Site:
    - Site Cleanup Requirements Order No. 91-016, adopted February 20, 1991 (rescinding and replacing Order 85-67 to reflect change in lead agency, to include tasks necessary to complete the Feasibility Study/Remedial Action Plan (FS/RAP) process, to update groundwater monitoring and to ensure design of an adequate groundwater mitigation response for final site cleanup);
    - Site Cleanup Requirements Order No. 91-095 adopted June 19, 1991 (amending Order No. 91-016 to add provisions for implementing an Early Action Removal Plan (EARP));
    - Site Cleanup Requirements Order No. 92-022 adopted February 22, 1992, (containing the Remedial Action Plan for the Upland Operable Unit);
    - Site Cleanup Requirements Order No. 92-127 adopted October 21, 1992 (amending Order Nos. 92-022, 91-095 and 91-016, to revise and consolidate tasks and due dates);
    - Site Cleanup Requirements Order No. 94-042 adopted March 16, 1994 (amending Order Nos. 92-127, 92-022, 91-095 and 91-016, extending the Upland Operable Unit remedy into the Upland Operable Unit Annex area);
    - Site Cleanup Requirements Order No. 96-162 adopted December 18, 1996, (amending Order 94-042, 92-127, 92-022, 91-095 and 91-016, removing Sandoz Crop Protection Corporation from Site Cleanup Requirements);
    - Cleanup and Abatement Order No. 97-015 issued March 26, 1997, (names Torres as a discharger and sets forth time schedule for completion of remedial action on Torres property);

- Site Cleanup Requirements Order No. 97-095 issued July 16, 1997, (amending Order 92-022, extending the Upland Operable Unit remedy into the South of Weeks Street Upland Operable Unit Annex Subarea and revising the residential soil cleanup standard for arsenic from 70 mg/kg to 20 mg/kg);
- Administrative Civil Liability Complaint 97-127; and
- Administrative Civil Liability Complaint 98-050 adopted June 17, 1998 (amending Administrative Civil Liability Complaint 97-127).

7. **Remedial Investigation and Ecological Assessment of Wetland**: SLLI submitted a Final Remedial Investigation (RI) Report for the 1990 Bay Road Site on September 19, 1989. The RI was conducted to characterize the extent of arsenic in soil and groundwater at the Site.

   Soil and groundwater at the Site contain elevated concentrations of arsenic, cadmium, copper, lead, mercury, selenium, and zinc. Arsenic is the primary constituent of concern. The Site, as previously defined, includes areas with arsenic concentrations greater than 20 mg/kg in soil and sediment (weight of soil and sediment reported on the basis of in situ weight, which is commonly referred to as wet weight). The extent of soil with elevated arsenic concentrations prior to remediation is shown on Figure 2.

   The concentrations of arsenic in groundwater in the tidal wetland, based on 18 years of monitoring, are stable with the highest concentrations detected in the well close to the bend in the levee. Arsenic concentrations in the tidal wetland in April 2004 ranged from 0.196 mg/L in well M-4 to 0.0026 mg/L in well W-122. Of the other six constituents of concern at the Site, mercury and lead have not been detected in groundwater samples collected from wells located in the tidal wetland. Cadmium was detected in only two groundwater samples collected in 1988 at 0.0003 and 0.0004 mg/L in well W-122 and temporary well M-13, respectively. Copper was detected in groundwater samples collected in 1986 and 1988, with a maximum concentration of 0.070 mg/L in well W-114 in September 1986; however, copper was not detected in the subsequent sample collected from this well in December 1986. Selenium was detected in groundwater samples collected in 1986 and 1987 at a maximum concentration of 0.0002 mg/L, and zinc was detected at a maximum concentration of 0.100 mg/L in well W-114 in September 1986, but was not detected in the subsequent sample from this well collected in December 1986.

   The Ecological Assessment for the tidal wetland was submitted on June 24, 1994 and a Draft Ecological Risk Assessment for the tidal wetland was submitted on June 19, 1998. Results of an additional soil and sediment investigation in the tidal wetland were submitted on June 9, 2000.

   The primary objective of the Ecological Assessment was to evaluate the potential impact of contamination from the Site on the adjacent tidal wetland ecosystem. Samples of sediment, surface water, benthic invertebrates, fish, plants, and small mammals were

collected. Because seasonal changes could modify the distribution and bioavailability of the contaminants, sampling programs were conducted during the dry season and the wet season. Samples were analyzed to assess contaminant distribution in the wetlands, bioaccumulation of contaminants in plant and animals, and toxicity of sediments and water.

The Wetland OU encompasses approximately 2 acres of the 90-acre Laumeister Tract. The Laumeister Tract is owned by the City of Palo Alto, but is located in the City of East Palo Alto, San Mateo County. The Wetland OU is separated from the Upland OU by a levee on the east side of the former PG&E non-tidal marsh and the Torres property, separating the tidal and upland areas (Figure 4). The tidal wetland is estuarine and is open to full tidal action from San Francisco Bay. The wetland is classified as a northern coastal salt marsh and heavily vegetated with primarily pickleweed and salt grass. An extensive network of natural tidal sloughs and several man-made channels run through the tidal wetland that is ecologically distinct from the marsh surface. The sloughs and channels are inhabited by numerous benthic species and fish, which provide food to birds. The heavy vegetation and food sources provide good habitats for small mammals and birds that inhabit the tidal marsh. The California clapper rail (Rallus Longirostris obsoletus) and the salt marsh harvest mouse (Reithrodontomys raviventris), both endangered species, have been observed in the tidal marsh.

a. **Sediment:** Sediment samples were collected from the tidal wetland during the RI, the Ecological Assessment, and during an additional sediment investigation conducted in 2000 at the request of the Water Board. During the RI, sediment samples were collected from the tidal wetland at depths from 0.5 to 13 feet. During the Ecological Assessment, surface sediment samples (0.5 foot) were collected during the dry and wet season in the tidal wetland and two reference wetlands. In the tidal wetland, samples were collected close to the Site (near-field) and closer to the Bay (far-field). Surface sediment samples were also collected with increasing distance from the Site in the major slough (the primary drainage channel for the south-central portion of the tidal wetland), three adjacent sloughs, and at a reference wetland slough. In 2000, sediment samples were collected around Slough Station 2 at depths ranging from the surface (0 to 1.0) to 9 feet. Arsenic data for sediment samples are summarized in Table 1.

For marsh surface sampling locations, the highest arsenic concentration (86 mg/kg wet-weight) reported was collected at RI location B8-5, approximately 100 feet north of the bend in the levee (Wetland FS Figure 5). For slough surface sampling locations, the highest arsenic concentration (16.3 mg/kg wet weight; 45.2 mg/kg dry weight) was collected during the Ecological Assessment at Slough Station 2 (SM-2). In 2000, surface sediment samples were collected from 16 slough locations and five marsh locations surrounding Slough Station 2 (SM-2); the closest slough sampling location to SM-2 was SL-2. The arsenic concentrations in surface sediment samples collected from SL-2 at depths of 0.5

and 1 foot were 10.88 and 9.48 mg/kg wet weight, respectively. Therefore, the elevated arsenic concentration reported in surface sediment in the vicinity of Slough Station 2 during the Ecological Assessment was not reproduced in the 2000 samples.

The highest arsenic concentrations in subsurface sediment were found at sample location R8-5 near the bend in the levee at depths below 5 feet (depicted in Wetland FS, Figure 6). These deep sediments are not intersected by slough channels. Arsenic concentrations decreased rapidly with distance from the bend in the levee.

Reference sediment samples were collected during the Ecological Assessment from the Ravenswood wetland, just north of the Dumbarton Bridge on the west side of the Bay, and the Dumbarton wetland on the east side of the Bay just south of the bridge. The Ecological Assessment concluded that the arsenic concentrations in sediment near the Site were not statistically significantly different than at the reference locations.

Approximately 300 sediment replicates collected from 104 sample locations were analyzed for cadmium, copper, lead, mercury, selenium, and zinc. The mean concentrations for these constituents were found to be below the Water Board sediment cover guidelines with the exception of mercury and selenium. Mercury was not detected above the detection limit in samples for the Ecological Assessment, however, the method detection limit for these samples was above the Water Board sediment cover guidelines. The U.S. Fish and Wildlife Service (USFWS) sampled several wetlands in the South Bay, including the tidal wetland. During the Ecological Risk Assessment, these USFWS data were used to calculate a mean concentration of mercury for the tidal wetland. The mean concentration of mercury was found to be above the Water Board sediment cover guidelines but similar to other mean mercury concentrations from marshes in the South Bay. The mean selenium concentrations in the tidal wetland also exceed the Water Board sediment cover guidelines, however, no significant difference in sediment selenium concentrations was seen between the tidal wetland and reference wetlands. Within the Tidal Wetland, concentrations of selenium in the far-field were significantly greater than in the near-field, suggesting a possible Bay source.

The RI concluded that the levee was effective in limiting the extent of contamination from the Site into the tidal wetland and that some contamination at greater depths occurred before the levee was constructed. More recent studies have concluded that concentrations at depth are the result of groundwater transport. The Ecological Assessment concluded that there was not a statistically significant difference between arsenic concentrations in sediment in the tidal wetland from the reference data, the concentrations showed no consistent spatial

patterns that could be related to the Site, and the data indicated that there is no broad-scale enrichment of arsenic in surface sediment in the tidal marsh. The Ecological Assessment also concluded that, although there was a minor statistically significant difference between concentrations of copper, lead, and zinc in the tidal wetland and other marshes in San Francisco Bay, the difference was much less than the typical 2- to 4-fold temporal variation in metals concentrations throughout the Bay. It further concluded that concentrations of copper, lead, and zinc were consistent with those reported for other wetlands.

b. **Surface Water:** Surface water samples were collected during the RI and the Ecological Assessment from the sloughs and marshes in the tidal wetland. Arsenic concentrations in surface water from the sloughs ranged from 0.001 to 0.041 mg/L. Arsenic concentrations in surface water from the reference slough locations ranged from 0.001 to 0.016 mg/L. Arsenic concentrations in surface water from the marsh surface ranged from 0.001 to 0.049 mg/L in near-field samples and from 0.001 to 0.068 mg/L in far-field samples. At the reference marsh locations, surface water arsenic concentrations ranged from 0.001 to 0.116 mg/L.

Copper, lead, selenium, and zinc concentrations were detected in slough surface water samples and in marsh surface water samples. Cadmium and mercury were not detected in slough surface water samples but were detected in marsh surface water samples. The Ecological Assessment concluded that there was no statistically significant difference between concentrations of constituents in surface water samples collected from the tidal wetland sloughs and marsh than the reference wetland surface water; therefore, surface water in the tidal wetland appears to be unaffected by Site activities.

c. **Biota:** The Ecological Assessment focused on small mammals and birds as environmental receptors in the tidal wetlands. Of note were two endangered species, the salt marsh harvest mouse and the California clapper rail. The primary potential exposure pathways for small mammals and birds include: (1) the food chain due to ingestion of contaminated native vegetation and benthic invertebrates; (2) drinking of contaminated surface water; and (3) ingestion of soil during grooming behavior. Secondary routes of exposure, including inhalation of air-borne contaminants and direct absorption of contaminants across the skin were considered limited relative to the primary routes. The Ecological Assessment assessed the potential for direct exposure of small mammals and birds to contaminated sediments and surface water, and indirect exposure via the ingestion of contaminated native vegetation and invertebrates.

Tissue samples of pickleweed plants, benthic invertebrates, fish, and small mammals were analyzed to assess bioaccumulation of constituents and to evaluate the potential for exposure to the salt marsh harvest mouse and the California

clapper rail. Tissue samples of benthic invertebrates collected at Slough Station 2, where elevated arsenic concentrations were reported in sediment, indicated that contaminant concentrations were not significantly higher than those in benthic invertebrates at reference sites. In addition, tissues of plants, fish, and small mammals showed no indication of bioaccumulation of constituents and native populations of these species did not appear impacted by localized arsenic concentrations in sediments. A field survey also indicated that the tidal wetland provided good habitat quality for the California clapper rail and a habitat equivalent to nearby reference sites for the salt marsh harvest mouse. The Ecological Assessment concluded that the tidal wetland is not generally impacted by contaminants from the Site.

The USFWS has determined that there is an approximately 25% loss in habitat service due to low concentrations of arsenic and zinc in surface sediment in several small areas in the tidal wetland that comprise in total approximately 1.3 acres. These areas are where marsh surface sediment concentrations exceed 24 mg/kg arsenic dry weight and/or 201 mg/kg zinc dry weight, and where slough sediment concentrations exceed 16 mg/kg arsenic dry weight. These threshold levels were derived to be protective for the salt marsh harvest mouse and the California clapper rail.

8. **Feasibility Study**: SLLI submitted a Feasibility Study for the Wetland OU (the Wetland FS) on June 16, 2004, and an addendum to the FS addressing human health risk issues was issued on October 18, 2004. The Wetland FS developed remedial action objectives; screened potentially applicable remedial action technologies and process options; and developed, evaluated, and compared remedial alternatives.

9. **Development of Remedial Goals:** The objective for the Wetland FS was to develop a remedial alternative that minimizes threats to and provides adequate protection of human health and the tidal wetland environment. Remedial actions for the Upland OU addressed the groundwater plume; therefore, the Wetland FS did not address risks associated with groundwater.

Human health and the environment are protected by selecting remedial actions that meet health-based and environmentally-based criteria, including applicable or relevant and appropriate requirements (ARARs). In the Wetland FS several potential chemical, location, and action-specific ARARs and criteria were identified for the tidal wetlands. An evaluation of potential ARARs was presented in Table 2 in the Wetland FS and is described briefly below.

a. **Chemical-Specific Criteria - Surface Water**: National Ambient Water Quality Criteria are potential chemical-specific ARARs for surface water in the tidal wetlands. The chronic aquatic life for saltwater would be the potential chemical-specific ARAR for surface water in the tidal wetland; however, the Water Board

criteria established in the Basin Plan supersede these federal criteria. The most recent version of the Basin Plan was published in 1995, and was officially approved by the U.S. EPA on May 20, 2000. In May 2000, U.S. EPA promulgated the California Toxics Rule, which establishes water quality criteria for priority toxic pollutants listed in section 307(a) of the Clean Water Act. This action (65 Federal Register 31683-31719) was taken because California was not in compliance with the Clean Water Act, which requires states to adopt water quality criteria for priority pollutants. The Basin Plan lists aquatic life objectives for a limited set of pollutants (10 inorganic pollutants and polynuclear aromatic hydrocarbons), which apply to water north of the Dumbarton Bridge. Water south of the Dumbarton Bridge is not subject to the Basin Plan objectives; instead, the California Toxics Rule criteria apply, except for copper and nickel, for which recently adopted site-specific objectives apply. These criteria are contained in the San Francisco Bay Basin (Basin Plan). The proposed California Toxics Rule criteria for arsenic are the same as in the Basin Plan; the marine chronic and acute water quality objectives for arsenic are 0.036 mg/L and 0.069 mg/L, respectively.

b. **Chemical-Specific Criteria – Sediment**: The Ecological Assessment identified environmental receptors in the tidal wetland including two endangered species, the California clapper rail and the salt marsh harvest mouse, and several species of benthic organisms, fish, and birds. The Ecological Assessment concluded that although there was one localized area (Slough Station 2) of elevated metal concentrations in sediment, the various receptors did not appear to be impacted.

Based on the data collected during the Ecological Assessment, an Ecological Risk Assessment was performed that evaluated the likelihood of adverse effects to five ecological receptor groups: plants, invertebrates, fish, birds, and small mammals. The Ecological Risk Assessment concluded that "the tidal wetland is a high quality habitat that supports abundant and diverse flora and fauna, that the tidal wetland ecology shows no signs of adverse effects, and adverse ecological effects are not predicted to be associated with site-related chemical exposure." The Ecological Risk Assessment also concluded that mean (unfiltered) concentrations of constituents in marsh and slough surface water were less than the Water Board chronic water quality objective or were not significantly different from reference wetlands, indicating a regional condition.

Subsequent to the Ecological Risk Assessment, additional characterization of sediment was conducted in the area of Slough Station 2. The elevated concentrations in the slough sediments reported in the Ecological Assessment were not reproduced, and the additional evaluations indicate that arsenic concentrations in the vicinity of Slough Station 2 are only slightly elevated above background levels. Sediments with elevated arsenic concentrations were

generally at a depth of greater than 5 feet and were not in areas intersected by the slough channels.

The USFWS requested that ecological threshold values be developed for the top 12 inches of sediment. Development of these ecological threshold values for the California clapper rail and the salt marsh harvest mouse were included as Appendix B to the Wetland FS. The dry weight Target Low Levels, which are based on the larger of the no adverse effect levels or background concentrations, were calculated to be 24 mg/kg arsenic for the marsh and 16 mg/kg arsenic for the sloughs, and 201 mg/kg zinc for the marsh and 158 mg/kg zinc for the sloughs. The dry weight Target High Levels, which represent the mid-point of adverse effects, for both the marsh and sloughs were calculated to be 40 mg/kg arsenic and 252 mg/kg zinc. The areas in the tidal wetland where dry weight arsenic and zinc concentrations in surface sediment exceed the calculated Target Low Levels guidance criteria comprise a total of approximately 1.3 acres; 1.25 acres on the marsh surface and 0.02 acres in the tidal sloughs.

Using a methodology called Habitat Equivalency Analysis (HEA), the value of lost habitat and the value of replacement of projects can be estimated. The Wetland FS presented the calculation for the loss of habitat value for the tidal wetland based on assumptions provided by the USFWS. These assumptions include an approximately 25% loss of habitat service between 1981 and 2000 for the acres in the tidal wetland with arsenic and zinc concentrations above the Target Low Levels for the endangered species. This method can also be used to evaluate the loss in habitat service for no action and active remediation alternatives in the future, and to calculate the acreage of restored wetlands required to offset the losses.

Health-based cleanup goals developed by U.S. EPA for the Upland OU were used as the basis for evaluating potential human health risks associated with exposure to arsenic in sediment in the tidal wetland. U.S. EPA developed health-based cleanup goals for both residential and commercial/industrial exposure. Both residential and commercial/industrial exposure scenarios are highly conservative compared to potential exposure by a trespasser in the wetland. For this evaluation, the commercial/industrial scenario was considered more applicable to the wetland trespasser scenario as it considers shorter duration exposure (250 days per year compared to 365 days per year for a resident) and only the soil ingestion and inhalation exposure pathways (plant ingestion was considered for a resident). However, the commercial/industrial exposures would still far exceed exposures by trespassers to the wetland. Not only would the exposure duration for trespassers be shorter, the wet sediments in the wetland would not be subject to re-suspension as dust under the conditions assumed for the upland soil, reducing the contribution to exposure of the inhalation pathway.

The Wetland FS presented a health-based cleanup goal developed by U.S. EPA for arsenic assuming commercial/industrial exposure was 300 mg/kg. However, this health-based goal was developed in 1991 and since that time toxicity criteria for arsenic have been updated by U.S. EPA and the California Environmental Protection Agency's (Cal-EPA) Office of Environmental Health Hazard Assessment. The Wetland FS Risk Addendum (the risk addendum) updated the health-based goals to include the new toxicity criteria and compared concentrations in sediment in the wetland to the health-based goals.
Because arsenic is considered a carcinogen, the health-based goal is based on the potential carcinogenic effects of arsenic. The revised risk calculation presented in the addendum used updated carcinogenic toxicity criteria for inhalation and oral exposure (i.e., slope factors) from U.S. EPA and Cal-EPA. U.S. EPA and Cal-EPA developed slope factors for inhalation and oral exposure that relate potential exposure to the probability of cancer occurring. For U.S. EPA, the inhalation slope factor [15 $(mg/kg\text{-}day)^{-1}$] had not been updated since 1991, but the oral slope factor decreased from 1.8 $(mg/kg\text{-}day)^{-1}$ to 1.5 $(mg/kg\text{-}day)^{-1}$. For Cal-EPA, the inhalation slope factor is 12 $(mg/kg\text{-}day)^{-1}$ and the oral slope factor is 9.45 $(mg/kg\text{-}day)^{-1}$. The calculations presented in the addendum show the health-based goal using the current U.S. EPA's slope factors remains at 300 mg/kg but decreases to 60 mg/kg using Cal-EPA's slope factors.

The sediment data collected from the Wetland OU was compared to the revised health-based criteria. Over 350 samples have been collected to characterize soil in the wetland. Because potential exposure to sediment in the wetland by an occasional visitor could occur across the entire wetland, an average concentration across the entire wetland was used for comparison. Consistent with U.S. EPA guidance, the 95 percent upper confidence limit (95% UCL) on the mean of the data was used as the representative concentration. ProUCL software published by U.S. EPA (2001) was used to evaluate the distribution of the arsenic concentration data and the 95% UCL recommended in the output was 12.9 mg/kg. This concentration is below both health-based goals and is the appropriate concentration for representing potential exposure by an occasional visitor. It should be noted that digging in the wetland is restricted and potential contact with subsurface sediment is highly unlikely.

Based on this evaluation, sediment in the tidal wetland does not present a public health risk to the occasional visitor.

c. **Potential Location-Specific ARARs**: Several potential location-specific ARARs were identified for the tidal wetland:

The Endangered Species Act of 1973 requires action to conserve endangered species within critical habitats upon which endangered species depend. Two endangered species, the California clapper rail and the salt marsh harvest mouse,

have been identified in the tidal wetlands. Site-specific ecological threshold values were developed for the two endangered species.

The Clean Water Act Section 404 and General Regulatory Policies for the Department of the Army Corps of Engineers require permits for structures or work in or affecting navigable waters, and the tidal wetlands is within the Corps' Section 404 Jurisdiction. Administrative permits are not required for CERCLA sites; however, substantive requirements may apply. The Army Corps of Engineers had the opportunity to review the proposed plan during the public comment period. Also, any excavation work within the tidal wetland would be performed under an agency-approved plan.

Executive Order 11990 for the Protection of Wetlands requires federal agencies to minimize the destruction, loss or degradation of wetlands, to preserve and enhance the natural beneficial values of wetlands, and to avoid support of new construction in wetlands if a practical alternative exists.

The Porter Cologne Water Quality Control Act identifies general duties and authorities of state and regional water boards, including preparation of a Basin Plan and enforcement of water quality regulations (see discussion of Basin Plan in previous section). The Wetland FS was prepared pursuant to an order from the Water Board and the Water Board was involved in establishing the cleanup criteria and remediation plan.

The California Coastal Act of 1976 and McAteer-Petris Act of 1969 establish permit authority for the Bay Conservation and Development Commission (BCDC) over any construction within 100 feet of tidal waters of San Francisco Bay and in tidal water. Administrative permits are not required for CERCLA sites; however, substantive requirements may apply. The BCDC had the opportunity to review the Proposed Plan during the public comment period.

d. **Remedial Goals**: Based on the health-based cleanup goals for commercial/industrial receptors discussed previously, concentrations of arsenic in sediment do not represent a public health risk requiring remedial action. Therefore, the primary objective of remediation in the tidal wetlands is to protect the ecological receptors.

The area of the tidal wetland where surface sediment contains arsenic concentrations above the calculated Target Low Levels guidance criteria for endangered species at the Site is only 1.3 acres of the 90-acre Laumeister Tract. Other elevated sediment concentrations have been found at depths greater than 5 feet, but these sediments are not accessible to ecological receptors, which forage primarily in the top 6 inches of sediment. Therefore, quantitative remedial objectives for sediment were not developed.

The Ecological Assessment, the Ecological Risk Assessment, and the Endangered Species Risk Calculations concluded that the wetland is healthy, there is no evidence of significant risks to ecological receptors from the Site, and the area of marsh surface and slough that exceeds the Target Low Levels is 1.3 acres. In this area, the USFWS has determined that there is a 25% loss of habitat service. In addition, the completed remedial actions in the Upland OU have eliminated or minimized the potential for future Site impacts on the tidal wetland.

Based on the above discussions, the remedial goal developed for the Wetland OU is to preserve and protect the habitat value of the tidal wetlands. This remedial goal was used to identify potentially applicable technologies and process options for protecting the tidal wetland and for evaluating remedial alternatives.

10. **Feasibility Study - Alternative Development:** Alternative technologies and process options were identified for addressing the affected sediment in the tidal wetland. Based on considerations about technical feasibility, effectiveness for the chemicals of concern, appropriateness for the site conditions, administrative issues and relative costs, three remedial alternatives were defined for the 1990 Bay Road Site. As required by the U. S. EPA, one of these alternatives is the "No Action" alternative (to provide a basis for evaluating the relative costs and protectiveness of other alternatives analyzed) and another was a maximum cleanup alternative that would minimize the need for long-term management of the Site. The three alternatives are:

Alternative 1 - No Action
No action would take place in the Wetland OU, except for continued groundwater monitoring of the shallow and deep aquifers that is part of the Upland OU remedy.

Alternative 2 – Topographic Monitoring and Wetland Offset
In addition to continued groundwater monitoring, topographic monitoring of the wetland surface would be conducted in the vicinity of the bend in the levee, where elevated levels of arsenic were found at a depth of 5 feet or more below surface. The purpose of this periodic monitoring would be to evaluate whether erosion occurs that could expose the deeper sediments to the surface. If this does occur, a contingency plan would be developed and implemented. This alternative would also involve a 1.3-acre habitat service loss offset.

Alternative 3 – Excavation of Surface Soil, Topographic Monitoring and Wetland Offset.
This alternative would involve excavation of surface arsenic-affected sediments (upper one foot) in the wetland and sloughs near the bend in the levee and re-filling the excavations with clean soil. Excavation of deeper sediments (between 5 and 11 feet deep) was not considered, because the damage to the wetland caused by such a major

excavation is not warranted to remove the inaccessible and immobile arsenic-affected sediments found at depth.

11. **Feasibility Study - Evaluation of Alternatives:** U. S. EPA guidance specifies nine criteria to be used for selecting an appropriate final cleanup plan. Two of the nine criteria--state acceptance and community acceptance--cannot be completely assessed until the alternatives have been submitted for agency review and public comment. Therefore, each of the alternatives is evaluated against the remaining seven criteria, which are described below:

- Implementability: ability to implement the alternative, based on availability of technology and any materials or services required to implement it, as well as unique site conditions and administrative considerations;
- Short-term effectiveness: ability of the alternative to protect human health and the environment during remediation and until cleanup objectives are reached;
- Long-term effectiveness: ability to protect human health and the environment after remedial goals have been met; reliability of long-term engineering or institutional controls;
- Reduction of mobility, toxicity, and volume: ability to meet the statutory preference for achieving permanent solutions that reduce the need for long-term monitoring or management;
- Cost: relative cost of the alternative, including consideration of capital costs, as well as the costs of annual operations, maintenance and monitoring;
- Overall protection of the environment: ability to achieve the remedial goal and reduce both short-term and long-term potential for human or animal exposure to residual toxins; and
- Compliance with ARARs: ability to comply with any regulatory requirements that may apply to cleanup of the site, given its location and the chemicals of concern.

Table 2 provides a summary comparison of how each of the three remedial alternatives identified for the 1990 Bay Road Site meets these evaluation criteria. All three alternatives would achieve the remedial goal, to preserve and protect the habitat value of the tidal wetland, in the long term. In the short term, Alternative 3 would not be protective of the wetland, because during implementation a currently high value tidal wetland would be significantly disturbed and would be reduced to zero habitat service. Alternative 1 is already being implemented and would not require additional costs. Alternative 2 is implementable with relatively low costs. Alternative 3 would be difficult to implement in a wetland environment. In addition, Alternative 3 requires planning and coordination with other federal and state agencies (such as the U. S. Army Corps of Engineers and the Bay Conservation and Development Commission) that could take an additional one to two years or more to complete. In summary, Alternative 2 would be more effective than Alternative 1 (No Action) and less disruptive to the healthy, functioning wetland than Alternative 3. For these reasons, the preferred alternative or proposed plan is Alternative 2.

12. **Selected Remedy**: The discharger will continue groundwater monitoring, previously approved, of the deep and shallow aquifers and conduct topographic monitoring of the wetland surface near the bend in the levee every five years for thirty years (Alternative 2 of the Wetland FS). If the results indicate that natural erosion is exposing elevated concentrations of arsenic, a contingency plan will be developed. If, after 30 years of monitoring, the results indicate that erosion is not occurring, topographic monitoring will cease. In addition, an offset of 1.3 acres of the Cooley Landing Salt Pond restoration area will be provided in recognition of the minor loss of wetland habitat quality caused by the 1990 Bay Road Site.

    Based on information currently available, this selected remedy meets the threshold criteria and provides the best balance of tradeoffs among alternatives with respect to the evaluation criteria. This alternative will 1) be protective of human health and the environment, 2) comply with ARARs, 3) be cost-effective, 4) use appropriate technologies, and 5) be easily monitored for effectiveness.

13. **Remedial Action Plan**: The Proposed Plan Fact Sheet describes the final remedy for the Wetland OU as contained in this Order. The technical information contained in the RI, the Ecological Assessment, the Ecological Risk Assessment, the Wetland FS and the Proposed Plan Fact Sheet is consistent with the requirements of section 25356.1 of the California Health and Safety Code for RAPs and with the requirements of the National Contingency Plan for RIs and FSs. The final RAP for the Wetland OU satisfies the requirements of Water Board Order No. 91-016 and will consist of this Order, the RI, Ecological Assessment and Risk Assessment, the Wetland FS, and the Water Board's Proposed Plan Fact Sheet.

14. **Basis for Cleanup Standards**

    a. **General**: State Board Resolution No. 68-16, "Statement of Policy with Respect to Maintaining High Quality of Waters in California," applies to this discharge and requires attainment of background levels of water quality, or the highest level of water quality which is reasonable if background levels of water quality cannot be restored. Cleanup levels other than background must be consistent with the maximum benefit to the people of the State, not unreasonably affect present and anticipated beneficial uses of such water, and not result in exceedance of applicable water quality objectives. The Upland OU remedial action plan confirms the Water Board's initial conclusion that background levels of water quality cannot be restored. This Order and its requirements are consistent with Resolution No. 68-16.

    State Board Resolution No. 92-49, "Policies and Procedures for Investigation and Cleanup and Abatement of Discharges Under Water Code Section 13304," applies to this discharge. This Order and its requirements are consistent with the provisions of Resolution No. 92-49, as amended.

b. **Beneficial Uses**: The Water Board adopted a revised Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan) on January 21, 2004. This updated and consolidated plan represents the Water Board's master water quality control planning document. The revised Basin Plan was approved by the State Water Resources Control Board and the Office of Administrative Law on July 22, 2004, and October 4, 2004, respectively, and approved by the U.S. EPA, Region IX on January 5, 2005. A summary of regulatory provisions is contained in 23 CCR 3912. The Basin Plan defines beneficial uses and water quality objectives for waters of the State, including surface waters and groundwater.

Water Board Resolution No. 89-39, "Sources of Drinking Water," defines potential sources of drinking water to include all groundwater in the region, with limited exceptions for areas of high Total Dissolved Solids (TDS), low yield, or naturally high contaminant levels. The impacted shallow aquifer underlying the Site, including the Wetland OU, has no potential beneficial use as a municipal and domestic supply based on the TDScriteria of the State Board Resolution 88-63. There are no onsite wells currently drawing water from the shallow zone for these or any other purposes. The deep aquifer that underlies the Site is a source of drinking water; however, pumping of groundwater from this zone has been reduced to prevent saltwater intrusion and land subsidence.

The existing and potential beneficial uses of nearby surface waters (San Francisco Bay and San Francisquito Creek) include:

- Industrial service supply
- Commercial and Sport Fishing
- Water contact and non-contact recreation
- Wildlife habitat
- Cold freshwater and warm freshwater habitat
- Fish migration and spawning
- Navigation
- Estuarine habitat
- Shellfish harvesting
- Preservation of rare and endangered species

The existing and potential beneficial uses of the wetland include:

- Water non-contact recreation
- Wildlife habitat
- Estuarine habitat
- Preservation of rare and endangered species

15. **Basis for 13304 Order**: California Water Code Section 13304 authorizes the Water Board to issue orders requiring a discharger to cleanup and abate waste where the

discharger has caused or permitted waste to be discharged or deposited where it is or probably will be discharged into waters of the State and creates or threatens to create a condition of pollution or nuisance.

16. **Cost Recovery**: Pursuant to California Water Code Section 13304, the discharger is hereby notified that the Water Board is entitled to, and may seek reimbursement for, all reasonable costs actually incurred by the Water Board to investigate unauthorized discharges of waste and to oversee cleanup of such waste, abatement of the effects thereof, or other remedial action, required by this Order.

17. **CEQA**: This action is an order to enforce the laws and regulations administered by the Water Board. As such, this action is categorically exempt from the provisions of the California Environmental Quality Act (CEQA) pursuant to Section 15321 of the Resources Agency Guidelines.

18. **Notification**: The Water Board has notified the discharger and known interested agencies and persons of its intent under California Water Code Section 13304 to prescribe site cleanup requirements for the discharge, and has provided them with an opportunity to submit their written comments. The U.S. EPA and DTSC and other appropriate agencies have been notified regarding the requirements of this Order. The Water Board has consulted the National Oceanic and Atmospheric Administration, the USFWS, the U.S. Army Corps of Engineers, the Bay Area Air Quality Management District, the California Fish & Game Department, the San Francisco Bay Conservation and Development Commission, the County of San Mateo and the City of East Palo Alto prior to issuing this Order. The Water Board also mailed the Proposed Plan Fact Sheet describing the proposed remedy to addresses in the vicinity of the Site as well as known interested parties and agencies.

19. **Community Involvement and Public Hearing**: A community meeting was held at the Site to present the Proposed Plan to interested parties and to accept comment. All comments received during the 30-day public comment period have been responded to in the Responsiveness Summary, and were considered prior to approval of this Order. The Water Board, at a public meeting, heard and considered all comments pertaining to the Wetland FS/RAP and this Order.

IT IS HEREBY ORDERED, pursuant to Section 13304 of the California Water Code and Section 25356.1 of the California Health and Safety Code, that the discharger (or its agents, successors, or assigns) shall cleanup and abate the effects described in the above findings as follows:

A. PROHIBITIONS

1. The discharge of wastes or hazardous substances in a manner which will degrade water quality or adversely affect beneficial uses of waters of the State is prohibited.

2. Further significant migration of wastes or hazardous substances through subsurface transport to waters of the State is prohibited.

3. Activities associated with the subsurface investigation and cleanup which will cause significant adverse migration of wastes or hazardous substances are prohibited.

B. REMEDIAL ACTION PLAN IMPLEMENTATION

The discharger shall implement the RAP for the Wetland OU as described herein and pursuant to the Tasks listed below.

C. TASKS

1. **TOPOGRAPHIC MONITORING WORKPLAN**
   COMPLIANCE DATE: *October 1, 2005*

   Submit a technical report acceptable to the Executive Officer proposing a topographic monitoring plan of the wetland surface near the bend in the levee, as identified in finding 7 above.

2. **CONDUCT TOPOGRAPHIC MONITORING**
   COMPLIANCE DATE: *January 31, 2006 and every five years thereafter*

   Conduct and report in a manner acceptable to the Executive Officer topographic monitoring of the wetland surface near the bend in the levee. Submit the results of the topographic monitoring in the annual groundwater monitoring reports included as Task 3. If the results indicate that natural erosion is exposing elevated concentrations of arsenic, a contingency plan shall be submitted within 30 days. If, after 30 years of monitoring, the results indicate that erosion is not occurring, the discharger may submit a written request to cease topographic monitoring.

3. **GROUNDWATER MONITORING REPORTS**
   COMPLIANCE DATE: *Annually by January 31*

   Submit a technical report acceptable to the Executive Officer containing results of annual groundwater monitoring of the deep and shallow aquifers pursuant to

monitoring program previously approved and as may be amended by the Executive Officer. The annual report shall also include results of the most recent topographic monitoring from task 2.

4. **PROVIDE WETLAND OFFSET**

COMPLIANCE DATE: *Completed with the adoption of this Order*

Provide an offset of 1.3 acre of the Cooley Landing Salt Pond restoration area in recognition of the loss of wetland habitat quality caused by the 1990 Bay Road Site.

5. **EVALUATION OF NEW TECHNICAL INFORMATION**

COMPLIANCE DATE: *90 days after requested by Executive Officer*

Submit a technical report acceptable to the Executive Officer evaluating new technical information which bears on the approved remedial action plan and cleanup standards for this Site. In the case of a new cleanup technology, the report should evaluate the technology using the same criteria used in the feasibility study. Such technical reports shall not be requested unless the Executive Officer determines that the new information is reasonably likely to warrant a revision in the approved remedial action plan or cleanup standards.

6. **DELAYED COMPLAINCE**

If the discharger is delayed, interrupted, or prevented from meeting one or more of the completion dates specified for the above tasks, the discharger shall promptly notify the Executive Officer and the Board may consider revision to this Order.

D. **PROVISIONS**

1. **No Nuisance**: The storage, handling, treatment, or disposal of polluted soil or groundwater shall not create a nuisance as defined in California Water Code Section 13050(m).

2. **Good O&M**: The discharger shall maintain in good working order and operate as efficiently as possible any facility or control system installed to achieve compliance with the requirements of this Order.

3. **Lead Agency**: The Water Board has been acting as the lead agency pursuant to a stipulation between RPI, the DTSC, and the Water Board dated February 1991, vacating

the August 1987 Consent Order for the Site, and to various interagency agreements. Pursuant to the South Bay Multi-Site Cooperative Agreement (MSCA) and the South Bay Ground Water Contamination Enforcement Agreement, entered into on May 2, 1985 (as subsequently amended) by the Water Board, U.S. EPA and DTSC, the Water Board has been acting as the lead agency for the Site. The MSCA terminated in July 1996. The Water Board will continue as appropriate to regulate the discharger's remediation and administer enforcement actions in accordance with CERCLA as amended by SARA, the California Water Code, Health and Safety Code, and regulations adopted thereunder. Pursuant to CERCLA sections 104 and 122, 42 U.S.C.A. §§9604 and 9622, U.S. EPA will allow StarLink Logistics to conduct the remediation described herein.

4. **Access to Site and Records**: In accordance with California Water Code Section 13267(c), the discharger shall permit the Water Board or its authorized representative:

    a. Entry upon premises in which any pollution source exists, or may potentially exist, or in which any required records are kept, which are relevant to this Order.

    b. Access to copy any records required to be kept under the requirements of this Order.

    c. Inspection of any monitoring or remediation facilities installed in response to this Order.

    d. Sampling of any groundwater or soil which is accessible, or may become accessible, as part of any investigation or remedial action program undertaken by the discharger.

5. **Self-Monitoring Program**: The discharger shall comply with the groundwater Self Monitoring Program previously approved and as may be amended by the Executive Officer.

6. **Contractor / Consultant Qualifications**: All technical documents shall be signed by a California registered geologist, a California certified engineering geologist, or a California registered civil engineer.

7. **Lab Qualifications**: All samples shall be analyzed by State-certified laboratories or laboratories accepted by the Water Board using approved U.S. EPA methods for the type of analysis to be performed. All laboratories shall maintain quality assurance/quality control (QA/QC) records for Water Board review. This provision does not apply to analyses that can only reasonably be performed on-site (e.g., temperature).

8. **Document Distribution**: Copies of all correspondence, technical reports, and other documents pertaining to compliance with this Order shall be provided to the following agencies:

- Regional Water Quality Control Board
- U.S. Environmental Protection Agency
- U.S. Fish and Wildlife Service
- National Oceanic and Atmospheric Administration
- California Fish and Game
- Department of Toxic Substance Control
- City of Palo Alto- Administrative Services Department
- City of East Palo Alto- City Manager Department
- City of East Palo Alto- Public Works Department
- San Mateo County Health Services Agency
- East Palo Alto Sanitary District
- Palo Alto Regional Water Quality Control Plant
- Ravenswood School District

The Executive Officer may modify this distribution list as needed.

9. **Reporting of Changed Owner or Operator**: The discharger shall file a technical report on any changes in Site occupancy or ownership associated with the property described in this Order.

10. **Reporting of Hazardous Substance Release**: If any hazardous substance is discharged in or on any waters of the State, or discharged or deposited where it is, or probably will be, discharged in or on any waters of the State, the discharger shall report such discharge to the Water Board by calling (510) 622-2300 during regular office hours (Monday through Friday, 8:00 to 5:00).

    A written report shall be filed with the Water Board within five working days. The report shall describe: the nature of the hazardous substance, estimated quantity involved, duration of incident, cause of release, estimated size of affected area, nature of effect, corrective actions taken or planned, schedule of corrective actions planned, and persons/agencies notified.

    This reporting is in addition to reporting to the Office of Emergency Services required pursuant to the Health and Safety Code.

11. **Periodic Review of SCR:** The Water Board will review this Order periodically and may revise it when necessary.

12. **Existing Board Orders:** This Order supercedes Order No. 91-016 and its amendment with respect to the WetlandOU.

I, Bruce H. Wolfe, Executive Officer, do hereby certify that the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Francisco Bay Region, on July 20, 2005.

Bruce H. Wolfe
Executive Officer

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FAILURE TO COMPLY WITH THE REQUIREMENTS OF THIS ORDER MAY SUBJECT YOU TO ENFORCEMENT ACTION, INCLUDING BUT NOT LIMITED TO: IMPOSITION OF ADMINISTRATIVE CIVIL LIABILITY UNDER WATER CODE SECTIONS 13268 OR 13350, OR REFERRAL TO THE ATTORNEY GENERAL FOR INJUNCTIVE RELIEF OR CIVIL OR CRIMINAL LIABILITY

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Attachments: Tables 1-3
Figures 1-5

Table 1
Summary of Analytical Results for Arsenic Concentration in Sediment Samples
Wetland Operable Unit
1990 Bay Road Site
East Palo Alto, California

	Number of Sample Locations	Wet Weight			Dry Weight		
		Maximum Arsenic Concentration (mg/kg)[1]	Location / Depth (ft. bgs) of Maximum	Average[2] Arsenic Concentration (mg/kg) (No. Samples Averaged)	Maximum Arsenic Concentration (mg/kg)[1]	Location / Depth (ft. bgs[2]) of Maximum	Average[1] Arsenic Concentration (mg/kg) (No. Samples Averaged)
Sediment–All	145	190[4]	R8-5/7.5	9.1 (368)	76.6	WFS-3/5	12.3 (279)
Surface	136	86[4]	B8-05/0.5	6.3 (241)	53.8	GNF-21/0.5	11.9 (219)
Marsh	108	86[4]	B8-05/0.5	6.3 (185)	53.8	GNF-21/0.5	11.6 (165)
Slough	28	16.3	SM-2/0.5	6.2 (56)	45.2	SM-2/0.5	12.9 (54)
Subsurface	40	190[3]	R8-5/7.5	14.5 (127)	76.6	WFS-3/5	13.8 (60)
Reference Marsh[4]	40	12	GDB-17/0.5	5.7 (79)	23.6	GRW-16/0.5	12.4 (79)
Reference Slough[4]	5	8	SDB-3/0.5	5.0 (10)	16.4	SDB-3/0.5	10.9 (10)

Notes:

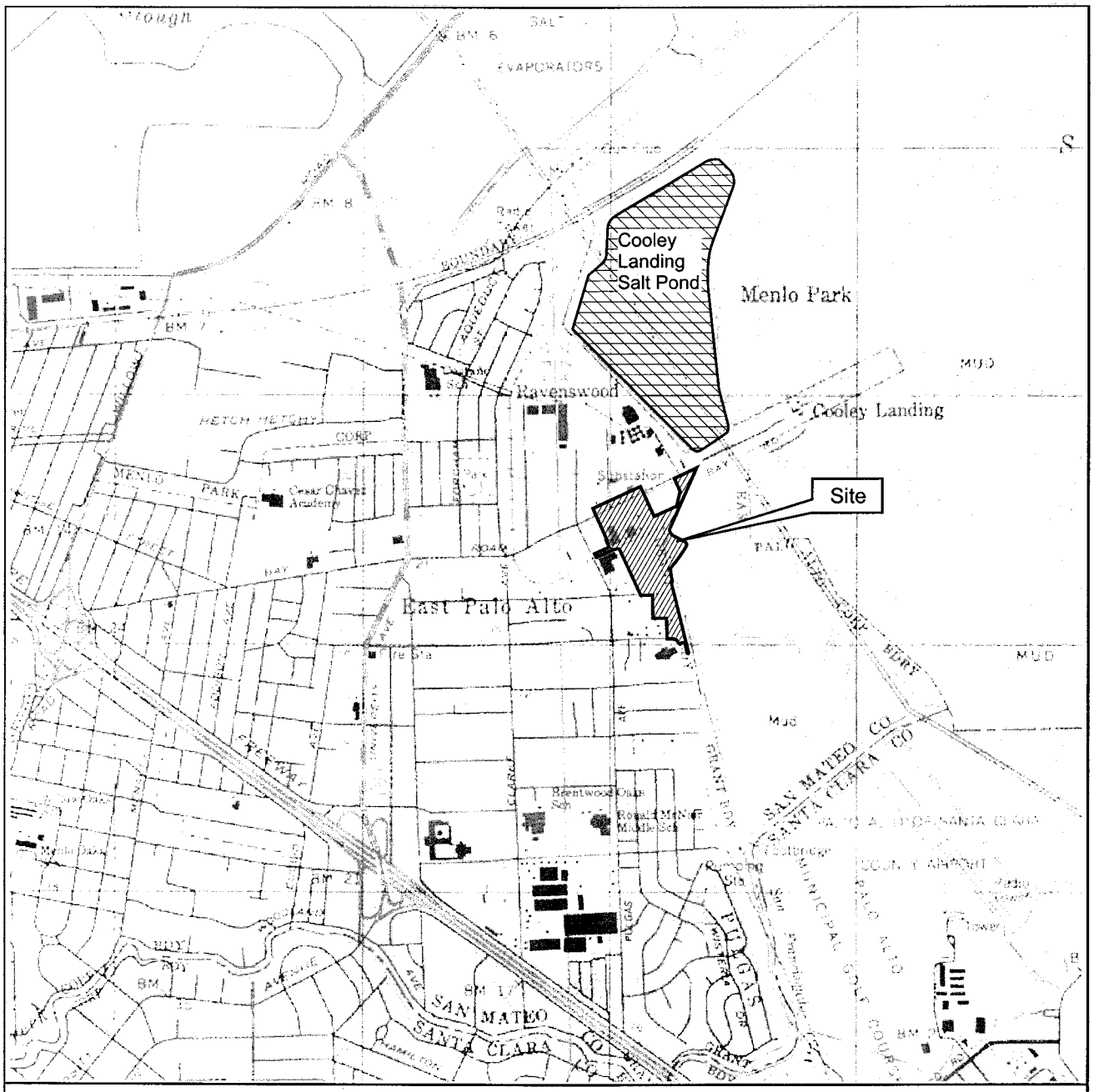
1. For samples collected at the same location, depth and time, the average concentration is used. Non-detects not included in calculation of average arsenic concentrations.
2. Below ground surface.
3. Dry weight arsenic concentration not available at sample locations R8-5 and B8-05.
4. Pooled data from the Ravenswood wetland and the Dumbarton wetland

Table 2
Comparison of Remedial Alternatives
Wetland Operable Unit
1990 Bay Road Site
East Palo Alto, California

Evaluation Criteria	Alternative 1	Alternative 2 (Proposed Plan)	Alternative 3
Implementability	Already implemented.	Easily implemented.	Difficult to implement in a wetland environment and may require 1 to 2 years to coordinate with state and federal agencies.
Short- and Long-term Effectiveness	The short-term effectiveness would be similar to current conditions, i.e., a moderate loss in habitat service in the 1.3 acres (assumed to be 25%). The habitat service would return in the long term, estimated by the fish and Wildlife Service to be 50 years.	The short-term effectiveness would be similar to current conditions, i.e., a moderate loss in habitat service in the 1.3 acres. The habitat service would return in the long term, estimated by the Fish and Wildlife Service to be 50 years. In the unlikely event that topographic monitoring indicates erosion of sediment, a contingency plan would be developed and implemented.	In the short term, excavation would reduce the habitat service to zero in the 1.3 acre where sediment would be excavated and in the 0.05 acre that would be needed to access the excavation areas. The wetland would slowly return to current conditions in approximately 50 years. In the unlikely event that topographic monitoring indicates erosion of sediment, a contingency plan would be developed and implemented.
Reduction of Mobility, Toxicity, and Volume	No reduction in mobility, toxicity, or volume.	No reduction in mobility, toxicity, or volume.	Small reduction in mobility, toxicity, and volume due to excavation of approximately 1500 cubic yards of soil.
Cost (net present value, 7%, 30 years)	$0	$ 116,000	$ 555,000
Overall Protection of the Environment	Protectiveness would be the same as under current conditions.	Protectiveness would be similar to current conditions in the short term and would be protective in the long term.	Would be less protective than under current conditions in the short term because the habitat service would be reduced to zero; would be protective in the long term.

Table 2
Comparison of Remedial Alternatives
Wetland Operable Unit
1990 Bay Road Site
East Palo Alto, California

Evaluation Criteria	Alternative 1	Alternative 2 (Proposed Plan)	Alternative 3
Compliance with ARARs	Would exceed the Target Low Levels for the clapper rail and salt marsh harvest mouse and would not provide offsets for the loss of habitat service.	Would exceed the Target Low Levels for the clapper rail and salt marsh harvest mouse and would provide offsets for the loss of habitat service with acreage from the restored Cooley Landing Salt Pond. Monitoring work would comply with state and federal requirements	Monitoring work would comply with state and federal requirements. Excavation activities would be coordinated with the Army Corps of Engineers and BCDC. The loss of habitat service would be offset with acreage from the restored Cooley Landing Salt Pond.



Basemap from USGS Quadrangle Map
Palo Alto, California 1991

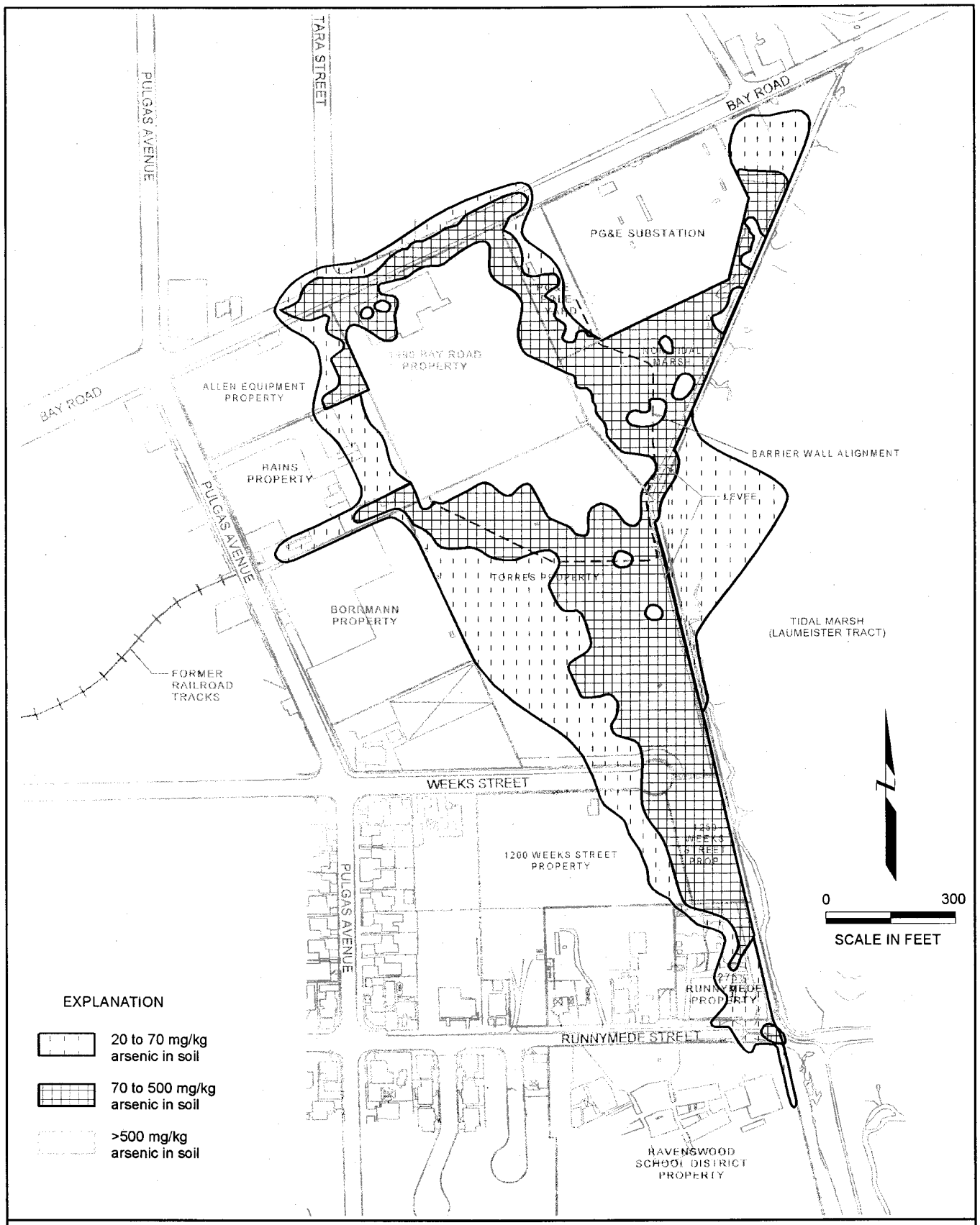
0 1000 2000
SCALE IN FEET

S.S. Papadopulos & Associates, Inc.

SITE LOCATION MAP

1990 Bay Road
East Palo Alto, California

Figure 1

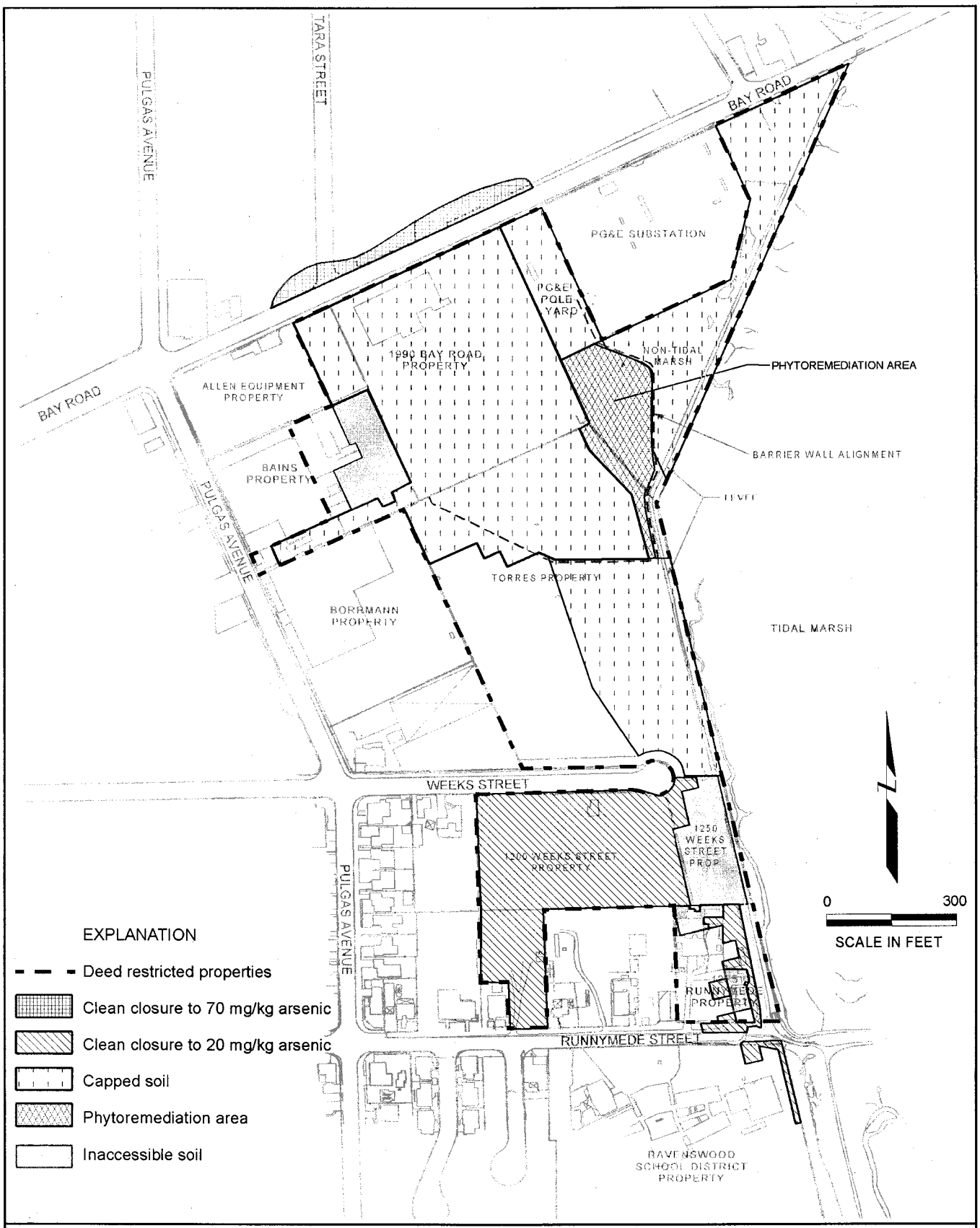


EXTENT OF SOIL WITH ARSENIC CONCENTRATIONS GREATER THAN 20, 70, AND 500 mg/kg PRIOR TO REMEDIATION

S.S. Papadopulos & Associates, Inc.

1990 Bay Road Site
East Palo Alto, California

Figure 2



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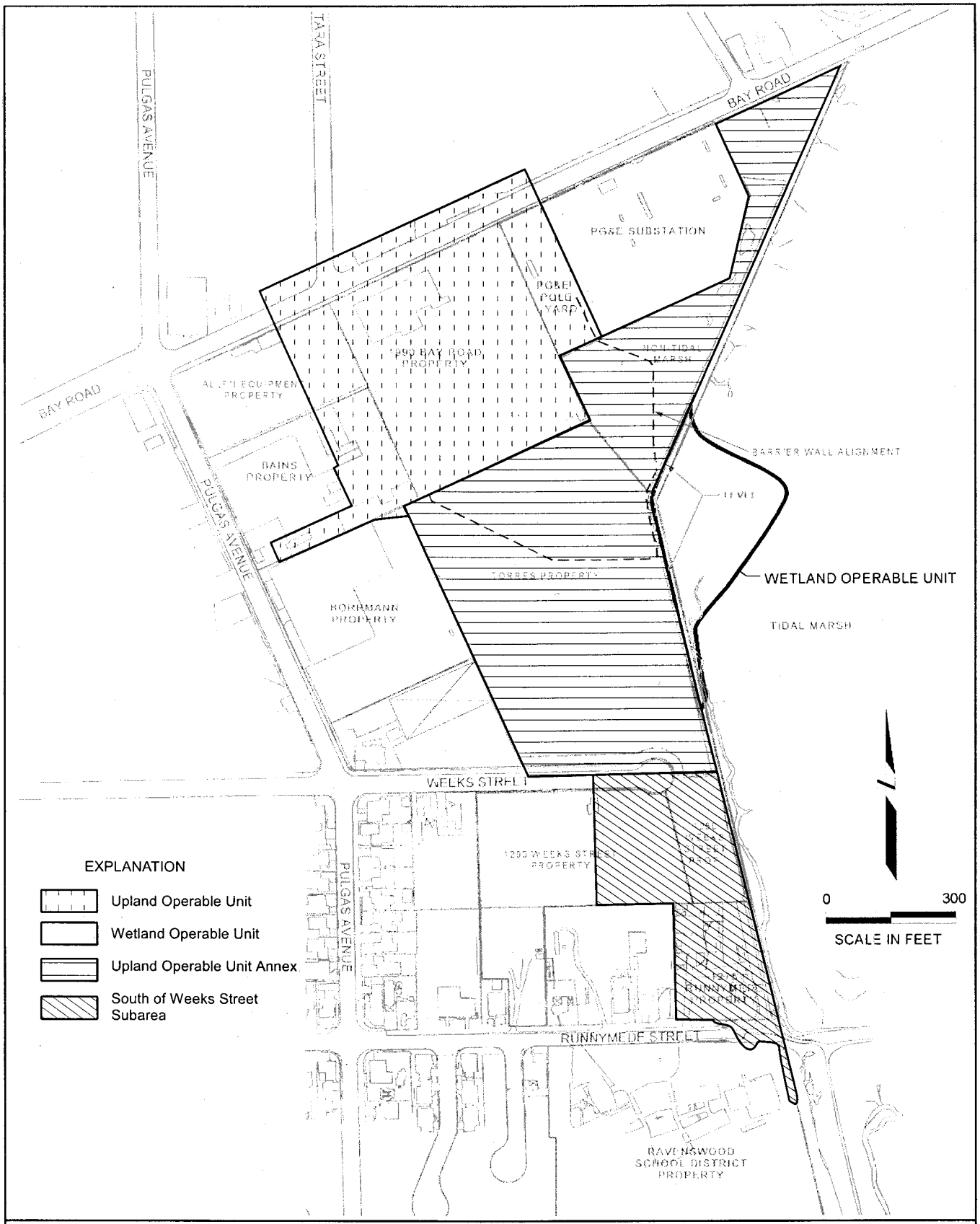
CURRENT STATUS OF REMEDIATION

1990 Bay Road Site
East Palo Alto, California

Figure 3



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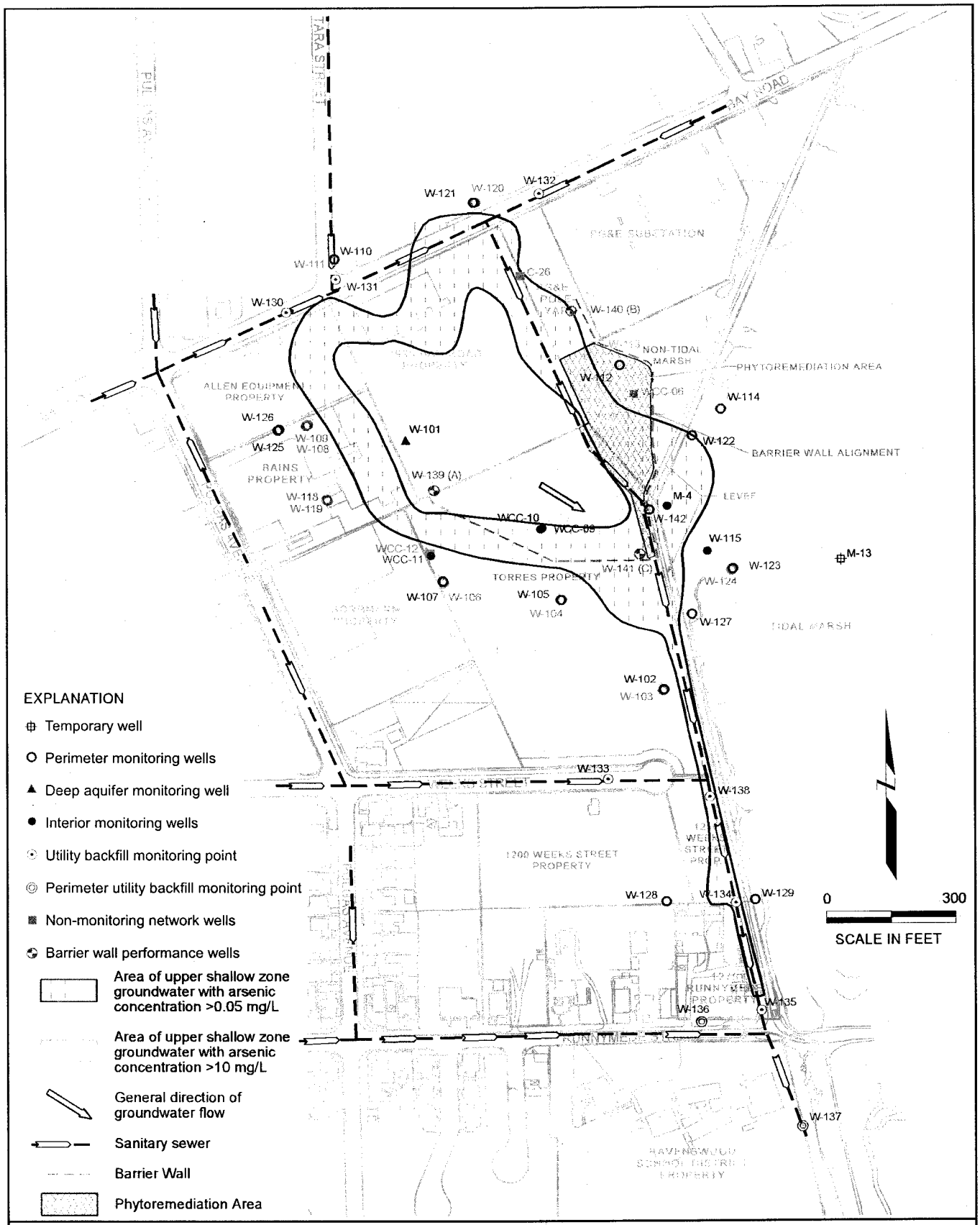
OPERABLE UNITS AND SUBAREAS

1990 Bay Road Site
East Palo Alto, California

Figure 4



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EXTENT OF ARSENIC IN GROUNDWATER

1990 Bay Road Site
East Palo Alto, California

Figure 5