

Project No.
8865.002.000
Phase 004

November 8, 2011

Mr. Brian Olin
Larkspur Land 8 Owner, LLC
% The New Home Company
1891 East Roseville Parkway, Suite 180
Roseville, CA 95661

Subject: Niven Nursery Site
Larkspur, California

REMOVAL ACTION IMPLEMENTATION PLAN ADDENDA

References: ENVIRON International Corporation (ENVIRON), Removal Action Implementation Plan, Niven Nursery, 2 Ward Street, Larkspur, California, October 2009.

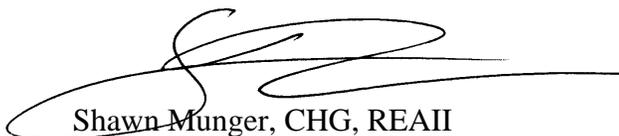
Dear Mr. Olin:

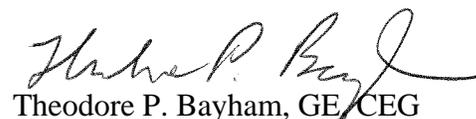
As requested, we have prepared this addenda to the referenced ENVIRON report prepared in October 2009. The purpose was to update pertinent information regarding site contacts and hospital routes. The referenced Removal Action Implementation Plan (RAIP) was approved by the CAL-EPA Department of Toxic Substance Control (DTSC) in 2010. The DTSC has since confirmed that work can proceed in accordance with the plan without revision at this time. No modifications to the approved RAIP will be implemented other than the information contained in this letter.

We are pleased to be of continued service to you with regard to this project. If you have any further questions, please contact us.

Sincerely,

ENGEO Incorporated


Shawn Munger, CHG, REAII


Theodore P. Bayham, GE/CEG

Attachments

Updated contacts for the Health and Safety Plan

Contact	Name	Office Phone	Mobile Phone
Fire Department	Larkspur Fire Department	911 or 415-927-5011	---
Hospital	Marin General Hospital	911 or 415-925-7000	---
Police	Twin Cities Police Authority	911 or 415-927-5150	---
ENGEO Managing Principal	Shawn Munger	916-580-6535	916-416-9000
ENGEO Project Manager	Shawn Munger	916-580-6535	916-416-9000
ENGEO Site Supervisor	Siobahn O'Reilly-Green	925-395-2562	925-570-9577
ENGEO Health and Safety Coordinator	Shawn Munger	916-580-6535	916-416-9000
Client Contact	Brian Olin	916-771-2223	925-330-0807
Poison Control	---	800-222-1222	---

Updated Health and Safety Sign-Off Sheet

By signing below, it is acknowledged that this HASP covers each of the activities that are anticipated to be performed in the field and all personal protective and monitoring equipment that may be necessary at the site will be available and used as appropriate. It is also understood that the provisions of this HASP will be abided by, and should a change of task, or the addition of tasks be necessary for this project, every effort to discuss additional health & safety requirements with the field personnel and the HASP will be updated.

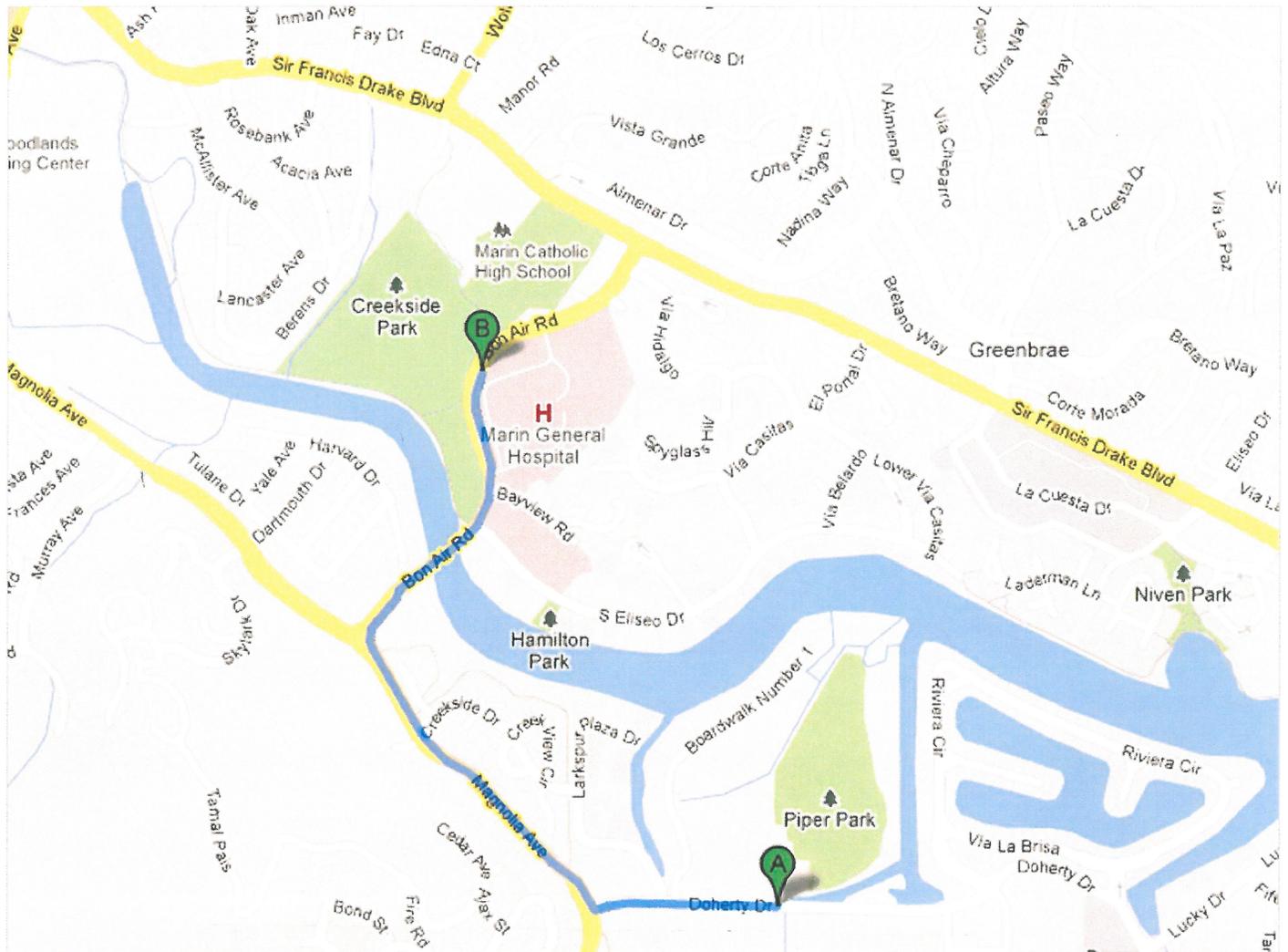
Shawn Munger  10-24-11
 Manager/Principal-in-Charge Signature Date

Shawn Munger  10-24-11
 Health & Safety Coordinator Signature Date

Siobhan O'Reilly-Green  10-24-11
 Designated Site Supervisor Signature Date



Primary Hospital Route

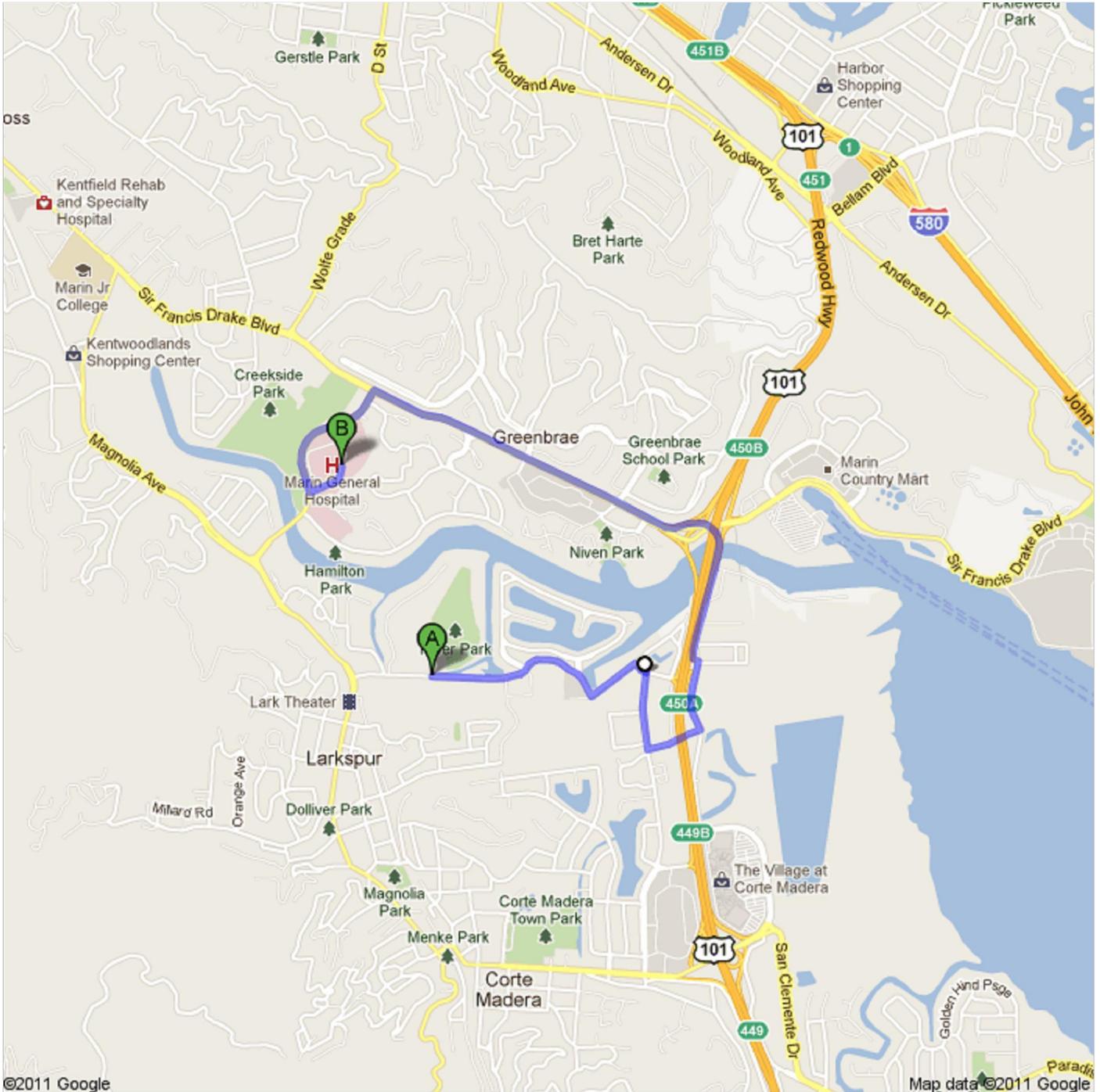


 Doherty Dr

1. Head **west** on **Doherty Dr** toward **Boardwalk Number 1**
go 0.2 mi
total 0.2 mi
-  2. Turn right onto **Magnolia Ave**
About 1 min
go 0.4 mi
total 0.7 mi
-  3. Turn right onto **Bon Air Rd**
Destination will be on the right
About 1 min
go 0.4 mi
total 1.1 mi

 **Marin General Hospital**
250 Bon Air Rd, Greenbrae, CA 94904

Secondary Hospital Route



 Doherty Dr

- | | | |
|--|--|---------------------------|
| | 1. Head east on Doherty Dr toward Riviera Cir
About 2 mins | go 0.5 mi
total 0.5 mi |
|  | 2. Turn left onto Lucky Dr | go 0.2 mi
total 0.7 mi |
|  | 3. Take the 1st right onto Fifer Ave | go 230 ft
total 0.8 mi |
|  | 4. Take the 1st right onto Tamal Vista Blvd | go 0.2 mi
total 1.0 mi |
|  | 5. Take the 1st left onto Wornum Dr | go 0.2 mi
total 1.2 mi |
|  | 6. Turn left onto Redwood Hwy
About 1 min | go 0.2 mi
total 1.4 mi |
|  | 7. Turn left onto the US-101 N ramp to Eureka
About 1 min | go 0.3 mi
total 1.7 mi |
|  | 8. Keep left at the fork, follow signs for San Anselmo and merge onto Sir Francis Drake Blvd
About 2 mins | go 1.2 mi
total 2.9 mi |
|  | 9. Turn left onto Bon Air Rd
About 1 min | go 0.4 mi
total 3.3 mi |
|  | 10. Turn left
About 1 min | go 0.1 mi
total 3.5 mi |

 Unknown road

These directions are for planning purposes only. You may find that construction projects, traffic, weather, or other events may cause conditions to differ from the map results, and you should plan your route accordingly. You must obey all signs or notices regarding your route.

Map data ©2011 Google

Directions weren't right? Please find your route on maps.google.com and click "Report a problem" at the bottom left.



Removal Action Implementation
Plan
Niven Nursery
2 Ward Street
Larkspur, California

Prepared for:
Larkspur Housing Partners, LLC

Prepared by:
ENVIRON International Corporation
Emeryville, California

Date:
October 14, 2009

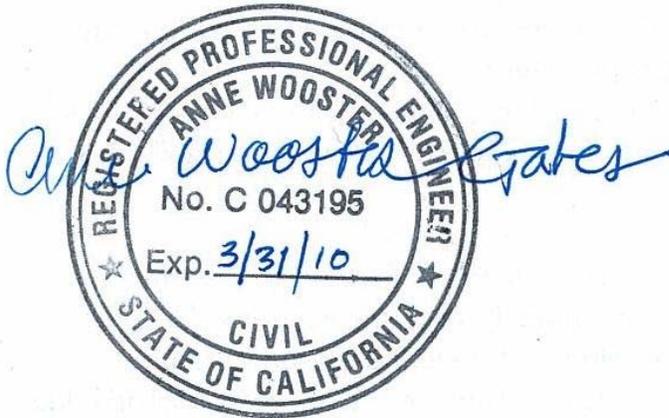
Project Number:
03-21512A

Signature and Environmental Professional Statement

Prepared by:

ENVIRON International Corporation
6001 Shellmound Street, Suite 700
Emeryville, California 94608
Tel. (510) 655-7400

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to be the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.



Anne Wooster Gates, PE
Senior Manager
ENVIRON International Corporation

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Acronyms

BAAQMD	Bay Area Air Quality Management District
bgs	Below Ground Surface
Cal/EPA	California Environmental Protection Agency
California AAQS	California Ambient Air Quality Standards
CCR	California Code of Regulations
CFR	Code of Federal Regulations
CHHSLs	California Human Health Screening Levels
COPC	Chemical of Potential Concern
CY	Cubic Yard
DDT	4,4'-Dichlorodiphenyltrichloroethane
DTSC	Department of Toxic Substances Control
H&A	Holman & Associates
HASP	Health and Safety Plan
LHP	Larkspur Housing Partners, LLC
$\mu\text{g}/\text{m}^3$	Micrograms per Cubic Meter
mg/kg	Milligrams per Kilogram
mg/L	Milligrams per Liter
μM	Micrometers
MPH	miles per hour
MSL	Mean Sea Level
NAAQS	National Ambient Air Quality Standards
OCP	Organochlorine Pesticide
OSHA	Occupational Safety and Health Administration
PRG	Preliminary Remediation Goal
RAL	Recommended Action Level
RAW	Removal Action Workplan
STLC	Soluble Threshold Leaching Concentration
TAT	Turn Around Time
USA	Underground Services Alert
USEPA	United States Environmental Protection Agency
VCA	Voluntary Cleanup Agreement
WMI	Waste Management, Inc.

1 Introduction

On behalf of Larkspur Housing Partners, LLC (LHP), and consistent with the Voluntary Cleanup Agreement (VCA) (Docket No. HSA-A99/00-135) with the California Environmental Protection Agency (Cal/EPA), Department of Toxic Substances Control (DTSC), ENVIRON International Corporation (ENVIRON) is preparing this implementation plan to implement the recommended removal action alternative from the Final Removal Action Workplan (RAW) for the Niven Nursery property located at 2 Ward Street in Larkspur, California (the "Site"), dated June 2009. The purpose of this implementation plan is to describe the proposed procedures and protocols for excavation and removal of chemicals of potential concern (COPCs), in soils associated with the historical use of the property as a nursery. Implementation of the RAW should mitigate health-based risks posed by COPC-impacted soil at the Site and allow for proposed re-development as residential housing.

A RAW is a remedy selection document that can be prepared for a hazardous substance release pursuant to Health and Safety Code Section 25356. It is prepared when a non-emergency action or a remedial action is projected to cost less than \$2,000,000 (California Health and Safety Code section 25356.1(h)(1)). The implementation plan contained herein describes the procedures to be followed for implementing the selected remedy from the Final RAW for the Site.

1.1 Background

The Site is located at 2 Ward Street in Larkspur, California, as shown on the attached Figure 1 (Site Location Map). The Site is currently developed as the Niven Nursery, with numerous greenhouses, storage and maintenance buildings, several residences, and associated roadways and parking areas. Site development is concentrated in the western, northern and southern sections of the Site. The eastern portion of the Site is undeveloped.

The approximately 16.8-acre Site is bordered on the east by Larkspur Creek; to the south by Larkspur Creek and Ward Street; to the west by a commercial shopping center; and to the north by Doherty Drive, beyond which is Hall Middle School. The Site is generally flat, with surface drainage to the southeast, except in the northwest corner of the Site, where drainage is directed north via a channel under Doherty Drive.

Based on past site investigations, shallow soils on the Site generally consist of three to five feet of artificial fill overlaying Bay Mud to a maximum depth explored of about 30 feet below ground surface (bgs). Fill at the Site appears to be comprised of fine-grained sand with clay and gravel and fine-grained sand mixed with organics and shell fragments (SFB 2008).

The U.S. Geologic Survey (USGS) topographic map of the San Rafael Quadrangle (1979) shows the Site within an area developed for residential and commercial use in the City of

Larkspur. Average ground surface elevations at the Site range from 5 to 15 feet above mean sea level (MSL), which includes fill placed across the Site (Harza 1998). Local drainage is generally to the east/southeast of the Site, with the exception of the northwest corner of the property, which drains to the north, under Doherty Drive, in a conveyance channel.

Due to the close proximity of Corte Madera Creek and San Francisco Bay, groundwater at the Site is encountered at varying depths across the Site, and groundwater depth appears to vary seasonally. In addition, local groundwater depth and gradient at the Site may fluctuate as they are influenced by tidal cycles, and groundwater may move toward the nearby surface waters during ebb tides (Harza 1998). Based on prior geotechnical borings in the Western Drainage Area, which were drilled at the Site in March 1998 (during the rainy season), groundwater was encountered at depths ranging from 3 to 4 feet bgs and quickly rose to depths of 6 inches to 1 foot bgs (SFB 2008). However, in borings drilled near the Western Drainage Area in October 2007 (the dry season), groundwater was encountered at depths between 8 and 21 feet bgs. In the northeastern portion of the Site, groundwater was not encountered in geotechnical borings that extended between 12 and 21 feet bgs in March 1998 and October 2007 (SFB 2008).

For the past 78 years, the Niven family has owned and operated a commercial nursery at the Site. Over the years, certain pesticides have been used at the Site in conjunction with the nursery operation and were kept in storage areas located in each nursery complex. Pesticides were mixed in small quantities as they were being applied and were applied by backpack sprayer and pushcart type applicators.

Based on the available soil, sediment, and groundwater sampling results and based on risk assessment assumptions and methods recommended by the Cal/EPA, ENVIRON found that, while pesticide residue levels varied somewhat across the site, the health risks attributable to pesticides and metals in surface soils at the Site do not pose a human health risk greater than the acceptable risk range of 1×10^{-6} to 1×10^{-4} used by the Cal/EPA and the United States Environmental Protection Agency (USEPA) (ENVIRON 2002). Two drainage areas, identified as the Northwest Drainage Area and Southern Drainage Area (Figure 2), were shown to have COPCs in the soil that merited remediation. Lead levels ranging from 23 milligram per kilogram (mg/kg) to 3,800 mg/kg were detected in the sediment of the Southern Drainage Area, and lead levels ranging from 620 mg/kg to 1,800 mg/kg were detected in the sediment of the Northwest Drainage Area. The volume of lead-impacted soil within the Northwest and Southern Drainage Areas is estimated to be less than 200 cubic yards (CYs).

In addition, COPCs were identified in five areas within the Western Nursery Area that merit remediation: lead, arsenic and 4,4'-dichlorodiphenyltrichloroethane (DDT) were detected in shallow soil samples W-1 (A-C), W-4 (A-C), W-5 (A-B), W-6 (A-B), W-1, W-3, and W-7. Soil in the footprint of the structure represented by these Western Nursery Area samples and in the vicinity of the sample outside the building footprints will be excavated to a depth of

approximately one foot. The amount of COPC-impacted soil in the Western Nursery Area is estimated to be less than 1000 CYs.

The Final RAW evaluated the implementability, effectiveness, and cost of three removal action alternatives to address COPC-impacted soils in the two drainage areas and the Western Nursery Area. The three alternatives were:

- Alternative 1 - No Action;
- Alternative 2 - Excavation, Consolidation and Soil Washing; and
- Alternative 3 - Excavation and Off-Site Disposal (with Possible On-Site Encapsulation of Lead-Impacted Culturally Significant Resources)

Based on a comparison analysis, Alternative 3 - Excavation and Off-Site Disposal (with Possible On-Site Encapsulation of Lead-Impacted Culturally Significant Resources) was the recommended alternative for addressing the COPC-impacted Site soils.

Implementation of the RAW should mitigate health-based risks posed by COPCs at the Site and allow for proposed re-development of the property as residential housing consisting of single family detached homes, cottage homes and a multi-family senior housing project. Additionally, to improve surface drainage at the site, LHP is planning on adding surface soil across the site to raise the site grade. The presence of this clean fill would substantially decrease any potential exposure and risk to people and wildlife that would be on the property in the future. Figure 3 shows the future layout of the Site.

1.2 2006 Archaeological Investigations

During November 2006 (after completion of the public comment period for the Draft RAW for the Site), archaeological investigations were conducted by Holman & Associates (H&A) on the Site (Holman 2007). Investigations centered on locations believed to formerly contain two previously recorded archaeological sites, Shellmounds CA-MRN-67 and MRN-68, recorded by N.C. Nelson in 1907. The H&A studies revealed evidence that portions of these archaeological deposits are intact and undisturbed. Although it likely that large portions of the “middens” have been disturbed during the past 140 years, the presence of human bone recovered during the H&A investigations suggests that there is the potential for human graves and unassociated bones within the Site. (“Middens” are mounds or deposits containing shells, animal bones, and other refuse that indicates the site of a human settlement).

Artifact types recovered indicate occupancy of the Site as early as 2200 years ago and show affinities with other archaeological sites in the Bay Area.

Because of these findings and as required by law, an agreement between the Federated Indians of Graton Rancheria and the City of Larkspur, and LHP to formalize procedures for the

protection and treatment of Native American human remains, funerary objects, cultural and religious landscapes, ceremonial items, and cultural items, in the event that any are discovered in conjunction with the Site's development and use, (including archaeological studies, excavation, geotechnical investigations, grading, and any ground-disturbing activity). This agreement (called "the Treatment Plan") also formalized procedures for Tribal Monitoring during archaeological studies, grading, and ground disturbing activities.

Under the Treatment Plan, it is important for non-human, cultural resources and artifacts to be left at the Site to the greatest degree possible consistent with the location and configuration of the future Site. In addition, the Treatment Plan specifies the procedures to be implemented if human remains are encountered. Soil excavated as part of RAW activities will be inspected per the Treatment Plan for evidence of midden and human remains. The Treatment Plan is attached in Appendix A.

As a result of the Treatment Plan, offsite disposal of culturally significant resources (such as Native American human remains, funerary objects, cultural and religious landscapes, ceremonial items, etc.), that may be present in excavated soil, is prohibited. If midden is encountered in excavated soils, the soil containing midden will be stockpiled separately and screened for culturally significant resources by appropriately-trained archaeologists and Tribal representatives. If culturally significant resources are identified, then these resources will be recovered from the midden and reburied on the Site as described in Section 2.3 below. Prior to reburial onsite, these resources will be evaluated for the presence of lead. If it is likely that a significant amount of lead may be present, these resources will be tested for lead as described in Section 2.3.1 below. If lead is present above the soil cleanup level or other applicable screening level, the resources will be reburied in an encapsulation area. If lead is not present above the soil cleanup level or other applicable screening level, then the resources will be reburied with any other resources recovered from non-COPC impacted areas at the Site. Excavated soil, including midden that is screened and found not to contain culturally significant resources, but has lead concentrations above the soil cleanup level, will be disposed of offsite as described in Section 3.6 below.

2 Removal Action Implementation

This Section details the steps that will be taken to implement Alternative 3 at the Site. Removal activities will be performed by a California hazardous substance removal certified contractor (the “Contractor”) including supervision by a California registered geologist or professional civil engineer (the “Engineer”). All removal, transportation and disposal will be performed in accordance with all applicable federal, state, and local laws, regulations, and ordinances.

2.1 Site Preparation

Prior to equipment mobilization for the proposed removal action, the preparation activities detailed in the following sections will be implemented.

2.1.1 Building Demolition and Confirmation Sampling

Since COPC-impacted soil is potentially present beneath buildings/structures at the Site, buildings/structures and their foundations must be demolished prior to implementation of RAW excavation activities. A demolition permit will be obtained from the City of Larkspur for performance of demolition activities as well as RAW excavation activities. In addition, demolition activities and required notifications will be conducted in accordance with all applicable regulations especially regulations pertaining to the handling, management and disposal of asbestos containing materials and lead-based paint. All building debris, which is not to be reused during future re-development, will be removed and disposed of offsite and disposed of in accordance with all applicable federal, state and local regulations. DTSC will be notified at least two weeks prior to the commencement of demolition activities.

For the Northern and Southern Nursery Area buildings, discrete samples shall be collected from soil up to 6 inches beneath each of the building foundations following building/foundation removal. Approximate sample locations are shown in Figure 4. Samples will be analyzed for lead and arsenic (by USEPA Method 6010B or 7471A). Additional samples may be collected and/or sampling locations modified and additional analyses performed if the Engineer observes evidence of possible releases of contaminants to soils beneath the former buildings/structures. Results for lead will be compared to Site cleanup goal, and the results for arsenic will be compared to typical California background concentrations.

One four-point composite sample will also be collected for every 250 CYs from the piles of fill soil at the northeastern corner of the Site. The fill soil samples will be analyzed for heavy metals (by USEPA Methods 6010B and 7471A), asbestos (by California Air Resources Board Method 435), Total Petroleum Hydrocarbons (by modified USEPA Method 8015) and organochlorine pesticides (OCPs) (by USEPA Method 8081A) to determine whether this soil is suitable for reuse at the Site. Results will be compared to regulatory screening levels such as California

Human Health Screening Levels (CHHSLs), and, for naturally-occurring constituents, typical California background concentrations.

For the Western Nursery Area and Northern and Southern Drainage areas, a sampling grid will be laid out after building demolition and after vegetation cutting as discussed further below.

2.1.2 Site Vegetation Removal

Following building demolition and except in areas that are to be excavated as part of the RAW, all vegetation¹ will be stripped and disked into the soil in preparation for sampling and future development. In the potentially COPC-impacted and RAW excavation areas, vegetation will be cut and left in place at the ground surface.

2.1.3 Utility Clearance

No invasive activities will begin without notification of local “Underground Services Alert (USA)” and identification of utilities in and around the excavation area at least 48 hours prior to beginning of work. In addition, a private utility locator will be retained to conduct a utility survey prior to beginning of the excavation, to ensure that all underground utilities in the proposed work areas have been identified.

2.1.4 Delineation of Excavation Areas

Following demolition and vegetation cutting, an excavation grid will be established over the Western Nursery area and Northern and Southern Drainage Areas to facilitate pre-and post excavation (i.e., confirmation) sampling. For the Western Nursery Area, the grid will typically be 25 feet by 25 feet as shown on Figure 4. Samples will be collected at the grid nodes in the Western Nursery Area. For the Northern and Southern Drainage Areas (which are less than 25 feet wide), discrete samples will be collected every twenty-five along the centerline of the drainage ditch/area. The boundaries of the grid areas are also shown on Figure 4.

2.1.5 Security Measures

Appropriate barriers and/or privacy fencing will be installed prior to beginning the excavation process to ensure that all work areas are secure and safe. To ensure trespassers or unauthorized personnel are not allowed near work areas, security measures may include, but are not limited to:

¹ Except for trees which are to be preserved and/or removed per the development plans.

- Posting notices directing visitors to the Site Manager and limiting access to work areas. The Site Manager will be the person in charge of supervising all activities at the site.
- Maintaining a visitor's log. Visitors must have prior approval from the Site Manager to enter the site. Visitors shall not be permitted to enter the site without first receiving site-specific health and safety training from the Site Health and Safety Officer(s). The Site Health and Safety Officer(s) will be in charge of ensuring compliance with the health and safety plan (HASP), and of providing a point of contact for employees working at the site who have questions regarding the HASP.
- Installing chain-link barrier fencing around the perimeter of the work area, which will be locked during non-work hours to restrict access to the excavation and nearby areas.
- Requiring that all visitors, before leaving the site, sign out in the visitor's log.
- Maintaining a safe and secure work area, including areas where equipment is stored or placed, at the close of each workday.

Persons requesting site access will be required to demonstrate a valid purpose for access and provide appropriate documentation to demonstrate they have received proper training required by the site-specific HASP (discussed below).

2.2 Permits

Per Section 2.1.1, a demolition permit will be obtained from the City of Larkspur which includes the implementation of RAW excavation activities.

2.3 Identification of Culturally Significant Resources in Midden

As discussed in Section 1.2 above, offsite disposal of culturally significant resources (such as Native American human remains, funerary objects, cultural and religious landscapes, ceremonial items, etc.), that may be present in excavated soil, is prohibited. Soil excavated as part of RAW activities will be inspected per the Treatment Plan (Appendix A), and any midden soils will stockpiled separately. One four-point composite sample will then be collected for every 100 CYs of excavated midden soils and analyzed for lead by USEPA Method 6010B. For midden stockpiles that have maximum lead concentrations less than 260 mg/kg, these midden soils will remain on the property and be reused in accordance with the Site development plan and the Treatment Plan. For midden stockpiles that have maximum lead concentrations greater than 260 mg/kg, the midden soil will be screened for culturally significant resources by appropriately trained archaeologists and Tribal representatives. The archaeologists and Tribal representatives performing the screening will be trained according to Title 8 CCR Section 5192 and 29 CFR 1910.120 and be working under a health and safety plan prepared in accordance with the requirements of Section 2.5. If culturally significant resources are identified, then these resources will be recovered from the midden and reburied on the Site as described below.

The recovered resources will be evaluated for the presence of lead by the Engineer in consultation with the DTSC. Factors to be considered in this evaluation include:

- The size, number and condition of the recovered resources; and
- The presence of significant amounts of fine material (such as soil) that is associated with the recovered resources.

For example, if only a small number of artifacts are recovered and they are relatively intact, then testing for lead is not warranted because of the small volume of material. On the other hand, if the recovered resources are associated with at least one cubic yard of soil/debris then one sample will be collected from these resources and tested for lead.

Also, if possible, recovered resources that are to remain on the Site shall be cleaned of soil and debris (as long as the cleaning process will not cause damage to the resources) prior to reburial and/or testing. In the event testing for lead is warranted, one four-point composite sample shall be collected for every 100 CYs of culturally significant soil/debris. Samples shall be analyzed for lead using USEPA Method 6010B. If a large volume of resources are recovered but very little soil/debris, then an alternative method of sampling may be proposed to the DTSC. Alternative methods to be considered include wipe sampling or sampling of de-ionized rinse water from intact resources.

If lead is present above the soil cleanup level or other applicable screening level, the resources will be reburied in an encapsulation area as described in Section 2.3.1 below. If a significant amount of lead is considered to not be present by the Engineer, or lead is not present above the soil cleanup level or other applicable screening level, then the resources will be reburied with any other resources recovered from non-COPC impacted areas at the Site. Excavated soil including midden that is screened and found not to contain culturally significant resources but has lead concentrations above the soil cleanup level, will be disposed of offsite as described in Section 3.6 below.

2.3.1 Encapsulation of Lead-Impacted Culturally Significant Resources

Culturally significant resources that are to be encapsulated will be mixed with water and 8 to 10% cement by wet weight. The cement will consist of Type II modified Portland cement that is resistant to both chloride and sulfate ions. The actual amount of the cement needed will be established by laboratory testing at the time of construction. After the cement mixture cures, it will have a total unit weight between 105 and 110 pounds per cubic foot, a compressive strength of between 50 and 150 pounds per square inch and be almost impermeable to the transmission of water either into or out of the mixture. The process of mixing and encapsulating the soil/culturally significant resources will be as follows:

- An excavation will be made from curb to curb in the street area in approximately the northern most 40 feet of Camellia Drive (Figure 3). The actual size of the encapsulation area will be determined based on the volume/number of lead-impacted culturally-significant resources that are recovered. The excavation will be up to 10 feet deep. The top of the final lift of the soil/cement mixture will be a minimum of 6 feet below the street subgrade (approximately 7 feet from the top of pavement). Based on geotechnical borings near the encapsulation area, the bottom of the soil/cement matrix will be between 5 and 10 feet above the water table (SFB 2008).
- The cement mixture will be placed into the encapsulation area in approximate 1 foot lifts and compacted by a smooth drum roller. No more than one lift will be placed on the same day. Once the first lift has solidified enough to support structure construction equipment, the next lift will be placed. Each successive lift will be placed in the same manner.
- After all of the cement has been processed and placed, the remainder of the excavation will be backfilled with onsite or import fill in accordance with the recommendations presented in the Site plans and geotechnical report.

2.4 Bay Area Air Quality Management District (BAAQMD)

Potentially applicable BAAQMD regulations include those addressing particulate matter emissions (Regulation 6). BAAQMD Regulation 6 addresses particulate matter and visible emissions mostly pertaining to discrete point sources. However, Regulation 6-305 states:

“Visible Particles: A person shall not emit particles from any operation in sufficient number to cause annoyance to any other person, which particles are large enough to be visible as individual particles at the emission point or of such size and nature as to be visible individually as incandescent particles. This Section 6-305 shall only apply if such particles fall on real property other than that of the person responsible for the emission.”

The air monitoring network described below and the dust control measures will be implemented such that the project remains in compliance with this regulation.

2.5 Health and Safety Plan (HASP)

All contractors will be responsible for operating in accordance with the most current federal and State Occupational Safety and Health Administration (OSHA) regulations. These regulations include Title 8 California Code of Regulations (CCR) Section 5192 and 29 Code of Federal Regulations (CFR) 1910.120, Hazardous Waste Operations and Emergency Response, and 29 CFR 1926, Construction Industry Standards, as well as other applicable federal, state and local laws and regulations. A sample HASP is included in Appendix B. All contractors (including archaeologists, Tribal representatives, and environmental personnel) are responsible for preparing their own HASP which addresses the specific work tasks that they will be performing.

The sample HASP is intended as general guidance and does not include all work tasks that will be occurring during RAW implementation.

2.6 Soil Sampling and Analysis Plan

Appendix C contains soil sampling and quality assurance guidelines for the sampling that is to be performed during RAW implementation.

2.7 Field Documentation

The Engineer will be responsible for maintaining a field logbook during the removal action activities. The field logbook will serve to document observations, personnel on-site, equipment arrival and departure times, and other vital project information.

2.8 Field Log Books

Field logbooks will document where, when, how, and from whom any vital project information was obtained. Logbook entries will be complete and accurate enough to permit reconstruction of field activities. Logbooks will be bound with consecutively numbered pages. Each page will be dated and the time of entry noted in military time. All entries will be legible, written in black ink, and signed by the individual making the entries. Language will be factual, objective, and free of personal opinions or other terminology, which might prove inappropriate. If an error is made, corrections will be made by crossing a line through the error and entering the correct information. Corrections will be dated and initialed. No entries will be obliterated or rendered unreadable.

Entries in the field logbook will include at a minimum the following for each fieldwork date:

- Site name and address
- Recorder's name
- Team members and their responsibilities
- Time of site arrival/entry on-site and time of site departure
- Other personnel on-site
- A summary of any on-site meetings
- Field observations of soil (e.g., heavy rains, odors, colors, etc.)
- Quantity of soil excavated
- Quantity of soil temporarily stored on-site
- Quantity of import fill material in truckloads

- Deviations from this RAW and/or HASP
- Changes in personnel and responsibilities as well as reasons for the changes
- Levels of safety protection
- Calibration readings for any equipment used and equipment model and serial number

2.9 Photographs

Photographs will be taken at every excavation area and in other areas of interest on-site. Photographs will also be taken prior to the commencement of site re-development and construction activities. They will serve to verify information entered in the field logbook. When a photograph is taken, the following information will be written in the logbook or will be recorded in a separate field photography log:

- Time, date, location, and, if appropriate, weather conditions
- Description of the subject photographed
- Name of person taking the photograph

In the unlikely event that Native American human remains are encountered, photographing of these human remains and/or grave sites is prohibited.

3 Excavation

3.1 Excavation Plan

The estimated extent of the excavation areas is shown in Figure 5 (although the actual lateral extent of removal would be determined based on confirmation sample results following demolition and excavation). The estimated volume of soil to be excavated is approximately 1000 CYs. Since it is highly likely that this soil will contain midden, midden soils will be stockpiled separately and screened for lead and culturally significant resources per Section 2.3.

Properly equipped workers, required to be trained according to Title 8 CCR Section 5192 and 29 CFR 1910.120, will complete all fieldwork. Soil containing elevated concentrations of lead will be excavated using a hydraulic backhoe or other types of earth moving equipment, as necessary. Excavation areas will be controlled to avoid dust generation with physical barriers (such as perimeter fencing with tarps) and wetting. The Site will be controlled and no excavation will be conducted in times of high wind conditions. Storm water drains will be covered with plastic sheeting during all excavation activities, to prevent sediment or excavation runoff from entering the drains.

3.1.1 Northern and Southern Nursery Areas

For the Northern and Southern Nursery Areas, sampling data collected to date indicates that excavation and remediation is not required. However, if confirmation sampling and observations conducted during demolition indicate that lead and/or arsenic may be present at concentrations above the Site cleanup goal for lead or typical California background levels for arsenic, then excavation may be warranted in these areas. If excavation and remediation is warranted, the excavation will proceed in a manner that is similar to the remediation excavations planned for the Western Nursery Area and Northern and Southern Drainage Areas (see below). DTSC will be consulted with respect to the confirmation of cleanup levels and the scope of any additional excavation and remediation activities.

3.1.2 Western Nursery Area

For the Western Nursery Area, the excavation will be conducted in one-foot cuts. Prior to excavating each one-foot cut, discrete samples of surface soil will be collected in each of the grid nodes shown in Figure 4 and analyzed for lead on a 24-hour turnaround time (TAT). Samples will be collected prior to excavation because building demolition may result in disturbance of soil from portions of the Site. The excavation area will be determined based on the results of the post-demolition samples. The Engineer will delineate the grid areas that require excavation to a one-foot depth considering the lead soil cleanup level for the site, i.e. no individual lead concentrations above 260 mg/kg. Soil in the delineated areas will be excavated to a one-foot depth and then discrete samples collected from the grid nodes in the delineated

areas to determine if the cleanup level has been met. The excavation will continue in one-foot depth increments until the Engineer determines the lead cleanup level has been met or specific site conditions require the Engineer to revise the excavation plan or sampling sequence. Discrete, confirmation samples will be collected at the grid nodes at the base of the excavation, i.e., approximately every twenty-five feet. Once confirmation samples indicate that the lead cleanup level has been met, then final confirmation samples will also be analyzed for the remaining CAM 17 metals by USEPA Methods 6010B or 7471A as discussed in Section 4.1.3 of the RAW. If needed, soil excavation and confirmatory sampling would continue until in-place concentrations of the other CAM 17 metals are below their respective CHHSL or background level.

3.1.3 Northern and Southern Drainage Areas

For the Northern and Southern Drainage Areas, initially, an approximately 6-inch layer of sediment will be removed from the drainage channel. Following removal of the sediment, discrete confirmation samples will be collected every twenty-five along the centerline of the drainage ditch/areas. Additional excavation areas will be determined based on the results of the confirmation samples. The Engineer will delineate the areas that require additional removal to up to a one-foot depth considering the lead soil cleanup level for the site, i.e. no individual lead concentrations above 260 mg/kg. Soil in the delineated areas will be excavated to a one-foot depth and then discrete samples collected every 25 feet in the delineated areas to determine if the cleanup level has been met. The excavation will continue in one-foot depth increments until the Engineer determines the lead cleanup level has been met or specific Site conditions require the Engineer to revise the excavation plan or sampling sequence. Once confirmation samples indicate that the lead cleanup level has been met, then final confirmation samples will also be analyzed for the remaining CAM 17 metals by USEPA Methods 6010B or 7471A as discussed in Section 4.1.3 of the RAW. If needed, soil excavation and confirmatory sampling would continue until in-place concentrations of the other CAM 17 metals are below their respective CHHSL or background level.

3.2 Temporary Storage Operations

As soil is excavated, it will be temporarily stored at staging areas on-site. At the staging areas, excavated soil will be placed on an impermeable barrier and covered with tarps when work is not being performed to prevent any run-on and/or dust generation, and bermed to contain any run-off. Stockpiles shall be no higher than 6 feet. Each excavation area will be secured and water will be used to control any fugitive dust from blowing onto other properties.

To minimize fugitive dust emissions during loading, drop heights should be minimized and water should be used. It is anticipated that soil will be temporarily stockpiled on the southeastern portion of the Site (Figure 4). Extra measures will be taken to ensure that soil stockpiles that

remain beyond 30 days are securely covered and bermed to prevent fugitive dust or runoff into storm drains or other water bodies.

3.3 Decontamination Procedures

Entry to the excavation areas should be limited to avoid unnecessary exposure and related transfer of COPC-impacted soil. In unavoidable circumstances, equipment or trucks should be decontaminated in a designated decontamination area before leaving the site. Decontamination will occur prior to and after the removal activity has been completed using dry brush, hand washing, or steam cleaning methods. Equipment will be decontaminated in a pre-designated area on pallets or plastic sheeting. Clean bulky equipment will be stored on plastic sheeting. Cleaned small equipment will be stored in plastic bags.

3.4 Air and Meteorological Monitoring

This section details the air and meteorological monitoring strategy and methodologies that will be used during the removal action. The strategy and methodologies are designed to achieve several goals:

- Measure the particulate matter generated during the excavation and decontamination activities to assign the appropriate personal protective equipment (PPE) for on-site workers;
- Measure particulate matter and meteorological variables to assist the Contractor for the implementation of dust control measures;
- Measure particulate matter to determine potential off-site impacts during excavation and decontamination activities.

Air and meteorological monitoring will be conducted during excavation activities. The monitoring network will consist of two separate networks to monitor for dust or particulate matter (PM) with an aerodynamic diameter less than 10 micrometers (μM). One network will consist of real time dust monitors to be used by on-site health and safety personnel and the Contractor. The second network will consist of real-time PM_{10} monitors to be used for fence-line measurements.

3.4.1 On-site Monitoring Network

Monitor locations for the on-site dust monitors will be based on the on-site health and safety officer's and the Contractor's needs. The locations will be representative of worker exposure and general site conditions. This dust monitoring network will consist of monitors such as the Personal DataRam or PDM-3 Miniram particulate monitor manufactured by MIE, or equivalent.

Implementation of PPE will be based on the interpretation of the collected data in comparison to action levels established by the on-site health and safety officer.

3.4.2 Regulatory Standards and Recommended Action Levels

In Section 2.4, potentially applicable BAAQMD regulations included those addressing particulate matter emissions (Regulation 6). The fenceline air monitoring network described below and the dust control measures will be implemented to help insure that the project remains in compliance with this regulation.

Federal and state air regulations limit the concentration of PM₁₀ in the ambient air through the National Ambient Air Quality Standards (NAAQS) and the California Ambient Air Quality Standards (California AAQS). The NAAQS specify that the concentration of PM₁₀ must not exceed 150 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) for a 24-hour period and an annual arithmetic mean of 50 $\mu\text{g}/\text{m}^3$. California AAQS specify that the concentration of PM₁₀ must not exceed 50 $\mu\text{g}/\text{m}^3$ for a 24-hour period and an annual arithmetic mean of 20 $\mu\text{g}/\text{m}^3$. The more stringent state limits were used to determine the Recommended Action Level (RAL) for this monitoring program for shorter averaging periods, which are more relevant to the removal activities. Action levels for eight hour averaging periods were developed using averaging time conversion factors of 1.75.² The RAL for PM₁₀ for this air-monitoring program is an eight-hour average concentration of 87.5 $\mu\text{g}/\text{m}^3$.

3.4.3 Fenceline Monitoring Network

Monitor locations for the fenceline PM₁₀ monitors will consist of one location, upwind of the site based on the primary wind direction, and multiple locations along the fenceline in the direction of sensitive off-site locations. The monitors will be real-time PM₁₀ monitors. The on-site meteorological station will be located in an area representative of wind patterns for the site, as described in published guidance.^{3,4} On-site meteorological data collected will include wind speed and direction, temperature, and relative humidity. During excavation, fenceline monitoring and meteorological data will be collected on a hourly basis. If during excavation PM₁₀ levels exceed 50 $\mu\text{g}/\text{m}^3$ between upwind and downwind monitors, then additional dust control measures will be implemented.

² United States Environmental Protection Agency (USEPA). 1992. *Screening Procedures for Estimating the Air Quality Impact of Stationary Sources, Revised*. EPA-454/R-92-019. October.

³ Bay Area Air Quality Management District (BAAQMD). 1996. "Meteorological Monitoring Guidance." *Manual of Procedures*. Volume IV. Appendix A. May 8.

⁴ United States Environmental Protection Agency (USEPA). 2000. *Meteorological Monitoring Guidance for Regulatory Modeling Applications*. EPA-454/R-99-005. February.

3.5 Dust Control Plan

This section details potential dust control measures that the Contractor will implement, if required, to minimize dust emissions during the removal action. Dust emissions may result from activities during removal action and from wind erosion. These sources are most effectively controlled using wet suppression. A high wind threshold will also be established to minimize wind erosion during extreme meteorological conditions and low visibility/permeability wind fencing will be installed around the excavation area(s). Stockpiles will be covered unless being loaded, water will be sprayed on areas which have already been excavated and are subject to wind erosion.

3.5.1 Wet Suppression

The main mechanism for the control of fugitive dust emissions from construction activities and wind erosion is by watering, which leads to the formation of a surface crust to reduce the available reservoir of dust. In addition to water, a wide variety of chemical dust suppressants are available to enhance the formation of a surface crust.

The effectiveness of wet suppression is dependent on the type of activities occurring, the frequency of watering, and the meteorological conditions. The watering schedule will be determined by an evaluation of the air monitoring and meteorological data, site conditions, and site activities.

3.5.2 High Wind Warnings

High wind conditions can lead to higher dust emissions. Thus, based on the information collected by the on-site meteorological station, work will be stopped during high wind conditions. There are no wind speed restrictions stated in local or federal regulations. However, an initial self imposed action level for work stoppage will be set at a sustained wind speed of 25 miles per hour (mph). This action level is subject to revision based on actual site conditions.

3.5.3 Wind Fences

Wind fences will be used as a dust control measure in conjunction with other dust control measures discussed above. The fence reduces the wind speed at a specific location. The fence dimensions necessary to achieve optimum effectiveness will vary depending on the geography of the dust source. Typically, a fence material with 50% porosity is generally considered optimum for most applications. Low visibility/permeability windscreens will be installed around the perimeters of the excavation area(s) during the removal activities.

3.6 Transportation Plan For Off-Site Disposal

Excavated soil and midden⁵ that have lead concentrations above the cleanup goal will be transported off-site to an appropriately licensed waste disposal facility. Using representative sampling data collected after building demolition and during excavation activities, the stockpiled soil material will be profiled for off-site disposal. It is likely that excavated soil will require disposal as a California hazardous waste and therefore, will require disposal at a California Class 1 hazardous waste disposal facility such as the Waste Management Incorporated (WMI) Kettleman Hills facility. Final determination of the disposal site will be based on approval from the disposal site. Once the disposal facility is selected, copies of waste profile reports used to secure disposal permission from the landfill will be provided to DTSC. A Transportation Plan is included in Appendix D.

3.7 Site Restoration

Excavated areas will be backfilled with soil from the existing stockpiles at the northeastern corner of the Site assuming that stockpile sampling data indicates that the soil is acceptable for use on the Site. Backfill will be placed in 6-inch lifts and compacted to the standards specified in the City-approved construction plans for site re-development. If the soil from existing stockpiles cannot be used then backfilling of excavations will occur during site re-development. If the excavations are not backfilled, the Contractor will rough grade the excavations to make sure there are no unstable side slopes or dangerous drops in grade.

Following either backfilling and/or rough grading, the Site will be hydroseeded and/or sealed to prevent wind erosion and/or run-off of particulates during rain events. Stockpiles of soil that are to be encapsulated will remain at the Site until Site re-development and construction activities begin. Extra measures will be taken to ensure that these stockpiles are securely covered and bermed to prevent fugitive dust or runoff into storm drains or other water bodies.

3.8 Land Use Covenant

If any lead-impacted culturally significant resources are encapsulated onsite, a land use covenant (or deed restriction) may be implemented if deemed necessary by the DTSC to address the future disturbance of soil in the encapsulation area. The land use covenant will incorporate the requirements under California laws concerning disclosure of environmental conditions during property transfers, public and agency notification requirements, and annual inspection/reporting requirements. The land use covenant may include the following restrictions on the encapsulation area:

⁵ Where no culturally significant resources are identified.

- The area shall not be used for a residence, a hospital for humans, a public or private school for persons under 21 years of age, or a day care center for children;
- No activities that will disturb the soil at or below approximately 7 feet below grade⁶ shall be allowed without a Soil Management Plan approved by the DTSC in advance; and
- Any contaminated soils brought to the surface by grading, excavation, trenching or backfilling shall be managed in accordance with all applicable provisions of state and federal law.

3.9 Implementation Schedule

Implementation of RAW activities will begin after building demolition is completed. Table 1 summarizes the anticipated number of days for RAW tasks.

All RAW activities performed at the Site would remain under the oversight of the DTSC. A Report of Completion, documenting all activities conducted pursuant to the approved RAW and certifying that all activities have been conducted consistent with this RAW, will be submitted to DTSC 60 days after completion of site restoration activities. If needed, a draft land use covenant will also be submitted to DTSC with the Report of Completion.

⁶ Exact depth and elevation to be determined following encapsulation.

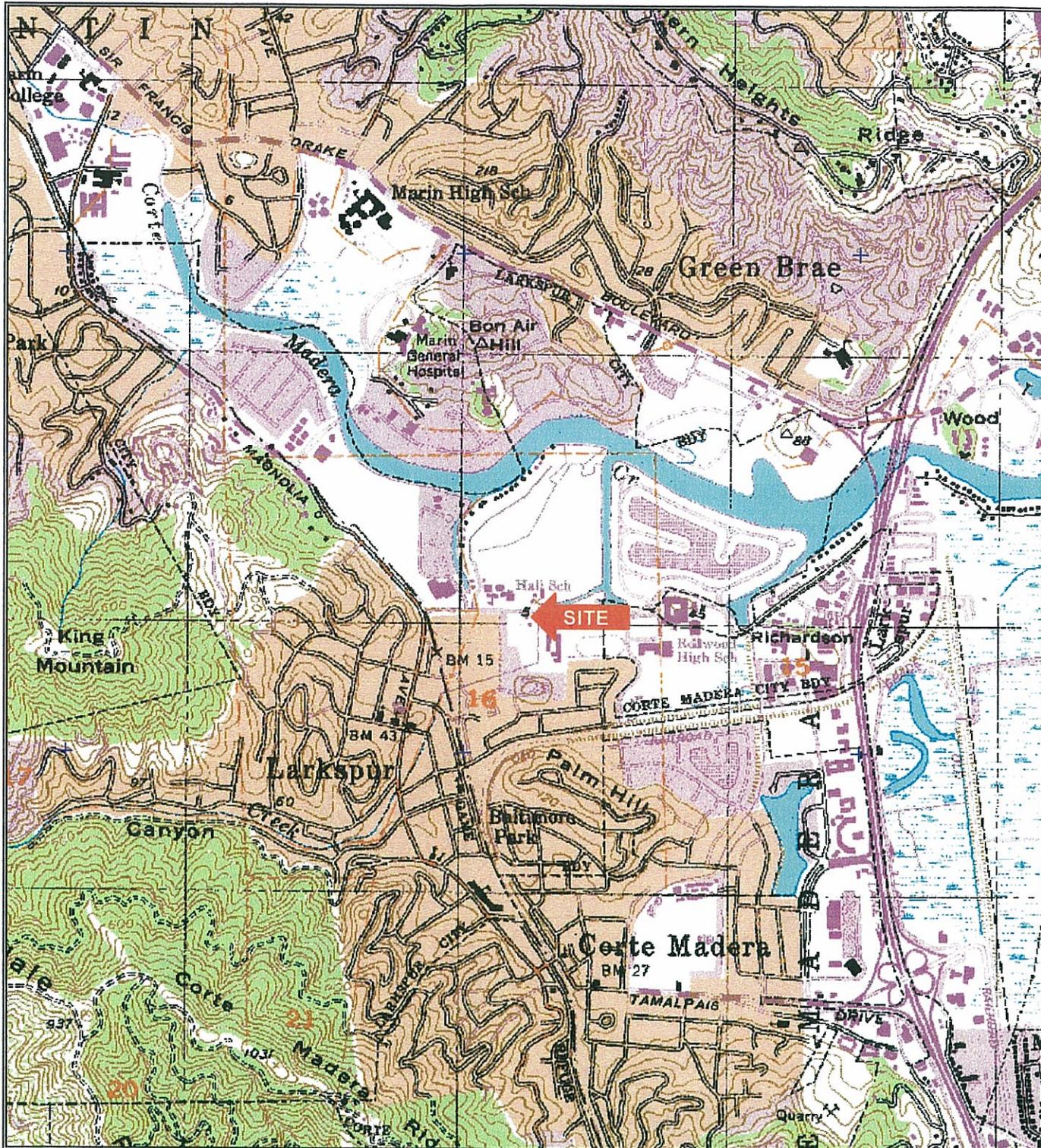
4 References

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Tables

Table 1 Anticipated Number of Days for Project Implementation and Reporting			
Schedule of Tasks			
Task	Days^a to Complete	Cumulative Days	Notes
Building Demolition	21	21	Not part of RAW, but must be completed prior to RAW implementation
Site Disking and Vegetation Cutting	7	28	Includes removal and/or preservation of trees; no disking in COPC-impacted areas
Post-Demolition/Pre-Excavation Sampling	3	31	
Excavation Activities	14	45	Assumes minimal weather delays
Site Restoration	7	52	
<p><u>Note:</u> ^a Calendar days</p>			

Figures



SOURCE: USGS 7½ Minute Topographic Quadrangle, San Rafael, California 1999.



1420 Harbor Bay Parkway
Suite 120
Alameda, California 94502

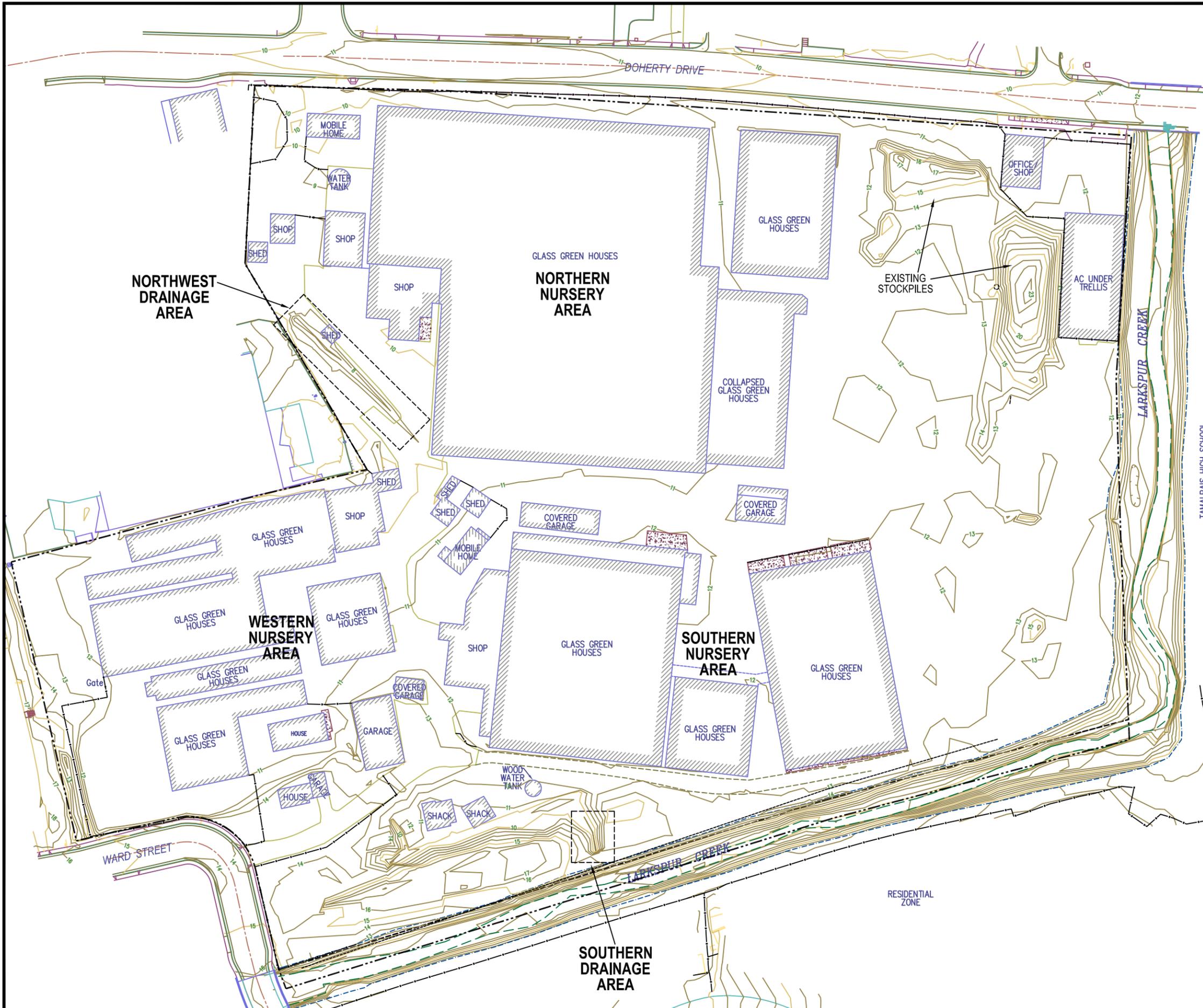
APPROXIMATE
SCALE

0 1/4 1/2 1 MILE

FIGURE 1
SITE LOCATION MAP
2 Ward Street
Larkspur, California

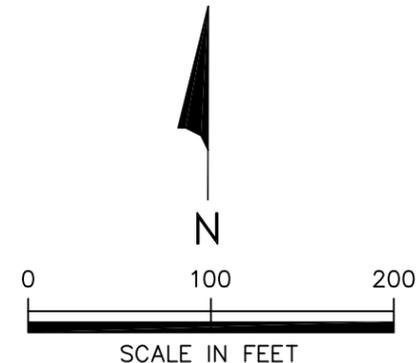
Project Manager: M Litzau	DATE: January 21, 2002	PROJECT NO.:	REV
File Name: Figure 1	CHECKED: C. Stagg	8727-061-900	1

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EXPLANATION:

- Existing Fence
- - - Property Line

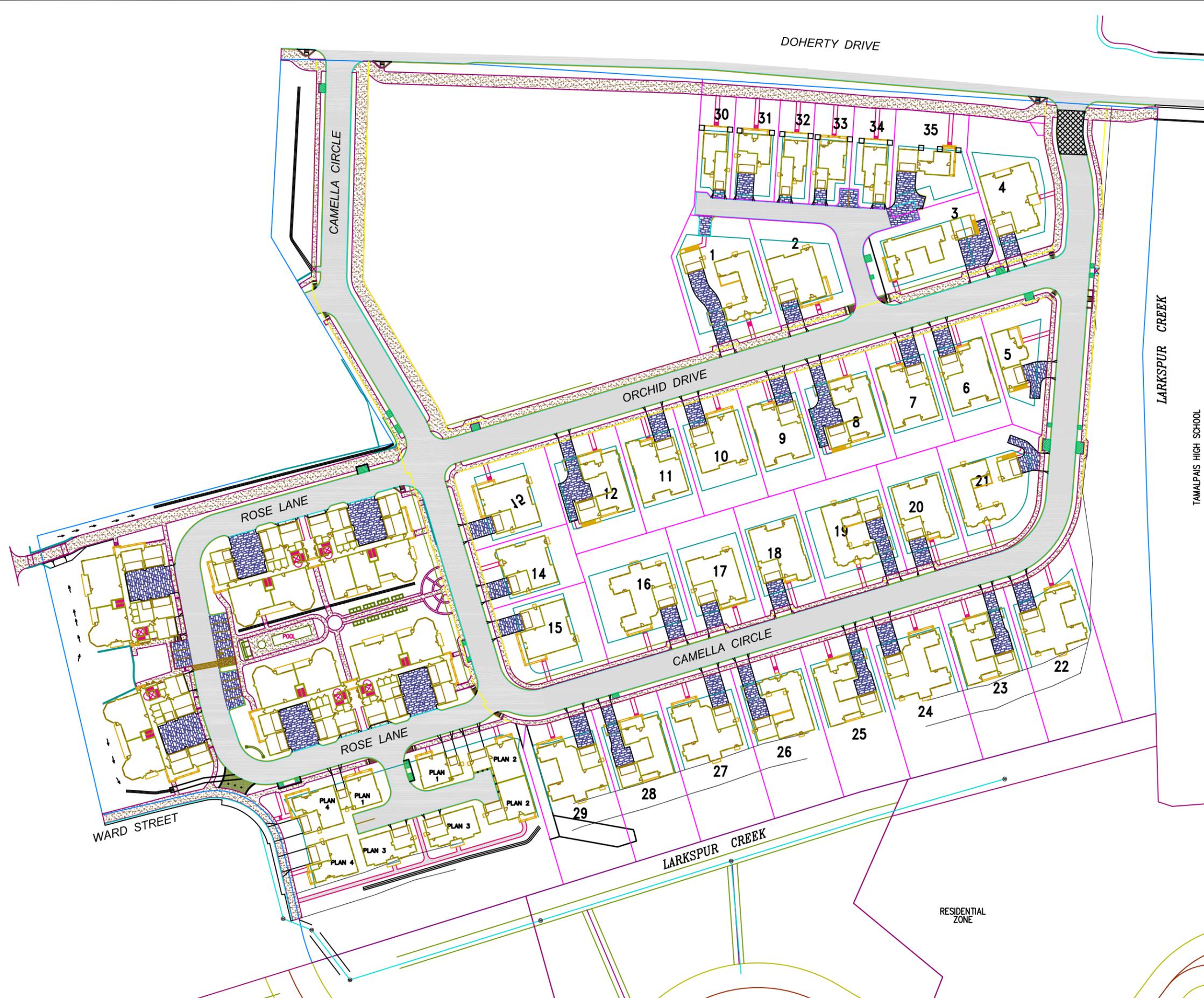


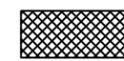
ENVIRON

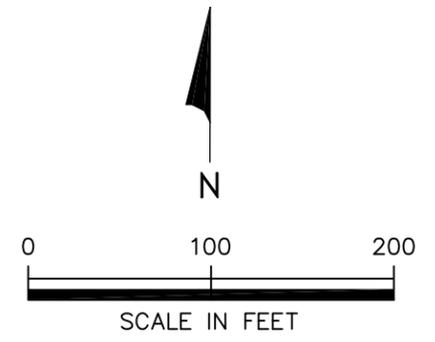
Existing Site Plan 2008
 Niven Nursery
 Larkspur, California

DATE: 4/16/09	CONTRACT NUMBER: 03-21512A	FIGURE 2
DRAFTER: RS	APPROVED:	REVISED:

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 Proposed Encapsulation Area



ENVIRON

Future Site Plan and Encapsulation Area
Niven Nursery
Larkspur, California

DATE: 4/16/09	CONTRACT NUMBER: 03-21512A	FIGURE 3
DRAFTER: RS	APPROVED:	REVISED:

RESIDENTIAL ZONE

LARKSPUR CREEK

TAMALPAIS HIGH SCHOOL

DOHERTY DRIVE

CAMELLA CIRCLE

ORCHID DRIVE

ROSE LANE

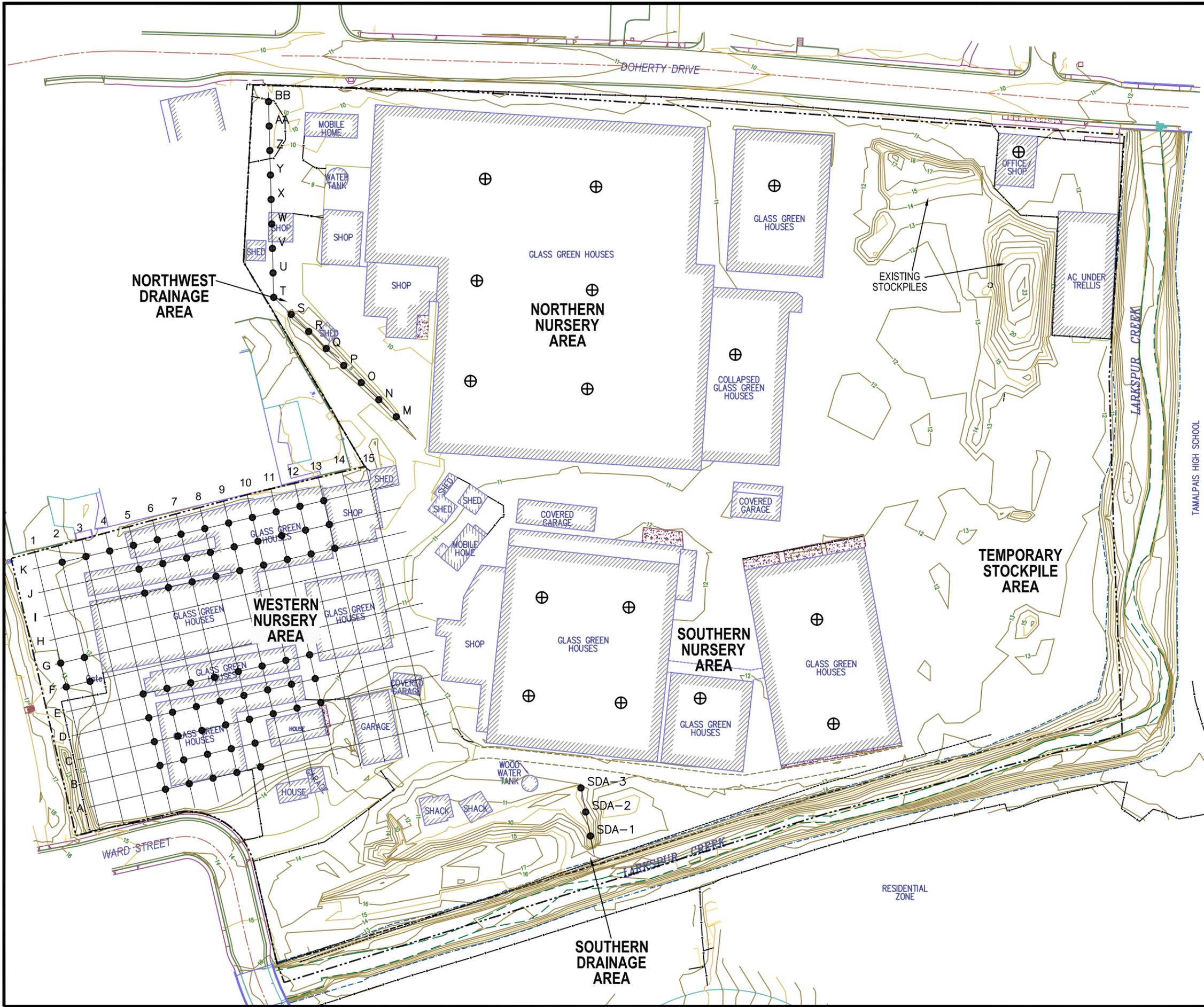
ROSE LANE

WARD STREET

LARKSPUR CREEK

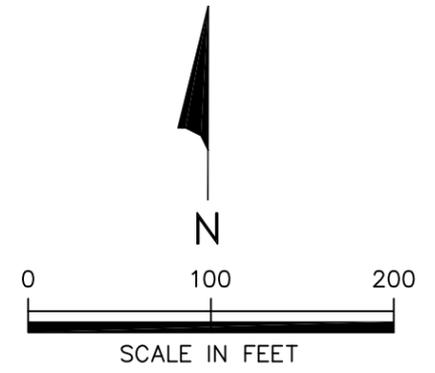
CAMELLA CIRCLE

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EXPLANATION:

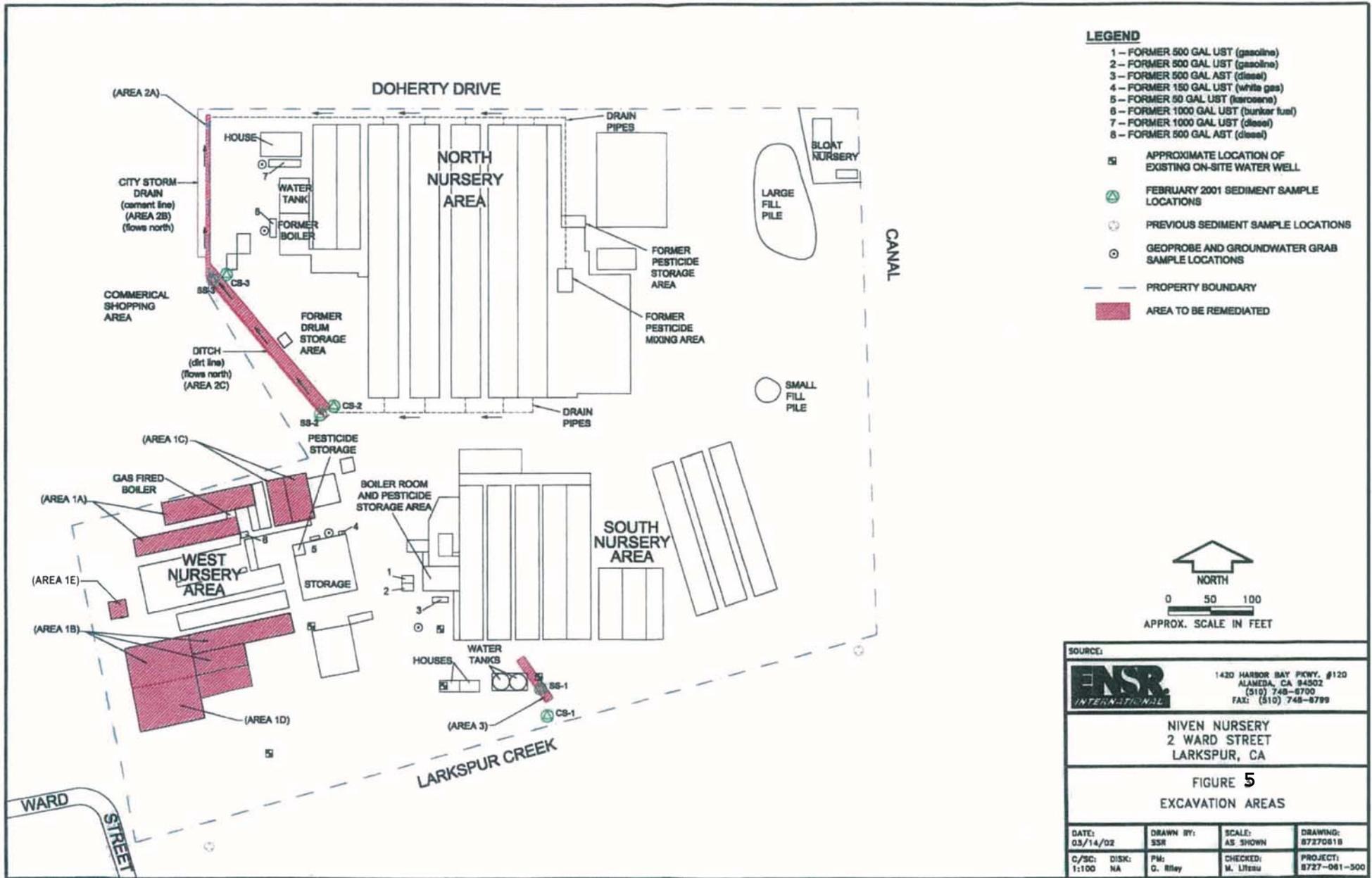
- Existing Fence
- - - Property Line
- ⊕ Post Demolition Confirmation Sample (Approximate Location Only)
- Pre-excavation/Confirmations Sample Location
- ⊠ Sampling Grid



ENVIRON

Confirmation Sampling Location and Sampling Grid
 Niven Nursery
 Larkspur, California

DATE: 4/16/09	CONTRACT NUMBER: 03-21512A	FIGURE 4
DRAFTER: RS	APPROVED:	REVISED:



Appendix A:
Treatment Plan: An Agreement between the
Federated Indians of Graton Rancheria,
the City of Larkspur,
and Larkspur Housing Partners, LLC

**TREATMENT PLAN
AN AGREEMENT BETWEEN THE
FEDERATED INDIANS OF GRATON RANCHERIA AND
THE CITY OF LARKSPUR, AND LARKSPUR HOUSING PARTNERS, LLC**

I. PARTIES

The PARTIES to this Agreement are the Federated Indians of Graton Rancheria (FIGR), a federally recognized Indian tribe ("Tribe") and the City of Larkspur, a California public entity ("City") and Larkspur Housing Partners, LLC, a California limited liability company ("Developer").

II. PROJECT

This Agreement concerns a project at the former Niven Nursery site, commonly known as APN No. 022-110-45, 2 Ward Street, Larkspur, California (the "Project").

III. PURPOSE

The purpose of this Agreement is to formalize procedures for the protection and treatment of Native American human remains, funerary objects, cultural and religious landscapes, ceremonial items, and cultural items, in the event that any are discovered in conjunction with the Project's development and use, including archaeological studies, excavation, geotechnical investigations, grading, and any ground-disturbing activity. This Agreement also formalizes procedures for Tribal Monitoring during archaeological studies, grading, and ground disturbing activities for the Project. This Agreement is effective as of the date provided for in Section XVI.

IV. CULTURAL AFFILIATION

The PARTIES agree that the Project area consists of land that has been traced to and traditionally occupied by the Southern Pomo and Coast Miwok people of the Tribe. The Tribe has designated its Sacred Sites Protection Committee to act on the Tribe's behalf with respect to the provisions of this Agreement. The Tribe's designated contact for purposes of this Agreement is NICK TIRON, a member of the Sacred Sites Committee, whose address is 6400 REDWOOD DR. #300 ROHWERT PARK, CA 94928 and whose telephone number is 707 478-1737 (the "Designated Contact"). Any human remains that are found in conjunction with the development of this Project shall be treated in accordance with Section VII of the Agreement. Any other cultural resources shall be treated in accordance with Section IX of this Agreement.

V. COORDINATION WITH COUNTY CORONER

The Developer shall immediately contact the Coroner and the Designated Contact for the Tribe in the event that any human remains are discovered at the Project site (or, if the City first acquires actual knowledge of such discovery, the City shall contact the Developer who shall

then contact the Coroner and the Designated Contact for the Tribe). The Coroner shall ensure that notification is provided to the Native American Heritage Commission (“NAHC”) as required by California Public Resources Code Section 5097.98(a)

VI. MOST LIKELY DESCENDANT (MLD)

Pursuant to California Public Resources Code Section 5097.98, and given the history and prehistory of the area and the location of the Project site, the NAHC has made a Most Likely Descendant (“MLD”) determination in previous incidents of the discovery of Native American human remains at the Project site and has declared the remains to be ancestors of the Federated Indians of Graton Rancheria, who have been designated as the MLD

VII. TREATMENT OF NATIVE AMERICAN HUMAN REMAINS

In the event that Native American human remains are found on the Project site at any time, the following provisions shall apply.

The Coroner shall immediately be notified, ground disturbing activities in that location on the Project site shall cease and the Tribe shall be allowed, pursuant to California Public Resources Code Section 5097.98(a), to: (1) inspect the site of the discovery; and (2) make determinations as to how the human remains and grave goods should be treated and re-interred with appropriate dignity.

The Tribe shall complete its inspection and make its written MLD recommendation within forty-eight (48) hours of being granted, access to the site. The PARTIES agree to discuss in good faith what constitutes “appropriate dignity”, as that term is used in the applicable statutes and in the Tribe’s customs and traditions. Subject to applicable state and federal laws and the obligation of the Tribe to act reasonably and in good faith in accordance with this Agreement, the Tribe shall have the final determination as to the disposition and treatment of human remains and grave goods

The PARTIES acknowledge that the Tribe’s highest priority is to avoid disturbing human remains through consultation and appropriate avoidance and mitigation measures. It is understood by the PARTIES that avoidance of the human remains and grave goods may require changes to the Project schedule and activities, as well as limited changes in Project plans as provided in this Agreement.

When there is an inadvertent discovery of human remains, the PARTIES acknowledge the Tribe’s desire for the human remains to be left “in situ” and without further disturbance, unless major changes in the Project footprint or foundation will be necessary, in which event the Tribe agrees the human remains may be reburied elsewhere on the Project site or in another location reasonably acceptable to the Tribe. A “good faith” effort will be made by the City and the Developer to accommodate the Tribe’s cultural practices in connection with any such reburial.

In the case of inadvertent discoveries of human remains the PARTIES agree the reburial of the remains and their associated funerary objects will be in an area as close as possible to that location or if soil has been moved, to its original location, provided such reburial

is consistent with the Project Footprint (circulation, utilities and foundations). The human remains will not be subject to future disturbances and the PARTIES will take appropriate measures to make a record of this information in compliance with applicable law. Reburial of human remains shall be accomplished in compliance with California Public Resources Code Section 5097 98(a) and (b). The exact reburial location will be determined after consultation with the Tribe and the location designated will be recorded in a manner, acceptable to all Parties, to protect it and, if appropriate, to notify future users of the reburial location of any restrictions on excavation or use of the affected area required to prevent future disturbance of the reburial remains. The Tribe shall be responsible for reburial costs, except the Developer shall reimburse the Tribe for such costs up to a maximum of \$500.00.

The term "human remains" encompasses more than human bones. The Tribe's traditions call for the burial of associated cultural resources (funerary objects) with the deceased, the ceremonial burning of Native American human remains, funerary objects, grave goods and animals. Ashes and other remnants of these burning ceremonies, as well as funerary objects found or buried with the Native American remains are to be treated in the same manner as bones or bone fragments that remain intact.

The Tribe requests all human remains and associated funerary objects remain at the site until arrangements are made for a location to rebury. The Tribe shall take appropriate and prompt action to secure any remains for reburial in order that Project work may resume as soon as reasonably feasible following the discovery of the human remains. The Developer will provide an appropriate, locked and secure location on the site to store the remains until the Tribe has made final reburial plans

VIII. NON-DISCLOSURE OF LOCATION OF REBURIALS

It is understood by the PARTIES that, unless otherwise required by law, and except to the limited extent described in Section VII, above, the site of any reburial of Native American human remains shall not be disclosed to the public generally and will not be governed by public disclosure requirements of the California Public Records Act, California Government Code §§ 6250, et seq. Pursuant to the specific exemption set forth in California Government Code Section 62554(r), the Coroner is required to withhold public disclosure of information related to such reburial

IX. TREATMENT OF CULTURAL RESOURCES

The ceremonial and cultural items left by the Tribe's ancestors reflect the religious beliefs, rituals, customs, and practices of the Tribe. The Project site may be part of a sacred, religious or cultural landscape where these items may remain today. They may have been left in this place for a specific reason and purpose.

Therefore, the Developer agrees to consult with the Tribe on the disposition of all cultural items, including ceremonial items, which may be found at the property to the Tribe for appropriate treatment, unless the Developer is otherwise ordered by a court or agency of competent jurisdiction. The Developer agrees to waive any and all claims to ownership of Tribal ceremonial and cultural items, including archaeological items found on the site in favor of the

Tribe If temporary possession of cultural items by an entity or individual other than the Tribe is necessary, said entity or individual shall not possess those items for longer than is reasonably necessary before turning them over to the Tribe

It is important for non-human, cultural resources and artifacts to be left “in situ” to the greatest degree possible consistent with the location and configuration of the Project. If the Tribal Monitor determines the resources are in danger of being damaged or stolen if left “in situ,” the Tribe will work with the Developer to determine an appropriate location to rebury for their preservation. If the articles are to be catalogued and/or studied, their treatment and disposition shall be defined in an addendum to the Treatment Plan

The Developer agrees to consult with and immediately advise the Tribe’s Designated Contact of any discoveries of cultural resources found during construction of the Project. The treatment procedures for any discovery, planned or inadvertent, and the disposition of any cultural resources shall be as reasonably and promptly determined by the Tribe in good faith, provided the treatment procedures are consistent with the Project location and configuration and do not unreasonably delay construction of the Project. Within five (5) business days of written notification, the Tribe shall provide these treatment procedures to the Developer and its contractors as guidance in complying with the provisions of this Agreement prior to the implementation of any Project activities

X. UNRECORDED SIGNIFICANT SITES IMPACTED BY PROJECT

The PARTIES agree that additional significant sites or sites not identified in the original environmental review process may be subjected to further archaeological and cultural significance evaluation by the Developer and the Tribe to determine if additional mitigation measures are necessary to treat sites in a culturally appropriate manner consistent with Tribal policies, the recommendations of the Developer’s archaeological consultant, Miley Holman, Ph.D , and this Treatment Plan.

The PARTIES agree to the following: 1) a supplemental form shall be filed by the Developer’s archaeological consultant with the State Office of Historical Preservation, Northwest Information Center within 180 calendar days of completion of all archaeological monitoring required of the Project and a courtesy copy submitted to the Tribe for its records; 2) any primary record required as a result of discovery of any additional archaeological site shall be filed by the Developer’s archaeological consultant with the Northwest Information Center within 180 calendar days of completion of all archaeological monitoring required of the Project and a courtesy copy of the primary record and associated report submitted to the Tribe; and 3) copies of all archaeological documentation including, but not limited to, reports and surveys shall be submitted to the Tribe within 180 calendar days of completion of all archaeological monitoring required of the Project.

XI. TRIBAL MONITORS

The description of responsibilities and authority for the Tribal Monitor’s operations at the site is attached as Addendum 1 to this Treatment Plan.

XII. ENVIRONMENTAL COMPLIANCE

Nothing in this Agreement shall excuse the City or the Developer from their respective obligations under any applicable state or federal laws or regulations, including but not limited to the California Environmental Quality Act (“CEQA”); California Public Resources Code §§ 21000, et seq.; the California Civil Code § 815.3; the California Government Code §§ 65040.2, 65092, 65351, 65352, 65560, 65352.3, 65352.4, 65562.5, the National Historic Preservation Act (“NHPA”) 16 United States Code (“U.S.C.”) §§ 470, et seq.; California Public Resources Code §§ 5097.98, 5097.98(c), and 5097.99; California Health and Safety Code § 7050.5(c); California Government Code § 6254; the Native American Graves Protection and Repatriation Act, 25 U.S.C §§ 3001, et seq.; the California Native American Graves Protection and Repatriation Act of 2001, California Health and Safety Code §§ 8010, et seq.; the Native American Free Practice of Religion Act, 16 U.S.C. §§ 1996, et seq.; and the First Amendment to the United States Constitution. Nothing in this Agreement is intended to make any of the above-referenced laws applicable where such laws would otherwise be inapplicable.

XIII. INDEMNITY

Each of the Tribe and the Developer shall indemnify, defend and hold harmless the other parties, and their respective agents, employees and contractors, from any personal injury, death or property damage resulting from the negligent or intentional acts and/or omissions of the indemnifying party, its agents, employees, members and contractors, while on the Project site. In addition, the Tribe shall indemnify, defend and hold harmless the City from any claims, causes of action, damages and liabilities arising out of the actions or inactions of the Tribe in connection with this Agreement.

XIV. SEVERABILITY

Should any part of this Agreement be found by any court or agency of competent jurisdiction to be to any extent invalid or unenforceable, the remainder of this Agreement shall not be affected thereby and shall be valid and enforceable to the fullest extent permitted by law.

XV. LIMITATION ON SCOPE

This Agreement is unique to this Project site only and does not set a precedent for other projects.

XVI. AUTHORITY TO EXECUTE

Each of the persons executing the Agreement expressly warrants that he or she is authorized to do so. Each party to this Agreement represents and warrants that this Agreement is executed voluntarily, with full knowledge of its content and significance.

This completed document must be signed prior to work commencing.

SIGNATURES:

Date: _____

FIGR: _____

Contact Information:

Tribal Administrator Telephone: (707) 566-2288
Federated Indians of Graton Rancheria Fax: (707) 566-2291
6400 Redwood Drive, Suite 300
Rohnert Park, CA 94928

Date: _____

City: _____
Jean Bonander, City Manager

Contact Information for City:

Nancy Kaufman Telephone (415) 927-5025
Planning Director Fax (415) 927-5022
Larkspur Planning Department nkaufman@larkspurcityhall.org
400 Magnolia Avenue
Larkspur, CA 94939

Date: _____

Developer: Larkspur Housing Partners, LLC

Steve Seely, President, Sunstar Properties, LLC

Lee E. Newell, President, New Cities Land Company, Inc.

Contact Information:

Steve Seely Telephone (925) 899-9480
Larkspur Housing Partners, LLC Fax (925) 932-2500
1800 Alma Avenue, #311 srseely@aol.com
Walnut Creek, CA 94596

Federated Indians of Graton Rancheria

Treatment Plan
Addendum 1

SPECIFICATIONS FOR TRIBAL MONITORING

1. SPECIFICATIONS

There are sensitive and sacred cultural resources the PARTIES want to preserve and protect. The Tribal Monitor will be engaged by the Developer and work as an independent contractor. The Treatment Plan specifies when the Tribal Monitor is to be present during archaeological testing, studies, and surveys, geological/geotechnical testing, studies and surveys, and during mitigation, grading, and all ground-disturbing activities in the Project

In the event that human remains are found during these activities, the Tribal Monitor is empowered to stop or relocate excavation activities in the “immediate area,” as defined by the Project archaeologist, pending further investigation by the Coroner and the Designated Contact of the Tribe as the Most Likely Descendant (MLD). The Tribal Monitor is further empowered to stop or relocate excavation activities, for short periods of time, to conduct further controlled excavation for evaluation of the significance of discovered cultural items. All surface or subsurface artifacts of significance as determined by the Tribal Monitor and the attending archaeologist discovered during any testing, studies, survey, grading or other ground-disturbing activities are to be mapped.

If Native American human remains are found, coordination of the treatment of Native American remains and funerary objects and any cultural, archaeological and ceremonial items will be conducted in accordance with Sections V through X of this Agreement,

All modifications to the Project’s development activities requiring soil disturbance shall be discussed with the Tribal Monitor and the City or the Developer at least 7 days, or as agreed, prior to the commencement of the work to clarify mitigation measures and monitoring activities. The Tribe’s Sacred Sites Protection Committee representative and/or the Tribe’s Designated Contact shall be invited to participate in this conference. If necessary, a written amendment to the Treatment Plan will be agreed to for the Project.

If necessary, a qualified archaeologist may be required to be present during grading activities to identify and /or ascertain the significance of any subsurface cultural resources or to aid in the avoidance of sensitive areas.

2. MONITORED PROJECTS

The PARTIES agree the Project area has significant known and possibly unknown cultural resources and is possibly a “cultural landscape” important to the Tribe. Therefore, the Developer shall engage a Native American monitor (the “Tribal Monitor”)

recommended by the Tribe for the soil disturbing or excavation activities of the Project and shall be responsible for coordinating the activities of the Project.

The Tribal Monitor shall be given a reasonable opportunity to be present to monitor all soil disturbances within the scope of work and the Area of Potential Effect (APE) to protect and preserve potential resources. A notice of work schedule for soil disturbing or excavation activities shall be provided by the Developer or its agents to the Tribal Monitor a minimum of ten (10) working days prior to the specified work commencing. Following any rescheduling or interruptions of such activities, the Tribal Monitor shall be provided with a minimum of twenty-four (24) hours notice before activities resume. The Developer shall make good faith efforts to work with the Tribal Monitor relative to changes in the schedule due to changes in the work schedule.

3. COMPENSATION

The Tribal Monitor selected by the Developer shall work as a “contract employee” of the Tribe. The Tribe recognizes that dangerous working conditions can exist at a work site, particularly during grading and excavation operations. The Tribal Monitor will review safety procedures with the site supervisor and attend all safety meetings.

The Developer shall compensate the Tribal Monitor at the rate of no less than \$55.00 per hour and mileage at a rate of \$0.505 per mile or the current rate established by the Federal government. The Developer shall pay to the Tribal Monitor a minimum half-day charge (four hours) for the cost of the Tribal Monitor for unannounced work stoppages that are not due to the Tribal Monitor’s actions. The hourly rate will not be applicable to travel time to and from the Project site. If weekend work is required the rate is 150% of the base rate. If work is required between the hours of 7:00 PM to 7:00 AM or on a Federal or State holiday, the hourly rate is 200% of the base rate. These rates are commensurate with industry standards for pay during non-standard times.

The PARTIES agree that the Tribe will invoice the Developer for the compensation payable to the Tribal Monitor. The Tribal Monitor will send copies of his or her daily logs to the Tribal Office with invoices and copies of these documents will be forwarded to the Developer. The Developer also agrees to remit payment in full directly to the Tribal Office within thirty (30) days of receipt of the Tribe’s invoice or be charged a late fee of 5% of the total invoice from the Tribal Monitor.

The Tribal Office will mail a paycheck to the Tribal Monitor on a monthly basis within fourteen (14) days of receiving their invoice and daily logs.

4. INSURANCE

The Tribal Office will provide, on request, the City and/or the Developer with certificates of insurance provided for Tribal Monitors by the Tribe. The insurance will include workman’s comp, liability, use of private vehicle, and errors and omissions. Copies of the type and limits of coverage will be provided to the Tribal Monitor and the Developer on request.

Appendix B: Health and Safety Plan

ENVIRON



HEALTH AND SAFETY PLAN (HASP)

Niven Nursery
Larkspur, California

Prepared for

Larkspur Housing Partners, LLC
Walnut Creek, California

Prepared by

ENVIRON International Corporation
6001 Shellmound Street, Suite 700
Emeryville, California

June 11, 2009

SITE HASP SUMMARY

SITE NAME: Niven Nursery

SPECIFIC LOCATION: 2 Ward Street, Larkspur, California

EMERGENCY CONTRACT INFORMATION:

CONTACT	NAME	OFFICE PHONE #	MOBILE PHONE #
LOCAL FIRE DEPARTMENT	Larkspur Fire Department	911 or 415-924-2405 (from cell)	
LOCAL HOSPITAL	Marin General Hospital	415-925-7000	
LOCAL POLICE	Twin Cities Police Authority	911 or 415-924-2405 (from cell)	
ENVIRON MANAGING PRINCIPAL	Rob Scofield	510-420-2551	Not Provided
ENVIRON PROJECT MANAGER	Anne Gates	510-420-2524	415-877-0123
ENVIRON SITE SUPERVISOR	Dan Clark	510-420-2563	510-299-7036
LOCAL OFFICE HEALTH AND SAFETY COORDINATOR	Dan Clark	510-420-2563	510-299-7036
CLIENT CONTACT	Steve Seely	(925) 899-9480	(925) 899-9480
POISON CONTROL		1-800-222-1222	

POTENTIAL CHEMICALS OF CONCERN: Soil impacted with lead, arsenic, and organochlorine pesticides.

PLANNED ACTIVITIES: Areas of soil impacted by contaminants of potential concern (COPCs) at concentrations above cleanup criteria will be excavated and stockpiled. Confirmation soil samples will be collected from excavation areas. Excavated soils will be placed in an on-site encapsulation area.

ROUTE TO HOSPITAL:

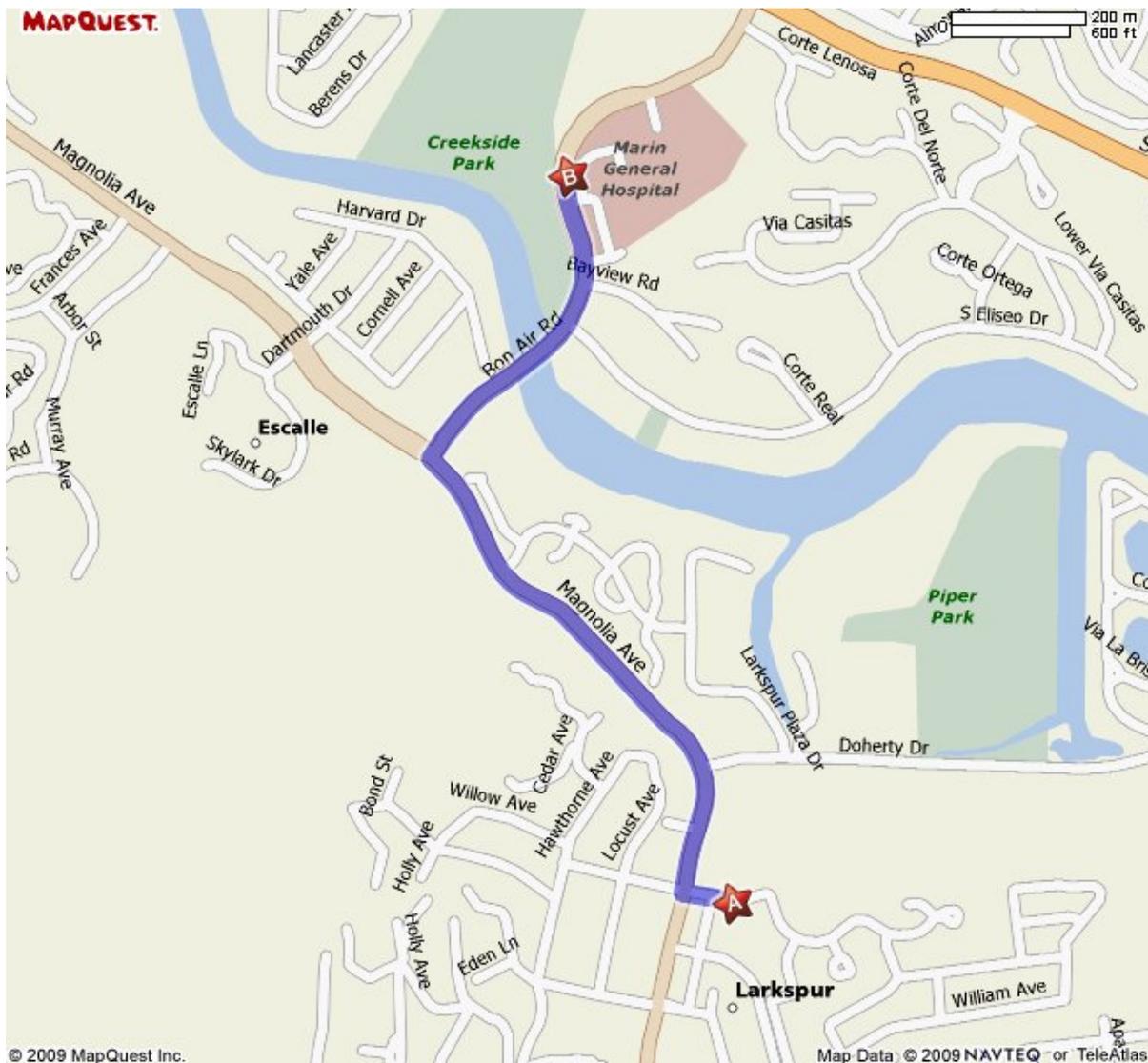
Marin General Hospital
250 Bon Air Road
Greenbrae, California
415-925-7000

Description of Route to Hospital

1. Start out going WEST on WARD ST. toward RICE LN.
2. Turn RIGHT onto MAGNOLIA AVE.
3. Turn RIGHT onto BON AIR RD.
4. End at 250 Bon Air Rd, Greenbrae, CA

Estimated distance: 1.06 miles

Estimated time: 3 minutes



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APPENDICES

- Appendix A: Chemical Safety Data
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1.0 GENERAL INFORMATION

SITE NAME: *Niven Nursery*

SITE LOCATION: *2 Ward Street, Larkspur, California*

SITE PHONE NUMBER: *Dan Clark's Cell Phone: 510-299-7036*

ENVIRON PROJECT NUMBER: *03-21512A*

1.1 General Requirements

This HASP was prepared to inform all ENVIRON personnel of known or reasonably anticipated potential hazards and safety concerns at the site. All personnel participating in field activities must be trained in the general and specific hazards unique to the job they are performing and, if applicable, meet recommended medical examination and/or training requirements. All ENVIRON employees shall follow the guidelines, rules, and procedures contained in this site-specific Health and Safety Plan (HASP). ENVIRON personnel shall cease field operations, remove themselves from the work area, and contact the Project Manager (PM) if unexpected conditions are encountered at the site.

Each contractor, subcontractor, and visitor shall be expected to review and understand the hazards, risks, and control methods (including emergency procedures) as outlined in this HASP. However, contractors and subcontractors will be required to prepare their own HASP to address site safety and work hazards associated with their proposed site activities prior to mobilization to the site. In addition, each contractor and subcontractor will be required to provide ENVIRON with information relevant to identifying the hazards and appropriate control strategies for the hazards for their particular job tasks for inclusion in the site-specific HASP. Each contractor or subcontractor must assume direct responsibility for its own employees' health and safety.

Copies of the HASPs will be kept on site for review and reference during all site activities. After the completion of the project, the finalized and signed copy of the HASP will be placed in the project file.

1.2 Responsibilities

1.2.1 Principal in Charge/Project Manager

Responsibilities include overall coordination of site activities. The Principal in Charge (PIC) and the project manager (PM) have overall accountability and responsibility for the safety of operations and the health and safety of all personnel.

1.2.2 Health and Safety Coordinator and Director

The local Health and Safety Coordinator (HSC) and Divisional Health & Safety Director are resources for development of the site-specific HASP and will be consulted on all related health and

safety issues that arise in the field, including any changes in the scope of work. The Health and Safety Director will make all final decisions regarding questions on the HASP.

1.2.3 Site Supervisor

The site supervisor is responsible for field-related activities under the direction of the PM and for maintaining field operations in accordance with project requirements. This person is responsible for enforcing daily implementation of the HASP and resolving health and safety issues. In addition, this person will:

- Establish and ensure maintenance of site work zones.
- Monitor the work area and personal breathing zone and ensure compliance of workers relative to pre-established personal protection levels.
- Evaluate site conditions (i.e., weather, chemical, physical) and recommend any modifications to existing levels of protection.
- Ensure that daily safety briefings are conducted and documented in this HASP (see Section 10) or in the field logbook.
- Initiate emergency response procedures with immediate communication to the project manager.
- Exercise stop-work authority in the event of imminent danger to project personnel.
- Notify PM of any noncompliance and/or unsafe conditions.
- Conduct regular inspections to determine effectiveness of the HASP.

1.2.4 Project Personnel

Project personnel involved in field activities are responsible for:

- Taking all reasonable precautions to prevent injury to themselves and to fellow employees.
- Conducting only those tasks that they believe they can do safely.
- Reporting all occurrences and/or unsafe conditions to the supervisor and/or project manager.

1.3 Health and Safety Plan Sign-Off Sheet

By signing below, it is acknowledged that this HASP covers each of the activities that are anticipated to be performed in the field and all personal protective and monitoring equipment that may be necessary at the site will be available and used as appropriate. It is also understood that the provisions of this HASP will be abided by and should a change of task or the addition of tasks be necessary for this project, every effort to discuss additional health & safety requirements with the field personnel and ensure that the HASP is updated.

<u>Anne Gates</u>		
Manager/Principal-in-Charge	Signature	Date

<u>Dan Clark</u>		<u>4/21/09</u>
Health & Safety Coordinator	Signature	Date

<u>Dan Clark</u>		<u>4/21/09</u>
Designated Site Supervisor	Signature	Date

<u>Dan Clark</u>		<u>4/21/09</u>
Designated HASP Preparer	Signature	Date

<u>Anne Gates</u>		
Designated HASP Reviewer	Signature	Date

This form MUST be signed prior to starting the on-site work. In addition, a copy of this form should be completed and returned to the office Health and Safety Coordinator prior to leaving for the field. After completion of the project, the original signed HASP must be retained in the project file.

2.0 PROJECT DESCRIPTION

2.1 Description of Anticipated Work

Areas of soil impacted by contaminants of potential concern (COPCs) at concentrations above cleanup criteria will be excavated and stockpiled. Confirmation soil samples will be collected from excavation areas. Excavated soils will be placed in an on-site encapsulation area.

2.2 Work Limitations (Weather, Time of Date, etc.)

Site work operations will be completed during daylight hours. All site work operations will cease if thunder and/or lightning are observed within approximately 5 miles of the site.

2.3 Facility Background

For over 78 years, the Niven family has owned and operated a commercial nursery at the Site. Over the years, certain pesticides have been used at the Site in conjunction with the nursery operation and were kept in storage areas located in each nursery complex. Pesticides were mixed in small quantities as they were being applied and were applied by backpack sprayer and pushcart type applicators. Currently, the nursery has reduced operations to cultivation of orchids in the southern greenhouse area.

Based on the available soil, sediment, and groundwater sampling results and based on risk assessment assumptions and methods recommended by the Cal/EPA, ENVIRON found that, while pesticide residue levels varied somewhat across the site, the health risks attributable to pesticides and metals in surface soils at the Site do not pose a human health risk greater than the acceptable risk range of 1×10^{-6} to 1×10^{-4} used by the Cal/EPA and the United States Environmental Protection Agency (USEPA) (ENVIRON 2002). Two drainage areas, identified as the Northwest Drainage Area and Southern Drainage Area, were shown to have COPCs in the soil that merited remediation. Lead levels ranging from 23 milligram per kilogram (mg/kg) to 3,800 mg/kg were detected in the sediment of the Southern Drainage Area, and lead levels ranging from 620 mg/kg to 1,800 mg/kg were detected in the sediment of the Northwest Drainage Area.

In addition, COPCs were identified in five areas within the Western Nursery Area that merit remediation: lead, arsenic and 4,4'-dichlorodiphenyltrichloroethane (DDT) were detected in shallow soil samples around the footprint of a former Western Nursery Area building. Soil in these areas will be excavated to a depth of approximately one foot and removed to an appropriate off-site disposal facility. Because the amount of COPC-impacted soil in the Western Nursery Area is estimated at approximately 24,844 cubic feet and the amount within the Northwest and Southern Drainage Areas is estimated at approximately 4,563 cubic feet, the overall total amount of soil that has been targeted for excavation, stockpiling, and burial in an on-site encapsulation area is estimated at approximately 29,407 cubic feet, which equates to approximately 1000 cubic yards.

2.4 Project Personnel

TITLE	NAME	COMPANY	PHONE #
PROJECT MANAGER:	Anne Gates	ENVIRON	Office: 510-420-2524 Mobile: 415-877-0123
PROJECT ENGINEER:	Anne Gates	ENVIRON	Office: 510-420-2524 Mobile: 415-877-0123
ON-SITE SUPERVISOR:	Dan Clark	ENVIRON	Office: 510-420-2563 Mobile: 510-299-7036
HEALTH & SAFETY COORDINATOR:	Dan Clark	ENVIRON	Office: 510-420-2563 Mobile: 510-299-7036
UTILITY LOCATOR COMPANY:	Anthony LoBue	Subdynamic Locators, Inc.	Office: 408-723-4191

3.0 SITE AND WASTE CHARACTERISTICS

3.1 Known and Suspected Chemicals (Chemical-specific information for known/suspected chemicals is included in Attachment A.)

The soils to be excavated from the site are impacted with varying concentrations of arsenic, lead, and organochlorine pesticides (primarily dichlorodiphenyltrichloroethane [4,4'-DDT]). The impacts to soil apparently originated from the use of pesticides and from certain building materials used in the construction of site buildings. Excavated soils are anticipated to be buried in an encapsulated area beneath utilities in an asphalt-paved roadway.

3.2 Work Area Description

The approximately 16.8-acre site is generally flat, and is bordered on the east by Larkspur Creek; to the south by Larkspur Creek and Ward Street; to the west by a commercial shopping center; and to the north by Doherty Drive, beyond which is Hall Middle School. The site is currently developed as a commercial nursery with several greenhouses, storage areas, residences, roadways, and parking areas. Some or all of the buildings at the site are expected to be demolished prior to beginning work.

3.3 Physical Dangers

Physical dangers include the operation of heavy machinery; slips and trips; fall hazards associated with excavations; on-site vehicle traffic (non-heavy machinery, e.g. pickup trucks); and heat illness.

3.4 Subsurface Clearance (SSC)

Subsurface Clearance (SSC)	SSC Requirement	Yes	No	NA	How will it be done? Why the exception?
Document the steps that must be followed and justify any exceptions.	Prequalification of Contractor for SSC capability	X			Subcontractor anticipated for use on this project is the primary subsurface locator used on many similar projects by ENVIRON.
	“Designated Person” for SSC work assigned	X			Mr. Anthony LoBue or designate, of Subdynamic Locators Inc.
	Site information reviewed	X			Available site plans and utility information will be reviewed prior to start of work.
	Site walkover including the approval of locations by facility personnel and service notifications provided ?	X			Site walk with property owners is anticipated to be completed prior to start of work.
	Underground utilities identified prior to commencement of intrusive activities as reasonably feasible	X			Utility locations will be marked by the private utility locator and by utility companies notified by Underground Service Alert, which will be notified at least 48 hours in advance of intrusive activities.
	Consider/document “Critical Zones” (i.e., locations of known underground utilities) as reasonably feasible	X			Utility locations will be marked by the private utility locator and by utility companies notified by Underground Service Alert.
	Will all drilling points be manually cleared if unknown hazards exist or slant borings be conducted?			X	Drilling operations are not anticipated for this project.

4.0 HAZARD EVALUATION AND CONTROLS

Review with Employees and Post at Job Site

Activity Number	Job Task	A	B	C	D	E	F	G	H	I	J	K	L	M
		Mechanical	Physical	Electrical	Chemical	Thermal	Acoustical	Ergonomic	Fire & Explosion	O ₂ Deficiency	Radiation	Biohazard	Subsurface Hazards	Traffic
1	Subsurface Utility Clearance		X	X		X								X
2	Soil Excavation and Stockpiling	X	X	X	X	X	X		X				X	X
3	Confirmation Soil Sampling	X	X		X	X		X						X
4	Burial of Excavated Soils	X	X		X	X	X							X
5	Excavation Backfilling	X	X			X								X

Hazard Controls

- A. Mechanical Hazards – When heavy, mobile equipment is being utilized on site, personnel will wear high visibility clothing and maintain a constant line-of-sight with the equipment operators. ENVIRON personnel shall not attempt to operate equipment brought on site by the subcontractor (i.e., crane, scissor lift). Site personnel shall familiarize themselves with the equipment being utilized on site and shall at a minimum, know how to stop or turn off the equipment.
- B. Physical Hazards – ENVIRON personnel shall minimize the risk of slips, trips, and falls by keeping the work area clear of excess equipment and cleaning up wet surfaces as soon as possible. Special care should be taken in the facility production areas where facility personnel are working and manufacturing equipment and materials are being used and stored. *(Additional information may be necessary if working near trenches, on ladders, or if other physical hazards exist).*
- C. Electrical Hazards – Maintain at least 10-foot clearance from all marked locations and overhead power lines, however, greater distances are required when working near overhead power lines with higher voltages. Contact utility company for minimum clearance requirements. If work is unavoidably close to buried or overhead power lines, have power turned off, with circuit breaker locked and tagged. Properly ground all electrical equipment. Avoid standing in water when operating electrical equipment. Ground fault outlets shall be used for any electrical equipment, if available. If equipment must be connected by splicing wires, all electrical work must be performed by a licensed and competent electrician.

- D. Chemical Hazards – ENVIRON personnel, contractors, subcontractors, and visitors shall wear appropriate personal protective equipment (PPE) while performing site activities (see Personal Protection section of this HASP). At a minimum, equipment shall include safety glasses, steel-toed boots, and hard hats (when overhead work being performed or when overhead hazards exist). ENVIRON personnel shall familiarize themselves with the appropriate health and safety responses for exposure to known on-site chemicals prior to beginning work at the site. See Attachment A for chemical safety data. Consult with your local Health and Safety Coordinator (HSC) for any personal air monitoring requirements.
- E. Thermal Hazards – ENVIRON personnel should consume plenty of liquids such as water or non-caffeinated sport drinks. During periods of hot weather, personnel shall be aware of the symptoms of and appropriate response actions for heat sickness and heat stroke. During periods of cold weather, field personnel shall acquaint themselves with the symptoms of cold stress, frostbite, and hypothermia. Dressing in layers is recommended for cold weather work. If cold temperatures are extreme, personnel should have a source of heat at the site (heated building or vehicle).
- F. Acoustical Hazards – Hearing protection will be worn by all personnel operating or working within the vicinity of heavy equipment; when noise is sufficient to interfere with general conversation at a normal speaking volume; when noise levels exceed 85dBA; and/or when client requirements indicates that it's usage is mandatory.
- G. Ergonomic Hazards – Proper lifting techniques such as keeping the back straight and legs bent, shall be utilized when lifting equipment. If the equipment cannot be lifted in this manner, it is too heavy to lift alone. Call other personnel, or use a mechanical device for lifting.
- H. Fire and Explosion Hazards – The presence of petroleum and solvent contaminated material presents a potential fire hazard. Smoking and use of open flame will be prohibited at the site. The use of non-sparking tools and equipment will be implemented if concentrations exceed those identified in Section 5.2.
- I. Oxygen Deficiency Hazards – ENVIRON personnel shall ensure that ventilation is increased to the maximum extent possible and that equipment generating combustion exhaust is vented to the exterior of the building while working inside of site buildings. If direct air monitoring readings (see Monitoring section) suggest an oxygen deficiency, take measures to increase work zone ventilation or consult the PM (and/or the HSC) to evaluate alternatives. Contact your local HSC if an oxygen deficiency hazard exists.
- J. Radiation Hazards – In the event that radiation hazards are encountered or are expected to be encountered, contact your local HSC.
- K. Biohazards – Biohazards may include poisonous plants (e.g., poison ivy/poison oak), insects, animals, or exposure to bloodborne pathogens or mold. Long sleeves will help protect against insect bites and exposure to poisonous plants. If desired and if pesticides are not a potential contaminant of concern at the site, an insect repellent may be applied to clothing in accordance with the manufacturer's directions. Site personnel should also avoid contact with animals whenever possible. Site personnel shall not perform first aid on other persons without clean latex, nitrile, or other appropriate protective gloves.
- L. Subsurface Hazards – Ensure that buried utilities at the site have been located and marked either by the respective utility company or public utility location company and either by the on-site authorized client representative or a private utility locator. NOTE: Some states require notifications to be made prior to commencing subsurface operations.

- M. Traffic Hazards – When working in or near areas where traffic hazards may be present, personnel shall isolate the work area using cones, flagging, or other methods to ensure a safe work zone. No work shall be conducted along or within 10 feet of rail lines without first consulting the owner/operator of the rail line and taking appropriate safety precautions. ANSI-rated high visibility safety vests should be worn by personnel when working in high traffic areas.

5.0 CHEMICALS OF CONCERN

The Permissible Exposure Limits (PELs) and/or Threshold Limit Values (TLVs) for the chemicals previously detected at the site (and degradation by-products, if applicable) or for chemicals that are expected to be detected and/or investigated for:

CHEMICALS OF CONCERN						
Chemical Name	PEL/TLV	50% of PEL/TLV	Highest Reported Concentration (if known) note units			Site Location/Source
			Air	Water	Soil	
Lead	50 ug/m ³	25 ug/m ³	N/A	5.9 mg/L	3,800 mg/kg	Soil: Southern Drainage Area, SS-1 Water: GW-4 (RAW)
Arsenic	10 ug/m ³	5 ug/m ³	N/A	ND	26 mg/kg	Soil: Western Nursery Area, W-1 (A-C), 0.5-1 ft (RAW)
4,4'-DDT	1 mg/m ³	0.5 mg/m ³	N/A	Not analyzed	10 mg/kg	Soil: Western Nursery Area, W-1 (A-C), 0.5-1 ft (RAW)

5.1 Volatile Organic Compound Action Level

An action level for each chemical or group of chemicals should be based on 50% of the most restrictive (lowest) PEL or TLV. If a sustained (i.e., 15-minute sampling period) total volatile organic compound (VOC) reading within the breathing zone as determined by a photoionization detector (PID) is above the action level, site personnel shall attempt to mitigate the situation through the use of engineering controls (i.e., move upwind, increase air circulation). If the action level still cannot be met, personnel shall leave the area and contact the PM and HSC for further instructions.

5.2 Combustible Gas Indicator (CGI)/Oxygen Meter

Meter Response	Action/Respiratory Protection
CGI response <10% LEL	Continue normal operations with regular, periodic monitoring
CGI response >10% and <20% LEL	Post "No Smoking" signs. Eliminate all sources of ignition from the work area; and implement continuous monitoring.
CGI response > 20% LEL	Discontinue operations; evacuate personnel and prohibit entry; allow to vent until readings are <10%.
Oxygen level <19.5% or >23.5%	Retreat from work area; consult with PM and HSC about upgrading to Level B respiratory protection, adding mechanical ventilation, or possible changes in work practices.

5.3 Odors

If strong odors are encountered or if personnel develop headaches, dizziness or other potential exposure symptoms, the personnel shall leave the work area to a well ventilated area and contact the PM and HSC for further instructions.

5.4 Dusts

Perimeter dust monitoring will be performed by a dust control contractor. Dust will be controlled using a water sprayer truck which will circle the site and wet roadway areas several times each day. Excavation areas and soil stockpiles will be periodically sprayed during excavation and stockpiling. Soil stockpiles will be sprayed prior to loading activities.

5.5 Compound Specific Default Limits

In general, this HASP must address site-specific chemicals as noted in the chemicals of concern table (above). However, there are chemicals commonly encountered in the workplace that may not be a chemical targeted for sampling but nonetheless will have adverse health effects. These chemicals are listed below.

Compound	Action Level
VOC (as Benzene)	0.5 ppm MAXIMUM
CH ₄	0.05% MAXIMUM OR 500 ppm
CO ₂	0.25% OR 2500 ppm MAXIMUM
CO	25 ppm MAXIMUM
H ₂ S	3 ppm MAXIMUM
O ₂	19% MINIMUM – 23.5% MAX

6.0 PERSONAL PROTECTION

Protective Clothing Required

LEVEL OF PROTECTION					
Task Description	Level				
	A	B	C	Mod D	D
1. Subsurface Utility Clearance					X
2. Soil Excavation and Stockpiling					X
3. Confirmation Soil Sampling					X
4. Use of Stockpiled Soils as On-Site Fill Material					X
5. Excavation Backfilling					X

Key:

Level D = Long sleeve natural fiber shirt; long pants (natural fiber); hard hat; eye protection; hearing protection; and safety shoes.

Level D Modified = Level D protection plus protective coveralls; and appropriate hand protection.

Level C = Level D (Modified) protection plus negative pressure respiratory protection with appropriate cartridges; chemical protective coveralls in lieu of general coveralls; use of inner and outer sets of hand protection.

Level B = Level C protection plus Pressure-demand supplied air respirator with escape bottle in lieu of negative pressure respirator; chemical resistant coveralls with hood; chemical resistant boots.

Level A = Level B protection plus fully encapsulating (gas tight) chemically resistant suit.

PERSONAL PROTECTIVE EQUIPMENT								
Equipment	Req	Rec	NA	Equipment	Req	Rec	NA	
Steel-toe Boots	X			Hard Hat	X			
Outer Disposable Boots		X		Safety Glasses with Side Shields	X			
Coveralls or Long Sleeve Shirt and Pants	X			Indirect Vented (Splash proof) Goggles			X	
Tyvek Suit			X	SCBA			X	
Poly-coated Tyvek / Saranex Suit			X	Full-face Airline Resp.			X	
Fully Encapsulated Chemical Suit			X	Full Face Negative Pressure Resp.			X	
Hearing Protection		X		Half Face Negative Pressure Resp			X	
Leather Gloves		X		Powered Air Purifying Resp			X	
Outer Chemical Gloves (Type):			X	Other:				
Inner Chemical Gloves (Type): Nitrile	X							

Key:

Req. = Required

Rec. = Recommended

NA = Not Applicable

7.0 MONITORING

MONITORING DEVICES AVAILABLE			
A	PID (10.6 eV)	H	Summa Canister
B	PID (11.7 eV)	I	Heat Stress Monitor
C	FID	J	Air Sampling:
D	OVA	K	Air Sampling:
E	CGI/LEL	L	Radiation Detector
F	Colorimetric Indicator Tubes	M	Gas Multimeter
G	Dust Monitoring	N	Other Device:

Required Monitoring If monitoring is necessary to identify that a risk is at or above tolerable limits and/or is used in controlling a risk on site, document the task and the maximum allowable exposure or trigger, and the monitoring instrument required to be used.	CONSTITUENT	TASK(s)	TRIGGER (Action Level)	Monitoring Instrument REQUIRED
	Acute Chemical Issues	N/A	N/A	N/A
	Oxygen	N/A	19.5% to 23.5%	N/A
	Carbon Monoxide	N/A	25 ppm	N/A
	H ₂ S	N/A	3 ppm	N/A
	C ₂ S	N/A	N/A	N/A
	Dusts	2, 4, 6, 7	5 mg/m ³	G (operated by dust control subcontractor)
	VOCs:	N/A	N/A	N/A
	Others:	N/A	N/A	N/A
	Semi - VOCs:	N/A	N/A	N/A
	Metals	N/A	N/A	N/A
	Others:	N/A	N/A	N/A

8.0 DECONTAMINATION AND SITE CONTROL

8.1 General Work Practices

- Smoking, eating, drinking, and chewing gum or tobacco will not be permitted within the work zones.
- Personnel should keep track of weather conditions and wind direction to the extent they could affect potential exposure.
- Personnel should be alert to any abnormal behavior on the part of other workers that might indicate distress, disorientation, or other ill effects.
- Personnel should never ignore symptoms that could indicate potential exposure to chemical contaminants. These should be immediately reported to their Project Manager or the HSC.
- Site Personnel shall acquaint themselves with the locations of exits and fire extinguishers prior to beginning site work.
- Visible indicators of potential immediate danger to life and health (IDLH) conditions include:
 - Large containers and tanks that must be entered.
 - Enclosed spaces such as tanks or trenches that must be entered.
 - Potentially explosive or flammable situations (indicated by bulging drums, effervescence, gas generation, or instrument readings).
 - Extremely hazardous materials (such as cyanide, phosgene, or radiation sources).
 - Visible vapor clouds.
 - Areas where biological indicators such as dead animals or vegetation are located.

8.2 Decontamination Procedures

Decontamination involves the orderly controlled removal of contaminants. All non-dedicated sampling equipment and sampling meters (if applicable) will be cleaned prior to and between each use. All on-site equipment will be decontaminated and allowed to dry or be dried before leaving the site. Decontamination may be accomplished using an approved cleaner, water, and/or steam. Subcontractors will be responsible for decontamination of their own equipment used during field operations.

All site personnel should minimize contact with contaminants. Non-disposal PPE must be decontaminated, particularly the safety boots. Any PPE that cannot be decontaminated should be disposed of along with waste generated from field operations. Personnel shall wash and remove PPE prior to leaving the site. At a minimum, gross removal of contaminants from the PPE, removal

of the PPE shall be required upon exiting the work area. Site personnel should wash hands and face prior to exiting the work area, if possible or as soon as feasible.

8.3 Site Entry Procedures and Control

The exclusion zone will be that area immediately surrounding the work being performed. It will be the responsibility of the designated ENVIRON site representative to prevent unauthorized personnel from entering the exclusion zone. When necessary, such as in high traffic areas, the exclusion zone will be delineated with barricade tape, cones, and/or barricades. If utilized, contamination reduction zones, decontamination areas, or support zones will also be appropriately marked and controlled.

9.0 EMERGENCY PROCEDURES

NOTE: Specific emergency contact information and applicable directions to the nearest medical facility are contained in Appendix B (i.e., the FIRST AND LAST PAGES of this HASP). In the event that an emergency situation occurs, *SECURE the safety of yourself and those working under your direction and then contact appropriate site and ENVIRON representatives that are referenced in Section 2.4 of this HASP.*

General Emergency guidelines are as follows:

9.1 First Aid Procedures

Each field project should have a first aid kit available for use. The contents of which should be based the treatment of the following potential injuries: major wounds, minor wounds (cuts and abrasions), minor burns and eye injuries including protective gloves, breathing barrier, eyewash solutions, and bandages. Since each workplace is unique, additional first aid products should be selected to augment required contents based on the particular work environment.

If an employee is injured, general first aid will be administered. If safety concerns or hazardous conditions are still present, the individual shall be moved to avoid further injury or risk. In the event that an employee is injured in a contaminated area, general first aid will be administered and then the employee will be moved to the support zone for decontamination (if applicable), additional first aid, and preparation for transportation, giving due consideration to which risk will be greater; the spread of contamination or the health/safety of the individual.

9.2 Fire Procedures

In the event of a fire, the client contact and/or the local fire fighting authorities shall be immediately notified. If safe and feasible, a fire extinguisher may be used to attempt to extinguish the fire. Upon depletion of one fire extinguisher, all personnel shall evacuate the area and await local fire fighters.

9.3 Spill Procedures

If warranted, before any work is initiated at the site, applicable local, state, and/or Federal Emergency Response Authorities will be identified by the preparer of this HASP. In the event of a spill, the client contact shall be immediately notified. If possible and feasible, attempts should be made to contain the spill. If it is determined by consultation with the PM and Client contact that there is no apparent threat to the population or environment, arrangements should be made with a commercial cleanup company to mitigate the spill.

9.4 Uncovering an Underground Service (Intact)

- Stop work, remove tools if safe to do so.
- Clear all persons from the scene.
- Without entering the excavation, try to identify the service, using the following color guide:

Black	–	Electricity
Red	–	Electricity – some 11kVA cables
Blue	–	Water
Yellow	–	Gas
Grey/White	–	Telecoms
Green	–	Cable TV / Data

Note that the above colors relate to recently installed services so therefore ASSUME THAT ANY PIPE THAT IS NOT COLORED IS LIVE!

- Contact the site contact/relevant utility for guidance.
- Contact the PM/Director and HSC.

9.5 Striking an Underground Electrical/Telecom Cable

- Stop work, remove tools ONLY if safe to do so (operator seats in excavators are normally electrically isolated ALTHOUGH OTHER PARTS MAY BE LIVE IF STILL IN CONTACT WITH A LIVE CABLE).
- Evacuate the immediate area.
- In the event of injuries provide first aid and summon medical assistance.
- Contact the site contact.
- Contact the PM/Director and HSC.
- Contact the electricity/telecom provider, as directed by site contact and/or PM.
- Do not allow anyone to enter the area of the excavation until the electricity provider has made the cable safe.

9.6 Striking a Pressurized Gas Pipeline

- Stop work, leave tools in-place but shut off any running equipment, including engines.
- Evacuate the immediate area.
- Ensure there are no sources of ignition in the area.
- Contact the site contact.
- Contact the PM/Director and HSC.
- Contact the pipeline owner, as directed by site contact and/or PM.
- Do not re-enter the immediate area until safe to do so.

9.7 Striking a Pressurized Water Main

- Stop work, remove tools if safe to do so, and if necessary and safe to do so, confine jetting water, if appropriate.

- Evacuate immediate area and inform site personnel.
- Ensure that water flowing away is not creating potential hazards (e.g., electrical shorting, flooding, contaminant migration etc) and where possible warn those likely to be affected.
- Contact the site contact.
- Contact the PM/Director and HSC.
- Contact the pipeline owner, as directed by site contact and/or PM.
- Do not re-enter the immediate area until safe to do so.

SAFETY MEETING CHECKLIST

The Site Supervisor should consider discussing the following topics with all field personnel conducting work as part of this HASP, as applicable.

Date and Time of Meeting: _____

Prepared By: _____

CHECK TOPIC(S) DISCUSSED:

HASP Content

- Chemicals of Concern
- Tasks to be Performed
- Location of Tasks
- Hazards/Risks of Tasks
- Site Limitations (e.g., cell phone use)

First Aid

- Facilities
- Reporting and Records
- Treatment of _____

Personal Protective Equipment

- Glasses, Goggles, and Shields
- Hard Hats
- Respirators
- Gloves
- Other _____

Emergency Procedures

- Communications
- Rally (assembly) point
- Headcount
- Hospital Location/Route
- PPE/Decon
- Other _____

Special Tools / Equipment

- Chain saws / Chop saws
- Other _____
- Other _____

HASP Content

- Personnel On-Site (Introductions)
- Responsibilities
- Monitoring equipment
- Other _____
- Other _____

Industrial Sanitation and Hygiene

- Drinking water
- Restrooms/Porta toilets
- Personal Cleanliness

Housekeeping

- Waste Containers
- Waste Materials
- Other _____

Fire Prevention

- Extinguishers
- Smoking
- Hot Work
- Explosives and Flammable Liquids
- Other _____

Vehicles/Heavy Equipment

- Transportation of Employees
- Operation and Inspection
- Preventative Maintenance
- Other _____

Discussion _____

A T T A C H M E N T A

Chemical Safety Data

CAS No: 50-29-3

RTECS No: KJ3325000

UN No: 2761

EC No: 602-045-00-7

Dichlorodiphenyltrichloroethane

1,1,1-Trichloro-2,2-bis(p-chlorophenyl)ethane

2,2-bis(p-Chlorophenyl)-1,1,1-trichloroethane

1,1'-(2,2,2-Trichloroethylidene)bis(4-chlorobenzene)

p,p'-DDT

C₁₄H₉Cl₅

Molecular mass: 354.5

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/SYMPTOMS	PREVENTION	FIRST AID/FIRE FIGHTING
FIRE	Combustible. Liquid formulations containing organic solvents may be flammable. Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames.	Powder, water spray, foam, carbon dioxide.
EXPLOSION			
EXPOSURE		PREVENT DISPERSION OF DUST! STRICT HYGIENE! AVOID EXPOSURE OF (PREGNANT) WOMEN!	
Inhalation	Cough.	Local exhaust or breathing protection.	Fresh air, rest.
Skin		Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
Eyes	Redness.	Safety goggles, or eye protection in combination with breathing protection if powder.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
Ingestion	Tremors. Diarrhoea. Dizziness. Headache. Vomiting. Numbness. Paresthesias. Hyperexcitability. Convulsions.	Do not eat, drink, or smoke during work. Wash hands before eating.	Rinse mouth. Give a slurry of activated charcoal in water to drink. Rest. Refer for medical attention.
SPILLAGE DISPOSAL		PACKAGING & LABELLING	
Do NOT let this chemical enter the environment. Sweep spilled substance into sealable non-metallic containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Personal protection: P3 filter respirator for toxic particles.		T Symbol N Symbol R: 25-40-48/25-50/53 S: (1/2-)22-36/37-45-60-61 UN Hazard Class: 6.1 UN Pack Group: III Do not transport with food and feedstuffs. Severe marine pollutant.	
EMERGENCY RESPONSE		STORAGE	
Transport Emergency Card: TEC (R)-61GT7-III		Provision to contain effluent from fire extinguishing. Separated from iron, aluminum and its salts, food and feedstuffs. See Chemical Dangers.	
    			
Prepared in the context of cooperation between the International Programme on Chemical Safety and the European Commission © IPCS 2004 SEE IMPORTANT INFORMATION ON THE BACK.			

IMPORTANT DATA

Physical State; Appearance

COLOURLESS CRYSTALS OR WHITE POWDER.
TECHNICAL PRODUCT IS WAXY SOLID.

Chemical dangers

On combustion, forms toxic and corrosive fumes including hydrogen chloride. Reacts with aluminium and iron.

Occupational exposure limits

TLV: 1 mg/m³; as TWA; A3; (ACGIH 2004).
MAK: 1 mg/m³; H; Peak limitation category: II(8); (DFG 2003).

Routes of exposure

The substance can be absorbed into the body by ingestion.

Inhalation risk

Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly especially if powdered.

Effects of short-term exposure

May cause mechanical irritation. The substance may cause effects on the central nervous system, resulting in convulsions and respiratory depression. Exposure at high levels may result in death. Medical observation is indicated.

Effects of long-term or repeated exposure

The substance may have effects on the central nervous system and liver. This substance is possibly carcinogenic to humans. Animal tests show that this substance possibly causes toxicity to human reproduction or development.

PHYSICAL PROPERTIES

Boiling point: 260°C
Melting point: 109°C
Density: 1.6 g/cm³

Solubility in water: poor
Octanol/water partition coefficient as log Pow: 6.36

ENVIRONMENTAL DATA

The substance is very toxic to aquatic organisms. This substance may be hazardous to the environment; special attention should be given to birds. Bioaccumulation of this chemical may occur along the food chain, for example in milk and aquatic organisms. This substance does enter the environment under normal use. Great care, however, should be given to avoid any additional release, e.g. through inappropriate disposal.

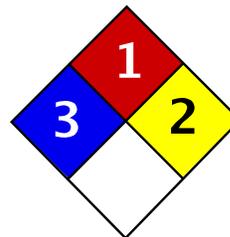
NOTES

Depending on the degree of exposure, periodic medical examination is indicated.
Carrier solvents used in commercial formulations may change physical and toxicological properties.
Do NOT take working clothes home.
Consult national legislation.
Agritan, Azotox, Anofex, Ixodex, Gesapon, Gesarex, Gesarol, Guesapon, Clofenotane, Zeidane, Dicophane, Neocid are trade names.

ADDITIONAL INFORMATION

LEGAL NOTICE

Neither the EC nor the IPCS nor any person acting on behalf of the EC or the IPCS is responsible



Health	3
Fire	1
Reactivity	2
Personal Protection	E

Material Safety Data Sheet Arsenic MSDS

Section 1: Chemical Product and Company Identification

Product Name: Arsenic

Catalog Codes: SLA1006

CAS#: 7440-38-2

RTECS: CG0525000

TSCA: TSCA 8(b) inventory: Arsenic

CI#: Not applicable.

Synonym:

Chemical Name: Arsenic

Chemical Formula: As

Contact Information:

Sciencelab.com, Inc.

14025 Smith Rd.

Houston, Texas 77396

US Sales: **1-800-901-7247**

International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:

1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Arsenic	7440-38-2	100

Toxicological Data on Ingredients: Arsenic: ORAL (LD50): Acute: 763 mg/kg [Rat]. 145 mg/kg [Mouse].

Section 3: Hazards Identification

Potential Acute Health Effects:

Very hazardous in case of ingestion, of inhalation. Slightly hazardous in case of skin contact (irritant), of eye contact (irritant).

Potential Chronic Health Effects:

CARCINOGENIC EFFECTS: Classified A1 (Confirmed for human.) by ACGIH.

MUTAGENIC EFFECTS: Not available.

TERATOGENIC EFFECTS: Not available.

DEVELOPMENTAL TOXICITY: Not available.

The substance is toxic to kidneys, lungs, the nervous system, mucous membranes.

Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention if irritation occurs.

Skin Contact: Wash with soap and water. Cover the irritated skin with an emollient. Get medical attention if irritation develops.

Serious Skin Contact: Not available.

Inhalation:

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation:

Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:

Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: May be combustible at high temperature.

Auto-Ignition Temperature: Not available.

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: Some metallic oxides.

Fire Hazards in Presence of Various Substances: Flammable in presence of open flames and sparks, of heat, of oxidizing materials.

Explosion Hazards in Presence of Various Substances:

Risks of explosion of the product in presence of mechanical impact: Not available.

Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:

SMALL FIRE: Use DRY chemical powder.

LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards:

Material in powder form, capable of creating a dust explosion. When heated to decomposition it emits highly toxic fumes.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Use appropriate tools to put the spilled solid in a convenient waste disposal container.

Large Spill:

Use a shovel to put the material into a convenient waste disposal container. Be careful that the product is not

present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:

Keep locked up.. Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not ingest. Do not breathe dust. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Keep away from incompatibles such as oxidizing agents, acids, moisture.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:

Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection: Safety glasses. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:

Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:

TWA: 0.01 from ACGIH (TLV) [United States] [1995]
Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Lustrous solid.)

Odor: Not available.

Taste: Not available.

Molecular Weight: 74.92 g/mole

Color: Silvery.

pH (1% soln/water): Not applicable.

Boiling Point: Not available.

Melting Point: Sublimation temperature: 615°C (1139°F)

Critical Temperature: Not available.

Specific Gravity: 5.72 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility: Insoluble in cold water, hot water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Reactive with oxidizing agents, acids, moisture.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Inhalation. Ingestion.

Toxicity to Animals: Acute oral toxicity (LD50): 145 mg/kg [Mouse].

Chronic Effects on Humans:

CARCINOGENIC EFFECTS: Classified A1 (Confirmed for human.) by ACGIH.

Causes damage to the following organs: kidneys, lungs, the nervous system, mucous membranes.

Other Toxic Effects on Humans:

Very hazardous in case of ingestion, of inhalation.

Slightly hazardous in case of skin contact (irritant).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans: Not available.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are as toxic as the original product.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: CLASS 6.1: Poisonous material.

Identification: : Arsenic UNNA: UN1558 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:

California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Arsenic
California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer which would require a warning under the statute: Arsenic

Pennsylvania RTK: Arsenic
Massachusetts RTK: Arsenic
TSCA 8(b) inventory: Arsenic

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

WHMIS (Canada):

CLASS D-1A: Material causing immediate and serious toxic effects (VERY TOXIC).
CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):

R22- Harmful if swallowed.
R45- May cause cancer.

HMIS (U.S.A.):

Health Hazard: 3

Fire Hazard: 1

Reactivity: 2

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 3

Flammability: 1

Reactivity: 2

Specific hazard:

Protective Equipment:

Gloves.
Lab coat.
Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate.
Safety glasses.

Section 16: Other Information**References:**

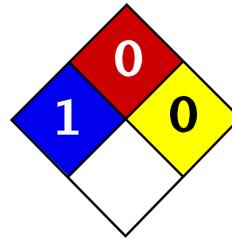
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Other Special Considerations: Not available.

Created: 10/09/2005 04:16 PM

Last Updated: 11/06/2008 12:00 PM

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Health	1
Fire	0
Reactivity	0
Personal Protection	E

Material Safety Data Sheet Lead MSDS

Section 1: Chemical Product and Company Identification

Product Name: Lead

Catalog Codes: SLL1291, SLL1669, SLL1081, SLL1459, SLL1834

CAS#: 7439-92-1

RTECS: OF7525000

TSCA: TSCA 8(b) inventory: Lead

CI#: Not available.

Synonym: Lead Metal, granular; Lead Metal, foil; Lead Metal, sheet; Lead Metal, shot

Chemical Name: Lead

Chemical Formula: Pb

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Lead	7439-92-1	100

Toxicological Data on Ingredients: Lead LD50: Not available. LC50: Not available.

Section 3: Hazards Identification

Potential Acute Health Effects: Slightly hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation.

Potential Chronic Health Effects:

Slightly hazardous in case of skin contact (permeator).

CARCINOGENIC EFFECTS: Classified A3 (Proven for animal.) by ACGIH, 2B (Possible for human.) by IARC.

MUTAGENIC EFFECTS: Not available.

TERATOGENIC EFFECTS: Not available.

DEVELOPMENTAL TOXICITY: Not available.

The substance may be toxic to blood, kidneys, central nervous system (CNS).

Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention if irritation occurs.

Skin Contact: Wash with soap and water. Cover the irritated skin with an emollient. Get medical attention if irritation develops.

Serious Skin Contact: Not available.

Inhalation:

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation: Not available.

Ingestion:

Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: May be combustible at high temperature.

Auto-Ignition Temperature: Not available.

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: Some metallic oxides.

Fire Hazards in Presence of Various Substances: Non-flammable in presence of open flames and sparks, of shocks, of heat.

Explosion Hazards in Presence of Various Substances:

Risks of explosion of the product in presence of mechanical impact: Not available.

Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:

SMALL FIRE: Use DRY chemical powder.

LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards: When heated to decomposition it emits highly toxic fumes of lead.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill:

Use appropriate tools to put the spilled solid in a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

Large Spill:

Use a shovel to put the material into a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system. Be careful that the product is not

present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:

Keep locked up.. Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not ingest. Do not breathe dust. Wear suitable protective clothing. If ingested, seek medical advice immediately and show the container or the label. Keep away from incompatibles such as oxidizing agents.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:

Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection: Safety glasses. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:

Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:

TWA: 0.05 (mg/m³) from ACGIH (TLV) [United States]

TWA: 0.05 (mg/m³) from OSHA (PEL) [United States]

TWA: 0.03 (mg/m³) from NIOSH [United States]

TWA: 0.05 (mg/m³) [Canada] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Metal solid.)

Odor: Not available.

Taste: Not available.

Molecular Weight: 207.21 g/mole

Color: Bluish-white. Silvery. Gray

pH (1% soln/water): Not applicable.

Boiling Point: 1740°C (3164°F)

Melting Point: 327.43°C (621.4°F)

Critical Temperature: Not available.

Specific Gravity: 11.3 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility: Insoluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Incompatible materials, excess heat

Incompatibility with various substances: Reactive with oxidizing agents.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity:

Can react vigorously with oxidizing materials.

Incompatible with sodium carbide, chlorine trifluoride, trioxane + hydrogen peroxide, ammonium nitrate, sodium azide, disodium acetylide, sodium acetylide, hot concentrated nitric acid, hot concentrated hydrochloric acid, hot concentrated sulfuric acid, zirconium.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Inhalation. Ingestion.

Toxicity to Animals:

LD50: Not available.

LC50: Not available.

Chronic Effects on Humans:

CARCINOGENIC EFFECTS: Classified A3 (Proven for animal.) by ACGIH, 2B (Possible for human.) by IARC.

May cause damage to the following organs: blood, kidneys, central nervous system (CNS).

Other Toxic Effects on Humans: Slightly hazardous in case of skin contact (irritant), of ingestion, of inhalation.

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans:

Acute Potential:

Skin:

Lead metal granules or dust: May cause skin irritation by mechanical action.

Lead metal foil, shot or sheets: Not likely to cause skin irritation

Eyes:

Lead metal granules or dust: Can irritate eyes by mechanical action.

Lead metal foil, shot or sheets: No hazard. Will not cause eye irritation.

Inhalation:

In an industrial setting, exposure to lead mainly occurs from inhalation of dust or fumes.

Lead dust or fumes: Can irritate the upper respiratory tract (nose, throat) as well as the bronchi and lungs by mechanical action. Lead dust can be absorbed through the respiratory system. However, inhaled lead does not accumulate in the lungs. All of an inhaled dose is eventually absorbed or transferred to the gastrointestinal tract. Inhalation effects of exposure to fumes or dust of inorganic lead may not develop quickly. Symptoms may include metallic taste, chest pain, decreased physical fitness, fatigue, sleep disturbance, headache, irritability, reduces memory, mood and personality changes, aching bones and muscles, constipation, abdominal pains, decreasing appetite. Inhalation of large amounts may lead to ataxia, delirium, convulsions/seizures, coma, and death.

Lead metal foil, shot, or sheets: Not an inhalation hazard unless metal is heated. If metal is heated, fumes will be released. Inhalation of these fumes may cause "fume metal fever", which is characterized by flu-like symptoms. Symptoms may include metallic taste, fever, nausea, vomiting, chills, cough, weakness, chest pain, generalized muscle pain/aches, and increased white blood cell count.

Ingestion:

Lead metal granules or dust: The symptoms of lead poisoning include abdominal pain or cramps (lead colic), spasms, nausea, vomiting, headache, muscle weakness, hallucinations, distorted perceptions, "lead line" on the gums, metallic taste, loss of appetite, insomnia, dizziness and other symptoms similar to that of inhalation. Acute poisoning may result in high lead levels in the blood and urine, shock, coma and death in extreme cases.

Lead metal foil, shot or sheets: Not an ingestion hazard for usual industrial handling.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are less toxic than the product itself.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: Not a DOT controlled material (United States).

Identification: Not applicable.

Special Provisions for Transport: Not applicable.

Section 15: Other Regulatory Information

Federal and State Regulations:

California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Lead

California prop. 65: This product contains the following ingredients for which the State of California has found to cause reproductive harm (female) which would require a warning under the statute: Lead

California prop. 65: This product contains the following ingredients for which the State of California has found to

cause reproductive harm (male) which would require a warning under the statute: Lead
California prop. 65 (no significant risk level): Lead: 0.0005 mg/day (value)
California prop. 65: This product contains the following ingredients for which the State of California has found to cause birth defects which would require a warning under the statute: Lead
California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer which would require a warning under the statute: Lead
Connecticut hazardous material survey.: Lead
Illinois toxic substances disclosure to employee act: Lead
Illinois chemical safety act: Lead
New York release reporting list: Lead
Rhode Island RTK hazardous substances: Lead
Pennsylvania RTK: Lead

Other Regulations:

OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).
EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada): CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):

R20/22- Harmful by inhalation and if swallowed.
R33- Danger of cumulative effects.
R61- May cause harm to the unborn child.
R62- Possible risk of impaired fertility.
S36/37- Wear suitable protective clothing and gloves.
S44- If you feel unwell, seek medical advice (show the label when possible).
S53- Avoid exposure - obtain special instructions before use.

HMIS (U.S.A.):

Health Hazard: 1

Fire Hazard: 0

Reactivity: 0

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 1

Flammability: 0

Reactivity: 0

Specific hazard:

Protective Equipment:

Gloves.
Lab coat.
Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate.

Safety glasses.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

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A T T A C H M E N T B
Emergency Information

APPENDIX B – ROUTE TO HOSPITAL

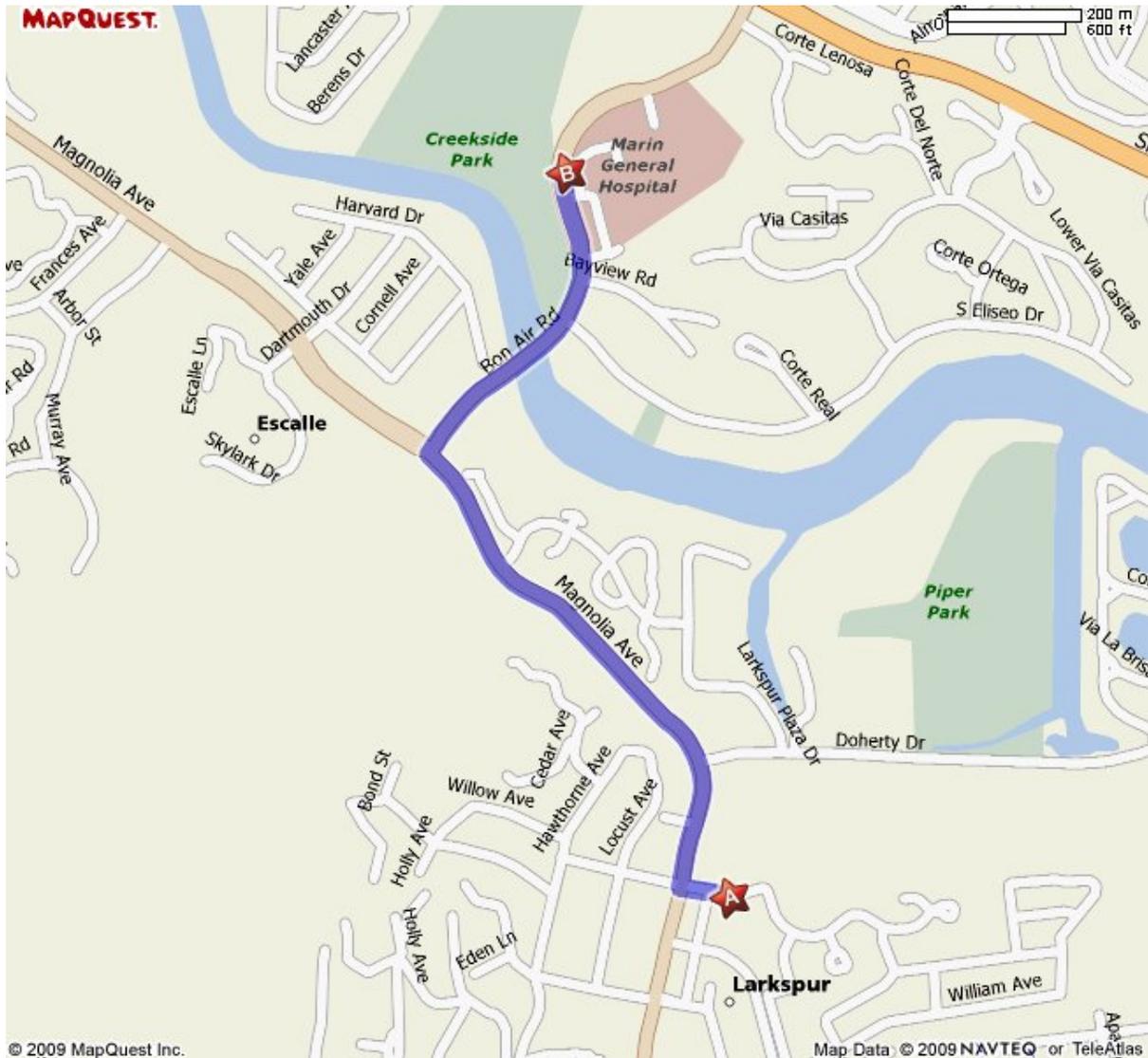
Marin General Hospital
250 Bon Air Road
Greenbrae, California
415-925-7000

Description of Route to Hospital

5. Start out going WEST on WARD ST. toward RICE LN.
6. Turn RIGHT onto MAGNOLIA AVE.
7. Turn RIGHT onto BON AIR RD.
8. End at 250 Bon Air Rd, Greenbrae, CA

Estimated distance: 1.06 miles

Estimated time: 3 minutes



Emergency Information

CONTACT	NAME	OFFICE PHONE #	MOBILE PHONE #
LOCAL FIRE DEPARTMENT	Larkspur Fire Department	911 or 415-924-2405 (from cell)	
LOCAL HOSPITAL	Marin General Hospital	415-925-7000	
LOCAL POLICE	Twin Cities Police Authority	911 or 415-924-2405 (from cell)	
ENVIRON MANAGING PRINCIPAL	Rob Scofield	510-420-2551	Not Provided
ENVIRON PROJECT MANAGER	Anne Gates	510-420-2524	415-877-0123
ENVIRON SITE SUPERVISOR	Dan Clark	510-420-2563	510-299-7036
LOCAL OFFICE HEALTH AND SAFETY COORDINATOR	Dan Clark	510-420-2563	510-299-7036
CLIENT CONTACT	Steve Seely	(925) 899-9480	(925) 899-9480
POISON CONTROL		1-800-222-1222	

When calling for emergency assistance, REMAIN CALM and provide the following information:

- Your name
- Your telephone number
- Your address and location within the facility
- Name of person exposed or injured
- Condition of the victim AND/OR situation
- Actions taken (i.e., first aid administered)
- **DO NOT HANG UP THE PHONE BEFORE THE OPERATOR.** If other personnel are nearby, designate a person to meet the emergency personnel and direct them to your location.

Appendix C: Soil Sampling and Quality Assurance Guidelines

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Table C.1 Quality Assurance Goals for Laboratory Analyses

Attachment

Attachment A Quality Assurance Manual, McCampbell Analytical, Inc.

1.0 Introduction

This Soil Sampling and Analysis and Quality Assurance Project Plan (SAP/QAPP) has been prepared on behalf of Larkspur Housing Partners, LLC (LHP) by ENVIRON International Corporation (ENVIRON). The purpose of this SAP/QAPP is to:

- describe the scope of work for soil sampling and laboratory analysis;
- describe the quality assurance/quality control (QA/QC) procedures the project team will follow during analysis of samples collected on the Niven Nursery site (the site); and,
- assure reporting of data that are representative of field conditions, and are legally defensible.

The SAP/QAPP is based on guidelines issued by the United States Environmental Protection Agency (USEPA) (USEPA, 1988, 1989, 1994, 1998, 2001), and reflects the selection of McCampbell Analytical, Inc. for analysis of samples.

2.0 Scope of Soil Sampling

2.1 Problem Definition and Background

The problem definition and background details for this project are discussed in Chapter 3.0 of the Removal Action Workplan (RAW).

2.2 Sampling Project/Task Description

A summary of work to be performed for this project is provided in Sections 2.0 and 3.0 of the RAW Implementation Plan. The soil sampling work consists of the following main elements:

- Collection of discrete soil samples to determine the extent of lead-impacted soils at the Site (“Excavation Sampling”);
- Collection of discrete soil samples to determine that COPC-impacted soils have been removed (“Confirmation Sampling”);
- Collection of discrete soil samples from areas beneath building foundations, which were inaccessible prior to building demolition; and
- Collection of composite soil samples from existing soil stockpiles to confirm the fill material meets California Department of Toxic Substances Control (DTSC) criteria. This sampling will not be conducted if the fill material has already undergone adequate characterization at the borrow site as per DTSC guidance (DTSC, 2001).

2.3 Sampling Methods

All samples will be collected in-situ using a standard core sampler attached to a slide hammer. Discrete samples will be collected from the ground surface 0 to 6 inches bgs. In cases where the excavation depth prevents safe entry, soil will be taken from the selected location using the backhoe. The sample will be collected from the backhoe bucket using the standard core sampler. Soil samples will be collected in factory pre-cleaned brass or stainless steel liners.

Soil samples will be collected from existing soil stockpiles and will be combined as four-point composite samples prior to laboratory analysis. One four-point composite sample will be collected per 250 cubic yards of stockpiled soil. Field personnel will collect each composite sample in four individual factory pre-cleaned glass jars or brass or stainless steel liners, and will submit the individual containers to the laboratory with instructions to create a four-point composite while retaining a portion of each individual soil sample for potential later analysis.

2.4 Sample Handling and Custody

Standard EPA procedures to identify, track, monitor and maintain chain-of-custody for all samples will be implemented. Soil samples will be handled using the following procedures:

- The sampler will don clean gloves appropriate for the chemicals of concern before touching any sample containers, and care will be taken to avoid direct contact with the sample.
- The sample will be quickly observed for color, appearance, and composition and recorded in the field soil boring log. The ends of the liners will be immediately covered with Teflon® sheeting, capped with plastic end caps, and sealed with Silicone tape.
- The sample container will be labeled before or immediately after sampling with a self-adhesive label having the following information written in waterproof ink:
 - .Company name
 - .Project name
 - .Project number
 - .Sample ID number
 - .Date and time sample was collected
 - .Initials of sample collector
- The sample will be placed in an ice chest kept at 4 °C for transport to the laboratory within 24 hours of collection.

2.5 Analytical Methods

Excavation and Final Confirmation Samples

Soil samples from excavation areas will be analyzed for lead by USEPA Method 6010. The proposed reporting limit for lead in soils is 0.2 mg/kg.

After the lead cleanup goals have been met, final confirmation samples will also be analyzed for heavy metals (by USEPA Methods 6010B and 7471A).

Following building demolition, confirmation samples in the Northern and Southern Nursery areas will be analyzed for lead and arsenic (by USEPA Methods 6010B and 7471A).

Collection of Soil Samples from Existing Stockpiles

The existing soil stockpile samples will be analyzed for heavy metals (by USEPA Methods 6010B and 7471A), asbestos (by California Air Resources Board Method 435), Total Petroleum Hydrocarbons (by modified USEPA Method 8015) and organochlorine pesticides (OCPs) (by USEPA Method 8081A) to determine whether this soil is suitable for reuse at the Site.

2.6 Equipment Decontamination

The soil sampler will be washed with a laboratory-gradealconox detergent and water solution to remove residual soil and rinsed with deionized water between sampling. Construction

equipment and transportation vehicles will be decontaminated using a steam cleaner prior to leaving the site.

2.7 Quality Control

The requirements and procedures for maintaining laboratory quality control for project data are described in Section 4.3 below.

3.0 Project/Task Organization

Personnel assigned to the project will be required to familiarize themselves with pertinent protocols and procedures presented in this SAP/QAPP. The following paragraphs identify and describe the responsibilities of key project positions related to project management, chemical data quality management and subcontractor relationships.

3.1 Key Project Positions

Project Director and Assistant Project Director - The Project Director is responsible for reviewing technical and policy decisions regarding the project, including interaction and coordination with LHP, DTSC, ENVIRON, and subcontractor personnel.

Technical Peer Reviewer - The Technical Peer Reviewer is responsible for reviewing technical aspects of the work including QA/QC, strategies, methods to be used, and key reports.

Project Manager - The Project Manager is responsible for the scope, cost, and technical considerations related to the project; staff and project coordination; and implementation of review of overall project quality to the collection, completeness, and presentation of data.

Project Quality Assurance Officer - The Project Quality Assurance (QA) Officer is responsible for reviewing the project QA program as it relates to the collection and completeness of data from field and laboratory operations, including the training of personnel to follow established protocols and procedures. This individual is also responsible for maintaining the official, approved SAP/QAPP.

Task Leaders - Task Leaders are responsible for formulating a work plan and executing work elements related to an assigned task. Each Task Leader will issue specific instructions for performing assigned work elements and will ensure that work is conducted in compliance with project-specific objectives and applicable QA procedures. Task Leaders will coordinate with the Project Manager and QA Officer to review general work plans and specific work elements.

3.2 Quality Objectives and Criteria for Measurement Data

Measurement performance criteria are outlined in Section D of the McCampbell Analytical, Inc. Quality Assurance Program, January 2007 (MAI QA Manual). A copy of the MAI QA Manual is included as Attachment A to this SAP/QAPP.

3.3 Special Training and Certification

No specialized training of field personnel is required for this project. All personnel involved in field sampling shall have completed the emergency response and hazardous waste operations training requirements defined in Title 29 Code of Federal Regulations (CFR) Part 1910.120.

Furthermore, fieldwork personnel for this project are appropriately trained for the sampling activities that will be conducted.

The training programs implemented by the laboratory for its personnel are described in Section 8.0 of the MAI QA Manual in Attachment A.

3.4 Documentation and Records

The most current, approved version of the SAP/QAPP will be provided to the appropriate project personnel prior to the initiation of field activities.

Documents related to field activities conducted will be submitted with the Completion Report, which will be completed following field activities. These documents include field investigation daily logs, daily calibration logs, chain-of-custody records and corrective action reports. Laboratory-specific records will be compiled by MAI in a "Level III Report" (USEPA report, "Guidance for Data Useability in Risk Assessment (Part A) Final" (DURA)), which includes the following elements:

- Sample data such as sampling date, submission date, extraction and analytical dates, method used, sample results, dilution factors, reporting limits, and GC fingerprint chromatograms;
- Sample management records such as cooler receipt forms, chain-of-custody records, and a sample receipt check list;
- Test method records such as method summaries, sample preparation logs, run sequences and injection time logs; and
- QA/QC documents such as calibration summaries, laboratory control sample results, surrogate recoveries, matrix spike results, method blank results, preparation and instrument analysis logs, and QC reports.

According to Section G of the MAI QA Manual, laboratory-specific records will be kept in storage for a period of at least five years. Project-related documents will be retained by ENVIRON in the Emeryville office for a period of five years.

4.0 Data Generation And Acquisition

4.1 Sample Handling and Custody

Standard EPA procedures to identify, track, monitor and maintain chain-of-custody for all samples will be implemented as discussed in Section 2.4.

Laboratory sample handling and custody procedures are described in Section B of the MAI QA Manual (Attachment A).

4.2 Analytical Methods

Soil samples will be analyzed for heavy metals (primarily lead) by USEPA Methods 6010 and 7471A. The samples collected from the existing soil stockpiles will be analyzed for CAM 17 metals by USEPA Methods 6010B and 7471A, asbestos by California Air Resources Board Method 435, Total Petroleum Hydrocarbons by modified USEPA Method 8015 and OCPs by USEPA Method 8081A to determine whether this soil is suitable for reuse at the Site.

In general, samples will be processed as a batch. Samples will be processed sequentially, and samples to be analyzed by a given method will be generally processed on the same apparatus.

Samples will be processed without interruption of samples from other projects. At a minimum, the laboratory will perform matrix spikes on one of each ten project samples, or one per sample delivery batch, per matrix type, whichever is more frequent, and independent of the number of analytical instruments used. Samples will be analyzed so that each detected analyte will be quantified within its respective linear range of calibration of the analytical instrument; if analytes are detected outside the linear range of calibration, the sample will be re-analyzed with an appropriate dilution and within holding times so that the analyte can be properly quantified. Additional information on laboratory analytical procedures is included in Section D of the MAI QA Manual (Attachment A).

Corrective actions for any failures in the analytical system will be handled by MAI. Section K of the MAI QA Manual identifies the protocols for corrective actions as well as related procedures and documentation.

4.3 Quality Control

The requirements and procedures for maintaining laboratory quality control for project data are described below. More details on QC procedures conducted by the laboratory are provided in Sections D and H of the MAI QA Manual (Attachment A).

4.3.1 Quality Control Samples

To evaluate the precision and accuracy of analytical data, laboratory quality control samples will be analyzed periodically for this project. The minimum project requirements for collection and analysis of these samples are listed in the subsections below.

4.3.1.1 Matrix Spikes and Matrix-Spike Duplicates

A matrix spike is an aliquot of a project sample, either soil or water, to which the laboratory adds a known quantity of a compound prior to sample extraction/digestion and analysis. The reported percent recovery of the known compound in the sample indicates the presence or absence of any effects of the matrix on the sample analyses. A matrix-spike duplicate is an aliquot of the matrix-spike sample that is analyzed separately; the results indicate the precision of the analytical method. A matrix-spike and matrix-spike duplicate analysis will be performed on at least one of each ten project samples, or one per sample delivery batch, per matrix type, whichever is more frequent, and independent of the number of analytical instruments used.

4.3.1.2 Method Blanks

A method blank consists of a laboratory-prepared sample that is carried through the entire analytical procedure. Method blanks for soil and water analyses consist of deionized and/or organic-free water, while method blanks for soil gas analyses consist of ambient air. The purpose of method blanks is to check for laboratory contamination during preparation and analysis of soil, water or soil gas samples. Method blanks will be prepared and analyzed at least once with each analytical batch, with a minimum of one for every 20 samples.

4.3.1.3 Laboratory Control Sample

A laboratory control sample (LCS), or check sample, is a sample prepared by the laboratory or a reliable source that contains known concentrations of the analytes of concern. It is subjected to the same preparation/extraction procedures as a soil, soil gas or water sample, and is prepared independently of calibration standards. The LCS recovery checks the accuracy of the analytical methods and equipment, and will be prepared and analyzed at least once with each analytical batch, with a minimum of one for every 20 samples. LCS recoveries should fall within the limits set by the laboratory.

4.3.1.4 Laboratory Surrogate Compounds

A surrogate spike is an addition to the soil, soil gas or water sample of a known concentration of an organic compound that is not expected to be a compound of concern in the sample. Every blank, QC sample, and project sample will be spiked with surrogate compounds if specified in the particular analytical method (they are not required for metals analyses). Surrogate recovery should fall within the limits set by the laboratory in accordance with procedures specified by the method.

4.3.2 Calculation of QC Statistics

The validity of chemical data will be measured in terms of precision, accuracy, completeness, and representativeness. The ways in which these four parameters will be evaluated for project data are described below. These calculations are also discussed in Section D of the MAI QA Manual (Attachment A).

4.3.2.1 Precision

For chemical data generated by the laboratory, data precision will be estimated by comparing analytical results from duplicate samples and from matrix spikes and matrix-spike duplicates. The comparison will be made by calculating the relative percent difference (RPD) given by the following equation:

$$RPD = \frac{2(S_1 - S_2)}{S_1 + S_2} \times 100$$

Where S_1 = sample
 S_2 = duplicate

This information will be calculated and reviewed periodically by the Project Manager and/or Project QA Officer. The goals for data precision are summarized in Table 1. RPD goals are applicable only for samples with detected concentrations greater than five times the reporting limit.

4.3.2.2 Accuracy

Data accuracy will be assessed for laboratory data only and is based on recoveries (R), expressed as the percentage of the true (known) concentration, from laboratory-spiked samples (i.e., matrix spikes, matrix spike duplicates, and laboratory control samples) generated by the analytical laboratory. The equation for calculating recoveries is:

$$R = \frac{(A - B)}{T} \times 100$$

Where A = measured concentration after spiking
B = background concentration
T = known true value of spike

This information will be reviewed periodically by the Project Manager and/or Project QA Officer. The goals for the recovery of selected target analytes in laboratory-spiked samples are

presented in Table 1. These goals may need to be modified depending upon potential matrix interferences associated with the site samples. Alteration or failure to meet these preliminary goals should not be construed to indicate that the data is unsuitable for site characterization and risk assessment as long as the uncertainty associated with the data is adequately characterized (USEPA, 1992).

4.3.2.3 Completeness

Data generated during the investigation will be evaluated for completeness, that is, the amount of data meeting project precision and accuracy goals presented in Table 1. If data generated via analytical procedures appear to deviate significantly from observed trends, the Project Manager and/or Project QA Officer will review field or laboratory procedures with the appropriate personnel to evaluate the cause of such deviations. Where data anomalies cannot be explained, resampling may be necessary.

4.3.2.4 Representativeness

The representativeness of the data is the degree to which data represent a characteristic of a population, parameter variations at a sampling point, or an environmental condition. Analytical data should represent the sample analyzed regardless of the heterogeneity of the original sample matrix. Field duplicate samples will be collected as a means to assess field representativeness, in addition to being used to assess precision as described in Section 4.3.2.1. Trip blanks will be included in each sample shipment and will contain water samples for volatile organic analysis to evaluate potential cross contamination during transport. Representativeness will also be ensured by use of proper collection protocols as specified in Section 2.3 and 2.4.

4.3.3 Data Review

The Project Manager, Project QA Officer, or appropriate Task Leader assigned by the Project Manager, will review laboratory data. Section 4.3.2 outlines the procedures for evaluating the precision and accuracy of data. If comparison of data to previous measurements or known conditions at the site indicates anomalies, the laboratory will be instructed to review the submitted data while the methods used to collect and handle the samples are reviewed. If anomalies remain, the laboratory may be asked to re-analyze selected samples; other possible corrective actions are discussed below.

4.3.4 Corrective Actions

Corrective actions may be initiated if the precision or accuracy goals listed in Table 1 are not achieved. The initial step in corrective action will be to instruct the analytical laboratory to examine its procedures to assess whether analytical or computational errors caused the anomalous results. At the same time, sample collection and handling procedures will be reviewed to assess whether they could have contributed to the anomalous results. Based on

this evaluation, the Project Manager, with the Project QA Officer, will assess whether re-analysis or resampling is required or whether any protocol should be modified for future sampling events. Laboratory corrective actions are described in the laboratory quality assurance manuals. Any changes in laboratory methods, or quality assurance parameters or limits require written approval prior to implementation by the laboratory.

4.4 Instrument/Equipment Testing, Inspection and Maintenance

Information regarding testing, inspection and maintenance of laboratory equipment is provided in Sections A, D and H of the MAI QA Manual (Attachment A).

4.5 Instrument/Equipment Calibration and Frequency

Details on calibration procedures for laboratory equipment, including frequency and techniques, are provided in Section D of the MAI QA Manual (Attachment A).

4.6 Inspection/Acceptance of Supplies and Consumables

Project Managers have primary responsibility for identifying the types and quantities of supplies and consumables needed for environmental data collection projects. Supplies and consumables will be received in the field. When supplies are received, the Field Task Leader will inspect the supplies to ensure that they meet the inspection and acceptance requirements. Acquisition and testing of supplies and consumables (including reagents, standards, water and glassware) used by the laboratory is discussed in Section I of the MAI QA Manual (Attachment A).

4.7 Data Management

New analytical data for the project will be generated and reported by the lab. Information regarding data reduction, storage, validation and reporting by the laboratory is provided in Section G of the MAI QA Manual (Attachment A).

Analytical data will be provided by the laboratory in electronic format via e-mail followed by a mailed hard copy report. The electronic data will be entered and maintained in a project database. Analytical results in the database will be checked against the hard copy report upon their receipt.

5.0 Assessment and Oversight

5.1 Assessments and Response Actions

Assessments that will be performed for this project include laboratory audits, data reviews and peer reviews of data analysis reports. Section H of the MAI QA Manual (Attachment A) describes laboratory audit procedures and related response actions.

The Project Manager, Project QA Officer, or appropriate Task Leader assigned by the Project Manager, will review laboratory data. If comparison of data to previous measurements or known conditions at the site indicates anomalies, the laboratory will be instructed to review the submitted data while the methods used to collect and handle the samples are reviewed. If anomalies remain, the laboratory may be asked to re-analyze selected samples; other possible corrective actions are discussed in Section 4.3.4. Reports related to this project will be peer-reviewed by the Technical Peer Reviewer.

5.2 Reports to Management

The Project Manager will be provided with status reports that will address any work assignment-specific QA issues. Identification of these issues will be facilitated by communication among all project participants.

6.0 Data Validation AND Usability

6.1 Data Review, Verification, and Validation

The criteria for reviewing and validating data are outlined in Sections D and H of the MAI QA Manual (Attachment A). Precision and accuracy goals for data are presented in Table 1.

6.2 Verification and Validation Methods

The validity of chemical data will be measured in terms of precision, accuracy, completeness, and representativeness. Methods to determine these parameters are discussed in Section 4.3.2.

6.3 Reconciliation with User Requirements

Reconciliation of the sampling and analysis results with the requirements defined by the decisions makers will be discussed in the Completion Report, which will be prepared following completion of field activities and receipt of laboratory analytical data.

7.0 References

- Department of Toxic Substances Control (DTSC). 2001. Information Advisory, Clean Imported Fill Material, October.
- U.S. Environmental Protection Agency (USEPA). 2001. EPA Requirements for Quality Assurance Project Plans, EPA QA/R-5.
- USEPA. 1998. EPA Guidance for Quality Assurance Project Plans, EPA QA/G-5.
- USEPA. 1994. EPA Requirements for Quality Assurance Project Plans: EPA QA/R-5, May.
- USEPA. 1992. Guidance for Data Usability in Risk Assessment (Part A) Final. U.S. Environmental Protection Agency, Office of Emergency and Remedial Response, Washington, D.C. EPA/9285.7-09A.
- USEPA Region IX. 1989. Guidance for Preparing Quality Assurance Project Plans for Superfund Remedial Projects: 9QA-03-89, September.
- USEPA. 1988. Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA, EPA/540/g-89/004, October.

**Table C.1
QUALITY ASSURANCE GOALS FOR FIELD AND LABORATORY ANALYSES**

Tests	Compound	Spike level	Control Limits (%)	% RPD Limit
EPA Method 6010-Metals LCS/LCSD	Arsenic	10 mg/kg	75-125	20
	Lead	10 mg/kg	75-125	20
EPA Method 1311/CAM W.E.T. - Metals LCS/LCSD	Lead	10 mg/L	85-115	20
		10 mg/L	85-115	20
EPA Method 8081A-OCPs LCS/LCSD	Aldrin	0.01 mg/kg	70-130	30
	δ-BHC (δ-HCH)	0.01 mg/kg	70-130	30
	4,4'-DDT	0.025 mg/kg	70-130	30
	Dieldrin	0.025 mg/kg	70-130	30
	Endrin	0.025 mg/kg	70-130	30
	Heptachlor	0.01 mg/kg	70-130	30
EPA Method 8015 Modified - TPH LCS/LCSD	TPH gas (BTEX)	0.6ug/Kg	70-130	30
	TPH diesel	20 ug/Kg	70-130	30
	TPH kerosene	20 ug/Kg	70-130	30

LCS - Laboratory Control Spike
 LCSD - Laboratory Control Spike Duplicate
 OCPs - Organochlorine Pesticides
 TPH - Total Petroleum Hydrocarbons

**Attachment A:
Quality Assurance (QA) Manual
McC Campbell Analytical, Inc.**



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IX Quality Assurance Program

for

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A. Organization, Responsibility and Goals

McCampbell Analytical currently has a staff of approximately fifty. The lab director Edward Hamilton, lab manager Angela Rydelius, QC Officer Shino Hamilton, and shift supervisors Oanh Cao & Phuong Doan share final responsibility for all decisions.

Our goal is generate scientifically valid & reproducible data using published technical protocols, including EPA, SSSA, AOAC, ASTM & other methodologies. When discrepant data arises, that is data that is serially inconsistent or is inconsistent with different but related test methodologies, we will investigate the cause, including reanalysis & re-extraction of the sample, until arriving at a conclusion as to the cause of the discrepancy & the probability of which data are correct. If there is a probability of lab error we will revise our published data. If there is a probability of sampling error we will inform the sample submitter. If there is a probability of sample inhomogeneity we will average the data & we will publish either the entire data or averaged value & flag the data as such. Our goal to generate scientifically valid & reproducible data & these procedures guide our lab towards publishing only unbiased & scientifically valid data that is free from third party influence.

The lab and QA managers are also responsible for data review and have the authority to approve or disapprove specific analyses and final reports. Periodically lab and QA managers will review internal documents including but not limited to SOP's, Published methods, etc and if and when deemed necessary will revise and or update to ensure continuing suitability and compliance with applicable requirements. In addition, any documents that are outdated and or superceded will be replaced by the updated document; the superceded document will be stored in our "Obsolete" folder and will no longer be used within the laboratory; this in effort of diminishing any unintended use. Obsolete documents are stored in the "Obsolete" folder and are available at any time for review at the request of an interested party. Lab and QA managers are responsible for advising on all aspects of QA/QC including: assuring proper QA/QC procedures are employed during data generation; periodically reviewing QA/QC procedures; and, if problems are detected, making recommendations to ensure that appropriate corrective actions are taken. Our QA officer reviews all QC data prior to its release to our clients.

The Supervisory Chemists are considered competent and proficient in a wide variety of analyses and instrument troubleshooting / repair and serve as technical advisors to the less experienced technicians and chemists. They are responsible for training new employees and ensuring that analytical methods and instruments are working properly. Other chemists and technicians may also be experienced and proficient enough to conduct training and instrument troubleshooting and maintenance but are generally knowledgeable in fewer analyses.

Veteran employees train the new employees. Training includes hands-on instrumental operation, becoming familiar with the appropriate SOPs and completing a satisfactory initial demonstration of proficiency. In addition, the trainer



will review the trainee's data until proficiency has been established. Proficiency is defined as being able to independently and satisfactorily perform an analysis error free for a period of two weeks to one month.

The pursuit of quality is one of the primary goals of this laboratory and this document outlines some of the specific steps taken to achieve this goal. While no QA program can achieve absolute perfection, the identification of problems and subsequent corrective actions will move the laboratory steadily towards this goal.

B. Chain of Custody for Samples

Samples shall be delivered to the lab by the contractor or a third party, and will not be collected in the field by McCampbell Analytical personnel. The chain of custody will record the following:

- a) the time and date of sampling and the sampler's signature,
- b) the time and date when the samples were relinquished to the lab,
- c) the signatures of persons who relinquished and received the samples,
- d) a description of each sample matrix,
- e) a unique identifier for each sample,
- f) the type of analysis requested,
- g) a description of the condition of the samples, for example, whether or not they were kept cool, the presence of head space, preservatives, or the smell of fuel products, and,
- h) client name;
- i) for bacteriological tests the sample type (repeat positive, repeat invalid,...) water type (drinking, surface, effluent, recreational – marine, 'not-for-compliance') and collection time to the minute shall be recorded because they are required for protocol compliance;
- j) for drinking water testing, the name of the drinking water facility must be given;
- k) any initial in lab processing or testing of the sample, such as filtration, addition of preservative, confirmation of low pH or the absence of chlorine, shall be recorded on the COC.

Additional useful information includes Client Contact name, Project ID, TAT, billing, phone, fax and email information.

Clients shall be informed immediately of any sample identity discrepancies between the COC and actual sample container, or if hold time, preservatives, or containers are invalid, or if sampling times are not present on the COC, or if testing instructions are ambiguous.

Samples may be couriered to the lab by a third party service. In such instances, the courier must formally receive and relinquish the samples by signing the COC. Some courier companies such as FedEx, UPS and CA Overnight will not participate in the chain of receiving and relinquishing and MAI recommends that the client seal the cooler with a tamper



proof seal prior to shipment. In such instances, MAI personnel will note on the COC the name of the courier service, and if found true by observation, that the samples were received sealed and intact.

Our laboratory shall note the following on the sample's chain of custody: ice, head space, appropriate containers, preservative, sample handling procedures prior to sample storage such as dechlorination and filtration, and approximate sediment content of each water sample. The sediment content of a water sample is based upon observation of one randomly chosen or more of its clear and transparent containers. Dissolved metals rather than total metals shall be assumed for the analysis of water samples containing significant sediment unless otherwise specified on the COC. It will be noted on the chain of custody if samples are removed from the lab.

Log In staff shall clarify with client ASAP any ambiguities they find upon receipt of new COCs. They shall determine whether a particular test will be performed in house or sub-contracted to another lab, & shall ascertain by consultation with the lab manager or staff chemists whether we have the capability and capacity to meet the clients analytical needs & TATs.

Each sample will be assigned a unique number, which will be used to identify it within the laboratory. Once the sample is given a lab ID, the sample is either refrigerated when required by method or given to our extraction department, depending upon the flow of work within the lab. When the extraction department is finished with the sample it is returned to a refrigerator or other appropriate storage area. Our staff is trained to not allow any sample requiring refrigeration to remain un-refrigerated longer than is necessary, with a maximum time of 2 hours. Samples are handled in accordance with regulations set forth by the State of California and the federal government, the EPA, the LUFT manual, SW-846 and other publications.

Samples will be stored for a minimum of one month, and are stored separately from the standards. Water and soil blanks will be placed in refrigerators that contain samples in order to assess the possibility of vapor phase cross contamination. Samples will be discarded in accordance with local, state and federal regulations.

C. Maintenance and Calibration of Simple Machines

Refrigerator and Freezer temperatures will be recorded daily and drying ovens as used. The thermostats of these appliances will be adjusted as necessary to maintain their working range, or the equipment repaired or replaced.

The accuracy of the gravimetric balance will be checked monthly against class S weights and a record kept of these measurements. The manufacturer will be consulted for corrective action if discrepancies greater than 2% are observed.

All pipettes will be tested for accuracy monthly. Pipettes with an error greater than 2% will be refurbished or replaced.

Method specified rotation rates (rpms) will be verified annually for rotating extraction devices.

Autoclaves will be tested periodically for sterility, maximum temperature and timer accuracy. Results will be recorded and corrective action taken if necessary.



Incubators will be tested periodically for sterility and temperature accuracy. Results will be recorded and corrective action taken if necessary.

All measuring devices used to record temperatures, weights & volumes, including thermometers, balances & volumetric devices, shall be periodically calibrated against traceable standards, and this calibration documented.

D. Analytical Procedures

The analytical procedures and methodologies that are used here are described in EPA SW-846, 600/4-79-020, 600/4-84-017, 600/4-82-057, CFR40 (parts 260-299), Standard Methods for the Examination of Water & Wastewater, the California LUFT manual, and California State Title 22 as well as other published paper and internet documents. When ambiguity exists in these sources, common sense and good scientific practices are followed.

1. GC, GC-MS, HPLC, IC and IR Analyses

TPH (g/ss) (8015), volatile aromatics (8020/ 602), volatile halocarbons (8021/ 8010/ 601/ 502) and VOCs (8240/ 8260/ 624/ 524) solids and liquids are direct loaded or extracted with methanol, polyethylene glycol or other suitable solvents. Semi-volatiles including TPH (d/k/mo) (8015), Oil & Grease (SM5520), TRPH (418.1), EDB-DBCP-TCPA (504.1/ 8011), endoathal (548), phenyl ureas (532), Diquat-Paraquat (549.2), PNAs (550/ 550.1/ 8310), HAAs (552.1/ 552.2), aldehydes / carbonyls (554/ 8315), anions (300.0/ 300.1), hexachrome (218.6), perchlorate (314.0), chlorinated pesticides and PCBs (8082/ 8081/ 608/ 505/ 508), SVOCs (8270/ 625/ 525/ 526/ 528), NP pesticides (8141/ 507), nitroaromatics & nitramines (8330), chlorinated herbicides (8151/ 515) solids and liquids are solid-liquid, liquid-liquid, or liquid-SPE extracted with methylene chloride, hexane, diethylether, acetone, MTBE, deionized water, or trichlorotrifluoroethane according to EPA methods 3510, 3520, 3550, 418.1 or the relevant analytical method and derivitized when proscribed by the method. Volatiles are analyzed using purge & trap (EPA method 5030) or whole container (EPA method 5035) methodology. Aqueous samples testing for acrolein-acrylonitrile-acrylamide (8316), glyphosate (547), carbamates (531.1/ 8318), anions (300.0/ 300.1) or hexachrome (218.6) are filtered and directly loaded for HPLC analysis; glyphosate and carbamates, as proscribed by method, are derivitized on line prior to detection. These procedures are documented in our company SOPs, which are derived from published methods.

Two separate standards, each made from a stock standard having a different lot number or manufacturer, are utilized. One stock standard is used to calibrate the instrument and to prepare daily matrix spikes and LCS QC, and may be used for the CCV if a second source standard (ERS) is also analyzed. The CCV will be run daily to confirm that the instrument is still within calibration. This system ensures high quality data by spotting inaccurately prepared (by the manufacturer or analyst) or "aged" standards. A standards logbook will be kept detailing the preparation of working standards and uniquely identifying them.



The variability of gasoline and diesel preclude the use of multi-source standards. However the constancy over time of the FID detector's response is assessed by comparison of the historical calibration to the daily standard and to the matrix spikes.

CCV acceptance criteria vary by method; for example hexachrome (218.6) is $\pm 5\%$, EPA GC 8000 series are $\pm 15\%$, drinking water chromatography range from $\pm 10\text{-}20\%$, and are found in their respective SOPs.

The GC's are calibrated using a minimum of five concentrations of the same standard. The highest concentration defines the upper working range of the calibration while the lowest concentration equals the working instrumental detection limit. A linear calibration is typically used for all compounds and is considered acceptable if the %RSD of the CF or RF of each target analyte is $\leq 20\%$ as required by the CA DHS and federal EPA. Alternatively, a non-linear calibration may be used. A non-linear calibration is considered acceptable if the coefficient of determination (COD) for each target analyte is ≥ 0.99 .

Many GC / LC methods, especially those pertaining to drinking water (504.1, 505, 508, 508.1, 515.x, 524.2, 525.2) but also 8081, 8260, 8270, 314.0 & others, require special LPC (Laboratory Performance Check standards) to be analyzed and passed prior to the analysis of samples. The procedural details, acceptance criteria and corrective actions are found in the relevant SOPs.

A blank shall be run initially and a daily mid-level standard (continuing calibration verification standards) initially and approximately every 10 samples or 12 hours and evaluated against method criteria. Corrective action includes re-analysis and/ or the instrument re-calibration.

Surrogate standards, when known, are added prior to extraction; this encompasses most of these analyses. Matrix spike and surrogate recoveries must fall within the ranges outlined in the method or corrective action will be taken.

The techniques for quantitating and resolving complex chlorinated mixtures are detailed in EPA method 8081. Dual column confirmation will be done on all positive pesticide samples and will be done on positive volatile analytes (non-GC-MS methods) by request. Dual detector confirmation (example PID-FID or PID-ELCD) is present for most volatile analytes.

EPA methods 8240/ 8260/ 624/ 524 shall be run as follows. A historical five-point calibration shall be conducted. Three surrogates and three internal standards are added to each injection. The system performance check compounds, SPCCs (chloromethane, 1,1-dichloroethane, bromoform, 1,1,2,2-tetrachloroethane, chlorobenzene) must have RRFs $\leq 0.1, 0.1, 0.25, 0.3, 0.3$, respectively, and the calibration check compounds, CCCs (1,1-dichloroethene, chloroform, 1,2-dichloropropane, toluene, ethylbenzene, vinyl chloride) must have %RSDs $< 30\%$ in order that the calibration be valid.



On a daily basis, the MS is tuned and the mass ratios shown in method 8240 for BFB must be met initially and after every 12 hours (8 hours for 524) of analysis. A mid-range daily standard will be run after 12 hours of analysis; the above-mentioned SPCC criteria must be met and the CCCs must be within 20% of their daily calibration values for the run to continue. Additional continuance criteria are that any internal standard's retention time must not have changed by more than 30 seconds or its area by a factor of two from that last daily calibration unless by design (tuning or column shortening). Criteria for qualitative and tentative identification and quantitation of a compound are detailed in EPA method 8240. Each analyst will demonstrate their capability through a precision and accuracy study of four QC samples as outlined in the method. Matrix spike and surrogate recoveries must fall within the ranges outlined in the method or corrective action will be taken.

EPA methods 8270/ 625/ 525/ 526/ 528 shall be run as follows. A historical five-point calibration shall be conducted. Each injection will contain the six recommended internal and six recommended surrogate standards. The MS will be tuned to fulfill the method criteria for DFTPP before a run can be initiated. The system performance check compounds, SPCCs (N-nitroso-di-n-propylamine, hexachlorocyclopentadiene, 2,4-dinitro-phenol, 4-nitrophenol) must have RRFs ≥ 0.05 , and the calibration check compounds, CCCs (see method 8270) must have % RSDs $< 30\%$ in order that the calibration be valid. On a daily basis, the MS is tuned and the mass ratios shown in method 8270 for DFTPP must be met initially and after 12 hours (8 hours for 525/ 526/ 528) of analysis. A mid-range daily standard will be run after 12 hours of analysis; the above-mentioned SPCC criteria must be met and the CCCs must be within 20% of their daily calibration values for the run to continue. Additional continuance criteria are that any internal standard's retention time must not have changed by more than 30 seconds or its area by a factor of two from that last daily calibration unless by design (tuning or column shortening). Criteria for qualitative and tentative identification and quantitation of a compound are detailed in EPA method 8270. Each analyst will demonstrate their capability through a precision and accuracy study of four QC samples as outlined in the method or corrective action will be taken.

For GC and IR analyses in general, a daily LCS and LCSD (and matrix spike and spike duplicate when sufficient sample containers are provided) will be analyzed every 20 samples for each matrix being analyzed on a given instrument. The quantitated value of LCS, LCSD, spike and spike duplicate must be within 60-140% recovery or the method acceptance criteria, whichever is more stringent. One method blank must also be run initially for that day's sequence. A volatiles water/air blank is reagent grade water defined as tap water that has been brought to a rolling boil for 30 minutes, cooled and continuously purged with N_2 . Method blanks must contain less than the reporting limit of each method analyte. In the event that any of the CCVs or QC samples fail their criteria they should be immediately reanalyzed. If they continue to fail, an investigation must be conducted to determine the root cause and the sequence scrutinized for validity by an independent QA officer. Some data may be usable depending on the type and severity of the problem. Corrective action should be taken to resolve the problem and the instrument recalibrated if necessary. If it is determined that there is unusable data, the affected samples will need to be reanalyzed in a new sequence.



The failure of standards, surrogates or QC to fall within accepted ranges is not the only criteria for rerunning samples. The suspicion of contamination arising from the previously injected sample, the previous sample in the same purge & trap vessel / port position, or contamination that exists instrument-wide in flow pathways or valves, or the analyte concentration being greater than the highest calibration standard will necessitate that the effected sample(s) be rerun.

The statistical analysis of replicate samples will be used to determine the minimum detection limit for each individual and group analyte and for external standard methods to determine relative retention time windows, as outlined in chapter one and method 8000 of SW-846. An initial demonstration of proficiency will be conducted for each instrument to assess the precision and accuracy of the instrument and operator. On a daily basis, precision and accuracy are found by comparison of the spike and spike duplicate or a chosen sample and its duplicate.

Records shall be kept of all this data for each instrument and updated as new information is generated. This data will be analyzed for trends that may indicate the onset of problems.

2. Metals

Soil, sludge and water samples for metals analysis are digested using EPA methods (200.7, 200.8, 200.9, 3005, 3010, 3020, 3040, 3050, 6020B method 245.2/ 7470/ 245.7/ 1631F for mercury) and analyzed according to EPA methods in 600/4-79-020, SW-846 and elsewhere and documented in our company SOPs.

In general, MAI uses EPA 200.7/ 200.8/ 200.9 for metals in water matrix and 7010/ 6010B/ 6020A for analyzing metals in solids, sludge, and other non-aqueous matrices. EPA 1631E (AFS) is used for ultra low level Hg in water.

All atomic absorption methods (FAA, GFAA, HGAA, CVAA) will run in the following manner. Each run will be preceded by a minimum three-point calibration and a blank, followed by an independent check standard ($\pm 15\%$ of the calibration curve), followed by samples. A mid-point calibration standard will be run after each set of 10 samples and at the end of each run. A matrix-spike, spike-duplicate, reagent-blank and one serial dilution will be analyzed with each batch (or 20 samples). Background correction will be used unless it is known to degrade the quality of results. All GFAA standards and samples will be matrix matched to whenever possible.

ICP will be run as follows. An initial 5-point calibration will be performed for each metal to define its range of linearity. On a daily basis, a single mid-point standard will be run to “re-slope” the calibration curve, followed by a blank and an instrument performance check standard. The instrument performance check standard must be within 5% of its true value before the run can proceed. A matrix-spike, spike-duplicate and reagent-blank will be analyzed with each batch (or 20 samples). A mid-point calibration standard and calibration blank will be run after each set of 10 samples and at the end of each run. The standard must be $\pm 10\%$ of the true value and the calibration blank must be below the RL for all



elements for the run to proceed. An ERS standard must be analyzed once per run and must be $\pm 10\%$ of the true value. Appropriate background corrections will be made for each element.

ICP-MS will be run as follows. On a daily basis, a tune must be performed for all three modes and each pass the relevant criteria outlined in the SOP for 6010B. A 5-point calibration will be performed for each metal at the beginning of each sequence to define its response factor and range of linearity. A minimum of 3 IS must be used for a full mass range scan and each must exhibit 60-125% recovery of the values found in the calibration blank (200.8). If the IS recovery is $<30\%$ “and the cause is not due to instrument drift” then the sample must be diluted and reanalyzed until $>70\%$ IS recovery is achieved (6020B). An internal standard should be no more than 50 amu removed from the analyte. A CCV must be analyzed initially, after every 10 samples, and at the end of the run to verify the calibration curve, and must be within 10% of its true value. It is followed in each instance by a reagent blank which must be below the RL for each element. At a minimum 3 replicates of each standard and sample must be analyzed and averaged. An LCS-LCSD ($\pm 15\%$ for 200.8 / waters, $\pm 25\%$ & $RSD < 20\%$ for 6020B / solids), MS-MSD ($\pm 30\%$ if spike $> 30\%$ of sample for 200.8 / waters, $\pm 25\%$ & $RSD < 20\%$ for 6020B / solids), and reagent-blank will be analyzed with each batch (or 20 samples). A mid-point calibration standard and calibration blank will be run after each set of 10 samples and at the end of each run. The standard must be $\pm 10\%$ of the true value and the calibration blank must be below the RL for all elements for the run to proceed. An ERS standard must be analyzed once per run and must be $\pm 10\%$ of the true value. For each element, all interfering masses must be monitored and isobaric correction equations used when appropriate. The Interference check standard, ICS (see 6010B SOP), must be analyzed initially and every 12 hours to demonstrate the magnitude of elemental and molecular ion isobaric interferences and the adequacy of any corrections used. The percent of interference correction applied to reported data using an interference equation must be stated in the analytical report. One dilution test (1:5 serial dilution) must be included for each batch of each matrix and must be within 10% agreement. HCl must be integral to all digestions that are analyzed for Hg.

EPA 1631E, Hg by AFS, will be run as follows. A statistical MDL study must be performed initially and yield an MDL < 0.2 ng/L or MDL $< 1/3$ regulating limit, whichever is greater. An initial precision and recovery (IPR) should be performed by analyzing 4 replicates of the calibration standard at a concentration of 5 ng/L Hg in reagent water. Percent recoveries must be 79-121% and $RSD \leq 21\%$. MAI will test one new bottle blank per lot.

A batch is a set of up to 20 samples oxidized with the same batch of reagents, and analyzed during the same 12-hour shift. Each batch must be accompanied by 3 system blanks (< 0.50 ng/L Hg) which precede the calibration. The calibration must contain a minimum of 5 non-zero points (ex: 0.5, 5, 25, 50, 100 ng/L) and the results of analysis of 3 system blanks, and must be performed at a minimum every 12 hours. The lowest calibration point must be at the minimum level (ML). If the average $RSD \leq 15\%$ and the recovery of the lowest standard is in the range of 75-125%, the calibration is acceptable.



Analyze 5 ng/L CCV (=OPR) solution prior to the analysis of each analytical sample batch, every 12 hours, and at the end of each analytical sequence. The recovery must be 77-123% for the run to proceed. The ERS (=QCS) should be analyzed at the beginning of each batch following the CCV. At least 3 method blanks (<0.5 ng/L) should be analyzed per batch and there must be 1 MS and 1 MSD sample for every 10 samples (71-125% recovery, RPD 71-125% but may exceed this range if the subsequent OPR (=CCV) passes. The RPD for MS-MSD pair must be $\leq 24\%$, but may exceed this range if the subsequent CCV passes. Field blanks are required at a frequency no less than 1 per 10 samples. Field duplicates, if taken, should have RPD < 20% or the sampling personnel should be alerted

The statistical analysis of replicate samples will be used to determine the minimum detection limit for each individual and group analyte. Records shall be kept of all QC data for each element and updated as new information is generated. This data will be analyzed for trends that may indicate the onset of problems.

E. Wet Chemistry Tests

Acidity, alkalinity, ammonia, BOD, TOC, NPOC, IC, titrimetric Cl, residual chlorine, COD, color, cyanide, dissolved O₂, MBAS, hardness, Karl Fisher water, colorimetric nitrate-nitrite, TKN, total N (combustion, UV-persulfate, summation of forms), odor, total P, paint filter test, phenolics, physical properties, RCI, redox potential, settleable solids, sulfide, TDS, TSS, TS, TVS, turbidity, UV₂₅₄, pH, 5520 Oil & Grease, specific conductivity, colorimetric hexachrome, ignitability and other miscellaneous tests that are conducted here are performed in accordance with their methods outlined in EPA SW-846, 600/4-84-017, 600/4-82-057, CRF40 (parts 260-299), Standards Methods for the Examination of Water & Wastewater, the California LUFT manual, and the California State Title 22 and detailed in our SOPs. In general, for all QC, a matrix-spike, spike-duplicate and blank are analyzed every 20 samples. The quantitated value of both spike and spike duplicate must be within 60-140% recovery. One method blank must also be run for each matrix being analyzed on that day's sequence and must be less than the reporting limit. Where the analytical technique or sample is not amenable to spiking then one out of every ten samples will be analyzed in duplicate or by serial dilution.

When the analysis requires a calibration curve (cyanide, TOC, NPOC, ammonia, etc) a five point calibration is performed with low standard defining the minimum RL and the high standard the upper working range and a CCV is analyzed every 10 samples and at the end of the run. Acceptance criteria are generally $\pm 15\%$ for the CCV but method specific values are given in their respective SOPs. An initial MDL study and operator precision package are performed and statistically analyzed for the IDOC.

F. Bacteriological Testing (SM 9020-9060, SM9223B, Idexx SIM plate, Idexx Enterolert)

The type of water, such as drinking (chlorinated or non-chlorinated specified), ground water, effluent, waste water for disposal, surface waters (lacustrine, estuarine, marine, fluvial, urban), recreational waters (marine or fresh), storm water



run off, etc. must be specified because hold time and analytical protocols may follow. The sample category, whether routine, repeat, repeat positive, or repeat invalid should be recorded on the COC.

If chlorinated, samples must be dechlorinated at the time of sample collection by having a dechlorinating agent (100mg/L sodium thiosulfate) present in the sample container.

Samples must be stored at $<10^{\circ}\text{C}$ for transit times > 1 hour and refrigerated for lab storage. Potable waters (drinking water) must be analyzed within 30 hours of collection for coliform and 8 hours for HPC for compliance purposes. Non-potable water (source water, stream pollution, recreational water, waste water) has a maximum specified transport time of 6 hours from time of collection and should be processed by the lab within 2 hours of receipt for an 8 hour total hold time. Other water types for non-compliance purposes are to be held at $<10^{\circ}\text{C}$ during transport and storage and analyzed within 24 hours of collection. The date and time that the analysis was begun MUST be on the report for the purposes of hold time compliance.

Conduct 'Use test' for each new batch of materials, for sterility, and for inhibitors as described in the SOP, in particular monitor each new sample container lot, EST (Enzyme Substrate Technology) container lot, and reagent lot.

Each water sample MUST be shaken vigorously about 25X before analysis. Monitor incubator temperature 2X daily, > 4 hours apart. Perform duplicate analyses on at least 10% of the samples or one time per week if less than 10 samples per week are analyzed. Include known positive culture as QC tests, once per quarter if no sample positives.

For HPC always analyze a sterility control with each batch. Bottled water must be incubated for 72 rather than 48 hours.

Invalid samples (hold time, technical problems) MUST be repeated, sampled within 24 hours for compliance purposes.

G. Data Reduction and Reporting

Data will be acquired from all instruments using the manufacturers software, Agilent ChemStation or a LIMS system and analyzed by user-set methods. Formula for external and internal standard calculations are used that is identical to those found in method 8000 of SW-846. The chromatograms are scrutinized and the quantitations are reviewed before being reported in a run log or sent on to the LIMS. High values are double-checked for calculation mistakes and low values for the possibility of contamination. Raw data is converted to standard reporting units by the usual method of numerator and denominator unit cancellation. The lab manager gives the report the final review, before the data is sent via mail, email or faxed to the client.

It is our standard procedure to protect and back up all of our electronic records. In order for an employee to access or use LIMS they must have a user password or code; each code and password are unique. This is done in effort of minimizing unauthorized use of the system and any manipulation of data/records. Raw data from ChemStation is backed to a CD. Duplicate copies are made of the CD's, one set is stored in the lab for chemist convenience; the other



set is stored in high capacity hard drive and placed in a safe box to prevent from disaster. All records, including but not limited to instrumental raw data, run logs, analytical reports, instrument maintenance logs, standard logs and QA documents will be retained in the lab for a period of seven years. Records older than seven years will be destroyed.

Our goal is generate scientifically valid & reproducible data using published technical protocols. When discrepant data arises, that is data that is serially inconsistent or is inconsistent with different but related test methodologies, we will investigate the cause, including reanalysis & re-extraction of the sample, until arriving at a conclusion as to the cause of the discrepancy & the probability of which data are correct. If there is a probability of lab error we will revise our published data. If there is a probability of sampling error we will inform the sample submitter. If there is a probability of sample inhomogeneity we will average the data & we will publish either the entire data or averaged value & flag the data as such. Clients will occasionally contest the results of a specific sample and the subsequent re-analysis of this sample provides further feedback on the quality of analytical work. If re-analysis shows that the lab's original results are in error, then the analysis is free of charge and corrective action will be taken. If and when ethical concerns issues arise; it is immediately brought to the attention of both QA and laboratory management for further investigation. Together they will work towards resolving the matter. We strive towards publishing only unbiased & scientifically valid data that is free from third party influence.

H. Internal Quality Control Checks

QC, standards, blanks, method performance check standards, surrogates and internal standards are examined daily within each analytical batch or sequence and evaluated against their acceptance criteria, and corrective action taken if needed. These parameters are plotted & their graphs examined on a regular basis to determine trends & anticipate problems.

MAI has a dedicated internal QC officer who reviews all QC data, monitors QC compliance with established and method specified criteria. They report their findings to the lab manager & lab director.

When needed, and in consultation with the lab managers, the QA officer may implement new quality control procedures on a laboratory-wide or group basis.



External Quality Control Checks

QC samples are solicited from clients and are welcomed from governmental agencies in an ongoing effort to maintain and improve analytical quality. NVLAP & CA certified third party external performance evaluation samples are tested as an external QC check at a minimum of once per year for water and soil (when available) matrices. Our results for these blind QC samples are reported to the third party supplier who evaluates them against their true values, and reports this data and acceptance criteria ranges to MAI and the California DHS / ELAP. These reports are available for review upon request and will at a future time be published on our website for client access. External audits of our lab are performed by state agencies and other third party accreditors, as well as by our clients, and are welcomed. Complete supporting data (calibrations, CCVs, MB, QC, PCS & chromatograms / instrument records) are available to our clients when they want to audit particular data sets.

I. Chemical Standards & Reagents

Chemical standards and reagents are stored in a computerized log and identified with consistent nomenclature. Our goal and practice is to use one lot number or manufacturer, for CCV, QC or both. Our reagents/consumable materials are purchased through our known vendors. These reagents/consumables are tested to make sure that they meet our requirements and are compatible with our machines, this in effort to get the best results.

J. Confidentiality of Data

It is our policy not to release any data to third parties without the client's authorization. When asked for data by a third party we must first obtain our client's permission before releasing data. Data that is electronically transmitted by fax or email contains a confidentiality notice directing any unintended recipient to inform us of our error & destroy the received documents. Electronically stored data within the lab's computer network is protected by firewall security. We will comply with any written request by a client or government agency to maintain strict confidentiality regarding any data or techniques that are proprietary or matters of national security. The agreement must be in writing & will be signed by all pertinent parties within the lab.

K. Corrective Actions

Errors, deficiencies and data that do not pass acceptance criteria will be investigated. Some of these instances may require corrective actions. These corrective actions will be documented in appropriate locations including instrument-specific maintenance logs, run logs and the company error log. Clients will occasionally contest the results of a specific sample and the subsequent re-analysis of this sample provides further feedback on the quality of analytical work. If re-analysis shows that the lab's original results are in error, then the analysis is free of charge and corrective action will be taken. An overall lab error log is kept as record of our laboratory's performance and is available for client inspection.



L. Error Log

We keep an error log of mistakes that we have made, in terms of reported data, log in, hold time or service errors. This helps us track the relative error rate of the lab overall.

M. Staff Training

Staff that is well trained is essential to the error free operation of the laboratory & to the generation of high quality analytical data. A training document is signed by each chemist attesting that they have been adequately trained; and have read and understand the laboratory SOPs and published methods and they will conduct analysis according to the method criteria. All method criteria, whether for CCV, calibration, method blanks, performance check standards, & quality control are readily available to all in a convenient format. When method criteria do not exist we define in house acceptance criteria.

If method criteria cannot be met chemists are required to bring the matter to the attention of a supervisor for remedial action.

We have laboratory SOP's and published methods in proximity to each chemist. Each chemist is instilled with the philosophy that "We are not in the business of guessing, we are in the business of certainty." As such any questions that they have regarding data acceptability, suitability, or procedures must be brought to the attention of a higher authority that can resolve any questions.

The Supervisory Chemists are considered competent and proficient in a wide variety of analyses and instrument troubleshooting / repair and serve as technical advisors to the less experienced technicians and chemists. They are responsible for training new employees and ensuring that analytical methods and instruments are working properly. Other chemists and technicians may also be experienced and proficient enough to conduct training and instrument troubleshooting and maintenance but are generally knowledgeable in fewer analyses.

Veteran employees are in charge of training new employees. Training includes hands-on instrumental operation, becoming familiar with the appropriate SOPs and published methods and completing a satisfactory initial demonstration of proficiency. A training check list is signed by all chemists. In addition, the trainer will review the trainee's data until proficiency has been established. Proficiency is defined as being able to independently and satisfactorily perform an analysis error free for a period of two weeks to one month.

Our staff is trained to look for discrepant data & to examine as fully as is needed to characterize its source.

N. Client Feedback

Our staff welcome client feedback & carefully listen to spontaneous feedback that comes to us from clients so as to improve our quality & service. If a data result is questioned, we carefully and fully investigate it. Our first response is to ascertain whether the correct number & units were reported as well whether the sample was logged in correctly. Second, we reanalyze the original sample or its extract and simultaneously begin re extraction and re analysis of the



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O. Quality Assurance Reports

The QA program will be reviewed and reported on at least annually by the lab/QA manager. This report will include an assessment of the overall effectiveness of the program and identify any deficiencies. The report will also include suggestions on how to deal with deficiencies as well as on improvements if necessary.



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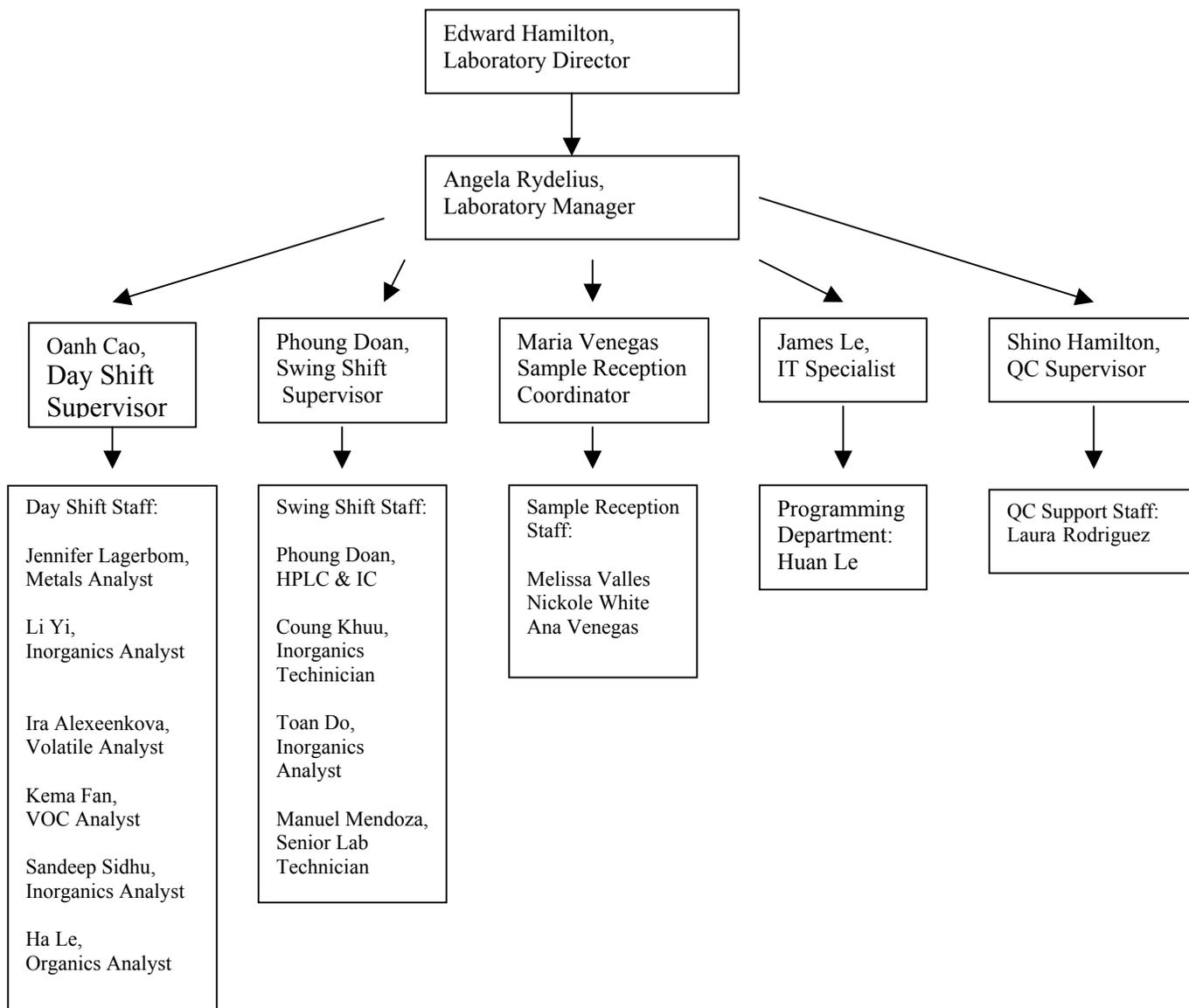
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Employee List as of 02/15/07

Employee Name	Title	Department	Other Training
Edward Hamilton	Laboratory Director	---	---
Angela Rydelius	Laboratory Manager	Management	---
Oanh Cao	Day Shift Supervisor	Management	---
Duyen Le	Data Entry	Data Entry	---
Sonia Valles	Data Entry	Data Entry	---
Heidi Ricca	Data Entry	Data Entry	---
Elisa Venegas	Accountant	Accounting	Log In
Maria Venegas	Log In Reception Supervisor	Log In	---
Cuong Khuu	Metals Technician	Metals	TOC, Wet Chemistry
Ha Le	Organics Manager	Organics/Research	---
Hien Nguyen	Technician	Wet Chemistry	Diesel
Toan Do	Swing Shift Supervisor	HPLC/IC	Diesel
Jennifer Lagerbom	Metals Manager	Metals	VOC
Ira Alexeenkova	Volatile Analyst	BTEX	Diesel
Kema Fan	VOC Analyst	VOC	---
Sandeep Sidhu	Inorganics Manager	Inorganics	---
Phuong Doan	HPLC/IC	---	---
Rosa Venegas	Sales Manager	Marketing	Log In
Melissa Valles	Log In Reception	Log In	---
Nickole White	Data Entry	Log In	---
Shino Hamilton	QC/EDF Supervisor	QC/EDF	---
Laura Rodriguez	QC Support	QC	---
James Le	IT Specialist	IT	---
Huan Le	Programmer	LIMS Administration	Bacteria
Manuel Mendoza	Sen. Lab Technician	BTEX/VOC	---
Ryan Buensalida	Extractionist	Extractions	---
Tho Pham	Lab Technician	---	---
Michael Alison	Facility Engineer	---	---
Brian Hom	Dioxins Analysts	Dioxin	---
Carlos Madrigal	Fish Tox Technician	Fish Tox	---
Viet Phan	Extractionist	Extraction	---
Yasue McGonigle	EDF Assistant	EDF	---
Ghada White	Pesticides Analyst	8080/8082	---
Ann Truong	Wet Chem Analystst	Wet Chemistry	Bacteria
Craig Warling	Metals Analyst	Metals	---
Danh Nguyen	SVOC Extractionist	Extractions	---
Jeffrey Sam	Wet Chem Analyst	Wet Chemistry	---
Jerri Koenig	IC Analyst	IC	---
Li Yi	SVOC Analyst	SVOC	Special Projects
Max Velazquez	Extractionist	Extractions	---
Rick Salig	Extractionist	Extractions	---
Robert Pringle	Courier	Courier	---
Sy Liu	Extractionist	Extractions	---



McCampbell Analytical, Inc. Organizational Flow Chart, 2007



Appendix D: Transportation Plan

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Figure D.1 Proposed Route of Transportation to the Kettleman Hills Landfill and Altamont Landfill

1 Introduction

For more than 80 years, the Niven family has owned and operated a commercial nursery at the site. The site currently consists of numerous greenhouse buildings along with several small, residential-type structures, storage buildings, offices, and associated roadways. Larkspur Housing Partners, LLC (LHP) intends to develop the site as single-family residential housing.

A Remedial Action Workplan (RAW) has been prepared to identify, evaluate, and recommend remediation alternatives for impacted soils at the site (ENVIRON, 2008). The recommended alternative was excavation and off-site disposal of soil. Soil above the cleanup goal of 260 mg/kg of lead would be excavated from the site and disposed of at a licensed California hazardous waste landfill. Soil below the cleanup goal is anticipated to be reused as on-site fill material. Up to approximately 1,089 cubic yards of soil are anticipated to be excavated from the site. This Transportation Plan is prepared as a key component of the RAW. All removal, transportation and disposal activities will be performed in accordance with all applicable federal, state, and local laws, regulations, and ordinances.

2 Waste Transportation, Handling and Management

The maximum volume of excavated soil that could potentially be disposed of offsite is estimated to be approximately 1,089 cubic yards. Some soil may be encapsulated onsite if miden and/or culturally significant materials are identified in the soil, which would result in a much lower volume of soil to be disposed of offsite. The primary chemical of potential concern in the excavated soil deriving from the removal effort is lead.

2.1 Waste Profile

The waste material will be profiled for acceptance by the disposal facility before any excavation activities commence. Additional documentation will be provided to the DTSC pertaining to waste disposal profiles and waste disposal acceptance prior to any off-site shipments of waste.

2.2 Requirement of Transporters

Only qualified transporters will be hired for hauling the excavated soil offsite. The selected transporters will be fully licensed and insured to transport the excavated soil.

2.3 Traffic Control Procedures

Impacted soil for off-site disposal will be transported in end-dump trailers/trucks to the designated disposal facility. Prior to loading, all dump trucks will be staged onsite to avoid impacts on the local streets. Dump trucks to be loaded will not be allowed to cross removal or staging areas. Traffic will be coordinated in such a manner that, at any given time, no more than three dump trucks will be on the site, to reduce truck traffic on surrounding surface streets and reduce dust generation during on-site transportation. While onsite, all vehicles will be required to maintain slow speeds (i.e., less than five miles per hour) for safety purposes and for dust control measures. A traffic flag person will be used to control truck traffic entering and leaving the site. Trucks and other vehicles will use the entrance and exit points as described in Section 2.7.

2.4 Truck Loading Operations

Trucks will be loaded on the designated portion of the staging area. A hydraulic backhoe (or similar equipment) will load the soil from the stockpile into dump trucks for transportation to the designated disposal facility. All vehicles will be decontaminated prior to leaving the work area. All stray waste material on vehicles, tires, etc., will be brushed off and sprayed off with water, if necessary. Then the dump truck will be covered with a tarp to prevent the excavated soil and/or dust from spilling out of the truck during transport to the disposal facility. Prior to leaving the load-out area, each truck will be inspected by the site manager to ensure that the payloads are adequately covered, the trucks are cleaned of contaminated soil, and the shipment is properly documented. Each truck will receive the proper placarding and paper work. Water spray or mist, as appropriate, will be applied during loading operations for dust control purposes.

2.5 Shipment Documentation

Non-hazardous Waste Shipment

A non-hazardous waste shipping manifest or bill of lading will be used to document and accompany each truck shipment of soils excavated from the Site.

Hazardous Waste Shipment

A hazardous waste shipping manifest will be used to document and accompany each truck shipment containing soils profiled as hazardous waste.

The Site manager will maintain a copy of shipping documents onsite for each truckload until completion of the removal action.

2.6 Off-Site Land Disposal Facilities

Hazardous Waste Disposal Facility

Based on the results of waste profile and classification, a portion of the excavated lead-impacted soil is classified as California hazardous waste. This waste will be profiled as California hazardous waste and will be transported to a proper off-site land disposal facility. This waste is planned to be transported to a Class I landfill specified below, or equivalent:

Chemical Waste Management, Inc.
Kettleman Hills Landfill
35251 Old Skyline Road
Kettleman City, California
Phone: (888) 543-9646
Hours of Operation: Monday – Friday 8:00 AM – 8:00 PM

Final determination of the landfill selected for disposal will be based on approval from the landfill. Once the landfill is determined, copies of waste profile reports used to secure disposal permission from the landfill will be provided to DTSC. Compliance with the land disposal restrictions, as necessary, will be documented and provided to DTSC once it is determined which disposal facility will be used.

Non-Hazardous Waste Disposal

For the purposes of this Transportation Plan, a portion of the lead-impacted soil is assumed to be non-hazardous waste. Both materials are planned to be transported to a California Class 3 landfill specified below, or equivalent:

Waste Management, Inc.
Altamont Landfill
10840 Altamont Pass Road
Livermore, California 94551

Waste Approvals Manager Phone: (925) 455-7305
Hours of Operation: Monday – Friday 6:00 AM – 6:00 PM

Final determination of the landfill selected for disposal will be based on approval from the landfill. Once the landfill is determined, DTSC will be notified via email and/or telephone.

2.7 Transportation Routes

Transportation of the excavated waste materials will be on arterial streets and/or freeways approved for truck traffic to minimize any potential impact on the local neighborhood.

The transportation routes from the site to the designated disposal facilities are described below and shown on Figure D.1. When entering the site, trucks and other vehicles will use the main entrance, located at 2 Ward Street in Larkspur, CA. Trucks will exit the site directly onto Doherty Drive, as described below. The access points are shown on Figure D.1.

Hazardous Waste Route

If the lead-impacted soil that is classified as California hazardous waste is accepted by the Kettleman Hills Landfill, the transport trucks will follow the following route:

All trucks will proceed west on Doherty Drive toward Magnolia Avenue. The trucks will turn right onto Magnolia Avenue and travel approximately one-half mile and make a slight right onto Bon Air Road. The trucks will travel approximately 0.7 mile and turn right onto Sir Francis Drake Boulevard. After approximately 2.6 miles, trucks will take the on-ramp for Interstate 580 East (I-580 East) and cross the Richmond-San Rafael Bridge. The trucks will travel for approximately 70 miles on I-580 East toward Tracy and merge onto Interstate-5 (I-5) South. The trucks will then travel south on I-5 toward Los Angeles for approximately 137 miles and exit at Highway 41 South in Kettleman City. The trucks will then travel south on Highway 41 for approximately 2.5 miles. The trucks will then turn right onto Old Skyline Road and follow it into the Kettleman Hills Landfill. When returning to the site, trucks will enter through the main gate located at 2 Ward Street.

A map depicting the proposed transportation route for off-site shipment of hazardous wastes is shown on Figure D.1 and will be updated as necessary.

If possible, transportation will be conducted during off-peak traffic hours (e.g., from 9:00 AM until 3:00 PM). Trucks on public roads will obey all applicable traffic laws.

Non-Hazardous Waste Route

If the lead-impacted soil that is classified as non-hazardous waste and accepted by the Altamont Landfill, the transport trucks will follow the following route:

All trucks will proceed west on Doherty Drive toward Magnolia Avenue. The trucks will turn right onto Magnolia Avenue and travel approximately one-half mile and make a slight right onto Bon Air Road. The trucks will travel approximately 0.7 mile and turn right onto Sir Francis Drake Boulevard. After approximately 2.6 miles, trucks will take the on-ramp for Interstate 580 East (I-580 East) and cross the Richmond-San Rafael Bridge. The trucks will travel on I-580 East for approximately 45 miles and then exit toward N. Greenville Road/Altamont Pass Road. The trucks will then follow signs for Altamont Pass Road and turn right onto Altamont Pass Road. Finally, the trucks will travel approximately 3.2 miles north-northeast on Altamont Pass Road to the Altamont Landfill entrance. When returning to the site, trucks will enter through the main gate located at 2 Ward Street.

If possible, transportation will be conducted during off-peak traffic hours (e.g., from 9:00 AM until 3:00 PM). Trucks on public roads will obey all applicable traffic laws.

2.8 Recordkeeping

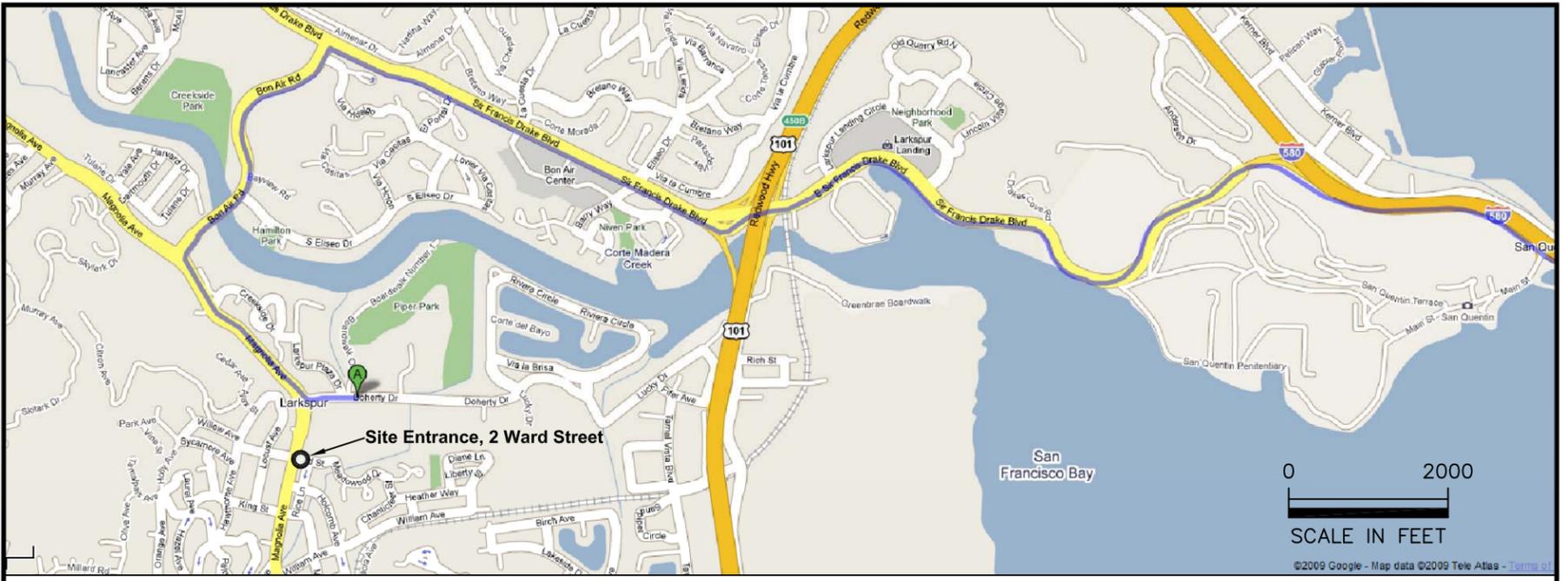
The excavation contractor will be responsible for maintaining a field logbook during the removal action activities. The field logbook will serve to document observations, personnel onsite, truck arrival and departure times, and other vital project information.

2.9 Health and Safety

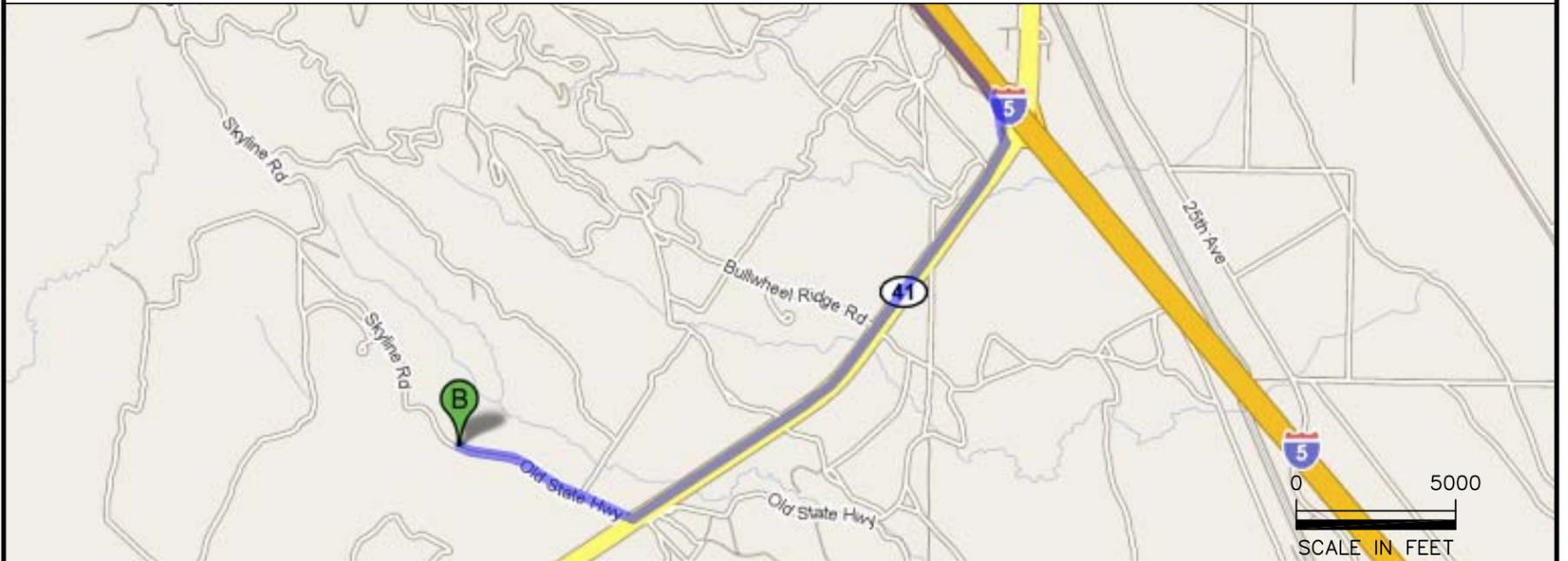
The selected contractor will prepare a site-specific HASP prior to initiation of site work. Everyone working at the site will be required to be familiar with the site-specific HASP.

2.10 Contingency Plan

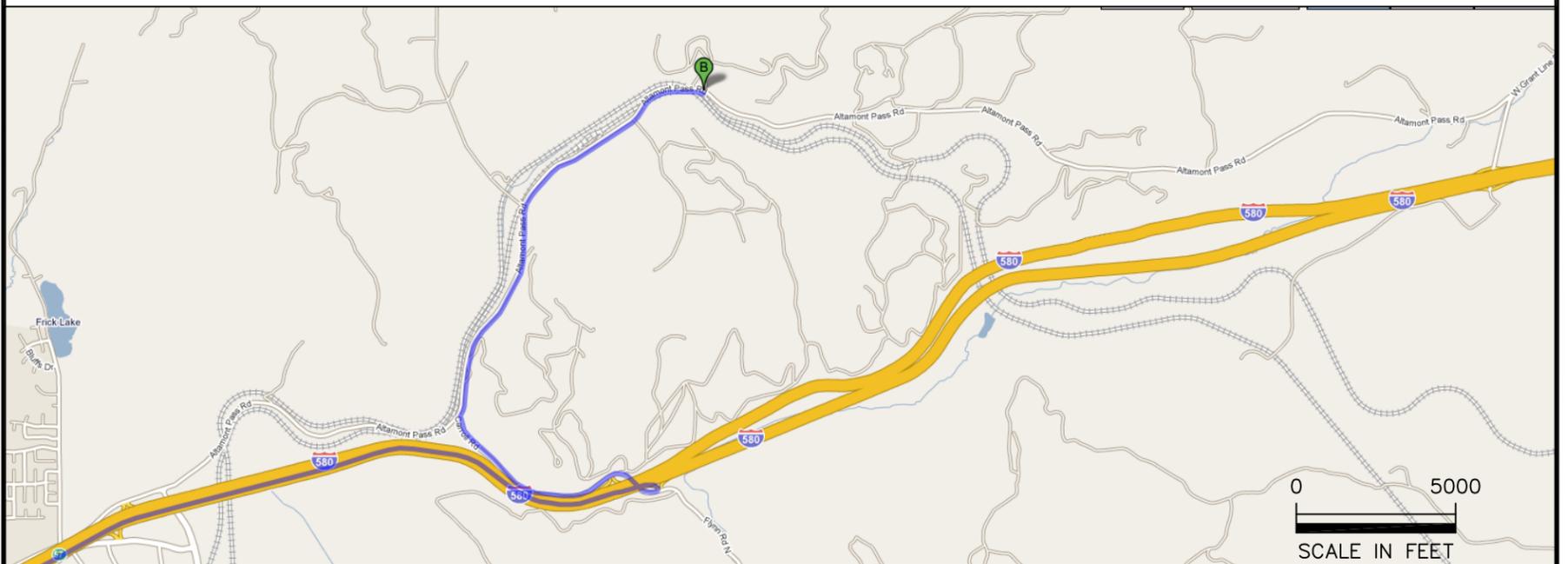
Each waste hauler is required to have a contingency plan prepared for emergency situations (vehicle breakdown, accident, spill or leak of materials, fire, explosion, etc.) during transportation of excavated soil from the Site to the designated disposal facility. Once the waste hauler is selected, a copy of its contingency plan will be attached to this Transportation Plan.



Starting Point: Doherty Drive, Larkspur, California



Ending Point 1: 35251 Old Skyline Road, Kettleman City, California



Ending Point 2: 10840 Altamont Pass Road, Livermore, California

DIRECTIONS TO KETTLEMAN HILLS LANDFILL:

1. Head west on Doherty Drive toward Magnolia Avenue
2. Turn right at Magnolia Avenue
3. Slight right at Bon Air Road
4. Turn right at Sir Francis Drake Boulevard
5. Take the ramp onto I-580 East
6. Cross the Richmond-San Rafael Bridge
7. Continue to Follow I-580 East towards Tracy
8. Merge onto I-5 South
9. Take Exit 309 for CA-41 toward Kettleman City/Paso Robles
10. Turn right at CA-41
11. Turn Right at Old State Highway
12. Arrive at Kettleman Hills Landfill

DIRECTIONS TO ALTAMONT LANDFILL:

1. Head west on Doherty Drive toward Magnolia Avenue
2. Turn right at Magnolia Avenue
3. Slight right at Bon Air Road
4. Turn right at Sir Francis Drake Boulevard
5. Take the ramp onto I-580 East
6. Cross the Richmond-San Rafael Bridge
7. Continue to follow I-580 East towards Tracy
8. Take the exit toward Flynn Road
9. Sharp right at Carroll Road
10. Turn right at Altamont Pass Road



ENVIRON

Proposed Transportation Route to Kettleman Hills Landfill and Altamont Landfill
 Niven Nursery
 Larkspur, California

Figure
D-1