13.3 Revised Remedial Action Plan and Human Health Risk Assessment

COUNTY OF ORANGE
HEALTH CARE AGENCY

PUBLIC HEALTH SERVICES
ENVIRONMENTAL HEALTH

DAVID L. RILEY
DIRECTOR

BOB WILSON
ASSISTANT AGENCY DIRECTOR

DAVID M. SOULELES, MPH
DEPUTY AGENCY DIRECTOR

RICHARD SANCHEZ, REHS, MPH
DIRECTOR
ENVIRONMENTAL HEALTH

MAILING ADDRESS:
1241 E. DYER RD., #120
SANTA ANA, CA 92705-5611

TELEPHONE: (714) 433-6000
FAX: (714) 754-1732
E-MAIL: ehealth@ochca.com

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February 15, 2011

Jim Engle
Community Services Department
City of Huntington Beach
2000 Main Street
Huntington Beach, CA 92648

Subject: **Remedial Action Plan**

Re: Former Gun Range Site
18191 Gothard Street
Huntington Beach, CA 92649
OCHCA Case # 01IC004

Dear Mr. Engle:

Please be advised that Orange County Health Care Agency (OCHCA) Environmental Health has reviewed the subject plan of September 7, 2010 (revised January 2011) submitted by your consultant, Waterstone Environmental, Inc. and found it acceptable for implementation provided the following considerations are addressed:

1. Final verification soil samples are to be analyzed for both total and soluble lead (Pb).
2. OCHCA must be provided copies of disposal manifests for the excavated Pb-impacted soil.
3. OCHCA should also be provided a certification letter from the environmental contractor/consultant indicating the volume of the planned imported soil tested, the number of samples collected for analyses, what analyses were performed, with attached laboratory analysis data sheets reflecting the analytical results. The environmental contractor/consultant must also provide a map showing the location of samples and the geometry of the stockpile or area sampled prior to transporting the imported soil to the referenced site.
4. Lastly, OCHCA must be provided documentation on the disposition of the backstop telephone posts and wood post fencing classified as hazardous waste.

Should you have any question regarding this matter, please do not hesitate to contact the undersigned at (714) 433-6253 or LLodrigueza@ochca.com.

Sincerely,

Luis Lodrigueza
Hazardous Waste Specialist
Hazardous Materials Mitigation Section
Environmental Health Division

cc: Kamron Saremi, California Regional Water Quality Control Board—Santa Ana Region
Ricky Ramos, Senior Planner, Planning Division, City of Huntington Beach
2000 Main Street, Huntington Beach, CA 92648
David Dominguez, Manager, City of Huntington Beach Community Services
2000 Main Street, Huntington Beach, CA 92648
Nancy Beresky, Waterstone Environmental, Inc., 2936 East Coronado Street
Anaheim, CA 92806

Revised
Remedial Action Plan and Human Health Risk Assessment

Former Gun Range Site
18191 Gothard Street
Huntington Beach, California

January 2011

Prepared for: **City of Huntington Beach Planning Department**
200 Main Street
Huntington Beach, California 92648

Orange County Health Care Agency
1241 East Dyer Road, Suite 120
Santa Ana, CA 92705

Prepared by:

Waterstone Environmental, Inc.
2936 East Coronado Street
Anaheim, California 92806
(714) 414-1122; Fax (714) 414-1166

Revised Remedial Action Plan and Human Health Risk Assessment

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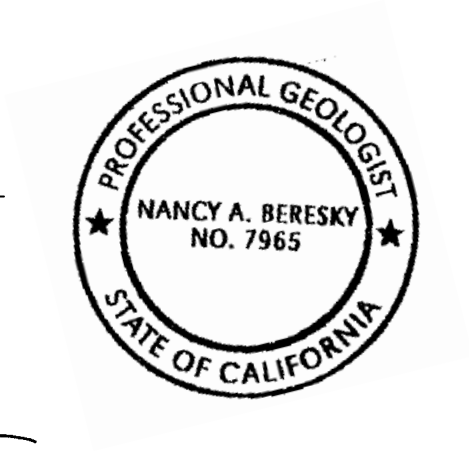

Nancy Beresky, P.G. 7965
Principal Hydrogeologist

Jeffrey V. Dagdigian, PhD
Managing Partner

Waterstone Environmental, Inc.
2936 East Coronado Street
Anaheim, California 92806
(714) 414-1122; Fax (714) 414-1166

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Section 1.0
Introduction

The City of Huntington Beach (City) retained Waterstone Environmental, Inc. (Waterstone) to prepare a Remedial Action Plan (RAP) and Human Health Risk Assessment (HHRA) for a Former Gun Range Site located at 18191 Gothard Street in Huntington Beach, California (Subject Property). This document was submitted to the City of Huntington Beach in April 2009 and was released for submittal to the Orange County Health Care Agency (OCHCA) in September 2010.

OCHCA's review of the original RAP submitted in September 2010 included a consultation with OEHHA. OEHHA stated that new standards for lead cleanup levels have been issued by the State of California. In addition, OEHHA recommended that the Subject Property be cleaned up to a residential standard rather than the commercial/industrial standard that was proposed in the original RAP. The new, much more conservative cleanup levels for lead were approved for use by the City of Huntington Beach and caused the need to provide this revised RAP to reflect the change in standards for lead cleanup and the change from an industrial/commercial cleanup scenario to a residential standard cleanup.

Figure 1 shows the Subject Property location. This RAP and the HHRA are based on initial soil sampling and analysis performed in 2001 by Hart Crowser, Inc. and additional soil sampling/analysis performed in 2008 by Waterstone. Background and historical information provided in this RAP are taken from previous reports by others.

Portions of the soil areas of the Subject Property and wood telephone poles used as a backstop and for property delineation are known to be contaminated by the heavy metal, lead, from bullets discharged during firing range activities. This RAP and HHRA address lead contamination and propose a clean up plan that will allow the Subject Property to be remediated for future use as open space and/or parks.

Based on implementation, effectiveness, and cost efficiency, the recommended response action for the removal of the lead-containing soil and wood is off-site disposal at an appropriate landfill. The HHRA has been performed on the existing soil results and provides clean up guidance indicating that when the RAP is implemented, the Subject Property will be restored to a condition that allows for the protection of human health for a residential scenario – this is a more stringent standard than is typically required for an open-space reuse scenario. The residential scenario was the recommended cleanup level scenario by OCHCA based on its conversation with the State of California Office of Environmental Health Hazard Assessment (OEHHA).

Section 2.0
Subject Property Description

2.1 Subject Property Location

The Subject Property is approximately 4.91 acres in size and is located in the central portion of the City of Huntington Beach, within Huntington Central Park (see Figure 1). It is presently owned by the City and is designated as Open Space-Park in the City's General Plan. This area is designed to preserve open spaces for the City's existing and future residents and provide, maintain, and protect significant environmental resources, recreational opportunities, and visual relief from development.

The Subject Property has a physical street address of 18191 Gothard Street, in Huntington Beach, California (Figure 1). Access to the Former Gun Range Site is provided by Gothard Street, located south of Talbert Avenue and north of Ellis Avenue. Regionally the Subject Property is located south of the City of Westminster, west of the City of Fountain Valley and southeast of the City of Seal Beach.

The legal description of the Subject Property is as follows:

> *The north 535.00 feet of the west 300.00 feet of the east 445.00 feet of the southeast quarter of the northwest quarter of the northwest quarter of Section 35, Township 5 South, Range 11 West.*

An aerial photograph of the property with the legal description is included as Figure 2.

2.2 Subject Property History

Starting in the 1920's, the immediate area surrounding the Subject Property was used for the recovery of sand and aggregate. On historical topography maps for the area, Sully Miller Lake (directly south of the Subject Property) was identified as a "sand pit" and the former Bruce Brothers Pit was located a short distance away to the northeast.

Prior to any development, the Subject Property contained a natural drainage channel approximately 35 feet deep. This natural channel entered the Subject Property from the northwest and trended towards the south emptying into the existing Sully Miller Lake area to the south of the Subject Property. Beginning in the 1950's, this natural drainage channel was filled with earth, debris and trash and became part of the approximately 52-acre Huntington Beach Landfill (Landfill) owned and operated by Orange County (County).

The County operated the Landfill as a burning dump from September 1947 through September 1956. After that date, the Landfill operated as a cut and cover operation. During that time, it is estimated that more than one million tons of earth and debris materials, including trash, waste, and refuse fill have been placed beneath and immediately surrounding the Subject Property. Various investigations have estimated that the refuse thickness is about 35-feet. The majority of the Subject Property has been covered with loose to medium dense silty sands ranging from less

than 4 to 25 feet in thickness. These sands were most likely placed without controlled compaction based on known settling and shifting that has subsequently occurred.

The Landfill was divided into two distinct areas, 33.2-acres of mixed municipal refuse and 18.3 acres of construction demolition material. The Subject Property reportedly overlies the mixed municipal refuse portion of the Landfill.

When the Landfill closed, the County deeded the property to the City for public park and recreation purposes. The Huntington Beach Police Officers Association (HBPOA) constructed the current gun range improvements with a public and private training facility in approximately 1968 and operated the facility under a 20-year lease from the City. In 1988, the long-term lease expired, and the gun range lease was continued on a year-to-year basis until 1997. The gun range was not used after 1997.

In the early 1990s, unstable soil conditions caused by the decomposing landfill materials became evident. The public side of the facility was closed and partially demolished because of the structural stability concerns. In 1993, the City began discussions with the HBPOA regarding rebuilding the gun range. In 1997, the City terminated the lease with HBPOA due to safety concerns, and the gun range was closed.

2.3 Subject Property Layout and Areas of Concern

For the purposes of environmental evaluation, the gun range is separated into 7 areas as shown on Figure 3. The main portions of the Subject Property were originally sampled by Hart Crowser in 2001 with the adjacent areas sampled by Waterstone in 2008 (see Figure 4). Figures 5 and 6 are based on Hart Crowser maps showing the different gun range use areas that have been subdivided into Areas A-G.

In the discussion that follows, Areas of Concern (AOCs) for the purposes of this RAP are identified in capitalized and underlined font. Following is a description of these areas.

1) **The Sniper and Special Forces Training Area:** (Sniper Area) - This is a 40-50 foot wide strip of the Subject Property located along the western boundary. It is separated from the Main Firing Range by a double wall of 20-foot high telephone poles that run north-south separating the two areas along the length of the Subject Property. This area is paved with asphalt over the northern third. In earlier reports, Hart Crowser references this area as Area A (northern 1/3) and Area B as shown on Figure 6. This area was sampled by Hart Crowser.

2) **Main Firing Range**: The Main Firing Range consisted of over 20 shooting "stations" in the central part of the Subject Property with target areas to the north. The target areas were on or in front of a 3-4 feet high **Soil Berm** at the base of a double wall of telephone poles used as a backstop on north end of property. The Soil Berm traverses the entire northern boundary of the Subject Property. In earlier reports, Hart Crowser references the Soil Berm as Area C and the Main Firing Range as Areas D (western portion) and E (eastern portion) as shown on Figure 6. This area was sampled by Hart Crowser.

3) **Telephone Poles**: Behind the Soil Berm area is a backstop wall constructed of 20-foot high, vertically placed telephone poles installed side-by-side in an east/west-trending row. A second wall of telephone poles is placed about 2 feet behind the first wall. The space in between the walls is filled with soil and concrete debris. This double-wall functioned as the backstop for the Main Firing Range. The **Backstop Telephone Poles** are impacted by lead as they are impregnated with bullets and bullet fragments, primarily within approximately 5 feet of target height. Other areas of the Subject Property have been "fenced in" or provide **Telephone Pole Walls** between areas of the gun range property and are likely to be much less impacted by lead. All the Telephone Poles have been treated with wood preservative. Laboratory analysis performed by Hart Crowser indicates this material is coal tar, not the more commonly used creosote. Hart Crowser performed sampling and analysis of the wooden telephone poles in 2001.

4) **Pistol Range:** The Pistol Range is located south of the Main Firing Range. It was originally sampled by Hart Crowser. The Pistol Range is designated as Area F in Hart Crowser reports as shown on Figures 5 and 6.

5) **Spoil Pile**: Immediately south of the Sniper Area is a small area where residual soil has been placed from "mining" the Soil Berm two times per year to separate out lead bullet pieces for recycling. It was originally sampled by Hart Crowser and is designated as Area G in Hart Crowser reports as shown on Figures 5 and 6.

6) **Ravine Area**: The ravine area is a natural drainage way located on the western boundary of the former gun range. The City requested additional sampling in this area to determine whether rain water runoff that may have originated from the gun range has impacted the ravine. Waterstone performed sampling of this area in 2008. This area is shown on Figures 4 and 7.

7) **Area South and East of the Pistol Range**: This area was not used for gun range purposes. The City requested additional sampling to determine whether potential rain water runoff from the gun range may have caused lead impact in this area. Waterstone performed sampling of this area in 2008. This area is shown on Figures 4 and 7.

Several wooden, cinder block, and metal structures associated with gun range uses are present on the Subject Property. Asphalt paving is present along the entry driveway and the shooter's area for the Main Firing Range.

2.4 Nature of Contamination

Use of the Subject Property for target shooting and police firearms training has caused impact to the soil and backstop materials (telephone poles and soil berms) by the heavy metal lead from bullet fragments. The Soil Berm was "mined" regularly to remove and recycle lead fragments. Although this practice significantly reduced the amount of lead impact at the Subject Property, soil sampling indicates that elevated lead concentrations remain on some areas of the Subject Property that will require remediation.

Several studies involving the collection and laboratory analysis of soil samples collected at the Subject Property have been performed. An initial study by Hart Crowser was performed in 2001 (see Figures 5 and 6 and Appendix A) and Waterstone performed additional sampling in 2008 (see Table 1, Figure 7, and Appendix B). References used in this RAP are:

- April 23, 2001, Hart Crowser, *Soil Investigation-Wood Posts/Fencing Characterization, Final Remedial Investigation Report*

- October 14, 2002, Hart Crowser, *Remedial Action Plan, Former Firing Range Property, 18191 Gothard Street, Huntington Beach, CA*

These studies have verified that soil in portions of the Subject Property contain elevated levels of lead that will require remediation. Following is a brief discussion of the impact at each area. Impacted locations and depths are shown on Figure 6.

The **Soil Berm** was evaluated by Hart Crowser by advancing 6 soil borings to 10 feet in depth. Laboratory analysis indicates all 6 locations are impacted by lead at concentrations exceeding cleanup levels at depths ranging from 8 to over 10 feet (Figure 6). This is most impacted area of the Subject Property based on volume, depth, and concentration of lead impact.

The **Backstop Telephone Poles** are considered the second most impacted feature on the Subject Property. Besides the double wall of wooden poles on the northern boundary, the same double wall is used on the west side of the Subject Property and on the northern quarter of the east side of the property. The remainder of the property is fenced. The western and eastern **Telephone Pole Walls** are only minorly impacted by lead as they were not directly used as backstops in the shooting areas.

The **Main Firing Range** area between the shooting stations and the Soil Berm is also impacted. Fifteen of the 24 locations sampled have lead concentrations exceeding cleanup guidance. Impact occurs to a depth that appears to be limited to the top one foot of soil in 11 locations, 3.5 feet in depth at 3 locations and 6.5 feet in depth at one location.

The **Pistol Range Area** south of the Main Firing Range is also impacted. Fifteen of the 20 locations sampled have lead concentrations exceeding cleanup guidance. Impact appears to be limited mostly to the top one foot of soil although 3 locations are impacted to a depth at least 3.5 feet in depth.

The area **West of the Pistol Range** is impacted at 8 of 12 sampling locations to a depth of at least one foot.

The **Soil Berm** in the **Sniper Area** is impacted to a depth of at least 10 feet and about half of the remainder of this area is impacted to a depth less than 1 foot. The remainder of the **Sniper Area** is impacted at 2 of 4 sampling locations.

The **Ravine Area** (Figure 7) has soil with lead concentrations that exceed cleanup criteria in five of 18 sampled locations. The Ravine Area is west of and adjacent to the Sniper Area.

In the **Spoil Pile Area**, Hart Crowser performed sampling at 12 locations. Each location was sampled at 2, 4, 6, 8, 10, and 12 feet in depth. Discrete samples were composited to evaluate three depth intervals by laboratory analysis (2-4', 6-8', 10-12'). The 72 discrete samples were composited into nine samples with laboratory analysis results for lead ranging from 3 ppm to 65 ppm. Based on these results, no remediation is necessary for the Spoil Pile Area.

The Subject Property is uncovered and unpaved. Because of this condition, any rainfall events have the potential to create runoff and downhill impact to topographically lower areas. Areas where runoff from the gun range may have occurred are included in the remedial action planning for the Subject Property. These are the **Ravine Area** and the **Area South of the Pistol Range**.

The **Area South of the Pistol Range** was sampled at 20 locations by Waterstone (see Figure 7). Of these, 1 exceeds cleanup guidance.

2.5 Geologic Setting & Topography

The Subject Property is generally located on a coastal plain known as the Los Angeles Basin on the northern margin of a landform regionally known as the Huntington Beach Mesa. The Los Angeles Basin is divided into four blocks that contain both uplifted and depressed areas. The active Newport-Inglewood Fault Zone (NIFZ) divides the seaward portion of the Basin from the Los Angeles Coastal Plain. The Subject Property is located approximately 1 ¼ -miles north of the NIFZ.

According to the USGS topographic map for Seal Beach (1982), the Subject Property is located at an approximate elevation of 50 feet above mean sea level (MSL). Surface topography in the vicinity of the Subject Property slopes gently to the south-southwest in the general direction of the Pacific Ocean, 2-miles to the southwest. On-site topography is variable with subsidence of fill sands throughout.

Section 3.0
Subject Property Characterization Results

3.1 Hart Crowser Investigation

The following reports were supplied to Waterstone by the City of Huntington Beach for the purposes of preparing this RAP/HHRA document:

- April 23, 2001, Hart Crowser, *Soil Investigation-Wood Posts/Fencing Characterization, Final Remedial Investigation Report*

- October 14, 2002, Hart Crowser, *Remedial Action Plan, Former Firing Range Property, 18191 Gothard Street, Huntington Beach, CA*

Hart Crowser completed its field-sampling program for the Remedial Investigation (RI) in March 2001. Soil samples were collected from the Soil Berm, from the floor of the Main Firing Range, from the floor of the Pistol Range, and from the Spoil Pile. In addition, wood samples were collected from the wood post fencing throughout the property.

Figure 5 and Appendix A provide laboratory results for all sampling performed by Hart Crowser. Figure 6 highlights those locations where lead concentrations exceed 80 ppm or where the Soluble Threshold Limit Concentration (STLC) analysis for lead exceeds the regulatory guidance of 5 ppm.

Concentrations of lead were found in the soils throughout the berm of the Main Firing Range. In general, elevated total lead concentrations appeared to be randomly scattered with soil locations and depths across the floors of both firing ranges. No direct relationship between total and soluble lead concentrations was found to exist based on sampling data. It was determined that this pattern may be due to the variable soil types associated with imported fill materials, and soil relocations known to have occurred throughout the property. Hart Crowser did not observe evidence of a consistent soil depth at which lead concentrations diminished. This may be due to uneven and irregular screening by the HBPOA and the fact that landfill materials were encountered at unexpectedly shallow levels, most likely due to lack of a cover cap. Laboratory results indicate that wood post fencing at the Subject Property was treated with coal tar, not creosote as was originally believed.

Laboratory results indicated that wood post fencing at the Subject Property was treated with coal tar, a common by-product of manufactured gas plants (also referred to as coal-gasification). In Hart Crowser's discussion of laboratory results, reference was made to a March 11, 1998 Santa Ana Regional Water Quality Control Board (RWQCB) letter directed to OCHCA which specified that "wood products treated with PCP (pentachlorophenol), creosote, arsenic, copper and chromium shall be disposed of at permitted, lined Class III landfills in the region. Wood products treated with creosote may also be disposed of at permitted, unlined Class III landfills."

3. 2 Waterstone Investigation 2008

During the preparation of the Environmental Impact Report for the Subject Property, it became necessary to understand whether the southern and western areas adjacent to the former Gun Range property would disturb any soil during remediation activities. Therefore, the City requested that Waterstone evaluate the ravine to the west of the Subject Property and the area South and West of the Pistol Range for potential impacts by lead.

Waterstone measured out and flagged the proposed sample locations at approximately the same density as the Hart Crowser study. On August 5, 2008, fifty (50) soil samples were collected in the field. Eighteen (18) locations were sampled on the down-slope, bottom, and up-slope in the Ravine Area located to the west of the former Gun Range. Twenty (20) locations were sampled in the Area South of the Pistol Range and 12 locations were sampled in the Area West of the Pistol Range Area. The locations are shown in light green on Figure 4, Waterstone's sample identification numbers are preceded by "Ravine" or "Surface."

Approximately 3-6 inches of plant and surface debris was cleared from each sampling area and a surface soil sample was collected with a decontaminated trowel. Each soil sample was placed in a labeled glass jar for laboratory analysis. Protocols are included in Appendix C. All samples were analyzed for lead by EPA Method 6010B at a State-certified laboratory.

Data results are included on Table 1 and the laboratory analysis data sheets are included in Appendix B.

3.3 Areas of the Subject Property That Exceed Cleanup Guidance

The Subject Property has been sampled along a grid pattern of approximately 50 foot centers by Hart Crowser and Waterstone. This sampling coverage has provided a clear understanding of the areas that require remediation based on the 80 ppm cleanup level and exceedances of the soluble limit for lead of 5 ppm. Figure 7 is a map that identifies each sample location where removal will be required. Table 2 provides details of the dimensions of each area proposed for excavation.

Section 4.0
Human Health Risk Assessment

A human health risk assessment (HHRA) can be used to evaluate whether the release of chemicals has the potential to cause harm to human health or the environment. For the Subject Property, an HHRA has been prepared to provide a toxological study to assess the potential risks resulting from exposure to residual lead in the soil.

This risk assessment follows the California Environmental Protection Agency's (Cal/EPA's) Department of Toxic Substances Control (DTSC, 2010) recommendations and changes to the standards for lead cleanup levels. The DTSC has recommended the use of a computer modeling program called the LeadSpread 7 to evaluate exposure and the potential for adverse health effects resulting from exposure to lead in the environment. LeadSpread is a tool that can be used to estimate blood lead concentrations resulting from exposure to lead via dietary intake, drinking water, soil and dust ingestion, inhalation, and dermal contact. Each of these pathways is represented by an equation relating incremental blood lead increase to a concentration in an environmental medium, using contact rates and empirically determined ratios. The contributions via the five human exposure pathways are added to arrive at an estimate of median blood lead concentration resulting from the multi-pathway exposure.

OCHCA's review of the original RAP submitted in September 2010 included a consultation with OEHHA. OEHHA stated that new standards for lead cleanup levels have been issued by the State of California. In addition, OEHHA recommended that the Subject Property be cleaned up to a residential standard rather than the commercial/industrial standard that was proposed in the original RAP. The new, much more conservative cleanup levels for lead were approved for use by the City of Huntington Beach and caused the need to provide a revised RAP to reflect this change in standards for lead cleanup and the change from an industrial/commercial cleanup scenario to a residential standard cleanup.

The revised standards are posted on the net at http://www.oehha.org/risk/pdf/LeadCHHSL091709.pdf. Specifically, the revised standard states that the human health screening value for lead for a residential scenario should be 80 milligrams of lead per kilogram of soil (80 mg/kg or parts per million [ppm]). The reason for the revision is OEHHA has recently developed a 1 microgram per deciliter (1 µg/dL) benchmark for source-specific incremental change in blood lead levels for protection of school children and fetuses. The blood lead level benchmark was previously 10 µg/dL.

The HHRA included as Appendix D provides a formal health risk assessment that illustrates the methodology and rationale used to arrive at this conclusion. The assumptions used in the HHRA likely significantly overestimate an individual's average exposure; the actual risks posed by exposure lead at the Subject Property may be significantly lower.

The DTSC currently recommends that sites be remediated to a target concentration of 80 mg/kg. If soils are removed containing lead equal to or greater than 80 mg/kg, this goal can be attained. The results of the risk assessment presented in this document indicate that, following the proposed remedial action plan, the presence of lead at the former gun range would not present a health risk to future users of the Subject Property.

Section 5.0
Identification of Remedial Alternatives

This RAP is designed to reduce chemical concentration levels and/or eliminate potential exposure pathways that may affect future users of the Subject Property. Identification of remedial alternatives allows for the evaluation of different methodologies and an understanding of the feasibility of each alternative. The goal of any remediation program is protection of human health and the environment. Therefore, cleanup goals must be determined prior to identification of remedial alternatives.

5.1 Cleanup Goals

Cleanup goals developed for the protection of human health and the environment have been performed via the use of regulatory standards and Human Health Risk Assessment (HHRA). In addition, Waterstone met with the OCHCA case officer, Mr. Luis Lodrigueza, at the Subject Property on March 27, 2009. During this meeting, a site walk was performed and cleanup goals were discussed. Mr. Lodrigueza indicated that January 2009 State guidance sets the remediation goal for lead at 800 ppm. Since that time, Mr. Lodrigueza has recommended the use of new risk assessment guidance and a residential cleanup guidance of 80 ppm. The HHRA for the Subject Property is provided in Appendix D which calculates the effect on human health when a cleanup goal of 80 ppm is used.

OCHCA reviewed the initial RAP document dated April, 2009 (submitted September 7, 2010)**.** Based on its review, OCHCA requested that the City consider using residential clean up levels consisting of the revised California Human Health Screening Level (CHHSL) for lead. Although the Subject Property will not be utilized for residential or commercial use, and no occupancy of the Subject Property is contemplated other than for recreational use, the City approved the use of the residential CHHSL level of 80 parts per million (ppm) as the cleanup level for this Revised RAP.

5.2 Remedial Alternatives

Alternate remediation technologies for the Subject Property were selected based on the following criteria:

- The technologies for the remediation method are proven, viable, and cost-effective;
- The remedial option is acceptable to the regulatory agencies;
- The remedial option is cost-effective on a per unit volume basis; and

The alternatives considered are as follows:

- No Action;
- Excavation of Areas Exceeding 80 ppm Lead
- As above but limited excavation of the Soil Berm, capping with fill soils.

The volumes for remediation are included on Table 2.

5.2.1 Alternative 1 – No Action

The "no-action" alternative leaves the Subject Property in its current condition with no remedial treatment actions, no affected soil removals, or capping. As a result, the existing ground cover throughout the Subject Property would degrade with time and would result in exposures to contaminated soils, both berms and ground surfaces, continued surface water infiltration, and potential landfill gas migration. There are no specific remedial technologies or process options included under this "no-action" category. Rather, this response action serves as a baseline against which the effectiveness of other remedial technology action alternatives can be measured. Under this alternative, no funds would be expended to reduce or remove the mobility, toxicity, or volume of contaminated soil materials at the Subject Property. Because there is no remedial action conducted with this alternative, no personnel or equipment are required. There would be no construction or operational/maintenance costs. Also, the Subject Property would have little or no beneficial land usages due to potential contact with lead-impacted soils.

5.2.2 Alternative 2 – Excavation of Areas Exceeding 80 ppm Lead, Removal of Telephone Poles (segregation of lead impacted portions)

This option entails the excavation of the bermed area to depths from 9-12 feet (1-2 feet deeper than known contamination) and removing other surficial (estimated 1 foot to 3.5 feet) impacts where sample results indicate greater than 80 ppm lead. Based on the site investigation information approximately 14,00 tons of lead-impacted soil is estimated to be present on-site. The proposed depths and areas of excavation are shown on Figure 7. The proposed excavation areas and volumes are shown on Table 2.

In-situ sampling indicates that all removed soil will be either non-RCRA (California Hazardous meaning exceeding 1,000 ppm total lead or 5 ppm STLC lead) or RCRA (Federal Hazardous meaning exceeding 5ppm TCLP lead). Where practical, RCRA and non-RCRA soil will be separated into separate stockpiles and sampled to determine whether it can be left onsite or requires disposal offsite.

Hart Crowser had discussed in its RAP document from 2002 the possibility of chipping the unimpacted portions of the Telephone Poles for placement on the Subject Property as fill material. Apparently, the Regional Water Quality Control Board had given tentative concurrence if the OCHCA and South Coast Air Quality Management District approved of the procedure. Waterstone contacted Mr. Lodrigueza at OCHCA to discuss this alternative. Because of the large number of polynuclear aromatic hydrocarbons in the coal tar coating (see Appendix A) and the very permeable nature of the underlying landfill, the Telephone Poles will require removal from the Subject Property and cannot be used as fill material.

All wooden Telephone Poles will be removed and transported to a landfill using this alternative. Additionally, each pole will be examined for lead fragments. It is assumed that the Backstop Telephone Poles will have significant lead impact and the remainder of the Telephone Poles will be mostly un-impacted.

For the Backstop Telephone Poles, bullets are not expected to have penetrated deeper than about 12 inches. For those Telephone Poles with obvious lead contamination, the portion of the pole that is most heavily impacted by lead fragments will be cut out and separated from the remainder of the un-impacted pole. Then, the "front" 12-inch portion of the impacted pieces of the Backstop Telephone Poles will be removed and disposed of separately.

The unimpacted portions of the Telephone Poles will be profiled based on the coal tar used to preserve them and disposed of appropriately. We understand that some facilities may require that the poles be "chipped" prior to acceptance. Once the receiving facility is identified, if it requires reducing the Telephone Poles to wood chips, that work will be performed at the Subject Property.

5.2.3 Alternative 3 – Same as Alternative 2 but Limited Excavation of the Bermed Area and "Hot Spots" and Limited Clean Fill Capping

This option is identical to Alternative 3 with two exceptions:

1. Remove soil in the Soil Berm area to a depth of 5 feet only.
2. Replace the removed soil with 5 feet of compacted fill for protection of the underlying lead-containing soil.

An advantage of this method is it is more cost effective as shown on Table 2. A disadvantage is that an engineered cap may continue to shift and must be maintained over time because of the nature of the uncompacted landfill materials underlying the Subject Property.

5.3 Choice of Alternative 2 for Remediation

Alternative 2 is the choice for remediation of the former Gun Range Property. This methodology completely removes all lead-impacted soil from the Subject Property and does not require the ongoing maintenance of an engineered fill cap. For the purposes of parks and open space, it is a more complete solution that will not require any special treatment or handling of soil after the remediation is complete. Given that this area is expected to continue to subside and shift as the underlying landfill materials settle, it is more feasible to allow City of Huntington Beach employees to work in this area without the need for special training in potentially encountering impacted soil.

Section 6.0
Wood Post Fencing and Debris Removal

The RAP assumes that the wood post fencing will be removed prior to remediation of lead-impacted soil. Based on assessment work performed using aerial photography, it is estimated that over 600 telephone poles ranging from 20 feet to 60 feet in length are onsite in use as double walls and wall supports. Telephone Poles separate the Main Gun Range from the Sniper and Pistol Ranges as well as comprise a West Wall and partial East Wall of the entire Subject Property. Table 3 provides an estimate of the volume and costs for removal assuming that approximately 25% of the wood will require removal under RCRA standards.

Removal of wood post fencing would be accomplished by utilizing an excavator with a hydraulic shear. The shear would assist in the dismantling and processing of the wood material to facilitate loading. Wood posts would be cut into manageable pieces for optimal separation of lead-impacted and non-lead-impacted wood and to facilitate loading of trucks.

Hart Crowser has assumed that approximately 40 loads of wood, classified as nonhazardous waste, would be transported to a licensed landfill for proper disposal, and approximately 11 loads of wood, classified as California Hazardous Waste, would be transported to a licensed landfill for proper disposal.

Grading is based on the movement of no more than six inches of material over the proposed grading area, and is intended to promote positive drainage. Additional cut and fill requirements (based on approved grading plans) and any work required if landfill materials are encountered would be considered out of scope for the purposes of this RAP.

Debris associated with dismantling the buildings, asphalt areas, and rubber tires used throughout the facility are assumed to be construction debris that does not require special handling. However, prior to demolition of buildings, a hazardous materials survey for lead, asbestos, and mercury light ballasts, etc. will be performed. If hazardous materials exist, they will be removed separately under all applicable regulations prior to demolition. Rubber tires will be examined for lead fragments prior to removal. Rubber tires impacted by lead fragments will be segregated and disposed of separately according to applicable regulations. Rubber tires not impacted by lead will be recycled if possible and disposed of as debris, if not.

Section 7.0
Excavation and Confirmation Sampling Procedures

This section presents the various tasks that make up the remedial action plan for the Subject Property.

7.1 Subject Property Mobilization/Pre-field Activities

Mobilization activities to be completed prior to initiating remediation activities are designed to establish the framework for on-site work during remediation for the purpose of avoiding delays and insuring safety during work on the Subject Property. Mobilization activities include:

1) Securing the site and controlling site access;
2) Preparing the Health and Safety plan;
3) Conducting utility clearances or procuring clearance from the City of Huntington Beach;
4) Filing necessary plans and permits including but not limited to grading permits and Storm Water Pollution Prevention Plans;
5) Removal of Telephone Poles (see Section 6.0);
6) Evaluating excavation areas and volumes for the purpose of selecting and preparing soil stockpile staging areas and determining the sequence of excavation activities;
7) Working with the waste acceptance contractor to schedule receipt of the material to be disposed;
8) Surveying in excavation areas;
9) Removing debris in excavation areas; and
10) Clearing and grubbing brush, trees, and other vegetation with a minimum of disturbance to the surface.

Following are the pre-field activities that will be performed prior to the implementation of field work.

7.1.1 Health and Safety Plan

A site-specific Health and Safety Plan (HASP) will be prepared. The HASP is for all onsite remediation work activities. The purpose of the HASP is to describe the controls and procedures that will be implemented to minimize incidents, injury, and health risks associated with the excavation activities to be conducted at the Subject Property. The HASP incorporates the requirements specified by OSHA Hazardous Waste Operations Standards (WPA 29 CFR 1910.120 and CCR Title 8).

Field personnel will review the HASP prior to commencing field work. Prior to initiation of field activities each day, a tailgate safety meeting will be conducted to identify potential physical and

chemical hazards and outline measures to be taken in event of an emergency. All on-site personnel will be required to document their attendance at the tailgate safety meeting by signing a form before work each day.

During field activities, appropriate personal protective equipment will be worn by all personnel within designated exclusion zones. The amount of dust present in the operator breathing zone will be obtained in the field on a regular basis using a dust meter or equivalent as required by the HASP.

7.1.2 Utility Clearance

Prior to commencement of field activities, Underground Service Alert (USA) will be notified of the intent to conduct excavation activities and prior to the initiation of any intrusive field tasks. A USA ticket number for the project will be kept current throughout excavation activities to be performed. All proposed locations of subsurface disturbance with mechanical equipment will be clearly marked with flagging as required by USA. USA will contact all utility owners of record within the Subject Property vicinity and notified them of our intention to conduct subsurface excavation in proximity to buried utilities. All utility owners of record, or their designated agents, are expected to clearly mark the position of their utilities on the ground surface throughout the area designated for excavation.

If necessary, a geophysical survey will be conducted by an independent subcontractor to help identify subsurface lines and obstructions. Three typical geophysical methods used to clear excavation area include magnetics, electromagnetics, and electromagnetic line location. Magnetics and electromagnetics use their respective technologies to identify underground tanks, drums, and conduits. These features are detected due to the ferrous and electrically conductive material of their construction. The geophysical survey may be waived if as-built plans with details of underground utilities (including but not limited to gas, phone, cable, electrical, water, sewer, oil pipelines, etc.) for the former Gun Range are available from the City of Huntington Beach and the City authorizes excavation without the utility clearance.

7.1.3 Permitting Prior to Excavation

Permits that may apply to the excavation scope of work described in this workplan include the following:

- Storm Water Pollution Prevention Plan requirements.
- Grading Permit requirements.

Following is a discussion of each.

Storm Water Pollution Prevention Plan

Regulations provide that discharges of storm water to waters of the United States from construction projects that encompass one (1) or more acres of soil disturbance are effectively prohibited unless the discharge is in compliance with a National Pollutant Discharge Elimination System (NPDES) Permit. The proposed excavation to be conducted on the Subject Property

involves the disturbance of greater than 1 acre of soil; therefore, a Storm Water Pollution Prevention Plan (SWPPP) will be required for this project.

Grading Permit

A City of Huntington Beach (or Orange County) Building and Safety Department Grading Permit will be procured and all requirements of the Grading Permit will be implemented during proposed excavation activities. Excavations to be conducted at the Subject Property are designed to remove impacted soil that represents the material that is most likely to contain elevated chemical compounds on the Subject Property. The following precautions are to be implemented during excavation activities to insure soil stability is not jeopardized:

- No buildings or structures are near planned deep excavations on the Subject Property; therefore, no surface surcharge other than excavation equipment and soil stockpiles need to be considered during excavation.
- The Berm Area excavation will be properly sloped as needed for soil stability.
- No excavation is anticipated below groundwater bearing zones.
- Excavation side slope stability in the Berm Area will be closely monitored to determine if shoring or sloping is required.
- Upon the completion of remediation activities, each excavation will be fenced until clean overburden material is brought in per geotechnical guidelines.
- Compaction of backfilled areas will be performed during grading activities that will be conducted by following remediation of the Subject Property. Grading of this area as open space is beyond the scope of this RAP.

7.2 Remediation Areas and Frequency of Confirmation Sampling

Each sample location on the Subject Property where lead has been detected at concentrations exceeding total lead of 80 ppm or STLC lead of 5 ppm is identified on Figure 7. Each of these areas represents an area requiring remediation. See Table 2 for the areas of each impacted location that require removal.

To expedite the excavation schedule, a portable instrument that can measure lead concentrations in the field will be used rather than doing costly iterations of excavation, sampling, and laboratory analysis leading to more excavation. A hand-held x-ray fluorescence (XRF) device manufactured by Innov-X (or equivalent) will be utilized in the field to provide real-time lead analysis for confirmation samples. Innov-X is considered among the newest, most accurate, and most user-friendly metals analyzers available.

Prior to analysis by XRF samples will be collected and prepared for field analysis. Preparation includes the following:

- A confirmation soil sample is collected in a ziplock plastic bag and labeled with a unique identification number.

- Using gloves, the field scientist removes large gravel, debris, and non-soil items from the soil sample to the extent possible.
- The bag is closed and the soil in each bag is then thoroughly mixed as the XRF is known to be most accurate and reproducible with a "homogenized" sample.
- A sample will be collected from the bag for laboratory analysis to confirm the XRF results (see section 7.2).

After excavation of the blocks to a depth of one foot, confirmation samples will be collected from each block using the following procedure:

- Two (2) bottom samples per 50 X 50-foot grid will be collected and analyzed by XRF. The results of lead analysis using the XRF meter will determine whether additional soil requires removal.

- Four (4) sidewall samples per each 50-foot by 50-foot excavation will be collected and analyzed by XRF. Note that side by side grids will eliminate sidewall samples for some grids altogether, since sidewalls will not exist for grids at shared sides.

7.3 Confirmation Sample Collection and Excavation "Extensions"

Prior to and between the sampling intervals, all reusable equipment will be decontaminated by washing in a non-phosphate detergent (Alconox) solution. The equipment will then be rinsed in tap water, and then in distilled water. Each confirmation soil sample will be collected using a decontaminated small trowel or other hand tool to retrieve a soil sample from the required confirmation sample depth and location.

Precautions will be taken to collect soil from the center of the soil sampling interval and not mix the soil from other depths in the sampling horizon. The sample will initially be placed in a small zip-lock bag for field analysis using the XRF instrument. The XRF reads total lead concentrations that will be used to determine whether excavation confirmation samples can be analyzed or if more excavation should be performed as follows:

- XRF Reading below 300 ppm: Send to laboratory for analysis
- XRF Reading 300-500 ppm: Perform additional excavation for 6 additional inches of sidewall or bottom removal
- XRF Reading over 500 ppm: Perform additional excavation for 1 foot of additional sidewall or bottom removal prior to recollection of confirmation samples.

For samples sent to a laboratory a 4-oz. jar of soil will be collected from the bag for laboratory analysis of lead. Each time the excavation is enlarged, the same procedure will be used to collect confirmation samples until laboratory analysis for all confirmation samples indicates that remaining soil meets the cleanup standards.

The final sampling to verify the successful completion of remedial excavation (i.e., cleanup goal has been achieved) will be conducted under the direction or supervision of an OCHCA representative, who must be notified at least 48 hours in advance of sampling activities.

For samples submitted to the laboratory, the sample jar is fitted with a Teflon-lined lid, labeled, and placed inside a ziplock bag. The sample label includes identifying information such as a unique sample ID, the date the sample was collected, and other pertinent project information. Soil samples are placed in a thermally insulated container with ice and shipped or couriered to a State-certified hazardous waste-testing laboratory under appropriate chain-of-custody procedures.

7.4 Waste Characterization

During excavation, removed soil will be segregated based on in-situ sampling results into two waste streams: 1) RCRA (exceeding 5ppm TCLP), and 2) non-RCRA (California hazardous is 5ppm or greater STLC or 1000 ppm or greater total lead). Because the clean up level of 80 ppm is greater than 10 times the STLC of 5 ppm (the STLC is an approximately 10X dilution), it is assumed that all soil removed from the Subject Property will be either RCRA or non-RCRA hazardous waste.

The Berm in the Main Firing Range and the Sniper Range will be remediated first to 1 or 2 feet deeper than the sample depths identified on Figure 7. Soil from this area will be stockpiled as RCRA waste. The exception to this is some SB-4 and SB-6 which indicate there is some clean soil overlying soil with hazardous lead levels. This volume will be separated as practical into a separate stockpile and sampled to determine whether it can be left onsite or requires disposal offsite.

Based on field observations, if a large amount of lead shot and lead bullet fragments are visible in soil removed from the Berm Area, screening and separation of lead pieces may be performed in the field. The separation of lead pieces will reduce the weight of the waste stream and also allow lead pieces to be recycled.

Whether additional screening for separation of lead fragments occurs or not, the stockpile will be sampled again for waste profiling. At this time, XRF field measurements of the stockpile will be used to determine whether additional laboratory analysis for STLC (California Hazardous test) and TCLP (RCRA or Federal Hazardous test) should be performed. All stockpile samples with XRF lead concentrations greater than 50 ppm will be sampled and analyzed at a laboratory for STLC and those with concentrations greater than 100 ppm will be sampled and analyzed at a laboratory for TCLP to determine which portions of the Berm Area waste pile should be segregated into RCRA and non-RCRA waste streams for disposal.

Other grids on the Subject Property that require remediation and the estimated excavation depths are listed on Table 2. Removal and segregation of soil will be into stockpiles based on in-situ sampling results. These grid areas are shown on Figure 7.

7.5 Backfill

If necessary, clean backfill will be imported to the Subject Property to replace the removed impacted soil. The environmental contractor will direct the subcontractor in obtaining all

required testing of backfill sources being considered for use. The following protocol will be used to identify acceptable backfill sources:

1. The site with available backfill will be identified and the historical uses of the backfill source property will be evaluated. Any backfill that has originated from an industrial site where chemical compounds were used or stored will not be considered an acceptable backfill source.
2. One or all of the following analyses will be required to evaluate soil from locations where the site history can be determined. Frequency of sampling will follow the protocol in Appendix E – use of material for school sites. For sites with no historical chemical use or known potential impact, the first three analyses, at a minimum will be required:
    - TPH by EPA Method 8015M for carbon chain analysis from C6-C40;
    - VOCs including oxygenates by EPA Method 8260;
    - Metals including mercury and chromium IV by EPA Method 6000/7000 series;
    - Low level analysis of 1, 4-dioxane; 1, 2, 3-trichloropropane; dioxin; and other emerging chemicals as identified by the State of California at the time of backfill source identification.
    - SVOCs by EPA Method 8270;
    - PCBs and pesticides by EPA Method 8080 and 8082;
    - Asbestos and leaded paint.
3. If the source of the backfill cannot be identified or if the site history cannot be ascertained, confirmation sampling will be required for every 250 cubic yards of soil if it is determined feasible to use the source for backfill.
4. All analytical testing results will be reviewed by the environmental contractor for inclusion in the HHSA prior to shipment of soil to the Subject Property**.** If the sampling results indicate the fill material is acceptable, the environmental contractor will provide a short letter indicating the volume of soil tested, the number of samples collected for analyses, what analyses were performed, and will attach laboratory analysis data sheets reflecting the analytical results. The environmental subcontractor will also provide a map showing the location of samples and the geometry of the stockpile or area sampled prior to transporting soil to the Subject Property.

Section 8.0
Landfill Gas

An active landfill gas extraction system has been designed for the Sports Center Complex including 34 vertical gas extraction wells and a 10 horsepower gas extraction blower facility with activated carbon canister scrubbers. If necessary, this landfill gas extraction system can be modified and expanded to handle the migration of gases from the Subject Property.

Section 9.0
Summary and Conclusions

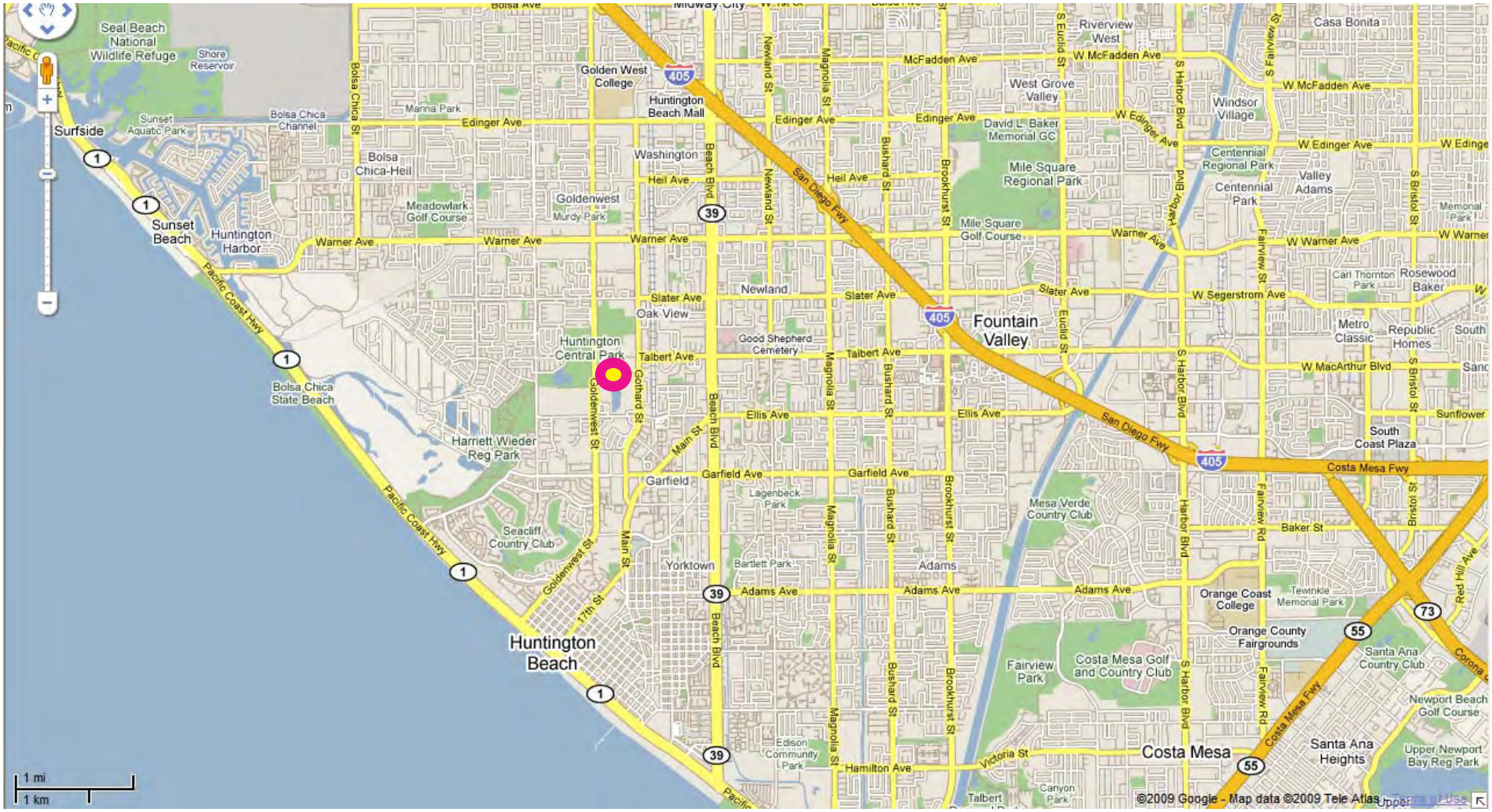
Site investigation activities performed on a roughly 50-foot by 50-foot grid pattern were performed on the Subject Property in 2001 by Hart Crowser and 2008 by Waterstone. Laboratory results indicate that elevated lead levels exist at the Subject Property. The source of lead is bullet fragments and lead shot from the former use of the Subject Property as a Gun Range since the 1960's. Based on these studies, the following summary and conclusions are made:

- Approximately 14,000 tons of lead-impacted soil above the proposed 80 ppm lead clean up level exist onsite. The areas are shown on Figures 6 and 7 and described on Table 2:
    - Soil in the Berm Area is impacted at all locations to depths exceeding 10 feet.
    - The Main Firing Range has been impacted at 15 of 24 locations.
    - The Sniper Area has been impacted at 3 of 4 locations (including the berm).
    - The Pistol Range Area has been impacted in 15 of 20 locations.
    - The Ravine Area to the west of the Gun Range has been impacted in 5 of 18 locations.
    - The Area West of the Pistol Range Area has been impacted in 8 of 12 locations.
    - The Area South of the Pistol Range Area has been impacted at 1 of 20 locations.
- Based on recent regulatory guidance from the State of California EPA, Department of Toxic Substances Control, OEHHA and concurrence with OCHCA, the clean up standard for lead used in this RAP/HHRA document for soil is the residential standard of 80 mg/kg. In addition, OCHCA has provided guidance that all results greater than the lead STLC of 5 ppm will also require removal from the Subject Property.
- Based on in-situ sampling results, excavated soil is anticipated to be classified into two waste streams: either RCRA (federal) hazardous waste (exceeding TCLP lead results of 5 ppm) or California hazardous waste (exceeding STLC lead results of 5 ppm).
- The HHRA for the Subject Property indicates that cleanup of the Gun Range to 80 ppm lead is very conservative and more than protective of human health for an open space, recreational park future use.
- Over 600 wooden telephone poles used as backstop and fencing for the Subject Property will require removal from the site. Approximately 25% are estimated to be impacted by lead shot. All are assumed to be treated with coal tar based on investigation results performed by Hart Crowser.
- Significant variation in the lead concentrations is likely, because the presence of different sized lead fragments at different locations, and limitations of the soil collection and sampling procedures. The disposal options and costs can change significantly depending on these sample results at the Subject Property and at the disposal facility.

- The chosen alternative, Alternate 2, is the simplest and the easiest option. It is to excavate lead-impacted soil and dispose of it off-site as RCRA or non-RCRA waste.
- Every effort will be made not to penetrate the landfill materials during excavation. With the current lack of complete information regarding the location and depth of fill materials, care will be taken to protect the landfill materials under the Subject Property. Additional agency approvals may be needed if the excavation extends into the landfill.

On behalf of the City of Huntington Beach, Waterstone respectfully requests that OCHCA prepare a letter indicating its approval and comments to this Revised RAP/HHRA document.

FIGURES



Former Gun Range Location

Figure 1

Subject Site Location
Former Gun Range

18191 Gothard Street
Huntington Beach, CA

Figure 2

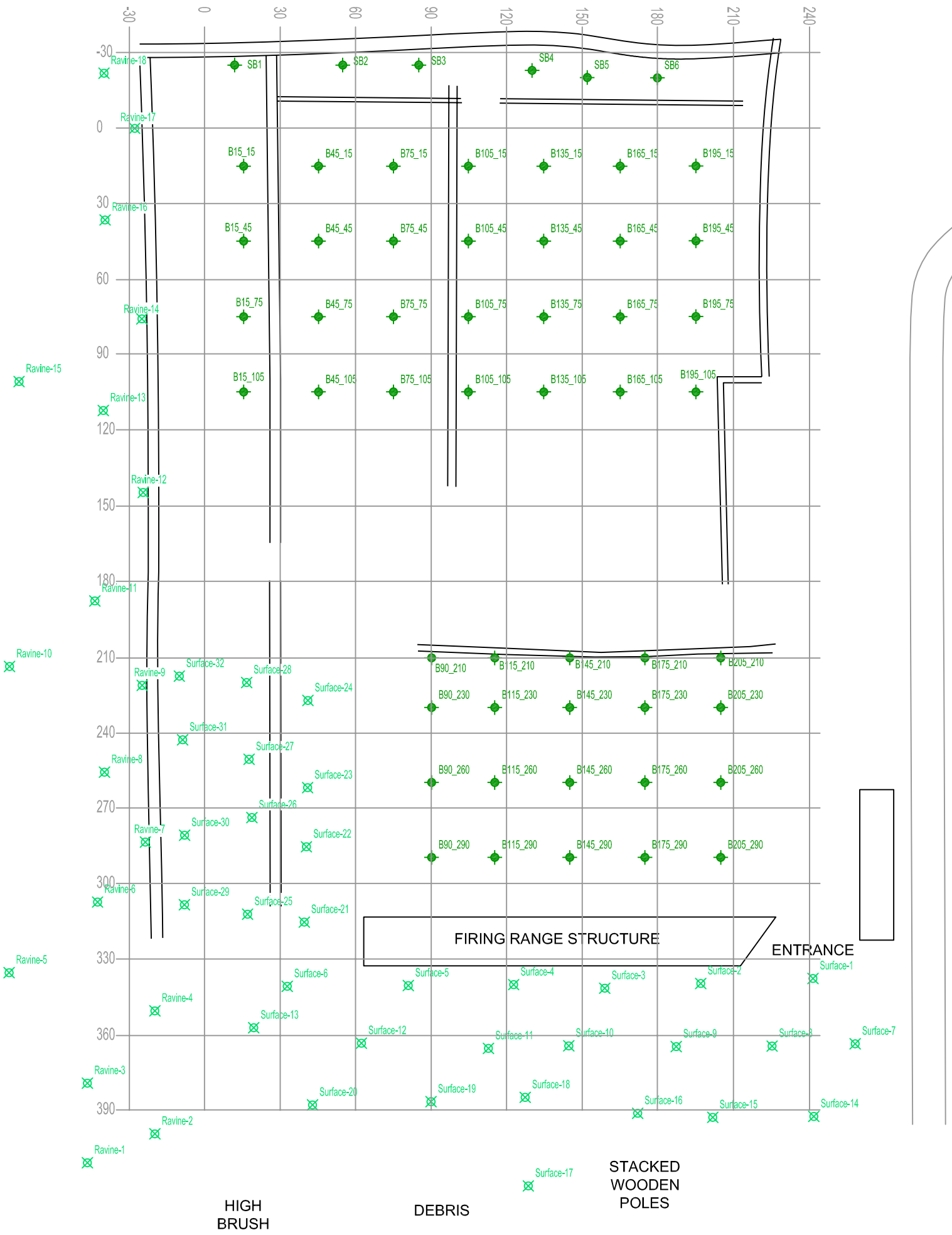
Former Gun Range
Aerial Photograph and
Legal Description

Huntington Beach, CA

Figure 3

Areas of the Former Gun Range

Huntington Beach, CA
(orange lines show legal boundary)



LEGEND

B90_290 — Soil Sample Location by Hart Crowser, 2001

Ravine-3 — Soil Sample Location by Waterstone, 2008

Interior and Exterior Fencing Consisting of Telephone Poles

0' 25' 50'

Scale

Figure 4

Site Characterization Soil Sampling Locations

City of Huntington Beach
Former Gun Range

WATERSTONE ENVIRONMENTAL, INC.
2936 East Coronado Street
Anaheim, California 92806

Drawn By: BAR	Version: 1.0
Approved By:	Date: 9/10/08

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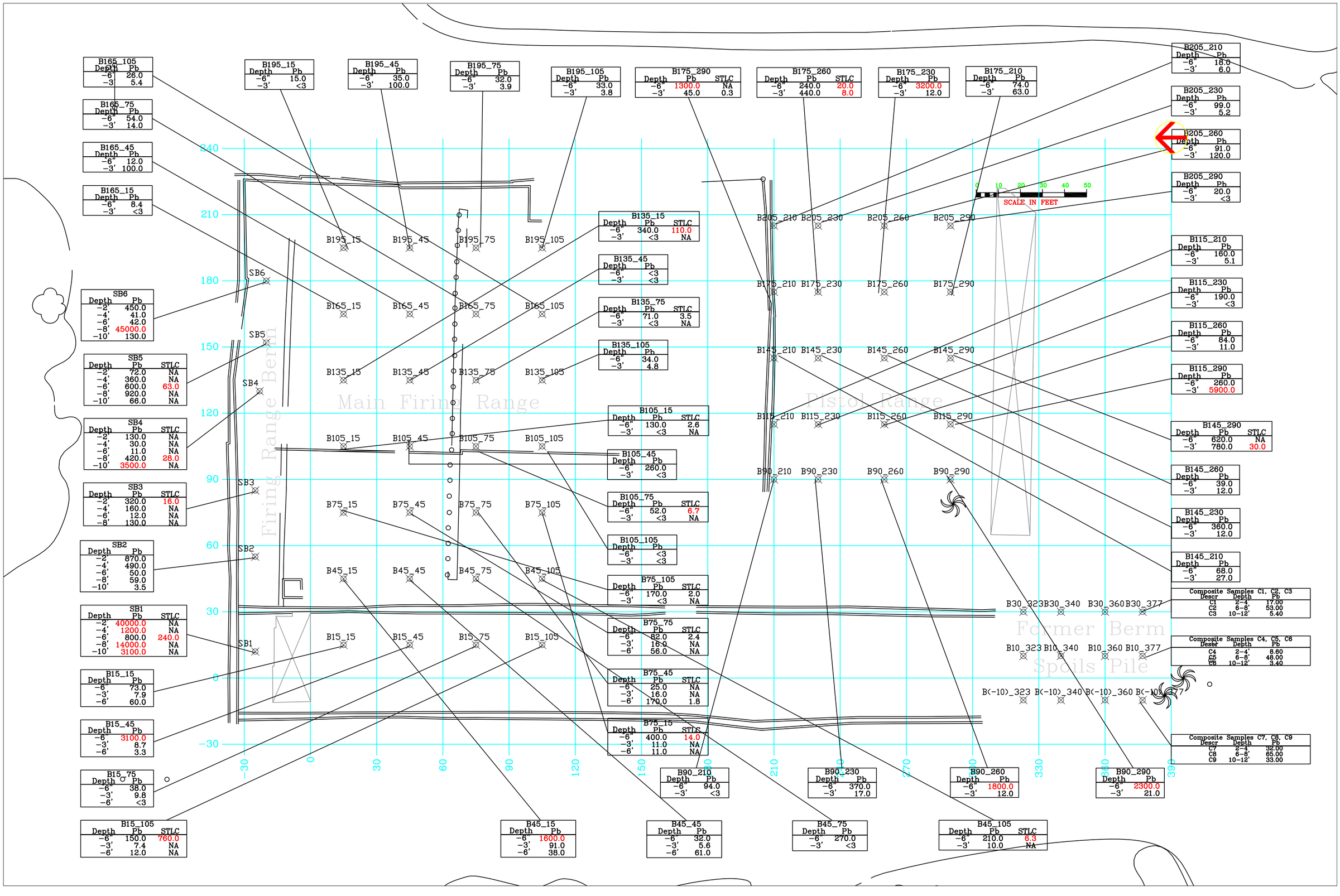

REV	DATE	DESCRIPTION	APPROVAL
A	04/11/01	Phase II Draft Report	JAW

REVISIONS AND APPROVALS

-30 Sample Grid Coordinates

Sample Grid Square

B15_15 Borehole Location and Coordinates

Log Fencing

Trees

Vegetation

Sample collection, analysis and map preparation by Hart Crowser, 2001.

SOURCE MetroPointe	DATE 01/24/01	SCALES In Model Space	
		CAD FILES Figure2.dwg	
DRAWN JAW	04/09/01	TECHNICAL APPROVAL WFM	DATE 04/10/01
DRAFTING CHECK MHE	04/09/01	PROJECT APPROVAL WFM	02/08/01
CHIEF DRAFTSMAN JAW	04/09/01	CLIENT APPROVAL	

Figure 5

Hart Crowser Soil Sampling Points and Data
Former Gun Range
City of Huntington Beach, CA

Figure 6

Map Showing Lead Analyses from Hart Crowser Data Exceeding 80 ppm Lead

Former Gun Range
Huntington Beach, CA

B195_45	
Depth	Pb
-6"	35.0
-3'	100.0

B135_15		
Depth	Pb	STLC
-6"	340.0	110.0
-3'	<3	NA

B105_45	
Depth	Pb
-6"	260.0
-3'	<3

B165_45	
Depth	Pb
-6"	12.0
-3'	100.0

B105_15		
Depth	Pb	STLC
-6"	130.0	2.6
-3'	<3	NA

B145_230	
Depth	Pb
-6"	360.0
-3'	12.0

B175_230	
Depth	Pb
-6"	3200.0
-3'	12.0

B205_260	
Depth	Pb
-6"	91.0
-3'	120.0

B205_230	
Depth	Pb
-6"	99.0
-3'	5.2

B175_260		
Depth	Pb	STLC
-6"	240.0	20.0
-3'	440.0	8.0

B175_290		
Depth	Pb	STLC
-6"	1300.0	NA
-3'	45.0	0.3

B145_290		
Depth	Pb	STLC
-6"	620.0	NA
-3'	780.0	30.0

B115_230	
Depth	Pb
-6"	190.0
-3'	<3

B115_260	
Depth	Pb
-6"	84.0
-3'	11.0

B115_290	
Depth	Pb
-6"	260.0
-3'	5900.0

B90_290	
Depth	Pb
-6"	2300.0
-3'	21.0

B90_230	
Depth	Pb
-6"	370.0
-3'	17.0

B90_210	
Depth	Pb
-6"	94.0
-3'	<3

B115_210	
Depth	Pb
-6"	160.0
-3'	5.1

B105_75		
Depth	Pb	STLC
-6"	52.0	6.7
-3'	<3	NA

B75_75		
Depth	Pb	STLC
-6"	82.0	2.4
-3'	16.0	NA
-6'	56.0	NA

B75_105		
Depth	Pb	STLC
-6"	170.0	2.0
-3'	<3	NA

B45_105		
Depth	Pb	STLC
-6"	210.0	6.3
-3'	10.0	NA

B45_75	
Depth	Pb
-6"	270.0
-3'	<3

B75_45		
Depth	Pb	STLC
-6"	25.0	NA
-3'	16.0	NA
-6'	179.0	1.8

B75_15		
Depth	Pb	STLC
-6"	400.0	14.0
-3'	11.0	NA
-6'	11.0	NA

B45_15	
Depth	Pb
-6"	1600.0
-3'	91.0
-6'	38.0

B15_45	
Depth	Pb
-6"	3100.0
-3'	8.7
-6'	3.3

B15_105		
Depth	Pb	STLC
-6"	150.0	760.0
-3'	7.4	NA
-6'	12.0	NA

B90_260	
Depth	Pb
-6"	1800.0
-3'	12.0

SB6	
Depth	Pb
-2'	450.0
-4'	41.0
-6'	42.0
-8'	45000.0
-10'	130.0

SB5		
Depth	Pb	STLC
-2'	72.0	NA
-4'	360.0	NA
-6'	600.0	63.0
-8'	920.0	NA
-10'	66.0	NA

SB4		
Depth	Pb	STLC
-2'	130.0	NA
-4'	30.0	NA
-6'	11.0	NA
-8'	420.0	28.0
-10'	3500.0	NA

SB3		
Depth	Pb	STLC
-2'	320.0	16.0
-4'	160.0	NA
-6'	12.0	NA
-8'	130.0	NA

SB2	
Depth	Pb
-2'	870.0
-4'	490.0
-6'	50.0
-8'	59.0
-10'	3.5

SB1		
Depth	Pb	STLC
-2'	40000.0	NA
-4'	1200.0	NA
-6'	800.0	240.0
-8'	14000.0	NA
-10'	3100.0	NA

B195_15 B195_45 B195_75 B195_105
B165_15 B165_45 B165_75 B165_105
B135_15 B135_45 B135_75 B135_105
B105_15 B105_45 B105_75 B105_105
B75_15 B75_45 B75_75 B75_105
B45_15 B45_45 B45_75 B45_105
B15_15 B15_45 B15_75 B15_105
B205_210 B205_230 B205_260 B205_290
B175_210 B175_230 B175_260 B175_290
B145_210 B145_230 B145_260 B145_290
B115_210 B115_230 B115_260 B115_290
B90_210 B90_230 B90_260 B90_290
B30_323 B30_360 B30_340 B30_377
B10_323 B10_360 B10_340 B10_377
B(-10)_323 B(-10)_360 B(-10)_340 B(-10)_377

AREA A
AREA B
AREA C
AREA D
AREA E
AREA F
Main Firing Range
Pistol Range
Former Berm Spoils Pile
Firing Line Berm
PALM TREES

Legend

B15_15 — BOREHOLE LOCATION AND COORDINATES
B1 — SAMPLE WITH LEAD ABOVE 80 PPM RESIDENTIAL CHHSL
Blue Circle designates locations over the 750 ppm cleanup level originally proposed.
LOG FENCING
VEGETATION

SB1		
Depth	Pb	STLC
-2'	40000.0	NA
-4'	1200.0	NA
-6'	800.0	240.0
-8'	14000.0	NA
-10'	3100.0	NA

BOREHOLE I.D.
DEPTH, LEAD IN ?, STLC IN ?
LEAD CONCENTRATIONS (??), STLC CONCENTRATIONS (??)

0' 20' 40'

Waterstone Environmental, Inc.
2936 East Coronado Street
Anaheim, California 92806

Drawn By: BAR	Version: 1.0
Approved By:	Date: 07/18/03

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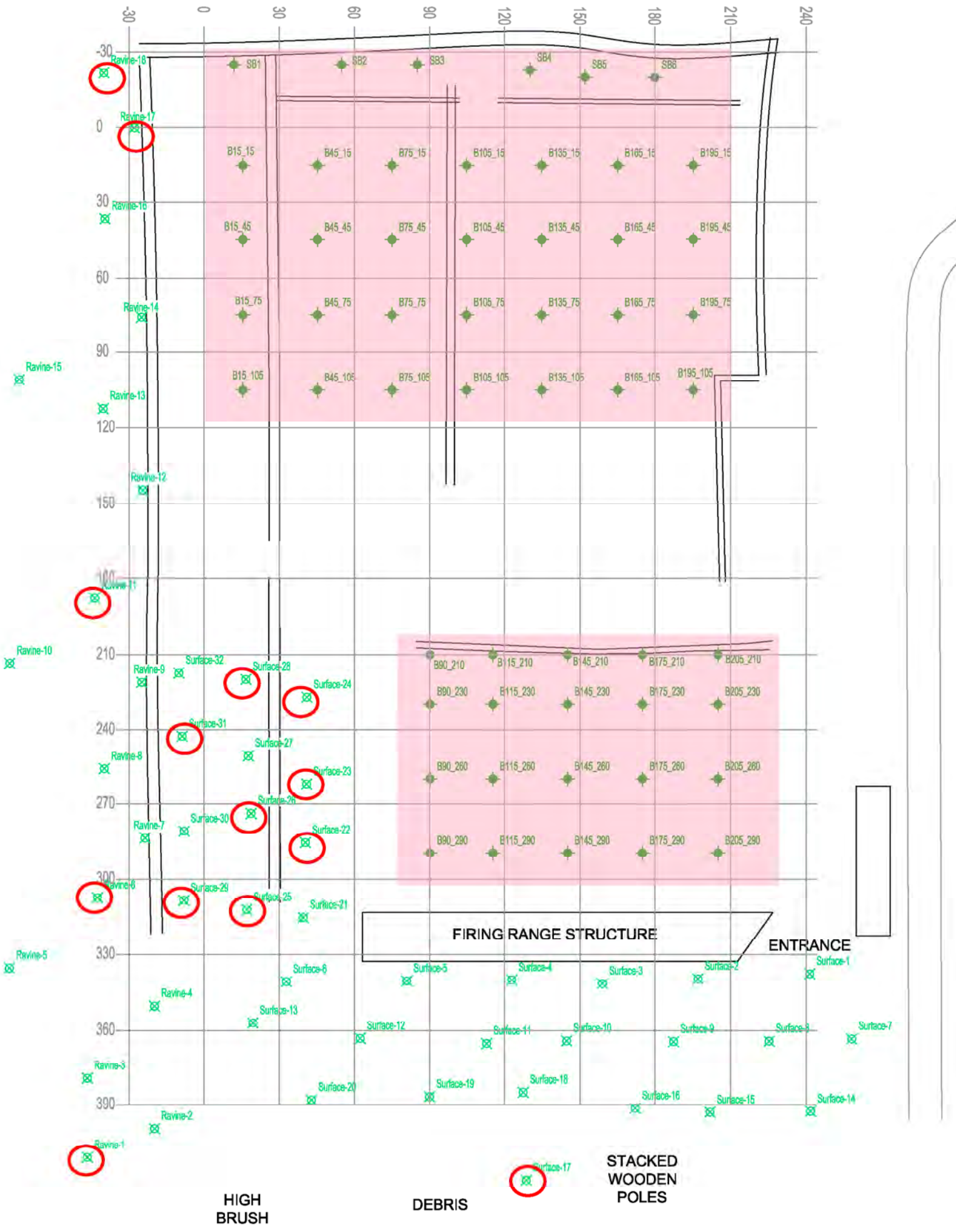

LEGEND

- Soil Sample Location by Hart Crowser, 2001
- Soil Sample Location by Waterstone, 2008
- Interior and Exterior Fencing Consisting of Telephone Poles
- Area previously sampled by Hart Crowser, see Figure 6 for impacted locations.
- Red circled locations show sampling results exceeding cleanup level of 80 ppm lead.

0' 25' 50'
Scale

Figure 7

Waterstone Soil Sampling Locations
Showing Locations
Exceeding Cleanup Criteria

City of Huntington Beach
Former Gun Range

WATERSTONE ENVIRONMENTAL, INC.
2936 East Coronado Street
Anaheim, California 92806

Drawn By: BAR	Version: 1.0
Approved By:	Date: 9/10/08

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TABLES

Table 1

Laboratory Results for Soil Samples Collected by Waterstone in 2008
Lead by EPA Method 6010B
Former Gun Range Site
City of Huntington Beach, CA
Results in mg/kg

Area of Concern	Sample ID	Lead
South of the Pistol Range	Surface - 1	18
	Surface - 2	18
	Surface - 3	22
	Surface - 4	24
	Surface - 5	21
	Surface - 6	8.9
	Surface - 7	11
	Surface - 8	24
	Surface - 9	9.8
	Surface - 10	16
	Surface - 11	8.3
	Surface - 12	9.5
	Surface - 13	14
	Surface - 14	11
	Surface - 15	15
	Surface - 16	25
	Surface - 17	**28000**
	Surface - 18	8.6
	Surface - 19	11
	Surface - 20	9.5

Area of Concern	Sample ID	Lead
West of the Pistol Range	Surface - 21	19
	Surface - 22	**3300**
	Surface - 23	**570**
	Surface - 24	**41000**
	Surface - 25	**95**
	Surface - 26	**1000**
	Surface - 27	57
	Surface - 28	**150**
	Surface - 29	**420**
	Surface - 30	13
	Surface - 31	**140**
	Surface - 32	48

Area of Concern	Sample ID	Lead
Ravine Area	**Ravine - 1**	**2000**
	Ravine - 2	6.3
	Ravine - 3	12
	Ravine - 4	5.4
	Ravine - 5	17
	Ravine - 6	**17000**
	Ravine - 7	65
	Ravine - 8	58
	Ravine - 9	43
	Ravine - 10	9
	Ravine - 11	**260**
	Ravine - 12	62
	Ravine - 13	57
	Ravine - 14	43
	Ravine - 15	12
	Ravine - 16	**86**
	Ravine - 17	**2300**
	Ravine - 18	44

RED Red font indicates elevated above OCHCA cleanup level of 80 ppm

TABLE 2

Removal Volumes Using 80 ppm Lead Cleanup Level
Former Gun Range
City of Huntington Beach, CA

Gun Range Area	Locations Exceeding Cleanup Guidance and Depth	Volume of impacted area			Area (cubic yards)	Tons
		Dimensions (feet)		*Average Depth (feet)*		
				Cubic yards conversion to Tons:		**1.7**
East Portion of Berm	SB4 - 2, 8, 10' SB5 - 4, 6, 8' SB6 - 2, 8, 10'	110	22	11	986	1,676
Central Portion of Berm	SB3 - 2, 4, 8' SB2 - 2, 4'	70	22	6	342	582
Sniper Range Berm	SB1 - 2,4, 6, 8, 10'	32	40	12	569	967
Sniper Area	B15-45 - 6"	35	35	2	91	154
	B15-105 - 6"	35	35	2	91	154
Main Range	B135-15 - 6" B105-15 - 6" B75-15 - 6" B45-15 - 6", 3'	140	35	2.5	454	771
	B75-105 - 6" B45-105 - 6"	70	35	2	181	309
	B105-75 - 6" B75-75 - 6" B45-75 - 6"	105	35	2	272	463
	B105-45 - 6"	35	35	2	91	154
	B75-45 - 6'	35	35	7	318	540
	B195-45 - 3' B165-45 - 3'	70	35	4	363	617
Pistol Range	B175-230, 290 - 6"	65	55	2	265	450
	B145-230, 290 - 6"	65	55	2	265	450
	B205-230 - 6"	35	30	2	78	132
	B115-, 210, 230, 260 B90-210,230, 260 - all at 6"	100	60	2	444	756
	B205,175- 260 - 6", 3'	110	55	4	896	1,524
	B90, 115-290 - 6", 3'	110	55	5	1,120	1,905
Ravine	Ravine 1, 6, 11, 16, 17 - surface (25 X 25 X 1' at each location)	125	125	1	579	984
South and East of Pistol Range	Surface 17, 22, 23, 24-26, 28, 29, 31 (15 X 15 X 1' at each location)	145	145	1	779	1,324
				TOTAL:	**8,183**	**13,911**

TABLE 3
Estimated Volume of Telephone Poles
(based on aerial photograph review)
Former Gun Range - City of Huntington Beach, CA

Note: All poles are considered impacted by coal tar preservative. "Unimpacted" in this table means not impacted by lead. All footages are ESTIMATES-actual volumes can only be determined in the field.

Area	Length	Total # of Poles	# Not Impacted	# Impacted	Total footage unimpacted	Total footage impacted
Backstop - Horizontal Poles facing Main Firing Range	40	12	4	8	160	320
	40	12	4	8	160	320
	40	12	4	8	160	320
	40	12	4	8	160	320
	20	12	4	8	80	160
Backstop - Horizontal Poles behind those facing Main Firing Range	40	12	12	0	480	0
	40	12	12	0	480	0
	40	12	12	0	480	0
	40	12	12	0	480	0
	20	12	12	0	240	0
Backstop - Vertical Poles on Main Firing Range Side	20	19	0	19	0	380
Backstop- Vertical Poles Not on Main Firing Range Side	20	19	19	0	380	0
East Wall of Main Firing Range-Horizontal Poles (closest to backstop)	45	12	6	6	270	270
	45	12	12	0	540	0
(furthest from Backstop)	45	12	12	0	540	0
East Wall of Main Firing Range - Vertical Poles In Firing Range	25	10	4	6	100	150
East Wall of Main Firing Range - Vertical Poles Not in Firing Range	25	10	10	0	250	0
West Wall of Main Firing Range - Horizontal Poles facing Main Firing Range	40	12	6	6	240	240
	40	12	6	6	240	240
	40	12	6	6	240	240
	40	12	12	0	480	0
	20	12	12	0	240	0
West Wall of Main Firing Range - Horizontal poles facing Sniper Range	40	12	12	0	480	0
	40	12	12	0	480	0
	40	12	12	0	480	0
	40	12	12	0	480	0
	20	12	12	0	240	0
West Wall Vertical Poles - In Main Firing Range	20	19	17	2	340	40
West Wall Vertical Poles - In Sniper Range	20	19	19	0	380	0

TABLE 3
Estimated Volume of Telephone Poles
(based on aerial photograph review)
Former Gun Range - City of Huntington Beach, CA

Note: All poles are considered impacted by coal tar preservative. "Unimpacted" in this table means not impacted by lead. All footages are ESTIMATES-actual volumes can only be determined in the field.

Area	Length	Total # of Poles	# Not Impacted	# Impacted	Total footage unimpacted	Total footage impacted
South Wall of Main Firing Range - facing Main Firing Range	60	12	12	0	720	0
	45	12	12	0	540	0
	35	12	12	0	420	0
South Wall of Main Firing Range - facing Pistol Range	60	12	6	6	360	360
	45	12	6	6	270	270
	35	12	6	6	210	210
South Wall Vertical Poles - In Pistol Range	25	9	9	0	225	0
South Wall Vertical Poles - Not in Pistol Range	25	9	0	9	0	225
West Wall of Sniper Range - facing sniper range	40	12	6	6	240	240
	40	12	6	6	240	240
	40	12	6	6	240	240
	40	12	12	0	480	0
	20	12	12	0	240	0
West Wall of Sniper Range - not facing SniperRange	40	12	12	0	480	0
	40	12	12	0	480	0
	40	12	12	0	480	0
	40	12	12	0	480	0
	20	12	12	0	240	0
West Wall Vertical Poles - In Sniper Range	20	19	17	2	340	40
West Wall Vertical Poles - Not In Sniper Range	20	19	19	0	380	0
Poles in pile to south:	25	50	50	0	1250	0
Totals:		**620**	**532**	**138**	**17,595**	**4825**

Average wt per ft (lbs) (from utility specifications manual)	46	Weight in lbs.	809,370	221,950
		Weight in tons:	**405**	**111**

APPENDIX A

CITY OF HUNTINGTON BEACH
FIRING RANGE

TABLE 1 : Total Lead, Copper, Zinc Concentrations in Soil (TTLC)

Sample Identification	Date Sampled	Total Copper EPA 7210 TTLC (mg/Kg)	Total Zinc EPA 7950 TTLC (mg/Kg)	Total Lead EPA 7420 TTLC (mg/Kg)	Soluble Lead Title 22 WET STLC (mg/L)
B-15,15-6"	3/12/01	25	74	73	NA
B-15,15-3'	3/12/01	16	51	7.9	NA
B-15,15-6'	3/12/01	17	42	60	NA
B-15,45-6"	3/12/01	47	60	3100	NA
B-15,45-3'	3/12/01	17	54	8.7	NA
B-15,45-6'	3/12/01	18	61	3.3	NA
B-15,75-6"	3/12/01	24	68	38	NA
B-15,75-3'	3/12/01	18	58	9.8	NA
B-15,75-6'	3/12/01	13	51	<3	NA
B-15,105-6"	3/12/01	18	49	150	760
B-15,105-3'	3/12/01	17	69	7.4	NA
B-15,105-6'	3/12/01	18	60	12	NA
B-45,15-6"	3/12/01	98	85	1600	NA
B-45,15-3'	3/12/01	50	85	91	NA
B-45,15-6'	3/12/01	60	240	38	NA
B-45,45-6"	3/12/01	21	66	32	NA
B-45,45-3'	3/12/01	10	35	5.6	NA
B-45,45-6'	3/12/01	180	190	61	NA
B-45,75-6"	3/12/01	21	69	270	NA
B-45,75-3'	3/12/01	18	64	<3	NA
B-45,105-6"	3/12/01	19	77	210	6.3
B-45,105-3'	3/12/01	19	60	10	NA
B-75,15-6"	3/12/01	180	350	400	14
B-75,15-3'	3/12/01	16	72	11	NA
B-75,15-6'	3/12/01	27	67	11	NA
B-75,45-6"	3/12/01	27	70	25	NA
B-75,45-3'	3/12/01	68	96	16	NA
B-75,45-6'	3/12/01	640	240	170	1.8
B-75,75-6"	3/12/01	61	64	82	2.4
B-75,75-3'	3/12/01	70	67	16	NA
Threshold for California Hazardous Waste		≥ 2,500	≥ 5,000	≥ 1,000	≥ 5

Notes:

1. mg/Kg = milligrams per kilogram
2. mg/L = milligrams per liter
3. NA = Not Analyzed
4. TTLC = Total Threshold Limit Concentration
5. Title 22 WET = California Code of Regulations, Title 22 Waste Extraction Test
6. STLC = Soluble Threshold Limit Concentration

CITY OF HUNTINGTON BEACH
FIRING RANGE

TABLE 1 : Total Lead, Copper, Zinc Concentrations in Soil (TTLC)

Sample Identification	Date Sampled	Total Copper EPA 7210 TTLC (mg/Kg)	Total Zinc EPA 7950 TTLC (mg/Kg)	Total Lead EPA 7420 TTLC (mg/Kg)	Soluble Lead Title 22 WET STLC (mg/L)
B-75,75-6'	3/12/01	32	170	56	NA
B-75,105-6"	3/12/01	20	70	170	2
B-75,105-3'	3/12/01	14	44	<3	NA
B-90,210-6"	3/20/01	20	78	1800	NA
B-90,210-3'	3/20/01	16	56	12	NA
B-90,230-6"	3/20/01	20	68	2300	NA
B-90,230-3'	3/20/01	11	48	21	NA
B-90,260-6"	3/20/01	22	66	160	NA
B-90,260-3'	3/20/01	19	69	5.1	NA
B-90,290-6"	3/20/01	22	65	190	NA
B-90,290-3'	3/20/01	21	62	<3	NA
B-105,15-6"	3/12/01	33	70	130	2.6
B-105,15-3'	3/12/01	8.8	28	<3	NA
B-105,45-6"	3/12/01	21	56	260	NA
B-105,45-3'	3/12/01	10	29	<3	NA
B-105,75-6"	3/12/01	27	67	52	6.7
B-105,75-3'	3/12/01	15	52	<3	NA
B-105,105-6"	3/12/01	21	67	<3	NA
B-105,105-3'	3/12/01	13	46	<3	NA
B-115,210-6"	3/20/01	20	81	84	NA
B-115,210-3'	3/20/01	10	50	11	NA
B-115,230-6"	3/20/01	18	70	260	NA
B-115,230-3'	3/20/01	15	60	5900	NA
B-115,260-6"	3/20/01	11	44	68	NA
B-115,260-3'	3/20/01	13	53	27	NA
B-115,290-6"	3/20/01	16	63	360	NA
B-115,290-3'	3/20/01	47	180	12	NA
B-135,15-6"	3/13/01	24	66	340	110
B-135,15-3'	3/13/01	16	51	<3	NA
B-135,45-6"	3/13/01	16	60	<3	NA
Threshold for California Hazardous Waste		≥ 2,500	≥ 5,000	≥ 1,000	≥ 5

Notes:

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CITY OF HUNTINGTON BEACH
FIRING RANGE

TABLE 1 : Total Lead, Copper, Zinc Concentrations in Soil (TTLC)

Sample Identification	Date Sampled	Total Copper EPA 7210 TTLC (mg/Kg)	Total Zinc EPA 7950 TTLC (mg/Kg)	Total Lead EPA 7420 TTLC (mg/Kg)	Soluble Lead Title 22 WET STLC (mg/L)
B-135,45-3'	3/13/01	14	42	<3	NA
B-135,75-6"	3/13/01	19	76	71	3.5
B-135,75-3'	3/13/01	15	50	<3	NA
B-135,105-6"	3/13/01	18	66	34	NA
B-135,105-3'	3/13/01	9.8	38	4.8	NA
B-145,210-6"	3/20/01	14	65	39	NA
B-145,210-3'	3/20/01	16	72	12	NA
B-145,230-6"	3/20/01	16	50	620	NA
B-145,230-3'	3/20/01	17	65	780	NA
B-145,260-6"	3/20/01	14	44	74	NA
B-145,260-3'	3/20/01	18	63	63	NA
B-145,290-6"	3/20/01	12	50	3200	NA
B-145,290-3'	3/20/01	38	89	12	30
B-165,15-6"	3/13/01	15	56	8.4	NA
B-165,15-3'	3/13/01	13	40	<3	NA
B-165,45-6"	3/13/01	15	63	12	NA
B-165,45-3'	3/13/01	22	69	100	NA
B-165,75-6"	3/13/01	11	39	54	NA
B-165,75-3'	3/13/01	9.8	37	14	NA
B-165,105-6"	3/13/01	21	64	26	NA
B-165,105-3'	3/13/01	15	54	5.4	NA
B-175,210-6"	3/20/01	14	67	74	NA
B-175,210-3'	3/20/01	19	71	63	NA
B-175,230-6"	3/20/01	18	58	3200	NA
B-175,230-3'	3/20/01	15	59	12	NA
B-175,260-6"	3/20/01	11	43	240	20
B-175,260-3'	3/20/01	15	58	440	8
B-175,290-6"	3/20/01	19	64	1300	NA
B-175,290-3'	3/20/01	16	63	45	0.39
B-195,15-6"	3/13/01	16	100	15	NA
Threshold for California Hazardous Waste		≥ 2,500	≥ 5,000	≥ 1,000	≥ 5

Notes:

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CITY OF HUNTINGTON BEACH
FIRING RANGE

TABLE 1 : Total Lead, Copper, Zinc Concentrations in Soil (TTLC)

Sample Identification	Date Sampled	Total Copper EPA 7210 TTLC (mg/Kg)	Total Zinc EPA 7950 TTLC (mg/Kg)	Total Lead EPA 7420 TTLC (mg/Kg)	Soluble Lead Title 22 WET STLC (mg/L)
B-195,15-3'	3/13/01	11	34	<3	NA
B-195,45-6"	3/13/01	12	58	35	NA
B-195,45-3'	3/13/01	17	56	100	NA
B-195,75-6"	3/13/01	12	38	32	NA
B-195,75-3'	3/13/01	9.4	32	3.9	NA
B-195,105-6"	3/13/01	27	70	33	NA
B-195,105-3'	3/13/01	8.2	28	3.8	NA
B-205,210-6"	3/20/01	7.2	46	18	NA
B-205,210-3'	3/20/01	33	81	6	NA
B-205,230-6"	3/20/01	21	53	99	NA
B-205,230-3'	3/20/01	24	64	5.2	NA
B-205,260-6"	3/20/01	17	61	91	NA
B-205,260-3'	3/20/01	36	260	120	NA
B-205,290-6"	3/20/01	16	62	20	NA
B-205,290-3'	3/20/01	11	42	<3	NA
B10,C4-2+4	3/21/01	15	52	8.6	NA
B10,C5-6+8	3/21/01	17	54	48	NA
B10,C6-10+12	3/21/01	16	51	3.4	NA
B30,C1-2+4	3/21/01	29	71	17	NA
B30,C2-6+8	3/21/01	20	58	53	NA
B30,C3-10+12	3/21/01	18	55	5.4	NA
B(10),C7-2+4	3/21/01	15	54	32	NA
B(10),C8-6+8	3/21/01	18	63	65	NA
B(10),C9-10+12	3/21/01	15	52	33	NA
SB1-2'	3/12/01	890	59	40000	NA
SB1-4'	3/12/01	38	57	1200	NA
SB1-6'	3/12/01	24	66	800	240
SB1-8'	3/12/01	42	59	14000	NA
SB1-10'	3/12/01	61	53	3100	NA
SB2-2'	3/12/01	55	62	870	NA
Threshold for California Hazardous Waste		≥ 2,500	≥ 5,000	≥ 1,000	≥ 5

Notes:

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CITY OF HUNTINGTON BEACH
FIRING RANGE

TABLE 1 : Total Lead, Copper, Zinc Concentrations in Soil (TTLC)

Sample Identification	Date Sampled	Total Copper EPA 7210 TTLC (mg/Kg)	Total Zinc EPA 7950 TTLC (mg/Kg)	Total Lead EPA 7420 TTLC (mg/Kg)	Soluble Lead Title 22 WET STLC (mg/L)
SB2-4'	3/12/01	46	67	490	NA
SB2-6'	3/12/01	17	51	50	NA
SB2-8'	3/12/01	17	55	59	NA
SB2-10'	3/12/01	6.8	26	3.5	NA
SB3-2'	3/12/01	29	63	320	16
SB3-4'	3/12/01	36	59	160	NA
SB3-6'	3/12/01	17	58	12	NA
SB3-8'	3/12/01	17	36	130	NA
SB4-2'	3/13/01	21	59	130	NA
SB4-4'	3/13/01	21	68	30	NA
SB4-6'	3/13/01	19	66	11	NA
SB4-8'	3/13/01	26	51	420	28
SB4-10'	3/13/01	70	57	3500	NA
SB5-2'	3/13/01	20	66	72	NA
SB5-4'	3/13/01	28	62	360	NA
SB5-6'	3/13/01	30	66	600	63
SB5-8'	3/13/01	36	51	920	NA
SB5-10'	3/13/01	18	57	66	NA
SB6-2'	3/13/01	26	52	450	NA
SB6-4'	3/13/01	18	68	41	NA
SB6-6'	3/13/01	14	51	42	NA
SB6-8'	3/13/01	1900	55	45000	NA
SB6-10'	3/13/01	34	29	130	NA
B-15,105-3D	3/21/01	17	51	9.8	NA
B-45,45-3D	3/12/01	19	72	72	NA
B-45,75-6D	3/21/01	22	58	19	NA
B-105,15-6D	3/21/01	24	71	3	NA
B-115,260-3D	3/21/01	13	53	5.8	NA
B-145,230-6D	3/21/01	15	43	300	NA
B-165,105-3D	3/21/01	4.4	22	<3	NA
B-205,210-6D	3/21/01	12	72	9.7	NA
B-205,290-3D	3/21/01	13	44	<3	NA
Threshold for California Hazardous Waste		≥ 2,500	≥ 5,000	≥ 1,000	≥ 5

Notes:

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CITY OF HUNTINGTON BEACH
FIRING RANGE

TABLE 2 : Semi Volatile Organic Compounds (Semi-VOCs) in Wood-Post Fencing

COMPOUNDS	Semi Volatile Organic Compounds EPA METHOD 8270 (mg/Kg)								
	W-1	W-2	W-3	W-4	W-5	W-6	W-7	W-8	W-9
Acenaphthene	1800	320	4400	980	6700	1900	1500	1000	300
Acenaphthylene	<25	<25	73	<25	130	46	<25	<25	<25
Aniline	<50	<50	<50	<50	<50	<50	<50	<50	<50
Anthracene	1300	220	5000	3400	5300	2900	1200	750	540
Azobenzene	<25	35	<25	<25	<25	<25	<25	<25	<25
Benzidine	<100	<100	<100	<100	<100	<100	<100	<100	<100
Benzo(a)anthracene	580	100	1100	1600	1100	420	570	320	340
Benzo(a)pyrene	170	<25	<25	410	340	<25	160	75	120
Benzo(b)fluoranthene	190	32	330	480	240	72	170	100	230
Benzo(g,h,i)perylene	<25	<25	55	<25	<25	<25	<25	<25	<25
Benzo(k)fluoranthene	250	37	560	510	340	100	230	85	130
Benzoic acid	<250	<250	<250	<250	<250	<250	<250	<250	<250
Benzyl Alcohol	<25	<25	<25	<25	<25	<25	<25	<25	<25
Bis(2-chloroethoxy)methane	<25	<25	<25	<25	<25	<25	<25	<25	<25
Bis(2-chloroethyl)ether	<25	<25	<25	<25	<25	<25	<25	<25	<25
s(2-chloroisopropyl)ether	<25	<25	<25	<25	<25	<25	<25	<25	<25
Bis(2-ethylhexyl)phthalate	<50	<50	<50	<50	<50	<50	<50	<50	<50
4-Bromophenyl phenyl ether	<25	<25	<25	<25	<25	<25	<25	<25	<25
Butyl benzyl phthalate	<125	<125	<125	<125	<125	<125	<125	<125	<125
4-Chloro-3-methylphenol	<50	<50	<50	<50	<50	<50	<50	<50	<50
4-Chloroaniline	<100	<100	<100	<100	<100	<100	<100	<100	<100
2-Chloronaphthalene	28	<25	<25	<25	<25	<25	<25	<25	<25
2-Chlorophenol	<25	<25	<25	<25	<25	<25	<25	<25	<25
4-Chlorophenyl phenyl ether	<25	<25	<25	<25	<25	<25	<25	<25	<25
Chrysene	650	130	1200	1400	900	260	790	260	380
Di-n-butyl phthalate	<500	<500	<500	<500	<500	<500	<500	<500	<500
Di-n-octyl phthalate	<25	<25	<25	<25	<25	<25	<25	<25	<25
Dibenzo(a,h)anthracene	<25	<25	<25	<25	<25	<25	<25	<25	<25
Dibenzofuran	1600	330	2900	950	4100	1500	1300	<25	300
1,2-Dichlorobenzene	<25	<25	<25	<25	<25	<25	<25	<25	<25
1,3-Dichlorobenzene	<25	<25	<25	<25	<25	<25	<25	<25	<25
1,4-Dichlorobenzene	<25	<25	<25	<25	<25	<25	<25	<25	<25
3,3'-Dichlorobenzidine	<100	<100	<100	<100	<100	<100	<100	<100	<100
2,4-Dichlorophenol	<25	<25	<25	<25	<25	<25	<25	<25	<25

ote :

1. mg/Kg = milligrams per kilogram

CITY OF HUNTINGTON BEACH
FIRING RANGE

TABLE 2 : Semi Volatile Organic Compounds (Semi-VOCs) in Wood-Post Fencing

COMPOUNDS	Semi Volatile Organic Compounds EPA METHOD 8270 (mg/Kg)								
	W-1	W-2	W-3	W-4	W-5	W-6	W-7	W-8	W-9
Diethylphthalate	<200	<200	<200	<200	<200	<200	<200	<200	<200
2,4-Dimethylphenol	70	<25	74	<25	35	120	150	<25	65
Dimethylphthalate	<50	<50	<50	<50	<50	<50	<50	<50	<50
2,4-Dinitrophenol	<100	<100	<100	<100	<100	<100	<100	<100	<100
2,4-Dinitrotoluene	<25	<25	<25	<25	<25	<25	<25	<25	<25
2,6-Dinitrotoluene	<25	<25	<25	<25	<25	<25	<25	<25	<25
Fluoranthene	3400	600	5400	6800	4900	1800	2100	1700	2000
Fluorene	1700	300	3700	1200	5100	1600	1400	810	290
Hexachlorobenzene	<25	<25	<25	<25	<25	<25	<25	<25	<25
Hexachlorobutadiene	<25	<25	<25	<25	<25	<25	<25	<25	<25
Hexachlorocyclopentadiene	<25	<25	<25	<25	<25	<25	<25	<25	<25
Hexachloroethane	<25	<25	<25	<25	<25	<25	<25	<25	<25
Indeno(1,2,3-cd)pyrene	<100	<100	100	170	<100	<100	<100	<100	<100
Isophorone	<25	<25	<25	<25	<25	<25	<25	<25	<25
2-Methyl-4,6-dinitrophenol	<50	<50	<50	<50	<50	<50	<50	<50	<50
Methylnaphthalene	2100	350	1500	<25	3000	1800	1500	900	150
2-Methylphenol	<50	<50	<50	<50	54	95	80	<50	<50
4-Methylphenol	<50	<50	160	<50	130	210	250	<50	85
N-Nitrosodi-n-propylamine	<25	<25	<25	<25	<25	<25	<25	<25	<25
N-Nitrosodimethylamine	<25	<25	<25	<25	<25	<25	<25	<25	<25
N-Nitrosodiphenylamine	<25	<25	<25	<25	<25	<25	<25	<25	<25
Naphthalene	7000	500	2500	39	5200	3300	3100	740	470
2-Nitroaniline	<25	<25	<25	<25	<25	<25	<25	<25	<25
3-Nitroaniline	<100	<100	<100	<100	<100	<100	<100	<100	<100
4-Nitroaniline	<50	<50	<50	<50	<50	<50	<50	<50	<50
Nitrobenzene	<25	<25	<25	<25	<25	<25	<25	<25	<25
2-Nitrophenol	<50	<50	<50	<50	<50	<50	<50	<50	<50
4-Nitrophenol	<50	<50	<50	<50	<50	<50	<50	<50	<50
Pentachlorophenol	1900	370	83	<25	<25	<25	1400	330	<25
Phenanthrene	7400	1400	15000	12000	19000	6600	7000	4000	2100
Phenol	<25	<25	110	<25	150	230	170	<25	31
Pyrene	2200	400	3900	5200	3800	1100	1400	1100	1100
1,2,4-Trichlorobenzene	<25	<25	<25	<25	<25	<25	<25	<25	<25
2,4,5-Trichlorophenol	<50	<50	<50	<50	<50	<50	<50	<50	<50
2,4,6-Trichlorophenol	<50	<50	<50	<50	<50	<50	<50	<50	<50

Note :

1. mg/Kg = milligrams per kilogram

CITY OF HUNTINGTON BEACH
FIRING RANGE

TABLE 3 : Title 22 Metals (CAM) in Samples with Highest Lead Concentrations

COMPOUNDS	CAM METALS EPA METHOD 6000/7000 (mg/Kg)						
	SB6-8'	SB1-2'	B-15,45-6"	B-45,15-6"	B-75,15-6"	B-115,290-3'	B-175,230-6"
Antimony	1200	4600	42	<10	<10	<10	<10
Arsenic	11	1100	4.5	7.1	5.3	3	5.8
Barium	110	<10	95	110	100	98	350
Beryllium	<1	<1	<1	<1	<1	<1	1.3
Cadmium	<1	<1	<1	<1	<1	<1	<1
Chromium	14	<3	17	21	45	18	20
Cobalt	3.8	<3	3.7	5.3	4.6	5.8	6.5
Copper	110	87	47	22	56	20	18
Lead	27000	41000	2100	150	290	160	240
Mercury	<0.05	<0.05	<0.05	<0.05	<0.05	0.062	<0.05
Molybdenum	<5	7	<5	<5	<5	<5	<5
Nickel	6	<3	4.7	12	13	9	12
Selenium	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Silver	1.8	7.4	1	1.5	1.4	1.2	7.4
Thallium	<5	5.1	<5	<5	<5	<5	<5
Vanadium	23	<10	21	34	28	42	40
Zinc	45	9.7	56	76	260	90	310

Note :

1. mg/Kg = milligrams per kilogram

APPENDIX B

FIELD PROTOCOL
FOR COLLECTION OF CONFIRMATION SOIL SAMPLES

A confirmation soil sample is collected using a decontaminated small trowel or other hand tool to retrieve a soil sample from the required confirmation sample depth and location. Precautions are taken to collect soil from the center of the soil sampling interval and not mix the soil from other depths in the sampling horizon. The sample is initially placed in a small zip-lock bag for field analysis using the XRF instrument. If the XRF reading indicates the sample does not exceed the defined cleanup standards, then a 4-oz. jar of soil is collected from the bag. If the XRF reading is elevated above the defined cleanup standard, the sample will be discarded and additional excavation will be performed.

The jar is fitted with a Teflon-lined lid, labeled, and placed inside a ziplock bag. The sample label includes identifying information such as a unique sample ID, the date the sample was collected, and other pertinent project information. Soil samples a placed in a thermally insulated container with ice and shipped or couriered to a State-certified hazardous waste-testing laboratory under appropriate chain-of-custody procedures.

Prior to and between the sampling intervals, all reusable equipment is decontaminated by washing in a non-phosphate detergent (Alconox) solution. The equipment is then rinsed in tap water, and then rinsed in distilled water.

■ *Application Brief*

Alpha Series™

portable XRF technology for analysis of arsenic and lead in soil.

Improper waste disposal often leads to soil contamination.

Alpha Series™ XRF analyser enables fast site survey for on-site analysis of As and Pb.

Overview.

For decades, field portable X-ray fluorescence (XRF) has provided rapid, on-site measurements of metals contamination in soil. The purpose of such assessments was the identification and remediation of contaminated soil.

In 1998, EPA incorporated Method 6200 for portable XRF into SWA846 as a standard method. However, because field portable XRF systems used radioactive isotopes as their source of X-rays, they were expensive to own and operate. They also created regulatory burdens for their owners and made site-to-site travel difficult due to the requirements for transporting a radioactive source.

With its Alpha Series™ Innov-X Systems has pioneered a handheld XRF analyzer that utilizes an X-ray tube instead of radioactive isotopes. This battery powered point-and-shoot XRF system eliminates burdensome radioactive sources and provides on-the-spot quality data about elements critical to the analysis of metals in soil.

The single X-ray tube replaces multiple isotopes used in source-based systems to offer simultaneous analysis of 20-25 metals including all eight RCRA metals and the EPA priority pollutant metals. It generally provides superior detection limits (DL) compared to isotope systems. Moreover, the testing time never increases with an X-ray tube because there is no source decaying. The testing speed after 4-5 years is the same as when the analyzer was purchased.

Innov-X Systems developed this technology to overcome the significant regulatory headaches of isotope-based XRF systems. Isotope-based units require the use of radioactive materials to irradiate the sample. The sources decay and lose testing speed over time. In addition to the loss in analytical capabilities, the sources have to be replaced. The use and subsequent disposal of radioactive isotopes also require licensing (state-to-state in the US) and a radioactive materials control program.

Interstate travel is particularly difficult because multiple state licensing and reciprocity arrangements must be made prior to travel – making rapid response impractical. Isotopes can be difficult to ship and transport, as they require hazardous materials declarations and/or permits.

All of these factors add significant additional cost and paperwork for source-based systems – more so for the environmental consulting community where regular travel to multiple job sites is common.

Arsenic and Lead Analysis.

Two of the most common metals requiring field analysis are lead (Pb) and arsenic (As). Interestingly, while both of these elements are ideal candidates for XRF analysis, analyzing As in the presence of high Pb concentration presents some challenges, whereas high As content has no effect on the analysis of Pb. Interference-free detection limits (DLs) are shown in Table 1.

Table 1 ***Interference-free detection limits (DLs)***

Element	Detection Limit, ppm (Interference-Free, 2-minute Test Time)
Pb	13
As	9

*As values represent latest (Aug. 2003) values.

Results on laboratory-analyzed samples are shown in Fig. 1a and 1b for arsenic and lead respectively. Correlations are good in a variety of soil samples, exhibiting R2 values of 0.99 in each case. The XRF calibration method – Compton Normalization method as described in EPA Method 6200 – provides good results without the need for site-specific calibration corrections.

fig.1a As Results: Portable XRF Analysis of Soil Samples

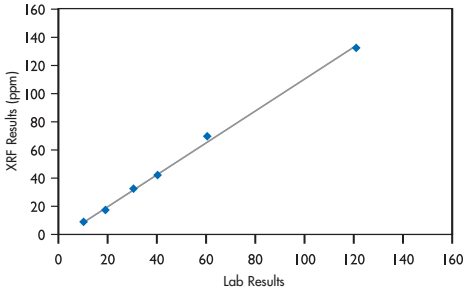
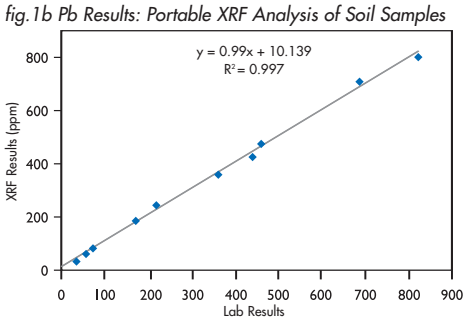


fig.1b Pb Results: Portable XRF Analysis of Soil Samples



INNOV-X SYSTEMS™

Innovative XRF Technologies

Alpha Series™

portable XRF technology for analysis of arsenic and lead in soil.

Using in-situ XRF data, site contamination patterns are quickly determined to facilitate remediation.

XRF Analysis for Arsenic in the Presence of Lead.

While analyzing lead and arsenic with portable XRF is relatively straightforward, analyzing arsenic when lead is present, particularly in high concentrations, poses an additional challenge. Lead produces two strong spectral peaks L_α at energy 10.5 keV and L_β at 12.6 keV. Generally the lead L_β peak is used for lead analysis. The best arsenic spectral line for measurement is the K_α peak – also at 10.5 keV. Thus lead produces an interference, whereby the lead L_α completely overlaps the desired arsenic K_α spectral peak. The lead interference becomes detrimental to arsenic measurement in two ways:

- Elevates the arsenic detection level.
- Moderately reduces arsenic precision for the same testing time compared to an identical sample with no lead.

The Innov-X software algorithm automatically corrects the arsenic result when lead is present. The algorithm predicts the contribution in the 10.5 keV spectral reason from the lead L_α based on the interference-free measurement of the lead L_β. The lead L_α contribution is subtracted, yielding the peak intensity due solely to the arsenic K_α.

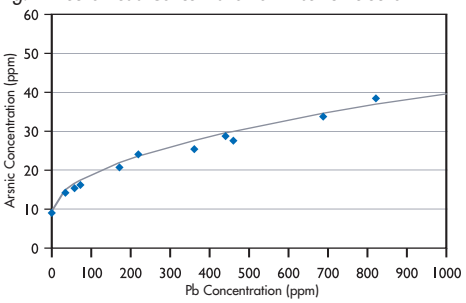
However, the precision of the arsenic result (and the detection limit in the case of low arsenic concentrations) are affected because the statistical uncertainty of the lead L_α background subtraction yields a less precise result for the arsenic concentration. This effect does not occur if there is negligible lead present in the spectrum.

The impact on both As detection limit and precision can be determined. The arsenic detection limit as a function of lead concentration is presented in Fig. 2. Based on X-ray measurement statistics, the As detection limit increases as the square root of the increase in lead concentration, following the functional form in the equation below:

$$As\big|_{Pb} = As\big|_{noPb} + \sqrt{Pb(ppm)}$$

Figure 2 shows both the calculated (solid line) and measured arsenic detection limit as a function of lead concentration. For example, for no detectable lead in the sample (< 13 ppm) the As detection limit is approximately 9 ppm. The As DL increases smoothly to a value of about 19 for 100 ppm lead, and about 45 for 1,000 ppm lead. Thus for a 10-fold increase in lead concentration (100 ppm to 1,000 ppm), the detection limit worsens by a factor of about 2.5. The effect on precision of the arsenic measurement will follow a similar trend.

fig.2 Effect of Lead Concentration on Arsenic Detection Limit



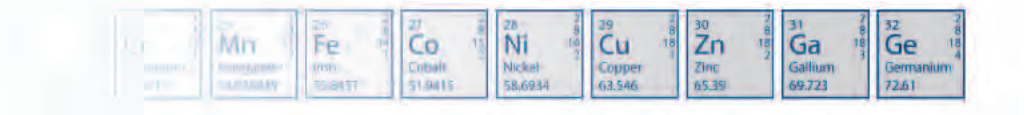
Summary.

Innov-X Alpha Series™ X-ray tube technology offers faster, higher-precision measurements of important environmental metals in soil and relieves the regulatory burden of using radioactive isotopes. Two of the most common elements analyzed are lead and arsenic. By themselves, both elements are excellent candidates for portable XRF analysis due to the high accuracy achievable, and the low detection limits.

Measurement of low concentrations of arsenic in the presence of high lead concentrations presents some unique challenges due to the large interference of the lead with the arsenic measurement. By quantifying the effect of lead concentrations on arsenic measurements, Alpha Series™ provides operators with a way to determine data quality objectives at sites with both Pb and As present, rather than relying solely on interference-free detection limits.

INNOV-X SYSTEMS™

Innovative XRF Technologies



Innov-X Systems, Inc., Worldwide Headquarters, Woburn, MA USA (781) 938-5005 (866) 4-Innov-X www.Innov-Xsys.com

AB-301 6-05

APPENDIX C

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

17461 Derian Avenue. Suite 100, Irvine, CA 92614 (949) 261-1022 Fax:(949) 260-3297

LABORATORY REPORT

Prepared For: Waterstone Environmental
2936 E Coronado Street
Anaheim, CA 92806
Attention: Everett Ferguson

Project: 07-168

Sampled: 08/05/08
Received: 08/08/08
Issued: 08/19/08 16:16

NELAP #01108CA California ELAP#1197 CSDLAC #10256

The results listed within this Laboratory Report pertain only to the samples tested in the laboratory. The analyses contained in this report were performed in accordance with the applicable certifications as noted. All soil samples are reported on a wet weight basis unless otherwise noted in the report. This Laboratory Report is confidential and is intended for the sole use of TestAmerica and its client. This report shall not be reproduced, except in full, without written permission from TestAmerica. The Chain(s) of Custody, 5 pages, are included and are an integral part of this report.
This entire report was reviewed and approved for release.

SAMPLE CROSS REFERENCE

LABORATORY ID	CLIENT ID	MATRIX
IRH0821-01	Surface-1	Soil
IRH0821-02	Surface-2	Soil
IRH0821-03	Surface-3	Soil
IRH0821-04	Surface-4	Soil
IRH0821-05	Surface-5	Soil
IRH0821-06	Surface-6	Soil
IRH0821-07	Surface-7	Soil
IRH0821-08	Surface-8	Soil
IRH0821-09	Surface-9	Soil
IRH0821-10	Surface-10	Soil
IRH0821-11	Surface-11	Soil
IRH0821-12	Surface-12	Soil
IRH0821-13	Surface-13	Soil
IRH0821-14	Surface-14	Soil
IRH0821-15	Surface-15	Soil
IRH0821-16	Surface-16	Soil
IRH0821-17	Surface-17	Soil
IRH0821-18	Surface-18	Soil
IRH0821-19	Surface-19	Soil
IRH0821-20	Surface-20	Soil
IRH0821-21	Surface-21	Soil
IRH0821-22	Surface-22	Soil
IRH0821-23	Surface-23	Soil

TestAmerica Irvine

Kathleen A. Robb
Project Manager

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

17461 Derian Avenue. Suite 100, Irvine, CA 92614 (949) 261-1022 Fax:(949) 260-3297

Waterstone Environmental
2936 E Coronado Street
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Project ID: 07-168

Report Number: IRH0821

Sampled: 08/05/08
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LABORATORY ID	CLIENT ID	MATRIX
IRH0821-24	Surface-24	Soil
IRH0821-25	Surface-25	Soil
IRH0821-26	Surface-26	Soil
IRH0821-27	Surface-27	Soil
IRH0821-28	Surface-28	Soil
IRH0821-29	Surface-29	Soil
IRH0821-30	Surface-30	Soil
IRH0821-31	Surface-31	Soil
IRH0821-32	Surface-32	Soil
IRH0821-33	Ravine-1	Soil
IRH0821-34	Ravine-2	Soil
IRH0821-35	Ravine-3	Soil
IRH0821-36	Ravine-4	Soil
IRH0821-37	Ravine-5	Soil
IRH0821-38	Ravine-6	Soil
IRH0821-39	Ravine-7	Soil
IRH0821-40	Ravine-8	Soil
IRH0821-41	Ravine-9	Soil
IRH0821-42	Ravine-10	Soil
IRH0821-43	Ravine-11	Soil
IRH0821-44	Ravine-12	Soil
IRH0821-45	Ravine-13	Soil
IRH0821-46	Ravine-14	Soil
IRH0821-47	Ravine-15	Soil
IRH0821-48	Ravine-16	Soil
IRH0821-49	Ravine-17	Soil
IRH0821-50	Ravine-18	Soil

Reviewed By:

TestAmerica Irvine

Kathleen A. Robb
Project Manager

TestAmerica
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Report Number: IRH0821

Sampled: 08/05/08
Received: 08/08/08

METALS

Analyte	Method	Batch	Reporting Limit	Sample Result	Dilution Factor	Date Extracted	Date Analyzed	Data Qualifiers
Sample ID: IRH0821-01 (Surface-1 - Soil)				**Sampled: 08/05/08**				
Reporting Units: mg/kg								
Lead	EPA 6010B	8H18075	2.0	**18**	0.995	8/18/2008	8/18/2008	
Sample ID: IRH0821-02 (Surface-2 - Soil)				**Sampled: 08/05/08**				
Reporting Units: mg/kg								
Lead	EPA 6010B	8H18075	2.0	**18**	1	8/18/2008	8/18/2008	
Sample ID: IRH0821-03 (Surface-3 - Soil)				**Sampled: 08/05/08**				
Reporting Units: mg/kg								
Lead	EPA 6010B	8H18075	2.0	**22**	0.99	8/18/2008	8/18/2008	
Sample ID: IRH0821-04 (Surface-4 - Soil)				**Sampled: 08/05/08**				
Reporting Units: mg/kg								
Lead	EPA 6010B	8H18075	2.0	**24**	0.99	8/18/2008	8/18/2008	
Sample ID: IRH0821-05 (Surface-5 - Soil)				**Sampled: 08/05/08**				
Reporting Units: mg/kg								
Lead	EPA 6010B	8H18075	2.0	**21**	0.995	8/18/2008	8/18/2008	
Sample ID: IRH0821-06 (Surface-6 - Soil)				**Sampled: 08/05/08**				
Reporting Units: mg/kg								
Lead	EPA 6010B	8H18075	2.0	**8.9**	1	8/18/2008	8/18/2008	
Sample ID: IRH0821-07 (Surface-7 - Soil)				**Sampled: 08/05/08**				
Reporting Units: mg/kg								
Lead	EPA 6010B	8H18075	4.0	**11**	1.99	8/18/2008	8/19/2008	
Sample ID: IRH0821-08 (Surface-8 - Soil)				**Sampled: 08/05/08**				
Reporting Units: mg/kg								
Lead	EPA 6010B	8H18075	2.0	**24**	0.99	8/18/2008	8/18/2008	
Sample ID: IRH0821-09 (Surface-9 - Soil)				**Sampled: 08/05/08**				
Reporting Units: mg/kg								
Lead	EPA 6010B	8H18075	2.0	**9.8**	0.995	8/18/2008	8/18/2008	
Sample ID: IRH0821-10 (Surface-10 - Soil)				**Sampled: 08/05/08**				
Reporting Units: mg/kg								
Lead	EPA 6010B	8H18075	2.0	**16**	0.995	8/18/2008	8/18/2008	

TestAmerica Irvine

Kathleen A. Robb
Project Manager

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

17461 Derian Avenue. Suite 100, Irvine, CA 92614 (949) 261-1022 Fax:(949) 260-3297

Waterstone Environmental
2936 E Coronado Street
Anaheim, CA 92806
Attention: Everett Ferguson

Project ID: 07-168
Report Number: IRH0821

Sampled: 08/05/08
Received: 08/08/08

METALS

Analyte	Method	Batch	Reporting Limit	Sample Result	Dilution Factor	Date Extracted	Date Analyzed	Data Qualifiers
Sample ID: IRH0821-11 (Surface-11 - Soil)				**Sampled: 08/05/08**				
Reporting Units: mg/kg								
Lead	EPA 6010B	8H18075	2.0	**8.3**	0.99	8/18/2008	8/18/2008	
Sample ID: IRH0821-12 (Surface-12 - Soil)				**Sampled: 08/05/08**				
Reporting Units: mg/kg								
Lead	EPA 6010B	8H18075	2.0	**9.5**	1	8/18/2008	8/18/2008	
Sample ID: IRH0821-13 (Surface-13 - Soil)				**Sampled: 08/05/08**				
Reporting Units: mg/kg								
Lead	EPA 6010B	8H18075	4.0	**14**	1.99	8/18/2008	8/19/2008	
Sample ID: IRH0821-14 (Surface-14 - Soil)				**Sampled: 08/05/08**				
Reporting Units: mg/kg								
Lead	EPA 6010B	8H18075	2.0	**11**	0.995	8/18/2008	8/18/2008	
Sample ID: IRH0821-15 (Surface-15 - Soil)				**Sampled: 08/05/08**				
Reporting Units: mg/kg								
Lead	EPA 6010B	8H18075	2.0	**15**	0.985	8/18/2008	8/18/2008	
Sample ID: IRH0821-16 (Surface-16 - Soil)				**Sampled: 08/05/08**				
Reporting Units: mg/kg								
Lead	EPA 6010B	8H18075	2.0	**25**	0.995	8/18/2008	8/18/2008	
Sample ID: IRH0821-17 (Surface-17 - Soil)				**Sampled: 08/05/08**				
Reporting Units: mg/kg								
Lead	EPA 6010B	8H18075	200	**28000**	99.5	8/18/2008	8/19/2008	
Sample ID: IRH0821-18 (Surface-18 - Soil)				**Sampled: 08/05/08**				
Reporting Units: mg/kg								
Lead	EPA 6010B	8H18075	2.0	**8.6**	0.985	8/18/2008	8/19/2008	
Sample ID: IRH0821-19 (Surface-19 - Soil)				**Sampled: 08/05/08**				
Reporting Units: mg/kg								
Lead	EPA 6010B	8H18075	2.0	**11**	1	8/18/2008	8/19/2008	
Sample ID: IRH0821-20 (Surface-20 - Soil)				**Sampled: 08/05/08**				
Reporting Units: mg/kg								
Lead	EPA 6010B	8H18075	2.0	**9.5**	1	8/18/2008	8/19/2008	

TestAmerica Irvine

Kathleen A. Robb
Project Manager

TestAmerica
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17461 Derian Avenue. Suite 100, Irvine, CA 92614 (949) 261-1022 Fax:(949) 260-3297

Waterstone Environmental
2936 E Coronado Street
Anaheim, CA 92806
Attention: Everett Ferguson

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Report Number: IRH0821

Sampled: 08/05/08
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METALS

Analyte	Method	Batch	Reporting Limit	Sample Result	Dilution Factor	Date Extracted	Date Analyzed	Data Qualifiers
Sample ID: IRH0821-21 (Surface-21 - Soil)				**Sampled: 08/05/08**				
Reporting Units: mg/kg								
Lead	EPA 6010B	8H18077	2.0	**19**	0.99	8/18/2008	8/18/2008	
Sample ID: IRH0821-22 (Surface-22 - Soil)				**Sampled: 08/05/08**				
Reporting Units: mg/kg								
Lead	EPA 6010B	8H18077	10	**3300**	4.98	8/18/2008	8/19/2008	
Sample ID: IRH0821-23 (Surface-23 - Soil)				**Sampled: 08/05/08**				
Reporting Units: mg/kg								
Lead	EPA 6010B	8H18077	2.0	**570**	0.99	8/18/2008	8/18/2008	
Sample ID: IRH0821-24 (Surface-24 - Soil)				**Sampled: 08/05/08**				
Reporting Units: mg/kg								
Lead	EPA 6010B	8H18077	200	**41000**	98.5	8/18/2008	8/19/2008	
Sample ID: IRH0821-25 (Surface-25 - Soil)				**Sampled: 08/05/08**				
Reporting Units: mg/kg								
Lead	EPA 6010B	8H18077	2.0	**95**	1	8/18/2008	8/18/2008	
Sample ID: IRH0821-26 (Surface-26 - Soil)				**Sampled: 08/05/08**				
Reporting Units: mg/kg								
Lead	EPA 6010B	8H18077	2.0	**1000**	0.995	8/18/2008	8/18/2008	
Sample ID: IRH0821-27 (Surface-27 - Soil)				**Sampled: 08/05/08**				
Reporting Units: mg/kg								
Lead	EPA 6010B	8H18077	2.0	**57**	1	8/18/2008	8/18/2008	
Sample ID: IRH0821-28 (Surface-28 - Soil)				**Sampled: 08/05/08**				
Reporting Units: mg/kg								
Lead	EPA 6010B	8H18077	2.0	**150**	0.99	8/18/2008	8/18/2008	
Sample ID: IRH0821-29 (Surface-29 - Soil)				**Sampled: 08/05/08**				
Reporting Units: mg/kg								
Lead	EPA 6010B	8H18077	2.0	**420**	1	8/18/2008	8/18/2008	
Sample ID: IRH0821-30 (Surface-30 - Soil)				**Sampled: 08/05/08**				
Reporting Units: mg/kg								
Lead	EPA 6010B	8H18077	2.0	**13**	0.985	8/18/2008	8/18/2008	

TestAmerica Irvine

Kathleen A. Robb
Project Manager

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

17461 Derian Avenue. Suite 100, Irvine, CA 92614 (949) 261-1022 Fax:(949) 260-3297

Waterstone Environmental
2936 E Coronado Street
Anaheim, CA 92806
Attention: Everett Ferguson

Project ID: 07-168
Report Number: IRH0821

Sampled: 08/05/08
Received: 08/08/08

METALS

Analyte	Method	Batch	Reporting Limit	Sample Result	Dilution Factor	Date Extracted	Date Analyzed	Data Qualifiers
Sample ID: IRH0821-31 (Surface-31 - Soil)				**Sampled: 08/05/08**				
Reporting Units: mg/kg								
Lead	EPA 6010B	8H18077	2.0	**140**	0.995	8/18/2008	8/18/2008	
Sample ID: IRH0821-32 (Surface-32 - Soil)				**Sampled: 08/05/08**				
Reporting Units: mg/kg								
Lead	EPA 6010B	8H18077	2.0	**48**	0.995	8/18/2008	8/18/2008	
Sample ID: IRH0821-33 (Ravine-1 - Soil)				**Sampled: 08/05/08**				
Reporting Units: mg/kg								
Lead	EPA 6010B	8H18077	2.0	**2000**	0.99	8/18/2008	8/18/2008	
Sample ID: IRH0821-34 (Ravine-2 - Soil)				**Sampled: 08/05/08**				
Reporting Units: mg/kg								
Lead	EPA 6010B	8H18077	2.0	**6.3**	1	8/18/2008	8/19/2008	
Sample ID: IRH0821-35 (Ravine-3 - Soil)				**Sampled: 08/05/08**				
Reporting Units: mg/kg								
Lead	EPA 6010B	8H18077	4.0	**12**	2	8/18/2008	8/19/2008	
Sample ID: IRH0821-36 (Ravine-4 - Soil)				**Sampled: 08/05/08**				
Reporting Units: mg/kg								
Lead	EPA 6010B	8H18077	2.0	**5.4**	0.99	8/18/2008	8/19/2008	
Sample ID: IRH0821-37 (Ravine-5 - Soil)				**Sampled: 08/05/08**				
Reporting Units: mg/kg								
Lead	EPA 6010B	8H18077	2.0	**17**	0.985	8/18/2008	8/19/2008	
Sample ID: IRH0821-38 (Ravine-6 - Soil)				**Sampled: 08/05/08**				
Reporting Units: mg/kg								
Lead	EPA 6010B	8H18077	39	**17000**	19.7	8/18/2008	8/19/2008	
Sample ID: IRH0821-39 (Ravine-7 - Soil)				**Sampled: 08/05/08**				
Reporting Units: mg/kg								
Lead	EPA 6010B	8H18077	2.0	**65**	0.995	8/18/2008	8/19/2008	
Sample ID: IRH0821-40 (Ravine-8 - Soil)				**Sampled: 08/05/08**				
Reporting Units: mg/kg								
Lead	EPA 6010B	8H18077	2.0	**58**	1	8/18/2008	8/19/2008	

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Waterstone Environmental
2936 E Coronado Street
Anaheim, CA 92806
Attention: Everett Ferguson

Project ID: 07-168
Report Number: IRH0821

Sampled: 08/05/08
Received: 08/08/08

METALS

Analyte	Method	Batch	Reporting Limit	Sample Result	Dilution Factor	Date Extracted	Date Analyzed	Data Qualifiers
Sample ID: IRH0821-41 (Ravine-9 - Soil)				**Sampled: 08/05/08**				
Reporting Units: mg/kg								
Lead	EPA 6010B	8H18080	2.0	**43**	1	8/18/2008	8/19/2008	
Sample ID: IRH0821-42 (Ravine-10 - Soil)				**Sampled: 08/05/08**				
Reporting Units: mg/kg								
Lead	EPA 6010B	8H18080	2.0	**9.0**	0.995	8/18/2008	8/19/2008	
Sample ID: IRH0821-43 (Ravine-11 - Soil)				**Sampled: 08/05/08**				
Reporting Units: mg/kg								
Lead	EPA 6010B	8H18080	2.0	**260**	0.99	8/18/2008	8/19/2008	
Sample ID: IRH0821-44 (Ravine-12 - Soil)				**Sampled: 08/05/08**				
Reporting Units: mg/kg								
Lead	EPA 6010B	8H18080	2.0	**62**	1	8/18/2008	8/19/2008	
Sample ID: IRH0821-45 (Ravine-13 - Soil)				**Sampled: 08/05/08**				
Reporting Units: mg/kg								
Lead	EPA 6010B	8H18080	2.0	**57**	0.985	8/18/2008	8/19/2008	
Sample ID: IRH0821-46 (Ravine-14 - Soil)				**Sampled: 08/05/08**				
Reporting Units: mg/kg								
Lead	EPA 6010B	8H18080	2.0	**43**	0.985	8/18/2008	8/19/2008	
Sample ID: IRH0821-47 (Ravine-15 - Soil)				**Sampled: 08/05/08**				
Reporting Units: mg/kg								
Lead	EPA 6010B	8H18080	2.0	**12**	1	8/18/2008	8/19/2008	
Sample ID: IRH0821-48 (Ravine-16 - Soil)				**Sampled: 08/05/08**				
Reporting Units: mg/kg								
Lead	EPA 6010B	8H18080	2.0	**86**	1	8/18/2008	8/19/2008	
Sample ID: IRH0821-49 (Ravine-17 - Soil)				**Sampled: 08/05/08**				
Reporting Units: mg/kg								
Lead	EPA 6010B	8H18080	2.0	**2300**	0.995	8/18/2008	8/19/2008	
Sample ID: IRH0821-50 (Ravine-18 - Soil)				**Sampled: 08/05/08**				
Reporting Units: mg/kg								
Lead	EPA 6010B	8H18080	2.0	**44**	0.985	8/18/2008	8/19/2008	

TestAmerica Irvine

Kathleen A. Robb
Project Manager

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Waterstone Environmental
2936 E Coronado Street
Anaheim, CA 92806
Attention: Everett Ferguson

Project ID: 07-168
Report Number: IRH0821

Sampled: 08/05/08
Received: 08/08/08

METHOD BLANK/QC DATA

METALS

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Data Qualifiers
Batch: 8H18075 Extracted: 08/18/08										
Blank Analyzed: 08/18/2008 (8H18075-BLK1)										
Lead	ND	2.0	mg/kg							
LCS Analyzed: 08/18/2008 (8H18075-BS1)										
Lead	45.9	2.0	mg/kg	50.0		92	80-120			
Matrix Spike Analyzed: 08/18/2008 (8H18075-MS1)					**Source: IRH0821-01**					
Lead	64.2	2.0	mg/kg	50.0	17.7	93	75-125			
Matrix Spike Dup Analyzed: 08/18/2008 (8H18075-MSD1)					**Source: IRH0821-01**					
Lead	58.2	2.0	mg/kg	50.0	17.7	81	75-125	10	20	
Batch: 8H18077 Extracted: 08/18/08										
Blank Analyzed: 08/18/2008 (8H18077-BLK1)										
Lead	ND	2.0	mg/kg							
LCS Analyzed: 08/18/2008 (8H18077-BS1)										
Lead	47.8	2.0	mg/kg	50.0		96	80-120			
Matrix Spike Analyzed: 08/18/2008 (8H18077-MS1)					**Source: IRH0821-21**					
Lead	68.3	2.0	mg/kg	49.8	18.7	100	75-125			
Matrix Spike Dup Analyzed: 08/18/2008 (8H18077-MSD1)					**Source: IRH0821-21**					
Lead	68.3	2.0	mg/kg	49.8	18.7	100	75-125	0	20	
Batch: 8H18080 Extracted: 08/18/08										
Blank Analyzed: 08/19/2008 (8H18080-BLK1)										
Lead	ND	2.0	mg/kg							

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Project ID: 07-168
Report Number: IRH0821

Sampled: 08/05/08
Received: 08/08/08

METHOD BLANK/QC DATA

METALS

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Data Qualifiers
Batch: 8H18080 Extracted: 08/18/08										
LCS Analyzed: 08/19/2008 (8H18080-BS1)										
Lead	48.7	2.0	mg/kg	50.0		97	80-120			
Matrix Spike Analyzed: 08/19/2008 (8H18080-MS1)					**Source: IRH0821-41**					
Lead	88.1	2.0	mg/kg	49.5	43.1	91	75-125			
Matrix Spike Dup Analyzed: 08/19/2008 (8H18080-MSD1)					**Source: IRH0821-41**					
Lead	85.8	2.0	mg/kg	49.8	43.1	86	75-125	3	20	

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Project ID: 07-168
Report Number: IRH0821

Sampled: 08/05/08
Received: 08/08/08

DATA QUALIFIERS AND DEFINITIONS

ND Analyte NOT DETECTED at or above the reporting limit or MDL, if MDL is specified.

RPD Relative Percent Difference

TestAmerica Irvine

Kathleen A. Robb
Project Manager

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Received: 08/08/08

Certification Summary

TestAmerica Irvine

Method	Matrix	Nelac	California
EPA 6010B	Soil	X	X

Nevada and NELAP provide analyte specific accreditations. Analyte specific information for TestAmerica may be obtained by contacting the laboratory or visiting our website at www.testamericainc.com

TestAmerica Irvine

Kathleen A. Robb
Project Manager

ANALYSIS REQUEST AND CHAIN OF CUSTODY

WATERSTONE ENVIRONMENTAL, INC.
2936 EAST CORONADO STREET
ANAHEIM, CALIFORNIA 92806
PHONE 714-414-1122 FAX 714-414-1166

6802

IRH 0821

TURN AROUND TIME REQUESTED:

SEND REPORT TO:

LABORATORY INFORMATION	PROJECT INFORMATION
COMPANY: Test America	PROJECT NAME: HB Former Gun Range
LAB JOB NUMBER:	PROJECT NUMBER: 07-168
ADDRESS:	PROJECT LOCATION: Gothard + Goldenwest HB, CA
PHONE: FAX:	PROJECT MANAGER: Everett Ferguson

LAB ID		SAMPLE ID	SAMPLE DATE	SAMPLE TIME	SAMPLE MATRIX	NO. OF CONTAINERS	CONTAINER TYPE	PRES.	ANALYSIS / METHOD REQUEST: Total Lead	COMMENTS
	1	Surface - 1	8/5/08	~~0845~~ 0745	Soil	1	8oz jar	no	X	
	2	Surface - 2		0750						
	3	Surface - 3		0754						
	4	Surface - 4		0759						
	5	Surface - 5		0804						
	6	Surface - 6		0809						
	7	Surface - 7		0815						SB 8.9.08
	8	Surface - 8		0822						
	9	Surface - 9		0831						
	10	Surface - 10		0842						
	11	Surface - 11		0849						
	12	Surface - 12		0900						

TOTAL NUMBER OF SAMPLES: 12

SAMPLED BY: Gregory Spooner 8/5/08 DATE	METHOD OF SHIPMENT: Cooler	REPORTING FORMAT:	
RELINQUISHED BY: Gregory Spooner 8/5/08 1500 DATE / TIME	RECEIVED BY: Refrigerator 8/5/08 1500 DATE / TIME		
RELINQUISHED BY: DATE / TIME	RECEIVED BY: 8/8/08 1315 DATE / TIME		
RELINQUISHED BY: 8/8/08 1445 DATE / TIME	RECEIVED BY: 8/8/08 1445 DATE / TIME	SAMPLE INTEGRITY: 4.6/4.7 ☒ INTACT ☒ ON ICE ☐ OTHER:	

(W)

ANALYSIS REQUEST AND CHAIN OF CUSTODY

WATERSTONE ENVIRONMENTAL, INC.
2936 EAST CORONADO STREET
ANAHEIM, CALIFORNIA 92806
PHONE 714-414-1122 FAX 714-414-1166

6803

TURN AROUND TIME REQUESTED:

SEND REPORT TO:

LABORATORY INFORMATION	PROJECT INFORMATION
COMPANY: Test America	PROJECT NAME: HB Former Gun Range
LAB JOB NUMBER:	PROJECT NUMBER: 07-168
ADDRESS:	PROJECT LOCATION: Gothard + Goldenwest HB, CA
PHONE: FAX:	PROJECT MANAGER: Everett Ferguson

LAB ID		SAMPLE ID	SAMPLE DATE	SAMPLE TIME	SAMPLE MATRIX	NO. OF CONTAINERS	CONTAINER TYPE	PRES.	ANALYSIS/METHOD REQUEST: Total Lead	COMMENTS
	1	Surface - 13	8/5/08	0907	Soil	1	8oz jar	no	X	
	2	Surface - 14		0910						
	3	Surface - 15		0912						
	4	Surface - 16		0919						
	5	Surface - 17		0925						
	6	Surface - 18		0930						
	7	Surface - 19		0941						
	8	Surface - 20		0945						
	9	Surface - 21		1028						
	10	Surface - 22		1022						
	11	Surface - 23		1018						
	12	Surface - 24		1015						

TOTAL NUMBER OF SAMPLES: 12

SAMPLED BY: Gregory Spooner	8/5/08 DATE	METHOD OF SHIPMENT: Cooler	REPORTING FORMAT:
RELINQUISHED BY: Gregory Spooner	8/5/08: 1500 DATE / TIME	RECEIVED BY: Refrigerator	8/5/08: 1500 DATE / TIME
RELINQUISHED BY:	DATE / TIME	RECEIVED BY: L Delony	8/8/08 1315 DATE / TIME
RELINQUISHED BY: L Delony	8/8/08 1445 DATE / TIME	RECEIVED BY: Van Brand	8/8/08 1445 DATE / TIME

SAMPLE INTEGRITY: 4.6/4.7
☒ INTACT ☒ ON ICE ☐ OTHER:

ANALYSIS REQUEST AND CHAIN OF CUSTODY

WATERSTONE ENVIRONMENTAL, INC.
2936 EAST CORONADO STREET
ANAHEIM, CALIFORNIA 92806
PHONE 714-414-1122 FAX 714-414-1166

6804

TURN AROUND TIME REQUESTED:

SEND REPORT TO:

LABORATORY INFORMATION	PROJECT INFORMATION
COMPANY: Test America	PROJECT NAME: HB Former Gun Range
LAB JOB NUMBER:	PROJECT NUMBER: 07-168
ADDRESS:	PROJECT LOCATION: Gothard + Goldenwest HB, CA
PHONE: FAX:	PROJECT MANAGER: Everett Ferguson

LAB ID		SAMPLE ID	SAMPLE DATE	SAMPLE TIME	SAMPLE MATRIX	NO. OF CONTAINERS	CONTAINER TYPE	PRES.	ANALYSIS / METHOD REQUEST: Total Lead	COMMENTS
	1	Surface - 25	8/5/08	1013	Soil	1	8oz jar	no	X	
	2	Surface - 26		1010						
	3	Surface - 27		1007						
	4	Surface - 28		1003						
	5	Surface - 29		0950						
	6	Surface - 30		0957						
	7	Surface - 31		1000						
	8	Surface - 32		1002						
	9	Ravine - 1		1103						
	10	Ravine - 2		1047						
	11	Ravine - 3		1058						
	12	Ravine - 4		1030						

TOTAL NUMBER OF SAMPLES: 12

SAMPLED BY: Gregory Spooner 8/5/08 DATE	METHOD OF SHIPMENT: Cooler	REPORTING FORMAT:
RELINQUISHED BY: Greg Spooner 8/5/08 : 1500 DATE / TIME	RECEIVED BY: Refrigerator 8/5/08 : 1500 DATE / TIME	
RELINQUISHED BY: DATE / TIME	RECEIVED BY: T. DeLong 8/8/08 1315 DATE / TIME	
RELINQUISHED BY: T. DeLong 8/8/08 1445 DATE / TIME	RECEIVED BY: Jim Bland 8/8/08 1445 DATE / TIME	SAMPLE INTEGRITY: 4.6/4.7 ☒ INTACT ☒ ON ICE ☐ OTHER:

ANALYSIS REQUEST AND CHAIN OF CUSTODY

WATERSTONE ENVIRONMENTAL, INC.
2936 EAST CORONADO STREET
ANAHEIM, CALIFORNIA 92806
PHONE 714-414-1122 FAX 714-414-1166

6805

TURN AROUND TIME REQUESTED:

SEND REPORT TO:

LABORATORY INFORMATION	PROJECT INFORMATION
COMPANY: Test America	PROJECT NAME: HB Former Gun Range
LAB JOB NUMBER:	PROJECT NUMBER: 07-168
ADDRESS:	PROJECT LOCATION: Gothard + Goldenwest HB, CA
PHONE: FAX:	PROJECT MANAGER: Everett Ferguson

LAB ID		SAMPLE ID	SAMPLE DATE	SAMPLE TIME	SAMPLE MATRIX	NO. OF CONTAINERS	CONTAINER TYPE	PRES.	ANALYSIS / METHOD REQUEST: Total Lead	COMMENTS
	1	Ravine-5	8/5/08	1042	Soil	1	8oz jar	no	X	
	2	Ravine-6		1040						
	3	Ravine-7		1110						
	4	Ravine-8		1115						
	5	Ravine-9		1220						
	6	Ravine-10		1148						
	7	Ravine-11		1217						
	8	Ravine-12		1215						
	9	Ravine-13		1209						
	10	Ravine-14		1210						
	11	Ravine-~~B~~15		1155						
	12	Ravine-16		1205						

TOTAL NUMBER OF SAMPLES: 12

SAMPLED BY: Gregory Spooner 8/5/08 DATE	METHOD OF SHIPMENT: Cooler	REPORTING FORMAT:
RELINQUISHED BY: Gregory Spooner 8/5/08 : 1500 DATE / TIME	RECEIVED BY: Refrigerator 8/5/08 : 1500 DATE / TIME	
RELINQUISHED BY: DATE / TIME	RECEIVED BY: 8/8/08 1315 DATE / TIME	
RELINQUISHED BY: 8/8/08 1445 DATE / TIME	RECEIVED BY: 8/8/08 1445 DATE / TIME	SAMPLE INTEGRITY: 4.6/4.7 ☒ INTACT ☒ ON ICE ☐ OTHER:

ANALYSIS REQUEST AND CHAIN OF CUSTODY

WATERSTONE ENVIRONMENTAL, INC.
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ANAHEIM, CALIFORNIA 92806
PHONE 714-414-1122 FAX 714-414-1166

6806

TURN AROUND TIME REQUESTED:

SEND REPORT TO:

LABORATORY INFORMATION	PROJECT INFORMATION
COMPANY: Test America	PROJECT NAME: HB Former Gun Range
LAB JOB NUMBER:	PROJECT NUMBER: 07-168
ADDRESS:	PROJECT LOCATION: Gothard & Goldenwest HB, CA
PHONE: FAX:	PROJECT MANAGER: Everett Ferguson

LAB ID		SAMPLE ID	SAMPLE DATE	SAMPLE TIME	SAMPLE MATRIX	NO. OF CONTAINERS	CONTAINER TYPE	PRES	ANALYSIS / METHOD REQUEST: Total Lead	COMMENTS
	1	Ravine-17	8/5/08	1203	Soil	1	8oz jar	no	X	
	2	Ravine-18	8/5/08	1200	Soil	1	8oz jar	no	X	
	3									
	4									
	5									
	6									
	7									
	8									
	9									
	10									
	11									
	12									

TOTAL NUMBER OF SAMPLES: 2

SAMPLED BY: Gregory Spooner 8/5/08 DATE	METHOD OF SHIPMENT: Cooler	REPORTING FORMAT:
RELINQUISHED BY: Gregory Spooner 8/5/08 : 1500 DATE / TIME	RECEIVED BY: Refrigerator 8/5/08 : 1500 DATE / TIME	
RELINQUISHED BY: DATE / TIME	RECEIVED BY: 8/8/08 1315 DATE / TIME	
RELINQUISHED BY: 8/8/08 1445 DATE / TIME	RECEIVED BY: 8/8/08 1445 DATE / TIME	SAMPLE INTEGRITY: 4.6/4.7 ☒ INTACT ☒ ON ICE ☐ OTHER:

APPENDIX D

Environmental Health Decisions

Jill Ryer-Powder, Ph.D., DABT

16 Main Street
Ladera Ranch, California 92694
Office Phone: 949-481-8600
Fax: 949-481-8700

January 25, 2011

Mr. Ricky Ramos
Senior Planner
City of Huntington Beach Planning Department
2000 Main Street
Huntington Beach, CA 92648

RE: Revised Human Health Risk Assessment Information for Remediation of Lead in Soil: Former Gun Range Site, Huntington Beach, CA (07-168)

Dear Mr. Ramos:

This letter report is an update to the Human Health Risk Assessment attachment to Waterstone Environmental, Inc.'s (Waterstone's) *Revised Remedial Action Plan and Human Health Risk Assessment Report* (RAP/HHRA Document) dated January 2011. This letter is an integral part of the January 2011 RAP/HHRA Document and should be reviewed together with important background and site characterization information contained in the RAP/HHRA Document. Tables, figures, and attachments from the RAP/HHRA Document may be referenced in this letter report.

It is our understanding that the City of Huntington Beach is planning to demolish and remediate the closed gun range and reuse the land for parks and open space purposes. In September of 2010, the results of the original health risk-based evaluation were submitted to the Orange County Health Care Agency in the initial RAP for the Subject Property. The initial RAP proposed that the Subject Property be remediated to a commercial/industrial standard. The results were to be used to provide cleanup guidance for the planned remediation at the above-referenced Subject Property. Based on OCHCA review and after consultation with OEHHA, it was recommended that the Subject Property be remediated to a residential level, rather than the industrial/commercial level proposed in the RAP. The City of Huntington Beach was consulted regarding this change in the remediation plan and approved the use of a residential cleanup level.

Since the preparation of the original HHRA, the California Environmental Protection Agency has issued revised standards for site remediation. The revised standards are presented on the World Wide Web at http://www.oehha.org/risk/pdf/LeadCHHSL091709.pdf. Specifically, the revised standard states that the human health screening value for lead for a residential scenario should be 80 milligrams of lead per kilogram of soil (80 mg/kg or parts per million [ppm]). The reason for the revision is The California Office of Environmental Health Hazard Assessment (OEHHA) has recently developed a 1 microgram per deciliter (1 µg/dL) benchmark for source-specific incremental change in blood lead levels for protection of school children and fetuses. The blood lead level benchmark was previously 10 µg/dL.

Environmental Health Decisions

Jill Ryer-Powder, Ph.D., DABT

16 Main Street
Ladera Ranch, California 92694
Office Phone: 949-481-8600
Fax: 949-481-8700

In light of the revised standard for lead in soil at California Sites, we are proposing a cleanup level of 80 mg/kg as a conservative measure approved by the City of Huntington Beach although the Subject Property will not be used for residential purposes.

Exposure and risk management and cleanup decisions in support of the California Environmental Protection Agency and United States Environmental Protection Agency projects are often made based upon the mean concentrations of chemicals at a site. The City of Huntington Beach may elect at a future time to use the commonly-used statistical averaging methodology for meeting the 80 ppm cleanup level at the Subject Property.

The generally accepted statistical averaging method is to use a 95 percent (%) upper confidence limit (UCL95) of the arithmetic mean. This allows an estimate of the exposure point concentration (or representative concentration) to attain cleanup standards at a site (USEPA, 2007a). The USEPA provides methodology and an on-line program to calculate the UCL95 of a dataset (USEPA, 2007a and 2007b). We can therefore utilize the existing lead data to calculate a current exposure point concentration (i.e., the UCL95) for lead at the Property. We can then calculate the representative concentration of lead in soil once removal of contaminated soil (i.e., soil with concentrations of lead greater than or equal to 800 mg/kg) is completed. The following steps were taken to perform these calculations:

1. Data from Hart-Crowser and Waterstone was compiled and sorted from highest detected lead concentration to lowest detected lead concentration (see Table 1 and Appendix A).
2. The UCL95 was calculated for the existing data using USEPA's ProUCL program (USEPA, 2007b)
3. The samples with lead concentrations greater than 340 mg/kg were removed from the database as listed in the following table:

Sample ID	Lead (ppm)	Sample ID	Lead (ppm)	Sample ID	Lead (ppm)
SB6-8	45000	B90-290-0.5	2300	B145-290-0.5	620
SURFACE - 24	41000	RAVINE - 17	2300	SB5-6	600
SB1-2	40000	RAVINE - 1	2000	SURFACE - 23	570
SURFACE - 17	28000	B90-260-0.5	1800	SB2-4	490
RAVINE - 6	17000	B45-15-0.5	1600	SB6-2	450
SB1-8	14000	B175-290-0.5	1300	B175-260-3	440
B115-290-3	5900	SB1-4	1200	B175-260-3	440
SB4-10	3500	SURFACE - 26	1000	SB4-8	420
SURFACE - 22	3300	SB5-8	920	SURFACE - 29	420
B175-230-0.5	3200	SB2-2	870	B75-15-0.5	400
SB1-10	3100	SB1-6	800	B90-230-0.5	370
B15-45-0.5	3100	B145-290-3	780	SB5-4	360
				B145-230-0.5	360

Environmental Health Decisions
Jill Ryer-Powder, Ph.D., DABT
16 Main Street
Ladera Ranch, California 92694
Office Phone: 949-481-8600
Fax: 949-481-8700

4. The UCL95 was recalculated assuming removal of samples described in step 3.

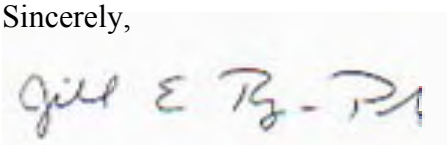
The results of the UCL95 indicated that the representative concentration of lead that is currently at the Property is 3830 mg/kg. If soil is removed at the locations specified in Step 3, the UCL95 will be 76.4 mg/kg. This concentration is less than the target value of 80 mg/kg specified by DTSC as the safe concentration at a residential site.

Conclusions

In conclusion, this report has presented a health risk-based approach to calculate the amount of lead (in soil) that may need to be removed such that future users of the Subject Property are not exposed to unsafe lead levels. The DTSC currently recommends that sites be remediated to a target concentration of 80 mg/kg. If soils containing lead equal to or greater than 340 mg/kg are removed and the UCL95 is calculated from sample concentrations remaining onsite, this goal can be attained. The results of the risk assessment presented in this document indicate that, following the proposed remedial action plan, the presence of lead at the former gun range should not present a health risk to future users of the Subject Property.

If you have any questions, please contact me at the letterhead office phone.

Sincerely,



Jill Ryer-Powder, Ph.D., D.A.B.T.
Principal Toxicologist

Environmental Health Decisions
Jill Ryer-Powder, Ph.D., DABT

16 Main Street
Ladera Ranch, California 92694
Office Phone: 949-481-8600
Fax: 949-481-8700

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APPENDIX E

Information Advisory
Clean Imported Fill Material

October 2001

DEPARTMENT OF TOXIC SUBSTANCES CONTROL

It is DTSC's mission to restore, protect and enhance the environment, to ensure public health, environmental quality and economic vitality, by regulating hazardous waste, conducting and overseeing cleanups, and developing and promoting pollution prevention.

State of California

California Environmental Protection Agency

Executive Summary

This fact sheet has been prepared to ensure that inappropriate fill material is not introduced onto sensitive land use properties under the oversight of the DTSC or applicable regulatory authorities. Sensitive land use properties include those that contain facilities such as hospitals, homes, day care centers, and schools. This document only focuses on human health concerns and ecological issues are not addressed. It identifies those types of land use activities that may be appropriate when determining whether a site may be used as a fill material source area. It also provides guidelines for the appropriate types of analyses that should be performed relative to the former land use, and for the number of samples that should be collected and analyzed based on the estimated volume of fill material that will need to be used. The information provided in this fact sheet is not regulatory in nature, rather is to be used as a guide, and in most situations the final decision as to the acceptability of fill material for a sensitive land use property is made on a case-by-case basis by the appropriate regulatory agency.

Introduction

The use of imported fill material has recently come under scrutiny because of the instances where contaminated soil has been brought onto an otherwise clean site. However, there are currently no established standards in the statutes or regulations that address environmental requirements for imported fill material. Therefore, the California Environmental Protection Agency, Department of Toxic Substances Control (DTSC) has prepared this fact sheet to identify procedures that can be used to minimize the possibility of introducing contaminated soil onto a site that requires imported fill material. Such sites include those that are undergoing site remediation, corrective action, and closure activities overseen by DTSC or the appropriate regulatory agency. These procedures may also apply to construction projects that will result in sensitive land uses. The intent of this fact sheet is to protect people who live on or otherwise use a sensitive land use property. By using this fact sheet as a guide, the reader will minimize the chance of introducing fill material that may result in potential risk to human health or the environment at some future time.

The energy challenge facing California is real. Every Californian needs to take immediate action to reduce energy consumption. For a list of simple ways you can reduce demand and cut your energy costs, see our website at www.dtsc.ca.gov.

Overview

Both natural and manmade fill materials are used for a variety of purposes. Fill material properties are commonly controlled to meet the necessary site specific engineering specifications. Because most sites requiring fill material are located in or near urban areas, the fill materials are often obtained from construction projects that generate an excess of soil, and from demolition debris (asphalt, broken concrete, etc.). However, materials from those types of sites may or may not be appropriate, depending on the proposed use of the fill, and the quality of the assessment and/or mitigation measures, if necessary. Therefore, unless material from construction projects can be demonstrated to be free of contamination and/or appropriate for the proposed use, the use of that material as fill should be avoided.

Selecting Fill Material

In general, the fill source area should be located in nonindustrial areas, and not from sites undergoing an environmental cleanup. Nonindustrial sites include those that were previously undeveloped, or used solely for residential or agricultural purposes. If the source is from an agricultural area, care should be taken to insure that the fill does not include former agricultural waste process byproducts such as manure or other decomposed organic material. Undesirable sources of fill material include industrial and/or commercial sites where hazardous ma-

Potential Contaminants Based on the Fill Source Area

Fill Source:	Target Compounds
Land near to an existing freeway	Lead (EPA methods 6010B or 7471A), PAHs (EPA method 8310)
Land near a mining area or rock quarry	Heavy Metals (EPA methods 6010B and 7471A), asbestos (polarized light microscopy), pH
Agricultural land	Pesticides (Organochlorine Pesticides: EPA method 8081A or 8080A; Organophosphorus Pesticides: EPA method 8141A; Chlorinated Herbicides: EPA method 8151A), heavy metals (EPA methods 6010B and 7471A)
Residential/acceptable commercial land	VOCs (EPA method 8021 or 8260B, as appropriate and combined with collection by EPA Method 5035), semi-VOCs (EPA method 8270C), TPH (modified EPA method 8015), PCBs (EPA method 8082 or 8080A), heavy metals including lead (EPA methods 6010B and 7471A), asbestos (OSHA Method ID-191)

**The recommended analyses should be performed in accordance with USEPA SW-846 methods (1996). Other possible analyses include Hexavalent Chromium: EPA method 7199*

Recommended Fill Material Sampling Schedule

Area of Individual Borrow Area	Sampling Requirements
2 acres or less	Minimum of 4 samples
2 to 4 acres	Minimum of 1 sample every 1/2 acre
4 to 10 acres	Minimum of 8 samples
Greater than 10 acres	Minimum of 8 locations with 4 subsamples per location
Volume of Borrow Area Stockpile	**Samples per Volume**
Up to 1,000 cubic yards	1 sample per 250 cubic yards
1,000 to 5,000 cubic yards	4 samples for first 1000 cubic yards +1 sample per each additional 500 cubic yards
Greater than 5,000 cubic yards	12 samples for first 5,000 cubic yards + 1 sample per each additional 1,000 cubic yards

terials were used, handled or stored as part of the business operations, or unpaved parking areas where petroleum hydrocarbons could have been spilled or leaked into the soil. Undesirable commercial sites include former gasoline service stations, retail strip malls that contained dry cleaners or photographic processing facilities, paint stores, auto repair and/or painting facilities. Undesirable industrial facilities include metal processing shops, manufacturing facilities, aerospace facilities, oil refineries, waste treatment plants, etc. Alternatives to using fill from construction sites include the use of fill material obtained from a commercial supplier of fill material or from soil pits in rural or suburban areas. However, care should be taken to ensure that those materials are also uncontaminated.

Documentation and Analysis

In order to minimize the potential of introducing contaminated fill material onto a site, it is necessary to verify through documentation that the fill source is appropriate and/or to have the fill material analyzed for potential contaminants based on the location and history of the source area. Fill documentation should include detailed information on the previous use of the land from where the fill is taken, whether an environmental site assessment was performed and its findings, and the results of any testing performed. It is recommended that any such documentation should be signed by an appropriately licensed (CA-registered) individual. If such documentation is not available or is inadequate, samples of the fill material should be chemically analyzed. Analysis of the fill material should be based on the source of the fill and knowledge of the prior land use.

Detectable amounts of compounds of concern within the fill material should be evaluated for risk in accordance with the DTSC Preliminary Endangerment Assessment (PEA) Guidance Manual. If

metal analyses are performed, only those metals (CAM 17 / Title 22) to which risk levels have been assigned need to be evaluated. At present, the DTSC is working to establish California Screening Levels (CSL) to determine whether some compounds of concern pose a risk. Until such time as these CSL values are established, DTSC recommends that the DTSC PEA Guidance Manual or an equivalent process be referenced. This guidance may include the Regional Water Quality Control Board's (RWQCB) guidelines for reuse of non-hazardous petroleum hydrocarbon contaminated soil as applied to Total Petroleum Hydrocarbons (TPH) only. The RWQCB guidelines should not be used for volatile organic compounds (VOCs) or semi-volatile organic compounds (SVOCS). In addition, a standard laboratory data package, including a summary of the QA/QC (Quality Assurance/Quality Control) sample results should also accompany all analytical reports.

When possible, representative samples should be collected at the borrow area while the potential fill material is still in place, and analyzed prior to removal from the borrow area. In addition to performing the appropriate analyses of the fill material, an appropriate number of samples should also be determined based on the approximate volume or area of soil to be used as fill material. The table above can be used as a guide to determine the number of samples needed to adequately characterize the fill material when sampled at the borrow site.

Alternative Sampling

A Phase I or PEA may be conducted prior to sampling to determine whether the borrow area may have been impacted by previous activities on the property. After the property has been evaluated, any sampling that may be required can be determined during a meeting with DTSC or appropriate regulatory agency. However, if it is not possible to analyze the fill material at the borrow area or determine that it is appropriate for use via a Phase I or PEA, it is recommended that one (1) sample per truckload be collected and analyzed for all compounds of concern to ensure that the imported soil is uncontaminated and acceptable. (See chart on Potential Contaminants Based on the Fill Source Area for appropriate analyses). This sampling frequency may be modified upon consultation with the DTSC or appropriate regulatory agency if all of the fill material is derived from a common borrow area. However, fill material that is not characterized at the borrow area will need to be stockpiled either on or off-site until the analyses have been completed. In addition, should contaminants exceeding acceptance criteria be identified in the stockpiled fill material, that material will be deemed unacceptable and new fill material will need to be obtained, sampled and analyzed. Therefore, the DTSC recommends that all sampling and analyses should be completed prior to delivery to the site to ensure the soil is free of contamination, and to eliminate unnecessary transportation charges for unacceptable fill material.

Composite sampling for fill material characterization may or may not be appropriate, depending on quality and homogeneity of source/borrow area, and compounds of concern. Compositing samples for volatile and semivolatile constituents is not acceptable. Composite sampling for heavy metals, pesticides, herbicides or PAH's from unanalyzed stockpiled soil is also unacceptable, unless it is stockpiled at the borrow area and originates from the same source area. In addition, if samples are composited, they should be from the same soil layer, and not from different soil layers.

When very large volumes of fill material are anticipated, or when larger areas are being considered as borrow areas, the DTSC recommends that a Phase I or PEA be conducted on the area to ensure that the borrow area has not been impacted by previous activities on the property. After the property has been evaluated, any sampling that may be required can be determined during a meeting with the DTSC.

For further information, call Richard Coffman, Ph.D., R.G., at (818) 551-2175.