Final Report

Restore Saugus River Turning Basin and Dock – Marsh Characterization

Saugus Iron Works National Historic Site
Saugus, Massachusetts

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Executive Summary

Saugus Iron Works National Historic Site (NHS) in Saugus, Massachusetts is the site of the first integrated iron works in North America, which operated from 1646 to 1668. In 1957, a dam breach upstream of the park caused extensive sedimentation in the turning basin that served as an important historical element of the Saugus Iron Works NHS. Consequently, today, approximately four acres of the river are choked with invasive plant species and are impacted by industrial contaminants derived from the urbanized Saugus River watershed, as well as from waste material produced by the historic iron works (i.e., the slag pile). This purpose of this report is to characterize the nature and extent of contaminated sediments within the potential restoration areas (Figure 1), characterize the likely depth below ground surface (bgs) of the pre-1957 sediments, identify the range of typical summer tidal fluctuations within the study area, and characterize the vegetative and benthic invertebrate communities within the study area.

To characterize the nature and extent of contamination in the marsh, sediment samples were collected and analyzed for priority pollutant metals (PPMs), polycyclic aromatic hydrocarbons (PAHs) and total organic carbon (TOC). Historical studies have shown PPM and PAH contamination in the marsh sediments. PPMs are a group of 13 metals identified by the United States Environmental Protection Agency (USEPA), including antimony, arsenic, beryllium, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, thallium, and zinc. PAHs are chemicals that are formed during the incomplete burning of coal, oil and gas, garbage, or other organic substances. PAHs are probable carcinogens and are therefore potentially hazardous to humans and wildlife. Organic matter content in sediments is typically measured as TOC. Organic matter plays a major role in aquatic systems, affecting biogeochemical processes, chemical transport and bioavailability, and nutrient cycling.

A total of 17 shallow sediment cores (up to 5 ft) and three deep sediment cores (up to 16 ft) were collected in the wetland sediment and former tidal basin to characterize the marsh sediments within the proposed restoration area. From the 17 shallow core locations, 47 depth/horizon intervals were sampled and analyzed for PPMs, PAHs, and TOC. From the three deep core locations, 11 depth intervals were sampled and analyzed for PPMs and PAHs. An additional sample was collected at every 1-ft interval in the deep core samples and submitted for TOC analysis.

Most of the samples contained detectable concentrations of PPMs. The most frequently detected metals were arsenic, chromium, lead, nickel, and zinc. The concentrations of most of the detected metals were generally higher in the upper, organically rich sediment layers. PAHs were detected less frequently than were metals. The detected PPM and PAH concentrations were compared with Massachusetts Contingency Plan (MDEP, 1999) Reportable Concentrations for Soil Category 1 (MCP RCS-1). The MCP is the state equivalent of the federal Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). The law's aim is to address parties responsible for releases of hazardous substances that may endanger public health or the environment.

Only six of the 20 sampling locations contained concentrations of PPMs or PAHs greater than the MCP RCS-1 values. Generally, the locations with MCP RCS-1 exceedances were closest to the Saugus River. The least impacted areas of the wetlands appear to be near the slag pile and the interior portion of the southern wetland, away from the river. This pattern of contamination would seem to be consistent with contaminant migration and deposition from an upstream release of PAHs. The concentrations of PPMs and PAHs detected in the marsh sediments are not unusually high for sediments in an urban river with a highly developed watershed, since these contaminants are common in surface water runoff from roadways and parking lots.

Visual observations of the sediment characteristics were used in conjunction with TOC content of the depth intervals to attempt to discern the likely depth of the pre-1957 and post-1957 interface in the sediment profile. The basis for this evaluation was that it is likely that large amounts of coarse particulate matter (i.e., sand), which typically has a low TOC content, was deposited in the former turning basin during the 1957 flood event. In the recovered sediment cores, the uppermost layer generally consisted of vegetative and peat materials with depths ranging from approximately 0.5 to 2.5 ft. The thickest organic/peat layer was generally found in the cores located away from the river, closer to the uplands. Below this layer were various layers of organic, organic silt, and sand layers. In the Northern Area, very low TOC concentrations in a coarse sand layer noted in the cores with good recoveries suggest that pre-1957 sediments are likely found at a depth greater than 3.5 ft bgs in the northern wetland area. In the Southern Area, although the interface between the pre-1957 and post-1957 sediments also could not definitively identified, the evidence does suggest that the pre-1957 sediments are likely found at a depth greater than 2 ft bgs over the majority of the southern wetland area.

Excavation alternatives for the tidal basin were evaluated in a technical memorandum to the National Park Service (Appendix C). Alternatives were proposed and evaluated against specific requirements, including minimal impacts on the Saugus River channel, both within the work area and downstream, minimal disruption of park resources, operations, and historic artifacts, minimal impacts on the community, and cost effectiveness. Three alternatives considered included were wet dredging, dry dredging, and conventional wet excavation. Conventional wet excavation was recommended because it is capable of excavating to less than 3 feet, produces less water, and appears to be feasible given the state of the current subsurface and observations made during sediment coring activities.

Preliminary excavation requirements were estimated based on the information from the sediment coring activities, current base elevations for the Saugus River channel, and dredge line information from previous design drawings. It is estimated that the depth of excavation will vary from 0.6 to 5.6 feet. Sediment volumes for excavations proposed in Alternatives 1 and 2 were calculated. Alternative 1 involves the excavation of the Northern Area only while Alternative 2 requires the excavation of both the Northern and Southern Areas. The alternatives correspond to Alternative B and Alternative C, respectively, as referred to in the *Value Analysis Study for Restore Saugus River Turning Basin and Dock* (CH2M HILL, 2004). The Northern Area (1.0 acre) would be excavated to a weighted average depth of 2.7 feet. This results in a total volume of 5,000 cubic yards of sediment (Alternative 1). The Southern Area (3.4 acres) would be excavated to a weighted average depth of 2.1 feet, resulting in a total

sediment volume of 9,000 cubic yards. Alternative 2 requires the excavation of a total volume of 14,000 cubic yards.

Based on the sampling and analysis of the marsh sediments, the proposed excavated sediments are likely non-hazardous. The analytical data indicate that some portion of the proposed excavated sediments may be used as general fill, while the remaining portion that exceed MCP RCS-1 for PAHs will be required to be disposed at an unlined landfill. Based on the contaminant concentrations observed, the volume of sediments requiring disposal at an unlined landfill was estimated to be 30 percent of the total sediment volume while the majority of excavated sediment, or 70 percent, would be disposed as general fill. Disposal costs (loading, transportation, and off-site disposal of dewatered sediment) for the Northern Area alone were estimated at $408,000. Disposal costs for the Northern Area and Southern Area combined were estimated at $1,142,400. For a complete Class B cost estimate, please refer to the *Value Analysis Study for Restore Saugus River Turning Basin and Dock* (CH2M HILL, 2004).

Containment alternatives for the slag pile were evaluated in a technical memorandum to the National Park Service dated April 19, 2004 (Appendix D). The slag pile is approximately 150 feet long, 50 feet wide, and 12 feet high, and is approximately 40% covered by vegetation, with the remainder of the surface being exposed bare slag. The slag pile is generally stable and free of damage due to erosion. Four alternatives were evaluated using a "strengths, weaknesses, opportunities, and threats" (SWOT) analysis process with the project objectives. Alternative 1, Maintain Slag Pile in Current Condition, was determined to meet all of the project objectives at a low cost. The primary disadvantage to this alternative (potential for future toe erosion) was found to be speculative, and this alternative was recommended as the preferred alternative.

1.0 Introduction

This report presents a characterization of the quality and composition of the wetland sediments within the Saugus Iron Works National Historic Site (NHS). In 1957, a dam breach upstream of the park caused extensive sedimentation in a former tidal turning basin that served as an important historical element of Saugus Iron Works NHS. This sedimentation event also serves as a marker below which sediment could potentially contain historically significant archeological and cultural resources. Consequently, today, approximately four acres of wetland (formerly the part of the turning basin and Saugus River) are choked with invasive plants and are impacted by industrial contaminants derived from the urbanized Saugus River watershed, as well as from waste material produced by the historic iron works (i.e., the slag pile).

The Saugus Iron Works NHS General Management Plan (GMP) recommends restoring approximately four acres of the Saugus River turning basin to its original open-water condition to preserve the distinctive character of the park resources and thereby provide for quality visitor experiences (Figure 1). The goal of the project is to restore the turning basin to an environment with a higher ecological value commensurate with the historically correct setting. An open water habitat surrounded by an emergent wetland fringe would enhance the habitat for fish, waterfowl, and other birds. This goal will be achieved through the following project components:

- **Removal of contamination within the wetland sediments**. The removal of contaminated wetland sediments will help to minimize threats to human and ecosystem health, and will improve natural habitats.
- **Containment of the slag pile**. Stabilization or containment of the slag pile will reduce or eliminate arsenic migration into the marsh, further minimizing threats to human and ecosystem health, and improving natural habitats. The intent of the project is to stabilize the slag pile, while also keeping it intact because it is the only remaining feature of the original iron works.
- **Removal of invasive exotic plant species**. Invasive plant species displace valuable native species and contribute to the narrowing of the river channel, threatening the health of wetland habitats and limiting biodiversity. This displacement has also impacted the park's viewsheds, as character-defining landscape elements are now blocked by stands of *Phragmites* and other exotic invasive species. Control of invasive plant species infesting the marsh area is needed to improve biodiversity, restore habitat and achieve a more historically accurate, natural wetland vista for visitor enjoyment.
- **Restoration of the open water condition by regrading**. Restoration of the open water condition of the historic tidal basin is essential to visitors' understanding that the iron works was located on the Saugus River to allow the transport of raw materials and the shipping of finished iron goods to local and international markets. It will also serve to improve biodiversity and make the river a more suitable habitat for aquatic and terrestrial organisms. Regrading the marsh sediments after removal of the sediments

and overlying organic material will restore the open water condition of the turning basin. The landscape will consist of alternating mudflats and open water with a fringing emergent marsh of native brackish vegetation (Figure 2). This will be achieved by careful selection of target elevations within the intertidal zone, which will be derived from tidal change and contaminant studies, as well as topographic surveys. The appropriate microtopography elevations can also serve to curtail the spread of freshwater invasive plants, such as *Phragmites*.

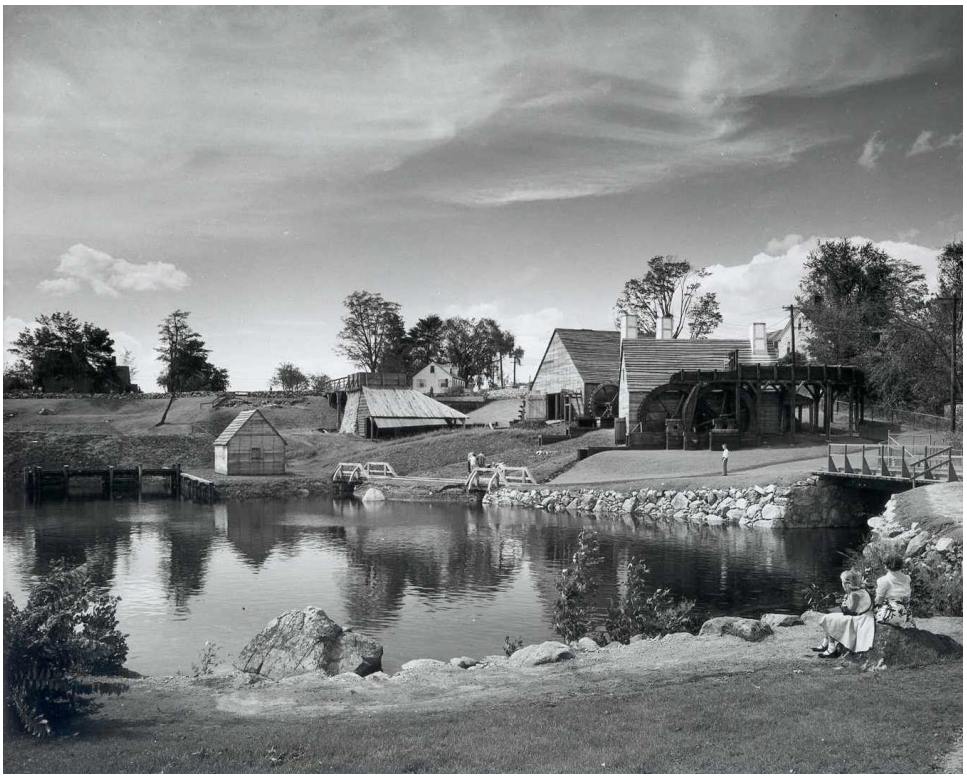
- **Construction of fringing emergent wetlands using native vegetation**. Native vegetation will contribute to a more historically-appropriate, ecologically diverse, and aesthetically pleasing landscape for visitors to appreciate, and will also enhance wildlife habitat.
- **Removal and in-kind replacement of the bulkhead and dock**. Restoration of the bulkhead and dock will restore the cultural landscape of the park, improve visitor understanding of the historical context in which these structures were used, and allow visitors improved access to the waterfront area.

2.0 Site Description

Saugus Iron Works NHS in Saugus, Massachusetts is the site of the first integrated ironworks in North America, which operated from 1646 to 1668. The original manufacturing site served as a training ground for skilled ironworkers for what would become America's iron and steel industry. Iron making provided the infrastructure for the rise of other colonial industries. Called "the forerunner of America's industrial giants," the site served as a center for technology, innovation, and invention (www.nps.gov/sair).

Saugus Iron Works NHS illustrates the critical role of iron making in seventeenth-century settlement and its legacy in shaping the early history of the nation. The site's setting on the Saugus River, featuring an open-air museum with working waterwheels, evokes a unique experience for park visitors. These resources demonstrate seventeenth-century engineering and design methods, iron-making technology and operations, local and overseas trade, and life and work in the Massachusetts Bay Colony. The site is the southern gateway to the Essex National Heritage Area, linking thousands of historic places in Essex County related to the themes of colonial settlement, maritime trade, and early industrialization.

The Saugus River and its turning basin are integral landscape features of the historic setting at the Saugus Iron Works.



Saugus River, Saugus Iron Works turning basin, 1954 (photo obtained from NPS).

The sediments in the former turning basin are contaminated with hazardous materials derived from the urbanized Saugus River watershed, as well as from waste material produced by the historic iron works (i.e., the slag pile). The contaminants in the river within the park site include PPMs, including arsenic, cadmium, nickel, beryllium, and lead, and PAHs, all of which are considered toxic.

A critical constraint on the sediment removal is to protect potential archeologically significant resources of the former iron works by only removing sediments that were deposited after the dam breach in 1957. In support of this constraint, an objective of the marsh characterization was to identify the depth below ground surface (bgs) of pre-1957 sediment through a combination of visual observations of sediments cores as well as evaluation of the chemical signatures in the cores (i.e., contaminants and TOC).

This objectives of this report are to: 1) characterize the nature and extent of contaminated sediments within the potential restoration areas (Figure 1); 2) characterize the likely depth bgs of the pre-1957 sediments; 3) identify the range of typical summer tidal fluctuations within the study area; and 4) characterize the aquatic vegetation and benthic invertebrate communities within the study area.

Due to the time constraints necessary to complete this project, the final report is following a phased approach. This report was prepared prior to the completion of the tidal study and the aquatic vegetation and invertebrate surveys and, as such, the results of these studies will be documented in an addendum to this report.

3.0 Marsh Characterization

This section of the report presents the methods, analyses, and results used to characterize the nature and extent of contamination in the marsh sediments within the proposed restoration area (Figure 1). The characterization work was focused solely on the marsh sediments; thus no sediment samples were collected within the river channel. Also presented is an evaluation of the likely depth of sediments deposited since 1957.

3.1 Field Work

The primary objectives of the sediment coring were:

1) To characterize the nature and extent of PPM and PAH contamination of the wetland sediments within the proposed restoration area.

2) To delineate the breakpoint depth of pre- and post-1957 sediments based on visual observations of sediment characteristics and analysis of TOC content.

3.1.1 Sample Collection

A total of 17 shallow cores (up to 5 ft) and 3 deep cores (up to 16 ft) were collected in the wetland sediment and former tidal basin. Prior to sampling, each sample was horizontally located with a labeled grade stake using a Trimble® GPS unit (Figure 3). The coordinates for the sediment core locations are provided in Table 1. The deep cores (SD01, SD02, and SD03) were collected by "direct push" soil probing using mechanical methods (i.e., GeoProbe® equipment), and the shallow cores (SD04 to SD20) were collected by manual methods.

A Geoprobe® machine relies on a relatively small amount of static weight (i.e., the field vehicle) combined with percussion as the energy for advancement and is hydraulically powered. Plywood sheathing was laid across the marsh surface to allow the GeoProbe® equipment (model 54DT) to access to the sample locations in the wetland sediment and former tidal basin. The three borings were advanced to approximately 15 ft using continuous macro core sampling. The macro core sampling was comprised of 4-ft plastic core tubes (1.75-inch diameter) inside a metal core tube. The macro core assembly was hydraulically driven into the sediments to a depth of 15 ft or until refusal was encountered. The inner plastic liner was retrieved at each 4 ft-depth interval.

The 17 shallow cores were collected using a 5 ft polycarbonate tube (1- 7/8-inch diameter), which was advanced to depth using a combination of hand pressure and by hammering with a mallet. Once at depth, the tube was removed and analyzed. Modifications were made to this method, depending on the amount of resistance encountered when a tube was advanced to depth. If the sample was lost when the tube was retrieved, a new sample was collected in the immediate proximity and a core catcher was employed to increase sample recovery. At locations with the greatest resistance and/or sample loss (i.e., the tube could not be advanced with a mallet and/or zero recovery was observed despite the modifications), the polycarbonate tube was placed inside a metal gravity corer, which was

then advanced to depth with a slide hammer attached to the metal corer. At some locations, removal of the tubes and/or metal corer required expanding the sample hole with a post-hole digger to create more pulling leverage.

3.1.2 Sediment Core Analysis

Following removal of the sediment cores, the surface of the liner was cleaned and a photograph of the sediment core was taken through the liner, if visible (Appendix A). If the core was not visible through the liner, the core was extruded onto a clean sheet of polyethylene to photograph and record the core characteristics. The sediment type was classified using the Unified Soil Classification System, noting particularly the percentage of fines (silt and clay). The total length of tube then was advanced and the length of the sample core inside the tube was also recorded.

The vacant area at the top of each core suggests that the cores were subjected to some degree of compaction and/or plugging at the end of the core so that the cores stopped collecting material as they were advanced to depth. Additionally, in some of the cores, some material was lost from the bottom of the tubes during retrieval. Thus, the sediment coring logs must be interpreted with caution. The sediment cores depicted in Figures 7 through 10, and Figure 13 show the cores as they were retrieved from the marsh sediments. However, the analyses presented below account for the possible compaction, plugging of the core tube, and loss of material upon retrieval by assuming that the top of the peat layer in each tube represents the marsh surface. Thus, measurements of sediment horizons below ground surface in each core are based on depth from the top of the peat layer, rather than from the top of the core tube itself.

After recording characteristics of the sediment core, shallow cores were subdivided into 2 or 3 sections based on discernable difference noted in the individual horizons. Each depth interval was separated into a pre-cleaned stainless steel bowl and homogenized until a consistent color and texture was attained. The deep cores were subdivided into the 4-ft sample intervals, regardless of individual horizons. Subsamples of the homogenized depth intervals were transferred into labeled 250 ml sample jars with a stainless steel spoon, and placed on ice in coolers. Each depth/horizon interval was labeled as A, B, or C to designate the depth of collection (e.g., SD01A, SD01B, and SD01C), with A indicating the shallowest interval and C indicating the deepest interval. Two of the deep cores also contained a fourth depth interval labeled as “D”, since these cores were divided into the 4-ft macro core tubes, rather than by discernable sediment horizons.

From the 17 shallow core locations, 47 depth/horizon intervals were sampled. At four sample locations (SD14, SD17, SD19, and SD20), only two horizons were discernable and sampled. The samples were analyzed for metals, PAH and TOC analyses. From the three deep core locations, 11 depth intervals were sampled and analyzed for PPMs and PAHs (only three 4-ft sections were collected at SD-02 because core refusal was at 12 ft). An additional sample was collected at every 1-ft interval in the deep core samples and submitted for TOC analysis. At the end of each field day, the samples were sent to a Massachusetts-certified laboratory via courier.

3.2 Sediment Quality

The quality of the sediment within the project area has been impacted by PPMs and PAHs. Metals, PAH, and TOCs sample results for each sample collected are presented in Tables 2, 3, and 4, for the deep cores, the shallow cores in the Northern Area, and the shallow cores in the Southern Area, respectively. The raw analytical data are provided in Appendix B. Most of the samples contained detectable concentrations of PPMs. The most frequently detected metals were arsenic, chromium, lead, nickel, and zinc. PAHs were detected less frequently than were metals. PAHs were detected at 10 of the 20 samplings locations, mostly in the upper organic peat layer samples (i.e., "A" depth intervals).

The detected PPM and PAH concentrations were compared with Massachusetts Contingency Plan Reportable Concentrations for Soil Category 1 (MCP RCS-1) (MDEP, 1999). Detected concentrations that exceeded the MCP RCS-1 concentrations are highlighted in Tables 2 to 4. Six of the twenty sampling locations contained concentrations of PPMs or PAHs greater than the MCP RCS-1 values (Figure 4). With the exception of location SD06, the locations with MCP RCS-1 exceedances of PAHs were closest to the Saugus River. This pattern of contamination would seem to be consistent with contaminant migration and deposition from an upstream release of PAHs.

An initial review of the sediment chemical data was conducted by a Massachusetts Licensed Site Professional (LSP) from CH2M HILL. The review confirmed that the exceedences of the MCP RCS-1 concentrations would require the NPS to submit a notification of release to the Massachusetts Department of Environmental Protection (MA DEP) within 120 days of receipt of the analytical data, which were received on May 20, 2004. This notification will result in the generation of a new release tracking number (RTN) for the site under the MCP. Initial review of MA DEP records revealed that 3 RTNs were previously opened for the site, 2 of which were subsequently closed. It is anticipated that the new RTN generated from this sampling effort will be tied in with the previous RTNs for the site.

Arsenic was detected in most of the samples, but exceeded the MCP RCS-1 value of 30 mg/kg in only two of the samples (SD07C and SD16C, at 95 mg/kg and 32 mg/kg, respectively). Arsenic concentrations were generally higher in the upper sediments (A layer) and the deeper sediments (C layer) than they were in the middle (B layer) sediments (Figure 5). The average arsenic concentrations in the C layer samples shown in Figure 5 are biased high because of the two concentrations that exceeded MCP RCS-1 values.

Although none of the other metals exceeded MCP RCS-1 values, the concentrations of some of the metals (e.g., chromium, lead, and zinc) may be elevated and thus may be impacting the quality of the wetland habitat. The concentrations of most of the detected metals were generally higher in the upper, organically rich sediment layers. It is likely that the metals in the upper sediments are representative of the impact from the highly developed urban watershed upgradient of the project area.

The deep sediment cores collected near the slag pile (SD01, SD02, and SD03) did not contain concentrations of arsenic that exceeded MCP RCS-1 value of 30 mg/kg at any depth (Figure 6), which suggests that the slag pile does not represent a significant current source of arsenic to the wetland. Since the slag pile has been in place hundreds of years, it is likely that the leaching of metals is no longer a significant concern. The two locations where

arsenic was found above the MCP RCS-1 values (SD07C and SD16C) were collected from a depth of at least 2 ft bgs and are likely a result of historical migration of particulate-bound arsenic from the slag pile.

Three sampling locations (SD07, SD10, and SD16) contained the highest concentrations of PPMs and PAHs in the marsh sediments. In addition to the high arsenic concentration at SD07, chromium, lead, mercury, and zinc were also detected at higher concentrations than other sampling locations. Lead and zinc were highest at SD-10, and five PAH compounds were detected. Twelve PAH compounds were detected at sampling location SD16, whereas only 1 to 3 PAH compounds were detected at the remaining sampling locations.

The least impacted areas of the wetlands appear to be near the slag pile (i.e., SD01, SD02, SD03, SD08, and SD09) and the interior portion of the southern wetland, away from the river (i.e., SD11, SD13, SD15, and SD17). Although PPMs were detected in the samples near the slag pile, they were present at concentrations generally lower than those in samples from other parts of the wetland closer to the river. At sampling locations SD11, SD13, and SD15, no PAHs and three or less PPMs were detected, and no PAHs or PPMs were detected at sampling location SD17.

3.3 Evaluation of Depth of Pre-1957 and Post-1957 Sediments

Visual observations of the sediment characteristics were used in conjunction with TOC content of the depth intervals to attempt to discern the likely depth of the pre-1957 and post-1957 interface. The hypothesis for this evaluation was that it is likely that large amounts of coarse particulate matter (i.e., sand) were deposited in the former turning basin during the 1957 flood event. Because the river is highly constricted just upstream of the Saugus Iron Works, a flood event would produce very high velocity, turbulent flow that would transport sand and gravel downstream to an area of less constriction, the former turning basin. It is likely that smaller, lighter particles, such as silts were carried further downstream with the floodwaters before settling out.

3.3.1 Northern Area (Turning Basin)

Existing sediment in the Northern Area (turning basin) was investigated by three deep corings (SD01, SD02, and SD03) with bottom depths ranging from 12 to 16 feet (Figures 7 through 9) and seven shallow corings with depths ranging from 3.75 to 5 feet (Figure 10).

Core recovery rates ranged from 10 to 36 inches in the shallow cores, with the uppermost 5 to 8 inches consisting of plant and organic materials, and layers of coarse to fine sand and organic silt and clay beneath the organic materials. Deeper deposits, as identified in the deep soil boring along the western side of the area near the slag pile, were predominately fine to coarse sand with layers of organic, silt, and clay materials. It was difficult from the boring logs alone to determine the possible interface between the pre-1957 and post-1957 sediment. However, very low TOC concentrations in a coarse sand layer noted in the cores with good recoveries (i.e., approximately 70% or greater recovery of the length of the core) at locations SD05, SD06, and SD07 (Figure 11) suggest that pre-1957 sediments are likely found at a depth greater than 3.5 ft bgs in the northern wetland area. The TOC in the deep cores (SD01, SD02, and SD03) also show a decrease in concentration at 3 ft bgs that supports this conclusion (Figure 12).

3.3.2 Southern Area (*Phragmites* Wetland)

Graphical depictions of the boring logs for the shallow cores collected in the southern wetland area are shown on Figure 12. Sediment in the Southern Area was investigated with ten shallow corings ranging from 1 to 5 ft deep, depending on the depth of refusal. In the recovered sediment cores, the uppermost layer in the Southern Area generally consisted of vegetative and peat materials with depths ranging from approximately 0.5 to 2.5 ft. The thickest organic/peat layer was generally found in the cores located away from the river, closer to the uplands. Below this layer were various layers of organic, organic silt, and sand layers. With the possible exception of a coarse sand layer (ranging from approximately 8 to 12 inches thick) noted in some corings, it was difficult to determine where the interface between the pre-1957 and post-1957 materials might exist. The top of the coarse sand layer was found at depths ranging from approximately 16 inches to 36 inches bgs. The coarse sand layer also contained very little TOC, with values ranging from 0.2 to 3.4% TOC, in contrast to TOC values above and below the sand layer, which ranged from 19 to 100%TOC. The low TOC sand layer from three cores with relatively good recoveries is shown on Figure 10. Thus, although the interface between the pre-1957 and post-1957 sediments could not definitively identified, the evidence does suggests that the pre-1957 sediments are likely found at a depth greater than 2 ft bgs over the majority of the southern wetland area.

The sediment cores collected from the Southern Area with good recoveries generally contained higher TOC content at all depths (Figure 14). The sand layer was not evident in all the cores; thus, the average TOC concentrations are higher in the B layer in the Southern Area than they are in the Northern Area. However, there is still a marked decrease in TOC evident in the sediments at a depth of approximately 2 to 3 ft bgs.

4.0 Sediment Removal Evaluation

In this section, sediment removal methods, volumes and costs are evaluated and slag pile alternatives are discussed. For a detailed analysis, please refer to *Value Analysis Study for Restore Saugus River Turning Basin and Dock* (CH2M HILL, 2004) and *Pre-Design Report, Restore Saugus River Turning Basin and Dock, Saugus Iron Works National Historic Site* (CH2M HILL, 2004).

4.1 Removal Methods

Excavation alternatives for the tidal basin were evaluated in a technical memorandum to the National Park Service (Appendix C). The tidal basin within the historical site boundary consists of two parts, the northern approximately 1-acre "turning basin" and the approximately 3-acre Southern Area. Failure of the upstream dam in 1957 resulted in the deposit of debris and silt in both areas. This deposit reduced the depth of the basin and resulted in the growth of invasive, non-native plants. In addition, the deposited material may have been contaminated by upstream industrial activities.

Although the interface between pre-1957 and post-1957 sediments could not be definitively identified, evidence suggests that pre-1957 sediments are likely found at a depth greater than 2 feet bgs over the majority of the Southern Area, and at around 3.5 feet bgs in the Northern Area.

Primary goals of the sediment removal effort include:

- Restoration of the tidal basin to the approximate bottom configuration at the end of historical site reconstruction in 1954 (prior to the 1957 dam breach);
- Removal of contaminated sediments; and
- Provision of sufficient permanent water depth to prevent future intrusion by invasive, non-native plant species.

Three alternatives were proposed and evaluated against specific requirements, including minimal impacts on the Saugus River channel, both within the work area and downstream, minimal disruption of park resources, operations, and historic artifacts, minimal impacts on the community, and cost effectiveness.

Three alternatives considered included were wet dredging, dry dredging, and conventional wet excavation. Dry dredging was removed from consideration because it is no longer available. Although wet dredging and conventional wet excavation are both available, conventional wet excavation was found to be more appropriate for this site. Wet dredging requires a minimum excavation depth of 3 feet, as well as at least 3 feet of water to float the dredge. Substantial dewatering facilities would be required, and more water would be generated that may require treatment. Conventional wet excavation was recommended because it is capable of excavating to less than 3 feet, produces less water, and appears to be feasible given the state of the current subsurface and observations made during sediment

coring activities. Conventional wet excavation for this project will likely require the use of heavy equipment such as a tracked backhoe similar to that shown below.



Figure 15. Photo of tracked backhoe (equipment likely to be used for the sediment removal).

Two additional factors related to the excavation were suggested, protection of the Saugus River from sediment and contaminants and work area access. Alternatives suggested for the protection of the river included a super silt fence, floating silt curtain, portable dike, and other options. Access considerations for the Northern Area include the reinforcement of two existing bridges required to accommodate the weight of construction equipment and loaded dump trucks. For the Southern Area, environmental concerns require that a temporary access trail be constructed and reinforced to minimize environmental impact. Access to both areas will have a potential impact on the public, requiring that public access of certain areas be restricted and traffic controls be provided for the Southern Area.

4.2 Sediment Volumes

Preliminary excavation requirements were estimated based on the information from the April 2004 sediment coring activities, current base elevations for the Saugus River channel, and dredge line information from previous design drawings.

It is estimated that the depth of excavation will vary from 0.6 to 5.6 feet. Sediment volumes for excavations were calculated for two alternatives. Alternative 1 involves the excavation of the Northern Area (the former turning basin) only. Alternative 2 requires the excavation of both the Northern Area and the Southern Area (*Phragmites*-dominated wetland). The alternatives correspond to Alternative B and Alternative C, respectively, as referred to in the

Value Analysis Study for Restore Saugus River Turning Basin and Dock (CH2M HILL, 2004). The Northern Area (1.0 acre) would be excavated to a weighted average depth of 2.7 feet. This results in a total volume of 5,000 cubic yards of sediment (Alternative 1). The Southern Area (3.4) acres would be excavated to a weighted average depth of 2.1 feet, resulting in a total sediment volume of 9,000 cubic yards. Alternative 2 requires the excavation of a total volume of 14,000 cubic yards.

4.3 Disposal Alternatives and Costs

Based on the sampling and analysis of the marsh sediments, it is assumed that the proposed excavated sediments are non-hazardous. The analytical data indicate that some portion of the proposed excavated sediments may be used as general fill, while the remaining portion that exceed MCP RCS-1 for PAHs will be required to be disposed at an unlined landfill.

The analytical data showed MCP RCS-1 exceedences for PAHs at six of the twenty sediment core locations. Four of the six were only in the peat layer, which is about the top 12 inches on average, while two of the six occurred deeper at a depth of approximately 1-2 ft bgs. Based on the contaminant concentrations observed, the volume of sediments requiring disposal at an unlined landfill was estimated to be 30 percent of the total sediment volume while the majority of excavated sediment, or 70 percent, would be disposed as general fill. Disposal via asphalt batching or incineration should not be required because the level of contamination does not warrant these disposal methods.

Disposal costs (loading, transportation, and off-site disposal of dewatered sediment) for the Northern Area alone were estimated at $408,000. Disposal costs for the Northern Area and Southern Area combined were estimated at $1,142,400. For a complete Class B cost estimate, please refer to the *Value Analysis Study for Restore Saugus River Turning Basin and Dock* (CH2M HILL, 2004).

4.4 Slag Pile Containment Alternatives

Containment alternatives for the slag pile were evaluated in a technical memorandum to the National Park Service dated April 19, 2004 (Appendix D). Slag is an aggregate-like waste material produced in the iron-making process. During site operations, this material was removed from the blast furnace and dumped in a ridge-like pile in the northwestern corner of the tidal basin. The slag pile is approximately 150 feet long, 50 feet wide, and 12 feet high, and is approximately 40% covered by vegetation, with the remainder of the surface being exposed bare slag. The slag pile is generally stable and free of damage due to erosion.

In June 1998, the State of Massachusetts issued a Notice of Activity and Use Limitation (AUL) for the slag pile due to the presence of PPMs and PAHs in exposed marshland sediments and arsenic in the slag pile. Although current and future foreseeable site activities pose no significant risk to human health, public welfare, safety, or the environment (based on site-specific risk characterization), the AUL was developed to maintain this no-risk status by restricting inappropriate uses (such as a playground or residential vegetable garden).

Four alternatives were evaluated using a "strengths, weaknesses, opportunities, and threats" (SWOT) analysis process with the project objectives of:

- Maintaining, to the extent possible, the existing configuration, historical character, and view of the existing slag pile;
- Minimizing long-term operations and maintenance requirements;
- Minimizing impacts to the surrounding area; and
- Maintaining restrictions and conformance with the existing AUL.

Alternative 1, Maintain Slag Pile in Current Condition, was determined to meet all of the project objectives at a low cost. The primary disadvantage to this alternative (potential for future toe erosion) was found to be speculative, and this alternative was recommended as the preferred alternative.

Alternative 2, Existing Slag Pile with Toe Armoring, is similar to Alternative 1 but provides for erosion protection at the toe of the pile to mitigate the erosion potential issue raised with Alternative 1. This alternative is more costly, raises possible wetland encroachment issues, and may have a non-historical look if not carefully implemented. This alternative was recommended to be used as a basis for cost estimates to provide funding in the case that erosion at the toe of the slag pile becomes necessary.

Alternative 3, Soil Cover and Vegetation over Entire Slag Pile, was not recommended due to its high cost and inability to meet project objectives (such as maintaining the historical character and view of the slag pile). In addition, the actions proposed by this alternative are not required in order to meet the requirements of the AUL.

Alternative 4, Geotextile Layer with Exposed Surface Slag, would have provided a view of an exposed slag surface, but also provided limited containment. This alternative was not recommended due to high cost, potential for undue worker exposure during construction, potential regulatory issues with slag reuse, and greater maintenance requirements. In addition, this alternative did not appear to provide substantial advantage over existing conditions.

4.5 Logistical and Economic Considerations

It was agreed in the initial project workshop that the proposed work areas cannot be accessed across the river channel, including no fords, fills, or culverts. In order to meet this requirement, the turning basin area will have to be accessed by way of the maintenance road and trail at the southeastern corner of the historic area. This will require the evaluation and reinforcement of two bridges to accommodate construction equipment and loaded dump trucks. A ramp and temporary loading area will have to be installed in the northern end of the basin to the west of the wharf area for dewatering, staging, and loading of materials. Due to the sandy nature of much of the sediment in the basin, it appears that the loading area can be made of excavated materials. It will be removed last as the excavation equipment works out of the basin.

The Southern Area will have to be accessed by way of town streets and an existing gate located located approximately 700 feet south of the existing maintenance area. Preparation of this area will require removal of trees and installation of a temporary access trail into the work area. Environmental considerations require that the access trail include reinforcement,

geotextiles, and other features to minimize compaction and disturbance of the existing ground by equipment. Conceptually, a temporary loading area will be installed along the edge of the tidal basin for dewatering, staging, and loading of materials. Exact configuration and operational requirements will have to be further detailed during subsequent design activities due to the topography in the vicinity of this access point.

Access to both areas will have a potential impact on the public. Within the historic area, the work area and associated access trails will have to be cordoned off from public access with security fencing or other measures. The Southern Area will require traffic controls, barriers, flagmen, and other controls to minimize conflicts with the community.

An additional constraint on the project is the timeframe for conducting the work. In the Saugus River, adult rainbow smelt migrate up the tidal estuary and spawn from March through May, depositing eggs at the tidal headwaters of the River (the section of the river within the project area) and a short distance upstream from the Saugus Iron Works NHS. After spawning, the adults return to the saltwater portion of the estuary or coastal waters. The eggs generally hatch within 8 to 27 days, depending on temperature. Larvae are transported downstream to the saltwater portion of the estuary and young-of-the-year smelt remain in the saltwater estuary or coastal waters. Thus, sediment excavation should not take place during the months of March, April, and May, which is the spawning season for smelt, as well as other species of anadromous fish (Site Visit Summary, Rainbow Smelt Spawning Habitat Discussion at the Saugus Iron Works National Historic Site, April 26, 2004).

Sediment Control Considerations

Excavation and other disturbances within the proposed work areas will generate sediment that can be transported as suspended solids in impounded water or in runoff. To prevent the transport of these suspended solids into the river, silt barriers will have to be provided along the perimeter of all work areas. Alternatives include:

- Earth or stone dikes
- Silt Curtains
- Portable dikes
- Silt Fence
- Straw Bale Dikes

Earth or stone dikes may be constructed along the perimeter of the excavation to contain and/or filter water. The cost of earth and stone dikes varies with size, materials, and difficulty in construction and removal. These types of dikes are probably not appropriate for this project, except in limited areas where they can be constructed of excavated materials. If used, they will have to be augmented with other erosion and sediment controls.

Silt curtains consist of a floating boom with a skirt, which extends into the water column to contain silt and other contaminants. The Massachusetts Erosion and Sediment Control Manual lists these devices as a primary method of protecting rivers, lakes, etc., from sediment generated in adjacent areas. The minimum depth of a conventional silt curtains is typically about 3 feet, with the bottom of the curtain suspended about 1 foot above the bottom. Since the depth of water within the subject work area is expected to be less than 3, a conventional silt curtain is probably not applicable. If a silt curtain must be used, a curtain with a geotextile skirt anchored to the bottom could be used. The typical cost of a floating

silt curtain with 3-foot conventional or geotextile skirt is approximately $6 per linear foot, not including installation and contractor markup costs.

Portable dikes consist of pre-fabricated dike systems that can be mobilized and installed at the work site. They are applicable mainly where a low permeability barrier is required to retain water within an excavation, prevent water from entering an excavation. The Aqua Dam system is geomembrane tube-like structure, which is filled with water to form a temporary dike. This type of system is relatively expensive, costing approximately $25 to $40 per linear foot for a 3 to 4 foot dike, not including installation and contractor markup costs.

A silt fence contains and filters sediment and prevents it from leaving the work area. A conventional silt fence is generally applicable for small upland areas that are not subject to substantial hydraulic pressures. A super silt fence, which consists of a silt fence with metal posts and heavy wire backing, is applicable where loading conditions would be more severe. A typical cost for a conventional silt fence is in the range of $2 to $3 per linear foot, depending upon installation requirements. Super silt fence is more expensive, ranging from $7 to $9 per linear foot, depending upon design and installation conditions.

Straw bale dikes contain silt and provide some filtering. However, they have limited effectiveness and are falling out of favor in some jurisdictions. Mobilization and demobilization of materials could also be a difficult. Although they may not be applicable for the entire barrier system, they may be useful in replacing or augmenting other measures in limited areas.

Evaluation of the various sediment control measures above suggest the following conclusions:

- The sensitive environment requires that appropriate erosion and sediment controls must be provided around all work areas, no matter how small.
- Conventional silt fence should be installed downgradient of all disturbed areas associated with access, dewatering and loading areas, earth diking, etc., not subject to stream flow conditions.
- Current information does not suggest the presence of contamination requiring full containment of water within the excavation. As a result, a permeable silt barrier between the excavation and the river could be used.
- Projected site conditions suggest that a super silt fence may be the most practical sediment barrier along the Saugus River channel. It must be appropriately designed and reinforced to withstand expected flooding and flow conditions.
- If future design information or regulatory requirements require the use of a silt curtain in lieu of a super silt fence, a curtain with a geotextile skirt anchored to the stream bottom should be used. The installation should conform to details in the Massachusetts Erosion and Sediment Control Manual.
- If containment of water within or outside the excavation is deemed to be necessary, structural dike systems such as those discussed should be considered. Since these systems have similar capabilities, the final decision will likely depend upon cost and the method that would cause the least disturbance to the adjacent stream channel.

5.0 Tidal Change Study

The results of this study 1will be included as an addendum to this report once the study is completed in the summer of 2004.

6.0 Aquatic Invertebrate and Habitat Survey

The results of this survey will be included as an addendum to this report once the survey is completed in the summer of 2004.

7.0 References

CH2M HILL. 2004. Final Pre-Design Report, Restore Saugus River Turning Basin and Dock, Saugus Iron Works National Histric Site, Saugus, Massachusetts, July 2004.

CH2M HILL. 2004. Final Value Analysis Report, Restore Saugus River Turning Basin and Dock, Saugus Iron Works National Histric Site, Saugus, Massachusetts, June 2004.

General Management Plan (GMP)/Environmental Assessment. 2002. Saugus Iron Works National Historic Site, Saugus, Massachusetts. April 2002.

Goff-Chem, Inc. 1995. Phase I Initial Site Investigation Report. Prepared for National Park Service, Saugus Iron Works National Historic Site. Release Tracking Number 3-12551. December 1995.

Massachusetts Department of Environmental Protection. 1999. Massachusetts Contingency Plan, 310 CMR 40.000. Boston, MA: Office of the Secretary of State.

www.nps.gov/sair

Tables

Table 1
GPS Coordinates for Sediment Core Locations
Saugus Iron Works
Saugus, Massachusetts

Sample Location	Easting (m)*	Northing (m)*
SD01	334938	4703788
SD02	334943	4703771
SD03	334946	4703752
SD04	334980	4703813
SD05	334972	4703790
SD06	334956	4703785
SD07	334963	4703764
SD08	334924	4703751
SD09	334936	4703732
SD10	334955	4703738
SD11	334977	4703701
SD12	334960	4703691
SD13	334986	4703656
SD14	334970	4703646
SD15	335003	4703613
SD16	334970	4703602
SD17	335020	4703578
SD18	335007	4703562
SD19	335047	4703548
SD20	335035	4703521

* NAD83, UTM zone 19

Table 2
Sample Concentrations in Deep Borings Collected from the Northern Shore
Saugus Iron Works
Saugus, Massachusetts

Analyte	MCP RCS-1	SD01				SD02			SD03						
	(MDEP, 1999)	A (0-4)	B (4-8)	C (8-12)	D (12-15)	A (0-4)	B (4-8)	C (8-12)	A (0-4)	DUP4 (A)	B (4-8)	DUP5 (B)	C (8-12)	DUP6 (C)	D (12-15)
Metals by EPA Method 6010 B - Results in mg/kg															
Antimony, Total	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic, Total	30	3.1	2.2	3.5	2.4	13	7.5	2.2	9.1	6.6	5.8	4.6	7.6	5.7	8.9
Beryllium, Total	0.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium, Total	30	-	-	-	-	-	-	-	-	0.95	-	-	-	-	-
Chromium, Total	1,000	17	21	14	-	42	91	25	64	29	24	21	-	-	13
Copper, Total	1,000	-	-	-	-	-	-	-	43	-	-	-	-	-	-
Lead, Total	300	-	18	-	-	78	17	-	110	70	18	-	-	-	-
Nickel, Total	300	18	22	15	-	20	38	19	47	23	21	26	-	-	14
Selenium, Total	400	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silver, Total	100	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium, Total	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc, Total	2,500	-	-	-	-	160	-	-	130	97	-	-	-	-	-
Mercury by EPA Method 7471 A - Results in mg/kg															
Mercury, Total	20	-	-	-	-	0.16	0.055	-	0.3	0.27	0.049	-	-	0.19	0.23
SVOCs by EPA Method 8270 C - Results in ug/kg															
Naphthalene	4,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Methylnaphthalene	4,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthylene	100,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthene	20,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluorene	400,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenanthrene	100,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Anthracene	100,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluoranthene	1,000,000	-	-	-	-	-	-	-	880	540	-	-	-	-	-
Pyrene	700,000	-	-	-	-	-	-	-	780	-	-	-	-	-	-
Benzo[a]anthracene	700	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chrysene	7,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo[b]fluoranthene	700	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo[k]fluoranthene	7,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo[a]pyrene	700	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Indeno[1,2,3-c,d]pyrene	700	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dibenzo[a,h]anthracene	700	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo[g,h,i]perylene	1,000,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Organic Carbon by Modified EPA Method 9060 - Results in mg/kg															
Total Organic Carbon		*	*	*	*	*	*	*	*	*	*	*	*	*	*

Notes:
- Below Reporting Limit
* Total organic carbon data for borings SD01, SD02, and SD03 are presentedin Table 5.
MCP RCS-1 - Massachusetts Contingency Plan Reportable Concentration for Soil Category 1 (MDEP, 1999)
mg/kg - milligram per kilogram
NA - Not analyzed
SVOC - semi-volatile organic compound
ug/kg - microgram per kilogram
Units are as specified in header unless otherwise noted.
Values in bold exceed MCP RCS-1 concentrations

Table 3
Concentrations in Shallow Borings Collected from the Northern Shore
Saugus Iron Works
Saugus, Massachusetts

Analyte	MCP RCS-1 (MDEP, 1999)	SD04			SD05			SD06			SD07			SD08			SD09			SD10		
		A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C
Metals by EPA Method 6010 B - Results in mg/kg																						
Antimony, Total	10	-	1.3	-	-	-	-	-	-	-	-	-	5	-	-	-	-	-	-	-	-	-
Arsenic, Total	30	20	4.9	15	11	1.6	11	17	2.7	14	9.9	3.8	**95**	17	4.3	-	16	7.6	5.9	14	2.6	3.1
Beryllium, Total	0.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium, Total	30	-	-	-	-	-	-	-	-	1.4	-	-	1.5	-	-	-	1.6	-	-	1.3	-	-
Chromium, Total	1,000	33	25	65	40	12	62	62	15	81	41	23	150	-	38	12	110	41	41	58	15	23
Copper, Total	1,000	-	-	-	-	-	-	58	-	47	-	-	84	-	-	-	64	-	-	58	-	-
Lead, Total	300	120	24	100	140	-	68	250	-	93	180	16	170	150	-	-	130	-	-	230	24	-
Nickel, Total	300	27	21	50	33	14	22	49	16	51	32	22	28	70	39	11	70	29	26	46	17	-
Selenium, Total	400	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silver, Total	100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium, Total	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc, Total	2,500	120	-	260	180	-	190	300	-	310	190	-	820	310	-	-	360	-	-	370	75	-
Mercury by EPA Method 7471 A - Results in mg/kg																						
Mercury, Total	20	0.25	-	0.15	0.32	-	0.48	0.32	0.067	0.21	0.27	-	0.93	0.29	-	-	0.27	-	-	0.32	0.22	-
SVOCs by EPA Method 8270 C - Results in ug/kg																						
Naphthalene	4,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Methylnaphthalene	4,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthylene	100,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthene	20,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluorene	400,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenanthrene	100,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Anthracene	100,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluoranthene	1,000,000	-	-	-	-	-	870	1300	-	-	-	-	1,400	-	-	-	1,100	-	-	1,500	480	-
Pyrene	700,000	-	-	-	-	-	740	1100	-	-	-	-	1,200	-	-	-	880	-	-	1,300	420	-
Benzo[a]anthracene	700	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chrysene	7,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	850	-	-
Benzo[b]fluoranthene	700	-	-	-	-	-	560	**1000**	-	-	-	-	**820**	-	-	-	-	-	-	**1,200**	-	-
Benzo[k]fluoranthene	7,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo[a]pyrene	700	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**820**	-	-
Indeno[1,2,3-c,d]pyrene	700	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dibenzo[a,h]anthracene	700	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo[g,h,i]perylene	1,000,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Organic Carbon by Modified EPA Method 9060 - Results in mg/kg																						
Total Organic Carbon		71,000	8,000	250,000	52,000	2,900	160,000	250,000	10,000	120,000	360,000	24,000	130,000	130,000	>220000	>39000	120,000	130,000	94,000	140,000	14,000	>150,000

Notes:
- Below Reporting Limit
MCP RCS-1 - Massachusetts Contingency Plan Reportable Concentration for Soil Category 1 (MDEP, 1999)
mg/kg - milligram per kilogram
NA - Not analyzed
SVOC - semi-volatile organic compound
ug/kg - microgram per kilogram
Units are as specified in header unless otherwise noted.
Values in bold exceed MCP RCS-1 concentrations

Table 4
Sample Concentrations in Shallow Borings Collected from the Southern Shore
Saugus Iron Works
Saugus, Massachusetts

Analyte	MCP RCS-1 (MDEP, 1999)	SD11					SD12			SD13			SD14	
		A	B	DUP7 (B)	C	DUP8 (C)	A	B	C	A	B	C	A	B
Metals by EPA Method 6010 B - Results in mg/kg														
Antimony, Total	10	-	-	-	-	-	-	-	-	-	-	-	-	1.6
Arsenic, Total	30	12	6.8	4.1	8.8	8.6	16	1.9	9.4	-	4.8	2.7	15	2.1
Beryllium, Total	1	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium, Total	30	-	-	-	-	-	1.5	-	1.3	-	-	-	-	-
Chromium, Total	1,000	71	36	33	46	46	60	15	59	-	-	34	59	41
Copper, Total	1,000	-	-	-	-	-	66	-	-	-	-	-	-	-
Lead, Total	300	130	-	-	-	-	200	19	81	64	-	-	180	15
Nickel, Total	300	-	-	-	29	30	52	14	41	-	-	22	44	39
Selenium, Total	400	-	-	-	-	-	-	-	-	-	-	-	-	-
Silver, Total	100	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium, Total	8	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc, Total	2,500	-	-	-	-	-	340	-	270	-	-	-	210	-
Mercury by EPA Method 7471 A - Results in mg/kg														
Mercury, Total	20	0.5	-	-	-	-	0.44	-	0.19	-	-	-	0.36	-
SVOCs by EPA Method 8270 C - Results in ug/kg														
Naphthalene	4,000	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Methylnaphthalene	4,000	-	-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthylene	100,000	-	-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthene	20,000	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluorene	400,000	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenanthrene	100,000	-	-	-	-	-	-	-	-	-	-	-	-	-
Anthracene	100,000	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluoranthene	1,000,000	-	-	-	-	-	1,600	-	-	-	-	-	-	-
Pyrene	700,000	-	-	-	-	-	1,300	-	-	-	-	-	-	-
Benzo[a]anthracene	700	-	-	-	-	-	-	-	-	-	-	-	-	-
Chrysene	7,000	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo[b]fluoranthene	700	-	-	-	-	-	**1,200**	-	-	-	-	-	-	-
Benzo[k]fluoranthene	7,000	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo[a]pyrene	700	-	-	-	-	-	-	-	-	-	-	-	-	-
Indeno[1,2,3-c,d]pyrene	700	-	-	-	-	-	-	-	-	-	-	-	-	-
Dibenzo[a,h]anthracene	700	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo[g,h,i]perylene	1,000,000	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Organic Carbon by Modified EPA Method 9060 - Results in mg/kg														
Total Organic Carbon		510,000	530,000	520,000	240,000	580,000	99,000	2,300	190,000	1,000,000	140,000	34,000	130,000	3,200

Notes:
- Below Reporting Limit
MCP RCS-1 - Massachusetts Contingency Plan Reportable Concentration for Soil Category 1 (MDEP, 1999)
mg/kg - milligram per kilogram
NA - Not analyzed
SVOC - semi-volatile organic compound
ug/kg - microgram per kilogram
Units are as specified in header unless otherwise noted.
Values in bold exceed MCP RCS-1 concentrations

Table 4
Sample concentrations in shallow borings collected from the southern shore
Saugus Iron Works
Saugus, Massachusetts

Analyte	MCP RCS-1 (MDEP, 1999)	SD15			SD16			SD17		SD18			SD19		SD20	
		A	B	C	A	B	C	A	B	A	B	C	A	B	A	B
Metals by EPA Method 6010 B - Results in mg/kg																
Antimony, Total	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic, Total	30	9.6	4	4.6	12	2.2	**32**	-	-	14	6.7	6.9	17	5	14	6.1
Beryllium, Total	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium, Total	30	-	-	-	1.9	-	2.6	-	-	-	-	-	1.1	-	1.6	-
Chromium, Total	1,000	-	-	34	57	18	180	-	-	62	39	40	110	27	69	42
Copper, Total	1,000	-	-	-	56	-	120	-	-	51	-	-	76	-	60	-
Lead, Total	300	95	-	-	230	17	190	-	-	150	-	-	170	13	210	-
Nickel, Total	300	-	-	25	47	18	39	-	-	29	-	-	50	40	46	21
Selenium, Total	400	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silver, Total	100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium, Total	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc, Total	2,500	-	-	-	280	-	700	-	-	150	-	-	320	-	300	-
Mercury by EPA Method 7471 A - Results in mg/kg																
Mercury, Total	20	0.26	-	-	0.21	0.056	0.16	-	-	0.17	0.19	-	0.37	-	0.42	-
SVOCs by EPA Method 8270 C - Results in ug/kg																
Naphthalene	4,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Methylnaphthalene	4,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthylene	100,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthene	20,000	-	-	-	-	450	-	-	-	-	-	-	-	-	-	-
Fluorene	400,000	-	-	-	-	580	-	-	-	-	-	-	-	-	-	-
Phenanthrene	100,000	-	-	-	-	3,000	1,200	-	-	-	-	-	-	-	-	-
Anthracene	100,000	-	-	-	-	1,100	-	-	-	-	-	-	-	-	-	-
Fluoranthene	1,000,000	-	-	-	-	2,700	2,100	-	-	-	-	-	850	-	1,400	-
Pyrene	700,000	-	-	-	-	2,100	1,800	-	-	-	-	-	720	-	1,200	-
Benzo[a]anthracene	700	-	-	-	-	**1,100**	-	-	-	-	-	-	-	-	-	-
Chrysene	7,000	-	-	-	-	940	1,100	-	-	-	-	-	-	-	-	-
Benzo[b]fluoranthene	700	-	-	-	-	**1,100**	**1,300**	-	-	-	-	-	-	-	**1,000**	-
Benzo[k]fluoranthene	7,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo[a]pyrene	700	-	-	-	-	**950**	**920**	-	-	-	-	-	-	-	-	-
Indeno[1,2,3-c,d]pyrene	700	-	-	-	-	600	-	-	-	-	-	-	-	-	-	-
Dibenzo[a,h]anthracene	700	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo[g,h,i]perylene	1,000,000	-	-	-	-	520	-	-	-	-	-	-	-	-	-	-
Total Organic Carbon by Modified EPA Method 9060 - Results in mg/kg																
Total Organic Carbon		520,000	1,110,000	400,000	350,000	9,800	>290,000	890,000	440,000	270,000	200,000	120,000	340,000	11,000	430,000	190,000

Notes:
- Below Reporting Limit
MCP RCS-1 - Massachusetts Contingency Plan Reportable Concentration for Soil Categoy 1 (MDEP, 1999)
mg/kg - milligram per kilogram
NA - Not analyzed
SVOC - semi-volatile organic compound
ug/kg - microgram per kilogram
Units are as specified in header unless otherwise noted.
Values in bold exceed MCP RCS-1

Figures

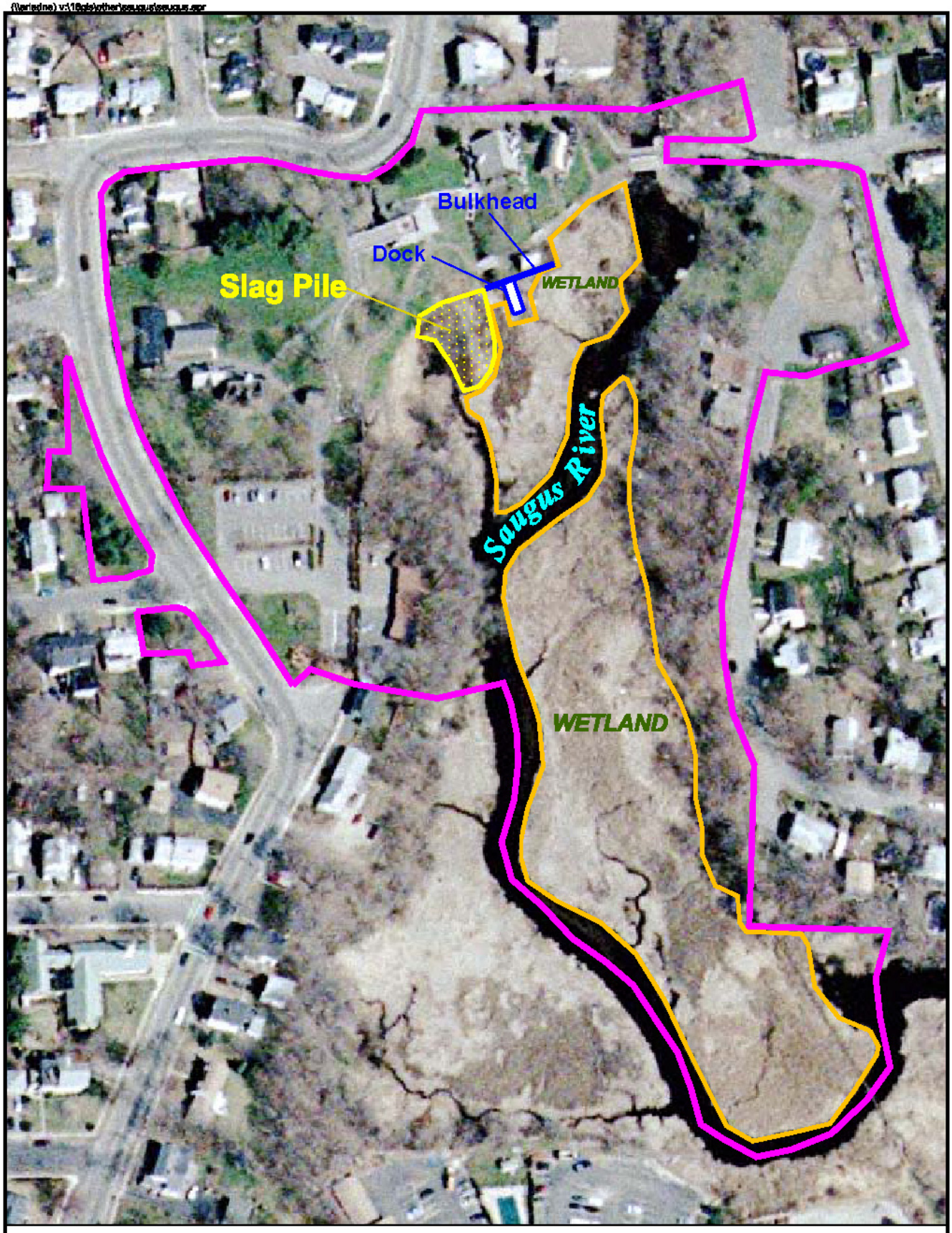
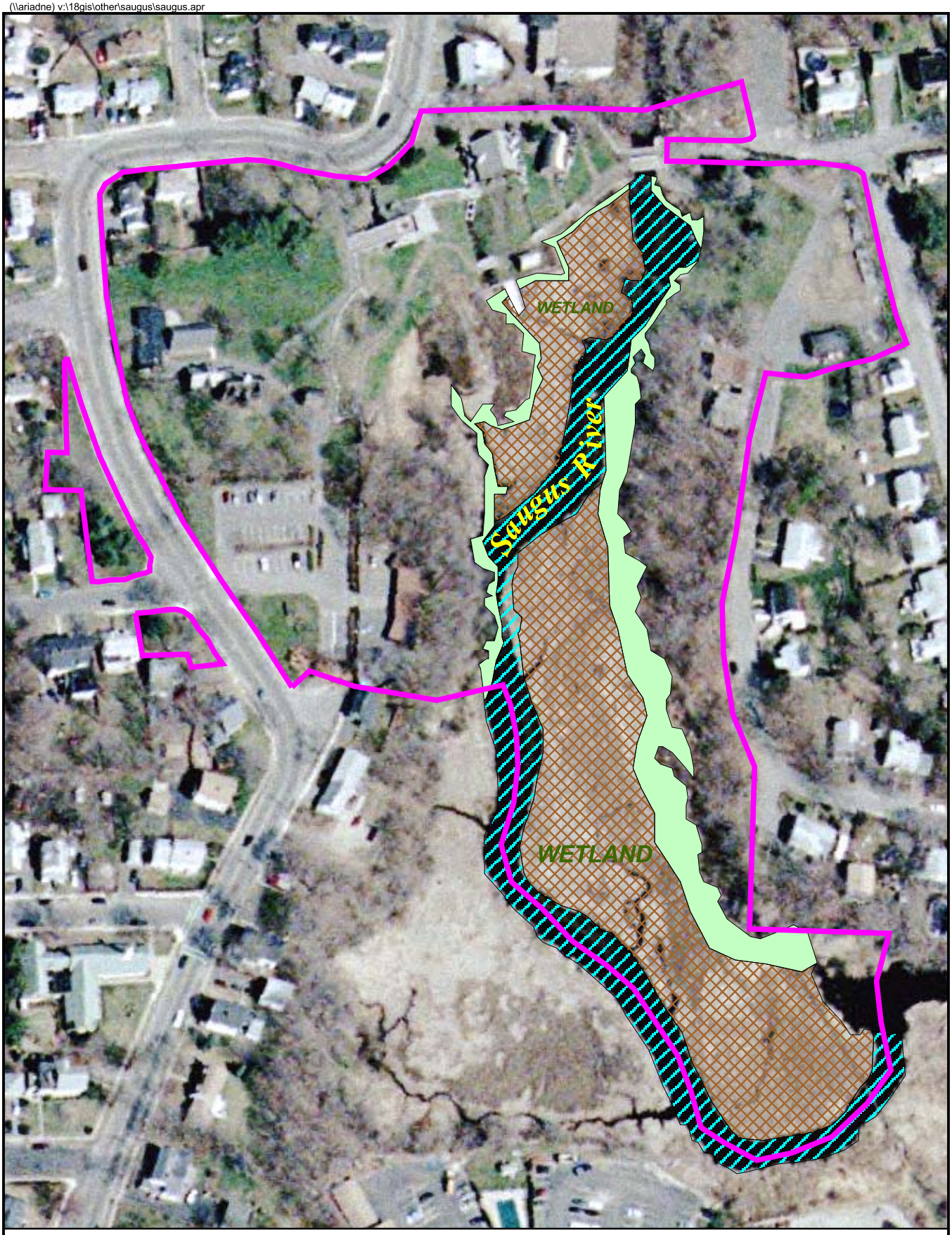


Figure 1
Site Map
Saugus Iron Works NHS
Saugus, Massachusetts

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Park Boundary
Fringing Marsh
Existing Channel
Intertidal Flats

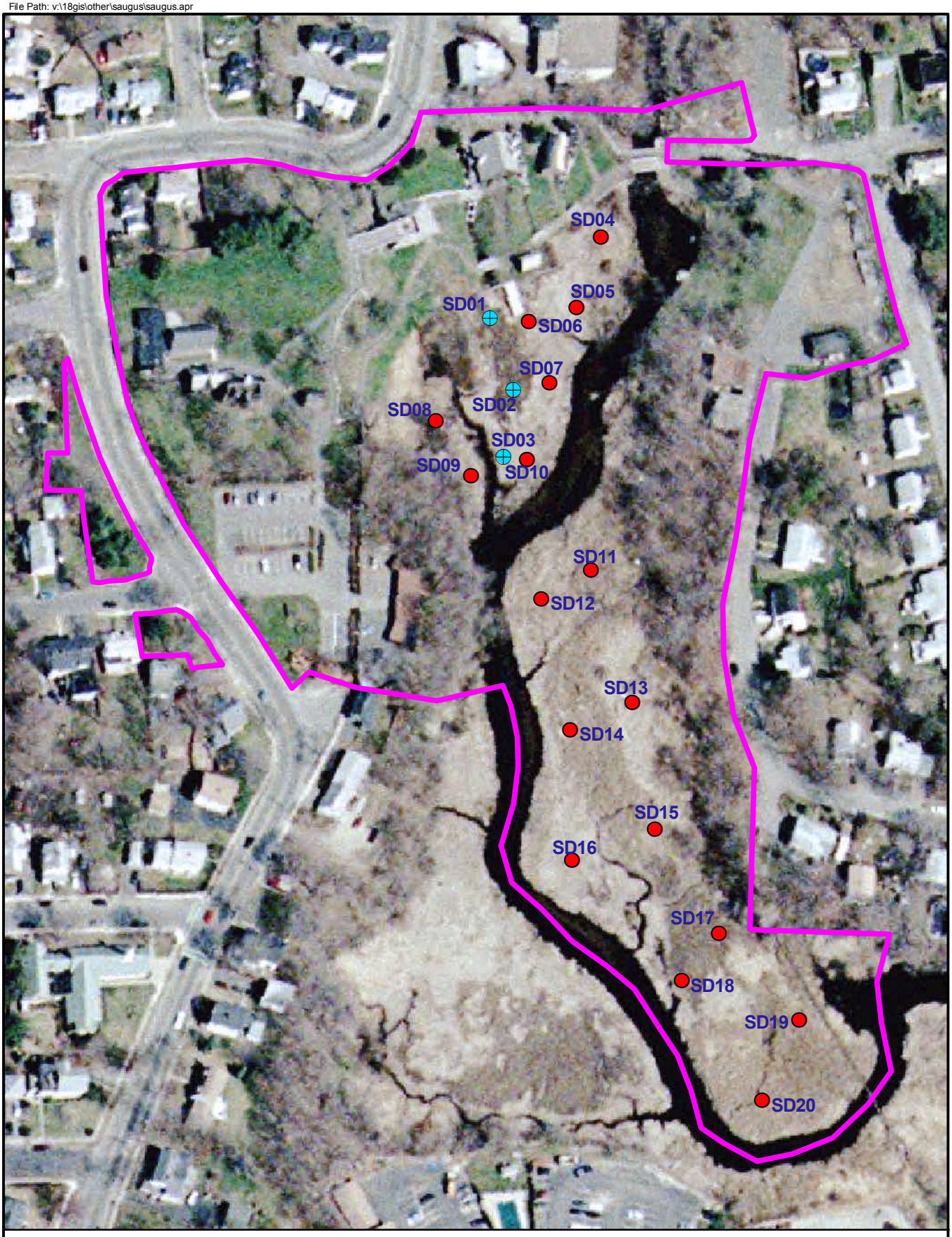
N

0 100 200 Feet

Figure 2
Conceptual Restoration
Saugus Iron Works NHS
Saugus, Massachusetts

CH2MHILL

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Shallow Cores (5 ft)
Deep Cores (15 ft)
Park Boundary

N

0 100 200 Feet

Figure 3
Sediment Coring Locations
Saugus Iron Works
Saugus, Massachusetts

CH2MHILL

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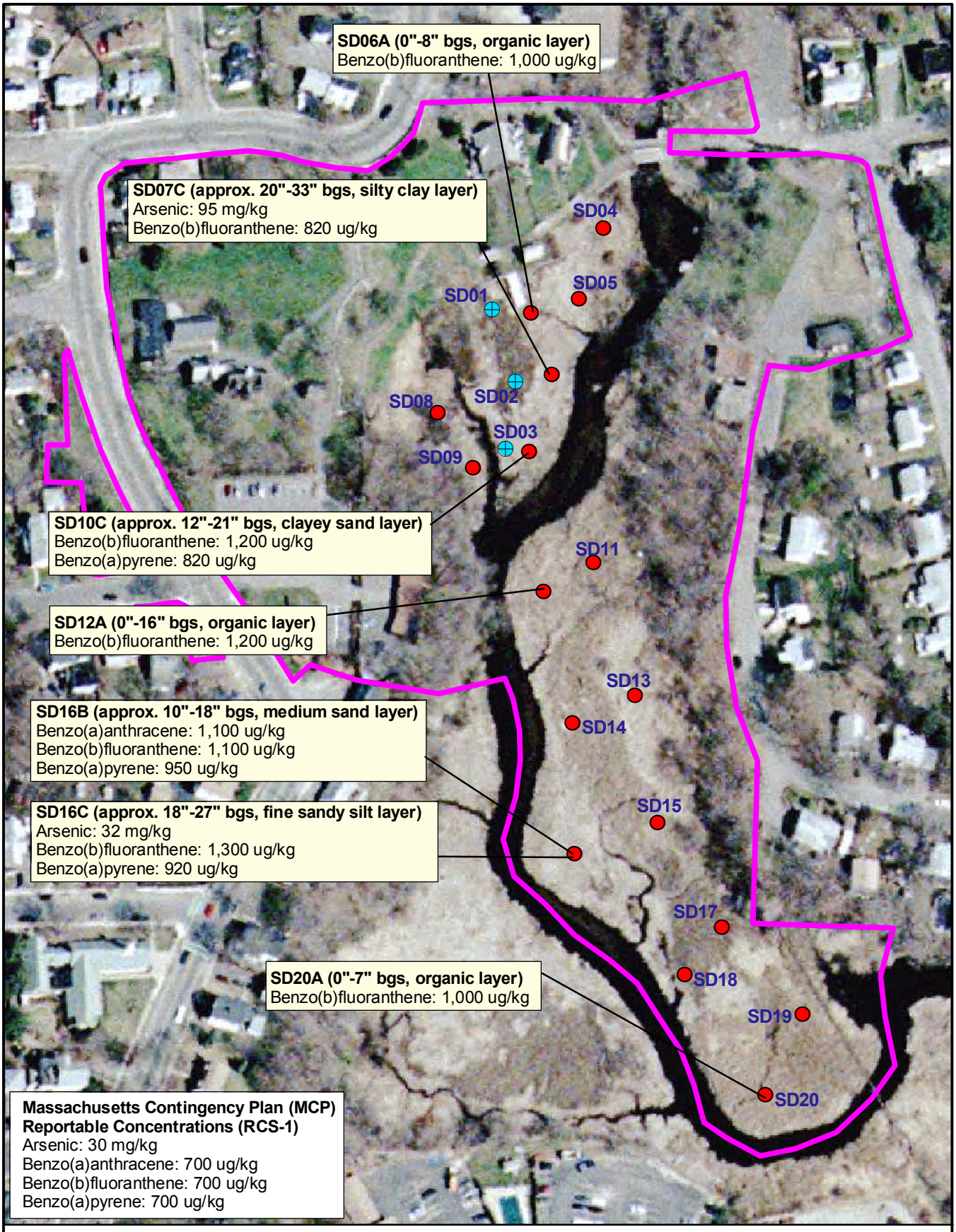


Figure 4
Locations with Concentrations Exceeding
MCP Reportable Concentrations
Saugus Iron Works
Saugus, Massachusetts

CH2MHILL

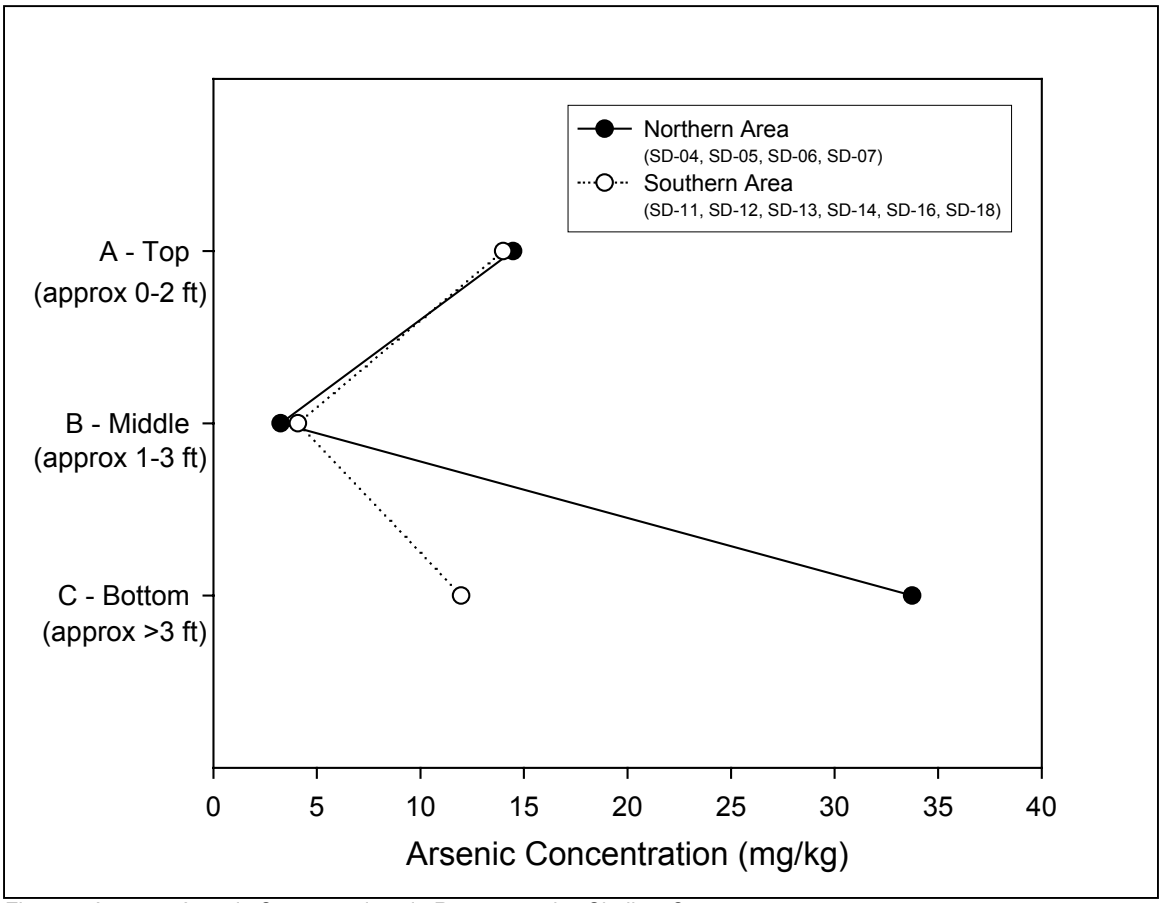


Figure 5 Average Arsenic Concentrations in Representative Shallow Cores

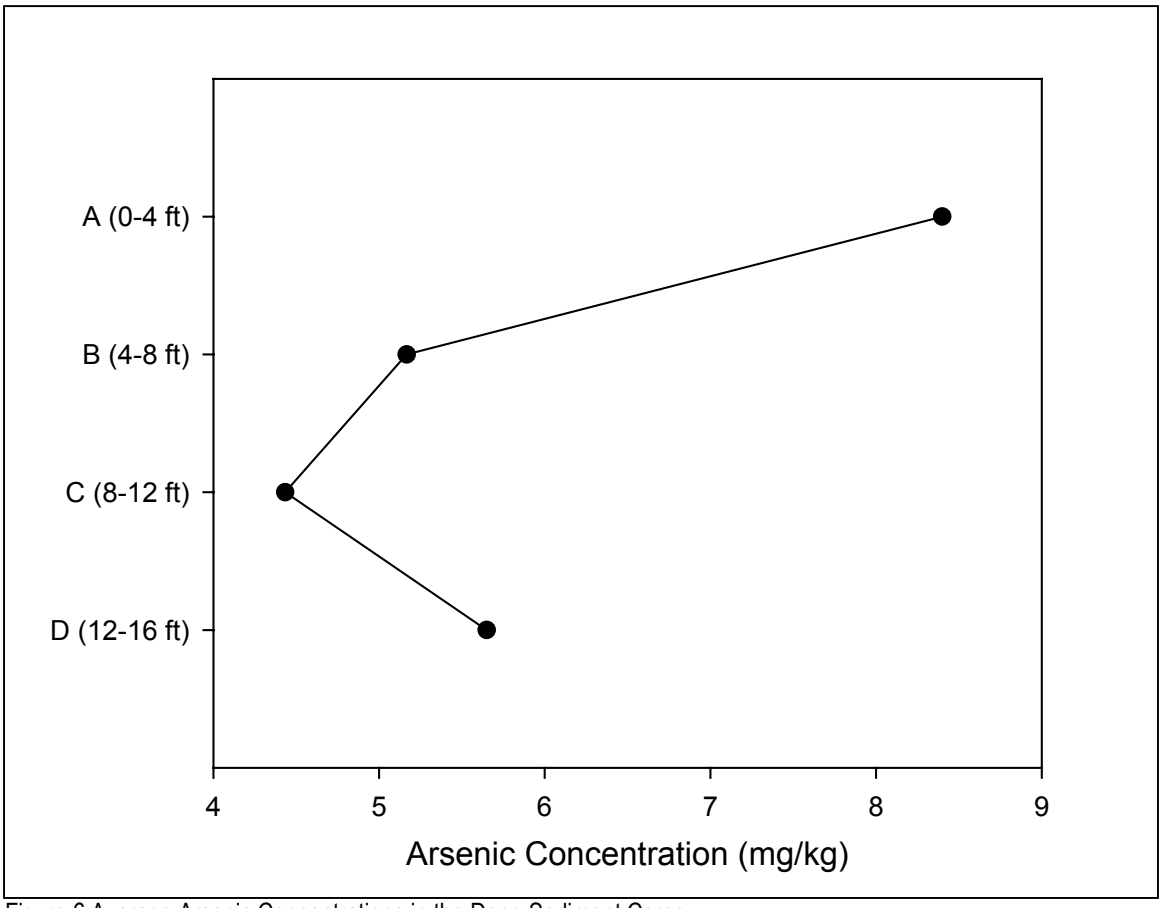


Figure 6 Average Arsenic Concentrations in the Deep Sediment Cores

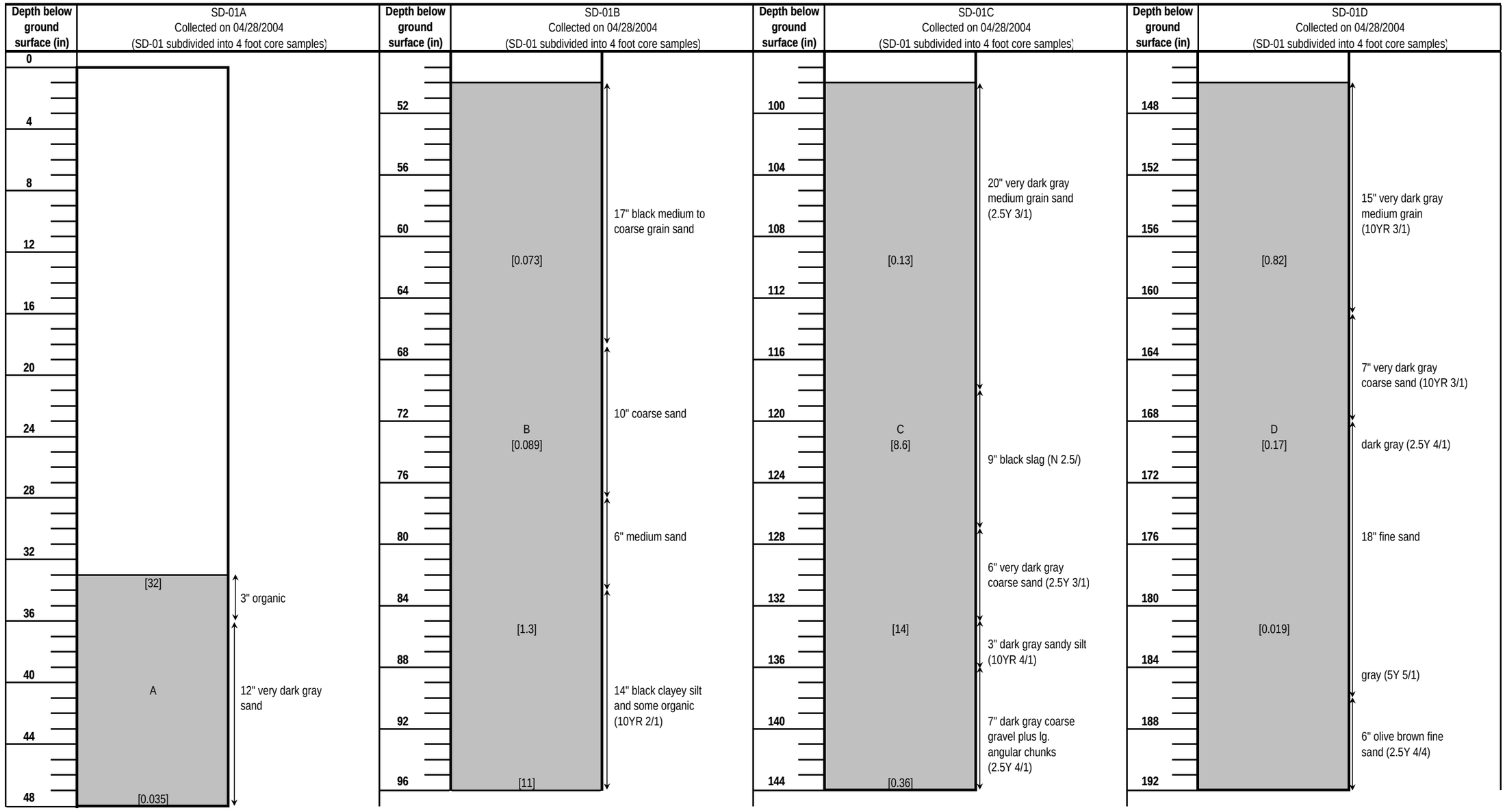


Figure 7

Graphical representation of 4 ft. subsamples of deep soil/sediment boring SD-01 collected on the northern shore with GeoProbe equipment

Saugus Iron Works

Saugus, Massachusetts

Notes:

Inner shaded boundary represents sample inside of core tubing (white/empty area represents empty space in core tubing)

Outer boundary represents position of core tubing

The letter in the shaded box indicates the sample collected - A to D - in the boring

The number in parentheses (e.g., [0.8]) is the percentage of total organic carbon, which was sampled at approximately every foot

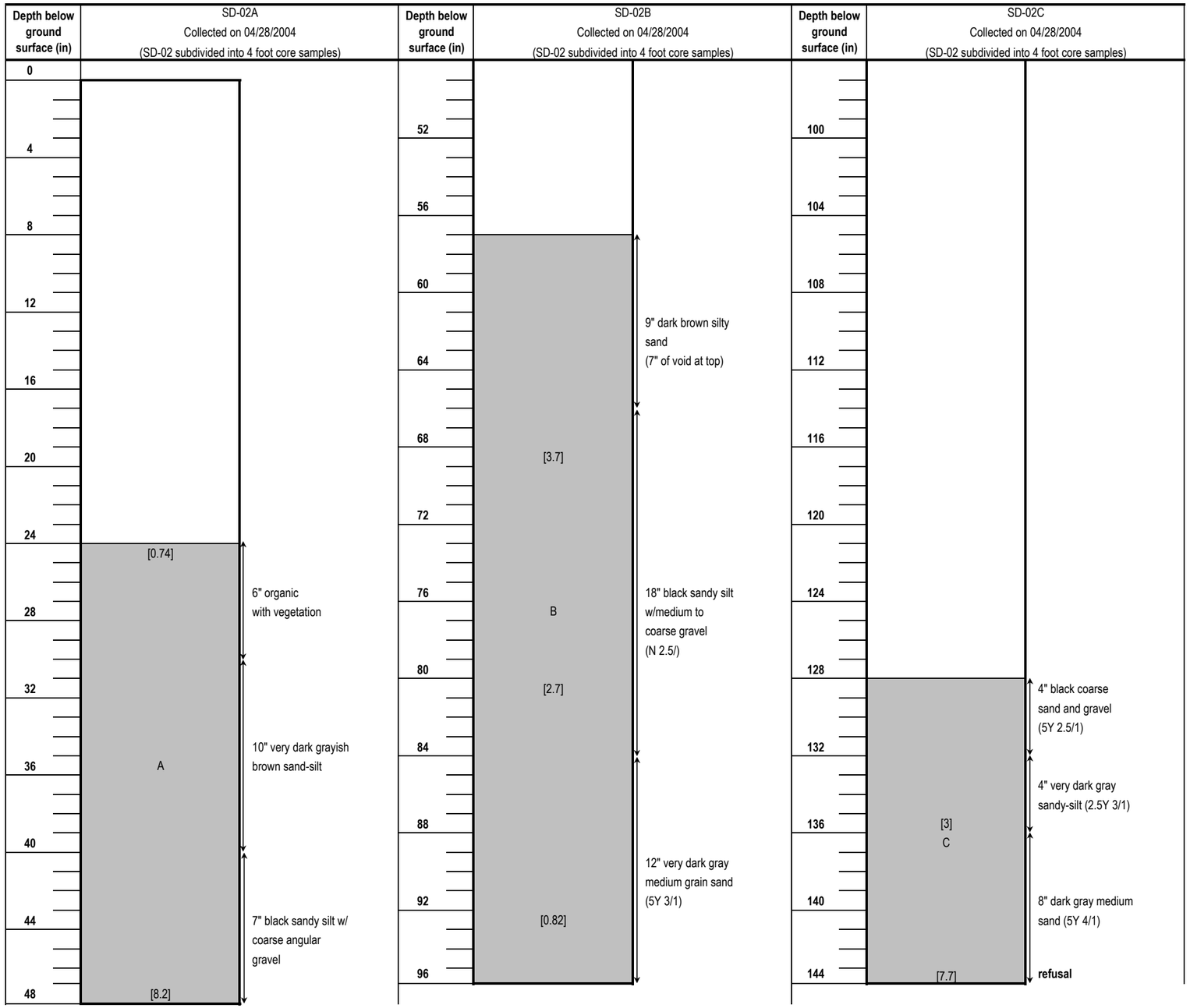


Figure 8

Graphical representation of 4 ft. subsamples of deep soil/sediment boring SD-02 collected on the northern shore with GeoProbe equipment
Saugus Iron Works
Saugus, Massachusetts

Notes:

Inner shaded boundary represents sample inside of core tubing (white/empty area represents empty space in core tubing)

Outer boundary represents position of core tubing

The letter in the shaded box indicates the sample collected - A to D - in the boring

The number in parentheses (e.g., [0.8]) is the percentage of total organic carbon, which was sampled at approximately every foot

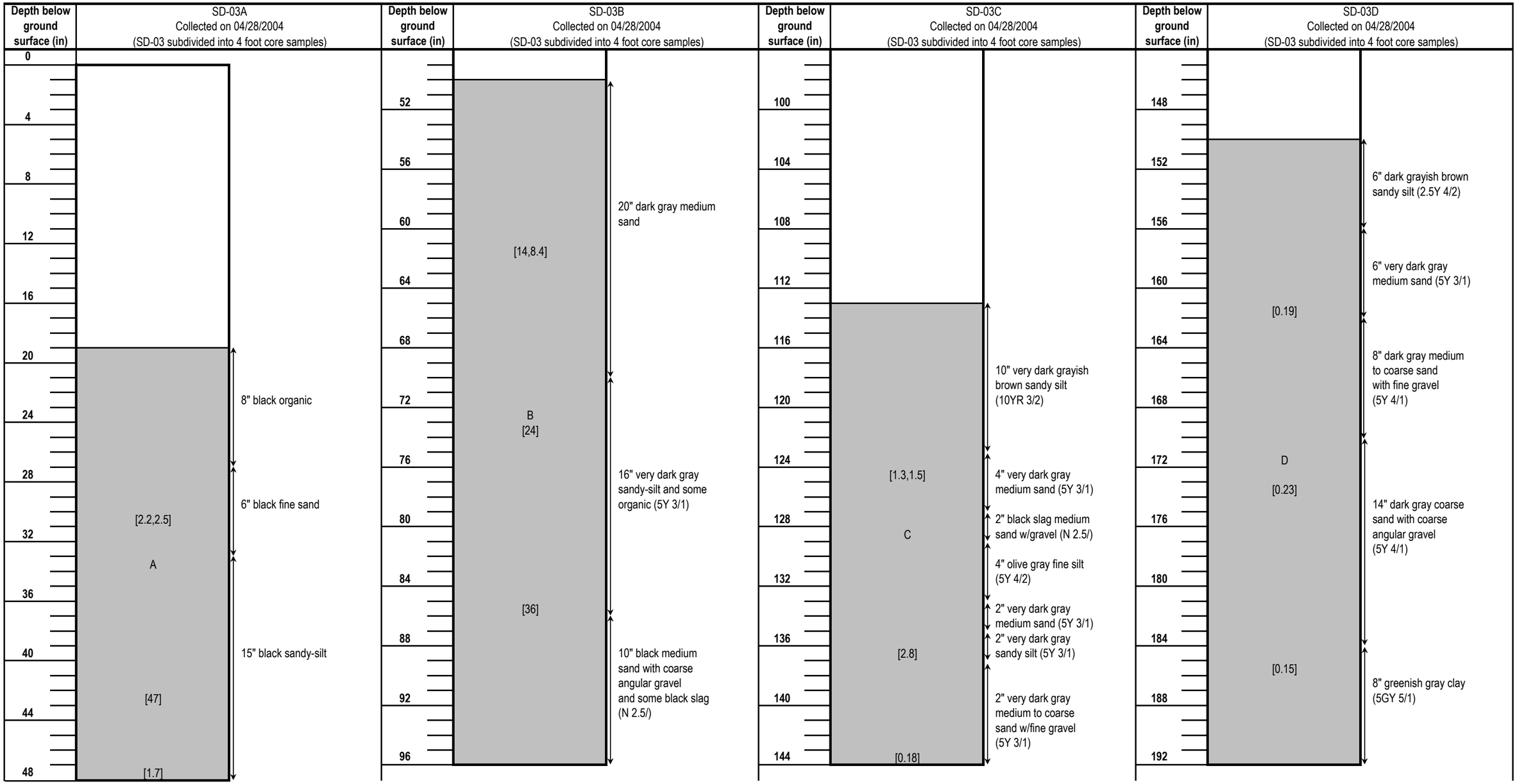


Figure 9
Graphical representation of 4 ft. subsamples of deep soil/sediment boring SD-03 collected on the northern shore with GeoProbe equipment
Saugus Iron Works
Saugus, Massachusetts

Notes:
Inner shaded boundary represents sample inside of core tubing (white/empty area represents empty space in core tubing)
Outer boundary represents position of core tubing
The letter in the shaded box indicates the sample collected - A to D - in the boring
The number in parentheses (e.g., [0.8]) is the percentage of total organic carbon, which was sampled at approximately every foo

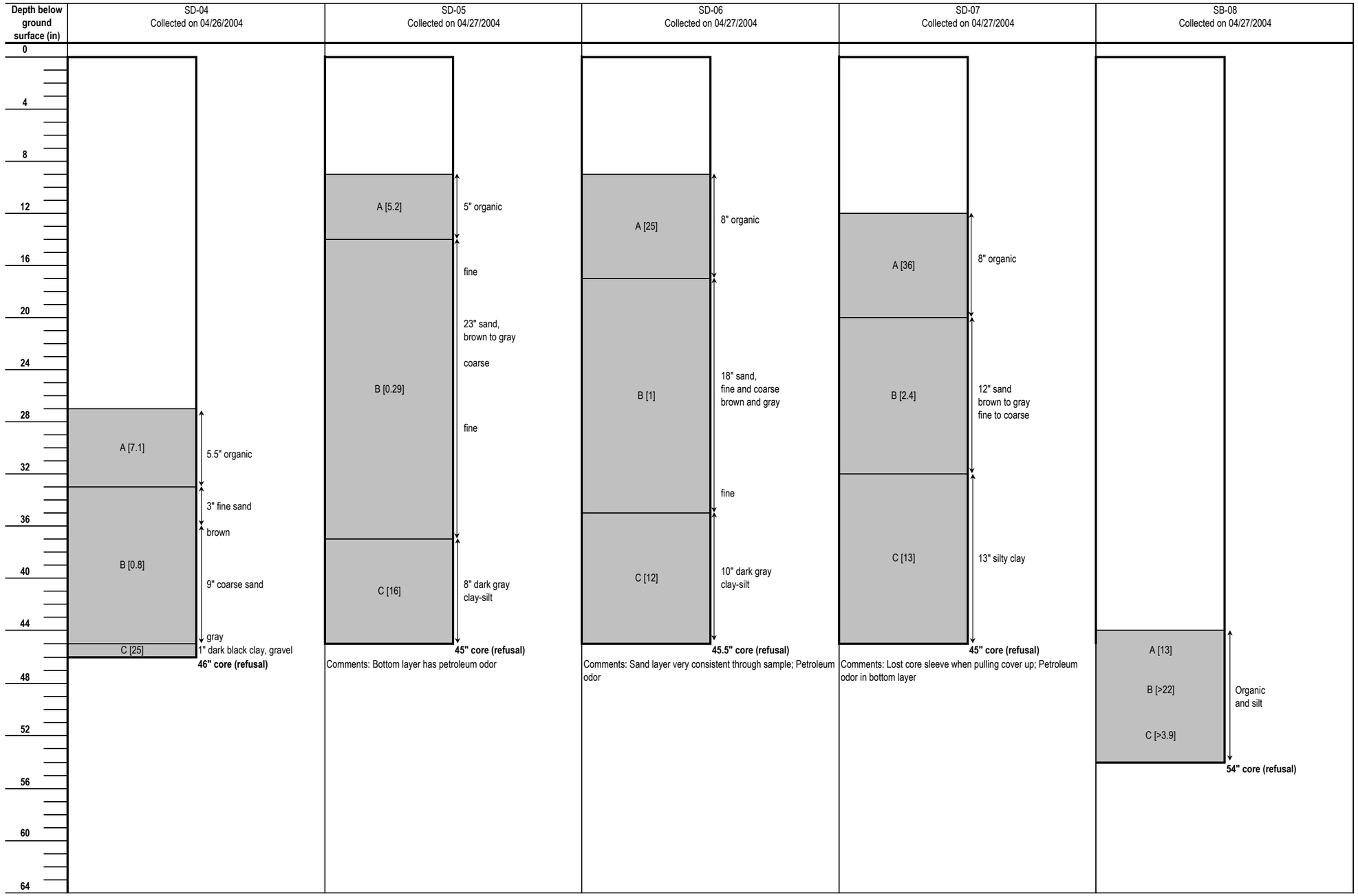


Figure 10

Graphical representation of soil/sediment borings for shallow samples collected on the northern shore

Saugus Iron Works

Saugus, Massachusetts

Notes:

Outer boundary represents position of core tubing

Inner shaded boundary represents sample inside of core tubing (white/empty area represents empty space in core tubing)

The letter in the shaded box indicates the sample collected - A to C - in the boring

The number in parentheses (e.g., [0.8]) is the percentage of total organic carbon for the sample collected

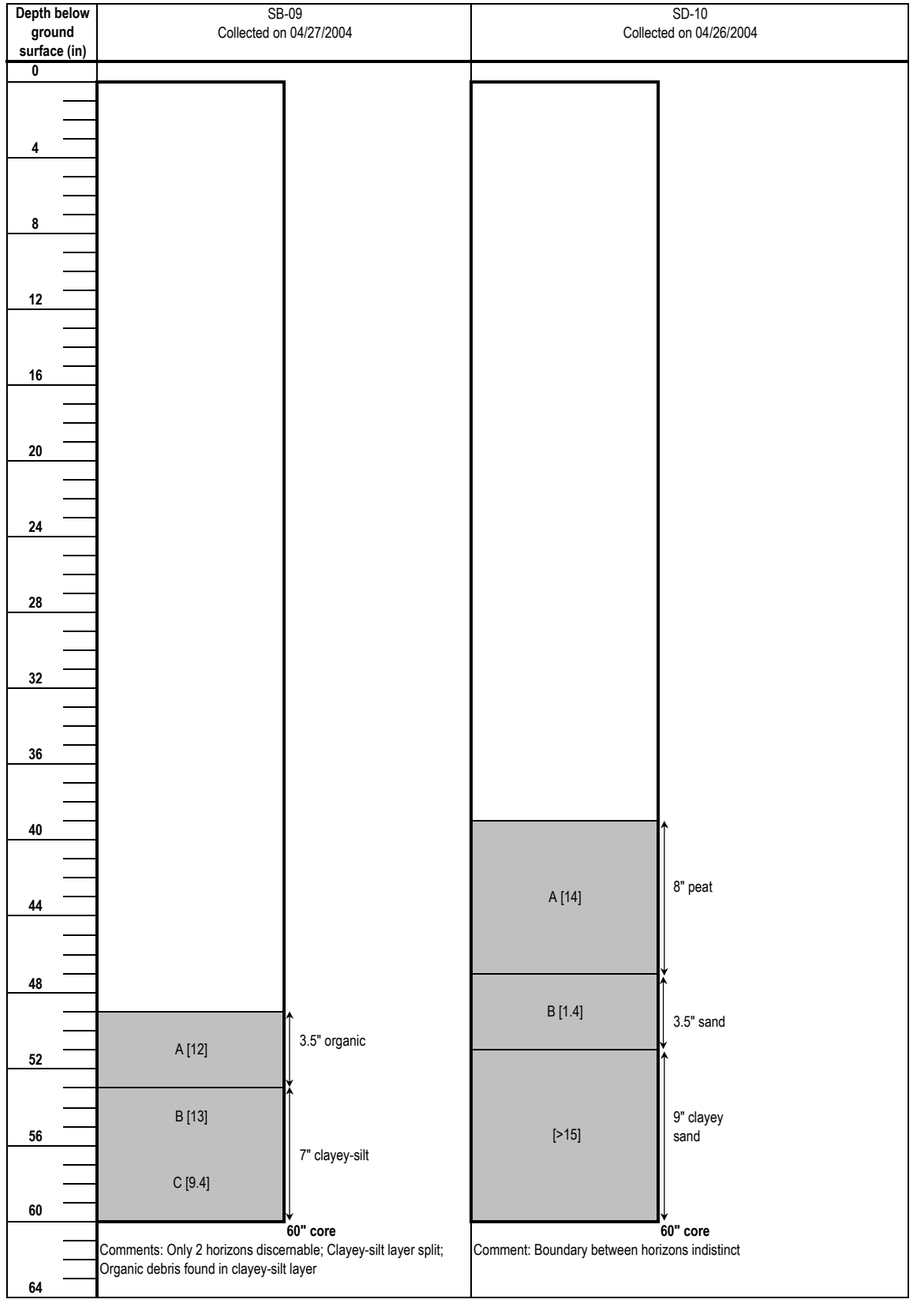


Figure 10

Graphical representation of soil borings for shallow samples collected on the northern shore

Saugus Iron Works

Saugus, Massachusetts

Notes:

Outer boundary represents position of core tubing

Inner shaded boundary represents sample inside of core tubing (white/empty area represents empty space in core tubing)

The letter in the shaded box indicates the sample collected - A to C - in the boring

The number in parentheses (e.g., [0.8]) is the percentage of total organic carbon for the sample collected

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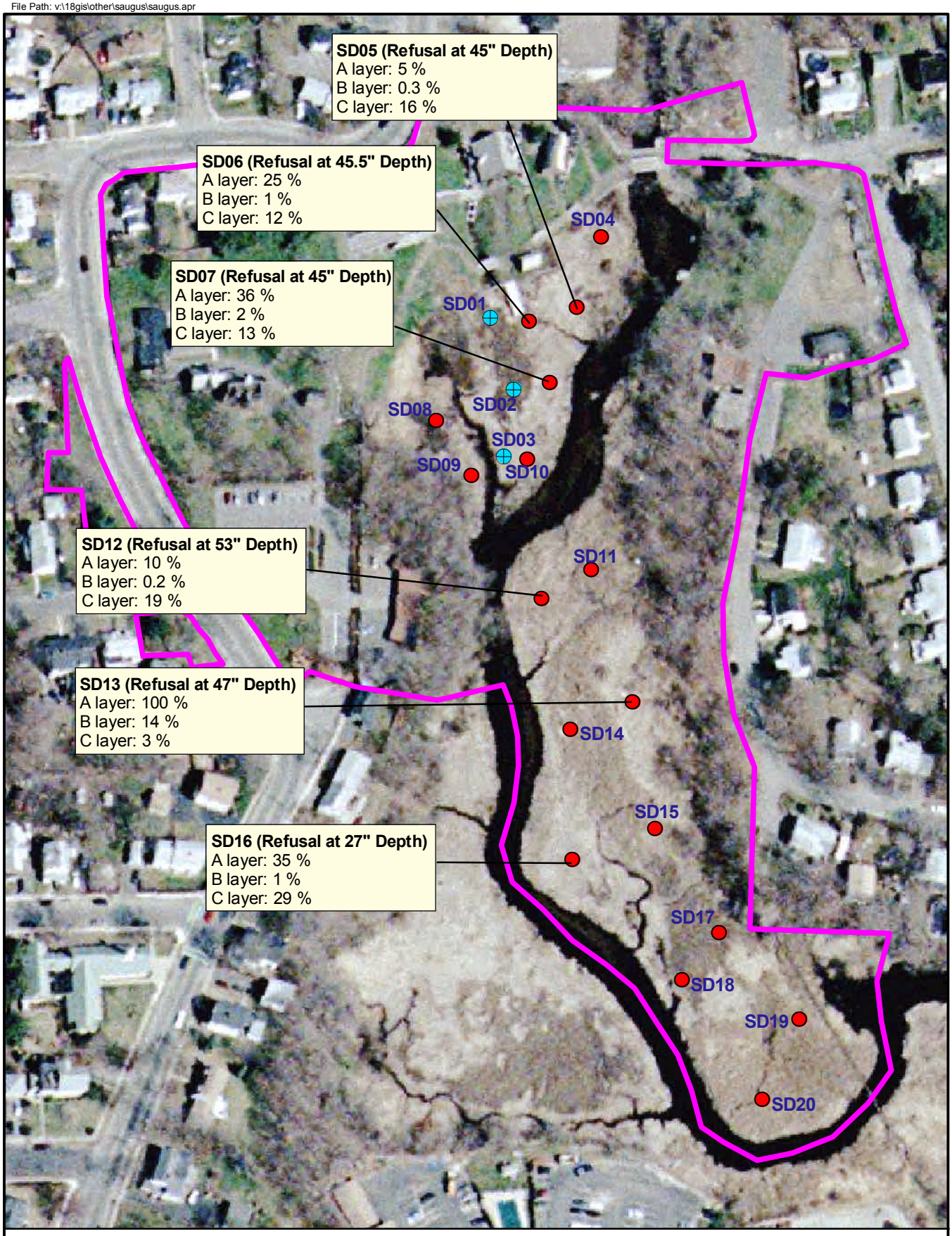


Figure 11
Total Organic Carbon in Selected Sediment Cores with Good Recoveries
Saugus Iron Works
Saugus, Massachusetts

CH2MHILL

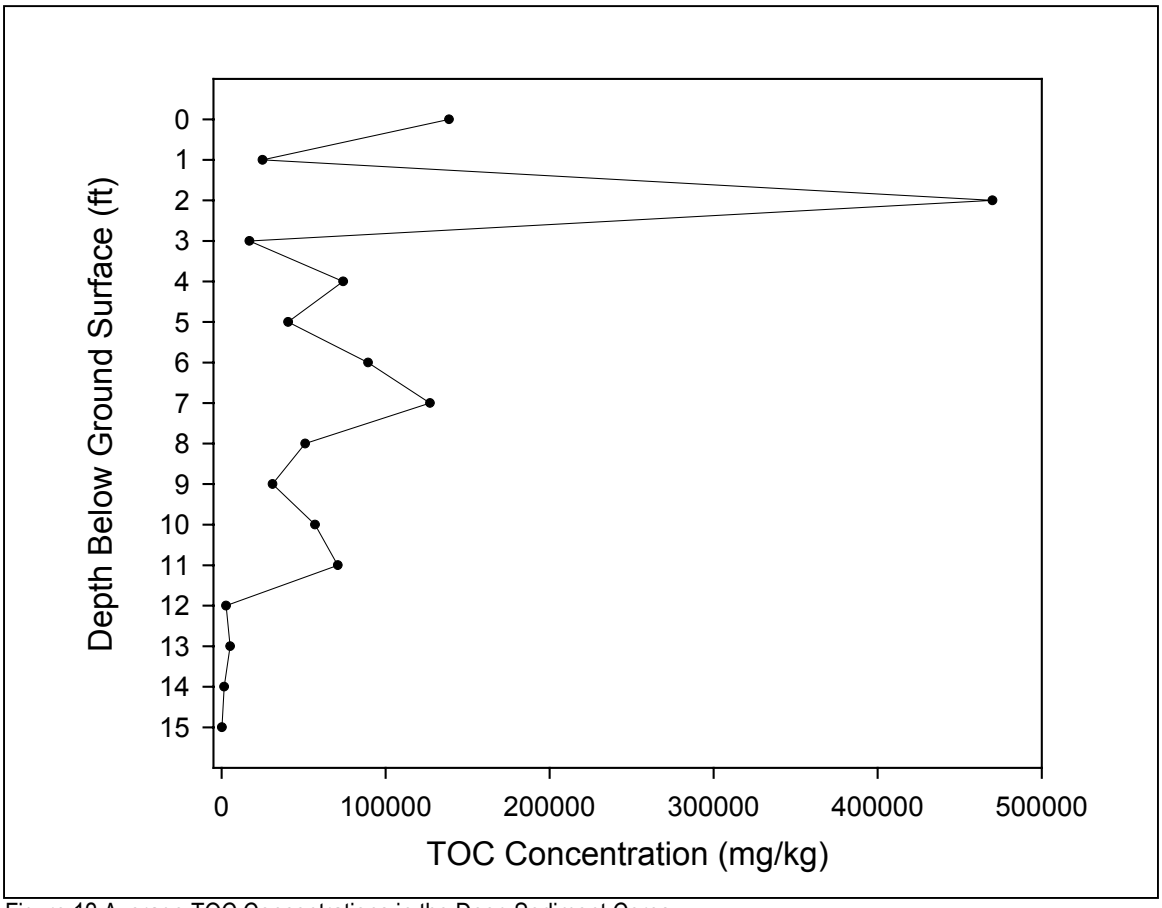


Figure 12 Average TOC Concentrations in the Deep Sediment Cores

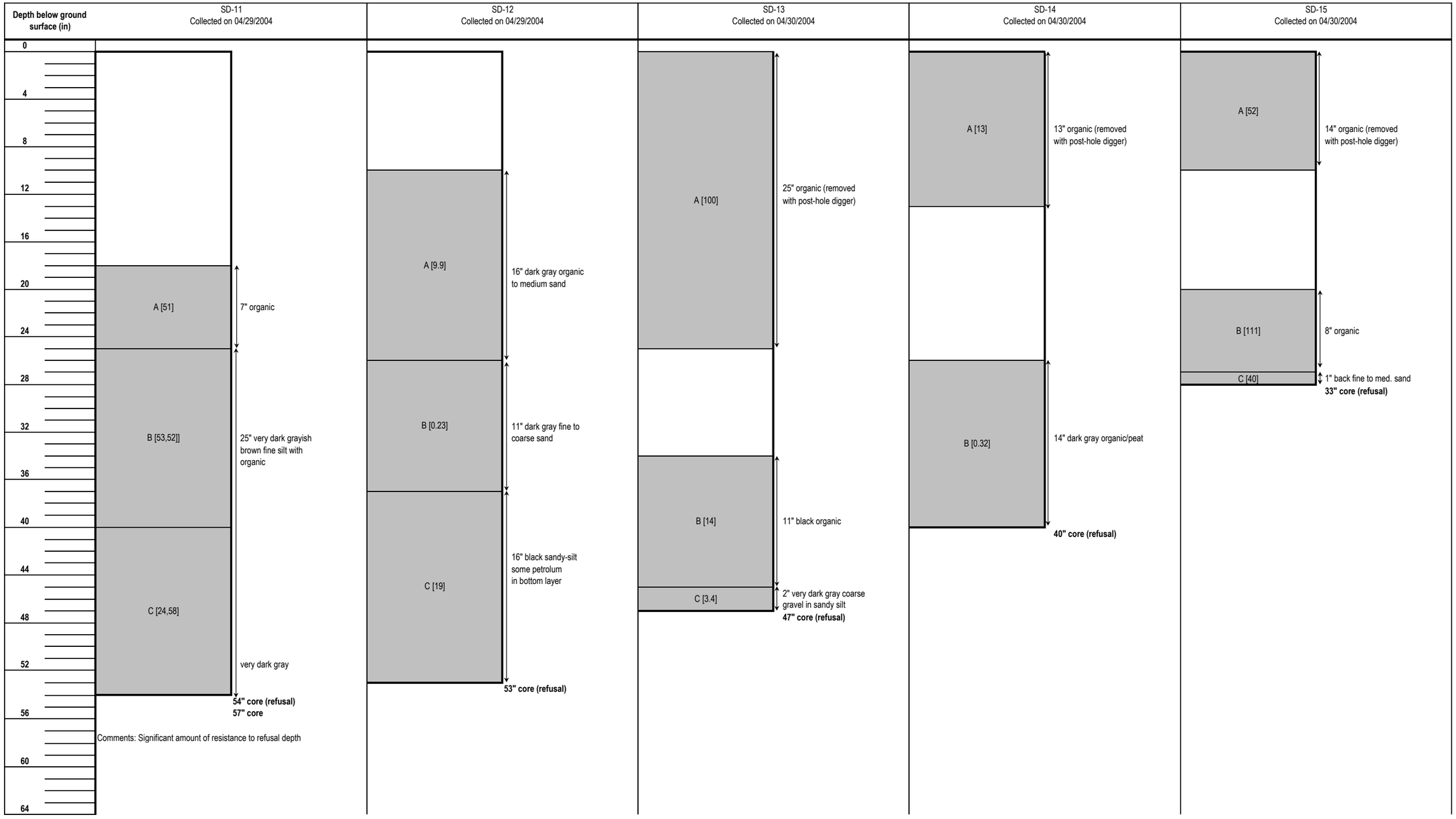


Figure 13
Graphical representation of soil/sediment borings for shallow samples collected on the southern shore
Saugus Iron Works
Saugus, Massachusetts

Notes:
Outer boundary represents position of core tubing
Inner shaded boundary represents sample inside of core tubing (white/empty area represents empty space in core tubing)
The letter in the shaded box indicates the sample collected - A to C - in the boring
The number in parentheses (e.g., [0.8]) is the percentage of total organic carbon for the sample collected

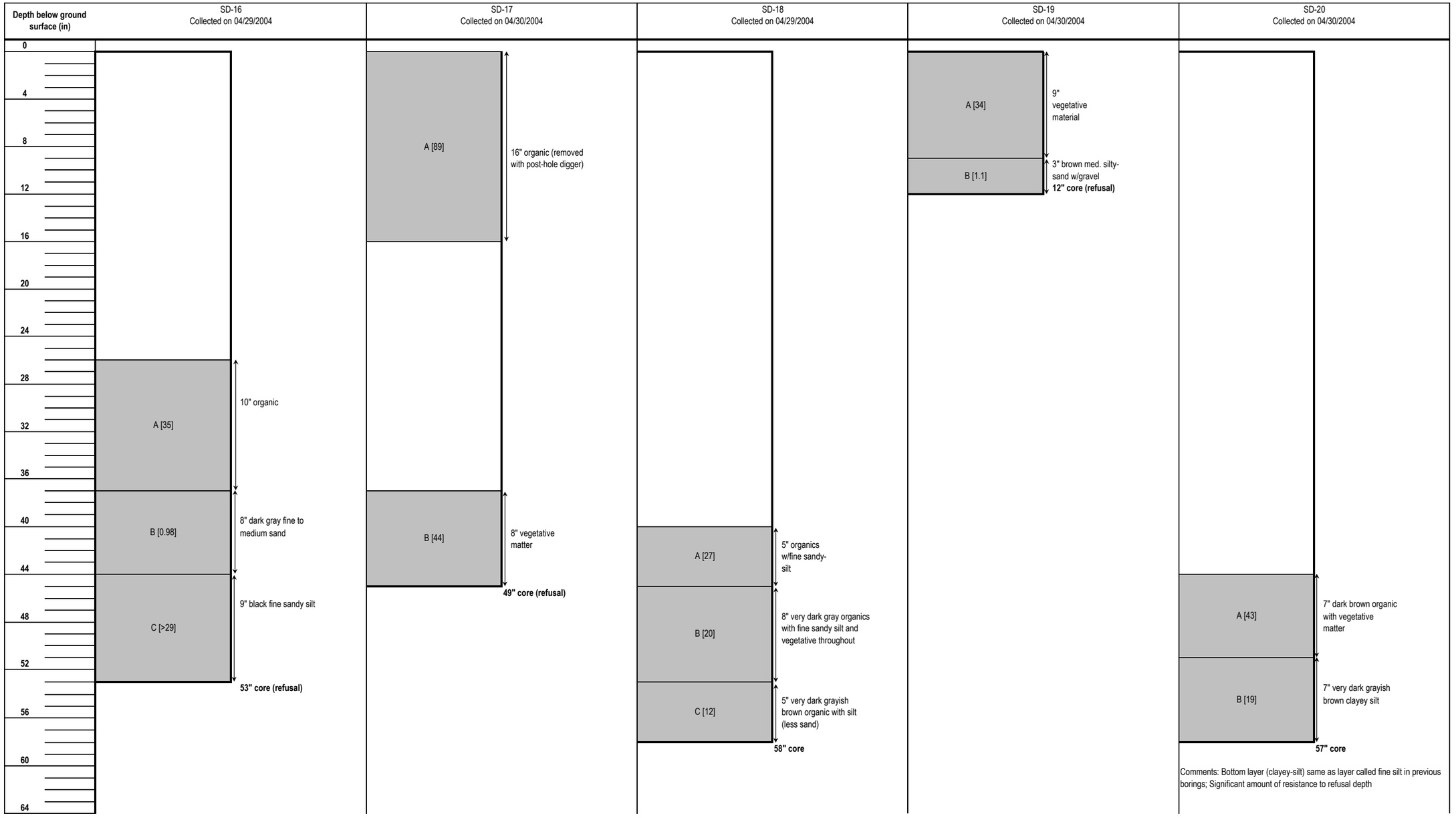


Figure 13
Graphical representation of soil/sediment borings for shallow samples collected on the southern shore
Saugus Iron Works
Saugus, Massachusetts

Notes:
Outer boundary represents position of core tubing
Inner shaded boundary represents sample inside of core tubing (white/empty area represents empty space in core tubing)
The letter in the shaded box indicates the sample collected - A to C - in the boring
The number in parentheses (e.g., [0.8]) is the percentage of total organic carbon for the sample collected

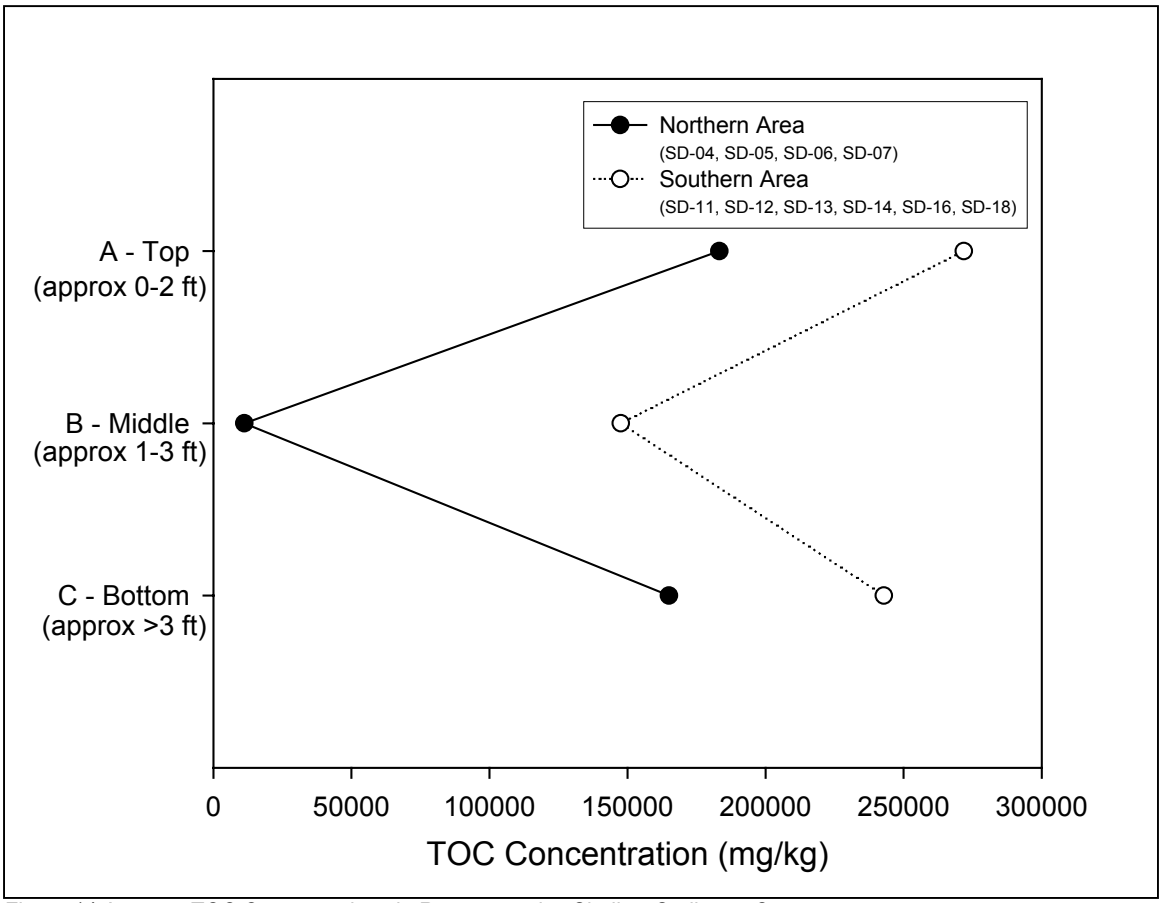


Figure 14 Average TOC Concentrations in Representative Shallow Sediment Cores

Appendix A

Photo Log of Sediment Cores

(Note: Photo of sediment core SD-13 is not available)



FIGURE A1
Photograph of Sediment Core SD-01A
Saugus Iron Works
Saugus, Massachusetts



FIGURE A2
Photograph of Sediment Core SD-01B
Saugus Iron Works
Saugus, Massachusetts

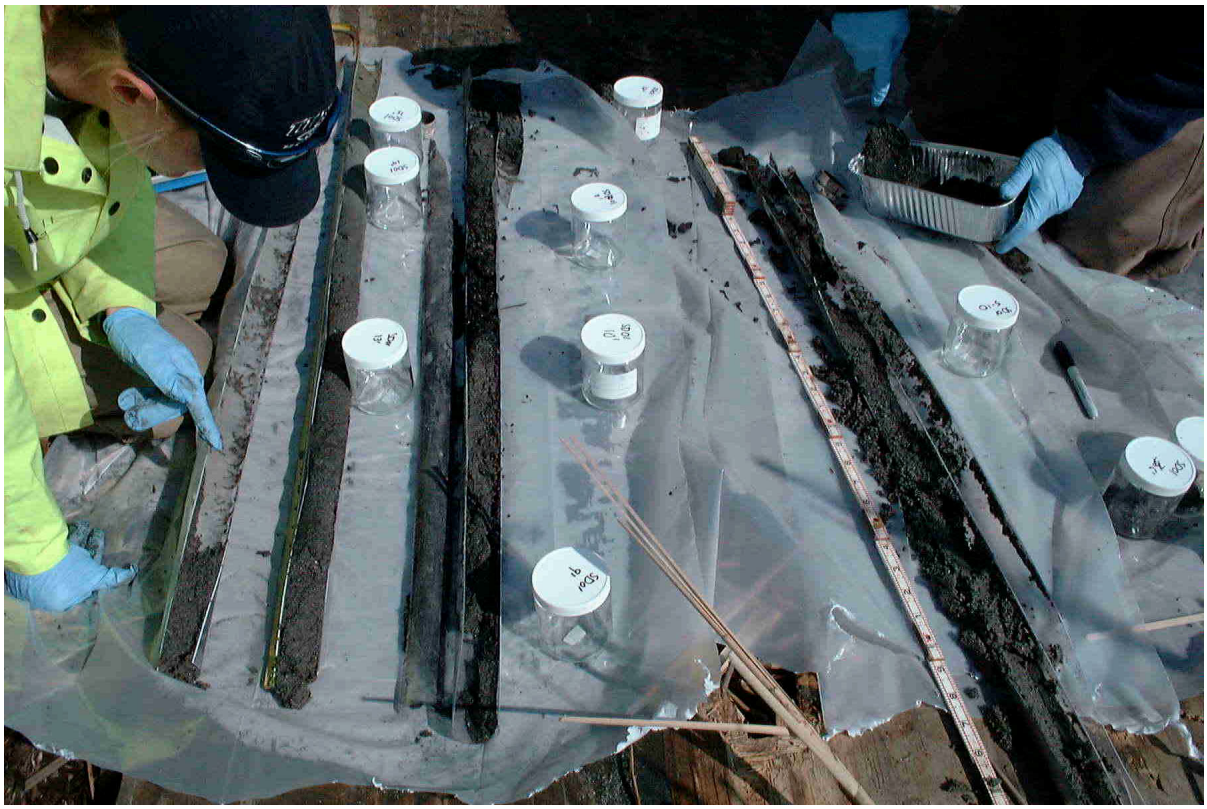


FIGURE A3
Photograph of Sediment Core SD-01C (Middle)
Saugus Iron Works
Saugus, Massachusetts



FIGURE A4
Photograph of Sediment Core SD-01D (Left)
Saugus Iron Works
Saugus, Massachusetts



FIGURE A5
Photograph of Sediment Core SD-02-A (Top)
Saugus Iron Works
Saugus, Massachusetts



FIGURE A6
Photograph of Sediment Core SD-02-B (Middle) and SD-2C (Left)
Saugus Iron Works
Saugus, Massachusetts



FIGURE A7
Photograph of Sediment Core SD-3A (Left)
Saugus Iron Works
Saugus, Massachusetts



FIGURE A8
Photograph of Sediment Cores SD-03A (Right), SD-03B (Middle), and SD-3D (Left)
Saugus Iron Works
Saugus, Massachusetts



FIGURE A9
Photograph of Sediment Core SD-04
Saugus Iron Works
Saugus, Massachusetts



FIGURE A10
Photograph of Sediment Core SD-05
Saugus Iron Works
Saugus, Massachusetts



FIGURE A11
Photograph of Sediment Core SD-06
Saugus Iron Works
Saugus, Massachusetts



FIGURE A12
Photograph of Sediment Core SD-07
Saugus Iron Works
Saugus, Massachusetts



FIGURE A13
Photograph of Sediment Core SD-08
Saugus Iron Works
Saugus, Massachusetts



FIGURE A14
Photograph of Sediment Core SD-09
Saugus Iron Works
Saugus, Massachusetts



FIGURE A15
Photograph of Sediment Core SD-10
Saugus Iron Works
Saugus, Massachusetts



FIGURE A16
Photograph of Sediment Core SD-11
Saugus Iron Works
Saugus, Massachusetts



FIGURE A17
Photograph of Sediment Core SD-12
Saugus Iron Works
Saugus, Massachusetts



FIGURE A18
Photograph of Sediment Core SD-14
Saugus Iron Works
Saugus, Massachusetts



FIGURE A19
Photograph of Sediment Core SD-15 (Top) and SD-17 (Bottom)
Saugus Iron Works
Saugus, Massachusetts



FIGURE A20
Photograph of Sediment Core SD-16
Saugus Iron Works
Saugus, Massachusetts



FIGURE A21
Photograph of Sediment Core SD-18
Saugus Iron Works
Saugus, Massachusetts



FIGURE A22
Photograph of Sediment Core SD-19
Saugus Iron Works
Saugus, Massachusetts



FIGURE A23
Photograph of Sediment Core SD-20
Saugus Iron Works
Saugus, Massachusetts

Appendix B

Raw Analytical Data

Groundwater Analytical, Inc.
P.O.Box 1200
228 Main Street
Buzzards Bay, MA 02532

Telephone: (508) 759-4441
FAX: (508) 759-4475

GROUNDWATER ANALYTICAL

e-mail

To:	John Burgess	**From:**	e-mail reporting GWA
	CH2M Hill	**Pages:**	78
e-mail:	jburgess@ch2m.com	**Date:**	05/11/2004 04:56:48 PM
Re:	72023	**CC:**	

NOTE

The format or contents of this e-mail transmission may not meet all applicable National Environmental Laboratory Accreditation Conference (NELAC) Standards for data reporting.

- **Comments:** Project Number: 72023

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Confidential

GROUNDWATER ANALYTICAL

Groundwater Analytical, Inc.
P.O. Box 1200
228 Main Street
Buzzards Bay, MA 02532

Telephone (508) 759-4441
FAX (508) 759-4475
www.groundwateranalytical.com

May 11, 2004

Mr. John Burgess
CH2M Hill
25 New Chardon Street
Suite 500
Boston, MA 02114

LABORATORY REPORT

Project: **Saugus Iron Works**
Lab ID: **72023**
Received: **04-27-04**

Dear John:

Enclosed are the analytical results for the above referenced project. The project was processed for Standard turnaround.

This letter authorizes the release of the analytical results, and should be considered a part of this report. This report contains a sample receipt report detailing the samples received, a project narrative indicating project changes and non-conformances, a quality control report, and a statement of our state certifications.

The analytical results contained in this report meet all applicable NELAC standards, except as may be specifically noted, or described in the project narrative. This report may only be used or reproduced in its entirety.

I attest under the pains and penalties of perjury that, based upon my inquiry of those individuals immediately responsible for obtaining the information, the material contained in this report is, to the best of my knowledge and belief, accurate and complete.

Should you have any questions concerning this report, please do not hesitate to contact me.

Sincerely,

Jonathan R. Sanford
President

JRS/smd
Enclosures

GROUNDWATER ANALYTICAL

Sample Receipt Report

Project: **Saugus Iron Works**
Client: **CH2M Hill**
Lab ID: **72023**

Delivery: **GWA Courier**
Airbill: **n/a**
Lab Receipt: **04-27-04**

Temperature: **4.2'C**
Chain of Custody: **Present**
Custody Seal(s): **n/a**

Lab ID	Field ID	Matrix	Sampled	Method	Notes
72023-1	SD05A	Soil	4/27/04 11:00	EPA 6010B/7471A 13 Priority Pollutant Metals EPA 8270C PAHs EPA 9060 Mod Total Organic Carbon	

Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship
C498263	250 mL Glass	Fisher	BX12259	None	n/a	n/a	n/a

Lab ID	Field ID	Matrix	Sampled	Method	Notes
72023-2	SD05B	Soil	4/27/04 11:00	EPA 6010B/7471A 13 Priority Pollutant Metals EPA 8270C PAHs EPA 9060 Mod Total Organic Carbon	

Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship
C498259	250 mL Glass	Fisher	BX12259	None	n/a	n/a	n/a

Lab ID	Field ID	Matrix	Sampled	Method	Notes
72023-3	SD05C	Soil	4/27/04 11:00	EPA 6010B/7471A 13 Priority Pollutant Metals EPA 8270C PAHs EPA 9060 Mod Total Organic Carbon	

Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship
C498254	250 mL Glass	Fisher	BX12259	None	n/a	n/a	n/a

Lab ID	Field ID	Matrix	Sampled	Method	Notes
72023-4	SD06A	Soil	4/27/04 11:00	EPA 6010B/7471A 13 Priority Pollutant Metals EPA 8270C PAHs EPA 9060 Mod Total Organic Carbon	

Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship
C498260	250 mL Glass	Fisher	BX12259	None	n/a	n/a	n/a

Lab ID	Field ID	Matrix	Sampled	Method	Notes
72023-5	SD06B	Soil	4/27/04 11:00	EPA 6010B/7471A 13 Priority Pollutant Metals EPA 8270C PAHs EPA 9060 Mod Total Organic Carbon	

Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship
C498255	250 mL Glass	Fisher	BX12259	None	n/a	n/a	n/a

Lab ID	Field ID	Matrix	Sampled	Method	Notes
72023-6	SD06C	Soil	4/27/04 11:00	EPA 6010B/7471A 13 Priority Pollutant Metals EPA 8270C PAHs EPA 9060 Mod Total Organic Carbon	

Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship
C498261	250 mL Glass	Fisher	BX12259	None	n/a	n/a	n/a

Lab ID	Field ID	Matrix	Sampled	Method	Notes
72023-7	SD09A	Soil	4/27/04 13:30	EPA 6010B/7471A 13 Priority Pollutant Metals EPA 8270C PAHs EPA 9060 Mod Total Organic Carbon	

Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship
C498256	250 mL Glass	Fisher	BX12259	None	n/a	n/a	n/a

GROUNDWATER ANALYTICAL

Sample Receipt Report (Continued)

Project: **Saugus Iron Works**
Client: **CH2M Hill**
Lab ID: **72023**

Delivery: **GWA Courier**
Airbill: **n/a**
Lab Receipt: **04-27-04**

Temperature: **4.2'C**
Chain of Custody: **Present**
Custody Seal(s): **n/a**

Lab ID	Field ID	Matrix	Sampled	Method	Notes
72023-8	SD09B	Soil	4/27/04 13:30	EPA 6010B/7471A 13 Priority Pollutant Metals EPA 8270C PAHs EPA 9060 Mod Total Organic Carbon	

Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship
C498252	250 mL Glass	Fisher	BX12259	None	n/a	n/a	n/a

Lab ID	Field ID	Matrix	Sampled	Method	Notes
72023-9	SD09C	Soil	4/27/04 13:30	EPA 6010B/7471A 13 Priority Pollutant Metals EPA 8270C PAHs EPA 9060 Mod Total Organic Carbon	

Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship
C498258	250 mL Glass	Fisher	BX12259	None	n/a	n/a	n/a

Lab ID	Field ID	Matrix	Sampled	Method	Notes
72023-10	SD08A	Soil	4/27/04 14:30	EPA 6010B/7471A 13 Priority Pollutant Metals EPA 8270C PAHs EPA 9060 Mod Total Organic Carbon	

Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship
C498262	250 mL Glass	Fisher	BX12259	None	n/a	n/a	n/a

Lab ID	Field ID	Matrix	Sampled	Method	Notes
72023-11	SD08B	Soil	4/27/04 14:30	EPA 6010B/7471A 13 Priority Pollutant Metals EPA 8270C PAHs EPA 9060 Mod Total Organic Carbon	

Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship
C498253	250 mL Glass	Fisher	BX12259	None	n/a	n/a	n/a

Lab ID	Field ID	Matrix	Sampled	Method	Notes
72023-12	SD08C	Soil	4/27/04 14:30	EPA 6010B/7471A 13 Priority Pollutant Metals EPA 8270C PAHs EPA 9060 Mod Total Organic Carbon	

Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship
C498257	250 mL Glass	Fisher	BX12259	None	n/a	n/a	n/a

Lab ID	Field ID	Matrix	Sampled	Method	Notes
72023-13	SD07A	Soil	4/26/04 10:00	EPA 6010B/7471A 13 Priority Pollutant Metals EPA 8270C PAHs EPA 9060 Mod Total Organic Carbon	

Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship
C464059	250 mL Glass	Greenwood	BX11505	None	n/a	n/a	n/a

Lab ID	Field ID	Matrix	Sampled	Method	Notes
72023-14	SD07B	Soil	4/26/04 10:00	EPA 6010B/7471A 13 Priority Pollutant Metals EPA 8270C PAHs EPA 9060 Mod Total Organic Carbon	

Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship
C464058	250 mL Glass	Greenwood	BX11505	None	n/a	n/a	n/a

GROUNDWATER ANALYTICAL

Sample Receipt Report (Continued)

Project: **Saugus Iron Works**
Client: **CH2M Hill**
Lab ID: **72023**

Delivery: **GWA Courier**
Airbill: **n/a**
Lab Receipt: **04-27-04**

Temperature: **4.2'C**
Chain of Custody: **Present**
Custody Seal(s): **n/a**

Lab ID	Field ID	Matrix	Sampled	Method	Notes
72023-15	SD07C	Soil	4/26/04 10:00	EPA 6010B/7471A 13 Priority Pollutant Metals EPA 8270C PAHs EPA 9060 Mod Total Organic Carbon	

Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship
C464063	250 mL Glass	Greenwood	BX11505	None	n/a	n/a	n/a

Lab ID	Field ID	Matrix	Sampled	Method	Notes
72023-16	SD04A	Soil	4/26/04 11:30	EPA 6010B/7471A 13 Priority Pollutant Metals EPA 8270C PAHs EPA 9060 Mod Total Organic Carbon	

Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship
C414265	250 mL Glass	Fisher	BX12228	None	n/a	n/a	n/a

Lab ID	Field ID	Matrix	Sampled	Method	Notes
72023-17	SD04B	Soil	4/26/04 11:30	EPA 6010B/7471A 13 Priority Pollutant Metals EPA 8270C PAHs EPA 9060 Mod Total Organic Carbon	

Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship
C414266	250 mL Glass	Fisher	BX12228	None	n/a	n/a	n/a

Lab ID	Field ID	Matrix	Sampled	Method	Notes
72023-18	SD04C	Soil	4/26/04 11:30	EPA 6010B/7471A 13 Priority Pollutant Metals EPA 8270C PAHs EPA 9060 Mod Total Organic Carbon	

Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship
C414264	250 mL Glass	Fisher	BX12228	None	n/a	n/a	n/a

Lab ID	Field ID	Matrix	Sampled	Method	Notes
72023-19	SD10A	Soil	4/26/04 15:00	EPA 6010B/7471A 13 Priority Pollutant Metals EPA 8270C PAHs EPA 9060 Mod Total Organic Carbon	

Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship
C414267	250 mL Glass	Fisher	BX12228	None	n/a	n/a	n/a

Lab ID	Field ID	Matrix	Sampled	Method	Notes
72023-20	SD10B	Soil	4/26/04 15:00	EPA 6010B/7471A 13 Priority Pollutant Metals EPA 8270C PAHs EPA 9060 Mod Total Organic Carbon	

Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship
C414269	250 mL Glass	Fisher	BX12228	None	n/a	n/a	n/a

Lab ID	Field ID	Matrix	Sampled	Method	Notes
72023-21	SD10C	Soil	4/26/04 15:00	EPA 6010B/7471A 13 Priority Pollutant Metals EPA 8270C PAHs EPA 9060 Mod Total Organic Carbon	

Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship
C414268	250 mL Glass	Fisher	BX12228	None	n/a	n/a	n/a

GROUNDWATER ANALYTICAL

Sample Receipt Report (Continued)

Project: **Saugus Iron Works**
Client: **CH2M Hill**
Lab ID: **72023**

Delivery: **GWA Courier**
Airbill: **n/a**
Lab Receipt: **04-27-04**

Temperature: **4.2'C**
Chain of Custody: **Present**
Custody Seal(s): **n/a**

Lab ID	Field ID		Matrix	Sampled	Method				Notes
72023-22	EB01		Aqueous	4/26/04 16:30	EPA 8270C PAHs Low Level SIM				
Con ID	**Container**	**Vendor**	**QC Lot**	**Preserv**	**QC Lot**	**Prep**	**Ship**		
C331448	1 L Amber Glass	Proline	BX10083	None	n/a	n/a	n/a		
C331447	1 L Amber Glass	Proline	BX10083	None	n/a	n/a	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
72023-23	EB01		Aqueous	4/26/04 16:30	EPA 6010/7470A 13 Priority Pollutant Metals				
Con ID	**Container**	**Vendor**	**QC Lot**	**Preserv**	**QC Lot**	**Prep**	**Ship**		
C311638	250 mL Plastic	Proline	BX10723	HNO3	R-3884A	02-02-04	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
72023-24	EB02		Aqueous	4/27/04 15:00	EPA 8270C PAHs Low Level SIM				
Con ID	**Container**	**Vendor**	**QC Lot**	**Preserv**	**QC Lot**	**Prep**	**Ship**		
C331449	1 L Amber Glass	Proline	BX10083	None	n/a	n/a	n/a		
C331446	1 L Amber Glass	Proline	BX10083	None	n/a	n/a	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
72023-25	EB02		Aqueous	4/27/04 15:00	EPA 6010/7470A 13 Priority Pollutant Metals				
Con ID	**Container**	**Vendor**	**QC Lot**	**Preserv**	**QC Lot**	**Prep**	**Ship**		
C311727	250 mL Plastic	Proline	BX10723	HNO3	R-3884A	02-02-04	n/a		

GROUNDWATER ANALYTICAL

Data Certification

Project: **Saugus Iron Works** Lab ID: **72023**
Client: **CH2M Hill** Received: **04-27-04 18:30**

MA DEP Compendium of Analytical Methods											
Project Location:	n/a					MA DEP RTN:	n/a				
This Form provides certifications for the following data set:											
EPA 8270C:	72023-01,-02,-03,-04,-05,-06,-07,-08,-09,-10,-11,-12,-13,-14,-15,-16,-17,-18,-19,-20,-21,-22,-24										
EPA 6010B:	72023-01,-02,-03,-04,-05,-06,-07,-08,-09,-10,-11,-12,-13,-14,-15,-16,-17,-18,-19,-20,-21,-23,-23,-25,-25										
EPA 7470A/1A:	72023-01,-02,-03,-04,-05,-06,-07,-08,-09,-10,-11,-12,-13,-14,-15,-16,-17,-18,-19,-20,-21,-23,-23,-25,-25										
Sample Matrices:	Groundwater	(X)	Soil/Sediment	(X)	Drinking Water	( )	Other	( )			
MCP SW-846 Methods Used	8260B	( )	8151A	( )	8330	( )	6010B	(X)	7470A/1A	(X)	
	8270C	(X)	8081A	( )	VPH	( )	6020	( )	9012A[2]	( )	
As specified in MA DEP Compendium of Analytical Methods (check all that apply)	8082	( )	8021B	( )	EPH	( )	7000 S[3]	( )	Other	( )	
	1. List Release Tracking Number (RTN), if known.										
	2. SW-846 Method 9012A (Equivalent to 9014) or MA DEP Physiologically Available Cyanide (PAC) Method										
	3. S - SW-846 Methods 7000 Series. List individual method and analyte.										

An affirmative response to questions A, B, C and D is required for "Presumptive Certainty" status.

A.	Were all samples received by the laboratory in a condition consistent with that described on the Chain-of-Custody documentation for the data set?	Yes
B.	Were all QA/QC procedures required for the specified analytical method(s) included in this report followed, including the requirement to note and discuss in a narrative QC data that did not meet appropriate performance standards or guidelines?	Yes
C.	Does the analytical data included in this report meet all the requirements for "Presumptive Certainty," as described in Section 2.0 of the MA DEP document CAM VII A, *Quality Assurance and Quality Control Guidelines for the Acquisition and Reporting of Analytical Data*?	No
D.	VPH and EPH methods only: Was the VPH or EPH method run without significant modifications, as specified in Section 11.3?	n/a

A response to questions E and F below is required for "Presumptive Certainty" status.

E.	Were all QC performance standards and recommendations for the specified methods achieved?	Yes
F.	Were results for all analyte-list compounds/elements for the specified method(s) reported?	No

All No answers are addressed in the attached Project Narrative.

I, the undersigned, attest under the pains and penalties of perjury that, based upon my personal inquiry of those responsible for obtaining the information, the material contained in this analytical report is, to the best of my knowledge and belief, accurate and complete.

Signature: Jonathan R. Sanford Position: President

Printed Name: Jonathan R. Sanford Date: 05-11-04

GROUNDWATER ANALYTICAL

EPA Method 8270C
Polynuclear Aromatic Hydrocarbons by GC/MS

Field ID:	**SD05A**	Matrix:	**Soil**
Project:	**Saugus Iron Works**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72023-01**	QC Batch ID:	**SV-1438-P**
Sampled:	**04-27-04 11:00**	Instrument ID:	**MS-3 HP 5890**
Received:	**04-27-04 18:30**	Sample Weight:	**15 g**
Extracted:	**04-30-04 14:00**	Final Volume:	**1 mL**
Cleaned Up:	**05-06-04 12:00**	Percent Solids:	**58**
Analyzed:	**05-06-04 17:00**	Dilution Factor:	**1**
Analyst:	**JJT**		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
91-20-3	Naphthalene	BRL		ug/Kg	560
91-57-6	2-Methylnaphthalene	BRL		ug/Kg	560
208-96-8	Acenaphthylene	BRL		ug/Kg	560
83-32-9	Acenaphthene	BRL		ug/Kg	560
86-73-7	Fluorene	BRL		ug/Kg	560
85-01-8	Phenanthrene	BRL		ug/Kg	560
120-12-7	Anthracene	BRL		ug/Kg	560
206-44-0	Fluoranthene	BRL		ug/Kg	560
129-00-0	Pyrene	BRL		ug/Kg	560
56-55-3	Benzo[a]anthracene	BRL		ug/Kg	560
218-01-9	Chrysene	BRL		ug/Kg	560
205-99-2	Benzo[b]fluoranthene	BRL		ug/Kg	560
207-08-9	Benzo[k]fluoranthene	BRL		ug/Kg	560
50-32-8	Benzo[a]pyrene	BRL		ug/Kg	560
193-39-5	Indeno[1,2,3-c,d]pyrene	BRL		ug/Kg	560
53-70-3	Dibenzo[a,h]anthracene	BRL		ug/Kg	560
191-24-2	Benzo[g,h,i]perylene	BRL		ug/Kg	560

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Nitrobenzene-d5	11,000	6,600	59 %	30 - 130 %
2-Fluorobiphenyl	11,000	7,300	64 %	30 - 130 %
Terphenyl-d14	11,000	7,800	69 %	30 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample extraction performed by EPA Method 3545. Cleanup performed by EPA Method 3630C. Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8270C
Polynuclear Aromatic Hydrocarbons by GC/MS

Field ID:	**SD05B**	Matrix:	**Soil**
Project:	**Saugus Iron Works**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72023-02**	QC Batch ID:	**SV-1438-P**
Sampled:	**04-27-04 11:00**	Instrument ID:	**MS-3 HP 5890**
Received:	**04-27-04 18:30**	Sample Weight:	**15 g**
Extracted:	**04-30-04 14:00**	Final Volume:	**1 mL**
Cleaned Up:	**05-06-04 12:00**	Percent Solids:	**80**
Analyzed:	**05-06-04 17:40**	Dilution Factor:	**1**
Analyst:	**JJT**		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
91-20-3	Naphthalene	BRL		ug/Kg	410
91-57-6	2-Methylnaphthalene	BRL		ug/Kg	410
208-96-8	Acenaphthylene	BRL		ug/Kg	410
83-32-9	Acenaphthene	BRL		ug/Kg	410
86-73-7	Fluorene	BRL		ug/Kg	410
85-01-8	Phenanthrene	BRL		ug/Kg	410
120-12-7	Anthracene	BRL		ug/Kg	410
206-44-0	Fluoranthene	BRL		ug/Kg	410
129-00-0	Pyrene	BRL		ug/Kg	410
56-55-3	Benzo[a]anthracene	BRL		ug/Kg	410
218-01-9	Chrysene	BRL		ug/Kg	410
205-99-2	Benzo[b]fluoranthene	BRL		ug/Kg	410
207-08-9	Benzo[k]fluoranthene	BRL		ug/Kg	410
50-32-8	Benzo[a]pyrene	BRL		ug/Kg	410
193-39-5	Indeno[1,2,3-c,d]pyrene	BRL		ug/Kg	410
53-70-3	Dibenzo[a,h]anthracene	BRL		ug/Kg	410
191-24-2	Benzo[g,h,i]perylene	BRL		ug/Kg	410

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Nitrobenzene-d5	8,200	5,300	64 %	30 - 130 %
2-Fluorobiphenyl	8,200	5,900	72 %	30 - 130 %
Terphenyl-d14	8,200	6,200	76 %	30 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample extraction performed by EPA Method 3545. Cleanup performed by EPA Method 3630C. Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8270C
Polynuclear Aromatic Hydrocarbons by GC/MS

Field ID:	**SD05C**	Matrix:	**Soil**
Project:	**Saugus Iron Works**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72023-03**	QC Batch ID:	**SV-1438-P**
Sampled:	**04-27-04 11:00**	Instrument ID:	**MS-3 HP 5890**
Received:	**04-27-04 18:30**	Sample Weight:	**16 g**
Extracted:	**04-30-04 14:00**	Final Volume:	**1 mL**
Cleaned Up:	**05-06-04 12:00**	Percent Solids:	**60**
Analyzed:	**05-06-04 18:20**	Dilution Factor:	**1**
Analyst:	**JJT**		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
91-20-3	Naphthalene	BRL		ug/Kg	530
91-57-6	2-Methylnaphthalene	BRL		ug/Kg	530
208-96-8	Acenaphthylene	BRL		ug/Kg	530
83-32-9	Acenaphthene	BRL		ug/Kg	530
86-73-7	Fluorene	BRL		ug/Kg	530
85-01-8	Phenanthrene	BRL		ug/Kg	530
120-12-7	Anthracene	BRL		ug/Kg	530
206-44-0	Fluoranthene	**870**		ug/Kg	530
129-00-0	Pyrene	**740**		ug/Kg	530
56-55-3	Benzo[a]anthracene	BRL		ug/Kg	530
218-01-9	Chrysene	BRL		ug/Kg	530
205-99-2	Benzo[b]fluoranthene	**560**		ug/Kg	530
207-08-9	Benzo[k]fluoranthene	BRL		ug/Kg	530
50-32-8	Benzo[a]pyrene	BRL		ug/Kg	530
193-39-5	Indeno[1,2,3-c,d]pyrene	BRL		ug/Kg	530
53-70-3	Dibenzo[a,h]anthracene	BRL		ug/Kg	530
191-24-2	Benzo[g,h,i]perylene	BRL		ug/Kg	530

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Nitrobenzene-d5	11,000	6,000	**56 %**	30 - 130 %
2-Fluorobiphenyl	11,000	6,100	**57 %**	30 - 130 %
Terphenyl-d14	11,000	7,500	**70 %**	30 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample extraction performed by EPA Method 3545. Cleanup performed by EPA Method 3630C. Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8270C
Polynuclear Aromatic Hydrocarbons by GC/MS

Field ID:	**SD06A**	Matrix:	**Soil**
Project:	**Saugus Iron Works**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72023-04**	QC Batch ID:	**SV-1438-P**
Sampled:	**04-27-04 11:00**	Instrument ID:	**MS-3 HP 5890**
Received:	**04-27-04 18:30**	Sample Weight:	**15 g**
Extracted:	**04-30-04 14:00**	Final Volume:	**1 mL**
Cleaned Up:	**05-06-04 12:00**	Percent Solids:	**44**
Analyzed:	**05-06-04 19:00**	Dilution Factor:	**1**
Analyst:	**JJT**		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
91-20-3	Naphthalene	BRL		ug/Kg	740
91-57-6	2-Methylnaphthalene	BRL		ug/Kg	740
208-96-8	Acenaphthylene	BRL		ug/Kg	740
83-32-9	Acenaphthene	BRL		ug/Kg	740
86-73-7	Fluorene	BRL		ug/Kg	740
85-01-8	Phenanthrene	BRL		ug/Kg	740
120-12-7	Anthracene	BRL		ug/Kg	740
206-44-0	Fluoranthene	**1,300**		ug/Kg	740
129-00-0	Pyrene	**1,100**		ug/Kg	740
56-55-3	Benzo[a]anthracene	BRL		ug/Kg	740
218-01-9	Chrysene	BRL		ug/Kg	740
205-99-2	Benzo[b]fluoranthene	**1,000**		ug/Kg	740
207-08-9	Benzo[k]fluoranthene	BRL		ug/Kg	740
50-32-8	Benzo[a]pyrene	BRL		ug/Kg	740
193-39-5	Indeno[1,2,3-c,d]pyrene	BRL		ug/Kg	740
53-70-3	Dibenzo[a,h]anthracene	BRL		ug/Kg	740
191-24-2	Benzo[g,h,i]perylene	BRL		ug/Kg	740

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Nitrobenzene-d5	15,000	8,800	**59 %**	30 - 130 %
2-Fluorobiphenyl	15,000	9,400	**63 %**	30 - 130 %
Terphenyl-d14	15,000	11,000	**73 %**	30 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample extraction performed by EPA Method 3545. Cleanup performed by EPA Method 3630C. Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8270C
Polynuclear Aromatic Hydrocarbons by GC/MS

Field ID:	**SD06B**	Matrix:	**Soil**
Project:	**Saugus Iron Works**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72023-05**	QC Batch ID:	**SV-1438-P**
Sampled:	**04-27-04 11:00**	Instrument ID:	**MS-3 HP 5890**
Received:	**04-27-04 18:30**	Sample Weight:	**15 g**
Extracted:	**04-30-04 14:00**	Final Volume:	**1 mL**
Cleaned Up:	**05-06-04 12:00**	Percent Solids:	**70**
Analyzed:	**05-06-04 19:39**	Dilution Factor:	**1**
Analyst:	**JJT**		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
91-20-3	Naphthalene	BRL		ug/Kg	460
91-57-6	2-Methylnaphthalene	BRL		ug/Kg	460
208-96-8	Acenaphthylene	BRL		ug/Kg	460
83-32-9	Acenaphthene	BRL		ug/Kg	460
86-73-7	Fluorene	BRL		ug/Kg	460
85-01-8	Phenanthrene	BRL		ug/Kg	460
120-12-7	Anthracene	BRL		ug/Kg	460
206-44-0	Fluoranthene	BRL		ug/Kg	460
129-00-0	Pyrene	BRL		ug/Kg	460
56-55-3	Benzo[a]anthracene	BRL		ug/Kg	460
218-01-9	Chrysene	BRL		ug/Kg	460
205-99-2	Benzo[b]fluoranthene	BRL		ug/Kg	460
207-08-9	Benzo[k]fluoranthene	BRL		ug/Kg	460
50-32-8	Benzo[a]pyrene	BRL		ug/Kg	460
193-39-5	Indeno[1,2,3-c,d]pyrene	BRL		ug/Kg	460
53-70-3	Dibenzo[a,h]anthracene	BRL		ug/Kg	460
191-24-2	Benzo[g,h,i]perylene	BRL		ug/Kg	460

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Nitrobenzene-d5	9,300	6,000	64 %	30 - 130 %
2-Fluorobiphenyl	9,300	6,600	71 %	30 - 130 %
Terphenyl-d14	9,300	6,900	74 %	30 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample extraction performed by EPA Method 3545. Cleanup performed by EPA Method 3630C. Results are reported on a dry weight basis.

Report Notations: **BRL** Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8270C
Polynuclear Aromatic Hydrocarbons by GC/MS

Field ID:	SD06C	Matrix:	Soil
Project:	Saugus Iron Works	Container:	250 mL Glass
Client:	CH2M Hill	Preservation:	Cool
Laboratory ID:	72023-06	QC Batch ID:	SV-1438-P
Sampled:	04-27-04 11:00	Instrument ID:	MS-3 HP 5890
Received:	04-27-04 18:30	Sample Weight:	16 g
Extracted:	04-30-04 14:00	Final Volume:	1 mL
Cleaned Up:	05-06-04 12:00	Percent Solids:	44
Analyzed:	05-06-04 20:19	Dilution Factor:	1
Analyst:	JJT		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
91-20-3	Naphthalene	BRL		ug/Kg	720
91-57-6	2-Methylnaphthalene	BRL		ug/Kg	720
208-96-8	Acenaphthylene	BRL		ug/Kg	720
83-32-9	Acenaphthene	BRL		ug/Kg	720
86-73-7	Fluorene	BRL		ug/Kg	720
85-01-8	Phenanthrene	BRL		ug/Kg	720
120-12-7	Anthracene	BRL		ug/Kg	720
206-44-0	Fluoranthene	BRL		ug/Kg	720
129-00-0	Pyrene	BRL		ug/Kg	720
56-55-3	Benzo[a]anthracene	BRL		ug/Kg	720
218-01-9	Chrysene	BRL		ug/Kg	720
205-99-2	Benzo[b]fluoranthene	BRL		ug/Kg	720
207-08-9	Benzo[k]fluoranthene	BRL		ug/Kg	720
50-32-8	Benzo[a]pyrene	BRL		ug/Kg	720
193-39-5	Indeno[1,2,3-c,d]pyrene	BRL		ug/Kg	720
53-70-3	Dibenzo[a,h]anthracene	BRL		ug/Kg	720
191-24-2	Benzo[g,h,i]perylene	BRL		ug/Kg	720

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Nitrobenzene-d5	15,000	7,200	49 %	30 - 130 %
2-Fluorobiphenyl	15,000	7,100	48 %	30 - 130 %
Terphenyl-d14	15,000	10,000	70 %	30 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample extraction performed by EPA Method 3545. Cleanup performed by EPA Method 3630C. Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8270C
Polynuclear Aromatic Hydrocarbons by GC/MS

Field ID:	**SD09A**	Matrix:	**Soil**
Project:	**Saugus Iron Works**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72023-07**	QC Batch ID:	**SV-1438-P**
Sampled:	**04-27-04 13:30**	Instrument ID:	**MS-3 HP 5890**
Received:	**04-27-04 18:30**	Sample Weight:	**16 g**
Extracted:	**04-30-04 14:00**	Final Volume:	**1 mL**
Cleaned Up:	**05-06-04 12:00**	Percent Solids:	**41**
Analyzed:	**05-06-04 20:58**	Dilution Factor:	**1**
Analyst:	**JJT**		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
91-20-3	Naphthalene	BRL		ug/Kg	750
91-57-6	2-Methylnaphthalene	BRL		ug/Kg	750
208-96-8	Acenaphthylene	BRL		ug/Kg	750
83-32-9	Acenaphthene	BRL		ug/Kg	750
86-73-7	Fluorene	BRL		ug/Kg	750
85-01-8	Phenanthrene	BRL		ug/Kg	750
120-12-7	Anthracene	BRL		ug/Kg	750
206-44-0	Fluoranthene	**1,100**		ug/Kg	750
129-00-0	Pyrene	**880**		ug/Kg	750
56-55-3	Benzo[a]anthracene	BRL		ug/Kg	750
218-01-9	Chrysene	BRL		ug/Kg	750
205-99-2	Benzo[b]fluoranthene	BRL		ug/Kg	750
207-08-9	Benzo[k]fluoranthene	BRL		ug/Kg	750
50-32-8	Benzo[a]pyrene	BRL		ug/Kg	750
193-39-5	Indeno[1,2,3-c,d]pyrene	BRL		ug/Kg	750
53-70-3	Dibenzo[a,h]anthracene	BRL		ug/Kg	750
191-24-2	Benzo[g,h,i]perylene	BRL		ug/Kg	750

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Nitrobenzene-d5	15,000	9,100	**60 %**	30 - 130 %
2-Fluorobiphenyl	15,000	8,500	**56 %**	30 - 130 %
Terphenyl-d14	15,000	10,000	**67 %**	30 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample extraction performed by EPA Method 3545. Cleanup performed by EPA Method 3630C. Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8270C
Polynuclear Aromatic Hydrocarbons by GC/MS

Field ID:	**SD09B**	Matrix:	**Soil**
Project:	**Saugus Iron Works**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72023-08**	QC Batch ID:	**SV-1438-P**
Sampled:	**04-27-04 13:30**	Instrument ID:	**MS-3 HP 5890**
Received:	**04-27-04 18:30**	Sample Weight:	**16 g**
Extracted:	**04-30-04 14:00**	Final Volume:	**1 mL**
Cleaned Up:	**05-06-04 12:00**	Percent Solids:	**46**
Analyzed:	**05-06-04 21:38**	Dilution Factor:	**1**
Analyst:	**JJT**		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
91-20-3	Naphthalene	BRL		ug/Kg	690
91-57-6	2-Methylnaphthalene	BRL		ug/Kg	690
208-96-8	Acenaphthylene	BRL		ug/Kg	690
83-32-9	Acenaphthene	BRL		ug/Kg	690
86-73-7	Fluorene	BRL		ug/Kg	690
85-01-8	Phenanthrene	BRL		ug/Kg	690
120-12-7	Anthracene	BRL		ug/Kg	690
206-44-0	Fluoranthene	BRL		ug/Kg	690
129-00-0	Pyrene	BRL		ug/Kg	690
56-55-3	Benzo[a]anthracene	BRL		ug/Kg	690
218-01-9	Chrysene	BRL		ug/Kg	690
205-99-2	Benzo[b]fluoranthene	BRL		ug/Kg	690
207-08-9	Benzo[k]fluoranthene	BRL		ug/Kg	690
50-32-8	Benzo[a]pyrene	BRL		ug/Kg	690
193-39-5	Indeno[1,2,3-c,d]pyrene	BRL		ug/Kg	690
53-70-3	Dibenzo[a,h]anthracene	BRL		ug/Kg	690
191-24-2	Benzo[g,h,i]perylene	BRL		ug/Kg	690

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Nitrobenzene-d5	14,000	7,500	54 %	30 - 130 %
2-Fluorobiphenyl	14,000	7,700	55 %	30 - 130 %
Terphenyl-d14	14,000	9,100	65 %	30 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample extraction performed by EPA Method 3545. Cleanup performed by EPA Method 3630C. Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8270C
Polynuclear Aromatic Hydrocarbons by GC/MS

Field ID:	**SD09C**	Matrix:	**Soil**
Project:	**Saugus Iron Works**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72023-09**	QC Batch ID:	**SV-1438-P**
Sampled:	**04-27-04 13:30**	Instrument ID:	**MS-3 HP 5890**
Received:	**04-27-04 18:30**	Sample Weight:	**15 g**
Extracted:	**04-30-04 14:00**	Final Volume:	**1 mL**
Cleaned Up:	**05-06-04 12:00**	Percent Solids:	**48**
Analyzed:	**05-06-04 22:17**	Dilution Factor:	**1**
Analyst:	**JJT**		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
91-20-3	Naphthalene	BRL		ug/Kg	680
91-57-6	2-Methylnaphthalene	BRL		ug/Kg	680
208-96-8	Acenaphthylene	BRL		ug/Kg	680
83-32-9	Acenaphthene	BRL		ug/Kg	680
86-73-7	Fluorene	BRL		ug/Kg	680
85-01-8	Phenanthrene	BRL		ug/Kg	680
120-12-7	Anthracene	BRL		ug/Kg	680
206-44-0	Fluoranthene	BRL		ug/Kg	680
129-00-0	Pyrene	BRL		ug/Kg	680
56-55-3	Benzo[a]anthracene	BRL		ug/Kg	680
218-01-9	Chrysene	BRL		ug/Kg	680
205-99-2	Benzo[b]fluoranthene	BRL		ug/Kg	680
207-08-9	Benzo[k]fluoranthene	BRL		ug/Kg	680
50-32-8	Benzo[a]pyrene	BRL		ug/Kg	680
193-39-5	Indeno[1,2,3-c,d]pyrene	BRL		ug/Kg	680
53-70-3	Dibenzo[a,h]anthracene	BRL		ug/Kg	680
191-24-2	Benzo[g,h,i]perylene	BRL		ug/Kg	680

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Nitrobenzene-d5	14,000	6,700	**49 %**	30 - 130 %
2-Fluorobiphenyl	14,000	6,000	**43 %**	30 - 130 %
Terphenyl-d14	14,000	9,600	**70 %**	30 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample extraction performed by EPA Method 3545. Cleanup performed by EPA Method 3630C. Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8270C
Polynuclear Aromatic Hydrocarbons by GC/MS

Field ID:	**SD08A**	Matrix:	**Soil**
Project:	**Saugus Iron Works**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72023-10**	QC Batch ID:	**SV-1438-P**
Sampled:	**04-27-04 14:30**	Instrument ID:	**MS-3 HP 5890**
Received:	**04-27-04 18:30**	Sample Weight:	**16 g**
Extracted:	**04-30-04 14:00**	Final Volume:	**1 mL**
Cleaned Up:	**05-06-04 12:00**	Percent Solids:	**24**
Analyzed:	**05-06-04 22:56**	Dilution Factor:	**1**
Analyst:	**JJT**		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
91-20-3	Naphthalene	BRL		ug/Kg	1,300
91-57-6	2-Methylnaphthalene	BRL		ug/Kg	1,300
208-96-8	Acenaphthylene	BRL		ug/Kg	1,300
83-32-9	Acenaphthene	BRL		ug/Kg	1,300
86-73-7	Fluorene	BRL		ug/Kg	1,300
85-01-8	Phenanthrene	BRL		ug/Kg	1,300
120-12-7	Anthracene	BRL		ug/Kg	1,300
206-44-0	Fluoranthene	BRL		ug/Kg	1,300
129-00-0	Pyrene	BRL		ug/Kg	1,300
56-55-3	Benzo[a]anthracene	BRL		ug/Kg	1,300
218-01-9	Chrysene	BRL		ug/Kg	1,300
205-99-2	Benzo[b]fluoranthene	BRL		ug/Kg	1,300
207-08-9	Benzo[k]fluoranthene	BRL		ug/Kg	1,300
50-32-8	Benzo[a]pyrene	BRL		ug/Kg	1,300
193-39-5	Indeno[1,2,3-c,d]pyrene	BRL		ug/Kg	1,300
53-70-3	Dibenzo[a,h]anthracene	BRL		ug/Kg	1,300
191-24-2	Benzo[g,h,i]perylene	BRL		ug/Kg	1,300

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Nitrobenzene-d5	26,000	17,000	64 %	30 - 130 %
2-Fluorobiphenyl	26,000	17,000	65 %	30 - 130 %
Terphenyl-d14	26,000	17,000	66 %	30 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample extraction performed by EPA Method 3545. Cleanup performed by EPA Method 3630C. Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8270C
Polynuclear Aromatic Hydrocarbons by GC/MS

Field ID:	**SD08B**	Matrix:	**Soil**
Project:	**Saugus Iron Works**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72023-11**	QC Batch ID:	**SV-1438-P**
Sampled:	**04-27-04 14:30**	Instrument ID:	**MS-3 HP 5890**
Received:	**04-27-04 18:30**	Sample Weight:	**15 g**
Extracted:	**04-30-04 14:00**	Final Volume:	**1 mL**
Cleaned Up:	**05-06-04 12:00**	Percent Solids:	**36**
Analyzed:	**05-07-04 01:34**	Dilution Factor:	**1**
Analyst:	**JJT**		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
91-20-3	Naphthalene	BRL		ug/Kg	910
91-57-6	2-Methylnaphthalene	BRL		ug/Kg	910
208-96-8	Acenaphthylene	BRL		ug/Kg	910
83-32-9	Acenaphthene	BRL		ug/Kg	910
86-73-7	Fluorene	BRL		ug/Kg	910
85-01-8	Phenanthrene	BRL		ug/Kg	910
120-12-7	Anthracene	BRL		ug/Kg	910
206-44-0	Fluoranthene	BRL		ug/Kg	910
129-00-0	Pyrene	BRL		ug/Kg	910
56-55-3	Benzo[a]anthracene	BRL		ug/Kg	910
218-01-9	Chrysene	BRL		ug/Kg	910
205-99-2	Benzo[b]fluoranthene	BRL		ug/Kg	910
207-08-9	Benzo[k]fluoranthene	BRL		ug/Kg	910
50-32-8	Benzo[a]pyrene	BRL		ug/Kg	910
193-39-5	Indeno[1,2,3-c,d]pyrene	BRL		ug/Kg	910
53-70-3	Dibenzo[a,h]anthracene	BRL		ug/Kg	910
191-24-2	Benzo[g,h,i]perylene	BRL		ug/Kg	910

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Nitrobenzene-d5	18,000	11,000	58 %	30 - 130 %
2-Fluorobiphenyl	18,000	10,000	54 %	30 - 130 %
Terphenyl-d14	18,000	13,000	72 %	30 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample extraction performed by EPA Method 3545. Cleanup performed by EPA Method 3630C. Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8270C
Polynuclear Aromatic Hydrocarbons by GC/MS

Field ID:	**SD08C**	Matrix:	**Soil**
Project:	**Saugus Iron Works**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72023-12**	QC Batch ID:	**SV-1438-P**
Sampled:	**04-27-04 14:30**	Instrument ID:	**MS-3 HP 5890**
Received:	**04-27-04 18:30**	Sample Weight:	**15 g**
Extracted:	**04-30-04 14:00**	Final Volume:	**1 mL**
Cleaned Up:	**05-06-04 12:00**	Percent Solids:	**97**
Analyzed:	**05-07-04 02:13**	Dilution Factor:	**1**
Analyst:	**JJT**		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
91-20-3	Naphthalene	BRL		ug/Kg	340
91-57-6	2-Methylnaphthalene	BRL		ug/Kg	340
208-96-8	Acenaphthylene	BRL		ug/Kg	340
83-32-9	Acenaphthene	BRL		ug/Kg	340
86-73-7	Fluorene	BRL		ug/Kg	340
85-01-8	Phenanthrene	BRL		ug/Kg	340
120-12-7	Anthracene	BRL		ug/Kg	340
206-44-0	Fluoranthene	BRL		ug/Kg	340
129-00-0	Pyrene	BRL		ug/Kg	340
56-55-3	Benzo[a]anthracene	BRL		ug/Kg	340
218-01-9	Chrysene	BRL		ug/Kg	340
205-99-2	Benzo[b]fluoranthene	BRL		ug/Kg	340
207-08-9	Benzo[k]fluoranthene	BRL		ug/Kg	340
50-32-8	Benzo[a]pyrene	BRL		ug/Kg	340
193-39-5	Indeno[1,2,3-c,d]pyrene	BRL		ug/Kg	340
53-70-3	Dibenzo[a,h]anthracene	BRL		ug/Kg	340
191-24-2	Benzo[g,h,i]perylene	BRL		ug/Kg	340

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Nitrobenzene-d5	6,800	4,100	**60 %**	30 - 130 %
2-Fluorobiphenyl	6,800	3,600	**53 %**	30 - 130 %
Terphenyl-d14	6,800	4,800	**70 %**	30 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample extraction performed by EPA Method 3545. Cleanup performed by EPA Method 3630C. Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8270C
Polynuclear Aromatic Hydrocarbons by GC/MS

Field ID:	SD07A	Matrix:	Soil
Project:	Saugus Iron Works	Container:	250 mL Glass
Client:	CH2M Hill	Preservation:	Cool
Laboratory ID:	72023-13	QC Batch ID:	SV-1438-P
Sampled:	04-26-04 10:00	Instrument ID:	MS-3 HP 5890
Received:	04-27-04 18:30	Sample Weight:	15 g
Extracted:	04-30-04 14:00	Final Volume:	1 mL
Cleaned Up:	05-06-04 12:00	Percent Solids:	37
Analyzed:	05-07-04 02:53	Dilution Factor:	1
Analyst:	JJT		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
91-20-3	Naphthalene	BRL		ug/Kg	900
91-57-6	2-Methylnaphthalene	BRL		ug/Kg	900
208-96-8	Acenaphthylene	BRL		ug/Kg	900
83-32-9	Acenaphthene	BRL		ug/Kg	900
86-73-7	Fluorene	BRL		ug/Kg	900
85-01-8	Phenanthrene	BRL		ug/Kg	900
120-12-7	Anthracene	BRL		ug/Kg	900
206-44-0	Fluoranthene	BRL		ug/Kg	900
129-00-0	Pyrene	BRL		ug/Kg	900
56-55-3	Benzo[a]anthracene	BRL		ug/Kg	900
218-01-9	Chrysene	BRL		ug/Kg	900
205-99-2	Benzo[b]fluoranthene	BRL		ug/Kg	900
207-08-9	Benzo[k]fluoranthene	BRL		ug/Kg	900
50-32-8	Benzo[a]pyrene	BRL		ug/Kg	900
193-39-5	Indeno[1,2,3-c,d]pyrene	BRL		ug/Kg	900
53-70-3	Dibenzo[a,h]anthracene	BRL		ug/Kg	900
191-24-2	Benzo[g,h,i]perylene	BRL		ug/Kg	900

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Nitrobenzene-d5	18,000	11,000	58 %	30 - 130 %
2-Fluorobiphenyl	18,000	9,500	52 %	30 - 130 %
Terphenyl-d14	18,000	12,000	65 %	30 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample extraction performed by EPA Method 3545. Cleanup performed by EPA Method 3630C. Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8270C
Polynuclear Aromatic Hydrocarbons by GC/MS

Field ID:	**SD07B**	Matrix:	**Soil**
Project:	**Saugus Iron Works**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72023-14**	QC Batch ID:	**SV-1438-P**
Sampled:	**04-26-04 10:00**	Instrument ID:	**MS-3 HP 5890**
Received:	**04-27-04 18:30**	Sample Weight:	**15 g**
Extracted:	**04-30-04 14:00**	Final Volume:	**1 mL**
Cleaned Up:	**05-06-04 12:00**	Percent Solids:	**67**
Analyzed:	**05-07-04 03:32**	Dilution Factor:	**1**
Analyst:	**JJT**		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
91-20-3	Naphthalene	BRL		ug/Kg	480
91-57-6	2-Methylnaphthalene	BRL		ug/Kg	480
208-96-8	Acenaphthylene	BRL		ug/Kg	480
83-32-9	Acenaphthene	BRL		ug/Kg	480
86-73-7	Fluorene	BRL		ug/Kg	480
85-01-8	Phenanthrene	BRL		ug/Kg	480
120-12-7	Anthracene	BRL		ug/Kg	480
206-44-0	Fluoranthene	BRL		ug/Kg	480
129-00-0	Pyrene	BRL		ug/Kg	480
56-55-3	Benzo[a]anthracene	BRL		ug/Kg	480
218-01-9	Chrysene	BRL		ug/Kg	480
205-99-2	Benzo[b]fluoranthene	BRL		ug/Kg	480
207-08-9	Benzo[k]fluoranthene	BRL		ug/Kg	480
50-32-8	Benzo[a]pyrene	BRL		ug/Kg	480
193-39-5	Indeno[1,2,3-c,d]pyrene	BRL		ug/Kg	480
53-70-3	Dibenzo[a,h]anthracene	BRL		ug/Kg	480
191-24-2	Benzo[g,h,i]perylene	BRL		ug/Kg	480

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Nitrobenzene-d5	9,700	6,400	66 %	30 - 130 %
2-Fluorobiphenyl	9,700	7,100	73 %	30 - 130 %
Terphenyl-d14	9,700	7,100	74 %	30 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample extraction performed by EPA Method 3545. Cleanup performed by EPA Method 3630C. Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8270C
Polynuclear Aromatic Hydrocarbons by GC/MS

Field ID:	SD07C	Matrix:	Soil
Project:	Saugus Iron Works	Container:	250 mL Glass
Client:	CH2M Hill	Preservation:	Cool
Laboratory ID:	72023-15	QC Batch ID:	SV-1438-P
Sampled:	04-26-04 10:00	Instrument ID:	MS-3 HP 5890
Received:	04-27-04 18:30	Sample Weight:	15 g
Extracted:	04-30-04 14:00	Final Volume:	1 mL
Cleaned Up:	05-06-04 12:00	Percent Solids:	42
Analyzed:	05-07-04 04:11	Dilution Factor:	1
Analyst:	JJT		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
91-20-3	Naphthalene	BRL		ug/Kg	780
91-57-6	2-Methylnaphthalene	BRL		ug/Kg	780
208-96-8	Acenaphthylene	BRL		ug/Kg	780
83-32-9	Acenaphthene	BRL		ug/Kg	780
86-73-7	Fluorene	BRL		ug/Kg	780
85-01-8	Phenanthrene	BRL		ug/Kg	780
120-12-7	Anthracene	BRL		ug/Kg	780
206-44-0	Fluoranthene	1,400		ug/Kg	780
129-00-0	Pyrene	1,200		ug/Kg	780
56-55-3	Benzo[a]anthracene	BRL		ug/Kg	780
218-01-9	Chrysene	BRL		ug/Kg	780
205-99-2	Benzo[b]fluoranthene	820		ug/Kg	780
207-08-9	Benzo[k]fluoranthene	BRL		ug/Kg	780
50-32-8	Benzo[a]pyrene	BRL		ug/Kg	780
193-39-5	Indeno[1,2,3-c,d]pyrene	BRL		ug/Kg	780
53-70-3	Dibenzo[a,h]anthracene	BRL		ug/Kg	780
191-24-2	Benzo[g,h,i]perylene	BRL		ug/Kg	780

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Nitrobenzene-d5	16,000	9,000	57 %	30 - 130 %
2-Fluorobiphenyl	16,000	7,800	50 %	30 - 130 %
Terphenyl-d14	16,000	11,000	69 %	30 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample extraction performed by EPA Method 3545. Cleanup performed by EPA Method 3630C. Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8270C
Polynuclear Aromatic Hydrocarbons by GC/MS

Field ID:	**SD04A**	Matrix:	**Soil**
Project:	**Saugus Iron Works**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72023-16**	QC Batch ID:	**SV-1438-P**
Sampled:	**04-26-04 11:30**	Instrument ID:	**MS-3 HP 5890**
Received:	**04-27-04 18:30**	Sample Weight:	**15 g**
Extracted:	**04-30-04 14:00**	Final Volume:	**1 mL**
Cleaned Up:	**05-06-04 12:00**	Percent Solids:	**62**
Analyzed:	**05-07-04 04:51**	Dilution Factor:	**1**
Analyst:	**JJT**		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
91-20-3	Naphthalene	BRL		ug/Kg	530
91-57-6	2-Methylnaphthalene	BRL		ug/Kg	530
208-96-8	Acenaphthylene	BRL		ug/Kg	530
83-32-9	Acenaphthene	BRL		ug/Kg	530
86-73-7	Fluorene	BRL		ug/Kg	530
85-01-8	Phenanthrene	BRL		ug/Kg	530
120-12-7	Anthracene	BRL		ug/Kg	530
206-44-0	Fluoranthene	BRL		ug/Kg	530
129-00-0	Pyrene	BRL		ug/Kg	530
56-55-3	Benzo[a]anthracene	BRL		ug/Kg	530
218-01-9	Chrysene	BRL		ug/Kg	530
205-99-2	Benzo[b]fluoranthene	BRL		ug/Kg	530
207-08-9	Benzo[k]fluoranthene	BRL		ug/Kg	530
50-32-8	Benzo[a]pyrene	BRL		ug/Kg	530
193-39-5	Indeno[1,2,3-c,d]pyrene	BRL		ug/Kg	530
53-70-3	Dibenzo[a,h]anthracene	BRL		ug/Kg	530
191-24-2	Benzo[g,h,i]perylene	BRL		ug/Kg	530

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Nitrobenzene-d5	11,000	6,700	63 %	30 - 130 %
2-Fluorobiphenyl	11,000	6,900	64 %	30 - 130 %
Terphenyl-d14	11,000	8,200	76 %	30 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample extraction performed by EPA Method 3545. Cleanup performed by EPA Method 3630C. Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8270C
Polynuclear Aromatic Hydrocarbons by GC/MS

Field ID:	**SD04B**	Matrix:	**Soil**
Project:	**Saugus Iron Works**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72023-17**	QC Batch ID:	**SV-1438-P**
Sampled:	**04-26-04 11:30**	Instrument ID:	**MS-3 HP 5890**
Received:	**04-27-04 18:30**	Sample Weight:	**16 g**
Extracted:	**04-30-04 14:00**	Final Volume:	**1 mL**
Cleaned Up:	**05-06-04 12:00**	Percent Solids:	**78**
Analyzed:	**05-07-04 05:30**	Dilution Factor:	**1**
Analyst:	**JJT**		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
91-20-3	Naphthalene	BRL		ug/Kg	410
91-57-6	2-Methylnaphthalene	BRL		ug/Kg	410
208-96-8	Acenaphthylene	BRL		ug/Kg	410
83-32-9	Acenaphthene	BRL		ug/Kg	410
86-73-7	Fluorene	BRL		ug/Kg	410
85-01-8	Phenanthrene	BRL		ug/Kg	410
120-12-7	Anthracene	BRL		ug/Kg	410
206-44-0	Fluoranthene	BRL		ug/Kg	410
129-00-0	Pyrene	BRL		ug/Kg	410
56-55-3	Benzo[a]anthracene	BRL		ug/Kg	410
218-01-9	Chrysene	BRL		ug/Kg	410
205-99-2	Benzo[b]fluoranthene	BRL		ug/Kg	410
207-08-9	Benzo[k]fluoranthene	BRL		ug/Kg	410
50-32-8	Benzo[a]pyrene	BRL		ug/Kg	410
193-39-5	Indeno[1,2,3-c,d]pyrene	BRL		ug/Kg	410
53-70-3	Dibenzo[a,h]anthracene	BRL		ug/Kg	410
191-24-2	Benzo[g,h,i]perylene	BRL		ug/Kg	410

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Nitrobenzene-d5	8,300	5,700	69 %	30 - 130 %
2-Fluorobiphenyl	8,300	6,100	74 %	30 - 130 %
Terphenyl-d14	8,300	6,300	76 %	30 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample extraction performed by EPA Method 3545. Cleanup performed by EPA Method 3630C. Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8270C
Polynuclear Aromatic Hydrocarbons by GC/MS

Field ID:	**SD04C**	Matrix:	**Soil**
Project:	**Saugus Iron Works**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72023-18**	QC Batch ID:	**SV-1438-P**
Sampled:	**04-26-04 11:30**	Instrument ID:	**MS-3 HP 5890**
Received:	**04-27-04 18:30**	Sample Weight:	**15 g**
Extracted:	**04-30-04 14:00**	Final Volume:	**1 mL**
Cleaned Up:	**05-06-04 12:00**	Percent Solids:	**49**
Analyzed:	**05-07-04 06:09**	Dilution Factor:	**1**
Analyst:	**JJT**		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
91-20-3	Naphthalene	BRL		ug/Kg	680
91-57-6	2-Methylnaphthalene	BRL		ug/Kg	680
208-96-8	Acenaphthylene	BRL		ug/Kg	680
83-32-9	Acenaphthene	BRL		ug/Kg	680
86-73-7	Fluorene	BRL		ug/Kg	680
85-01-8	Phenanthrene	BRL		ug/Kg	680
120-12-7	Anthracene	BRL		ug/Kg	680
206-44-0	Fluoranthene	BRL		ug/Kg	680
129-00-0	Pyrene	BRL		ug/Kg	680
56-55-3	Benzo[a]anthracene	BRL		ug/Kg	680
218-01-9	Chrysene	BRL		ug/Kg	680
205-99-2	Benzo[b]fluoranthene	BRL		ug/Kg	680
207-08-9	Benzo[k]fluoranthene	BRL		ug/Kg	680
50-32-8	Benzo[a]pyrene	BRL		ug/Kg	680
193-39-5	Indeno[1,2,3-c,d]pyrene	BRL		ug/Kg	680
53-70-3	Dibenzo[a,h]anthracene	BRL		ug/Kg	680
191-24-2	Benzo[g,h,i]perylene	BRL		ug/Kg	680

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Nitrobenzene-d5	14,000	7,800	57 %	30 - 130 %
2-Fluorobiphenyl	14,000	7,500	55 %	30 - 130 %
Terphenyl-d14	14,000	9,500	69 %	30 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample extraction performed by EPA Method 3545. Cleanup performed by EPA Method 3630C. Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8270C
Polynuclear Aromatic Hydrocarbons by GC/MS

Field ID:	**SD10A**	Matrix:	**Soil**
Project:	**Saugus Iron Works**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72023-19**	QC Batch ID:	**SV-1438-P**
Sampled:	**04-26-04 15:00**	Instrument ID:	**MS-3 HP 5890**
Received:	**04-27-04 18:30**	Sample Weight:	**16 g**
Extracted:	**04-30-04 14:00**	Final Volume:	**1 mL**
Cleaned Up:	**05-06-04 12:00**	Percent Solids:	**40**
Analyzed:	**05-07-04 06:48**	Dilution Factor:	**1**
Analyst:	**JJT**		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
91-20-3	Naphthalene	BRL		ug/Kg	780
91-57-6	2-Methylnaphthalene	BRL		ug/Kg	780
208-96-8	Acenaphthylene	BRL		ug/Kg	780
83-32-9	Acenaphthene	BRL		ug/Kg	780
86-73-7	Fluorene	BRL		ug/Kg	780
85-01-8	Phenanthrene	BRL		ug/Kg	780
120-12-7	Anthracene	BRL		ug/Kg	780
206-44-0	Fluoranthene	**1,500**		ug/Kg	780
129-00-0	Pyrene	**1,300**		ug/Kg	780
56-55-3	Benzo[a]anthracene	BRL		ug/Kg	780
218-01-9	Chrysene	**850**		ug/Kg	780
205-99-2	Benzo[b]fluoranthene	**1,200**		ug/Kg	780
207-08-9	Benzo[k]fluoranthene	BRL		ug/Kg	780
50-32-8	Benzo[a]pyrene	**820**		ug/Kg	780
193-39-5	Indeno[1,2,3-c,d]pyrene	BRL		ug/Kg	780
53-70-3	Dibenzo[a,h]anthracene	BRL		ug/Kg	780
191-24-2	Benzo[g,h,i]perylene	BRL		ug/Kg	780

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Nitrobenzene-d5	16,000	9,500	**60 %**	30 - 130 %
2-Fluorobiphenyl	16,000	9,000	**57 %**	30 - 130 %
Terphenyl-d14	16,000	10,000	**65 %**	30 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample extraction performed by EPA Method 3545. Cleanup performed by EPA Method 3630C. Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8270C
Polynuclear Aromatic Hydrocarbons by GC/MS

Field ID:	**SD108**	Matrix:	**Soil**
Project:	**Saugus Iron Works**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72023-20**	QC Batch ID:	**SV-1438-P**
Sampled:	**04-26-04 15:00**	Instrument ID:	**MS-3 HP 5890**
Received:	**04-27-04 18:30**	Sample Weight:	**16 g**
Extracted:	**04-30-04 14:00**	Final Volume:	**1 mL**
Cleaned Up:	**05-06-04 12:00**	Percent Solids:	**80**
Analyzed:	**05-07-04 07:28**	Dilution Factor:	**1**
Analyst:	**JJT**		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
91-20-3	Naphthalene	BRL		ug/Kg	400
91-57-6	2-Methylnaphthalene	BRL		ug/Kg	400
208-96-8	Acenaphthylene	BRL		ug/Kg	400
83-32-9	Acenaphthene	BRL		ug/Kg	400
86-73-7	Fluorene	BRL		ug/Kg	400
85-01-8	Phenanthrene	BRL		ug/Kg	400
120-12-7	Anthracene	BRL		ug/Kg	400
206-44-0	Fluoranthene	480		ug/Kg	400
129-00-0	Pyrene	420		ug/Kg	400
56-55-3	Benzo[a]anthracene	BRL		ug/Kg	400
218-01-9	Chrysene	BRL		ug/Kg	400
205-99-2	Benzo[b]fluoranthene	BRL		ug/Kg	400
207-08-9	Benzo[k]fluoranthene	BRL		ug/Kg	400
50-32-8	Benzo[a]pyrene	BRL		ug/Kg	400
193-39-5	Indeno[1,2,3-c,d]pyrene	BRL		ug/Kg	400
53-70-3	Dibenzo[a,h]anthracene	BRL		ug/Kg	400
191-24-2	Benzo[g,h,i]perylene	BRL		ug/Kg	400

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Nitrobenzene-d5	8,000	4,900	62 %	30 - 130 %
2-Fluorobiphenyl	8,000	5,400	67 %	30 - 130 %
Terphenyl-d14	8,000	5,500	69 %	30 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample extraction performed by EPA Method 3545. Cleanup performed by EPA Method 3630C. Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8270C
Polynuclear Aromatic Hydrocarbons by GC/MS

Field ID:	SD10C	Matrix:	Soil
Project:	Saugus Iron Works	Container:	250 mL Glass
Client:	CH2M Hill	Preservation:	Cool
Laboratory ID:	72023-21	QC Batch ID:	SV-1439-P
Sampled:	04-26-04 15:00	Instrument ID:	MS-3 HP 5890
Received:	04-27-04 18:30	Sample Weight:	15 g
Extracted:	05-03-04 20:45	Final Volume:	1 mL
Cleaned Up:	05-06-04 22:00	Percent Solids:	48
Analyzed:	05-07-04 19:53	Dilution Factor:	1
Analyst:	JJT		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
91-20-3	Naphthalene	BRL		ug/Kg	680
91-57-6	2-Methylnaphthalene	BRL		ug/Kg	680
208-96-8	Acenaphthylene	BRL		ug/Kg	680
83-32-9	Acenaphthene	BRL		ug/Kg	680
86-73-7	Fluorene	BRL		ug/Kg	680
85-01-8	Phenanthrene	BRL		ug/Kg	680
120-12-7	Anthracene	BRL		ug/Kg	680
206-44-0	Fluoranthene	BRL		ug/Kg	680
129-00-0	Pyrene	BRL		ug/Kg	680
56-55-3	Benzo[a]anthracene	BRL		ug/Kg	680
218-01-9	Chrysene	BRL		ug/Kg	680
205-99-2	Benzo[b]fluoranthene	BRL		ug/Kg	680
207-08-9	Benzo[k]fluoranthene	BRL		ug/Kg	680
50-32-8	Benzo[a]pyrene	BRL		ug/Kg	680
193-39-5	Indeno[1,2,3-c,d]pyrene	BRL		ug/Kg	680
53-70-3	Dibenzo[a,h]anthracene	BRL		ug/Kg	680
191-24-2	Benzo[g,h,i]perylene	BRL		ug/Kg	680

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Nitrobenzene-d5	14,000	9,200	66 %	30 - 130 %
2-Fluorobiphenyl	14,000	9,600	70 %	30 - 130 %
Terphenyl-d14	14,000	10,000	73 %	30 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample extraction performed by EPA Method 3545. Cleanup performed by EPA Method 3630C. Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8270C
Polynuclear Aromatic Hydrocarbons by GC/MS-SIM

Field ID:	**EB01**	Matrix:	**Aqueous**
Project:	**Saugus Iron Works**	Container:	**1 L Amber Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72023-22**	QC Batch ID:	**SV-1485-L**
Sampled:	**04-26-04 16:30**	Instrument ID:	**MS-6 HP 6890**
Received:	**04-27-04 18:30**	Sample Volume:	**1,000 mL**
Extracted:	**04-27-04 22:00**	Final Volume:	**1 mL**
Analyzed:	**04-30-04 05:28**	Dilution Factor:	**1**
Analyst:	**JJT**		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
91-20-3	Naphthalene	BRL		ug/L	0.5
91-57-6	2-Methylnaphthalene	BRL		ug/L	0.5
208-96-8	Acenaphthylene	BRL		ug/L	0.5
83-32-9	Acenaphthene	BRL		ug/L	0.5
86-73-7	Fluorene	BRL		ug/L	0.5
85-01-8	Phenanthrene	BRL		ug/L	0.5
120-12-7	Anthracene	BRL		ug/L	0.5
206-44-0	Fluoranthene	BRL		ug/L	0.5
129-00-0	Pyrene	BRL		ug/L	0.5
56-55-3	Benzo[a]anthracene	BRL		ug/L	0.1
218-01-9	Chrysene	BRL		ug/L	0.1
205-99-2	Benzo[b]fluoranthene	BRL		ug/L	0.1
207-08-9	Benzo[k]fluoranthene	BRL		ug/L	0.1
50-32-8	Benzo[a]pyrene	BRL		ug/L	0.1
193-39-5	Indeno[1,2,3-c,d]pyrene	BRL		ug/L	0.1
53-70-3	Dibenzo[a,h]anthracene	BRL		ug/L	0.1
191-24-2	Benzo[g,h,i]perylene	BRL		ug/L	0.1

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Nitrobenzene-d5	10	10	**104 %**	30 - 130 %
2-Fluorobiphenyl	10	8.4	**84 %**	30 - 130 %
Terphenyl-d14	10	8.7	**87 %**	30 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Method modified by use of selected ion monitoring (SIM) in accordance with Section 7.5.5 of the method.
Sample extraction performed by EPA Method 3520C.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8270C
Polynuclear Aromatic Hydrocarbons by GC/MS-SIM

Field ID:	EB02	Matrix:	Aqueous
Project:	Saugus Iron Works	Container:	1 L Amber Glass
Client:	CH2M Hill	Preservation:	Cool
Laboratory ID:	72023-24	QC Batch ID:	SV-1485-L
Sampled:	04-27-04 15:00	Instrument ID:	MS-6 HP 6890
Received:	04-27-04 18:30	Sample Volume:	1,000 mL
Extracted:	04-27-04 22:00	Final Volume:	1 mL
Analyzed:	04-30-04 06:47	Dilution Factor:	1
Analyst:	JJT		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
91-20-3	Naphthalene	BRL		ug/L	0.5
91-57-6	2-Methylnaphthalene	BRL		ug/L	0.5
208-96-8	Acenaphthylene	BRL		ug/L	0.5
83-32-9	Acenaphthene	BRL		ug/L	0.5
86-73-7	Fluorene	BRL		ug/L	0.5
85-01-8	Phenanthrene	BRL		ug/L	0.5
120-12-7	Anthracene	BRL		ug/L	0.5
206-44-0	Fluoranthene	0.8		ug/L	0.5
129-00-0	Pyrene	0.8		ug/L	0.5
56-55-3	Benzo[a]anthracene	0.4		ug/L	0.1
218-01-9	Chrysene	0.4		ug/L	0.1
205-99-2	Benzo[b]fluoranthene	0.4		ug/L	0.1
207-08-9	Benzo[k]fluoranthene	0.3		ug/L	0.1
50-32-8	Benzo[a]pyrene	0.5		ug/L	0.1
193-39-5	Indeno[1,2,3-c,d]pyrene	0.3		ug/L	0.1
53-70-3	Dibenzo[a,h]anthracene	BRL		ug/L	0.1
191-24-2	Benzo[g,h,i]perylene	0.3		ug/L	0.1

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Nitrobenzene-d5	10	11	108 %	30 - 130 %
2-Fluorobiphenyl	10	8.4	84 %	30 - 130 %
Terphenyl-d14	10	8.5	85 %	30 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Method modified by use of selected ion monitoring (SIM) in accordance with Section 7.5.5 of the method.
Sample extraction performed by EPA Method 3520C.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

GROUNDWATER ANALYTICAL

Trace Metals

Field ID:	SD05A	Matrix:	Soil
Project:	Saugus Iron Works	Container:	250 mL Glass
Client:	CH2M Hill	Preservation:	Cool
Laboratory ID:	72023-01	Percent Solids:	58
Sampled:	04-27-04 11:00		
Received:	04-27-04 18:30		

Analysis Method	QC Batch ID	Prep Method	Prepared	Sample Weight	Instrument ID	Analyst
EPA 6010B[1]	MB-0338-S	EPA 3050B	04-28-04 08:00	0.5 g	ICP-1 PE 3000	CRL
EPA 7471A[2]	MP-1577-S	EPA 7471A	04-28-04 12:00	0.6 g	CVAA-1 PE FIMS	CRL

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit	DF	Analyzed	Method
7440-36-0	Antimony, Total	BRL		mg/Kg	1.7	1	04-28-04 15:31	EPA 6010B[1]
7440-38-2	Arsenic, Total	11		mg/Kg	1.7	1	04-28-04 15:31	EPA 6010B[1]
7440-41-7	Beryllium, Total	BRL		mg/Kg	0.66	1	04-28-04 15:31	EPA 6010B[1]
7440-43-9	Cadmium, Total	BRL		mg/Kg	0.83	1	04-28-04 15:31	EPA 6010B[1]
7440-47-3	Chromium, Total	40		mg/Kg	17	1	04-28-04 15:31	EPA 6010B[1]
7440-50-8	Copper, Total	BRL		mg/Kg	33	1	04-29-04 12:29	EPA 6010B[1]
7439-92-1	Lead, Total	140		mg/Kg	17	1	04-28-04 15:31	EPA 6010B[1]
7439-97-6	Mercury, Total	0.32		mg/Kg	0.056	1	04-28-04 17:43	EPA 7471A[2]
7440-02-0	Nickel, Total	33		mg/Kg	17	1	04-28-04 15:31	EPA 6010B[1]
7782-49-2	Selenium, Total	BRL		mg/Kg	33	1	04-28-04 15:31	EPA 6010B[1]
7440-22-4	Silver, Total	BRL		mg/Kg	8.3	1	04-28-04 15:31	EPA 6010B[1]
7440-28-0	Thallium, Total	BRL		mg/Kg	8.3	1	04-28-04 15:31	EPA 6010B[1]
7440-66-6	Zinc, Total	180		mg/Kg	83	1	04-28-04 15:31	EPA 6010B[1]

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Results are reported on a dry weight basis.

Report Notations:

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DF Dilution Factor.

GROUNDWATER ANALYTICAL

Trace Metals

Field ID:	**SD05B**	Matrix:	**Soil**
Project:	**Saugus Iron Works**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72023-02**	Percent Solids:	**80**
Sampled:	**04-27-04 11:00**		
Received:	**04-27-04 18:30**		

Analysis Method	QC Batch ID	Prep Method	Prepared	Sample Weight	Instrument ID	Analyst
EPA 6010B[1]	MB-0338-S	EPA 3050B	04-28-04 08:00	0.5 g	ICP-1 PE 3000	CRL
EPA 7471A[2]	MP-1577-S	EPA 7471A	04-28-04 12:00	0.6 g	CVAA-1 PE FIMS	CRL

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit	DF	Analyzed	Method
7440-36-0	Antimony, Total	BRL		mg/Kg	1.2	1	04-28-04 15:35	EPA 6010B[1]
7440-38-2	Arsenic, Total	1.6		mg/Kg	1.2	1	04-28-04 15:35	EPA 6010B[1]
7440-41-7	Beryllium, Total	BRL		mg/Kg	0.48	1	04-28-04 15:35	EPA 6010B[1]
7440-43-9	Cadmium, Total	BRL		mg/Kg	0.60	1	04-28-04 15:35	EPA 6010B[1]
7440-47-3	Chromium, Total	12		mg/Kg	12	1	04-28-04 15:35	EPA 6010B[1]
7440-50-8	Copper, Total	BRL		mg/Kg	24	1	04-29-04 12:33	EPA 6010B[1]
7439-92-1	Lead, Total	BRL		mg/Kg	12	1	04-28-04 15:35	EPA 6010B[1]
7439-97-6	Mercury, Total	BRL		mg/Kg	0.041	1	04-28-04 17:46	EPA 7471A[2]
7440-02-0	Nickel, Total	14		mg/Kg	12	1	04-28-04 15:35	EPA 6010B[1]
7782-49-2	Selenium, Total	BRL		mg/Kg	24	1	04-28-04 15:35	EPA 6010B[1]
7440-22-4	Silver, Total	BRL		mg/Kg	6.0	1	04-28-04 15:35	EPA 6010B[1]
7440-28-0	Thallium, Total	BRL		mg/Kg	6.0	1	04-28-04 15:35	EPA 6010B[1]
7440-66-6	Zinc, Total	BRL		mg/Kg	60	1	04-28-04 15:35	EPA 6010B[1]

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

DF Dilution Factor.

GROUNDWATER ANALYTICAL

Trace Metals

Field ID:	**SD05C**	Matrix:	**Soil**
Project:	**Saugus Iron Works**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72023-03**	Percent Solids:	**60**
Sampled:	**04-27-04 11:00**		
Received:	**04-27-04 18:30**		

Analysis Method	QC Batch ID	Prep Method	Prepared	Sample Weight	Instrument ID	Analyst
EPA 6010B[1]	MB-0338-S	EPA 3050B	04-28-04 08:00	0.5 g	ICP-1 PE 3000	CRL
EPA 7471A[2]	MP-1577-S	EPA 7471A	04-28-04 12:00	0.6 g	CVAA-1 PE FIMS	CRL

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit	DF	Analyzed	Method
7440-36-0	Antimony, Total	BRL		mg/Kg	1.7	1	04-28-04 15:39	EPA 6010B[1]
7440-38-2	Arsenic, Total	**11**		mg/Kg	1.7	1	04-28-04 15:39	EPA 6010B[1]
7440-41-7	Beryllium, Total	BRL		mg/Kg	0.66	1	04-28-04 15:39	EPA 6010B[1]
7440-43-9	Cadmium, Total	BRL		mg/Kg	0.83	1	04-28-04 15:39	EPA 6010B[1]
7440-47-3	Chromium, Total	**62**		mg/Kg	17	1	04-28-04 15:39	EPA 6010B[1]
7440-50-8	Copper, Total	BRL		mg/Kg	33	1	04-29-04 12:37	EPA 6010B[1]
7439-92-1	Lead, Total	**68**		mg/Kg	17	1	04-28-04 15:39	EPA 6010B[1]
7439-97-6	Mercury, Total	**0.48**		mg/Kg	0.057	1	04-28-04 17:49	EPA 7471A[2]
7440-02-0	Nickel, Total	**22**		mg/Kg	17	1	04-28-04 15:39	EPA 6010B[1]
7782-49-2	Selenium, Total	BRL		mg/Kg	33	1	04-28-04 15:39	EPA 6010B[1]
7440-22-4	Silver, Total	BRL		mg/Kg	8.3	1	04-28-04 15:39	EPA 6010B[1]
7440-28-0	Thallium, Total	BRL		mg/Kg	8.3	1	04-28-04 15:39	EPA 6010B[1]
7440-66-6	Zinc, Total	**190**		mg/Kg	83	1	04-28-04 15:39	EPA 6010B[1]

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Results are reported on a dry weight basis.

Report Notations:

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DF Dilution Factor.

GROUNDWATER ANALYTICAL

Trace Metals

Field ID:	**SD06A**	Matrix:	**Soil**
Project:	**Saugus Iron Works**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72023-04**	Percent Solids:	**44**
Sampled:	**04-27-04 11:00**		
Received:	**04-27-04 18:30**		

Analysis Method	QC Batch ID	Prep Method	Prepared	Sample Weight	Instrument ID	Analyst
EPA 6010B[1]	MB-0338-S	EPA 3050B	04-28-04 08:00	0.5 g	ICP-1 PE 3000	CRL
EPA 7471A[2]	MP-1577-S	EPA 7471A	04-28-04 12:00	0.6 g	CVAA-1 PE FIMS	CRL

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit	DF	Analyzed	Method
7440-36-0	Antimony, Total	BRL		mg/Kg	2.2	1	04-28-04 15:43	EPA 6010B[1]
7440-38-2	Arsenic, Total	17		mg/Kg	2.2	1	04-28-04 15:43	EPA 6010B[1]
7440-41-7	Beryllium, Total	BRL		mg/Kg	0.88	1	04-28-04 15:43	EPA 6010B[1]
7440-43-9	Cadmium, Total	BRL		mg/Kg	1.1	1	04-28-04 15:43	EPA 6010B[1]
7440-47-3	Chromium, Total	62		mg/Kg	22	1	04-28-04 15:43	EPA 6010B[1]
7440-50-8	Copper, Total	58		mg/Kg	44	1	04-29-04 12:42	EPA 6010B[1]
7439-92-1	Lead, Total	250		mg/Kg	22	1	04-28-04 15:43	EPA 6010B[1]
7439-97-6	Mercury, Total	0.32		mg/Kg	0.073	1	04-28-04 17:52	EPA 7471A[2]
7440-02-0	Nickel, Total	49		mg/Kg	22	1	04-28-04 15:43	EPA 6010B[1]
7782-49-2	Selenium, Total	BRL		mg/Kg	44	1	04-28-04 15:43	EPA 6010B[1]
7440-22-4	Silver, Total	BRL		mg/Kg	11	1	04-28-04 15:43	EPA 6010B[1]
7440-28-0	Thallium, Total	BRL		mg/Kg	11	1	04-28-04 15:43	EPA 6010B[1]
7440-66-6	Zinc, Total	300		mg/Kg	110	1	04-28-04 15:43	EPA 6010B[1]

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:
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DF Dilution Factor.

GROUNDWATER ANALYTICAL

Trace Metals

Field ID:	**SD06B**	Matrix:	**Soil**
Project:	**Saugus Iron Works**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72023-05**	Percent Solids:	**70**
Sampled:	**04-27-04 11:00**		
Received:	**04-27-04 18:30**		

Analysis Method	QC Batch ID	Prep Method	Prepared	Sample Weight	Instrument ID	Analyst
EPA 6010B[1]	MB-0338-S	EPA 3050B	04-28-04 08:00	0.5 g	ICP-1 PE 3000	CRL
EPA 7471A[2]	MP-1577-S	EPA 7471A	04-28-04 12:00	0.6 g	CVAA-1 PE FIMS	CRL

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit	DF	Analyzed	Method
7440-36-0	Antimony, Total	BRL		mg/Kg	1.4	1	04-28-04 15:47	EPA 6010B[1]
7440-38-2	Arsenic, Total	2.7		mg/Kg	1.4	1	04-28-04 15:47	EPA 6010B[1]
7440-41-7	Beryllium, Total	BRL		mg/Kg	0.55	1	04-28-04 15:47	EPA 6010B[1]
7440-43-9	Cadmium, Total	BRL		mg/Kg	0.69	1	04-28-04 15:47	EPA 6010B[1]
7440-47-3	Chromium, Total	15		mg/Kg	14	1	04-28-04 15:47	EPA 6010B[1]
7440-50-8	Copper, Total	BRL		mg/Kg	27	1	04-29-04 12:46	EPA 6010B[1]
7439-92-1	Lead, Total	BRL		mg/Kg	14	1	04-28-04 15:47	EPA 6010B[1]
7439-97-6	Mercury, Total	0.067		mg/Kg	0.046	1	04-28-04 18:01	EPA 7471A[2]
7440-02-0	Nickel, Total	16		mg/Kg	14	1	04-28-04 15:47	EPA 6010B[1]
7782-49-2	Selenium, Total	BRL		mg/Kg	27	1	04-28-04 15:47	EPA 6010B[1]
7440-22-4	Silver, Total	BRL		mg/Kg	6.9	1	04-28-04 15:47	EPA 6010B[1]
7440-28-0	Thallium, Total	BRL		mg/Kg	6.9	1	04-28-04 15:47	EPA 6010B[1]
7440-66-6	Zinc, Total	BRL		mg/Kg	69	1	04-28-04 15:47	EPA 6010B[1]

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

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DF Dilution Factor.

GROUNDWATER ANALYTICAL

Trace Metals

Field ID:	SD06C	Matrix:	Soil
Project:	Saugus Iron Works	Container:	250 mL Glass
Client:	CH2M Hill	Preservation:	Cool
Laboratory ID:	72023-06	Percent Solids:	44
Sampled:	04-27-04 11:00		
Received:	04-27-04 18:30		

Analysis Method	QC Batch ID	Prep Method	Prepared	Sample Weight	Instrument ID	Analyst
EPA 6010B[1]	MB-0338-S	EPA 3050B	04-28-04 08:00	0.5 g	ICP-1 PE 3000	CRL
EPA 7471A[2]	MP-1577-S	EPA 7471A	04-28-04 12:00	0.6 g	CVAA-1 PE FIMS	CRL

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit	DF	Analyzed	Method
7440-36-0	Antimony, Total	BRL		mg/Kg	2.2	1	04-28-04 15:52	EPA 6010B[1]
7440-38-2	Arsenic, Total	14		mg/Kg	2.2	1	04-28-04 15:52	EPA 6010B[1]
7440-41-7	Beryllium, Total	BRL		mg/Kg	0.89	1	04-28-04 15:51	EPA 6010B[1]
7440-43-9	Cadmium, Total	1.4		mg/Kg	1.1	1	04-28-04 15:52	EPA 6010B[1]
7440-47-3	Chromium, Total	81		mg/Kg	22	1	04-28-04 15:51	EPA 6010B[1]
7440-50-8	Copper, Total	47		mg/Kg	44	1	04-29-04 12:50	EPA 6010B[1]
7439-92-1	Lead, Total	93		mg/Kg	22	1	04-28-04 15:52	EPA 6010B[1]
7439-97-6	Mercury, Total	0.21		mg/Kg	0.073	1	04-28-04 18:04	EPA 7471A[2]
7440-02-0	Nickel, Total	51		mg/Kg	22	1	04-28-04 15:51	EPA 6010B[1]
7782-49-2	Selenium, Total	BRL		mg/Kg	44	1	04-28-04 15:52	EPA 6010B[1]
7440-22-4	Silver, Total	BRL		mg/Kg	11	1	04-28-04 15:51	EPA 6010B[1]
7440-28-0	Thallium, Total	BRL		mg/Kg	11	1	04-28-04 15:52	EPA 6010B[1]
7440-66-6	Zinc, Total	310		mg/Kg	110	1	04-28-04 15:51	EPA 6010B[1]

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Results are reported on a dry weight basis.

Report Notations:

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DF Dilution Factor.

GROUNDWATER ANALYTICAL

Trace Metals

Field ID:	**SD09A**	Matrix:	**Soil**
Project:	**Saugus Iron Works**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72023-07**	Percent Solids:	**41**
Sampled:	**04-27-04 13:30**		
Received:	**04-27-04 18:30**		

Analysis Method	QC Batch ID	Prep Method	Prepared	Sample Weight	Instrument ID	Analyst
EPA 6010B[1]	MB-0338-S	EPA 3050B	04-28-04 08:00	0.5 g	ICP-1 PE 3000	CRL
EPA 7471A[2]	MP-1577-S	EPA 7471A	04-28-04 12:00	0.6 g	CVAA-1 PE FIMS	CRL

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit	DF	Analyzed	Method
7440-36-0	Antimony, Total	BRL		mg/Kg	2.3	1	04-28-04 15:56	EPA 6010B[1]
7440-38-2	Arsenic, Total	**16**		mg/Kg	2.3	1	04-28-04 15:56	EPA 6010B[1]
7440-41-7	Beryllium, Total	BRL		mg/Kg	0.93	1	04-28-04 15:55	EPA 6010B[1]
7440-43-9	Cadmium, Total	**1.6**		mg/Kg	1.2	1	04-28-04 15:56	EPA 6010B[1]
7440-47-3	Chromium, Total	**110**		mg/Kg	23	1	04-28-04 15:55	EPA 6010B[1]
7440-50-8	Copper, Total	**64**		mg/Kg	46	1	04-29-04 12:54	EPA 6010B[1]
7439-92-1	Lead, Total	**130**		mg/Kg	23	1	04-28-04 15:56	EPA 6010B[1]
7439-97-6	Mercury, Total	**0.27**		mg/Kg	0.078	1	04-28-04 18:07	EPA 7471A[2]
7440-02-0	Nickel, Total	**70**		mg/Kg	23	1	04-28-04 15:55	EPA 6010B[1]
7782-49-2	Selenium, Total	BRL		mg/Kg	46	1	04-28-04 15:56	EPA 6010B[1]
7440-22-4	Silver, Total	BRL		mg/Kg	12	1	04-28-04 15:55	EPA 6010B[1]
7440-28-0	Thallium, Total	BRL		mg/Kg	12	1	04-28-04 15:55	EPA 6010B[1]
7440-66-6	Zinc, Total	**360**		mg/Kg	120	1	04-28-04 15:55	EPA 6010B[1]

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:
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DF Dilution Factor.

GROUNDWATER ANALYTICAL

Trace Metals

Field ID:	**SD09B**	Matrix:	**Soil**
Project:	**Saugus Iron Works**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72023-08**	Percent Solids:	**46**
Sampled:	**04-27-04 13:30**		
Received:	**04-27-04 18:30**		

Analysis Method	QC Batch ID	Prep Method	Prepared	Sample Weight	Instrument ID	Analyst
EPA 6010B[1]	MB-0338-S	EPA 3050B	04-28-04 08:00	0.5 g	ICP-1 PE 3000	CRL
EPA 7471A[2]	MP-1577-S	EPA 7471A	04-28-04 12:00	0.6 g	CVAA-1 PE FIMS	CRL

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit	DF	Analyzed	Method
7440-36-0	Antimony, Total	BRL		mg/Kg	2.1	1	04-28-04 16:08	EPA 6010B[1]
7440-38-2	Arsenic, Total	7.6		mg/Kg	2.1	1	04-28-04 16:08	EPA 6010B[1]
7440-41-7	Beryllium, Total	BRL		mg/Kg	0.83	1	04-28-04 16:07	EPA 6010B[1]
7440-43-9	Cadmium, Total	BRL		mg/Kg	1.0	1	04-28-04 16:08	EPA 6010B[1]
7440-47-3	Chromium, Total	41		mg/Kg	21	1	04-28-04 16:07	EPA 6010B[1]
7440-50-8	Copper, Total	BRL		mg/Kg	42	1	04-29-04 12:58	EPA 6010B[1]
7439-92-1	Lead, Total	BRL		mg/Kg	21	1	04-28-04 16:08	EPA 6010B[1]
7439-97-6	Mercury, Total	BRL		mg/Kg	0.070	1	04-28-04 18:11	EPA 7471A[2]
7440-02-0	Nickel, Total	29		mg/Kg	21	1	04-28-04 16:08	EPA 6010B[1]
7782-49-2	Selenium, Total	BRL		mg/Kg	42	1	04-28-04 16:08	EPA 6010B[1]
7440-22-4	Silver, Total	BRL		mg/Kg	10	1	04-28-04 16:07	EPA 6010B[1]
7440-28-0	Thallium, Total	BRL		mg/Kg	10	1	04-28-04 16:08	EPA 6010B[1]
7440-66-6	Zinc, Total	BRL		mg/Kg	100	1	04-28-04 16:07	EPA 6010B[1]

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:
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DF Dilution Factor.

GROUNDWATER ANALYTICAL

Trace Metals

Field ID:	SD09C	Matrix:	Soil
Project:	Saugus Iron Works	Container:	250 mL Glass
Client:	CH2M Hill	Preservation:	Cool
Laboratory ID:	72023-09	Percent Solids:	48
Sampled:	04-27-04 13:30		
Received:	04-27-04 18:30		

Analysis Method	QC Batch ID	Prep Method	Prepared	Sample Weight	Instrument ID	Analyst
EPA 6010B[1]	MB-0339-S	EPA 3050B	04-29-04 08:30	0.5 g	ICP-1 PE 3000	CRL
EPA 7471A[2]	MP-1577-S	EPA 7471A	04-28-04 12:00	0.6 g	CVAA-1 PE FIMS	CRL

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit	DF	Analyzed	Method
7440-36-0	Antimony, Total	BRL		mg/Kg	2.0	1	04-29-04 13:58	EPA 6010B[1]
7440-38-2	Arsenic, Total	5.9		mg/Kg	2.0	1	04-29-04 13:58	EPA 6010B[1]
7440-41-7	Beryllium, Total	BRL		mg/Kg	0.80	1	04-29-04 13:58	EPA 6010B[1]
7440-43-9	Cadmium, Total	BRL		mg/Kg	1.0	1	04-29-04 13:58	EPA 6010B[1]
7440-47-3	Chromium, Total	41		mg/Kg	20	1	04-29-04 13:58	EPA 6010B[1]
7440-50-8	Copper, Total	BRL		mg/Kg	40	1	04-29-04 13:58	EPA 6010B[1]
7439-92-1	Lead, Total	BRL		mg/Kg	20	1	04-29-04 13:58	EPA 6010B[1]
7439-97-6	Mercury, Total	BRL		mg/Kg	0.067	1	04-28-04 18:14	EPA 7471A[2]
7440-02-0	Nickel, Total	26		mg/Kg	20	1	04-29-04 13:58	EPA 6010B[1]
7782-49-2	Selenium, Total	BRL		mg/Kg	40	1	04-29-04 13:58	EPA 6010B[1]
7440-22-4	Silver, Total	BRL		mg/Kg	10	1	04-29-04 13:58	EPA 6010B[1]
7440-28-0	Thallium, Total	BRL		mg/Kg	10	1	04-29-04 13:58	EPA 6010B[1]
7440-66-6	Zinc, Total	BRL		mg/Kg	100	1	04-29-04 13:58	EPA 6010B[1]

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:
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DF Dilution Factor.

GROUNDWATER ANALYTICAL

Trace Metals

Field ID:	**SD08A**	Matrix:	**Soil**
Project:	**Saugus Iron Works**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72023-10**	Percent Solids:	**24**
Sampled:	**04-27-04 14:30**		
Received:	**04-27-04 18:30**		

Analysis Method	QC Batch ID	Prep Method	Prepared	Sample Weight	Instrument ID	Analyst
EPA 6010B[1]	MB-0339-S	EPA 3050B	04-29-04 08:30	0.5 g	ICP-1 PE 3000	CRL
EPA 7471A[2]	MP-1577-S	EPA 7471A	04-28-04 12:00	0.6 g	CVAA-1 PE FIMS	CRL

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit	DF	Analyzed	Method
7440-36-0	Antimony, Total	BRL		mg/Kg	4.0	1	04-29-04 14:02	EPA 6010B[1]
7440-38-2	Arsenic, Total	**17**		mg/Kg	4.0	1	04-29-04 14:02	EPA 6010B[1]
7440-41-7	Beryllium, Total	BRL		mg/Kg	1.6	1	04-29-04 14:01	EPA 6010B[1]
7440-43-9	Cadmium, Total	BRL		mg/Kg	2.0	1	04-29-04 14:02	EPA 6010B[1]
7440-47-3	Chromium, Total	BRL		mg/Kg	40	1	04-29-04 14:01	EPA 6010B[1]
7440-50-8	Copper, Total	BRL		mg/Kg	80	1	04-29-04 14:01	EPA 6010B[1]
7439-92-1	Lead, Total	**150**		mg/Kg	40	1	04-29-04 14:02	EPA 6010B[1]
7439-97-6	Mercury, Total	**0.29**		mg/Kg	0.13	1	04-28-04 18:17	EPA 7471A[2]
7440-02-0	Nickel, Total	**70**		mg/Kg	40	1	04-29-04 14:01	EPA 6010B[1]
7782-49-2	Selenium, Total	BRL		mg/Kg	80	1	04-29-04 14:02	EPA 6010B[1]
7440-22-4	Silver, Total	BRL		mg/Kg	20	1	04-29-04 14:01	EPA 6010B[1]
7440-28-0	Thallium, Total	BRL		mg/Kg	20	1	04-29-04 14:02	EPA 6010B[1]
7440-66-6	Zinc, Total	**310**		mg/Kg	200	1	04-29-04 14:01	EPA 6010B[1]

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

DF Dilution Factor.

GROUNDWATER ANALYTICAL

Trace Metals

Field ID: **SD08B**
Project: **Saugus Iron Works**
Client: **CH2M Hill**

Laboratory ID: **72023-11**
Sampled: **04-27-04 14:30**
Received: **04-27-04 18:30**

Matrix: **Soil**
Container: **250 mL Glass**
Preservation: **Cool**

Percent Solids: **36**

Analysis Method	QC Batch ID	Prep Method	Prepared	Sample Weight	Instrument ID	Analyst
EPA 6010B[1]	MB-0339-S	EPA 3050B	04-29-04 08:30	0.5 g	ICP-1 PE 3000	CRL
EPA 7471A[2]	MP-1577-S	EPA 7471A	04-28-04 12:00	0.6 g	CVAA-1 PE FIMS	CRL

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit	DF	Analyzed	Method
7440-36-0	Antimony, Total	BRL		mg/Kg	2.7	1	04-29-04 14:06	EPA 6010B[1]
7440-38-2	Arsenic, Total	4.3		mg/Kg	2.7	1	04-29-04 14:06	EPA 6010B[1]
7440-41-7	Beryllium, Total	BRL		mg/Kg	1.1	1	04-29-04 14:05	EPA 6010B[1]
7440-43-9	Cadmium, Total	BRL		mg/Kg	1.3	1	04-29-04 14:06	EPA 6010B[1]
7440-47-3	Chromium, Total	38		mg/Kg	27	1	04-29-04 14:05	EPA 6010B[1]
7440-50-8	Copper, Total	BRL		mg/Kg	54	1	04-29-04 14:05	EPA 6010B[1]
7439-92-1	Lead, Total	BRL		mg/Kg	27	1	04-29-04 14:06	EPA 6010B[1]
7439-97-6	Mercury, Total	BRL		mg/Kg	0.092	1	04-28-04 18:20	EPA 7471A[2]
7440-02-0	Nickel, Total	39		mg/Kg	27	1	04-29-04 14:06	EPA 6010B[1]
7782-49-2	Selenium, Total	BRL		mg/Kg	54	1	04-29-04 14:06	EPA 6010B[1]
7440-22-4	Silver, Total	BRL		mg/Kg	13	1	04-29-04 14:05	EPA 6010B[1]
7440-28-0	Thallium, Total	BRL		mg/Kg	13	1	04-29-04 14:06	EPA 6010B[1]
7440-66-6	Zinc, Total	BRL		mg/Kg	130	1	04-29-04 14:05	EPA 6010B[1]

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Results are reported on a dry weight basis.

Report Notations:
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DF Dilution Factor.

GROUNDWATER ANALYTICAL

Trace Metals

Field ID:	**SD08C**	Matrix:	**Soil**
Project:	**Saugus Iron Works**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72023-12**	Percent Solids:	**97**
Sampled:	**04-27-04 14:30**		
Received:	**04-27-04 18:30**		

Analysis Method	QC Batch ID	Prep Method	Prepared	Sample Weight	Instrument ID	Analyst
EPA 6010B[1]	MB-0339-S	EPA 3050B	04-29-04 08:30	0.5 g	ICP-1 PE 3000	CRL
EPA 7471A[2]	MP-1577-S	EPA 7471A	04-28-04 12:00	0.6 g	CVAA-1 PE FIMS	CRL

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit	DF	Analyzed	Method
7440-36-0	Antimony, Total	BRL		mg/Kg	1.0	1	04-29-04 14:10	EPA 6010B[1]
7440-38-2	Arsenic, Total	BRL		mg/Kg	1.0	1	04-29-04 14:10	EPA 6010B[1]
7440-41-7	Beryllium, Total	BRL		mg/Kg	0.41	1	04-29-04 14:09	EPA 6010B[1]
7440-43-9	Cadmium, Total	BRL		mg/Kg	0.51	1	04-29-04 14:10	EPA 6010B[1]
7440-47-3	Chromium, Total	12		mg/Kg	10	1	04-29-04 14:09	EPA 6010B[1]
7440-50-8	Copper, Total	BRL		mg/Kg	20	1	04-29-04 14:09	EPA 6010B[1]
7439-92-1	Lead, Total	BRL		mg/Kg	10	1	04-29-04 14:10	EPA 6010B[1]
7439-97-6	Mercury, Total	BRL		mg/Kg	0.033	1	04-28-04 18:23	EPA 7471A[2]
7440-02-0	Nickel, Total	11		mg/Kg	10	1	04-29-04 14:10	EPA 6010B[1]
7782-49-2	Selenium, Total	BRL		mg/Kg	20	1	04-29-04 14:10	EPA 6010B[1]
7440-22-4	Silver, Total	BRL		mg/Kg	5.1	1	04-29-04 14:09	EPA 6010B[1]
7440-28-0	Thallium, Total	BRL		mg/Kg	5.1	1	04-29-04 14:10	EPA 6010B[1]
7440-66-6	Zinc, Total	BRL		mg/Kg	51	1	04-29-04 14:09	EPA 6010B[1]

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
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DF Dilution Factor.

GROUNDWATER ANALYTICAL

Trace Metals

Field ID:	**SD07A**	Matrix:	**Soil**
Project:	**Saugus Iron Works**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72023-13**	Percent Solids:	**37**
Sampled:	**04-26-04 10:00**		
Received:	**04-27-04 18:30**		

Analysis Method	QC Batch ID	Prep Method	Prepared	Sample Weight	Instrument ID	Analyst
EPA 6010B[1]	MB-0339-S	EPA 3050B	04-29-04 08:30	0.5 g	ICP-1 PE 3000	CRL
EPA 7471A[2]	MP-1577-S	EPA 7471A	04-28-04 12:00	0.6 g	CVAA-1 PE FIMS	CRL

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit	DF	Analyzed	Method
7440-36-0	Antimony, Total	BRL		mg/Kg	2.6	1	04-29-04 14:22	EPA 6010B[1]
7440-38-2	Arsenic, Total	9.9		mg/Kg	2.6	1	04-29-04 14:22	EPA 6010B[1]
7440-41-7	Beryllium, Total	BRL		mg/Kg	1.1	1	04-29-04 14:21	EPA 6010B[1]
7440-43-9	Cadmium, Total	BRL		mg/Kg	1.3	1	04-29-04 14:22	EPA 6010B[1]
7440-47-3	Chromium, Total	41		mg/Kg	26	1	04-29-04 14:21	EPA 6010B[1]
7440-50-8	Copper, Total	BRL		mg/Kg	53	1	04-29-04 14:21	EPA 6010B[1]
7439-92-1	Lead, Total	180		mg/Kg	26	1	04-29-04 14:22	EPA 6010B[1]
7439-97-6	Mercury, Total	0.27		mg/Kg	0.091	1	04-28-04 18:26	EPA 7471A[2]
7440-02-0	Nickel, Total	32		mg/Kg	26	1	04-29-04 14:22	EPA 6010B[1]
7782-49-2	Selenium, Total	BRL		mg/Kg	53	1	04-29-04 14:22	EPA 6010B[1]
7440-22-4	Silver, Total	BRL		mg/Kg	13	1	04-29-04 14:21	EPA 6010B[1]
7440-28-0	Thallium, Total	BRL		mg/Kg	13	1	04-29-04 14:22	EPA 6010B[1]
7440-66-6	Zinc, Total	190		mg/Kg	130	1	04-29-04 14:21	EPA 6010B[1]

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Results are reported on a dry weight basis.

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DF Dilution Factor.

GROUNDWATER ANALYTICAL

Trace Metals

Field ID: **SD07B**
Project: **Saugus Iron Works**
Client: **CH2M Hill**

Laboratory ID: **72023-14**
Sampled: **04-26-04 10:00**
Received: **04-27-04 18:30**

Matrix: **Soil**
Container: **250 mL Glass**
Preservation: **Cool**

Percent Solids: **67**

Analysis Method	QC Batch ID	Prep Method	Prepared	Sample Weight	Instrument ID	Analyst
EPA 6010B[1]	MB-0339-S	EPA 3050B	04-29-04 08:30	0.5 g	ICP-1 PE 3000	CRL
EPA 7471A[2]	MP-1577-S	EPA 7471A	04-28-04 12:00	0.6 g	CVAA-1 PE FIMS	CRL

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit	DF	Analyzed	Method
7440-36-0	Antimony, Total	BRL		mg/Kg	1.4	1	04-29-04 14:26	EPA 6010B[1]
7440-38-2	Arsenic, Total	3.8		mg/Kg	1.4	1	04-29-04 14:26	EPA 6010B[1]
7440-41-7	Beryllium, Total	BRL		mg/Kg	0.57	1	04-29-04 14:25	EPA 6010B[1]
7440-43-9	Cadmium, Total	BRL		mg/Kg	0.71	1	04-29-04 14:26	EPA 6010B[1]
7440-47-3	Chromium, Total	23		mg/Kg	14	1	04-29-04 14:25	EPA 6010B[1]
7440-50-8	Copper, Total	BRL		mg/Kg	29	1	04-29-04 14:25	EPA 6010B[1]
7439-92-1	Lead, Total	16		mg/Kg	14	1	04-29-04 14:26	EPA 6010B[1]
7439-97-6	Mercury, Total	BRL		mg/Kg	0.049	1	04-28-04 18:29	EPA 7471A[2]
7440-02-0	Nickel, Total	22		mg/Kg	14	1	04-29-04 14:26	EPA 6010B[1]
7782-49-2	Selenium, Total	BRL		mg/Kg	29	1	04-29-04 14:26	EPA 6010B[1]
7440-22-4	Silver, Total	BRL		mg/Kg	7.1	1	04-29-04 14:25	EPA 6010B[1]
7440-28-0	Thallium, Total	BRL		mg/Kg	7.1	1	04-29-04 14:26	EPA 6010B[1]
7440-66-6	Zinc, Total	BRL		mg/Kg	71	1	04-29-04 14:25	EPA 6010B[1]

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Results are reported on a dry weight basis.

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DF Dilution Factor.

GROUNDWATER ANALYTICAL

Trace Metals

Field ID:	**SD07C**	Matrix:	**Soil**
Project:	**Saugus Iron Works**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72023-15**	Percent Solids:	**42**
Sampled:	**04-26-04 10:00**		
Received:	**04-27-04 18:30**		

Analysis Method	QC Batch ID	Prep Method	Prepared	Sample Weight	Instrument ID	Analyst
EPA 6010B[1]	MB-0339-S	EPA 3050B	04-29-04 08:30	0.5 g	ICP-1 PE 3000	CRL
EPA 7471A[2]	MP-1577-S	EPA 7471A	04-28-04 12:00	0.6 g	CVAA-1 PE FIMS	CRL

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit	DF	Analyzed	Method
7440-36-0	Antimony, Total	5.0		mg/Kg	2.3	1	04-29-04 14:30	EPA 6010B[1]
7440-38-2	Arsenic, Total	95		mg/Kg	2.3	1	04-29-04 14:30	EPA 6010B[1]
7440-41-7	Beryllium, Total	BRL		mg/Kg	0.94	1	04-29-04 14:30	EPA 6010B[1]
7440-43-9	Cadmium, Total	1.5		mg/Kg	1.2	1	04-29-04 14:30	EPA 6010B[1]
7440-47-3	Chromium, Total	150		mg/Kg	23	1	04-29-04 14:30	EPA 6010B[1]
7440-50-8	Copper, Total	84		mg/Kg	47	1	04-29-04 14:30	EPA 6010B[1]
7439-92-1	Lead, Total	170		mg/Kg	23	1	04-29-04 14:30	EPA 6010B[1]
7439-97-6	Mercury, Total	0.93		mg/Kg	0.078	1	04-28-04 18:38	EPA 7471A[2]
7440-02-0	Nickel, Total	28		mg/Kg	23	1	04-29-04 14:30	EPA 6010B[1]
7782-49-2	Selenium, Total	BRL		mg/Kg	47	1	04-29-04 14:30	EPA 6010B[1]
7440-22-4	Silver, Total	BRL		mg/Kg	12	1	04-29-04 14:30	EPA 6010B[1]
7440-28-0	Thallium, Total	BRL		mg/Kg	12	1	04-29-04 14:30	EPA 6010B[1]
7440-66-6	Zinc, Total	820		mg/Kg	120	1	04-29-04 14:30	EPA 6010B[1]

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

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DF Dilution Factor.

GROUNDWATER ANALYTICAL

Trace Metals

Field ID:	**SD04A**	Matrix:	**Soil**
Project:	**Saugus Iron Works**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72023-16**	Percent Solids:	**62**
Sampled:	**04-26-04 11:30**		
Received:	**04-27-04 18:30**		

Analysis Method	QC Batch ID	Prep Method	Prepared	Sample Weight	Instrument ID	Analyst
EPA 6010B[1]	MB-0339-S	EPA 3050B	04-29-04 08:30	0.5 g	ICP-1 PE 3000	CRL
EPA 7471A[2]	MP-1577-S	EPA 7471A	04-28-04 12:00	0.6 g	CVAA-1 PE FIMS	CRL

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit	DF	Analyzed	Method
7440-36-0	Antimony, Total	BRL		mg/Kg	1.6	1	04-29-04 14:34	EPA 6010B[1]
7440-38-2	Arsenic, Total	**20**		mg/Kg	1.6	1	04-29-04 14:34	EPA 6010B[1]
7440-41-7	Beryllium, Total	BRL		mg/Kg	0.63	1	04-29-04 14:34	EPA 6010B[1]
7440-43-9	Cadmium, Total	BRL		mg/Kg	0.79	1	04-29-04 14:34	EPA 6010B[1]
7440-47-3	Chromium, Total	**33**		mg/Kg	16	1	04-29-04 14:34	EPA 6010B[1]
7440-50-8	Copper, Total	BRL		mg/Kg	32	1	04-29-04 14:34	EPA 6010B[1]
7439-92-1	Lead, Total	**120**		mg/Kg	16	1	04-29-04 14:34	EPA 6010B[1]
7439-97-6	Mercury, Total	**0.25**		mg/Kg	0.052	1	04-28-04 18:41	EPA 7471A[2]
7440-02-0	Nickel, Total	27		mg/Kg	16	1	04-29-04 14:34	EPA 6010B[1]
7782-49-2	Selenium, Total	BRL		mg/Kg	32	1	04-29-04 14:34	EPA 6010B[1]
7440-22-4	Silver, Total	BRL		mg/Kg	7.9	1	04-29-04 14:34	EPA 6010B[1]
7440-28-0	Thallium, Total	BRL		mg/Kg	7.9	1	04-29-04 14:34	EPA 6010B[1]
7440-66-6	Zinc, Total	**120**		mg/Kg	79	1	04-29-04 14:34	EPA 6010B[1]

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Results are reported on a dry weight basis.

Report Notations:

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DF Dilution Factor.

GROUNDWATER ANALYTICAL

Trace Metals

Field ID: **SD04B**
Project: **Saugus Iron Works**
Client: **CH2M Hill**

Laboratory ID: **72023-17**
Sampled: **04-26-04 11:30**
Received: **04-27-04 18:30**

Matrix: **Soil**
Container: **250 mL Glass**
Preservation: **Cool**

Percent Solids: **78**

Analysis Method	QC Batch ID	Prep Method	Prepared	Sample Weight	Instrument ID	Analyst
EPA 6010B[1]	MB-0339-S	EPA 3050B	04-29-04 08:30	0.5 g	ICP-1 PE 3000	CRL
EPA 7471A[2]	MP-1577-S	EPA 7471A	04-28-04 12:00	0.6 g	CVAA-1 PE FIMS	CRL

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit	DF	Analyzed	Method
7440-36-0	Antimony, Total	1.3		mg/Kg	1.2	1	04-29-04 14:46	EPA 6010B[1]
7440-38-2	Arsenic, Total	4.9		mg/Kg	1.2	1	04-29-04 14:46	EPA 6010B[1]
7440-41-7	Beryllium, Total	BRL		mg/Kg	0.49	1	04-29-04 14:46	EPA 6010B[1]
7440-43-9	Cadmium, Total	BRL		mg/Kg	0.62	1	04-29-04 14:46	EPA 6010B[1]
7440-47-3	Chromium, Total	25		mg/Kg	12	1	04-29-04 14:46	EPA 6010B[1]
7440-50-8	Copper, Total	BRL		mg/Kg	25	1	04-29-04 14:46	EPA 6010B[1]
7439-92-1	Lead, Total	24		mg/Kg	12	1	04-29-04 14:46	EPA 6010B[1]
7439-97-6	Mercury, Total	BRL		mg/Kg	0.041	1	04-28-04 18:44	EPA 7471A[2]
7440-02-0	Nickel, Total	21		mg/Kg	12	1	04-29-04 14:46	EPA 6010B[1]
7782-49-2	Selenium, Total	BRL		mg/Kg	25	1	04-29-04 14:46	EPA 6010B[1]
7440-22-4	Silver, Total	BRL		mg/Kg	6.2	1	04-29-04 14:46	EPA 6010B[1]
7440-28-0	Thallium, Total	BRL		mg/Kg	6.2	1	04-29-04 14:46	EPA 6010B[1]
7440-66-6	Zinc, Total	BRL		mg/Kg	62	1	04-29-04 14:46	EPA 6010B[1]

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Results are reported on a dry weight basis.

Report Notations:
BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.
DF Dilution Factor.

GROUNDWATER ANALYTICAL

Trace Metals

Field ID:	**SD04C**	Matrix:	**Soil**
Project:	**Saugus Iron Works**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72023-18**	Percent Solids:	**49**
Sampled:	**04-26-04 11:30**		
Received:	**04-27-04 18:30**		

Analysis Method	QC Batch ID	Prep Method	Prepared	Sample Weight	Instrument ID	Analyst
EPA 6010B[1]	MB-0339-S	EPA 3050B	04-29-04 08:30	0.5 g	ICP-1 PE 3000	CRL
EPA 7471A[2]	MP-1577-S	EPA 7471A	04-28-04 12:00	0.6 g	CVAA-1 PE FIMS	CRL

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit	DF	Analyzed	Method
7440-36-0	Antimony, Total	BRL		mg/Kg	2.0	1	04-29-04 14:50	EPA 6010B[1]
7440-38-2	Arsenic, Total	**15**		mg/Kg	2.0	1	04-29-04 14:50	EPA 6010B[1]
7440-41-7	Beryllium, Total	BRL		mg/Kg	0.79	1	04-29-04 14:50	EPA 6010B[1]
7440-43-9	Cadmium, Total	BRL		mg/Kg	0.99	1	04-29-04 14:50	EPA 6010B[1]
7440-47-3	Chromium, Total	**65**		mg/Kg	20	1	04-29-04 14:50	EPA 6010B[1]
7440-50-8	Copper, Total	BRL		mg/Kg	40	1	04-29-04 14:50	EPA 6010B[1]
7439-92-1	Lead, Total	**100**		mg/Kg	20	1	04-29-04 14:50	EPA 6010B[1]
7439-97-6	Mercury, Total	**0.15**		mg/Kg	0.067	1	04-28-04 18:47	EPA 7471A[2]
7440-02-0	Nickel, Total	**50**		mg/Kg	20	1	04-29-04 14:50	EPA 6010B[1]
7782-49-2	Selenium, Total	BRL		mg/Kg	40	1	04-29-04 14:50	EPA 6010B[1]
7440-22-4	Silver, Total	BRL		mg/Kg	9.9	1	04-29-04 14:50	EPA 6010B[1]
7440-28-0	Thallium, Total	BRL		mg/Kg	9.9	1	04-29-04 14:50	EPA 6010B[1]
7440-66-6	Zinc, Total	**260**		mg/Kg	99	1	04-29-04 14:50	EPA 6010B[1]

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:
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DF Dilution Factor.

GROUNDWATER ANALYTICAL

Trace Metals

Field ID:	**SD10A**	Matrix:	**Soil**
Project:	**Saugus Iron Works**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72023-19**	Percent Solids:	**40**
Sampled:	**04-26-04 15:00**		
Received:	**04-27-04 18:30**		

Analysis Method	QC Batch ID	Prep Method	Prepared	Sample Weight	Instrument ID	Analyst
EPA 6010B[1]	MB-0339-S	EPA 3050B	04-29-04 08:30	0.5 g	ICP-1 PE 3000	CRL
EPA 7471A[2]	MP-1578-S	EPA 7471A	04-29-04 12:00	0.6 g	CVAA-1 PE FIMS	CRL

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit	DF	Analyzed	Method
7440-36-0	Antimony, Total	BRL		mg/Kg	2.5	1	04-29-04 14:54	EPA 6010B[1]
7440-38-2	Arsenic, Total	**14**		mg/Kg	2.5	1	04-29-04 14:54	EPA 6010B[1]
7440-41-7	Beryllium, Total	BRL		mg/Kg	1.0	1	04-29-04 14:54	EPA 6010B[1]
7440-43-9	Cadmium, Total	**1.3**		mg/Kg	1.3	1	04-29-04 14:54	EPA 6010B[1]
7440-47-3	Chromium, Total	**58**		mg/Kg	25	1	04-29-04 14:54	EPA 6010B[1]
7440-50-8	Copper, Total	**58**		mg/Kg	51	1	04-29-04 14:54	EPA 6010B[1]
7439-92-1	Lead, Total	**230**		mg/Kg	25	1	04-29-04 14:54	EPA 6010B[1]
7439-97-6	Mercury, Total	**0.32**		mg/Kg	0.084	1	04-29-04 16:16	EPA 7471A[2]
7440-02-0	Nickel, Total	**46**		mg/Kg	25	1	04-29-04 14:54	EPA 6010B[1]
7782-49-2	Selenium, Total	BRL		mg/Kg	51	1	04-29-04 14:54	EPA 6010B[1]
7440-22-4	Silver, Total	BRL		mg/Kg	13	1	04-29-04 14:54	EPA 6010B[1]
7440-28-0	Thallium, Total	BRL		mg/Kg	13	1	04-29-04 14:54	EPA 6010B[1]
7440-66-6	Zinc, Total	**370**		mg/Kg	130	1	04-29-04 14:54	EPA 6010B[1]

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

DF Dilution Factor.

GROUNDWATER ANALYTICAL

Trace Metals

Field ID:	**SD10B**	Matrix:	**Soil**
Project:	**Saugus Iron Works**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72023-20**	Percent Solids:	**80**
Sampled:	**04-26-04 15:00**		
Received:	**04-27-04 18:30**		

Analysis Method	QC Batch ID	Prep Method	Prepared	Sample Weight	Instrument ID	Analyst
EPA 6010B[1]	MB-0339-S	EPA 3050B	04-29-04 08:30	0.5 g	ICP-1 PE 3000	CRL
EPA 7471A[2]	MP-1578-S	EPA 7471A	04-29-04 12:00	0.6 g	CVAA-1 PE FIMS	CRL

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit	DF	Analyzed	Method
7440-36-0	Antimony, Total	BRL		mg/Kg	1.2	1	04-29-04 14:59	EPA 6010B[1]
7440-38-2	Arsenic, Total	**2.6**		mg/Kg	1.2	1	04-29-04 14:59	EPA 6010B[1]
7440-41-7	Beryllium, Total	BRL		mg/Kg	0.49	1	04-29-04 14:58	EPA 6010B[1]
7440-43-9	Cadmium, Total	BRL		mg/Kg	0.62	1	04-29-04 14:59	EPA 6010B[1]
7440-47-3	Chromium, Total	**15**		mg/Kg	12	1	04-29-04 14:58	EPA 6010B[1]
7440-50-8	Copper, Total	BRL		mg/Kg	25	1	04-29-04 14:58	EPA 6010B[1]
7439-92-1	Lead, Total	**24**		mg/Kg	12	1	04-29-04 14:59	EPA 6010B[1]
7439-97-6	Mercury, Total	**0.22**		mg/Kg	0.042	1	04-29-04 16:20	EPA 7471A[2]
7440-02-0	Nickel, Total	**17**		mg/Kg	12	1	04-29-04 14:59	EPA 6010B[1]
7782-49-2	Selenium, Total	BRL		mg/Kg	25	1	04-29-04 14:59	EPA 6010B[1]
7440-22-4	Silver, Total	BRL		mg/Kg	6.2	1	04-29-04 14:58	EPA 6010B[1]
7440-28-0	Thallium, Total	BRL		mg/Kg	6.2	1	04-29-04 14:59	EPA 6010B[1]
7440-66-6	Zinc, Total	**75**		mg/Kg	62	1	04-29-04 14:58	EPA 6010B[1]

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:
BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.
DF Dilution Factor.

GROUNDWATER ANALYTICAL

Trace Metals

Field ID:	**SD10C**	Matrix:	**Soil**
Project:	**Saugus Iron Works**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72023-21**	Percent Solids:	**48**
Sampled:	**04-26-04 15:00**		
Received:	**04-27-04 18:30**		

Analysis Method	QC Batch ID	Prep Method	Prepared	Sample Weight	Instrument ID	Analyst
EPA 6010B[1]	MB-0339-S	EPA 3050B	04-29-04 08:30	0.5 g	ICP-1 PE 3000	CRL
EPA 7471A[2]	MP-1578-S	EPA 7471A	04-29-04 12:00	0.6 g	CVAA-1 PE FIMS	CRL

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit	DF	Analyzed	Method
7440-36-0	Antimony, Total	BRL		mg/Kg	2.1	1	04-29-04 15:03	EPA 6010B[1]
7440-38-2	Arsenic, Total	**3.1**		mg/Kg	2.1	1	04-29-04 15:03	EPA 6010B[1]
7440-41-7	Beryllium, Total	BRL		mg/Kg	0.83	1	04-29-04 15:02	EPA 6010B[1]
7440-43-9	Cadmium, Total	BRL		mg/Kg	1.0	1	04-29-04 15:03	EPA 6010B[1]
7440-47-3	Chromium, Total	**23**		mg/Kg	21	1	04-29-04 15:02	EPA 6010B[1]
7440-50-8	Copper, Total	BRL		mg/Kg	41	1	04-29-04 15:02	EPA 6010B[1]
7439-92-1	Lead, Total	BRL		mg/Kg	21	1	04-29-04 15:03	EPA 6010B[1]
7439-97-6	Mercury, Total	BRL		mg/Kg	0.068	1	04-29-04 16:23	EPA 7471A[2]
7440-02-0	Nickel, Total	BRL		mg/Kg	21	1	04-29-04 15:03	EPA 6010B[1]
7782-49-2	Selenium, Total	BRL		mg/Kg	41	1	04-29-04 15:03	EPA 6010B[1]
7440-22-4	Silver, Total	BRL		mg/Kg	10	1	04-29-04 15:02	EPA 6010B[1]
7440-28-0	Thallium, Total	BRL		mg/Kg	10	1	04-29-04 15:03	EPA 6010B[1]
7440-66-6	Zinc, Total	BRL		mg/Kg	100	1	04-29-04 15:02	EPA 6010B[1]

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

DF Dilution Factor.

GROUNDWATER ANALYTICAL

Trace Metals

Field ID:	**EB01**	Matrix:	**Aqueous**
Project:	**Saugus Iron Works**	Container:	**250 mL Plastic**
Client:	**CH2M Hill**	Preservation:	**HNO3 / Cool**
Laboratory ID:	**72023-23**	Preserved:	**04-26-04 16:30**
Sampled:	**04-26-04 16:30**		
Received:	**04-27-04 18:30**		

Analysis Method	QC Batch ID	Prep Method	Prepared	Sample Volume	Instrument ID	Analyst
EPA 6010B[1]	MB-1078-W	EPA 3010A	04-28-04 09:30	50 mL	ICP-2 PE 3300	MWR
EPA 7470A[2]	MP-1497-W	EPA 7470A	04-28-04 10:10	25 mL	CVAA-1 PE FIMS	CRL

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit	DF	Analyzed	Method
7440-36-0	Antimony, Total	BRL		mg/L	0.06	1	04-29-04 18:13	EPA 6010B[1]
7440-38-2	Arsenic, Total	BRL		mg/L	0.01	1	04-29-04 18:13	EPA 6010B[1]
7440-41-7	Beryllium, Total	BRL		mg/L	0.004	1	04-29-04 18:12	EPA 6010B[1]
7440-43-9	Cadmium, Total	BRL		mg/L	0.005	1	04-29-04 18:13	EPA 6010B[1]
7440-47-3	Chromium, Total	BRL		mg/L	0.01	1	04-29-04 18:13	EPA 6010B[1]
7440-50-8	Copper, Total	BRL		mg/L	0.025	1	04-29-04 18:13	EPA 6010B[1]
7439-92-1	Lead, Total	BRL		mg/L	0.005	1	04-29-04 18:13	EPA 6010B[1]
7439-97-6	Mercury, Total	BRL		mg/L	0.0002	1	04-28-04 15:27	EPA 7470A[2]
7440-02-0	Nickel, Total	BRL		mg/L	0.04	1	04-29-04 18:13	EPA 6010B[1]
7782-49-2	Selenium, Total	BRL		mg/L	0.05	1	04-29-04 18:13	EPA 6010B[1]
7440-22-4	Silver, Total	BRL		mg/L	0.007	1	04-29-04 18:13	EPA 6010B[1]
7440-28-0	Thallium, Total	BRL		mg/L	0.02	1	04-29-04 18:13	EPA 6010B[1]
7440-66-6	Zinc, Total	BRL		mg/L	0.2	1	04-29-04 18:13	EPA 6010B[1]

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

DF Dilution Factor.

GROUNDWATER ANALYTICAL

Trace Metals

Field ID:	**EB02**	Matrix:	**Aqueous**
Project:	**Saugus Iron Works**	Container:	**250 mL Plastic**
Client:	**CH2M Hill**	Preservation:	**HNO3 / Cool**
Laboratory ID:	**72023-25**	Preserved:	**04-27-04 15:00**
Sampled:	**04-27-04 15:00**		
Received:	**04-27-04 18:30**		

Analysis Method	QC Batch ID	Prep Method	Prepared	Sample Volume	Instrument ID	Analyst
EPA 6010B[1]	MB-1078-W	EPA 3010A	04-28-04 09:30	50 mL	ICP-2 PE 3300	MWR
EPA 7470A[2]	MP-1497-W	EPA 7470A	04-28-04 10:10	25 mL	CVAA-1 PE FIMS	CRL

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit	DF	Analyzed	Method
7440-36-0	Antimony, Total	BRL		mg/L	0.06	1	04-29-04 18:18	EPA 6010B[1]
7440-38-2	Arsenic, Total	BRL		mg/L	0.01	1	04-29-04 18:18	EPA 6010B[1]
7440-41-7	Beryllium, Total	BRL		mg/L	0.004	1	04-29-04 18:17	EPA 6010B[1]
7440-43-9	Cadmium, Total	BRL		mg/L	0.005	1	04-29-04 18:18	EPA 6010B[1]
7440-47-3	Chromium, Total	BRL		mg/L	0.01	1	04-29-04 18:18	EPA 6010B[1]
7440-50-8	Copper, Total	BRL		mg/L	0.025	1	04-29-04 18:18	EPA 6010B[1]
7439-92-1	Lead, Total	BRL		mg/L	0.005	1	04-29-04 18:18	EPA 6010B[1]
7439-97-6	Mercury, Total	BRL		mg/L	0.0002	1	04-28-04 15:29	EPA 7470A[2]
7440-02-0	Nickel, Total	BRL		mg/L	0.04	1	04-29-04 18:18	EPA 6010B[1]
7782-49-2	Selenium, Total	BRL		mg/L	0.05	1	04-29-04 18:18	EPA 6010B[1]
7440-22-4	Silver, Total	BRL		mg/L	0.007	1	04-29-04 18:18	EPA 6010B[1]
7440-28-0	Thallium, Total	BRL		mg/L	0.02	1	04-29-04 18:18	EPA 6010B[1]
7440-66-6	Zinc, Total	BRL		mg/L	0.2	1	04-29-04 18:18	EPA 6010B[1]

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

DF Dilution Factor.

GROUNDWATER ANALYTICAL

Inorganic Chemistry

Field ID: **SD05A**
Project: **Saugus Iron Works**
Client: **CH2M Hill**

Matrix: **Soil**
Received: **04-27-04 18:30**

Lab ID: **72023-01** Sampled: **04-27-04 11:00** % Solids: **58** Container: **250 mL Glass** Preservation: **Cool**

Analyte	Result	Units	RL	DF	Weight	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	**52,000**	mg/Kg	15,000	89	0.11 g	04-29-04 15:10	TOC-0251-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:

BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

RL Reporting Limit.

DF Dilution Factor.

1 Instrument ID: Tekmar-Dohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Inorganic Chemistry

Field ID: **SD05B**
Project: **Saugus Iron Works**
Client: **CH2M Hill**

Matrix: **Soil**
Received: **04-27-04 18:30**

Lab ID: **72023-02** Sampled: **04-27-04 11:00** % Solids: **80** Container: **250 mL Glass** Preservation: **Cool**

Analyte	Result	Units	RL	DF	Weight	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	**2,900**	mg/Kg	830	7	1.5 g	04-29-04 15:50	TOC-0251-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:

BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

RL Reporting Limit.

DF Dilution Factor.

1 Instrument ID: Tekmar-Dohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Inorganic Chemistry

Field ID: **SD05C**
Project: **Saugus Iron Works**
Client: **CH2M Hill**

Matrix: **Soil**
Received: **04-27-04 18:30**

Lab ID: **72023-03** Sampled: **04-27-04 11:00** % Solids: **60** Container: **250 mL Glass** Preservation: **Cool**

Analyte	Result	Units	RL	DF	Weight	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	**160,000**	mg/Kg	11,000	67	0.15 g	04-29-04 16:31	TOC-0251-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:

BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

RL Reporting Limit.

DF Dilution Factor.

1 Instrument ID: Tekmar-Dohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Inorganic Chemistry

Field ID: **SD06A**
Project: **Saugus Iron Works**
Client: **CH2M Hill**

Matrix: **Soil**
Received: **04-27-04 18:30**

Lab ID: **72023-04** Sampled: **04-27-04 11:00** % Solids: **44** Container: **250 mL Glass** Preservation: **Cool**

Analyte	Result	Units	RL	Df	Weight	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	**250,000**	mg/Kg	30,000	133	0.075 g	04-29-04 16:51	TOC-0251-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:

BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

RL Reporting Limit.

DF Dilution Factor.

1 Instrument ID: Tekmar-Dohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Inorganic Chemistry

Field ID: **SD06B**
Project: **Saugus Iron Works**
Client: **CH2M Hill**

Matrix: **Soil**
Received: **04-27-04 18:30**

Lab ID: **72023-05** Sampled: **04-27-04 11:00** % Solids: **70** Container: **250 mL Glass** Preservation: **Cool**

Analyte	Result	Units	RL	DF	Weight	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	**10,000**	mg/Kg	2,500	18	0.57 g	04-30-04 09:48	TOC-0252-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:

BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

RL Reporting Limit.

DF Dilution Factor.

1 Instrument ID: Tekmar-Dohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Inorganic Chemistry

Field ID: **SD06C**
Project: **Saugus Iron Works**
Client: **CH2M Hill**

Matrix: **Soil**
Received: **04-27-04 18:30**

Lab ID: **72023-06** Sampled: **04-27-04 11:00** % Solids: **44** Container: **250 mL Glass** Preservation: **Cool**

Analyte	Result	Units	RL	DF	Weight	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	**120,000**	mg/Kg	23,000	100	0.1 g	04-30-04 10:07	TOC-0252-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:

BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

RL Reporting Limit.

DF Dilution Factor.

1 Instrument ID: Tekmar-Dohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Inorganic Chemistry

Field ID: **SD09A**
Project: **Saugus Iron Works**
Client: **CH2M Hill**

Matrix: **Soil**
Received: **04-27-04 18:30**

Lab ID: **72023-07** Sampled: **04-27-04 13:30** % Solids: **41** Container: **250 mL Glass** Preservation: **Cool**

Analyte	Result	Units	RL	DF	Weight	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	**120,000**	mg/Kg	15,000	62	0.16 g	04-30-04 10:25	TOC-0252-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:

BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

RL Reporting Limit.

DF Dilution Factor.

1 Instrument ID: Tekmar-Dohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Inorganic Chemistry

Field ID: **SD09B** Matrix: **Soil**
Project: **Saugus Iron Works** Received: **04-27-04 18:30**
Client: **CH2M Hill**

Lab ID: **72023-08** Sampled: **04-27-04 13:30** % Solids: **46** Container: **250 mL Glass** Preservation: **Cool**

Analyte	Result	Units	RL	DF	Weight	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	**130,000**	mg/Kg	19,000	89	0.11 g	04-30-04 11:13	TOC-0252-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:

BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

RL Reporting Limit.

DF Dilution Factor.

1 Instrument ID: Tekmar-Dohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Inorganic Chemistry

Field ID: **SD09C**
Project: **Saugus Iron Works**
Client: **CH2M Hill**

Matrix: **Soil**
Received: **04-27-04 18:30**

Lab ID: **72023-09** Sampled: **04-27-04 13:30** % Solids: **48** Container: **250 mL Glass** Preservation: **Cool**

Analyte	Result	Units	RL	DF	Weight	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	**94,000**	mg/Kg	9,600	94	0.11 g	04-30-04 11:36	TOC-0252-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:

BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

RL Reporting Limit.

DF Dilution Factor.

1 Instrument ID: Tekmar-Dohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Inorganic Chemistry

Field ID: **SD08A**
Project: **Saugus Iron Works**
Client: **CH2M Hill**

Matrix: **Soil**
Received: **04-27-04 18:30**

Lab ID: **72023-10** Sampled: **04-27-04 14:30** % Solids: **24** Container: **250 mL Glass** Preservation: **Cool**

Analyte	Result	Units	RL	DF	Weight	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	**130,000**	mg/Kg	21,000	52	0.19 g	04-30-04 11:57	TOC-0252-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:

BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

RL Reporting Limit.

DF Dilution Factor.

1 Instrument ID: Tekmar-Dohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Inorganic Chemistry

Field ID: **SD08B**
Project: **Saugus Iron Works**
Client: **CH2M Hill**

Matrix: **Soil**
Received: **04-27-04 18:30**

Lab ID: **72023-11** Sampled: **04-27-04 14:30** % Solids: **36** Container: **250 mL Glass** Preservation: **Cool**

Analyte	Result	Units	RL	DF	Weight	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	> 220,000	mg/Kg	37,000	133	0.075 g	04-30-04 13:29	TOC-0252-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:

BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

RL Reporting Limit.

DF Dilution Factor.

1 Instrument ID: Tekmar-Dohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Inorganic Chemistry

Field ID: **SD08C**
Project: **Saugus Iron Works**
Client: **CH2M Hill**

Matrix: **Soil**
Received: **04-27-04 18:30**

Lab ID: **72023-12** Sampled: **04-27-04 14:30** % Solids: **97** Container: **250 mL Glass** Preservation: **Cool**

Analyte	Result	Units	RL	DF	Weight	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	**>39,000**	mg/Kg	5,500	53	0.19 g	04-30-04 13:50	TOC-0252-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:

BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

RL Reporting Limit.

DF Dilution Factor.

1 Instrument ID: Tekmar-Dohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Inorganic Chemistry

Field ID: **SD07A**
Project: **Saugus Iron Works**
Client: **CH2M Hill**

Matrix: **Soil**
Received: **04-27-04 18:30**

Lab ID: **72023-13** Sampled: **04-26-04 10:00** % Solids: **37** Container: **250 mL Glass** Preservation: **Cool**

Analyte	Result	Units	RL	DF	Weight	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	**360,000**	mg/Kg	49,000	178	0.056 g	04-30-04 15:51	TOC-0252-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:

BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

RL Reporting Limit.

DF Dilution Factor.

1 Instrument ID: Tekmar-Dohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Inorganic Chemistry

Field ID: **SD07B**
Project: **Saugus Iron Works**
Client: **CH2M Hill**

Matrix: **Soil**
Received: **04-27-04 18:30**

Lab ID: **72023-14** Sampled: **04-26-04 10:00** % Solids: **67** Container: **250 mL Glass** Preservation: **Cool**

Analyte	Result	Units	RL	DF	Weight	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	**24,000**	mg/Kg	5,900	40	0.25 g	04-30-04 16:11	TOC-0252-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:

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RL Reporting Limit.

DF Dilution Factor.

1 Instrument ID: Tekmar-Dohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Inorganic Chemistry

Field ID: **SD07C**
Project: **Saugus Iron Works**
Client: **CH2M Hill**

Matrix: **Soil**
Received: **04-27-04 18:30**

Lab ID: **72023-15** Sampled: **04-26-04 10:00** % Solids: **42** Container: **250 mL Glass** Preservation: **Cool**

Analyte	Result	Units	RL	DF	Weight	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	**130,000**	mg/Kg	18,000	76	0.13 g	04-30-04 16:27	TOC-0252-5	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:

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RL Reporting Limit.

DF Dilution Factor.

1 Instrument ID: Tekmar-Dohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Inorganic Chemistry

Field ID: **SD04A**
Project: **Saugus Iron Works**
Client: **CH2M Hill**

Matrix: **Soil**
Received: **04-27-04 18:30**

Lab ID: **72023-16** Sampled: **04-26-04 11:30** % Solids: **62** Container: **250 mL Glass** Preservation: **Cool**

Analyte	Result	Units	RL	DF	Weight	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	71,000	mg/Kg	22,000	133	0.075 g	04-30-04 16:42	TOC-0252-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:

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RL Reporting Limit.

DF Dilution Factor.

1 Instrument ID: Tekmar-Dohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Inorganic Chemistry

Field ID: **SD04B**
Project: **Saugus Iron Works**
Client: **CH2M Hill**

Matrix: **Soil**
Received: **04-27-04 18:30**

Lab ID: **72023-17** Sampled: **04-26-04 11:30** % Solids: **78** Container: **250 mL Glass** Preservation: **Cool**

Analyte	Result	Units	RL	DF	Weight	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	**8,000**	mg/Kg	3,900	30	0.33 g	05-03-04 10:12	TOC-0253-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:

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RL Reporting Limit.

DF Dilution Factor.

1 Instrument ID: Tekmar-Dohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Inorganic Chemistry

Field ID: **SD04C**
Project: **Saugus Iron Works**
Client: **CH2M Hill**

Matrix: **Soil**
Received: **04-27-04 18:30**

Lab ID: **72023-18** Sampled: **04-26-04 11:30** % Solids: **49** Container: **250 mL Glass** Preservation: **Cool**

Analyte	Result	Units	RL	DF	Weight	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	**250,000**	mg/Kg	37,000	178	0.056 g	05-03-04 11:18	TOC-0253-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:

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RL Reporting Limit.

DF Dilution Factor.

1 Instrument ID: Tekmar-Dohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Inorganic Chemistry

Field ID: **SD10A**
Project: **Saugus Iron Works**
Client: **CH2M Hill**

Matrix: **Soil**
Received: **04-27-04 18:30**

Lab ID: **72023-19** Sampled: **04-26-04 15:00** % Solids: **40** Container: **250 mL Glass** Preservation: **Cool**

Analyte	Result	Units	RL	DF	Weight	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	**140,000**	mg/Kg	21,000	84	0.12 g	05-03-04 11:36	TOC-0253-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

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RL Reporting Limit.

DF Dilution Factor.

1 Instrument ID: Tekmar-Dohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Inorganic Chemistry

Field ID: **SD10B**
Project: **Saugus Iron Works**
Client: **CH2M Hill**

Matrix: **Soil**
Received: **04-27-04 18:30**

Lab ID: **72023-20** Sampled: **04-26-04 15:00** % Solids: **80** Container: **250 mL Glass** Preservation: **Cool**

Analyte	Result	Units	RL	DF	Weight	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	14,000	mg/Kg	3,000	24	0.42 g	05-03-04 11:59	TOC-0253-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

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RL Reporting Limit.

DF Dilution Factor.

1 Instrument ID: Tekmar-Dohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Inorganic Chemistry

Field ID: **SD10C**
Project: **Saugus Iron Works**
Client: **CH2M Hill**

Matrix: **Soil**
Received: **04-27-04 18:30**

Lab ID: **72023-21** Sampled: **04-26-04 15:00** % Solids: **48** Container: **250 mL Glass** Preservation: **Cool**

Analyte	Result	Units	RL	DF	Weight	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	> 150,000	mg/Kg	28,000	133	0.075 g	05-03-04 13:24	TOC-0253-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:

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RL Reporting Limit.

DF Dilution Factor.

1 Instrument ID: Tekmar-Dohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Project Narrative

Project:	**Saugus Iron Works**	Lab ID:	**72023**
Client:	**CH2M Hill**	Received:	**04-27-04 18:30**

A. Documentation and Client Communication

The following documentation discrepancies, and client changes or amendments were noted for this project:

1. Sample 72023-23 for Total Metals analysis was received preserved with HNO3, not with H2SO4, as indicated on the Chain of Custody.

B. Method Modifications, Non-Conformances and Observations

The sample(s) in this project were analyzed by the references analytical method(s), and no method modifications, non-conformances or analytical issues were noted, except as indicated below:

1. EPA 6010B Non-conformance: Samples 72023-01,-02,-03,-04,-05,-06,-07,-08,-09,-10,-11,-12,-13,-14,-15,-16,-17,-18,-19,-20,-21,-23,-23,-25,-25. A matrix spike (MS) sample was not performed in accordance with the minimum field QC requirements of the MA DEP CAM.
2. EPA 6010B Note: Samples 72023-01,-02,-03,-04,-05,-06,-07,-08,-09,-10,-11,-12,-13,-14,-15,-16,-17,-18,-19,-20,-21,-23,-23,-25,-25. Samples were analyzed for selected target analytes, as requested by client.
3. EPA 7470A/1A Non-conformance: Samples 72023-01,-02,-03,-04,-05,-06,-07,-08,-09,-10,-11,-12,-13,-14,-15,-16,-17,-18,-19,-20,-21,-23,-23,-25,-25. A matrix spike (MS) sample was not performed in accordance with the minimum field QC requirements of the MA DEP CAM.
4. EPA 8270C Modification: Samples 72023-22,-24. Method modified by use of selected ion monitoring (SIM) in accordance with Section 7.5.5 of the method. GC/MS-SIM was used to achieve low quantification limits necessary for regulatory compliance.
5. EPA 8270C Note: Samples 72023-01,-02,-03,-04,-05,-06,-07,-08,-09,-10,-11,-12,-13,-14,-15,-16,-17,-18,-19,-20,-21,-22,-24. Samples were analyzed for only selected polynuclear aromatic hydrocarbons (PAH) target analytes, as requested by client.

GROUNDWATER ANALYTICAL

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www.groundwateranalytical.com

CHAIN-OF-CUSTODY RECORD AND WORK ORDER

№ 08598

Project Name: Saugus Iron Works
Project Number:
Sampler Name: RL/CP/TB
Project Manager: John Burgess
Firm: CH2M HILL
Address: 25 New Chardon St., Ste. 500
City / State / Zip: Boston, MA 02114
Telephone: (617) 523-2260

INSTRUCTIONS: Use separate line for each container (except replicates).

TURNAROUND
- ☑ STANDARD (10 Business Days)
- ☐ PRIORITY (5 Business Days)
- ☐ RUSH (RAN- _____) (Rush requires Rush Authorization Number)
- ☐ Please Email to: _____
- ☐ Please FAX to: _____

BILLING
- ☐ Purchase Order No. _____
- ☐ Third Party Billing: _____
- ☐ GWA Quote: _____

ANALYSIS REQUEST

Sampling DATE	Sampling TIME	SAMPLE IDENTIFICATION	Matrix	Type	Container(s)	Preservation	Filtered	LABORATORY NUMBER (Lab Use Only)
4/27/04	1100	SD05A	WASTEWATER / SOIL	COMPOSITE	40mL VOA Vial	Sodium Bisulfate / ICE	NO	1
	1100	SD05B	WASTEWATER / SOIL	COMPOSITE	40mL VOA Vial	Sodium Bisulfate / ICE	NO	2
	1100	SD05C	WASTEWATER / SOIL	COMPOSITE	40mL VOA Vial	Sodium Bisulfate / ICE	NO	3
	1100	SD06A	WASTEWATER / SOIL	COMPOSITE	40mL VOA Vial	Sodium Bisulfate / ICE	NO	4
	1100	SD06B	WASTEWATER / SOIL	COMPOSITE	40mL VOA Vial	Sodium Bisulfate / ICE	NO	5
	1100	SD06C	WASTEWATER / SOIL	COMPOSITE	40mL VOA Vial	Sodium Bisulfate / ICE	NO	6
	1330	SD09A	WASTEWATER / SOIL	COMPOSITE	40mL VOA Vial	Sodium Bisulfate / ICE	NO	7
	1330	SD09B	WASTEWATER / SOIL	COMPOSITE	40mL VOA Vial	Sodium Bisulfate / ICE	NO	8
	1330	SD09C	WASTEWATER / SOIL	COMPOSITE	40mL VOA Vial	Sodium Bisulfate / ICE	NO	9
	1430	SD08A	WASTEWATER / SOIL	COMPOSITE	40mL VOA Vial	Sodium Bisulfate / ICE	NO	10
	1430	SD08B	WASTEWATER / SOIL	COMPOSITE	40mL VOA Vial	Sodium Bisulfate / ICE	NO	11
	1430	SD08C	WASTEWATER / SOIL	COMPOSITE	40mL VOA Vial	Sodium Bisulfate / ICE	NO	12

ANALYSIS REQUEST columns: Volatiles (☐ TIC Search; ☐ Add Only; ☐ BTEX Only; ☐ TPH Search); Semivolatiles (☐ 8270C PAHs only; ☐ 8081A Pesticides; ☐ 8082 PCBs; ☐ 8151A Herbicides; ☐ 8011 EDB/DBCP); Fuel/Hydr/PCBs Extractable / Vol. (☐ 8260B TCL-MTBE; ☐ 8260B MA PETROLEUM ☐ 8260B; ☐ 8021A Aromatics; ☐ 8021B Halocarbons; ☐ 8021B; ☐ 8270C; ☐ 524.2-MTBE; ☐ 524; ☐ 624-MTBE; ☐ 601; ☐ 601/602+MTBE; ☐ 625; ☐ 625 PAHs only; ☐ 608 Pesticides; ☐ 608 PCBs; ☐ 615; ☐ 8151A Herbicides; ☐ 8011 EDB/DBCP; ☐ 525.2; ☐ 505 ☐ 508; ☐ 531.1; ☐ 515.1; ☐ 504.1 EDB/DBCP; ☐ Lead and Copper); Metals (Specify For Water Samples ☐ Total ☐ Dissolved; ☐ 13 Priority Pollutant; ☐ Specify); Petroleum Hydrocarbon Ext. TPH / Vol. TPH (☐ TPH-IR; ☐ Diesel Range Organics (DRO) ☐ ME DRO; ☐ FT ETPH; ☐ MA DEP EPH w/all targets ☐ EPH Carbon Ranges only ☐ EPH w/4 PAHs; ☐ Hydrocarbon Fingerprint (GC/FID) by ASTM (1003/98-90 Mod.); ☐ PPH by GC/FID (8015B Mod) Quantitative Only; ☐ Gasoline Range Organics (GRO) ☐ ME GRO; ☐ MA DEP VPH w/all targets ☐ VPH Carbon ranges only; ☐ TCLP ☐ SPLP ☐ TS Metals ☐ PM only ☐ VOA ☐ Semi VOA; ☐ Corrosivity (as pH) ☐ Reactivity ☐ Ignitability (per Flashpoint) ☐ Paint Filter; ☐ MA Base Neutrals Criteria (8260B); TPH by GC, PCBs, 5 Metals, Corrosivity, Ignitability, Reactivity); Haz. Waste; General Chemistry (☐ Nitrate ☐ Nitrite ☐ Chloride ☐ Fluoride (3 Surface); ☐ Dissolved Phosphorus; ☐ Ammonia ☐ TKN ☐ Total Phosphorus ☐ Total N (as NO2/NO3/TKN); ☐ Oil & Grease; ☐ COD ☐ TOC; ☐ BOD ☐ TSS ☐ TS ☐ Alkalinity; ☐ Cyanide, Total ☐ Cyanide, Physiologically Available; ☐ pH ☐ Dissolved Oxygen ☐ Turbidity)

REMARKS / SPECIAL INSTRUCTIONS

MA DEP MCP Data Enhancement Affirmation

☐ YES ☐ NO MCP Data Certification is required.

☐ YES ☐ NO MCP minimum Field QC requirements have been met for this project. *(Metals, hexavalent chromium and cyanide analyses require one matrix spike per 20 samples)*

☐ YES ☐ NO MCP Drinking Water samples required. *(Require collection of contingent duplicate samples. Trip blanks are also required, if VOA samples collected)*

Signature: _____

DATA QUALITY OBJECTIVES

Regulatory Program

State	Standard	Deliverables
☐ CT	☒ MCP GW-1/S-1	☐ PWS Form
☐ ME	☐ MCP GW-2/S-2	☐ MWRA
☒ MA	☐ NY STARS	☐ _____
☐ NH	☐ Drinking Water	
☐ NY	☐ Wastewater	
☐ RI	☐ Waste Disposal	
☐ VT	☐ Dredge Material	
☐ ___	☐ _____	

Project Specific QC

Many regulatory programs and EPA methods require project specific QC. Project specific QC includes Sample Duplicates, Matrix Spikes, and/or Matrix Spike Duplicates. Laboratory QC is not project specific unless preamranged. Project specific QC samples are charged on a per sample basis. **Each MS, MSD and Sample Duplicate requires an additional sample aliquot.**

Project Specific QC Required	Selection of QC Sample
☐ Sample Duplicate	☐ Please use sample:
☐ Matrix Spike	
☐ Matrix Spike Duplicate	_____

CHAIN-OF-CUSTODY RECORD

NOTE: All samples submitted subject to Standard Terms and Conditions on reverse hereof.

	Date	Time		
Relinquished by Sampler: [signature]	4/27/04	1915	Received by: [signature]	Receipt Temperature: 4.2
Relinquished by: Alan Maddigan	4/27/04	6:30	Received by:	Container Count: 12
Relinquished by:	Date	Time	Received by Laboratory: [signature]	Shipping/Airbill Number:

Method of Shipment: ☐ GWA Courier ☐ Express Mail ☐ Federal Express ☐ UPS ☐ Hand ☐ _____

☐ Ice ☐ Refrigerated ☐ °C Recommended

Custody Seal Number:

GROUNDWATER ANALYTICAL

228 Main Street, P.O. Box 1200
Buzzards Bay, MA 02532
Telephone (508) 759-4441 • FAX (508) 759-4475
www.groundwateranalytical.com

CHAIN-OF-CUSTODY RECORD AND WORK ORDER

№ 085986

Project Name: Saugus Iron Works
Firm: CH2M HILL
Project Number:
Address: 25 New Chardon St. Ste. 500
Sampler Name: RL/CP/TB
City / State / Zip: Boston, MA 02114
Project Manager: John Burgess
Telephone: (617) 523-2260

INSTRUCTIONS: Use separate line for each container (except replicates).

TURNAROUND

- [x] STANDARD (10 Business Days)
- [ ] PRIORITY (5 Business Days)
- [ ] RUSH (RAN- _____)
  (Rush requires Rush Authorization Number)
- [ ] Please Email to: _____
- [ ] Please FAX to: _____

BILLING

- [ ] Purchase Order No.: _____
- [ ] Third Party Billing: _____
- [ ] GWA Quote: _____

ANALYSIS REQUEST

OPTIONS: [ ] TIC Search
SDWA: [ ] 524.2-MTBE
NPDES: [ ] 624 | [ ] 625+MTBE | [ ] 601 | [ ] CT-625/EPA-MTBE | [ ] 625
RCRA/21E: [ ] 8260B TCL+MTBE | [ ] 8260B MA PETRO LEAK | [ ] 8260B | [ ] 8021B Aromatics | [ ] 8021B Halocarbons | [ ] 8021B | [ ] 8270C

Volatiles: [ ] TIC Search
Semivolatiles: [ ] Acid Only [ ] B/N Only [ ] TIC Search | [ ] 525.2
Pest/Herb/PCBs Extractable: [ ] 508 [ ] 508.1 | [ ] 8081 | [ ] 515.1 | [ ] 504.1 EDB/DBCP | [ ] 8082
Vol.: [ ] Acid Only [ ] B/N Only [ ] TIC Search | [ ] 524.2 | [ ] 624 | [ ] 8260 | [ ] 8021 | [ ] 8260 | [ ] 8260
Metals: Specify for Water Samples [ ] Total [ ] Dissolved | [ ] Lead and Copper | [ ] 13 Priority Pollutant | [ ] 8270C PAHs only | [ ] 8082 PAHs only | [ ] 8081 Pesticides | [ ] 8082 PCBs | [ ] 8151A Herbicides | [ ] 8011 EDB/DBCP | [ ] 8 RCRA | [ ] 5 RCRA | [ ] MA List Metals | [ ] 23 TAL | [ ] Specify:
Petroleum Hydrocarbons Ext. TPH: [ ] TPH-HR | [ ] Diesel Range Organics (DRO) [ ] ME DRO | [ ] CT ETPH | [ ] MA DEP EPH w/all targets [ ] EPH Carbon Ranges only [ ] EPH w/4 PAHs | [ ] Hydrocarbon Fingerprint (GC/FID by ASTM D3328-00 Mod.) | [ ] EPH by GC/FID (8015M Mod) Quantitative Only
Vol. TPH: [ ] Gasoline Range Organics (GRO) [ ] ME GRO | [ ] MA DEP VPH w/all Targets [ ] VPH Carbon ranges only
Haz. Waste: [ ] TCLP [ ] SPLP [ ] 8 Metals [ ] PL only [ ] VOA [ ] Semi VOA [ ] Pesticides [ ] Herbicides | [ ] Corrosivity (ex. pH) [ ] Reactivity [ ] Ignitability (ex. Flashpoint) [ ] Paint Filter | [ ] MA Toxic Disposal Criteria: 22000, TPH by GC, PCBs, 5 Metals, Corrosivity, Ignitability, Reactivity
General Chemistry: [ ] Metals [ ] Chloride [ ] Fluoride [ ] Sulfate | [ ] Dissolved Phosphorus | [ ] Ammonia [ ] TKN [ ] Total Phosphorus [ ] Total N (as NO3/NO2/TKN) | [ ] Oil & Grease | [x] COD [x] TOC | [ ] BOD [ ] TSS [ ] TS [ ] Alkalinity | [ ] Cyanide, Total [ ] Cyanide, Physiologically Available | [ ] pH [ ] Dissolved Oxygen [ ] Turbidity | [ ] Total Coliform [ ] Fecal Coliform [ ] H2S

Sampling DATE	Sampling TIME	SAMPLE IDENTIFICATION	Matrix	Type	Container(s)	Preservation	Filtered	LABORATORY NUMBER (Lab Use Only)
4/27/04	1000	SD07A	SOIL	COMPOSITE	4oz VOA Vial			13
	1000	SD07B	SOIL	COMPOSITE	4oz VOA Vial			14
	1000	SD07C	SOIL	COMPOSITE	4oz VOA Vial			15
	1130	SD04A	SOIL	COMPOSITE	4oz VOA Vial			16
	1130	SD04B	SOIL	COMPOSITE	4oz VOA Vial			17
	1130	SD04C	SOIL	COMPOSITE	4oz VOA Vial			18
	1500	SD10A	SOIL	COMPOSITE	4oz VOA Vial			19
	1500	SD10B	SOIL	COMPOSITE	4oz VOA Vial			20
	1500	SD10C	SOIL	COMPOSITE	4oz VOA Vial			21
	1630	EB01	WATER	GRAB	40ml VOA Vial; 1L/32 oz Plastic	HCl; H2SO4	Yes	22
	1630	EB01	WATER	GRAB	1L/32 oz Amber Glass			23

REMARKS / SPECIAL INSTRUCTIONS

MA DEP MCP Data Enhancement Affirmation

- [ ] YES [ ] NO MCP Data Certification is required.
- [ ] YES [ ] NO MCP minimum Field QC requirements have been met for this project.
  (Metals, hexavalent chromium and cyanide analyses require one matrix spike per 20 samples)
- [ ] YES [ ] NO MCP Drinking Water samples required.
  (Require collection of contingent duplicate samples. Trip blanks are also required, if VOA samples collected)

Signature: _____

DATA QUALITY OBJECTIVES

Regulatory Program

State	Standard	Deliverables
[ ] CT	[x] MCP GW-1/S-1	[ ] PWS Form
[ ] ME	[ ] MCP GW-2/S-2	[ ] MWRA
[x] MA	[ ] NY STARS	[ ] _____
[ ] NH	[ ] Drinking Water	
[ ] NY	[ ] Wastewater	
[ ] RI	[ ] Waste Disposal	
[ ] VT	[ ] Dredge Material	
[ ] ___	[ ] _____	

Project Specific QC

Many regulatory programs and EPA methods require project specific QC. Project specific QC includes Sample Duplicates, Matrix Spikes, and/or Matrix Spike Duplicates. Laboratory QC is not project specific unless prearranged. Project specific QC samples are charged on a per sample basis. **Each MS, MSD and Sample Duplicate requires an additional sample aliquot.**

Project Specific QC Required
- [ ] Sample Duplicate
- [ ] Matrix Spike
- [ ] Matrix Spike Duplicate

Selection of QC Sample
- [ ] Please use sample: _____

CHAIN-OF-CUSTODY RECORD

NOTE: All samples submitted subject to Standard Terms and Conditions on reverse hereof.

	Date	Time		
Relinquished by Sampler:	4/27/04	1545	Received by: Alan Maddigan	Receipt Temperature: [ ] Ice [ ] Refrigerated 4.2 °C Recommended
Relinquished by: Alan Maddigan	4/27/04	6:30	Received by:	Container Count: 12
Relinquished by:	Date	Time	Received by Laboratory:	Shipping/Airbill Number:

Method of Shipment: [x] GWA Courier [ ] Express Mail [ ] Federal Express [ ] UPS [ ] Hand [ ] _____

Custody Seal Number:

GROUNDWATER ANALYTICAL

228 Main Street, P.O. Box 1200
Buzzards Bay, MA 02532
Telephone (508) 759-4441 • FAX (508) 759-4475
www.groundwateranalytical.com

CHAIN-OF-CUSTODY RECORD AND WORK ORDER

№ 08598

Project Name: Sangus Iron Works
Firm: CH2M HILL
Project Number:
Address: 25 New Chardon St Ste 500
Sampler Name: TB/CP/KL
City / State / Zip: Boston, MA 02114
Project Manager: J. Burgess
Telephone: (617) 523-2260

INSTRUCTIONS: Use separate line for each container (except replicates).

TURNAROUND

- [x] STANDARD (10 Business Days)
- [ ] PRIORITY (5 Business Days)
- [ ] RUSH (RAN- _____)
  (Rush requires Rush Authorization Number)
- [ ] Please Email to: _____
- [ ] Please FAX to: _____

BILLING

- [ ] Purchase Order No.: _____
- [ ] Third Party Billing: _____
- [ ] GWA Quote: _____

ANALYSIS REQUEST

OPTIONS: ☐ TIC Search

Volatiles
SIGMA: ☐ 624.2+MTBE
MWRA: ☐ RC4
RCRA/CAM: ☐ 8260B TCL+MTBE ☐ 8260B 1&H PCTRDLEaM ☐ 624MB ☐ 8021B Aromatics ☐ 8021B Halocarbons ☐ 8021B ☐ 8270C

Semivolatiles
☐ Acid Only ☐ Base Only ☐ TIC Search
SIGMA: ☐ 625.2
MWRA: ☐ 8270 ☐ 625 ☐ 625 PAHs only
RCRA/CAM: ☐ 8270C PAHs only ☐ L/B/P Pesticides ☐ 8082 PCBs ☐ RPSVA Herbicides ☐ 8011 EDB/DBCP ☐ 8 RCRA ☐ 5 RCRA ☐ MA List Metals ☐ 2/3 hit ☐ Specify:

Pest/Herb/PCBs Extractable Vol.
SIGMA: ☐ 505 ☐ 508 ☐ 531.1 ☐ 515.1 ☐ 504.1 EDB/DBCP
MWRA: ☐ 608 Pesticides ☐ 608 PCBs ☐ 615 ☐ 615
RCRA/CAM: ☐ 608 Pesticides ☐ 8082 PCBs ☐ RPSVA Herbicides ☐ 8011 EDB/DBCP

Metals
Specify For Water Samples ☐ Total ☐ Dissolved
SIGMA: ☐ Lead and Copper
MWRA: ☐ 13 Priority Pollutant
RCRA/CAM: ☐ 8 RCRA ☐ 5 RCRA ☐ MA List Metals ☐ 2/3 hit ☐ Specify:

Petroleum Hydrocarbons
Ext. TPH: ☐ TPH-IR ☐ Diesel Range Organics (DRO) ☐ ME DRO ☐ GC EPH ☐ MA DEP EPH w/all targets ☐ EPH w/all PAHs ☐ Hydrocarbon Fingerprint (GC/FID by ASTM D3328-90 Mod.) ☐ TPH by GC/FID (8015B Mod) Quantitative Only ☐ Gasoline Range Organics (GRO) ☐ ME GRO ☐ MA DEP VPH w/all targets ☐ VPH (Carbon ranges only ☐ VTCLP ☐ SPLP ☐ 8 Metals ☐ PCBs only ☐ VOAs ☐ SemiVOAs ☐ Pesticides ☐ Herbicides ☐ Corrosivity (as pH) ☐ Reactivity ☐ Ignitability (as Flashpoint) ☐ Paint Filter ☐ MA Basic Disposal Criteria: 9 Metals, TPH by GC, PCBs, 5 Metals, Corrosivity, Ignitability, Reactivity ☐ Nitrate ☐ Nitrite ☐ Chloride ☐ Fluoride ☐ Sulfate ☐ Dissolved Phosphorus ☐ Ammonia ☐ TKN ☐ Total Phosphorus ☐ Total N (as NO2/NO3/TKN) ☐ Oil & Grease ☐ COD ☐ TOC ☐ BOD ☐ TDS ☐ TSS ☐ TS ☐ Alkalinity ☐ Dyanis, Total ☐ Dyanis, Physiographically Available ☐ pH ☐ Dissolved Oxygen ☐ Turbidity

Haz. Waste
☐ Corrosivity (as pH) ☐ Reactivity ☐ Ignitability (as Flashpoint) ☐ Paint Filter ☐ MA Basic Disposal Criteria: 9 Metals, TPH by GC, PCBs, 5 Metals, Corrosivity, Ignitability, Reactivity

General Chemistry

Sampling DATE	Sampling TIME	SAMPLE IDENTIFICATION	Matrix	Type	Container(s)	Preservation	Filtered	LABORATORY NUMBER (Lab Use Only)
4/27/04	1500	EB01	DILORGANIC LIQUID: Water	COMPOSITE	NUMBER: 2; 40mL VOA Vial: X	HCl: X	ICE: X	24
4/27/04	1530	EB02	DILORGANIC LIQUID: Water	GRAB	NUMBER: 1; 1L/32 oz Amber Glass: X	HNO3 (<pH2): X	ICE: X	25

REMARKS / SPECIAL INSTRUCTIONS

MA DEP MCP Data Enhancement Affirmation

☐ YES ☐ NO MCP Data Certification is required.

☐ YES ☐ NO MCP minimum Field QC requirements have been met for this project.
(Metals, hexavalent chromium and cyanide analyses require one matrix spike per 20 samples)

☐ YES ☐ NO MCP Drinking Water samples required.
(Require collection of contingent duplicate samples. Trip blanks are also required, if VOA samples collected

Signature: _____

DATA QUALITY OBJECTIVES

Regulatory Program

State	Standard	Deliverables
☐ CT	[x] MCP GW-1/S-1	☐ PWS Form
☐ ME	☐ MCP GW-2/S-2	☐ MWRA
[x] MA	☐ NY STARS	☐ _____
☐ NH	☐ Drinking Water	
☐ NY	☐ Wastewater	
☐ RI	☐ Waste Disposal	
☐ VT	☐ Dredge Material	
☐ ___	☐ _____	

Project Specific QC

Many regulatory programs and EPA methods require project specific QC. Project specific QC includes Sample Duplicates, Matrix Spikes, and/or Matrix Spike Duplicates. Laboratory QC is not project specific unless prearranged. Project specific QC samples are charged on a per sample basis. **Each MS, MSD and Sample Duplicate requires an additional sample aliquot.**

Project Specific QC Required
- ☐ Sample Duplicate
- ☐ Matrix Spike
- ☐ Matrix Spike Duplicate

Selection of QC Sample
- ☐ Please use sample: _____

CHAIN-OF-CUSTODY RECORD

NOTE: All samples submitted subject to Standard Terms and Conditions on reverse hereof.

	Date	Time		
Relinquished by Sampler:	4/27/04	1545	Received by: Alan Maddigan	Receipt Temperature: ☐ Ice ☐ Refrigerated ☐ °C Recommended 4.2
Relinquished by: Alan Maddigan	4/27/04	6:30	Received by:	Container Count: 3
Relinquished by:	Date	Time	Received by Laboratory:	Shipping/Airbill Number:

Method of Shipment: [x] GWA Courier ☐ Express Mail ☐ Federal Express ☐ UPS ☐ Hand ☐ _____

Custody Seal Number:

GROUNDWATER ANALYTICAL

Quality Assurance/Quality Control

A. Program Overview

Groundwater Analytical conducts an active Quality Assurance program to ensure the production of high quality, valid data. This program closely follows the guidance provided by *Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans,* US EPA QAMS-005/80 (1980), and *Test Methods for Evaluating Solid Waste,* US EPA, SW-846, Update III (1996).

Quality Control protocols include written Standard Operating Procedures (SOPs) developed for each analytical method. SOPs are derived from US EPA methodologies and other established references. Standards are prepared from commercially obtained reference materials of certified purity, and documented for traceability.

Quality Assessment protocols for most organic analyses include a minimum of one laboratory control sample, one method blank, one matrix spike sample, and one sample duplicate for each sample preparation batch. All samples, standards, blanks, laboratory control samples, matrix spikes and sample duplicates are spiked with internal standards and surrogate compounds. All instrument sequences begin with an initial calibration verification standard and a blank; and excepting GC/MS sequences, all sequences close with a continuing calibration standard. GC/MS systems are tuned to appropriate ion abundance criteria daily, or for each 12 hour operating period, whichever is more frequent.

Quality Assessment protocols for most inorganic analyses include a minimum of one laboratory control sample, one method blank, one matrix spike sample, and one sample duplicate for each sample preparation batch. Standard curves are derived from one reagent blank and four concentration levels. Curve validity is verified by standard recoveries within plus or minus ten percent of the curve.

B. Definitions

Batches are used as the basic unit for Quality Assessment. A Batch is defined as twenty or fewer samples of the same matrix which are prepared together for the same analysis, using the same lots of reagents and the same techniques or manipulations, all within the same continuum of time, up to but not exceeding 24 hours.

Laboratory Control Samples are used to assess the accuracy of the analytical method. A Laboratory Control Sample consists of reagent water or sodium sulfate spiked with a group of target analytes representative of the method analytes. Accuracy is defined as the degree of agreement of the measured value with the true or expected value. Perent Recoveries for the Laboratory Control Samples are calculated to assess accuracy.

Method Blanks are used to assess the level of contamination present in the analytical system. Method Blanks consist of reagent water or an aliquot of sodium sulfate. Method Blanks are taken through all the appropriate steps of an analytical method. Sample data reported is not corrected for blank contamination.

Surrogate Compounds are used to assess the effectiveness of an analytical method in dealing with each sample matrix. Surrogate Compounds are organic compounds which are similar to the target analytes of interest in chemical behavior, but which are not normally found in environmental samples. Percent Recoveries are calculated for each Surrogate Compound.

GROUNDWATER ANALYTICAL

Quality Control Report
Laboratory Control Sample

Category:	**EPA Method 8270C PAHs**	Instrument ID:	**MS-3 HP 5890**
QC Batch ID:	**SV-1438-P**	Extracted:	**04-30-04 14:00**
Matrix:	**Soil**	Cleaned Up:	**05-06-04 12:00**
Units:	**ug/Kg**	Analyzed:	**05-06-04 16:20**
		Analyst:	**JJT**

CAS Number	Analyte	Spiked	Measured	Recovery	QC Limits
91-20-3	Naphthalene	3,300	2,300	69 %	40 - 140 %
91-57-6	2-Methylnaphthalene	3,300	2,500	76 %	40 - 140 %
208-96-8	Acenaphthylene	3,300	2,700	80 %	40 - 140 %
83-32-9	Acenaphthene	3,300	2,500	75 %	40 - 140 %
86-73-7	Fluorene	3,300	2,700	80 %	40 - 140 %
85-01-8	Phenanthrene	3,300	2,700	82 %	40 - 140 %
120-12-7	Anthracene	3,300	2,900	86 %	40 - 140 %
206-44-0	Fluoranthene	3,300	2,800	83 %	40 - 140 %
129-00-0	Pyrene	3,300	2,800	84 %	40 - 140 %
56-55-3	Benzo[a]anthracene	3,300	2,900	86 %	40 - 140 %
218-01-9	Chrysene	3,300	2,800	84 %	40 - 140 %
205-99-2	Benzo[b]fluoranthene	3,300	2,700	80 %	40 - 140 %
207-08-9	Benzo[k]fluoranthene	3,300	2,700	82 %	40 - 140 %
50-32-8	Benzo[a]pyrene	3,300	2,900	88 %	40 - 140 %
193-39-5	Indeno[1,2,3-c,d]pyrene	3,300	3,100	94 %	40 - 140 %
53-70-3	Dibenzo[a,h]anthracene	3,300	3,300	98 %	40 - 140 %
191-24-2	Benzo[g,h,i]perylene	3,300	3,100	92 %	40 - 140 %

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Nitrobenzene-d5	6,700	4,000	60 %	30 - 130 %
2-Fluorobiphenyl	6,700	4,700	70 %	30 - 130 %
Terphenyl-d14	6,700	5,200	78 %	30 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample extraction performed Sample extraction performed by EPA Method 3545. Cleanup performed by EPA Method 3630C.

Report Notations: All calculations performed prior to rounding. Quality Control Limits are defined by the methodology, or alternatively based upon the historical average recovery plus or minus three standard deviation units.

GROUNDWATER ANALYTICAL

Quality Control Report
Method Blank

Category: **EPA Method 8270C PAHs**
QC Batch ID: **SV-1438-P**
Matrix: **Soil**

Instrument ID: **MS-3 HP 5890**
Extracted: **04-30-04 14:00**
Cleaned Up: **05-06-04 12:00**
Analyzed: **05-06-04 15:40**
Analyst: **JJT**

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
91-20-3	Naphthalene	BRL		ug/Kg	330
91-57-6	2-Methylnaphthalene	BRL		ug/Kg	330
208-96-8	Acenaphthylene	BRL		ug/Kg	330
83-32-9	Acenaphthene	BRL		ug/Kg	330
86-73-7	Fluorene	BRL		ug/Kg	330
85-01-8	Phenanthrene	BRL		ug/Kg	330
120-12-7	Anthracene	BRL		ug/Kg	330
206-44-0	Fluoranthene	BRL		ug/Kg	330
129-00-0	Pyrene	BRL		ug/Kg	330
56-55-3	Benzo[a]anthracene	BRL		ug/Kg	330
218-01-9	Chrysene	BRL		ug/Kg	330
205-99-2	Benzo[b]fluoranthene	BRL		ug/Kg	330
207-08-9	Benzo[k]fluoranthene	BRL		ug/Kg	330
50-32-8	Benzo[a]pyrene	BRL		ug/Kg	330
193-39-5	Indeno[1,2,3-c,d]pyrene	BRL		ug/Kg	330
53-70-3	Dibenzo[a,h]anthracene	BRL		ug/Kg	330
191-24-2	Benzo[g,h,i]perylene	BRL		ug/Kg	330

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Nitrobenzene-d5	6,700	4,100	62 %	30 - 130 %
2-Fluorobiphenyl	6,700	4,500	68 %	30 - 130 %
Terphenyl-d14	6,700	5,100	76 %	30 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample extraction performed Sample extraction performed by EPA Method 3545. Cleanup performed by EPA Method 3630C.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

Groundwater Analytical, Inc.
P.O.Box 1200
228 Main Street
Buzzards Bay, MA 02532

Telephone: (508) 759-4441
FAX: (508) 759-4475

GROUNDWATER ANALYTICAL

e-mail

To:	John Burgess	**From:**	Eric Jensen
	CH2M Hill	**Pages:**	87
e-mail:	jburgess@ch2m.com	**Date:**	05/19/2004 04:52:04 PM
Re:	Project 72079	**CC:**	

NOTE

The format or contents of this e-mail transmission may not meet all applicable National Environmental Laboratory Accreditation Conference (NELAC) Standards for data reporting.

- **Comments:**

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Confidential

GROUNDWATER ANALYTICAL

Groundwater Analytical, Inc.
P.O. Box 1200
228 Main Street
Buzzards Bay, MA 02532

Telephone (508) 759-4441
FAX (508) 759-4475
www.groundwateranalytical.com

May 12, 2004

Mr. John Burgess
CH2M Hill
25 New Chardon Street
Suite 500
Boston, MA 02114

LABORATORY REPORT

Project: **Saugus Iron Works**
Lab ID: **72079**
Received: **04-28-04**

Dear John:

Enclosed are the analytical results for the above referenced project. The project was processed for Standard turnaround.

This letter authorizes the release of the analytical results, and should be considered a part of this report. This report contains a sample receipt report detailing the samples received, a project narrative indicating project changes and non-conformances, a quality control report, and a statement of our state certifications.

The analytical results contained in this report meet all applicable NELAC standards, except as may be specifically noted, or described in the project narrative. This report may only be used or reproduced in its entirety.

I attest under the pains and penalties of perjury that, based upon my inquiry of those individuals immediately responsible for obtaining the information, the material contained in this report is, to the best of my knowledge and belief, accurate and complete.

Should you have any questions concerning this report, please do not hesitate to contact me.

Sincerely,

Jonathan R. Sanford
President

JRS/smd
Enclosures

GROUNDWATER ANALYTICAL

Sample Receipt Report

Project: **Saugus Iron Works**
Client: **CH2M Hill**
Lab ID: **72079**

Delivery: **GWA Courier**
Airbill: **n/a**
Lab Receipt: **04-28-04**

Temperature: **2'C**
Chain of Custody: **Present**
Custody Seal(s): **n/a**

Lab ID	Field ID		Matrix	Sampled	Method				Notes
72079-1	SD0100		Soil	4/28/04 8:13	EPA 9060 Mod Total Organic Carbon				
Con ID	**Container**	**Vendor**	**QC Lot**	**Preserv**	**QC Lot**	**Prep**	**Ship**		
C464053	250 mL Glass	Greenwood	BX11505	None	n/a	n/a	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
72079-2	SD0101		Soil	4/28/04 8:15	EPA 9060 Mod Total Organic Carbon				
Con ID	**Container**	**Vendor**	**QC Lot**	**Preserv**	**QC Lot**	**Prep**	**Ship**		
C464066	250 mL Glass	Greenwood	BX11505	None	n/a	n/a	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
72079-3	SD0105		Soil	4/28/04 8:17	EPA 9060 Mod Total Organic Carbon				
Con ID	**Container**	**Vendor**	**QC Lot**	**Preserv**	**QC Lot**	**Prep**	**Ship**		
C464068	250 mL Glass	Greenwood	BX11505	None	n/a	n/a	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
72079-4	SD0106		Soil	4/28/04 8:19	EPA 9060 Mod Total Organic Carbon				
Con ID	**Container**	**Vendor**	**QC Lot**	**Preserv**	**QC Lot**	**Prep**	**Ship**		
C464049	250 mL Glass	Greenwood	BX11505	None	n/a	n/a	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
72079-5	SD0107		Soil	4/28/04 8:21	EPA 9060 Mod Total Organic Carbon				
Con ID	**Container**	**Vendor**	**QC Lot**	**Preserv**	**QC Lot**	**Prep**	**Ship**		
C464067	250 mL Glass	Greenwood	BX11505	None	n/a	n/a	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
72079-6	SD0108		Soil	4/28/04 8:23	EPA 9060 Mod Total Organic Carbon				
Con ID	**Container**	**Vendor**	**QC Lot**	**Preserv**	**QC Lot**	**Prep**	**Ship**		
C464069	250 mL Glass	Greenwood	BX11505	None	n/a	n/a	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
72079-7	SD0109		Soil	4/28/04 8:25	EPA 9060 Mod Total Organic Carbon				
Con ID	**Container**	**Vendor**	**QC Lot**	**Preserv**	**QC Lot**	**Prep**	**Ship**		
C464050	250 mL Glass	Greenwood	BX11505	None	n/a	n/a	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
72079-8	SD0110		Soil	4/28/04 8:27	EPA 9060 Mod Total Organic Carbon				
Con ID	**Container**	**Vendor**	**QC Lot**	**Preserv**	**QC Lot**	**Prep**	**Ship**		
C464054	250 mL Glass	Greenwood	BX11505	None	n/a	n/a	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
72079-9	SD0111		Soil	4/28/04 8:29	EPA 9060 Mod Total Organic Carbon				
Con ID	**Container**	**Vendor**	**QC Lot**	**Preserv**	**QC Lot**	**Prep**	**Ship**		
C464057	250 mL Glass	Greenwood	BX11505	None	n/a	n/a	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
72079-10	SD0112		Soil	4/28/04 8:31	EPA 9060 Mod Total Organic Carbon				
Con ID	**Container**	**Vendor**	**QC Lot**	**Preserv**	**QC Lot**	**Prep**	**Ship**		
C464052	250 mL Glass	Greenwood	BX11505	None	n/a	n/a	n/a		

GROUNDWATER ANALYTICAL

Sample Receipt Report (Continued)

Project: **Saugus Iron Works**
Client: **CH2M Hill**
Lab ID: **72079**

Delivery: **GWA Courier**
Airbill: **n/a**
Lab Receipt: **04-28-04**

Temperature: **2'C**
Chain of Custody: **Present**
Custody Seal(s): **n/a**

Lab ID	Field ID		Matrix	Sampled	Method				Notes
72079-11	SD0113		Soil	4/28/04 8:33	EPA 9060 Mod Total Organic Carbon				
Con ID	**Container**	**Vendor**	**QC Lot**	**Preserv**	**QC Lot**	**Prep**	**Ship**		
C464051	250 mL Glass	Greenwood	BX11505	None	n/a	n/a	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
72079-12	SD0114		Soil	4/28/04 8:35	EPA 9060 Mod Total Organic Carbon				
Con ID	**Container**	**Vendor**	**QC Lot**	**Preserv**	**QC Lot**	**Prep**	**Ship**		
C464056	250 mL Glass	Greenwood	BX11505	None	n/a	n/a	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
72079-13	SD0115		Soil	4/28/04 8:37	EPA 9060 Mod Total Organic Carbon				
Con ID	**Container**	**Vendor**	**QC Lot**	**Preserv**	**QC Lot**	**Prep**	**Ship**		
C464055	250 mL Glass	Greenwood	BX11505	None	n/a	n/a	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
72079-14	SD02TOC1		Soil	4/28/04 8:41	EPA 9060 Mod Total Organic Carbon				
Con ID	**Container**	**Vendor**	**QC Lot**	**Preserv**	**QC Lot**	**Prep**	**Ship**		
C414270	250 mL Glass	Fisher	BX12228	None	n/a	n/a	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
72079-15	SD02TOC2		Soil	4/28/04 8:43	EPA 9060 Mod Total Organic Carbon				
Con ID	**Container**	**Vendor**	**QC Lot**	**Preserv**	**QC Lot**	**Prep**	**Ship**		
C414271	250 mL Glass	Fisher	BX12228	None	n/a	n/a	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
72079-16	SD02TOC3		Soil	4/28/04 8:45	EPA 9060 Mod Total Organic Carbon				
Con ID	**Container**	**Vendor**	**QC Lot**	**Preserv**	**QC Lot**	**Prep**	**Ship**		
C414274	250 mL Glass	Fisher	BX12228	None	n/a	n/a	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
72079-17	SD02TOC4		Soil	4/28/04 8:47	EPA 9060 Mod Total Organic Carbon				
Con ID	**Container**	**Vendor**	**QC Lot**	**Preserv**	**QC Lot**	**Prep**	**Ship**		
C464064	250 mL Glass	Greenwood	BX11505	None	n/a	n/a	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
72079-18	SD02TOC5		Soil	4/28/04 8:49	EPA 9060 Mod Total Organic Carbon				
Con ID	**Container**	**Vendor**	**QC Lot**	**Preserv**	**QC Lot**	**Prep**	**Ship**		
C464065	250 mL Glass	Greenwood	BX11505	None	n/a	n/a	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
72079-19	SD02TOC6		Soil	4/28/04 8:51	EPA 9060 Mod Total Organic Carbon				
Con ID	**Container**	**Vendor**	**QC Lot**	**Preserv**	**QC Lot**	**Prep**	**Ship**		
C414273	250 mL Glass	Fisher	BX12228	None	n/a	n/a	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
72079-20	SD02TOC7		Soil	4/28/04 8:53	EPA 9060 Mod Total Organic Carbon				
Con ID	**Container**	**Vendor**	**QC Lot**	**Preserv**	**QC Lot**	**Prep**	**Ship**		
C501658	250 mL Glass	Greenwood	BX11499	None	n/a	n/a	n/a		

GROUNDWATER ANALYTICAL

Sample Receipt Report (Continued)

Project: **Saugus Iron Works**
Client: **CH2M Hill**
Lab ID: **72079**

Delivery: **GWA Courier**
Airbill: **n/a**
Lab Receipt: **04-28-04**

Temperature: **2'C**
Chain of Custody: **Present**
Custody Seal(s): **n/a**

Lab ID	Field ID		Matrix	Sampled	Method				Notes
72079-21	SD03TOC1		Soil	4/28/04 11:30	EPA 9060 Mod Total Organic Carbon				
Con ID	**Container**	**Vendor**	**QC Lot**	**Preserv**	**QC Lot**	**Prep**	**Ship**		
C501656	250 mL Glass	Greenwood	BX11499	None	n/a	n/a	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
72079-22	SD03DUP1		Soil	4/28/04 11:32	EPA 9060 Mod Total Organic Carbon				
Con ID	**Container**	**Vendor**	**QC Lot**	**Preserv**	**QC Lot**	**Prep**	**Ship**		
C501643	250 mL Glass	Greenwood	BX11499	None	n/a	n/a	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
72079-23	SD03TOC2		Soil	4/28/04 11:34	EPA 9060 Mod Total Organic Carbon				
Con ID	**Container**	**Vendor**	**QC Lot**	**Preserv**	**QC Lot**	**Prep**	**Ship**		
C501644	250 mL Glass	Greenwood	BX11499	None	n/a	n/a	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
72079-24	SD03TOC3		Soil	4/28/04 11:36	EPA 9060 Mod Total Organic Carbon				
Con ID	**Container**	**Vendor**	**QC Lot**	**Preserv**	**QC Lot**	**Prep**	**Ship**		
C501646	250 mL Glass	Greenwood	BX11499	None	n/a	n/a	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
72079-25	SD03TOC3 MS/MSD		Soil	4/28/04 11:38	EPA 9060 Mod Total Organic Carbon				
Con ID	**Container**	**Vendor**	**QC Lot**	**Preserv**	**QC Lot**	**Prep**	**Ship**		
C501645	250 mL Glass	Greenwood	BX11499	None	n/a	n/a	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
72079-26	SD03TOC4		Soil	4/28/04 11:46	EPA 9060 Mod Total Organic Carbon				
Con ID	**Container**	**Vendor**	**QC Lot**	**Preserv**	**QC Lot**	**Prep**	**Ship**		
C501657	250 mL Glass	Greenwood	BX11499	None	n/a	n/a	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
72079-27	SD03DUP2		Soil	4/28/04 11:48	EPA 9060 Mod Total Organic Carbon				
Con ID	**Container**	**Vendor**	**QC Lot**	**Preserv**	**QC Lot**	**Prep**	**Ship**		
C501647	250 mL Glass	Greenwood	BX11499	None	n/a	n/a	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
72079-28	SD03TOC5		Soil	4/28/04 11:50	EPA 9060 Mod Total Organic Carbon				
Con ID	**Container**	**Vendor**	**QC Lot**	**Preserv**	**QC Lot**	**Prep**	**Ship**		
C501648	250 mL Glass	Greenwood	BX11499	None	n/a	n/a	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
72079-29	SD03TOC6		Soil	4/28/04 11:52	EPA 9060 Mod Total Organic Carbon				
Con ID	**Container**	**Vendor**	**QC Lot**	**Preserv**	**QC Lot**	**Prep**	**Ship**		
C501649	250 mL Glass	Greenwood	BX11499	None	n/a	n/a	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
72079-30	SD03TOC7		Soil	4/28/04 12:00	EPA 9060 Mod Total Organic Carbon				
Con ID	**Container**	**Vendor**	**QC Lot**	**Preserv**	**QC Lot**	**Prep**	**Ship**		
C414272	250 mL Glass	Fisher	BX12228	None	n/a	n/a	n/a		

GROUNDWATER ANALYTICAL

Sample Receipt Report (Continued)

Project: **Saugus Iron Works**
Client: **CH2M Hill**
Lab ID: **72079**

Delivery: **GWA Courier**
Airbill: **n/a**
Lab Receipt: **04-28-04**

Temperature: **2'C**
Chain of Custody: **Present**
Custody Seal(s): **n/a**

Lab ID	Field ID		Matrix	Sampled	Method				Notes
72079-31	SD03DUP3		Soil	4/28/04 12:02	EPA 9060 Mod Total Organic Carbon				
Con ID	**Container**	**Vendor**	**QC Lot**	**Preserv**	**QC Lot**	**Prep**	**Ship**		
C501650	250 mL Glass	Greenwood	BX11499	None	n/a	n/a	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
72079-32	SD03TOC8		Soil	4/28/04 12:04	EPA 9060 Mod Total Organic Carbon				
Con ID	**Container**	**Vendor**	**QC Lot**	**Preserv**	**QC Lot**	**Prep**	**Ship**		
C501782	250 mL Glass	Greenwood	BX11473	None	n/a	n/a	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
72079-33	SD03TOC8 MS/MSD		Soil	4/28/04 12:06	EPA 9060 Mod Total Organic Carbon				
Con ID	**Container**	**Vendor**	**QC Lot**	**Preserv**	**QC Lot**	**Prep**	**Ship**		
C501651	250 mL Glass	Greenwood	BX11499	None	n/a	n/a	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
72079-34	SD03TOC9		Soil	4/28/04 12:08	EPA 9060 Mod Total Organic Carbon				
Con ID	**Container**	**Vendor**	**QC Lot**	**Preserv**	**QC Lot**	**Prep**	**Ship**		
C501652	250 mL Glass	Greenwood	BX11499	None	n/a	n/a	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
72079-35	SD03TOC10		Soil	4/28/04 12:14	EPA 9060 Mod Total Organic Carbon				
Con ID	**Container**	**Vendor**	**QC Lot**	**Preserv**	**QC Lot**	**Prep**	**Ship**		
C501653	250 mL Glass	Greenwood	BX11499	None	n/a	n/a	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
72079-36	SD03TOC11		Soil	4/28/04 12:16	EPA 9060 Mod Total Organic Carbon				
Con ID	**Container**	**Vendor**	**QC Lot**	**Preserv**	**QC Lot**	**Prep**	**Ship**		
C501654	250 mL Glass	Greenwood	BX11499	None	n/a	n/a	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
72079-37	SD03TOC12		Soil	4/28/04 12:18	EPA 9060 Mod Total Organic Carbon				
Con ID	**Container**	**Vendor**	**QC Lot**	**Preserv**	**QC Lot**	**Prep**	**Ship**		
C501655	250 mL Glass	Greenwood	BX11499	None	n/a	n/a	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
72079-38	SD03TOC12 MS/MSD		Soil	4/28/04 12:20	EPA 9060 Mod Total Organic Carbon				
Con ID	**Container**	**Vendor**	**QC Lot**	**Preserv**	**QC Lot**	**Prep**	**Ship**		
C501763	250 mL Glass	Greenwood	BX11473	None	n/a	n/a	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
72079-39	SD0104		Soil	4/28/04 8:16	EPA 6010B/7471A 13 Priority Pollutant Metals EPA 8270C PAHs				
Con ID	**Container**	**Vendor**	**QC Lot**	**Preserv**	**QC Lot**	**Prep**	**Ship**		
C464061	250 mL Glass	Greenwood	BX11505	None	n/a	n/a	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
72079-40	SD0148		Soil	4/28/04 8:24	EPA 6010B/7471A 13 Priority Pollutant Metals EPA 8270C PAHs				
Con ID	**Container**	**Vendor**	**QC Lot**	**Preserv**	**QC Lot**	**Prep**	**Ship**		
C464048	250 mL Glass	Greenwood	BX11505	None	n/a	n/a	n/a		

GROUNDWATER ANALYTICAL

Sample Receipt Report (Continued)

Project: **Saugus Iron Works**
Client: **CH2M Hill**
Lab ID: **72079**

Delivery: **GWA Courier**
Airbill: **n/a**
Lab Receipt: **04-28-04**

Temperature: **2'C**
Chain of Custody: **Present**
Custody Seal(s): **n/a**

Lab ID	Field ID		Matrix	Sampled	Method				Notes
72079-41	SD01812		Soil	4/28/04 8:32	EPA 6010B/7471A 13 Priority Pollutant Metals EPA 8270C PAHs				
Con ID	**Container**	**Vendor**	**QC Lot**	**Preserv**	**QC Lot**	**Prep**	**Ship**		
C464062	250 mL Glass	Greenwood	BX11505	None	n/a	n/a	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
72079-42	SD011215		Soil	4/28/04 8:38	EPA 6010B/7471A 13 Priority Pollutant Metals EPA 8270C PAHs				
Con ID	**Container**	**Vendor**	**QC Lot**	**Preserv**	**QC Lot**	**Prep**	**Ship**		
C464071	250 mL Glass	Greenwood	BX11505	None	n/a	n/a	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
72079-43	SD0204		Soil	4/28/04 8:44	EPA 6010B/7471A 13 Priority Pollutant Metals EPA 8270C PAHs				
Con ID	**Container**	**Vendor**	**QC Lot**	**Preserv**	**QC Lot**	**Prep**	**Ship**		
C464060	250 mL Glass	Greenwood	BX11505	None	n/a	n/a	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
72079-44	SD0248		Soil	4/28/04 8:52	EPA 6010B/7471A 13 Priority Pollutant Metals EPA 8270C PAHs				
Con ID	**Container**	**Vendor**	**QC Lot**	**Preserv**	**QC Lot**	**Prep**	**Ship**		
C464070	250 mL Glass	Greenwood	BX11505	None	n/a	n/a	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
72079-45	SD02812		Soil	4/28/04 8:54	EPA 6010B/7471A 13 Priority Pollutant Metals EPA 8270C PAHs				
Con ID	**Container**	**Vendor**	**QC Lot**	**Preserv**	**QC Lot**	**Prep**	**Ship**		
C414275	250 mL Glass	Fisher	BX12228	None	n/a	n/a	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
72079-46	SD0304		Soil	4/28/04 11:40	EPA 6010B/7471A 13 Priority Pollutant Metals EPA 8270C PAHs				
Con ID	**Container**	**Vendor**	**QC Lot**	**Preserv**	**QC Lot**	**Prep**	**Ship**		
C501661	250 mL Glass	Greenwood	BX11499	None	n/a	n/a	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
72079-47	SD03DUP4		Soil	4/28/04 11:42	EPA 6010B/7471A 13 Priority Pollutant Metals EPA 8270C PAHs				
Con ID	**Container**	**Vendor**	**QC Lot**	**Preserv**	**QC Lot**	**Prep**	**Ship**		
C501659	250 mL Glass	Greenwood	BX11499	None	n/a	n/a	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
72079-48	SD0304 MS/MSD		Soil	4/28/04 11:44	EPA 6010B/7471A 13 Priority Pollutant Metals EPA 8270C PAHs				
Con ID	**Container**	**Vendor**	**QC Lot**	**Preserv**	**QC Lot**	**Prep**	**Ship**		
C501766	250 mL Glass	Greenwood	BX11473	None	n/a	n/a	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
72079-49	SD0348		Soil	4/28/04 11:54	EPA 6010B/7471A 13 Priority Pollutant Metals EPA 8270C PAHs				
Con ID	**Container**	**Vendor**	**QC Lot**	**Preserv**	**QC Lot**	**Prep**	**Ship**		
C501665	250 mL Glass	Greenwood	BX11499	None	n/a	n/a	n/a		

GROUNDWATER ANALYTICAL

Sample Receipt Report (Continued)

Project:	**Saugus Iron Works**	Delivery:	**GWA Courier**	Temperature:	**2'C**
Client:	**CH2M Hill**	Airbill:	**n/a**	Chain of Custody:	**Present**
Lab ID:	**72079**	Lab Receipt:	**04-28-04**	Custody Seal(s):	**n/a**

Lab ID	Field ID		Matrix	Sampled	Method				Notes
72079-50	SD0348 MS/MSD		Soil	4/28/04 11:56	EPA 6010B/7471A 13 Priority Pollutant Metals EPA 8270C PAHs				
Con ID	**Container**	**Vendor**	**QC Lot**	**Preserv**	**QC Lot**	**Prep**	**Ship**		
C501660	250 mL Glass	Greenwood	BX11499	None	n/a	n/a	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
72079-51	SD03DUP5		Soil	4/28/04 11:58	EPA 6010B/7471A 13 Priority Pollutant Metals EPA 8270C PAHs				
Con ID	**Container**	**Vendor**	**QC Lot**	**Preserv**	**QC Lot**	**Prep**	**Ship**		
C501662	250 mL Glass	Greenwood	BX11499	None	n/a	n/a	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
72079-52	SD03812		Soil	4/28/04 12:10	EPA 6010B/7471A 13 Priority Pollutant Metals EPA 8270C PAHs				
Con ID	**Container**	**Vendor**	**QC Lot**	**Preserv**	**QC Lot**	**Prep**	**Ship**		
C501765	250 mL Glass	Greenwood	BX11473	None	n/a	n/a	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
72079-53	SD03DUP6		Soil	4/28/04 12:12	EPA 6010B/7471A 13 Priority Pollutant Metals EPA 8270C PAHs				
Con ID	**Container**	**Vendor**	**QC Lot**	**Preserv**	**QC Lot**	**Prep**	**Ship**		
C501663	250 mL Glass	Greenwood	BX11499	None	n/a	n/a	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
72079-54	SD031215		Soil	4/28/04 12:22	EPA 6010B/7471A 13 Priority Pollutant Metals EPA 8270C PAHs				
Con ID	**Container**	**Vendor**	**QC Lot**	**Preserv**	**QC Lot**	**Prep**	**Ship**		
C501664	250 mL Glass	Greenwood	BX11499	None	n/a	n/a	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
72079-55	EB03		Aqueous	4/28/04 14:15	EPA 6010/7470A 13 Priority Pollutant Metals				
Con ID	**Container**	**Vendor**	**QC Lot**	**Preserv**	**QC Lot**	**Prep**	**Ship**		
C311744	250 mL Plastic	Proline	BX10723	HNO3	R-3884A	02-02-04	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
72079-56	EB03		Aqueous	4/28/04 14:15	EPA 8270C PAHs Low Level SIM				
Con ID	**Container**	**Vendor**	**QC Lot**	**Preserv**	**QC Lot**	**Prep**	**Ship**		
C284118	1 L Amber Glass	Proline	BX7946	None	n/a	n/a	n/a		
C284117	1 L Amber Glass	Proline	BX7946	None	n/a	n/a	n/a		

GROUNDWATER ANALYTICAL

Data Certification

Project: **Saugus Iron Works** Lab ID: **72079**
Client: **CH2M Hill** Received: **04-28-04 18:30**

MA DEP Compendium of Analytical Methods

Project Location: **n/a** MA DEP RTN: **n/a**

This Form provides certifications for the following data set:

EPA 8270C: 72079-39,-40,-41,-42,-43,-44,-45,-46,-47,-48,-49,-50,-51,-52,-53,-54,-56
EPA 6010B: 72079-39,-40,-41,-42,-43,-44,-45,-46,-47,-48,-49,-50,-51,-52,-53,-54,-55,-55
EPA 7470A/1A: 72079-39,-40,-41,-42,-43,-44,-45,-46,-47,-48,-49,-50,-51,-52,-53,-54,-55,-55

Sample Matrices:	Groundwater (X)	Soil/Sediment (X)	Drinking Water ( )	Other ( )	
MCP SW-846 Methods Used	8260B ( )	8151A ( )	8330 ( )	6010B (X)	7470A/1A (X)
	8270C (X)	8081A ( )	VPH ( )	6020 ( )	9012A[2] ( )
	8082 ( )	8021B ( )	EPH ( )	7000 S[3] ( )	Other ( )

As specified in MA DEP Compendium of Analytical Methods. (check all that apply)

1. List Release Tracking Number (RTN), if known.
2. SW-846 Method 9012A (Equivalent to 9014) or MA DEP Physiologically Available Cyanide (PAC) Method
3. S - SW-846 Methods 7000 Series. List individual method and analyte.

An affirmative response to questions A, B, C and D is required for "Presumptive Certainty" status.

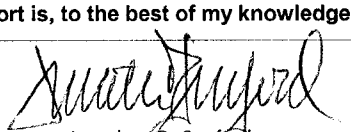
A.	Were all samples received by the laboratory in a condition consistent with that described on the Chain-of-Custody documentation for the data set?	Yes
B.	Were all QA/QC procedures required for the specified analytical method(s) included in this report followed, including the requirement to note and discuss in a narrative QC data that did not meet appropriate performance standards or guidelines?	Yes
C.	Does the analytical data included in this report meet all the requirements for "Presumptive Certainty," as described in Section 2.0 of the MA DEP document CAM VII A, *Quality Assurance and Quality Control Guidelines for the Acquisition and Reporting of Analytical Data*?	Yes
D.	VPH and EPH methods only: Was the VPH or EPH method run without significant modifications, as specified in Section 11.3?	n/a

A response to questions E and F below is required for "Presumptive Certainty" status.

E.	Were all QC performance standards and recommendations for the specified methods achieved?	No
F.	Were results for all analyte-list compounds/elements for the specified method(s) reported?	No

All No answers are addressed in the attached Project Narrative.

I, the undersigned, attest under the pains and penalties of perjury that, based upon my personal inquiry of those responsible for obtaining the information, the material contained in this analytical report is, to the best of my knowledge and belief, accurate and complete.

Signature:  Position: President

Printed Name: Jonathan R. Sanford Date: 05-12-04

GROUNDWATER ANALYTICAL

Inorganic Chemistry

Field ID: **SD0100**
Project: **Saugus Iron Works**
Client: **CH2M Hill**

Matrix: **Soil**
Received: **04-28-04 18:30**

Lab ID: **72079-01** Sampled: **04-28-04 08:13** % Solids: **30** Container: **250 mL Glass** Preservation: **Cool**

Analyte	Result	Units	RL	DF	Weight	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	**>320,000**	mg/Kg	51,000	150	0.27 mg	05-03-04 13:54	TOC-0253-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:

BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

RL Reporting Limit.

DF Dilution Factor.

1 Instrument ID: Tekmar-Dohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Inorganic Chemistry

Field ID: **SD0101**
Project: **Saugus Iron Works**
Client: **CH2M Hill**

Matrix: **Soil**
Received: **04-28-04 18:30**

Lab ID: **72079-02** Sampled: **04-28-04 08:15** % Solids: **80** Container: **250 mL Glass** Preservation: **Cool**

Analyte	Result	Units	RL	DF	Weight	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	**350**	mg/Kg	230	2	22 mg	05-03-04 14:18	TOC-0253-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
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RL Reporting Limit.

DF Dilution Factor.

1 Instrument ID: Tekmar-Dohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Inorganic Chemistry

Field ID: **SD0105**
Project: **Saugus Iron Works**
Client: **CH2M Hill**

Matrix: **Soil**
Received: **04-28-04 18:30**

Lab ID: **72079-03** Sampled: **04-28-04 08:17** % Solids: **82** Container: **250 mL Glass** Preservation: **Cool**

Analyte	Result	Units	RL	DF	Weight	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	**730**	mg/Kg	210	2	23 mg	05-03-04 14:33	TOC-0253-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

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RL Reporting Limit.

DF Dilution Factor.

1 Instrument ID: Tekmar-Dohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Inorganic Chemistry

Field ID: **SD0106**
Project: **Saugus Iron Works**
Client: **CH2M Hill**

Matrix: **Soil**
Received: **04-28-04 18:30**

Lab ID: **72079-04** Sampled: **04-28-04 08:19** % Solids: **83** Container: **250 mL Glass** Preservation: **Cool**

Analyte	Result	Units	RL	DF	Weight	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	**890**	mg/Kg	210	2	23 mg	05-03-04 15:28	TOC-0253-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:

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RL Reporting Limit.

DF Dilution Factor.

1 Instrument ID: Tekmar-Dohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Inorganic Chemistry

Field ID: **SD0107**
Project: **Saugus Iron Works**
Client: **CH2M Hill**

Matrix: **Soil**
Received: **04-28-04 18:30**

Lab ID: **72079-05** Sampled: **04-28-04 08:21** % Solids: **69** Container: **250 mL Glass** Preservation: **Cool**

Analyte	Result	Units	RL	DF	Weight	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	**13,000**	mg/Kg	6,400	44	0.9 mg	05-03-04 15:50	TOC-0253-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
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RL Reporting Limit.

DF Dilution Factor.

1 Instrument ID: Tekmar-Dohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Inorganic Chemistry

Field ID: **SD0108**
Project: **Saugus Iron Works**
Client: **CH2M Hill**

Matrix: **Soil**
Received: **04-28-04 18:30**

Lab ID: **72079-06** Sampled: **04-28-04 08:23** % Solids: **42** Container: **250 mL Glass** Preservation: **Cool**

Analyte	Result	Units	RL	DF	Weight	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	**110,000**	mg/Kg	27,000	114	0.35 mg	05-03-04 16:09	TOC-0253-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:

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RL Reporting Limit.

DF Dilution Factor.

1 Instrument ID: Tekmar-Dohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Inorganic Chemistry

Field ID: **SD0109**
Project: **Saugus Iron Works**
Client: **CH2M Hill**

Matrix: **Soil**
Received: **04-28-04 18:30**

Lab ID: **72079-07** Sampled: **04-28-04 08:25** % Solids: **83** Container: **250 mL Glass** Preservation: **Cool**

Analyte	Result	Units	RL	DF	Weight	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	**1,300**	mg/Kg	460	4	10 mg	05-03-04 16:33	TOC-0253-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:

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RL Reporting Limit.

DF Dilution Factor.

1 Instrument ID: Tekmar-Dohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Inorganic Chemistry

Field ID: **SD0110**
Project: **Saugus Iron Works**
Client: **CH2M Hill**

Matrix: **Soil**
Received: **04-28-04 18:30**

Lab ID: **72079-08** Sampled: **04-28-04 08:27** % Solids: **70** Container: **250 mL Glass** Preservation: **Cool**

Analyte	Result	Units	RL	DF	Weight	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	**86,000**	mg/Kg	23,000	160	0.25 mg	05-03-04 16:47	TOC-0253-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

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RL Reporting Limit.

DF Dilution Factor.

1 Instrument ID: Tekmar-Dohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Inorganic Chemistry

Field ID: **SD0111**
Project: **Saugus Iron Works**
Client: **CH2M Hill**

Matrix: **Soil**
Received: **04-28-04 18:30**

Lab ID: **72079-09** Sampled: **04-28-04 08:29** % Solids: **61** Container: **250 mL Glass** Preservation: **Cool**

Analyte	Result	Units	RL	DF	Weight	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	**140,000**	mg/Kg	22,000	133	0.3 mg	05-04-04 10:02	TOC-0254-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:

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RL Reporting Limit.

DF Dilution Factor.

1 Instrument ID: Tekmar-Dohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Inorganic Chemistry

Field ID: **SD0112**
Project: **Saugus Iron Works**
Client: **CH2M Hill**

Matrix: **Soil**
Received: **04-28-04 18:30**

Lab ID: **72079-10** Sampled: **04-28-04 08:31** % Solids: **90** Container: **250 mL Glass** Preservation: **Cool**

Analyte	Result	Units	RL	DF	Weight	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	**3,600**	mg/Kg	590	5	7.5 mg	05-04-04 10:37	TOC-0254-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
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RL Reporting Limit.

DF Dilution Factor.

1 Instrument ID: Tekmar-Dohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Inorganic Chemistry

Field ID: **SD0113**
Project: **Saugus Iron Works**
Client: **CH2M Hill**

Matrix: **Soil**
Received: **04-28-04 18:30**

Lab ID: **72079-11** Sampled: **04-28-04 08:33** % Solids: **82** Container: **250 mL Glass** Preservation: **Cool**

Analyte	Result	Units	RL	DF	Weight	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	**8,200**	mg/Kg	1,700	14	2.8 mg	05-04-04 11:45	TOC-0254-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:

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RL Reporting Limit.

DF Dilution Factor.

1 Instrument ID: Tekmar-Dohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Inorganic Chemistry

Field ID: **SD0114**
Project: **Saugus Iron Works**
Client: **CH2M Hill**

Matrix: **Soil**
Received: **04-28-04 18:30**

Lab ID: **72079-12** Sampled: **04-28-04 08:35** % Solids: **84** Container: **250 mL Glass** Preservation: **Cool**

Analyte	Result	Units	RL	DF	Weight	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	**1,700**	mg/Kg	1,200	10	4 mg	05-04-04 12:07	TOC-0254-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
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DF Dilution Factor.

1 Instrument ID: Tekmar-Dohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Inorganic Chemistry

Field ID: **SD0115**
Project: **Saugus Iron Works**
Client: **CH2M Hill**

Matrix: **Soil**
Received: **04-28-04 18:30**

Lab ID: **72079-13** Sampled: **04-28-04 08:37** % Solids: **83** Container: **250 mL Glass** Preservation: **Cool**

Analyte	Result	Units	RL	DF	Weight	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	**190**	mg/Kg	100	0	100 mg	05-04-04 13:43	TOC-0254-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:

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RL Reporting Limit.

DF Dilution Factor.

1 Instrument ID: Tekmar-Dohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Inorganic Chemistry

Field ID: **SD02TOC1**
Project: **Saugus Iron Works**
Client: **CH2M Hill**

Matrix: **Soil**
Received: **04-28-04 18:30**

Lab ID: **72079-14** Sampled: **04-28-04 08:41** % Solids: **34** Container: **250 mL Glass** Preservation: **Cool**

Analyte	Result	Units	RL	DF	Weight	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	**>74,000**	mg/Kg	13,000	44	0.9 mg	05-04-04 14:00	TOC-0254-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
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DF Dilution Factor.

1 Instrument ID: Tekmar-Dohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Inorganic Chemistry

Field ID: **SD02TOC2**
Project: **Saugus Iron Works**
Client: **CH2M Hill**

Matrix: **Soil**
Received: **04-28-04 18:30**

Lab ID: **72079-15** Sampled: **04-28-04 08:43** % Solids: **72** Container: **250 mL Glass** Preservation: **Cool**

Analyte	Result	Units	RL	DF	Weight	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	**82,000**	mg/Kg	22,000	160	0.25 mg	05-04-04 14:20	TOC-0254-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
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1 Instrument ID: Tekmar-Dohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Inorganic Chemistry

Field ID: **SD02TOC3**
Project: **Saugus Iron Works**
Client: **CH2M Hill**

Matrix: **Soil**
Received: **04-28-04 18:30**

Lab ID: **72079-16** Sampled: **04-28-04 08:45** % Solids: **66** Container: **250 mL Glass** Preservation: **Cool**

Analyte	Result	Units	RL	DF	Weight	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	**37,000**	mg/Kg	6,200	41	0.98 mg	05-04-04 14:34	TOC-0254-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
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DF Dilution Factor.

1 Instrument ID: Tekmar-Dohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Inorganic Chemistry

Field ID: **SD02TOC4**
Project: **Saugus Iron Works**
Client: **CH2M Hill**

Matrix: **Soil**
Received: **04-28-04 18:30**

Lab ID: **72079-17** Sampled: **04-28-04 08:47** % Solids: **78** Container: **250 mL Glass** Preservation: **Cool**

Analyte	Result	Units	RL	DF	Weight	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	**27,000**	mg/Kg	7,100	55	0.73 mg	05-04-04 15:23	TOC-0254-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
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RL Reporting Limit.

DF Dilution Factor.

1 Instrument ID: Tekmar-Dohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Inorganic Chemistry

Field ID: **SD02TOC5**
Project: **Saugus Iron Works**
Client: **CH2M Hill**

Matrix: **Soil**
Received: **04-28-04 18:30**

Lab ID: **72079-18** Sampled: **04-28-04 08:49** % Solids: **70** Container: **250 mL Glass** Preservation: **Cool**

Analyte	Result	Units	RL	DF	Weight	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	**8,200**	mg/Kg	1,700	12	3.5 mg	05-04-04 15:44	TOC-0254-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
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RL Reporting Limit.

DF Dilution Factor.

1 Instrument ID: Tekmar-Dohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Inorganic Chemistry

Field ID: **SD02TOC6**
Project: **Saugus Iron Works**
Client: **CH2M Hill**

Matrix: **Soil**
Received: **04-28-04 18:30**

Lab ID: **72079-19** Sampled: **04-28-04 08:51** % Solids: **66** Container: **250 mL Glass** Preservation: **Cool**

Analyte	Result	Units	RL	DF	Weight	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	**30,000**	mg/Kg	10,000	67	0.6 mg	05-04-04 16:00	TOC-0254-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:

BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

RL Reporting Limit.

DF Dilution Factor.

1 Instrument ID: Tekmar-Dohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Inorganic Chemistry

Field ID: **SD02TOC7**
Project: **Saugus Iron Works**
Client: **CH2M Hill**

Matrix: **Soil**
Received: **04-28-04 18:30**

Lab ID: **72079-20** Sampled: **04-28-04 08:53** % Solids: **63** Container: **250 mL Glass** Preservation: **Cool**

Analyte	Result	Units	RL	DF	Weight	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	**77,000**	mg/Kg	18,000	114	0.35 mg	05-04-04 16:18	TOC-0254-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:

BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

RL Reporting Limit.

DF Dilution Factor.

1 Instrument ID: Tekmar-Dohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Inorganic Chemistry

Field ID: **SD03TOC1**
Project: **Saugus Iron Works**
Client: **CH2M Hill**

Matrix: **Soil**
Received: **04-28-04 18:30**

Lab ID: **72079-21** Sampled: **04-28-04 11:30** % Solids: **65** Container: **250 mL Glass** Preservation: **Cool**

Analyte	Result	Units	RL	DF	Weight	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	**22,000**	mg/Kg	6,000	39	1 mg	05-04-04 16:36	TOC-0254-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:

BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

RL Reporting Limit.

DF Dilution Factor.

1 Instrument ID: Tekmar-Dohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Inorganic Chemistry

Field ID: **SD03DUP1**
Project: **Saugus Iron Works**
Client: **CH2M Hill**

Matrix: **Soil**
Received: **04-28-04 18:30**

Lab ID: **72079-22** Sampled: **04-28-04 11:32** % Solids: **64** Container: **250 mL Glass** Preservation: **Cool**

Analyte	Result	Units	RL	DF	Weight	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	**25,000**	mg/Kg	7,800	50	0.8 mg	05-04-04 16:50	TOC-0254-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:

BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

RL Reporting Limit.

DF Dilution Factor.

1 Instrument ID: Tekmar-Dohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Inorganic Chemistry

Field ID: **SD03TOC2**
Project: **Saugus Iron Works**
Client: **CH2M Hill**

Matrix: **Soil**
Received: **04-28-04 18:30**

Lab ID: **72079-23** Sampled: **04-28-04 11:34** % Solids: **39** Container: **250 mL Glass** Preservation: **Cool**

Analyte	Result	Units	RL	DF	Weight	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	**470,000**	mg/Kg	59,000	229	0.18 mg	05-05-04 10:35	TOC-0255-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:

BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

RL Reporting Limit.

DF Dilution Factor.

1 Instrument ID: Tekmar-Dohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Inorganic Chemistry

Field ID: **SD03TOC3**
Project: **Saugus Iron Works**
Client: **CH2M Hill**

Matrix: **Soil**
Received: **04-28-04 18:30**

Lab ID: **72079-24** Sampled: **04-28-04 11:36** % Solids: **69** Container: **250 mL Glass** Preservation: **Cool**

Analyte	Result	Units	RL	DF	Weight	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	**17,000**	mg/Kg	7,000	48	0.83 mg	04-30-04 14:49	TOC-0252-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:

BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

RL Reporting Limit.

DF Dilution Factor.

1 Instrument ID: Tekmar-Dohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Matrix Spike and Matrix Spike Duplicate
Inorganic Chemistry

			Parent Sample	Matrix Spike	Spike Duplicate
Field ID:	**SD03TOC3**	Laboratory ID:	**72079-24**	**72079-25MS**	**72079-25MSD**
Project:	**Saugus Iron Works**	Sampled:	**04-28-04 11:36**	**04-28-04 11:36**	**04-28-04 11:36**
Client:	**CH2M Hill**	Received:	**04-28-04 18:30**	**04-28-04 18:30**	**04-28-04 18:30**
Matrix:	**Soil**	% Solids:	**69**	**69**	**69**
Container:	**250 mL Glass**				
Preservation:	**Cool**				

Sample Type	Method	QC Batch ID	Sample Weight	Dilution	Analyzed	Instrument ID	Analyst
Matrix Spike	EPA 9060 Mod	TOC-0252-S	0.1 mg	1	04-30-04 14:49	Tekmar-Dohrman Apollo 9000	AVB

Analyte	Units	Unspiked Sample	MS Spiked	MS Measured	MS Recovery	MSD Spiked	MSD Measured	MSD Recovery	RPD	QC Limits		Method
										Spike	RPD	
Organic Carbon, Total	mg/Kg	17,000	82,000	65,000	**58 %** s	120,000	99,000	**68 %** s	**16 %**	75 - 125 %	35 %	EPA 9060 Mod

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:

BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

s Matrix spike recovery outside recommended limits due to high concentration of spike analyte native to the sample.

GROUNDWATER ANALYTICAL

Inorganic Chemistry

Field ID: **SD03TOC4**
Project: **Saugus Iron Works**
Client: **CH2M Hill**

Matrix: **Soil**
Received: **04-28-04 18:30**

Lab ID: **72079-26** Sampled: **04-28-04 11:46** % Solids: **59** Container: **250 mL Glass** Preservation: **Cool**

Analyte	Result	Units	RL	DF	Weight	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	**140,000**	mg/Kg	34,000	200	0.2 mg	05-05-04 11:02	TOC-0255-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:

BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

RL Reporting Limit.

DF Dilution Factor.

1 Instrument ID: Tekmar-Dohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Inorganic Chemistry

Field ID: **SD03DUP2**
Project: **Saugus Iron Works**
Client: **CH2M Hill**

Matrix: **Soil**
Received: **04-28-04 18:30**

Lab ID: **72079-27** Sampled: **04-28-04 11:48** % Solids: **59** Container: **250 mL Glass** Preservation: **Cool**

Analyte	Result	Units	RL	DF	Weight	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	**84,000**	mg/Kg	27,000	160	0.25 mg	05-05-04 11:28	TOC-0255-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:

BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

RL Reporting Limit.

DF Dilution Factor.

1 Instrument ID: Tekmar-Dohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Inorganic Chemistry

Field ID: **SD03TOC5**
Project: **Saugus Iron Works**
Client: **CH2M Hill**

Matrix: **Soil**
Received: **04-28-04 18:30**

Lab ID: **72079-28** Sampled: **04-28-04 11:50** % Solids: **63** Container: **250 mL Glass** Preservation: **Cool**

Analyte	Result	Units	RL	DF	Weight	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	**240,000**	mg/Kg	64,000	400	0.1 mg	05-05-04 12:01	TOC-0255-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:

BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

RL Reporting Limit.

DF Dilution Factor.

1 Instrument ID: Tekmar-Dohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Inorganic Chemistry

Field ID: **SD03TOC6**
Project: **Saugus Iron Works**
Client: **CH2M Hill**

Matrix: **Soil**
Received: **04-28-04 18:30**

Lab ID: **72079-29** Sampled: **04-28-04 11:52** % Solids: **12** Container: **250 mL Glass** Preservation: **Cool**

Analyte	Result	Units	RL	DF	Weight	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	**360,000**	mg/Kg	75,000	89	0.45 mg	05-05-04 13:41	TOC-0255-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:

BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

RL Reporting Limit.

DF Dilution Factor.

1 Instrument ID: Tekmar-Dohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Inorganic Chemistry

Field ID: **SD03TOC7**
Project: **Saugus Iron Works**
Client: **CH2M Hill**

Matrix: **Soil**
Received: **04-28-04 18:30**

Lab ID: **72079-30** Sampled: **04-28-04 12:00** % Solids: **69** Container: **250 mL Glass** Preservation: **Cool**

Analyte	Result	Units	RL	DF	Weight	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	**13,000**	mg/Kg	4,800	33	1.2 mg	05-05-04 14:08	TOC-0255-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:

BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

RL Reporting Limit.

DF Dilution Factor.

1 Instrument ID: Tekmar-Dohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Inorganic Chemistry

Field ID: **SD03DUP3**
Project: **Saugus Iron Works**
Client: **CH2M Hill**

Matrix: **Soil**
Received: **04-28-04 18:30**

Lab ID: **72079-31** Sampled: **04-28-04 12:02** % Solids: **63** Container: **250 mL Glass** Preservation: **Cool**

Analyte	Result	Units	RL	DF	Weight	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	**15,000**	mg/Kg	6,300	40	1 mg	05-05-04 14:26	TOC-0255-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:

BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

RL Reporting Limit.

DF Dilution Factor.

1 Instrument ID: Tekmar-Dohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Inorganic Chemistry

Field ID: **SD03TOC8**
Project: **Saugus Iron Works**
Client: **CH2M Hill**

Matrix: **Soil**
Received: **04-28-04 18:30**

Lab ID: **72079-32** Sampled: **04-28-04 12:04** % Solids: **70** Container: **250 mL Glass** Preservation: **Cool**

Analyte	Result	Units	RL	DF	Weight	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	**28,000**	mg/Kg	8,100	57	0.7 mg	05-05-04 14:48	TOC-0255-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:

BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

RL Reporting Limit.

DF Dilution Factor.

1 Instrument ID: Tekmar-Dohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Matrix Spike and Matrix Spike Duplicate
Inorganic Chemistry

			Parent Sample	Matrix Spike	Spike Duplicate
Field ID:	**SD03TOC8**				
Project:	**Saugus Iron Works**	Laboratory ID:	**72079-32**	**72079-33MS**	**72079-33MSD**
Client:	**CH2M Hill**	Sampled:	**04-28-04 12:04**	**04-28-04 12:04**	**04-28-04 12:04**
Matrix:	**Soil**	Received:	**04-28-04 18:30**	**04-28-04 18:30**	**04-28-04 18:30**
Container:	**250 mL Glass**	% Solids:	**70**	**69**	**69**
Preservation:	**Cool**				

Sample Type	Method	QC Batch ID	Sample Weight	Dilution	Analyzed	Instrument ID	Analyst
Matrix Spike	EPA 9060 Mod	TOC-0255-S	0.1 mg	1	05-05-04 14:49	Tekmar-Dohrman Apollo 9000	AVB

Analyte	Units	Unspiked Sample	MS Spiked	MS Measured	MS Recovery	MSD Spiked	MSD Measured	MSD Recovery	RPD	QC Limits Spike	QC Limits RPD	Method
Organic Carbon, Total	mg/Kg	28,000	240,000	210,000	76 %	280,000	240,000	76 %	0 %	75 - 125 %	35 %	EPA 9060 Mod

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

GROUNDWATER ANALYTICAL

Inorganic Chemistry

Field ID: **SD03TOC9**
Project: **Saugus Iron Works**
Client: **CH2M Hill**

Matrix: **Soil**
Received: **04-28-04 18:30**

Lab ID: **72079-34** Sampled: **04-28-04 12:08** % Solids: **92** Container: **250 mL Glass** Preservation: **Cool**

Analyte	Result	Units	RL	DF	Weight	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	**1,800**	mg/Kg	600	6	7.3 mg	05-05-04 15:52	TOC-0255-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:

BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

RL Reporting Limit.

DF Dilution Factor.

1 Instrument ID: Tekmar-Dohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Inorganic Chemistry

Field ID: **SD03TOC10**
Project: **Saugus Iron Works**
Client: **CH2M Hill**

Matrix: **Soil**
Received: **04-28-04 18:30**

Lab ID: **72079-35** Sampled: **04-28-04 12:14** % Solids: **84** Container: **250 mL Glass** Preservation: **Cool**

Analyte	Result	Units	RL	DF	Weight	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	**1,900**	mg/Kg	580	5	8.2 mg	05-06-04 14:24	TOC-0256-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:

BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

RL Reporting Limit.

DF Dilution Factor.

1 Instrument ID: Tekmar-Dohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Inorganic Chemistry

Field ID: **SD03TOC11**
Project: **Saugus Iron Works**
Client: **CH2M Hill**

Matrix: **Soil**
Received: **04-28-04 18:30**

Lab ID: **72079-36** Sampled: **04-28-04 12:16** % Solids: **93** Container: **250 mL Glass** Preservation: **Cool**

Analyte	Result	Units	RL	DF	Weight	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	**2,300**	mg/Kg	970	9	4.5 mg	05-06-04 15:00	TOC-0256-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:

BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

RL Reporting Limit.

DF Dilution Factor.

1 Instrument ID: Tekmar-Dohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Inorganic Chemistry

Field ID: **SD03TOC12**
Project: **Saugus Iron Works**
Client: **CH2M Hill**

Matrix: **Soil**
Received: **04-28-04 18:30**

Lab ID: **72079-37** Sampled: **04-28-04 12:18** % Solids: **91** Container: **250 mL Glass** Preservation: **Cool**

Analyte	Result	Units	RL	DF	Weight	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	**1,500**	mg/Kg	480	4	9.2 mg	05-06-04 15:19	TOC-0256-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:

BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

RL Reporting Limit.

DF Dilution Factor.

1 Instrument ID: Tekmar-Dohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Matrix Spike and Matrix Spike Duplicate
Inorganic Chemistry

			Parent Sample	Matrix Spike	Spike Duplicate
Field ID:	**SD03TOC12**				
Project:	**Saugus Iron Works**	Laboratory ID:	**72079-37**	**72079-38MS**	**72079-38MSD**
Client:	**CH2M Hill**	Sampled:	**04-28-04 12:18**	**04-28-04 12:18**	**04-28-04 12:18**
Matrix:	**Soil**	Received:	**04-28-04 18:30**	**04-28-04 18:30**	**04-28-04 18:30**
Container:	**250 mL Glass**	% Solids:	**91**	**93**	**93**
Preservation:	**Cool**				

Sample Type	Method	QC Batch ID	Sample Weight	Dilution	Analyzed	Instrument ID	Analyst
Matrix Spike	EPA 9060 Mod	TOC-0256-S	0.1 mg	1	05-06-04 15:44	Tekmar-Dohrman Apollo 9000	AVB

Analyte	Units	Unspiked Sample	MS Spiked	MS Measured	MS Recovery	MSD Spiked	MSD Measured	MSD Recovery	RPD	QC Limits Spike	QC Limits RPD	Method
Organic Carbon, Total	mg/Kg	1,500	11,000	7,500	**55 %** s	20,000	14,000	**63 %** s	**14 %**	75 - 125 %	35 %	EPA 9060 Mod

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:

BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

s Matrix spike recovery outside recommended limits due to high concentration of spike analyte native to the sample.

GROUNDWATER ANALYTICAL

EPA Method 8270C
Polynuclear Aromatic Hydrocarbons by GC/MS

Field ID:	**SD0104**	Matrix:	**Soil**
Project:	**Saugus Iron Works**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72079-39**	QC Batch ID:	**SV-1439-P**
Sampled:	**04-28-04 08:16**	Instrument ID:	**MS-3 HP 5890**
Received:	**04-28-04 18:30**	Sample Weight:	**16 g**
Extracted:	**05-03-04 20:45**	Final Volume:	**1 mL**
Cleaned Up:	**05-06-04 22:00**	Percent Solids:	**79**
Analyzed:	**05-07-04 20:32**	Dilution Factor:	**1**
Analyst:	**JJT**		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
91-20-3	Naphthalene	BRL		ug/Kg	400
91-57-6	2-Methylnaphthalene	BRL		ug/Kg	400
208-96-8	Acenaphthylene	BRL		ug/Kg	400
83-32-9	Acenaphthene	BRL		ug/Kg	400
86-73-7	Fluorene	BRL		ug/Kg	400
85-01-8	Phenanthrene	BRL		ug/Kg	400
120-12-7	Anthracene	BRL		ug/Kg	400
206-44-0	Fluoranthene	BRL		ug/Kg	400
129-00-0	Pyrene	BRL		ug/Kg	400
56-55-3	Benzo[a]anthracene	BRL		ug/Kg	400
218-01-9	Chrysene	BRL		ug/Kg	400
205-99-2	Benzo[b]fluoranthene	BRL		ug/Kg	400
207-08-9	Benzo[k]fluoranthene	BRL		ug/Kg	400
50-32-8	Benzo[a]pyrene	BRL		ug/Kg	400
193-39-5	Indeno[1,2,3-c,d]pyrene	BRL		ug/Kg	400
53-70-3	Dibenzo[a,h]anthracene	BRL		ug/Kg	400
191-24-2	Benzo[g,h,i]perylene	BRL		ug/Kg	400

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Nitrobenzene-d5	8,000	5,200	**64** %	30 - 130 %
2-Fluorobiphenyl	8,000	5,600	**70** %	30 - 130 %
Terphenyl-d14	8,000	5,800	**72** %	30 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample extraction performed by EPA Method 3545. Cleanup performed by EPA Method 3630C. Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8270C
Polynuclear Aromatic Hydrocarbons by GC/MS

Field ID:	**SD0148**	Matrix:	**Soil**
Project:	**Saugus Iron Works**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72079-40**	QC Batch ID:	**SV-1439-P**
Sampled:	**04-28-04 08:24**	Instrument ID:	**MS-3 HP 5890**
Received:	**04-28-04 18:30**	Sample Weight:	**16 g**
Extracted:	**05-03-04 20:45**	Final Volume:	**1 mL**
Cleaned Up:	**05-06-04 22:00**	Percent Solids:	**69**
Analyzed:	**05-07-04 21:12**	Dilution Factor:	**1**
Analyst:	**JJT**		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
91-20-3	Naphthalene	BRL		ug/Kg	460
91-57-6	2-Methylnaphthalene	BRL		ug/Kg	460
208-96-8	Acenaphthylene	BRL		ug/Kg	460
83-32-9	Acenaphthene	BRL		ug/Kg	460
86-73-7	Fluorene	BRL		ug/Kg	460
85-01-8	Phenanthrene	BRL		ug/Kg	460
120-12-7	Anthracene	BRL		ug/Kg	460
206-44-0	Fluoranthene	BRL		ug/Kg	460
129-00-0	Pyrene	BRL		ug/Kg	460
56-55-3	Benzo[a]anthracene	BRL		ug/Kg	460
218-01-9	Chrysene	BRL		ug/Kg	460
205-99-2	Benzo[b]fluoranthene	BRL		ug/Kg	460
207-08-9	Benzo[k]fluoranthene	BRL		ug/Kg	460
50-32-8	Benzo[a]pyrene	BRL		ug/Kg	460
193-39-5	Indeno[1,2,3-c,d]pyrene	BRL		ug/Kg	460
53-70-3	Dibenzo[a,h]anthracene	BRL		ug/Kg	460
191-24-2	Benzo[g,h,i]perylene	BRL		ug/Kg	460

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Nitrobenzene-d5	9,300	5,400	**58 %**	30 - 130 %
2-Fluorobiphenyl	9,300	6,000	**64 %**	30 - 130 %
Terphenyl-d14	9,300	6,600	**70 %**	30 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample extraction performed by EPA Method 3545. Cleanup performed by EPA Method 3630C. Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8270C
Polynuclear Aromatic Hydrocarbons by GC/MS

Field ID:	**SD01812**	Matrix:	**Soil**
Project:	**Saugus Iron Works**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72079-41**	QC Batch ID:	**SV-1439-P**
Sampled:	**04-28-04 08:32**	Instrument ID:	**MS-3 HP 5890**
Received:	**04-28-04 18:30**	Sample Weight:	**16 g**
Extracted:	**05-03-04 20:45**	Final Volume:	**1 mL**
Cleaned Up:	**05-06-04 22:00**	Percent Solids:	**82**
Analyzed:	**05-07-04 21:51**	Dilution Factor:	**1**
Analyst:	**JJT**		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
91-20-3	Naphthalene	BRL		ug/Kg	380
91-57-6	2-Methylnaphthalene	BRL		ug/Kg	380
208-96-8	Acenaphthylene	BRL		ug/Kg	380
83-32-9	Acenaphthene	BRL		ug/Kg	380
86-73-7	Fluorene	BRL		ug/Kg	380
85-01-8	Phenanthrene	BRL		ug/Kg	380
120-12-7	Anthracene	BRL		ug/Kg	380
206-44-0	Fluoranthene	BRL		ug/Kg	380
129-00-0	Pyrene	BRL		ug/Kg	380
56-55-3	Benzo[a]anthracene	BRL		ug/Kg	380
218-01-9	Chrysene	BRL		ug/Kg	380
205-99-2	Benzo[b]fluoranthene	BRL		ug/Kg	380
207-08-9	Benzo[k]fluoranthene	BRL		ug/Kg	380
50-32-8	Benzo[a]pyrene	BRL		ug/Kg	380
193-39-5	Indeno[1,2,3-c,d]pyrene	BRL		ug/Kg	380
53-70-3	Dibenzo[a,h]anthracene	BRL		ug/Kg	380
191-24-2	Benzo[g,h,i]perylene	BRL		ug/Kg	380

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Nitrobenzene-d5	7,800	5,000	**65 %**	30 - 130 %
2-Fluorobiphenyl	7,800	5,300	**69 %**	30 - 130 %
Terphenyl-d14	7,800	5,500	**71 %**	30 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample extraction performed by EPA Method 3545. Cleanup performed by EPA Method 3630C. Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8270C
Polynuclear Aromatic Hydrocarbons by GC/MS

Field ID:	**SD011215**	Matrix:	**Soil**
Project:	**Saugus Iron Works**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72079-42**	QC Batch ID:	**SV-1439-P**
Sampled:	**04-28-04 08:38**	Instrument ID:	**MS-3 HP 5890**
Received:	**04-28-04 18:30**	Sample Weight:	**16 g**
Extracted:	**05-03-04 20:45**	Final Volume:	**1 mL**
Cleaned Up:	**05-06-04 22:00**	Percent Solids:	**77**
Analyzed:	**05-07-04 22:31**	Dilution Factor:	**1**
Analyst:	**JJT**		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
91-20-3	Naphthalene	BRL		ug/Kg	410
91-57-6	2-Methylnaphthalene	BRL		ug/Kg	410
208-96-8	Acenaphthylene	BRL		ug/Kg	410
83-32-9	Acenaphthene	BRL		ug/Kg	410
86-73-7	Fluorene	BRL		ug/Kg	410
85-01-8	Phenanthrene	BRL		ug/Kg	410
120-12-7	Anthracene	BRL		ug/Kg	410
206-44-0	Fluoranthene	BRL		ug/Kg	410
129-00-0	Pyrene	BRL		ug/Kg	410
56-55-3	Benzo[a]anthracene	BRL		ug/Kg	410
218-01-9	Chrysene	BRL		ug/Kg	410
205-99-2	Benzo[b]fluoranthene	BRL		ug/Kg	410
207-08-9	Benzo[k]fluoranthene	BRL		ug/Kg	410
50-32-8	Benzo[a]pyrene	BRL		ug/Kg	410
193-39-5	Indeno[1,2,3-c,d]pyrene	BRL		ug/Kg	410
53-70-3	Dibenzo[a,h]anthracene	BRL		ug/Kg	410
191-24-2	Benzo[g,h,i]perylene	BRL		ug/Kg	410

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Nitrobenzene-d5	8,300	5,500	**66 %**	30 - 130 %
2-Fluorobiphenyl	8,300	6,100	**74 %**	30 - 130 %
Terphenyl-d14	8,300	6,000	**72 %**	30 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample extraction performed by EPA Method 3545. Cleanup performed by EPA Method 3630C. Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8270C
Polynuclear Aromatic Hydrocarbons by GC/MS

Field ID:	**SD0204**	Matrix:	**Soil**
Project:	**Saugus Iron Works**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72079-43**	QC Batch ID:	**SV-1439-P**
Sampled:	**04-28-04 08:44**	Instrument ID:	**MS-3 HP 5890**
Received:	**04-28-04 18:30**	Sample Weight:	**15 g**
Extracted:	**05-03-04 20:45**	Final Volume:	**1 mL**
Cleaned Up:	**05-06-04 22:00**	Percent Solids:	**59**
Analyzed:	**05-07-04 23:49**	Dilution Factor:	**1**
Analyst:	**JJT**		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
91-20-3	Naphthalene	BRL		ug/Kg	540
91-57-6	2-Methylnaphthalene	BRL		ug/Kg	540
208-96-8	Acenaphthylene	BRL		ug/Kg	540
83-32-9	Acenaphthene	BRL		ug/Kg	540
86-73-7	Fluorene	BRL		ug/Kg	540
85-01-8	Phenanthrene	BRL		ug/Kg	540
120-12-7	Anthracene	BRL		ug/Kg	540
206-44-0	Fluoranthene	BRL		ug/Kg	540
129-00-0	Pyrene	BRL		ug/Kg	540
56-55-3	Benzo[a]anthracene	BRL		ug/Kg	540
218-01-9	Chrysene	BRL		ug/Kg	540
205-99-2	Benzo[b]fluoranthene	BRL		ug/Kg	540
207-08-9	Benzo[k]fluoranthene	BRL		ug/Kg	540
50-32-8	Benzo[a]pyrene	BRL		ug/Kg	540
193-39-5	Indeno[1,2,3-c,d]pyrene	BRL		ug/Kg	540
53-70-3	Dibenzo[a,h]anthracene	BRL		ug/Kg	540
191-24-2	Benzo[g,h,i]perylene	BRL		ug/Kg	540

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Nitrobenzene-d5	11,000	7,300	**66 %**	30 - 130 %
2-Fluorobiphenyl	11,000	7,500	**69 %**	30 - 130 %
Terphenyl-d14	11,000	7,900	**72 %**	30 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample extraction performed by EPA Method 3545. Cleanup performed by EPA Method 3630C. Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8270C
Polynuclear Aromatic Hydrocarbons by GC/MS

Field ID:	**SD0248**	Matrix:	**Soil**
Project:	**Saugus Iron Works**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72079-44**	QC Batch ID:	**SV-1439-P**
Sampled:	**04-28-04 08:52**	Instrument ID:	**MS-3 HP 5890**
Received:	**04-28-04 18:30**	Sample Weight:	**15 g**
Extracted:	**05-03-04 20:45**	Final Volume:	**1 mL**
Cleaned Up:	**05-06-04 22:00**	Percent Solids:	**72**
Analyzed:	**05-08-04 00:29**	Dilution Factor:	**1**
Analyst:	**JJT**		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
91-20-3	Naphthalene	BRL		ug/Kg	460
91-57-6	2-Methylnaphthalene	BRL		ug/Kg	460
208-96-8	Acenaphthylene	BRL		ug/Kg	460
83-32-9	Acenaphthene	BRL		ug/Kg	460
86-73-7	Fluorene	BRL		ug/Kg	460
85-01-8	Phenanthrene	BRL		ug/Kg	460
120-12-7	Anthracene	BRL		ug/Kg	460
206-44-0	Fluoranthene	BRL		ug/Kg	460
129-00-0	Pyrene	BRL		ug/Kg	460
56-55-3	Benzo[a]anthracene	BRL		ug/Kg	460
218-01-9	Chrysene	BRL		ug/Kg	460
205-99-2	Benzo[b]fluoranthene	BRL		ug/Kg	460
207-08-9	Benzo[k]fluoranthene	BRL		ug/Kg	460
50-32-8	Benzo[a]pyrene	BRL		ug/Kg	460
193-39-5	Indeno[1,2,3-c,d]pyrene	BRL		ug/Kg	460
53-70-3	Dibenzo[a,h]anthracene	BRL		ug/Kg	460
191-24-2	Benzo[g,h,i]perylene	BRL		ug/Kg	460

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Nitrobenzene-d5	9,200	5,500	**59 %**	30 - 130 %
2-Fluorobiphenyl	9,200	6,000	**65 %**	30 - 130 %
Terphenyl-d14	9,200	6,400	**69 %**	30 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample extraction performed by EPA Method 3545. Cleanup performed by EPA Method 3630C. Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8270C
Polynuclear Aromatic Hydrocarbons by GC/MS

Field ID:	**SD02812**	Matrix:	**Soil**
Project:	**Saugus Iron Works**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72079-45**	QC Batch ID:	**SV-1439-P**
Sampled:	**04-28-04 08:54**	Instrument ID:	**MS-3 HP 5890**
Received:	**04-28-04 18:30**	Sample Weight:	**15 g**
Extracted:	**05-03-04 20:45**	Final Volume:	**1 mL**
Cleaned Up:	**05-06-04 22:00**	Percent Solids:	**69**
Analyzed:	**05-08-04 01:08**	Dilution Factor:	**1**
Analyst:	**JJT**		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
91-20-3	Naphthalene	BRL		ug/Kg	470
91-57-6	2-Methylnaphthalene	BRL		ug/Kg	470
208-96-8	Acenaphthylene	BRL		ug/Kg	470
83-32-9	Acenaphthene	BRL		ug/Kg	470
86-73-7	Fluorene	BRL		ug/Kg	470
85-01-8	Phenanthrene	BRL		ug/Kg	470
120-12-7	Anthracene	BRL		ug/Kg	470
206-44-0	Fluoranthene	BRL		ug/Kg	470
129-00-0	Pyrene	BRL		ug/Kg	470
56-55-3	Benzo[a]anthracene	BRL		ug/Kg	470
218-01-9	Chrysene	BRL		ug/Kg	470
205-99-2	Benzo[b]fluoranthene	BRL		ug/Kg	470
207-08-9	Benzo[k]fluoranthene	BRL		ug/Kg	470
50-32-8	Benzo[a]pyrene	BRL		ug/Kg	470
193-39-5	Indeno[1,2,3-c,d]pyrene	BRL		ug/Kg	470
53-70-3	Dibenzo[a,h]anthracene	BRL		ug/Kg	470
191-24-2	Benzo[g,h,i]perylene	BRL		ug/Kg	470

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Nitrobenzene-d5	9,500	6,100	**64 %**	30 - 130 %
2-Fluorobiphenyl	9,500	6,300	**66 %**	30 - 130 %
Terphenyl-d14	9,500	6,600	**70 %**	30 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample extraction performed by EPA Method 3545. Cleanup performed by EPA Method 3630C. Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8270C
Polynuclear Aromatic Hydrocarbons by GC/MS

Field ID:	**SD0304**	Matrix:	**Soil**
Project:	**Saugus Iron Works**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72079-46**	QC Batch ID:	**SV-1445-P**
Sampled:	**04-28-04 11:40**	Instrument ID:	**MS-3 HP 5890**
Received:	**04-28-04 18:30**	Sample Weight:	**15 g**
Extracted:	**05-12-04 20:45**	Final Volume:	**1 mL**
Cleaned Up:	**05-17-04 16:00**	Percent Solids:	**45**
Analyzed:	**05-18-04 01:04**	Dilution Factor:	**1**
Analyst:	**JJT**		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
91-20-3	Naphthalene	BRL		ug/Kg	710
91-57-6	2-Methylnaphthalene	BRL		ug/Kg	710
208-96-8	Acenaphthylene	BRL		ug/Kg	710
83-32-9	Acenaphthene	BRL		ug/Kg	710
86-73-7	Fluorene	BRL		ug/Kg	710
85-01-8	Phenanthrene	BRL		ug/Kg	710
120-12-7	Anthracene	BRL		ug/Kg	710
206-44-0	Fluoranthene	**880**		ug/Kg	710
129-00-0	Pyrene	**780**		ug/Kg	710
56-55-3	Benzo[a]anthracene	BRL		ug/Kg	710
218-01-9	Chrysene	BRL		ug/Kg	710
205-99-2	Benzo[b]fluoranthene	BRL		ug/Kg	710
207-08-9	Benzo[k]fluoranthene	BRL		ug/Kg	710
50-32-8	Benzo[a]pyrene	BRL		ug/Kg	710
193-39-5	Indeno[1,2,3-c,d]pyrene	BRL		ug/Kg	710
53-70-3	Dibenzo[a,h]anthracene	BRL		ug/Kg	710
191-24-2	Benzo[g,h,i]perylene	BRL		ug/Kg	710

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Nitrobenzene-d5	14,000	9,700	**67 %**	30 - 130 %
2-Fluorobiphenyl	14,000	9,500	**66 %**	30 - 130 %
Terphenyl-d14	14,000	10,000	**70 %**	30 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample extraction performed by EPA Method 3545. Cleanup performed by EPA Method 3630C. Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

GROUNDWATER ANALYTICAL

Matrix Spike and Matrix Spike Duplicate
EPA Method 8270C Polynuclear Aromatic Hydrocarbons

			Parent Sample	Matrix Spike	Matrix Spike Duplicate
Field ID:	SD0304	Laboratory ID:	72079-46	72079-48MS	72079-48MSD
Project:	Saugus Iron Works	Sampled:	04-28-04 11:40	04-28-04 11:40	04-28-04 11:40
Client:	CH2M Hill	Received:	04-28-04 18:30	04-28-04 18:30	04-28-04 18:30
Matrix:	Soil	Extracted:	05-12-04 20:45	05-12-04 20:45	05-12-04 20:45
Container:	250ml Glass	Cleaned Up:	05-17-04 16:00	05-17-04 16:00	05-17-04 16:00
Preservation:	Cool	Analyzed:	05-18-04 01:04	05-18-04 01:43	05-18-04 02:23
		Analyst:	JJT	JJT	JJT
		QC Batch ID:	SV-1445-P	SV-1445-P	SV-1445-P
		Instrument ID:	MS-3 HP 5890	MS-3 HP 5890	MS-3 HP 5890
		Sample Volume (g):	15	15	16
		Final Volume:	1 ml	1 ml	1 ml
		Percent Solids:	45	54	54
		Dilution Factor:	1	1	1

CAS Number	Analyte	Unspiked Sample	MS Spiked (ug/kg)	MS Measured (ug/kg)	MS Recovery (%)	MSD Spiked (ug/kg)	MSD Measured (ug/kg)	MSD Recovery (%)	RPD (%)	QC Limits Spike	RPD Limits
91-20-3	Naphthalene	BRL	3,600	3,800	106	3,500	4,100	114	5.5	40 - 140%	20 %
91-57-6	2-Methylnaphthalene	BRL	3,600	4,200	115	3,500	4,400	124	4.8	40 - 140%	20 %
208-96-8	Acenaphthylene	BRL	3,600	3,700	102	3,500	3,800	108	3.5	40 - 140%	20 %
83-32-9	Acenaphthene	BRL	3,600	4,200	116	3,500	4,400	123	3.4	40 - 140%	20 %
86-73-7	Fluorene	BRL	3,600	4,400	122	3,500	4,800	134	7.1	40 - 140%	20 %
85-01-8	Phenanthrene	430 j	3,600	4,900	122	3,500	4,900	127	1.3	40 - 140%	20 %
120-12-7	Anthracene	BRL	3,600	4,800	133	3,500	4,900	139	2.0	40 - 140%	20 %
206-44-0	Fluoranthene	880	3,600	5,200	117	3,500	5,300	126	3.6	40 - 140%	20 %
129-00-0	Pyrene	780	3,600	5,200	121	3,500	5,500	133	6.5	40 - 140%	20 %
56-55-3	Benzo[a]anthracene	350 j	3,600	4,800	121	3,500	5,000	132	5.5	40 - 140%	20 %
218-01-9	Chrysene	480 j	3,600	4,800	120	3,500	5,000	128	3.3	40 - 140%	20 %
205-99-2	Benzo[b]fluoranthene	650 j	3,600	4,700	112	3,500	4,800	118	2.4	40 - 140%	20 %
207-08-9	Benzo[k]fluoranthene	BRL	3,600	4,500	124	3,500	4,600	129	1.4	40 - 140%	20 %
50-32-8	Benzo[a]pyrene	450 j	3,600	5,000	124	3,500	5,200	132	3.5	40 - 140%	20 %
193-39-5	Indeno[1,2,3-c,d]pyren	370 j	3,600	4,500	114	3,500	4,700	121	2.9	40 - 140%	20 %
53-70-3	Dibenzo[a,h]anthracen	BRL	3,600	4,700	128	3,500	4,700	132	0.8	40 - 140%	20 %
191-24-2	Benzo[g,h,i]perylene	BRL	3,600	4,200	117	3,500	4,300	122	1.7	40 - 140%	20 %

QC Surrogate Compound	Surr. Rec. (%)									QC Limits
Nitrobenzene-d5	67	12,000	7,400	61	12,000	8,100	68			30 - 130 %
2-Fluorobiphenyl	66	12,000	7,600	62	12,000	7,600	64			30 - 130 %
Terphenyl-d14	70	12,000	7,900	65	12,000	8,400	71			30 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Sample extraction performed by EPA Method 3545. Cleanup performed by EPA Method 3630C. Results are reported on a dry weight basis.

Report Notations: Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be
Indicates an estimated value detected below the reporting limit for the analyte.

GROUNDWATER ANALYTICAL

EPA Method 8270C
Polynuclear Aromatic Hydrocarbons by GC/MS

Field ID:	**SD03DUP4**	Matrix:	**Soil**
Project:	**Saugus Iron Works**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72079-47**	QC Batch ID:	**SV-1439-P**
Sampled:	**04-28-04 11:42**	Instrument ID:	**MS-3 HP 5890**
Received:	**04-28-04 18:30**	Sample Weight:	**16 g**
Extracted:	**05-03-04 20:45**	Final Volume:	**1 mL**
Cleaned Up:	**05-06-04 22:00**	Percent Solids:	**67**
Analyzed:	**05-08-04 03:06**	Dilution Factor:	**1**
Analyst:	**JJT**		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
91-20-3	Naphthalene	BRL		ug/Kg	480
91-57-6	2-Methylnaphthalene	BRL		ug/Kg	480
208-96-8	Acenaphthylene	BRL		ug/Kg	480
83-32-9	Acenaphthene	BRL		ug/Kg	480
86-73-7	Fluorene	BRL		ug/Kg	480
85-01-8	Phenanthrene	BRL		ug/Kg	480
120-12-7	Anthracene	BRL		ug/Kg	480
206-44-0	Fluoranthene	**540**		ug/Kg	480
129-00-0	Pyrene	BRL		ug/Kg	480
56-55-3	Benzo[a]anthracene	BRL		ug/Kg	480
218-01-9	Chrysene	BRL		ug/Kg	480
205-99-2	Benzo[b]fluoranthene	BRL		ug/Kg	480
207-08-9	Benzo[k]fluoranthene	BRL		ug/Kg	480
50-32-8	Benzo[a]pyrene	BRL		ug/Kg	480
193-39-5	Indeno[1,2,3-c,d]pyrene	BRL		ug/Kg	480
53-70-3	Dibenzo[a,h]anthracene	BRL		ug/Kg	480
191-24-2	Benzo[g,h,i]perylene	BRL		ug/Kg	480

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Nitrobenzene-d5	9,600	5,900	**61 %**	30 - 130 %
2-Fluorobiphenyl	9,600	6,300	**65 %**	30 - 130 %
Terphenyl-d14	9,600	6,600	**68 %**	30 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample extraction performed by EPA Method 3545. Cleanup performed by EPA Method 3630C. Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8270C
Polynuclear Aromatic Hydrocarbons by GC/MS

Field ID:	**SD0348**	Matrix:	**Soil**
Project:	**Saugus Iron Works**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72079-49**	QC Batch ID:	**SV-1445-P**
Sampled:	**04-28-04 11:54**	Instrument ID:	**MS-3 HP 5890**
Received:	**04-28-04 18:30**	Sample Weight:	**15 g**
Extracted:	**05-12-04 20:45**	Final Volume:	**1 mL**
Cleaned Up:	**05-17-04 16:00**	Percent Solids:	**79**
Analyzed:	**05-18-04 03:02**	Dilution Factor:	**1**
Analyst:	**JJT**		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
91-20-3	Naphthalene	BRL		ug/Kg	410
91-57-6	2-Methylnaphthalene	BRL		ug/Kg	410
208-96-8	Acenaphthylene	BRL		ug/Kg	410
83-32-9	Acenaphthene	BRL		ug/Kg	410
86-73-7	Fluorene	BRL		ug/Kg	410
85-01-8	Phenanthrene	BRL		ug/Kg	410
120-12-7	Anthracene	BRL		ug/Kg	410
206-44-0	Fluoranthene	BRL		ug/Kg	410
129-00-0	Pyrene	BRL		ug/Kg	410
56-55-3	Benzo[a]anthracene	BRL		ug/Kg	410
218-01-9	Chrysene	BRL		ug/Kg	410
205-99-2	Benzo[b]fluoranthene	BRL		ug/Kg	410
207-08-9	Benzo[k]fluoranthene	BRL		ug/Kg	410
50-32-8	Benzo[a]pyrene	BRL		ug/Kg	410
193-39-5	Indeno[1,2,3-c,d]pyrene	BRL		ug/Kg	410
53-70-3	Dibenzo[a,h]anthracene	BRL		ug/Kg	410
191-24-2	Benzo[g,h,i]perylene	BRL		ug/Kg	410

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Nitrobenzene-d5	8,300	5,300	**64** %	30 - 130 %
2-Fluorobiphenyl	8,300	5,000	**60** %	30 - 130 %
Terphenyl-d14	8,300	5,600	**68** %	30 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample extraction performed by EPA Method 3545. Cleanup performed by EPA Method 3630C. Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

GROUNDWATER ANALYTICAL

Matrix Spike and Matrix Spike Duplicate
EPA Method 8270C Polynuclear Aromatic Hydrocarbons

			Parent Sample	Matrix Spike	Matrix Spike Duplicate
Field ID:	SD0348	Laboratory ID:	72079-49	72079-50MS	72079-50MSD
Project:	Saugus Iron Works	Sampled:	04-28-04 11:54	04-28-04 11:54	04-28-04 11:54
Client:	CH2M Hill	Received:	04-28-04 18:30	04-28-04 18:30	04-28-04 18:30
Matrix:	Soil	Extracted:	05-12-04 20:45	05-12-04 20:45	05-12-04 20:45
Container:	250ml Glass	Cleaned Up:	05-17-04 16:00	05-17-04 16:00	05-17-04 16:00
Preservation:	Cool	Analyzed:	05-18-04 03:02	05-18-04 03:42	05-18-04 04:21
		Analyst:	JJT	JJT	JJT
		QC Batch ID:	SV-1445-P	SV-1445-P	SV-1445-P
		Instrument ID:	MS-3 HP 5890	MS-3 HP 5890	MS-3 HP 5890
		Sample Volume (g):	15	16	15
		Final Volume:	1 ml	1 ml	1 ml
		Percent Solids:	79	74	74
		Dilution Factor:	1	1	1

CAS Number	Analyte	Unspiked Sample	MS Spiked (ug/kg)	MS Measured (ug/kg)	MS Recovery (%)	MSD Spiked (ug/kg)	MSD Measured (ug/kg)	MSD Recovery (%)	RPD (%)	QC Limits Spike	RPD Limits
91-20-3	Naphthalene	BRL	2,600	2,900	111	2,600	3,000	112	3.2	40 - 140%	20 %
91-57-6	2-Methylnaphthalene	BRL	2,600	3,100	120	2,600	3,300	123	4.6	40 - 140%	20 %
208-96-8	Acenaphthylene	BRL	2,600	2,900	113	2,600	3,000	114	3.2	40 - 140%	20 %
83-32-9	Acenaphthene	BRL	2,600	3,200	122	2,600	3,300	123	3.2	40 - 140%	20 %
86-73-7	Fluorene	BRL	2,600	3,200	125	2,600	3,300	126	2.9	40 - 140%	20 %
85-01-8	Phenanthrene	BRL	2,600	3,400	131	2,600	3,500	131	2.7	40 - 140%	20 %
120-12-7	Anthracene	BRL	2,600	3,500	135	2,600	3,700	138	4.4	40 - 140%	20 %
206-44-0	Fluoranthene	BRL	2,600	3,500	133	2,600	3,400	129	1.2	40 - 140%	20 %
129-00-0	Pyrene	BRL	2,600	3,500	136	2,600	3,600	134	1.2	40 - 140%	20 %
56-55-3	Benzo[a]anthracene	BRL	2,600	3,400	131	2,600	3,400	130	0.7	40 - 140%	20 %
218-01-9	Chrysene	BRL	2,600	3,400	130	2,600	3,400	128	0.4	40 - 140%	20 %
205-99-2	Benzo[b]fluoranthene	BRL	2,600	3,200	125	2,600	3,300	123	0.8	40 - 140%	20 %
207-08-9	Benzo[k]fluoranthene	BRL	2,600	3,300	127	2,600	3,300	124	0.1	40 - 140%	20 %
50-32-8	Benzo[a]pyrene	BRL	2,600	3,500	134	2,600	3,500	132	0.7	40 - 140%	20 %
193-39-5	Indeno[1,2,3-c,d]pyrene	BRL	2,600	3,300	126	2,600	3,100	118	4.0	40 - 140%	20 %
53-70-3	Dibenzo[a,h]anthracene	BRL	2,600	3,500	136	2,600	3,500	131	1.7	40 - 140%	20 %
191-24-2	Benzo[g,h,i]perylene	BRL	2,600	3,100	121	2,600	3,100	115	2.4	40 - 140%	20 %

QC Surrogate Compound	Surr. Rec. (%)									QC Limits
Nitrobenzene-d5	64	8,600	6,100	70	8,800	6,100	69			30 - 130 %
2-Fluorobiphenyl	60	8,600	5,700	66	8,800	5,700	65			30 - 130 %
Terphenyl-d14	68	8,600	6,300	73	8,800	6,200	70			30 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Sample extraction performed by EPA Method 3545. Cleanup performed by EPA Method 3630C. Results are reported on a dry weight basis.

Report Notations: Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be

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EPA Method 8270C
Polynuclear Aromatic Hydrocarbons by GC/MS

Field ID:	**SD03DUP5**	Matrix:	**Soil**
Project:	**Saugus Iron Works**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72079-51**	QC Batch ID:	**SV-1439-P**
Sampled:	**04-28-04 11:58**	Instrument ID:	**MS-3 HP 5890**
Received:	**04-28-04 18:30**	Sample Weight:	**15 g**
Extracted:	**05-03-04 20:45**	Final Volume:	**1 mL**
Cleaned Up:	**05-06-04 22:00**	Percent Solids:	**72**
Analyzed:	**05-08-04 07:40**	Dilution Factor:	**1**
Analyst:	**JJT**		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
91-20-3	Naphthalene	BRL		ug/Kg	450
91-57-6	2-Methylnaphthalene	BRL		ug/Kg	450
208-96-8	Acenaphthylene	BRL		ug/Kg	450
83-32-9	Acenaphthene	BRL		ug/Kg	450
86-73-7	Fluorene	BRL		ug/Kg	450
85-01-8	Phenanthrene	BRL		ug/Kg	450
120-12-7	Anthracene	BRL		ug/Kg	450
206-44-0	Fluoranthene	BRL		ug/Kg	450
129-00-0	Pyrene	BRL		ug/Kg	450
56-55-3	Benzo[a]anthracene	BRL		ug/Kg	450
218-01-9	Chrysene	BRL		ug/Kg	450
205-99-2	Benzo[b]fluoranthene	BRL		ug/Kg	450
207-08-9	Benzo[k]fluoranthene	BRL		ug/Kg	450
50-32-8	Benzo[a]pyrene	BRL		ug/Kg	450
193-39-5	Indeno[1,2,3-c,d]pyrene	BRL		ug/Kg	450
53-70-3	Dibenzo[a,h]anthracene	BRL		ug/Kg	450
191-24-2	Benzo[g,h,i]perylene	BRL		ug/Kg	450

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Nitrobenzene-d5	9,000	5,200	**58** %	30 - 130 %
2-Fluorobiphenyl	9,000	5,400	**60** %	30 - 130 %
Terphenyl-d14	9,000	6,300	**70** %	30 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample extraction performed by EPA Method 3545. Cleanup performed by EPA Method 3630C. Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

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EPA Method 8270C
Polynuclear Aromatic Hydrocarbons by GC/MS

Field ID:	**SD03812**	Matrix:	**Soil**
Project:	**Saugus Iron Works**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72079-52**	QC Batch ID:	**SV-1439-P**
Sampled:	**04-28-04 12:10**	Instrument ID:	**MS-3 HP 5890**
Received:	**04-28-04 18:30**	Sample Weight:	**15 g**
Extracted:	**05-03-04 20:45**	Final Volume:	**1 mL**
Cleaned Up:	**05-06-04 22:00**	Percent Solids:	**68**
Analyzed:	**05-08-04 08:19**	Dilution Factor:	**1**
Analyst:	**JJT**		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
91-20-3	Naphthalene	BRL		ug/Kg	480
91-57-6	2-Methylnaphthalene	BRL		ug/Kg	480
208-96-8	Acenaphthylene	BRL		ug/Kg	480
83-32-9	Acenaphthene	BRL		ug/Kg	480
86-73-7	Fluorene	BRL		ug/Kg	480
85-01-8	Phenanthrene	BRL		ug/Kg	480
120-12-7	Anthracene	BRL		ug/Kg	480
206-44-0	Fluoranthene	BRL		ug/Kg	480
129-00-0	Pyrene	BRL		ug/Kg	480
56-55-3	Benzo[a]anthracene	BRL		ug/Kg	480
218-01-9	Chrysene	BRL		ug/Kg	480
205-99-2	Benzo[b]fluoranthene	BRL		ug/Kg	480
207-08-9	Benzo[k]fluoranthene	BRL		ug/Kg	480
50-32-8	Benzo[a]pyrene	BRL		ug/Kg	480
193-39-5	Indeno[1,2,3-c,d]pyrene	BRL		ug/Kg	480
53-70-3	Dibenzo[a,h]anthracene	BRL		ug/Kg	480
191-24-2	Benzo[g,h,i]perylene	BRL		ug/Kg	480

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Nitrobenzene-d5	9,800	6,500	**66 %**	30 - 130 %
2-Fluorobiphenyl	9,800	6,400	**66 %**	30 - 130 %
Terphenyl-d14	9,800	6,900	**71 %**	30 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample extraction performed by EPA Method 3545. Cleanup performed by EPA Method 3630C. Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

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EPA Method 8270C
Polynuclear Aromatic Hydrocarbons by GC/MS

Field ID:	**SD03DUP6**	Matrix:	**Soil**
Project:	**Saugus Iron Works**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72079-53**	QC Batch ID:	**SV-1439-P**
Sampled:	**04-28-04 12:12**	Instrument ID:	**MS-3 HP 5890**
Received:	**04-28-04 18:30**	Sample Weight:	**15 g**
Extracted:	**05-03-04 20:45**	Final Volume:	**1 mL**
Cleaned Up:	**05-06-04 22:00**	Percent Solids:	**81**
Analyzed:	**05-08-04 08:58**	Dilution Factor:	**1**
Analyst:	**JJT**		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
91-20-3	Naphthalene	BRL		ug/Kg	400
91-57-6	2-Methylnaphthalene	BRL		ug/Kg	400
208-96-8	Acenaphthylene	BRL		ug/Kg	400
83-32-9	Acenaphthene	BRL		ug/Kg	400
86-73-7	Fluorene	BRL		ug/Kg	400
85-01-8	Phenanthrene	BRL		ug/Kg	400
120-12-7	Anthracene	BRL		ug/Kg	400
206-44-0	Fluoranthene	BRL		ug/Kg	400
129-00-0	Pyrene	BRL		ug/Kg	400
56-55-3	Benzo[a]anthracene	BRL		ug/Kg	400
218-01-9	Chrysene	BRL		ug/Kg	400
205-99-2	Benzo[b]fluoranthene	BRL		ug/Kg	400
207-08-9	Benzo[k]fluoranthene	BRL		ug/Kg	400
50-32-8	Benzo[a]pyrene	BRL		ug/Kg	400
193-39-5	Indeno[1,2,3-c,d]pyrene	BRL		ug/Kg	400
53-70-3	Dibenzo[a,h]anthracene	BRL		ug/Kg	400
191-24-2	Benzo[g,h,i]perylene	BRL		ug/Kg	400

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Nitrobenzene-d5	8,100	5,700	**70 %**	30 - 130 %
2-Fluorobiphenyl	8,100	5,800	**72 %**	30 - 130 %
Terphenyl-d14	8,100	6,000	**74 %**	30 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample extraction performed by EPA Method 3545. Cleanup performed by EPA Method 3630C. Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8270C
Polynuclear Aromatic Hydrocarbons by GC/MS

Field ID:	**SD031215**	Matrix:	**Soil**
Project:	**Saugus Iron Works**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72079-54**	QC Batch ID:	**SV-1439-P**
Sampled:	**04-28-04 12:22**	Instrument ID:	**MS-3 HP 5890**
Received:	**04-28-04 18:30**	Sample Weight:	**15 g**
Extracted:	**05-03-04 20:45**	Final Volume:	**1 mL**
Cleaned Up:	**05-06-04 22:00**	Percent Solids:	**86**
Analyzed:	**05-08-04 09:37**	Dilution Factor:	**1**
Analyst:	**JJT**		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
91-20-3	Naphthalene	BRL		ug/Kg	380
91-57-6	2-Methylnaphthalene	BRL		ug/Kg	380
208-96-8	Acenaphthylene	BRL		ug/Kg	380
83-32-9	Acenaphthene	BRL		ug/Kg	380
86-73-7	Fluorene	BRL		ug/Kg	380
85-01-8	Phenanthrene	BRL		ug/Kg	380
120-12-7	Anthracene	BRL		ug/Kg	380
206-44-0	Fluoranthene	BRL		ug/Kg	380
129-00-0	Pyrene	BRL		ug/Kg	380
56-55-3	Benzo[a]anthracene	BRL		ug/Kg	380
218-01-9	Chrysene	BRL		ug/Kg	380
205-99-2	Benzo[b]fluoranthene	BRL		ug/Kg	380
207-08-9	Benzo[k]fluoranthene	BRL		ug/Kg	380
50-32-8	Benzo[a]pyrene	BRL		ug/Kg	380
193-39-5	Indeno[1,2,3-c,d]pyrene	BRL		ug/Kg	380
53-70-3	Dibenzo[a,h]anthracene	BRL		ug/Kg	380
191-24-2	Benzo[g,h,i]perylene	BRL		ug/Kg	380

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Nitrobenzene-d5	7,600	5,200	**68 %**	30 - 130 %
2-Fluorobiphenyl	7,600	5,400	**71 %**	30 - 130 %
Terphenyl-d14	7,600	5,700	**74 %**	30 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample extraction performed by EPA Method 3545. Cleanup performed by EPA Method 3630C. Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8270C
Polynuclear Aromatic Hydrocarbons by GC/MS-SIM

Field ID:	**EB03**	Matrix:	**Aqueous**
Project:	**Saugus Iron Works**	Container:	**1 L Amber Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72079-56**	QC Batch ID:	**SV-1489-F**
Sampled:	**04-28-04 14:15**	Instrument ID:	**MS-6 HP 6890**
Received:	**04-28-04 18:30**	Sample Volume:	**1,000 mL**
Extracted:	**05-04-04 11:00**	Final Volume:	**1 mL**
Analyzed:	**05-06-04 22:21**	Dilution Factor:	**1**
Analyst:	**JJT**		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
91-20-3	Naphthalene	BRL		ug/L	0.5
91-57-6	2-Methylnaphthalene	BRL		ug/L	0.5
208-96-8	Acenaphthylene	BRL		ug/L	0.5
83-32-9	Acenaphthene	BRL		ug/L	0.5
86-73-7	Fluorene	BRL		ug/L	0.5
85-01-8	Phenanthrene	BRL		ug/L	0.5
120-12-7	Anthracene	BRL		ug/L	0.5
206-44-0	Fluoranthene	BRL		ug/L	0.5
129-00-0	Pyrene	BRL		ug/L	0.5
56-55-3	Benzo[a]anthracene	BRL		ug/L	0.1
218-01-9	Chrysene	BRL		ug/L	0.1
205-99-2	Benzo[b]fluoranthene	BRL		ug/L	0.1
207-08-9	Benzo[k]fluoranthene	BRL		ug/L	0.1
50-32-8	Benzo[a]pyrene	BRL		ug/L	0.1
193-39-5	Indeno[1,2,3-c,d]pyrene	BRL		ug/L	0.1
53-70-3	Dibenzo[a,h]anthracene	BRL		ug/L	0.1
191-24-2	Benzo[g,h,i]perylene	BRL		ug/L	0.1

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Nitrobenzene-d5	10	9.5	**95 %**	30 - 130 %
2-Fluorobiphenyl	10	7.7	**77 %**	30 - 130 %
Terphenyl-d14	10	9.1	**91 %**	30 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Method modified by use of selected ion monitoring (SIM) in accordance with Section 7.5.5 of the method.
Sample extraction performed by EPA Method 3510C.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

GROUNDWATER ANALYTICAL

Trace Metals

Field ID:	**SD0104**	Matrix:	**Soil**
Project:	**Saugus Iron Works**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72079-39**	Percent Solids:	**79**
Sampled:	**04-28-04 08:16**		
Received:	**04-28-04 18:30**		

Analysis Method	QC Batch ID	Prep Method	Prepared	Sample Weight	Instrument ID	Analyst
EPA 6010B[1]	MB-0340-S	EPA 3050B	04-29-04 09:00	0.5 g	ICP-1 PE 3000	CRL
EPA 7471A[2]	MP-1578-S	EPA 7471A	04-29-04 12:00	0.6 g	CVAA-1 PE FIMS	CRL

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit	DF	Analyzed	Method
7440-36-0	Antimony, Total	BRL		mg/Kg	1.2	1	04-29-04 15:52	EPA 6010B[1]
7440-38-2	Arsenic, Total	**3.1**		mg/Kg	1.2	1	04-29-04 15:52	EPA 6010B[1]
7440-41-7	Beryllium, Total	BRL		mg/Kg	0.49	1	04-29-04 15:52	EPA 6010B[1]
7440-43-9	Cadmium, Total	BRL		mg/Kg	0.61	1	04-29-04 15:52	EPA 6010B[1]
7440-47-3	Chromium, Total	**17**		mg/Kg	12	1	04-29-04 15:52	EPA 6010B[1]
7440-50-8	Copper, Total	BRL		mg/Kg	24	1	04-29-04 15:52	EPA 6010B[1]
7439-92-1	Lead, Total	BRL		mg/Kg	12	1	04-29-04 15:52	EPA 6010B[1]
7439-97-6	Mercury, Total	BRL		mg/Kg	0.041	1	04-29-04 16:26	EPA 7471A[2]
7440-02-0	Nickel, Total	**18**		mg/Kg	12	1	04-29-04 15:52	EPA 6010B[1]
7782-49-2	Selenium, Total	BRL		mg/Kg	24	1	04-29-04 15:52	EPA 6010B[1]
7440-22-4	Silver, Total	BRL		mg/Kg	6.1	1	04-29-04 15:52	EPA 6010B[1]
7440-28-0	Thallium, Total	BRL		mg/Kg	6.1	1	04-29-04 15:52	EPA 6010B[1]
7440-66-6	Zinc, Total	BRL		mg/Kg	61	1	04-29-04 15:52	EPA 6010B[1]

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:
BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.
DF Dilution Factor.

GROUNDWATER ANALYTICAL

Trace Metals

Field ID:	**SD0148**	Matrix:	**Soil**
Project:	**Saugus Iron Works**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72079-40**	Percent Solids:	**69**
Sampled:	**04-28-04 08:24**		
Received:	**04-28-04 18:30**		

Analysis Method	QC Batch ID	Prep Method	Prepared	Sample Weight	Instrument ID	Analyst
EPA 6010B[1]	MB-0340-S	EPA 3050B	04-29-04 09:00	0.5 g	ICP-1 PE 3000	CRL
EPA 7471A[2]	MP-1578-S	EPA 7471A	04-29-04 12:00	0.6 g	CVAA-1 PE FIMS	CRL

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit	DF	Analyzed	Method
7440-36-0	Antimony, Total	BRL		mg/Kg	1.4	1	04-29-04 15:56	EPA 6010B[1]
7440-38-2	Arsenic, Total	**2.2**		mg/Kg	1.4	1	04-29-04 15:56	EPA 6010B[1]
7440-41-7	Beryllium, Total	BRL		mg/Kg	0.56	1	04-29-04 15:56	EPA 6010B[1]
7440-43-9	Cadmium, Total	BRL		mg/Kg	0.70	1	04-29-04 15:56	EPA 6010B[1]
7440-47-3	Chromium, Total	**21**		mg/Kg	14	1	04-29-04 15:56	EPA 6010B[1]
7440-50-8	Copper, Total	BRL		mg/Kg	28	1	04-29-04 15:56	EPA 6010B[1]
7439-92-1	Lead, Total	**18**		mg/Kg	14	1	04-29-04 15:56	EPA 6010B[1]
7439-97-6	Mercury, Total	BRL		mg/Kg	0.048	1	04-29-04 16:29	EPA 7471A[2]
7440-02-0	Nickel, Total	**22**		mg/Kg	14	1	04-29-04 15:56	EPA 6010B[1]
7782-49-2	Selenium, Total	BRL		mg/Kg	28	1	04-29-04 15:56	EPA 6010B[1]
7440-22-4	Silver, Total	BRL		mg/Kg	7.0	1	04-29-04 15:56	EPA 6010B[1]
7440-28-0	Thallium, Total	BRL		mg/Kg	7.0	1	04-29-04 15:56	EPA 6010B[1]
7440-66-6	Zinc, Total	BRL		mg/Kg	70	1	04-29-04 15:56	EPA 6010B[1]

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:
BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.
DF Dilution Factor.

GROUNDWATER ANALYTICAL

Trace Metals

Field ID:	**SD01812**	Matrix:	**Soil**
Project:	**Saugus Iron Works**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72079-41**	Percent Solids:	**82**
Sampled:	**04-28-04 08:32**		
Received:	**04-28-04 18:30**		

Analysis Method	QC Batch ID	Prep Method	Prepared	Sample Weight	Instrument ID	Analyst
EPA 6010B[1]	MB-0340-S	EPA 3050B	04-29-04 09:00	0.5 g	ICP-1 PE 3000	CRL
EPA 7471A[2]	MP-1578-S	EPA 7471A	04-29-04 12:00	0.6 g	CVAA-1 PE FIMS	CRL

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit	DF	Analyzed	Method
7440-36-0	Antimony, Total	BRL		mg/Kg	1.2	1	04-29-04 16:08	EPA 6010B[1]
7440-38-2	Arsenic, Total	**3.5**		mg/Kg	1.2	1	04-29-04 16:08	EPA 6010B[1]
7440-41-7	Beryllium, Total	BRL		mg/Kg	0.48	1	04-29-04 16:07	EPA 6010B[1]
7440-43-9	Cadmium, Total	BRL		mg/Kg	0.61	1	04-29-04 16:08	EPA 6010B[1]
7440-47-3	Chromium, Total	**14**		mg/Kg	12	1	04-29-04 16:07	EPA 6010B[1]
7440-50-8	Copper, Total	BRL		mg/Kg	24	1	04-29-04 16:07	EPA 6010B[1]
7439-92-1	Lead, Total	BRL		mg/Kg	12	1	04-29-04 16:08	EPA 6010B[1]
7439-97-6	Mercury, Total	BRL		mg/Kg	0.039	1	04-29-04 16:38	EPA 7471A[2]
7440-02-0	Nickel, Total	**15**		mg/Kg	12	1	04-29-04 16:08	EPA 6010B[1]
7782-49-2	Selenium, Total	BRL		mg/Kg	24	1	04-29-04 16:08	EPA 6010B[1]
7440-22-4	Silver, Total	BRL		mg/Kg	6.1	1	04-29-04 16:07	EPA 6010B[1]
7440-28-0	Thallium, Total	BRL		mg/Kg	6.1	1	04-29-04 16:08	EPA 6010B[1]
7440-66-6	Zinc, Total	BRL		mg/Kg	61	1	04-29-04 16:07	EPA 6010B[1]

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

DF Dilution Factor.

GROUNDWATER ANALYTICAL

Trace Metals

Field ID:	**SD011215**	Matrix:	**Soil**
Project:	**Saugus Iron Works**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72079-42**	Percent Solids:	**77**
Sampled:	**04-28-04 08:38**		
Received:	**04-28-04 18:30**		

Analysis Method	QC Batch ID	Prep Method	Prepared	Sample Weight	Instrument ID	Analyst
EPA 6010B[1]	MB-0340-S	EPA 3050B	04-29-04 09:00	0.5 g	ICP-1 PE 3000	CRL
EPA 7471A[2]	MP-1578-S	EPA 7471A	04-29-04 12:00	0.6 g	CVAA-1 PE FIMS	CRL

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit	DF	Analyzed	Method
7440-36-0	Antimony, Total	BRL		mg/Kg	1.3	1	04-29-04 16:12	EPA 6010B[1]
7440-38-2	Arsenic, Total	**2.4**		mg/Kg	1.3	1	04-29-04 16:12	EPA 6010B[1]
7440-41-7	Beryllium, Total	BRL		mg/Kg	0.52	1	04-29-04 16:12	EPA 6010B[1]
7440-43-9	Cadmium, Total	BRL		mg/Kg	0.64	1	04-29-04 16:12	EPA 6010B[1]
7440-47-3	Chromium, Total	BRL		mg/Kg	13	1	04-29-04 16:12	EPA 6010B[1]
7440-50-8	Copper, Total	BRL		mg/Kg	26	1	04-29-04 16:12	EPA 6010B[1]
7439-92-1	Lead, Total	BRL		mg/Kg	13	1	04-29-04 16:12	EPA 6010B[1]
7439-97-6	Mercury, Total	BRL		mg/Kg	0.042	1	04-29-04 16:41	EPA 7471A[2]
7440-02-0	Nickel, Total	BRL		mg/Kg	13	1	04-29-04 16:12	EPA 6010B[1]
7782-49-2	Selenium, Total	BRL		mg/Kg	26	1	04-29-04 16:12	EPA 6010B[1]
7440-22-4	Silver, Total	BRL		mg/Kg	6.4	1	04-29-04 16:12	EPA 6010B[1]
7440-28-0	Thallium, Total	BRL		mg/Kg	6.4	1	04-29-04 16:12	EPA 6010B[1]
7440-66-6	Zinc, Total	BRL		mg/Kg	64	1	04-29-04 16:12	EPA 6010B[1]

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

DF Dilution Factor.

GROUNDWATER ANALYTICAL

Trace Metals

Field ID:	**SD0204**	Matrix:	**Soil**
Project:	**Saugus Iron Works**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72079-43**	Percent Solids:	**59**
Sampled:	**04-28-04 08:44**		
Received:	**04-28-04 18:30**		

Analysis Method	QC Batch ID	Prep Method	Prepared	Sample Weight	Instrument ID	Analyst
EPA 6010B[1]	MB-0340-S	EPA 3050B	04-29-04 09:00	0.5 g	ICP-1 PE 3000	CRL
EPA 7471A[2]	MP-1578-S	EPA 7471A	04-29-04 12:00	0.6 g	CVAA-1 PE FIMS	CRL

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit	DF	Analyzed	Method
7440-36-0	Antimony, Total	BRL		mg/Kg	1.7	1	04-29-04 16:16	EPA 6010B[1]
7440-38-2	Arsenic, Total	**13**		mg/Kg	1.7	1	04-29-04 16:16	EPA 6010B[1]
7440-41-7	Beryllium, Total	BRL		mg/Kg	0.69	1	04-29-04 16:16	EPA 6010B[1]
7440-43-9	Cadmium, Total	BRL		mg/Kg	0.87	1	04-29-04 16:16	EPA 6010B[1]
7440-47-3	Chromium, Total	**42**		mg/Kg	17	1	04-29-04 16:16	EPA 6010B[1]
7440-50-8	Copper, Total	BRL		mg/Kg	35	1	04-29-04 16:16	EPA 6010B[1]
7439-92-1	Lead, Total	**78**		mg/Kg	17	1	04-29-04 16:16	EPA 6010B[1]
7439-97-6	Mercury, Total	**0.16**		mg/Kg	0.055	1	04-29-04 16:44	EPA 7471A[2]
7440-02-0	Nickel, Total	**20**		mg/Kg	17	1	04-29-04 16:16	EPA 6010B[1]
7782-49-2	Selenium, Total	BRL		mg/Kg	35	1	04-29-04 16:16	EPA 6010B[1]
7440-22-4	Silver, Total	BRL		mg/Kg	8.7	1	04-29-04 16:16	EPA 6010B[1]
7440-28-0	Thallium, Total	BRL		mg/Kg	8.7	1	04-29-04 16:16	EPA 6010B[1]
7440-66-6	Zinc, Total	**160**		mg/Kg	87	1	04-29-04 16:16	EPA 6010B[1]

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

DF Dilution Factor.

GROUNDWATER ANALYTICAL

Trace Metals

Field ID:	**SD0248**	Matrix:	**Soil**
Project:	**Saugus Iron Works**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72079-44**	Percent Solids:	**72**
Sampled:	**04-28-04 08:52**		
Received:	**04-28-04 18:30**		

Analysis Method	QC Batch ID	Prep Method	Prepared	Sample Weight	Instrument ID	Analyst
EPA 6010B[1]	MB-0340-S	EPA 3050B	04-29-04 09:00	0.5 g	ICP-1 PE 3000	CRL
EPA 7471A[2]	MP-1578-S	EPA 7471A	04-29-04 12:00	0.6 g	CVAA-1 PE FIMS	CRL

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit	DF	Analyzed	Method
7440-36-0	Antimony, Total	BRL		mg/Kg	1.4	1	04-29-04 16:20	EPA 6010B[1]
7440-38-2	Arsenic, Total	**7.5**		mg/Kg	1.4	1	04-29-04 16:20	EPA 6010B[1]
7440-41-7	Beryllium, Total	BRL		mg/Kg	0.55	1	04-29-04 16:20	EPA 6010B[1]
7440-43-9	Cadmium, Total	BRL		mg/Kg	0.68	1	04-29-04 16:20	EPA 6010B[1]
7440-47-3	Chromium, Total	**91**		mg/Kg	14	1	04-29-04 16:20	EPA 6010B[1]
7440-50-8	Copper, Total	BRL		mg/Kg	27	1	04-29-04 16:20	EPA 6010B[1]
7439-92-1	Lead, Total	**17**		mg/Kg	14	1	04-29-04 16:20	EPA 6010B[1]
7439-97-6	Mercury, Total	**0.055**		mg/Kg	0.045	1	04-29-04 16:48	EPA 7471A[2]
7440-02-0	Nickel, Total	**38**		mg/Kg	14	1	04-29-04 16:20	EPA 6010B[1]
7782-49-2	Selenium, Total	BRL		mg/Kg	27	1	04-29-04 16:20	EPA 6010B[1]
7440-22-4	Silver, Total	BRL		mg/Kg	6.8	1	04-29-04 16:20	EPA 6010B[1]
7440-28-0	Thallium, Total	BRL		mg/Kg	6.8	1	04-29-04 16:20	EPA 6010B[1]
7440-66-6	Zinc, Total	BRL		mg/Kg	68	1	04-29-04 16:20	EPA 6010B[1]

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

DF Dilution Factor.

GROUNDWATER ANALYTICAL

Trace Metals

Field ID:	**SD02812**	Matrix:	**Soil**
Project:	**Saugus Iron Works**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72079-45**	Percent Solids:	**69**
Sampled:	**04-28-04 08:54**		
Received:	**04-28-04 18:30**		

Analysis Method	QC Batch ID	Prep Method	Prepared	Sample Weight	Instrument ID	Analyst
EPA 6010B[1]	MB-0340-S	EPA 3050B	04-29-04 09:00	0.5 g	ICP-1 PE 3000	CRL
EPA 7471A[2]	MP-1578-S	EPA 7471A	04-29-04 12:00	0.6 g	CVAA-1 PE FIMS	CRL

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit	DF	Analyzed	Method
7440-36-0	Antimony, Total	BRL		mg/Kg	1.5	1	04-29-04 16:24	EPA 6010B[1]
7440-38-2	Arsenic, Total	**2.2**		mg/Kg	1.5	1	04-29-04 16:24	EPA 6010B[1]
7440-41-7	Beryllium, Total	BRL		mg/Kg	0.59	1	04-29-04 16:24	EPA 6010B[1]
7440-43-9	Cadmium, Total	BRL		mg/Kg	0.74	1	04-29-04 16:24	EPA 6010B[1]
7440-47-3	Chromium, Total	**25**		mg/Kg	15	1	04-29-04 16:24	EPA 6010B[1]
7440-50-8	Copper, Total	BRL		mg/Kg	30	1	04-29-04 16:24	EPA 6010B[1]
7439-92-1	Lead, Total	BRL		mg/Kg	15	1	04-29-04 16:24	EPA 6010B[1]
7439-97-6	Mercury, Total	BRL		mg/Kg	0.047	1	04-29-04 16:51	EPA 7471A[2]
7440-02-0	Nickel, Total	**19**		mg/Kg	15	1	04-29-04 16:24	EPA 6010B[1]
7782-49-2	Selenium, Total	BRL		mg/Kg	30	1	04-29-04 16:24	EPA 6010B[1]
7440-22-4	Silver, Total	BRL		mg/Kg	7.4	1	04-29-04 16:24	EPA 6010B[1]
7440-28-0	Thallium, Total	BRL		mg/Kg	7.4	1	04-29-04 16:24	EPA 6010B[1]
7440-66-6	Zinc, Total	BRL		mg/Kg	74	1	04-29-04 16:24	EPA 6010B[1]

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

DF Dilution Factor.

GROUNDWATER ANALYTICAL

Trace Metals

Field ID:	**SD0304**	Matrix:	**Soil**
Project:	**Saugus Iron Works**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72079-46**	Percent Solids:	**45**
Sampled:	**04-28-04 11:40**		
Received:	**04-28-04 18:30**		

Analysis Method	QC Batch ID	Prep Method	Prepared	Sample Weight	Instrument ID	Analyst
EPA 6010B[1]	MB-0340-S	EPA 3050B	04-29-04 09:00	0.5 g	ICP-1 PE 3000	CRL
EPA 7471A[2]	MP-1578-S	EPA 7471A	04-29-04 12:00	0.6 g	CVAA-1 PE FIMS	CRL

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit	DF	Analyzed	Method
7440-36-0	Antimony, Total	BRL		mg/Kg	2.1	1	05-03-04 17:03	EPA 6010B[1]
7440-38-2	Arsenic, Total	**9.1**		mg/Kg	2.1	1	04-29-04 16:29	EPA 6010B[1]
7440-41-7	Beryllium, Total	BRL		mg/Kg	0.85	1	04-29-04 16:28	EPA 6010B[1]
7440-43-9	Cadmium, Total	BRL		mg/Kg	1.1	1	04-29-04 16:29	EPA 6010B[1]
7440-47-3	Chromium, Total	**64**		mg/Kg	21	1	04-29-04 16:28	EPA 6010B[1]
7440-50-8	Copper, Total	**43**		mg/Kg	43	1	04-29-04 16:28	EPA 6010B[1]
7439-92-1	Lead, Total	**110**		mg/Kg	21	1	04-29-04 16:29	EPA 6010B[1]
7439-97-6	Mercury, Total	**0.30**		mg/Kg	0.075	1	04-29-04 16:54	EPA 7471A[2]
7440-02-0	Nickel, Total	**47**		mg/Kg	21	1	04-29-04 16:28	EPA 6010B[1]
7782-49-2	Selenium, Total	BRL		mg/Kg	43	1	04-29-04 16:29	EPA 6010B[1]
7440-22-4	Silver, Total	BRL		mg/Kg	11	1	04-29-04 16:28	EPA 6010B[1]
7440-28-0	Thallium, Total	BRL		mg/Kg	11	1	04-29-04 16:29	EPA 6010B[1]
7440-66-6	Zinc, Total	**130**		mg/Kg	110	1	05-03-04 17:02	EPA 6010B[1]

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

DF Dilution Factor.

GROUNDWATER ANALYTICAL

Matrix Spike and Matrix Spike Duplicate
Trace Metals

Field ID:	**SD0304**
Project:	**Saugus Iron Works**
Client:	**CH2M Hill**
Matrix:	**Soil**
Container:	**250 mL Glass**
Preservation:	**Cool**

	Parent Sample	Matrix Spike	Spike Dup
Laboratory ID:	72079-46	72079-48MS	72079-48MSD
Sampled:	04-28-04 11:40	04-28-04 11:40	04-28-04 11:4
Received:	04-28-04 18:30	04-28-04 18:30	04-28-04 18:3
% Solids:	45	54	54

Sample Type	Method	QC Batch ID	Prep Method	Prepared	Weight	DF	Analyzed	Instrument ID	Analyst
Matrix Spike	EPA 6010B	MB-0341-S	EPA 3050B	04-30-04 07:40	0.5 g	1	05-03-04 17:07	ICP-1 PE 3000	CRL
Matrix Spike	EPA 7471A	MP-1578-S	EPA 7471A	04-29-04 12:00	0.6 g	1	04-29-04 17:29	CVAA-1 PE FIMS	CRL

CAS Number	Analyte	Unspiked Sample (mg/Kg)	MS Spiked (mg/Kg)	MS Measured (mg/Kg)	MS Recovery	MSD Spiked (mg/Kg)	MSD Measured (mg/Kg)	MSD Recovery	RPD	QC Limits Spike	QC Limits RPD	Method
7440-36-0	Antimony	BRL	180	120	**67 %** q	180	120	**68 %** q	**0 %**	75-125%	20 %	EPA 6010B
7440-38-2	Arsenic	9.1	180	170	**89 %**	180	160	**85 %**	**0 %**	75-125%	20 %	EPA 6010B
7440-41-7	Beryllium	BRL	180	160	**91 %**	180	150	**86 %**	**6 %**	75-125%	20 %	EPA 6010B
7440-43-9	Cadmium	BRL	180	160	**86 %**	180	150	**82 %**	**6 %**	75-125%	20 %	EPA 6010B
7440-47-3	Chromium	64	180	210	**80 %**	180	200	**77 %**	**5 %**	75-125%	20 %	EPA 6010B
7440-50-8	Copper	43	180	190	**81 %**	180	180	**78 %**	**5 %**	75-125%	20 %	EPA 6010B
7439-92-1	Lead	110	180	300	**110 %**	180	250	**78 %**	**18 %**	75-125%	20 %	EPA 6010B
7439-97-6	Mercury	0.30	0.30	0.56	**94 %**	0.30	0.56	**94 %**	**0 %**	75-125%	20 %	EPA 7471A
7440-02-0	Nickel	47	180	190	**77 %**	180	170	**71 %** s	**11 %**	75-125%	20 %	EPA 6010B
7782-49-2	Selenium	BRL	180	170	**91 %**	180	160	**88 %**	**6 %**	75-125%	20 %	EPA 6010B
7440-22-4	Silver	BRL	180	150	**82 %**	180	140	**80 %**	**7 %**	75-125%	20 %	EPA 6010B
7440-28-0	Thallium	BRL	180	150	**89 %**	180	150	**86 %**	**0 %**	75-125%	20 %	EPA 6010B
7440-66-6	Zinc	130	180	280	**79 %**	180	280	**78 %**	**0 %**	75-125%	20 %	EPA 6010B

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:

BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

DF Dilution Factor.

q Recovery outside recommended limits.

s Recovery outside recommended limits due to high concentration of spike analyte native to the sample.

GROUNDWATER ANALYTICAL

Trace Metals

Field ID:	**SD03DUP4**	Matrix:	**Soil**
Project:	**Saugus Iron Works**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72079-47**	Percent Solids:	**67**
Sampled:	**04-28-04 11:42**		
Received:	**04-28-04 18:30**		

Analysis Method	QC Batch ID	Prep Method	Prepared	Sample Weight	Instrument ID	Analyst
EPA 6010B[1]	MB-0341-S	EPA 3050B	04-30-04 07:40	0.5 g	ICP-1 PE 3000	CRL
EPA 7471A[2]	MP-1578-S	EPA 7471A	04-29-04 12:00	0.6 g	CVAA-1 PE FIMS	CRL

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit	DF	Analyzed	Method
7440-36-0	Antimony, Total	BRL		mg/Kg	1.5	1	04-30-04 14:11	EPA 6010B[1]
7440-38-2	Arsenic, Total	**6.6**		mg/Kg	1.5	1	04-30-04 14:11	EPA 6010B[1]
7440-41-7	Beryllium, Total	BRL		mg/Kg	0.6	1	04-30-04 14:11	EPA 6010B[1]
7440-43-9	Cadmium, Total	**0.95**		mg/Kg	0.75	1	04-30-04 14:11	EPA 6010B[1]
7440-47-3	Chromium, Total	**29**		mg/Kg	15	1	04-30-04 14:11	EPA 6010B[1]
7440-50-8	Copper, Total	BRL		mg/Kg	30	1	05-03-04 13:20	EPA 6010B[1]
7439-92-1	Lead, Total	**70**		mg/Kg	15	1	04-30-04 14:11	EPA 6010B[1]
7439-97-6	Mercury, Total	**0.27**		mg/Kg	0.048	1	04-29-04 16:57	EPA 7471A[2]
7440-02-0	Nickel, Total	**23**		mg/Kg	15	1	04-30-04 14:11	EPA 6010B[1]
7782-49-2	Selenium, Total	BRL		mg/Kg	30	1	04-30-04 14:11	EPA 6010B[1]
7440-22-4	Silver, Total	BRL		mg/Kg	7.5	1	04-30-04 14:11	EPA 6010B[1]
7440-28-0	Thallium, Total	BRL		mg/Kg	7.5	1	04-30-04 14:11	EPA 6010B[1]
7440-66-6	Zinc, Total	**97**		mg/Kg	75	1	04-30-04 14:11	EPA 6010B[1]

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

DF Dilution Factor.

GROUNDWATER ANALYTICAL

Trace Metals

Field ID:	**SD03048**	Matrix:	**Soil**
Project:	**Saugus Iron Works**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72079-49**	Percent Solids:	**79**
Sampled:	**04-28-04 11:54**		
Received:	**04-28-04 18:30**		

Analysis Method	QC Batch ID	Prep Method	Prepared	Sample Weight	Instrument ID	Analyst
EPA 6010B[1]	MB-0341-S	EPA 3050B	04-30-04 07:40	0.5 g	ICP-1 PE 3000	CRL
EPA 7471A[2]	MP-1578-S	EPA 7471A	04-29-04 12:00	0.6 g	CVAA-1 PE FIMS	CRL

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit	DF	Analyzed	Method
7440-36-0	Antimony, Total	BRL		mg/Kg	1.3	1	04-30-04 14:32	EPA 6010B[1]
7440-38-2	Arsenic, Total	**5.8**		mg/Kg	1.3	1	04-30-04 14:32	EPA 6010B[1]
7440-41-7	Beryllium, Total	BRL		mg/Kg	0.5	1	04-30-04 14:32	EPA 6010B[1]
7440-43-9	Cadmium, Total	BRL		mg/Kg	0.63	1	04-30-04 14:32	EPA 6010B[1]
7440-47-3	Chromium, Total	**24**		mg/Kg	13	1	04-30-04 14:32	EPA 6010B[1]
7440-50-8	Copper, Total	BRL		mg/Kg	25	1	05-03-04 13:41	EPA 6010B[1]
7439-92-1	Lead, Total	**18**		mg/Kg	13	1	04-30-04 14:32	EPA 6010B[1]
7439-97-6	Mercury, Total	**0.049**		mg/Kg	0.041	1	04-29-04 17:03	EPA 7471A[2]
7440-02-0	Nickel, Total	**21**		mg/Kg	13	1	04-30-04 14:32	EPA 6010B[1]
7782-49-2	Selenium, Total	BRL		mg/Kg	25	1	04-30-04 14:32	EPA 6010B[1]
7440-22-4	Silver, Total	BRL		mg/Kg	6.3	1	04-30-04 14:32	EPA 6010B[1]
7440-28-0	Thallium, Total	BRL		mg/Kg	6.3	1	04-30-04 14:32	EPA 6010B[1]
7440-66-6	Zinc, Total	BRL		mg/Kg	63	1	04-30-04 14:32	EPA 6010B[1]

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

DF Dilution Factor.

GROUNDWATER ANALYTICAL

Matrix Spike and Matrix Spike Duplicate
Trace Metals

Field ID:	**SD03048 MS/MSD**
Project:	**Saugus Iron Works**
Client:	**CH2M Hill**
Matrix:	**Soil**
Container:	**250 mL Glass**
Preservation:	**Cool**

	Parent Sample	Matrix Spike	Spike Dup
Laboratory ID:	**72079-49**	**72079-50MS**	**72079-50MSD**
Sampled:	**04-28-04 11:54**	**04-28-04 11:54**	**04-28-04 11:5**
Received:	**04-28-04 18:30**	**04-28-04 18:30**	**04-28-04 18:3**
% Solids:	**79**	**74**	**74**

Sample Type	Method	QC Batch ID	Prep Method	Prepared	Weight	DF	Analyzed	Instrument ID	Analyst
Matrix Spike	EPA 6010B	MB-0341-S	EPA 3050B	04-30-04 07:40	0.5 g	1	04-30-04 14:36	ICP-1 PE 3000	CRL
Matrix Spike	EPA 7471A	MP-1578-S	EPA 7471A	04-29-04 12:00	0.6 g	1	04-29-04 17:06	CVAA-1 PE FIMS	CRL

CAS Number	Analyte	Unspiked Sample (mg/Kg)	MS Spiked (mg/Kg)	MS Measured (mg/Kg)	MS Recovery	MSD Spiked (mg/Kg)	MSD Measured (mg/Kg)	MSD Recovery	RPD	QC Limits Spike	QC Limits RPD	Method
7440-36-0	Antimony	BRL	140	91	**65 %** q	140	95	**67 %** q	**4 %**	75-125%	20 %	EPA 6010B
7440-38-2	Arsenic	5.8	140	130	**86 %**	140	130	**88 %**	**0 %**	75-125%	20 %	EPA 6010B
7440-41-7	Beryllium	BRL	140	120	**85 %**	140	120	**86 %**	**0 %**	75-125%	20 %	EPA 6010B
7440-43-9	Cadmium	BRL	140	120	**83 %**	140	110	**81 %**	**9 %**	75-125%	20 %	EPA 6010B
7440-47-3	Chromium	24	140	140	**86 %**	140	150	**91 %**	**7 %**	75-125%	20 %	EPA 6010B
7440-50-8	Copper	BRL	140	120	**80 %**	140	130	**83 %**	**8 %**	75-125%	20 %	EPA 6010B
7439-92-1	Lead	18	140	130	**80 %**	140	130	**80 %**	**0 %**	75-125%	20 %	EPA 6010B
7439-97-6	Mercury	0.049	0.22	0.26	**95 %**	0.22	0.26	**95 %**	**0 %**	75-125%	20 %	EPA 7471A
7440-02-0	Nickel	21	140	140	**84 %**	140	150	**95 %**	**7 %**	75-125%	20 %	EPA 6010B
7782-49-2	Selenium	BRL	140	130	**87 %**	140	130	**87 %**	**0 %**	75-125%	20 %	EPA 6010B
7440-22-4	Silver	BRL	140	110	**82 %**	140	110	**82 %**	**0 %**	75-125%	20 %	EPA 6010B
7440-28-0	Thallium	BRL	140	110	**83 %**	140	110	**81 %**	**0 %**	75-125%	20 %	EPA 6010B
7440-66-6	Zinc	BRL	140	140	**69 %** q	140	150	**77 %**	**7 %**	75-125%	20 %	EPA 6010B

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:

BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

DF Dilution Factor.

q Recovery outside recommended limits.

GROUNDWATER ANALYTICAL

Trace Metals

Field ID:	**SD03DUP5**	Matrix:	**Soil**
Project:	**Saugus Iron Works**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72079-51**	Percent Solids:	**72**
Sampled:	**04-28-04 11:58**		
Received:	**04-28-04 18:30**		

Analysis Method	QC Batch ID	Prep Method	Prepared	Sample Weight	Instrument ID	Analyst
EPA 6010B[1]	MB-0341-S	EPA 3050B	04-30-04 07:40	0.5 g	ICP-1 PE 3000	CRL
EPA 7471A[2]	MP-1578-S	EPA 7471A	04-29-04 12:00	0.6 g	CVAA-1 PE FIMS	CRL

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit	DF	Analyzed	Method
7440-36-0	Antimony, Total	BRL		mg/Kg	1.4	1	04-30-04 14:52	EPA 6010B[1]
7440-38-2	Arsenic, Total	**4.6**		mg/Kg	1.4	1	04-30-04 14:52	EPA 6010B[1]
7440-41-7	Beryllium, Total	BRL		mg/Kg	0.56	1	04-30-04 14:52	EPA 6010B[1]
7440-43-9	Cadmium, Total	BRL		mg/Kg	0.71	1	04-30-04 14:52	EPA 6010B[1]
7440-47-3	Chromium, Total	**21**		mg/Kg	14	1	04-30-04 14:52	EPA 6010B[1]
7440-50-8	Copper, Total	BRL		mg/Kg	28	1	05-03-04 14:01	EPA 6010B[1]
7439-92-1	Lead, Total	BRL		mg/Kg	14	1	04-30-04 14:52	EPA 6010B[1]
7439-97-6	Mercury, Total	BRL		mg/Kg	0.045	1	04-29-04 17:16	EPA 7471A[2]
7440-02-0	Nickel, Total	**26**		mg/Kg	14	1	04-30-04 14:52	EPA 6010B[1]
7782-49-2	Selenium, Total	BRL		mg/Kg	28	1	04-30-04 14:52	EPA 6010B[1]
7440-22-4	Silver, Total	BRL		mg/Kg	7.1	1	04-30-04 14:52	EPA 6010B[1]
7440-28-0	Thallium, Total	BRL		mg/Kg	7.1	1	04-30-04 14:52	EPA 6010B[1]
7440-66-6	Zinc, Total	BRL		mg/Kg	71	1	04-30-04 14:52	EPA 6010B[1]

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

DF Dilution Factor.

GROUNDWATER ANALYTICAL

Trace Metals

Field ID:	**SD03812**	Matrix:	**Soil**
Project:	**Saugus Iron Works**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72079-52**	Percent Solids:	**68**
Sampled:	**04-28-04 12:10**		
Received:	**04-28-04 18:30**		

Analysis Method	QC Batch ID	Prep Method	Prepared	Sample Weight	Instrument ID	Analyst
EPA 6010B[1]	MB-0341-S	EPA 3050B	04-30-04 07:40	0.5 g	ICP-1 PE 3000	CRL
EPA 7471A[2]	MP-1578-S	EPA 7471A	04-29-04 12:00	0.6 g	CVAA-1 PE FIMS	CRL

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit	DF	Analyzed	Method
7440-36-0	Antimony, Total	BRL		mg/Kg	1.4	1	04-30-04 14:56	EPA 6010B[1]
7440-38-2	Arsenic, Total	**7.6**		mg/Kg	1.4	1	04-30-04 14:56	EPA 6010B[1]
7440-41-7	Beryllium, Total	BRL		mg/Kg	0.56	1	04-30-04 14:56	EPA 6010B[1]
7440-43-9	Cadmium, Total	BRL		mg/Kg	0.71	1	04-30-04 14:56	EPA 6010B[1]
7440-47-3	Chromium, Total	BRL		mg/Kg	14	1	04-30-04 14:56	EPA 6010B[1]
7440-50-8	Copper, Total	BRL		mg/Kg	28	1	05-03-04 14:05	EPA 6010B[1]
7439-92-1	Lead, Total	BRL		mg/Kg	14	1	04-30-04 14:56	EPA 6010B[1]
7439-97-6	Mercury, Total	BRL		mg/Kg	0.048	1	04-29-04 17:19	EPA 7471A[2]
7440-02-0	Nickel, Total	BRL		mg/Kg	14	1	04-30-04 14:56	EPA 6010B[1]
7782-49-2	Selenium, Total	BRL		mg/Kg	28	1	04-30-04 14:56	EPA 6010B[1]
7440-22-4	Silver, Total	BRL		mg/Kg	7.1	1	04-30-04 14:56	EPA 6010B[1]
7440-28-0	Thallium, Total	BRL		mg/Kg	7.1	1	04-30-04 14:56	EPA 6010B[1]
7440-66-6	Zinc, Total	BRL		mg/Kg	71	1	04-30-04 14:56	EPA 6010B[1]

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:
BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.
DF Dilution Factor.

GROUNDWATER ANALYTICAL

Trace Metals

Field ID:	**SD03DUP6**	Matrix:	**Soil**
Project:	**Saugus Iron Works**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72079-53**	Percent Solids:	**81**
Sampled:	**04-28-04 12:12**		
Received:	**04-28-04 18:30**		

Analysis Method	QC Batch ID	Prep Method	Prepared	Sample Weight	Instrument ID	Analyst
EPA 6010B[1]	MB-0341-S	EPA 3050B	04-30-04 07:40	0.5 g	ICP-1 PE 3000	CRL
EPA 7471A[2]	MP-1578-S	EPA 7471A	04-29-04 12:00	0.6 g	CVAA-1 PE FIMS	CRL

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit	DF	Analyzed	Method
7440-36-0	Antimony, Total	BRL		mg/Kg	1.3	1	04-30-04 15:00	EPA 6010B[1]
7440-38-2	Arsenic, Total	**5.7**		mg/Kg	1.3	1	04-30-04 15:00	EPA 6010B[1]
7440-41-7	Beryllium, Total	BRL		mg/Kg	0.51	1	04-30-04 15:00	EPA 6010B[1]
7440-43-9	Cadmium, Total	BRL		mg/Kg	0.64	1	04-30-04 15:00	EPA 6010B[1]
7440-47-3	Chromium, Total	BRL		mg/Kg	13	1	04-30-04 15:00	EPA 6010B[1]
7440-50-8	Copper, Total	BRL		mg/Kg	25	1	05-03-04 14:09	EPA 6010B[1]
7439-92-1	Lead, Total	BRL		mg/Kg	13	1	04-30-04 15:00	EPA 6010B[1]
7439-97-6	Mercury, Total	**0.19**		mg/Kg	0.040	1	04-29-04 17:23	EPA 7471A[2]
7440-02-0	Nickel, Total	BRL		mg/Kg	13	1	04-30-04 15:00	EPA 6010B[1]
7782-49-2	Selenium, Total	BRL		mg/Kg	25	1	04-30-04 15:00	EPA 6010B[1]
7440-22-4	Silver, Total	BRL		mg/Kg	6.4	1	04-30-04 15:00	EPA 6010B[1]
7440-28-0	Thallium, Total	BRL		mg/Kg	6.4	1	04-30-04 15:00	EPA 6010B[1]
7440-66-6	Zinc, Total	BRL		mg/Kg	64	1	04-30-04 15:00	EPA 6010B[1]

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:
BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.
DF Dilution Factor.

GROUNDWATER ANALYTICAL

Trace Metals

Field ID:	**SD031215**	Matrix:	**Soil**
Project:	**Saugus Iron Works**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72079-54**	Percent Solids:	**86**
Sampled:	**04-28-04 12:22**		
Received:	**04-28-04 18:30**		

Analysis Method	QC Batch ID	Prep Method	Prepared	Sample Weight	Instrument ID	Analyst
EPA 6010B[1]	MB-0341-S	EPA 3050B	04-30-04 07:40	0.5 g	ICP-1 PE 3000	CRL
EPA 7471A[2]	MP-1578-S	EPA 7471A	04-29-04 12:00	0.6 g	CVAA-1 PE FIMS	CRL

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit	DF	Analyzed	Method
7440-36-0	Antimony, Total	BRL		mg/Kg	1.1	1	04-30-04 15:05	EPA 6010B[1]
7440-38-2	Arsenic, Total	**8.9**		mg/Kg	1.1	1	04-30-04 15:05	EPA 6010B[1]
7440-41-7	Beryllium, Total	BRL		mg/Kg	0.46	1	04-30-04 15:04	EPA 6010B[1]
7440-43-9	Cadmium, Total	BRL		mg/Kg	0.57	1	04-30-04 15:05	EPA 6010B[1]
7440-47-3	Chromium, Total	**13**		mg/Kg	11	1	04-30-04 15:04	EPA 6010B[1]
7440-50-8	Copper, Total	BRL		mg/Kg	23	1	05-03-04 14:14	EPA 6010B[1]
7439-92-1	Lead, Total	BRL		mg/Kg	11	1	04-30-04 15:05	EPA 6010B[1]
7439-97-6	Mercury, Total	**0.23**		mg/Kg	0.038	1	04-29-04 17:26	EPA 7471A[2]
7440-02-0	Nickel, Total	**14**		mg/Kg	11	1	04-30-04 15:05	EPA 6010B[1]
7782-49-2	Selenium, Total	BRL		mg/Kg	23	1	04-30-04 15:05	EPA 6010B[1]
7440-22-4	Silver, Total	BRL		mg/Kg	5.7	1	04-30-04 15:04	EPA 6010B[1]
7440-28-0	Thallium, Total	BRL		mg/Kg	5.7	1	04-30-04 15:05	EPA 6010B[1]
7440-66-6	Zinc, Total	BRL		mg/Kg	57	1	04-30-04 15:04	EPA 6010B[1]

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:
BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.
DF Dilution Factor.

GROUNDWATER ANALYTICAL

Trace Metals

Field ID:	**EB03**	Matrix:	**Aqueous**
Project:	**Saugus Iron Works**	Container:	**250 mL Plastic**
Client:	**CH2M Hill**	Preservation:	**HNO3 / Cool**
Laboratory ID:	**72079-55**	Preserved:	**04-28-04 14:15**
Sampled:	**04-28-04 14:15**		
Received:	**04-28-04 18:30**		

Analysis Method	QC Batch ID	Prep Method	Prepared	Sample Volume	Instrument ID	Analyst
EPA 6010B[1]	MB-1079-W	EPA 3010A	04-29-04 09:15	50 mL	ICP-2 PE 3300	MWR
EPA 7470A[2]	MP-1498-W	EPA 7470A	04-29-04 10:45	25 mL	CVAA-1 PE FIMS	CRL

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit	DF	Analyzed	Method
7440-36-0	Antimony, Total	BRL		mg/L	0.06	1	04-30-04 15:50	EPA 6010B[1]
7440-38-2	Arsenic, Total	BRL		mg/L	0.01	1	04-30-04 15:50	EPA 6010B[1]
7440-41-7	Beryllium, Total	BRL		mg/L	0.004	1	04-30-04 15:49	EPA 6010B[1]
7440-43-9	Cadmium, Total	BRL		mg/L	0.005	1	04-30-04 15:50	EPA 6010B[1]
7440-47-3	Chromium, Total	BRL		mg/L	0.01	1	04-30-04 15:50	EPA 6010B[1]
7440-50-8	Copper, Total	BRL		mg/L	0.025	1	04-30-04 15:50	EPA 6010B[1]
7439-92-1	Lead, Total	BRL		mg/L	0.005	1	04-30-04 15:50	EPA 6010B[1]
7439-97-6	Mercury, Total	BRL		mg/L	0.0002	1	04-29-04 15:00	EPA 7470A[2]
7440-02-0	Nickel, Total	BRL		mg/L	0.04	1	04-30-04 15:50	EPA 6010B[1]
7782-49-2	Selenium, Total	BRL		mg/L	0.05	1	04-30-04 15:50	EPA 6010B[1]
7440-22-4	Silver, Total	BRL		mg/L	0.007	1	04-30-04 15:50	EPA 6010B[1]
7440-28-0	Thallium, Total	BRL		mg/L	0.02	1	04-30-04 15:50	EPA 6010B[1]
7440-66-6	Zinc, Total	BRL		mg/L	0.2	1	04-30-04 15:50	EPA 6010B[1]

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).

Report Notations:

BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

DF Dilution Factor.

GROUNDWATER ANALYTICAL

Project Narrative

Project: **Saugus Iron Works**
Client: **CH2M Hill**

Lab ID: **72079**
Received: **04-28-04 18:30**

A. Documentation and Client Communication

The following documentation discrepancies, and client changes or amendments were noted for this project:

1. No documentation discrepancies, changes, or amendments were noted.

B. Method Modifications, Non-Conformances and Observations

The sample(s) in this project were analyzed by the references analytical method(s), and no method modifications, non-conformances or analytical issues were noted, except as indicated below:

1. EPA 6010B Note: Samples 72079-39,-40,-41,-42,-43,-44,-45,-46,-47,-48,-49,-50,-51,-52,-53,-54,-55,-55. Samples were analyzed for selected target analytes, as requested by client.
2. EPA 8270C Modification: Samples 72079-56. Method modified by use of selected ion monitoring (SIM) in accordance with Section 7.5.5 of the method. GC/MS-SIM was used to achieve low quantification limits necessary for regulatory compliance.
3. EPA 8270C Note: Samples 72079-39,-40,-41,-42,-43,-44,-45,-46,-47,-48,-49,-50,-51,-52,-53,-54,-56. Samples were analyzed for only selected polynuclear aromatic hydrocarbons (PAH) target analytes, as requested by client.
4. EPA 9060 Mod Non-conformance: Samples 72079-01 through -38. Matrix spike recoveries were outside recommended limits due to concentration of spike analyte native to the sample.
5. EPA 6010B Non-conformance: Samples 72079-39 through -55. Matrix spike recoveries for analytes Antimony, Nickel and Zinc were outside recommended limits.

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CHAIN-OF-CUSTODY RECORD AND WORK ORDER

№ 085988

Project Name: Saugus Iron Works	Firm: CH2M HILL
Project Number:	Address: 25 New Chardon St., SH. 500
Sampler Name: CP/RL/TB	City / State / Zip: BOSTON, MA 02114
Project Manager: John Burgess	Telephone: (617) 523-2260

INSTRUCTIONS: Use separate line for each container (except replicates).

TURNAROUND

- ☑ STANDARD (10 Business Days)
- ☐ PRIORITY (5 Business Days)
- ☐ RUSH (RAN- _____)
  (Rush requires Rush Authorization Number)
- ☐ Please Email to: _____
- ☐ Please FAX to: _____

BILLING

- ☐ Purchase Order No.: _____
- ☐ Third Party Billing: _____
- ☐ GWA Quote: _____

ANALYSIS REQUEST

OPTIONS: Volatiles: TIC Search; Semivolatiles: Acid Only, B/N Only, TIC Search; Pest/Herb/PCBs: Extractable, Vol.; Metals: Specify For Water Samples, Total, Dissolved

SDWA: 524.2+MTBE; 525.2; 505; 508; 531.1; 515.1; 504.1 EDB/DBCP; Lead and Copper

NPDES: 624; 624+MTBE; 625; 625 PAHs only; 608 Pesticides; 608 PCBs; 615; 13 Priority Pollutant

RCRA/21E: 8260B TCL+MTBE; 8260B NH PETROLEUM 8260B; 8021B Aromatics; 8021B Halocarbons; 8021B; 8270C; 8270C PAHs only; 8081A Pesticides; 8082 PCBs; 8151A Herbicides; 8011 EDB/DBCP; 8 RCRA; 15 RCRA; MA List Metals; 23 TAL; Specify:

Petroleum Hydrocarbon — Ext. TPH: TPH-HR; Diesel Range Organics (DRO); ME DRO; CT ETPH; MA DEP EPH w/all targets; EPH Carbon Ranges only; EPH w/4 PAHs; Hydrocarbon Fingerprint (GC/FID by ASTM D3328-00 Mod.); TPH by GC/FID (8015B Mod) Quantitative Only; Gasoline Range Organics (GRO); ME GRO; MA DEP VPH w/all targets; VPH Carbon ranges only — Vol. TPH

Haz. Waste: TCLP: SPLP: 8 Metals; Phi only; VOA; Semi VOA; Pesticides; Herbicides; Corrosivity (as pH); Reactivity; Ignitability (as Flashpoint); Paint Filter; MA Base Disposal Criteria: 8260B TPH by GC, PCBs, 3 Metals; Corrosivity, Ignitability, Reactivity

General Chemistry: Nitrate; Nitrite; Chloride; Fluoride; Sulfate; Dissolved Phosphorus; Ammonia; TKN; Total Phosphorus; Perchlorate (SW6850 / 6860); 1814 Grease; COD; BOD; TOC; TSS; TDS; Alkalinity; Cyanide, Total; Cyanide, Physiologically Available; pH; Dissolved Oxygen; Turbidity; Total Coliform; Fecal Coliform; HPC

Other

Sampling DATE	Sampling TIME	SAMPLE IDENTIFICATION	Matrix	Type	Container(s)	Preservation	Filtered	LABORATORY NUMBER (Lab Use Only)
4/28/04	0813	SD0100	SOIL	GRAB	250mL/8 oz Glass	Ice		1
	0815	SD0101	SOIL	GRAB	250mL/8 oz Glass	Ice		2
	0817	SD0105	SOIL	GRAB	250mL/8 oz Glass	Ice		3
	0819	SD0106	SOIL	GRAB	250mL/8 oz Glass	Ice		4
	0821	SD0107	SOIL	GRAB	250mL/8 oz Glass	Ice		5
	0823	SD0108	SOIL	GRAB	250mL/8 oz Glass	Ice		6
	0825	SD0109	SOIL	GRAB	250mL/8 oz Glass	Ice		7
	0827	SD0110	SOIL	GRAB	250mL/8 oz Glass	Ice		8
	0829	SD0111	SOIL	GRAB	250mL/8 oz Glass	Ice		9
	0831	SD0112	SOIL	GRAB	250mL/8 oz Glass	Ice		10
	0833	SD0113	SOIL	GRAB	250mL/8 oz Glass	Ice		11
↓	0835	SD0114	SOIL	GRAB	250mL/8 oz Glass	Ice		12

REMARKS / SPECIAL INSTRUCTIONS

MS/MSD = Matrix Spike / duplicate

MA DEP MCP Data Enhancement Affirmation

☐ YES ☐ NO MCP Data Certification is required.

☐ YES ☐ NO MCP minimum Field QC requirements have been met for this project.
(Metals, hexavalent chromium and cyanide analyses require one matrix spike per 20 samples)

☐ YES ☐ NO MCP Drinking Water samples required.
(Require collection of contingent duplicate samples. Trip blanks are also required, if VOA samples collected)

Signature: _____

DATA QUALITY OBJECTIVES

Regulatory Program

State	Standard	Deliverables
☐ CT	☑ MCP GW-1/S-1	☐ PWS Form
☐ ME	☐ MCP GW-2/S-2	☐ MWRA
☑ MA	☐ NY STARS	☐ _____
☐ NH	☐ Drinking Water	
☐ NY	☐ Wastewater	
☐ RI	☐ Waste Disposal	
☐ VT	☐ Dredge Material	
☐ ___	☐ _____	

Project Specific QC

Many regulatory programs and EPA methods require project specific QC. Project specific QC includes Sample Duplicates, Matrix Spikes, and/or Matrix Spike Duplicates. Laboratory QC is not project specific unless prearranged. Project specific QC samples are charged on a per sample basis. **Each MS, MSD and Sample Duplicate requires an additional sample aliquot.**

Project Specific QC Required
- ☐ Sample Duplicate
- ☐ Matrix Spike
- ☐ Matrix Spike Duplicate

Selection of QC Sample
- ☐ Please use sample: _____

CHAIN-OF-CUSTODY RECORD

NOTE: All samples submitted subject to Standard Terms and Conditions on reverse hereof.

	Date	Time		
Relinquished by Sampler:	4/28/04	1555	Received by:	Receipt Temperature: ☐ Ice ☐ Refrigerated 2-6 °C Recommended
Relinquished by:	4/28/04	1820	Received by:	Container Count:
Relinquished by:			Received by Laboratory:	Shipping/Airbill Number:

Method of Shipment: ☐ GWA Courier ☐ Express Mail ☐ Federal Express ☐ UPS ☐ Hand ☐ _____

Custody Seal Number:

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CHAIN-OF-CUSTODY RECORD AND WORK ORDER

№ 085988

Project Name: Saugus Iron Works	Firm: CH2M HILL
Project Number:	Address: 25 New Chardon St Ste 500
Sampler Name: CP / RL / TB	City / State / Zip: Boston / MA / 02114
Project Manager: John Burgess	Telephone: (617) 523-2260

INSTRUCTIONS: Use separate line for each container (except replicates).

TURNAROUND

- ☑ STANDARD (10 Business Days)
- ☐ PRIORITY (5 Business Days)
- ☐ RUSH (RAN- _____)
  (Rush requires Rush Authorization Number)
- ☐ Please Email to: _____
- ☐ Please FAX to: _____

BILLING

- ☐ Purchase Order No.: _____
- ☐ Third Party Billing: _____
- ☐ GWA Quote: _____

ANALYSIS REQUEST

OPTIONS: Volatiles: ☐ Full List; Semivolatiles: ☐ Acid Only, ☐ BN Only, ☐ TIC Search; Pest/Herb/PCBs: Extractable / Vol.; Metals: Specify / Water Soluble / TCLP / Dissolved

SDWA: ☐ Specify Analytes; ☐ 525.2; ☐ 505 / 508; ☐ 531.1; ☐ 515.1; ☐ 504.1 / EDB DBCP; ☐ Total Coliform Present

NPDES: ☐ 624; ☐ 602 / MTBE; ☐ 601; ☐ 601 / 602 / MTBE; ☐ 625; ☐ 625 PAHs only; ☐ 608 Pesticides; ☐ 608 PCBs; ☐ 625; ☑ 13 Priority Pollutant Metals

RCRA / 21E: 8260B TCL MTBE; 8260B NH PETROLEUM; 8260B; ☐ 8021B Aromatics; ☐ 8021B Halocarbons; ☐ 8021B; ☐ 8270C; ☑ 8270C PAHs only; ☐ 8081A Pesticides; ☐ 8082 PCBs; 8151A Herbicides; 8011 / EDB DBCP; 8 RCRA; 5 RCRA; MA List Metals; 20 TAL; Specify

Petroleum Hydrocarbon — Ext. TPH: TPH-IR; ☐ Diesel Range Organics (DRO); ME DRO; ☐ CT ETPH; ☐ MA DEP EPH w/all targets; ☐ EPH Carbon Ranges only; EPH w/4 PAHs; ☐ Hydrocarbon Fingerprint (GC/FID by ASTM D3328-05 Mod.); ☐ TPH by GC/FID (8015B Mod) Quantitative Only; Vol. TPH: ☐ Gasoline Range Organics (GRO); ME GRO; ☐ MA DEP VPH w/all targets; ☐ VPH Carbon ranges only

Haz. Waste: ☐ TCLP; ☐ SPLP; ☐ 8 Metals; ☐ Pb only; ☐ VOA; ☐ Semi VOA; ☐ Pesticides; ☐ Herbicides; ☐ Corrosivity (as pH); ☐ Reactivity; ☐ Ignitability (as Flashpoint); ☐ Paint Filter; ☐ MA Basic Disposal Criteria: 8260B, TPH by GC, PCBs, 5 Metals, Corrosivity, Ignitability, Reactivity

General Chemistry: ☐ Alkalinity; ☐ Ammonia; ☐ Dissolved Phosphorus; ☐ TKN; ☐ Total Nitrate (as NO2/NO3/TKN); ☐ Total Phosphorus; ☐ Nitrate; ☐ Nitrite; ☐ Chloride; ☐ Fluoride; ☐ Sulfate; ☐ Oil & Grease; ☑ COD; BOD; TDS; TSS; TS; Alkalinity; Cyanide, total; Cyanide, Physiologically Available; pH; Dissolved Oxygen; Turbidity; Total Coliform; Fecal Coliform; HPC

Oth

Sampling DATE	Sampling TIME	SAMPLE IDENTIFICATION	Matrix: GROUNDWATER	DRINKING WATER	WASTEWATER	SOIL	OTHER SOLID	OIL/ORGANIC LIQUID	Type: COMPOSITE	GRAB	Container(s): NUMBER	40mL VOA Vial	60mL/2 oz Glass	120mL/4 oz Amber Glass	250mL/8 oz Glass	250mL/8 oz Amber Glass	500mL/16 oz Glass	1L/32 oz Amber Glass	250mL/8 oz Plastic	500mL/16 oz Plastic	1L/32 oz Plastic	120mL Sterile	Preservation: HCl	HNO3	H2SO4	NaOH	Methanol	Sodium Bisulfate	ICE	Filtered: YES	NO	LABORATORY NUMBER (Lab Use Only)
4/26/04	0837	SD0115				X				X	1				X													X			13
	0816	SD0104				X			X		1				X													X			39
	0824	SD0148				X			X		1				X													X			40
	0832	SD01812				X			X		1				X													X			41
	0838	SD011215				X			X		1				X													X			42
	0841	SD02TOC1				X				X	1				X													X			13 14
	0843	SD02 TOC2				X				X	1				X													X			14 15
	0845	SD02 TOC3				X				X	1				X													X			15 16
	0847	SD02 TOC4				X				X	1				X													X			16 17
	0849	SD02 TOC5				X				X	1				X													X			17 18
	0851	SD02 TOC6				X				X	1				X													X			18 19
↓	0853	SD02 TOC7				X				X	1				X													X			19 20

REMARKS / SPECIAL INSTRUCTIONS

MA DEP MCP Data Enhancement Affirmation

☐ YES ☐ NO MCP Data Certification is required.

☐ YES ☐ NO MCP minimum Field QC requirements have been met for this project.
(Metals, hexavalent chromium and cyanide analyses require one matrix spike per 20 samples)

☐ YES ☐ NO MCP Drinking Water samples required.
(Require collection of contingent duplicate samples. Trip blanks are also required, if VOA samples collected)

Signature: _____

DATA QUALITY OBJECTIVES

Regulatory Program

State	Standard	Deliverables
☐ CT	☐ MCP GW-1/S-1	☐ PWS Form
☐ ME	☐ MCP GW-2/S-2	☐ MWRA
☐ MA	☐ NY STARS	☐ _____
☐ NH	☐ Drinking Water	
☐ NY	☐ Wastewater	
☐ RI	☐ Waste Disposal	
☐ VT	☐ Dredge Material	
☐ ___	☐ _____	

Project Specific QC

Many regulatory programs and EPA methods require project specific QC. Project specific QC includes Sample Duplicates, Matrix Spikes, and/or Matrix Spike Duplicates. Laboratory QC is not project specific unless prearranged. Project specific QC samples are charged on a per sample basis. **Each MS, MSD and Sample Duplicate requires an additional sample aliquot.**

Project Specific QC Required
- ☐ Sample Duplicate
- ☐ Matrix Spike
- ☐ Matrix Spike Duplicate

Selection of QC Sample
- ☐ Please use sample: _____

CHAIN-OF-CUSTODY RECORD

NOTE: All samples submitted subject to Standard Terms and Conditions on reverse hereof.

	Date	Time		
Relinquished by Sampler:	4/26/04	1535	Received by:	Receipt Temperature: ☐ Ice ☐ Refrigerated 2-6°C Recommended 2
Relinquished by:	4/26/04	1800	Received by:	Container Count:
Relinquished by:	Date	Time	Received by Laboratory:	Shipping/Airbill Number:

Method of Shipment: ☐ GWA Courier ☐ Express Mail ☐ Federal Express ☐ UPS ☐ Hand ☐ _____

Custody Seal Number:

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www.groundwateranalytical.com

CHAIN-OF-CUSTODY RECORD AND WORK ORDER

№ 085988

Project Name: Sagus Iron Works	Firm: CH2M HILL
Project Number:	Address: 25 New Chardon St. Ste. 520
Sampler Name: CB/RL/TB	City / State / Zip: Boston / MA / 02114
Project Manager: John Burgess	Telephone: (617) 523-2260

INSTRUCTIONS: Use separate line for each container (except replicates).

TURNAROUND

- ☑ STANDARD (10 Business Days)
- ☐ PRIORITY (5 Business Days)
- ☐ RUSH (RAN- _____) (Rush requires Rush Authorization Number)
  - ☐ Please Email to: _____
  - ☐ Please FAX to: _____

BILLING

- ☐ Purchase Order No.: _____
- ☐ Third Party Billing: _____
- ☐ GWA Quote: _____

ANALYSIS REQUEST

OPTIONS: Volatiles (☐ TIC Search); Semivolatiles (☐ Acid Only ☐ BN Only ☐ TIC Search); Pest/Herb/PCBs Extractable / Vol.; Metals; Petroleum Hydrocarbon Ext. TPH / Vol. TPH; Haz. Waste; General Chemistry; Other

SDWA: ☐ 524.2-MTBE; ☐ 525.2; 504; 508; 515.1; 525.2

NPDES: ☐ 624; ☐ 625; ☐ 608 Pesticides; ☐ 608 PCBs; ☐ 601/602-MTBE; ☐ 602-MTBE; ☐ 601; ☐ 625 PAHs only; ☐ 608 Pesticides; ☐ 608 PCBs; ☐ 601/602-MTBE; ☐ 602-MTBE; ☐ 601; ☐ 625 PAHs only; ☐ 608 Pesticides; ☐ 608 PCBs; ☐ 624; ☐ 625

RCRA/21E: ☐ 8260B TCL-MTBE; ☐ 8260B NH PETROLEUM; ☐ 8260B; ☐ 8021B Aromatics; ☐ 8021B Halocarbons; ☐ 8021B; ☐ 8270C; ☐ 8270C PAHs only; 8081A Pesticides; 8082 PCBs; 8151A Herbicides; 8270C PAHs only; 8081A Pesticides; 8082 PCBs; 8151A Herbicides; 8270C

Petroleum Hydrocarbon: ☐ TPH-IR; ☐ Diesel Range Organics (DRO) ☐ ME DRO; ☐ CT ETPH; ☐ MA DEP EPH w/all targets ☐ EPH Carbon Ranges only ☐ EPH w/all PAHs; ☐ Hydrocarbon Fingerprint (GC/FID by ASTM D3328-00 Mod.); ☐ TPH by GC/FID (8015B Mod) Quantitative Only; ☐ Gasoline Range Organics (GRO) ☐ ME GRO; ☐ MA DEP VPH w/all targets ☐ VPH Carbon ranges only

Haz. Waste: ☐ Herbicides; ☐ Pesticides; ☐ Semi VOA; ☐ TCLP ☐ SPLP ☐ 8 Metals; ☐ Pb only ☐ VOA; ☐ Paint Filter; ☐ Corrosivity (as pH); ☐ Reactivity; ☐ Ignitability (as Flashpoint); ☐ MA Basic Disposal Criteria 8260B, TPH by GC, PCBs, 5 Metals, Corrosivity, Ignitability, Reactivity

General Chemistry: ☐ Nitrate; ☐ Nitrite; ☐ Chloride; ☐ Fluoride; ☐ Sulfate; ☐ Dissolved Phosphorus; ☐ Ammonia; ☐ TKN; ☐ Total Phosphorus; ☐ Total N (as NH3-NO3-TKN); ☐ Oil & Grease; GDOC; TOC; ☐ TSS; ☐ Alkalinity; ☐ Cyanide, Total; ☐ Cyanide, Physiologically Available; ☐ pH; ☐ Dissolved Oxygen; ☐ Turbidity; ☐ Total Coliform; ☐ Fecal Coliform; ☐ HPC

Sampling DATE	Sampling TIME	SAMPLE IDENTIFICATION	Matrix	Type	Container(s)	Preservation	Filtered	LABORATORY NUMBER (Lab Use Only)
4/28/04	0844	SD0204	WW: SOIL	COMPOSITE	1 × 250mL/8 oz Glass	ICE	NO	43
	0852	SD0248	WW: SOIL	COMPOSITE	1 × 250mL/8 oz Glass	ICE	NO	44
	0854	SD0282	WW: SOIL	COMPOSITE	1 × 250mL/8 oz Glass	ICE	NO	45
	1130	SD03TOC1	WW: SOIL	GRAB	1 × 250mL/8 oz Glass	ICE	NO	20 21
	1132	SD03DUP1	WW: SOIL	GRAB	1 × 250mL/8 oz Glass	ICE	NO	21 22
	1134	SD03TOC2	WW: SOIL	GRAB	1 × 250mL/8 oz Glass	ICE	NO	23 23
	1136	SD03TOC3	WW: SOIL	GRAB	1 × 250mL/8 oz Glass	ICE	NO	23 24
	1138	SD03TOC3 MS/MSD	WW: SOIL	GRAB	1 × 250mL/8 oz Glass	ICE	NO	24 25
	1140	SD0304	WW: SOIL	COMPOSITE	1 × 250mL/8 oz Glass	ICE	NO	46
	1142	SD03DUP4	WW: SOIL	COMPOSITE	1 × 250mL/8 oz Glass	ICE	NO	47
	1144	SD0304 MS/MSD	WW: SOIL	COMPOSITE	1 × 250mL/8 oz Glass	ICE	NO	48
↓	1146	SD03TOC4	WW: SOIL	GRAB	1 × 250mL/8 oz Glass	ICE	NO	25 26

REMARKS / SPECIAL INSTRUCTIONS

MA DEP MCP Data Enhancement Affirmation

☐ YES ☐ NO MCP Data Certification is required.

☐ YES ☐ NO MCP minimum Field QC requirements have been met for this project.
(Metals, hexavalent chromium and cyanide analyses require one matrix spike per 20 samples)

☐ YES ☐ NO MCP Drinking Water samples required.
(Require collection of contingent duplicate samples. Trip blanks are also required, if VOA samples collected)

Signature: _____

DATA QUALITY OBJECTIVES

Regulatory Program

State	Standard	Deliverables
☐ CT	☑ MCP GW-1/S-1	☐ PWS Form
☐ ME	☐ MCP GW-2/S-2	☐ MWRA
☑ MA	☐ NY STARS	☐ _____
☐ NH	☐ Drinking Water	
☐ NY	☐ Wastewater	
☐ RI	☐ Waste Disposal	
☐ VT	☐ Dredge Material	
☐ ___	☐ _____	

Project Specific QC

Many regulatory programs and EPA methods require project specific QC. Project specific QC includes Sample Duplicates, Matrix Spikes, and/or Matrix Spike Duplicates. Laboratory QC is not project specific unless prearranged. Project specific QC samples are charged on a per sample basis. **Each MS, MSD and Sample Duplicate requires an additional sample aliquot.**

Project Specific QC Required
- ☐ Sample Duplicate
- ☐ Matrix Spike
- ☐ Matrix Spike Duplicate

Selection of QC Sample
- ☐ Please use sample: _____

CHAIN-OF-CUSTODY RECORD

NOTE: All samples submitted subject to Standard Terms and Conditions on reverse hereof.

	Date	Time		
Relinquished by Sampler:	4/28/04	1155	Received by:	Receipt Temperature: ☐ Ice ☐ Refrigerated ☐ 2-6°C Recommended 2
Relinquished by:	4/28/04	1830	Received by:	Container Count:
Relinquished by:			Received by Laboratory:	Shipping/Airbill Number:

Method of Shipment: ☐ GWA Courier ☐ Express Mail ☐ Federal Express ☐ UPS ☐ Hand _____

Custody Seal Number:

GROUNDWATER ANALYTICAL

228 Main Street, P.O. Box 1200
Buzzards Bay, MA 02532
Telephone (508) 759-4441 • FAX (508) 759-4475
www.groundwateranalytical.com

CHAIN-OF-CUSTODY RECORD AND WORK ORDER

№ 085988

Project Name: Scituate Iron Works	Firm: CH2M HILL
Project Number:	Address: 25 New Chardon St Ste 500
Sampler Name: CP/RL/TB	City / State / Zip: Boston / MA / 02114
Project Manager: John Burgess	Telephone: (617) 523-2280

INSTRUCTIONS: Use separate line for each container (except replicates).

TURNAROUND

- [x] STANDARD (10 Business Days)
- [ ] PRIORITY (5 Business Days)
- [ ] RUSH (RAN- _____)
  (Rush requires Rush Authorization Number)
- [ ] Please Email to: _____
- [ ] Please FAX to: _____

BILLING

- [ ] Purchase Order No.: _____
- [ ] Third Party Billing: _____
- [ ] GWA Quote: _____

ANALYSIS REQUEST

OPTIONS: Volatiles: 8260 Scientific; Semivolatiles: Acid Only, BN Only, 8270 Scientific; Pest/Herb/PCBs Extractable: 505, 508, 515.1, 504.1 EDB/DBCP; Vol.: 524.2 MTBE; Metals: Specify Total and Dissolved; NPDES: 624, 625, 608 Pesticides, 608 PCBs, 625 PAHs only, 608 Pesticides, 8081 PCBs, 8151A Herbicides, 8011 EDB/DBCP, 13 Priority Pollutant; RCRA/21E: 8260B TCL+MTBE, 8260B NH PETROLEUM, 8260B, 8021B Aromatics, 8021B Halocarbons, 8021B, 8270C, 8270C PAHs only, 8 RCRA, 5 RCRA, MA List Metals, 23 TAL, Specify; Petroleum Hydrocarbon Ext. TPH: TPH-IR, Diesel Range Organics (DRO), ME DRO, CT ETPH, MA DEP EPH w/all targets, EPH Carbon Ranges only, EPH w/4 PAHs, Hydrocarbon Fingerprint (GC/FID by ASTM D3328-00 Mod.), TPH by GC/FID (8015B Mod) Quantitative Only, Gasoline Range Organics (GRO), ME GRO, MA DEP VPH w/all targets, VPH Carbon ranges only; Vol. TPH; Haz. Waste: TCLP, SPLP, 8 Metals, Pesticides, Herbicides, Corrosivity (as pH), Reactivity, Ignitability (as Flashpoint), Paint Filter, MA Base Disposal Criteria 8260B, TPH by GC, PCBs, 5 Metals, Corrosivity, Ignitability, Reactivity; General Chemistry: Nitrate, Nitrite, Chloride, Fluoride, Sulfate, Dissolved Phosphorus, Ammonia, TKN, Total Phosphorus, Total N (as NO2/NO3/TKN), Oil & Grease, COD, TOC, BOD, TDS, TSS, TS, Alkalinity, Cyanide, Total, Cyanide, Physiologically Available, pH, Dissolved Oxygen, Turbidity, Total Coliform, Fecal Coliform, HPC

Sampling DATE	Sampling TIME	SAMPLE IDENTIFICATION	Matrix	Type	Container(s)	Preservation	Filtered	LABORATORY NUMBER (Lab Use Only)
4/26/04	1148	SD03DUP2	SOIL	GRAB	1 × 250mL/8 oz Glass	ICE	NO	27
	1150	SD03TDC5	SOIL	GRAB	1 × 250mL/8 oz Glass	ICE	NO	28
	1152	SD03TDC6	SOIL	GRAB	1 × 250mL/8 oz Glass	ICE	NO	29
	1154	SD0348	SOIL	COMPOSITE	1 × 250mL/8 oz Glass	ICE	NO	49
	1156	SD0348MS/MSD	SOIL	COMPOSITE	1 × 250mL/8 oz Glass	ICE	NO	50
	1158	SD03DUP5	SOIL	COMPOSITE	1 × 250mL/8 oz Glass	ICE	NO	51
	1200	SD03TDC7	SOIL	GRAB	1 × 250mL/8 oz Glass	ICE	NO	30
	1202	SD03DUP3	SOIL	GRAB	1 × 250mL/8 oz Glass	ICE	NO	31
	1204	SD03TDC8	SOIL	GRAB	1 × 250mL/8 oz Glass	ICE	NO	32
	1206	SD03TDC8MS/MSD	SOIL	GRAB	1 × 250mL/8 oz Glass	ICE	NO	33
	1208	SD03TDC9	SOIL	GRAB	1 × 250mL/8 oz Glass	ICE	NO	34
↓	1210	SD0312	SOIL	COMPOSITE	1 × 250mL/8 oz Glass	ICE	NO	52

REMARKS / SPECIAL INSTRUCTIONS

MA DEP MCP Data Enhancement Affirmation

- ☐ YES ☐ NO MCP Data Certification is required.
- ☐ YES ☐ NO MCP minimum Field QC requirements have been met for this project.
  (Metals, hexavalent chromium and cyanide analyses require one matrix spike per 20 samples)
- ☐ YES ☐ NO MCP Drinking Water samples required.
  (Require collection of contingent duplicate samples. Trip blanks are also required, if VOA samples collected

Signature: _____

DATA QUALITY OBJECTIVES

Regulatory Program

State	Standard	Deliverables
☐ CT	☑ MCP GW-1/S-1	☐ PWS Form
☐ ME	☐ MCP GW-2/S-2	☐ MWRA
☑ MA	☐ NY STARS	☐ _____
☐ NH	☐ Drinking Water	
☐ NY	☐ Wastewater	
☐ RI	☐ Waste Disposal	
☐ VT	☐ Dredge Material	
☐ ___	☐ _____	

Project Specific QC

Many regulatory programs and EPA methods require project specific QC. Project specific QC includes Sample Duplicates, Matrix Spikes, and/or Matrix Spike Duplicates. Laboratory QC is not project specific unless prearranged. Project specific QC samples are charged on a per sample basis. **Each MS, MSD and Sample Duplicate requires an additional sample aliquot.**

Project Specific QC Required
- ☐ Sample Duplicate
- ☐ Matrix Spike
- ☐ Matrix Spike Duplicate

Selection of QC Sample
- ☐ Please use sample: _____

CHAIN-OF-CUSTODY RECORD

NOTE: All samples submitted subject to Standard Terms and Conditions on reverse hereof.

	Date	Time		
Relinquished by Sampler:	4/28/04	1555	Received by:	Receipt Temperature: ☐ Ice ☐ Refrigerated 2-6°C Recommended 2
Relinquished by:	4/28/04	1830	Received by:	Container Count:
Relinquished by:	Date	Time	Received by Laboratory:	Shipping/Airbill Number:

Method of Shipment: ☐ GWA Courier ☐ Express Mail ☐ Federal Express ☐ UPS ☐ Hand ☐ _____

Custody Seal Number:

GROUNDWATER ANALYTICAL
228 Main Street, P.O. Box 1200
Buzzards Bay, MA 02532
Telephone (508) 759-4441 • FAX (508) 759-4475
www.groundwateranalytical.com

CHAIN-OF-CUSTODY RECORD AND WORK ORDER

№ 085988

Project Name: Saugus Iron Works	Firm: CH2M HILL
Project Number:	Address: 25 New Chardon St. Ste. 500
Sampler Name: CP/RL/TB	City / State / Zip: Boston / MA / 02114
Project Manager: John Burgess	Telephone: (617) 523-2260

INSTRUCTIONS: Use separate line for each container (except replicates).

TURNAROUND

- ✓ STANDARD (10 Business Days)
- PRIORITY (5 Business Days)
- RUSH (RAN- _____)
  (Rush requires Rush Authorization Number)
- Please Email to: _____
- Please FAX to: _____

BILLING

- Purchase Order No.: _____
- Third Party Billing: _____
- GWA Quote: _____

ANALYSIS REQUEST

OPTIONS: TIC Search

Volatiles: SDWA: 524.2 MTBE; NPDES: 624; RCRA/21E: 8260B TCL+MTBE; 8260B NH PETROLEUM; 8260B

Semivolatiles: Acid Only; B/N Only; TIC Scratch; SDWA: 525.2; NPDES: 625; RCRA/21E: 8270C

Pest/Herb/PCBs Extractable: SDWA: 505; 508; NPDES: 608 Pesticides; 608 PCBs; RCRA/21E: 8081A Pesticides; 8082 PCBs; 8151A Herbicides

Pest/Herb/PCBs Vol.: SDWA: 524.2; 531.1; 515.1; NPDES: 624; 625; 601; 602; MTBE; 8021B; 8260C

Metals: Specify For Water Samples: Total; Dissolved; SDWA: Lead and Copper; NPDES: 13 Priority Pollutant; RCRA/21E: 8 RCRA; 5 RCRA; MA List Metals; 23 TAL; Specify

Petroleum Hydrocarbon Ext. TPH: DRO; ME DRO; CT ETPH; MA DEP EPH w/all targets; EPH Carbon Ranges only; EPH w/4 PAHs; Vol. TPH: Hydrocarbon Fingerprint (GC/FID) by ASTM D3328-00 Mod.); TPH by GC-FID (8015B Mod) Quantitative Only; Gasoline Range Organics (GRO); ME GRO; MA DEP VPH w/all targets; VPH Carbon ranges only

Haz. Waste: TCLP: SPLP: 8 Metals; Pb only; VOA; Semi VOA; Pesticides; Herbicides; Corrosivity (as pH); Reactivity; Ignitability (as Flashpoint); Paint Filter; MA Basic Disposal Criteria: 8260B, TPH by GC, PCBs, 5 Metals, Corrosivity, Ignitability, Reactivity

General Chemistry: Nitrate; Nitrite; Chloride; Fluoride; Sulfate; Dissolved Phosphorus; Ammonia; TKN; Total Phosphorus; Total N (as NO2+NO3+TKN); Oil & Grease; COD; TOC; BOD; TSS; TDS; Alkalinity; Chloride; Total; Cyanide; Physical Separation; Ignitability; pH; Dissolved Oxygen; Total Coliform; Fecal Coliform; HPC

Oth

Sampling DATE	Sampling TIME	SAMPLE IDENTIFICATION	Matrix	Type	Container(s)	Preservation	Filtered	LABORATORY NUMBER (Lab Use Only)
4/28/04	1212	SD03DUP6	SOIL	COMPOSITE	1 – 250mL/8 oz Glass	ICE		53
	1214	SD03TOC10	SOIL	GRAB	1 – 250mL/8 oz Glass	ICE		34 35
	1216	SD03TOC11	SOIL	GRAB	1 – 250mL/8 oz Glass	ICE		35 36
	1218	SD03TOC12	SOIL	GRAB	1 – 250mL/8 oz Glass	ICE		36 37
	1220	SD03TOC12 MS/MSD	SOIL	GRAB	1 – 250mL/8 oz Glass	ICE		~~37~~ 38
	1222	SD031215	SOIL	COMPOSITE	1 – 250mL/8 oz Glass	ICE		54
	1415	EB03	OIL/ORGANIC LIQUID	COMPOSITE	1 – 250mL/8 oz Plastic	HNO3; ICE		55
↓	1415	EB03	OIL/ORGANIC LIQUID	GRAB	2 – 40mL VOA Vial	HCl; ICE		56

REMARKS / SPECIAL INSTRUCTIONS

MA DEP MCP Data Enhancement Affirmation

☐ YES ☐ NO MCP Data Certification is required.

☐ YES ☐ NO MCP minimum Field QC requirements have been met for this project.
(Metals, hexavalent chromium and cyanide analyses require one matrix spike per 20 samples)

☐ YES ☐ NO MCP Drinking Water samples required.
(Require collection of contingent duplicate samples. Trip blanks are also required, if VOA samples collected)

Signature: _____

DATA QUALITY OBJECTIVES

Regulatory Program

State	Standard	Deliverables
☐ CT	☑ MCP GW-1/S-1	☐ PWS Form
☐ ME	☐ MCP GW-2/S-2	☐ MWRA
☑ MA	☐ NY STARS	☐ _____
☐ NH	☐ Drinking Water	
☐ NY	☐ Wastewater	
☐ RI	☐ Waste Disposal	
☐ VT	☐ Dredge Material	
☐ ___	☐ _____	

Project Specific QC

Many regulatory programs and EPA methods require project specific QC. Project specific QC includes Sample Duplicates, Matrix Spikes, and/or Matrix Spike Duplicates. Laboratory QC is not project specific unless prearranged. Project specific QC samples are charged on a per sample basis. **Each MS, MSD and Sample Duplicate requires an additional sample aliquot.**

Project Specific QC Required
- ☐ Sample Duplicate
- ☐ Matrix Spike
- ☐ Matrix Spike Duplicate

Selection of QC Sample
- ☐ Please use sample: _____

CHAIN-OF-CUSTODY RECORD

NOTE: All samples submitted subject to Standard Terms and Conditions on reverse hereof.

	Date	Time		
Relinquished by Sampler:	4/28/04	1555	Received by:	Receipt Temperature: ✓ Ice ☐ Refrigerated 2 °C 2-6°C Recommended
Relinquished by:	4/28/04	1870	Received by:	Container Count:
Relinquished by:	Date	Time	Received by Laboratory:	Shipping/Airbill Number:

Method of Shipment: ☐ GWA Courier ☐ Express Mail ☐ Federal Express ☐ UPS ☐ Hand ☐ _____

Custody Seal Number

Groundwater Analytical, Inc.
P.O.Box 1200
228 Main Street
Buzzards Bay, MA 02532

Telephone: (508) 759-4441
FAX: (508) 759-4475

GROUNDWATER ANALYTICAL

e-mail

To:	John Burgess	**From:**	e-mail reporting GWA
	CH2M Hill	**Pages:**	58
e-mail:	jburgess@ch2m.com	**Date:**	05/20/2004 04:07:45 PM
Re:	72159	**CC:**	

NOTE

The format or contents of this e-mail transmission may not meet all applicable National Environmental Laboratory Accreditation Conference (NELAC) Standards for data reporting.

- **Comments:** Project Number: 72159

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Confidential

GROUNDWATER ANALYTICAL

Groundwater Analytical, Inc.
P.O. Box 1200
228 Main Street
Buzzards Bay, MA 02532

Telephone (508) 759-4441
FAX (508) 759-4475
www.groundwateranalytical.com

May 13, 2004

Mr. John Burgess
CH2M Hill
25 New Chardon Street
Suite 500
Boston, MA 02114

LABORATORY REPORT

Project: **Saugus Iron Works/316337**
Lab ID: **72159**
Received: **04-29-04**

Dear John:

Enclosed are the analytical results for the above referenced project. The project was processed for Standard turnaround.

This letter authorizes the release of the analytical results, and should be considered a part of this report. This report contains a sample receipt report detailing the samples received, a project narrative indicating project changes and non-conformances, a quality control report, and a statement of our state certifications.

The analytical results contained in this report meet all applicable NELAC standards, except as may be specifically noted, or described in the project narrative. This report may only be used or reproduced in its entirety.

I attest under the pains and penalties of perjury that, based upon my inquiry of those individuals immediately responsible for obtaining the information, the material contained in this report is, to the best of my knowledge and belief, accurate and complete.

Should you have any questions concerning this report, please do not hesitate to contact me.

Sincerely,

Jonathan R. Sanford
President

JRS/smd
Enclosures

GROUNDWATER ANALYTICAL

Sample Receipt Report

Project: **Saugus Iron Works/316337**
Client: **CH2M Hill**
Lab ID: **72159**

Delivery: **GWA Courier**
Airbill: **n/a**
Lab Receipt: **04-29-04**

Temperature: **5.3'C**
Chain of Custody: **Present**
Custody Seal(s): **n/a**

Lab ID	Field ID	Matrix	Sampled	Method	Notes
72159-1	SD11-A	Soil	4/29/04 9:25	EPA 6010B/7471A 13 Priority Pollutant Metals EPA 8270C PAHs EPA 9060 Mod Total Organic Carbon	

Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship
C501764	250 mL Glass	Greenwood	BX11473	None	n/a	n/a	n/a

Lab ID	Field ID	Matrix	Sampled	Method	Notes
72159-2	SD11-B	Soil	4/29/04 9:27	EPA 6010B/7471A 13 Priority Pollutant Metals EPA 8270C PAHs EPA 9060 Mod Total Organic Carbon	

Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship
C501767	250 mL Glass	Greenwood	BX11473	None	n/a	n/a	n/a

Lab ID	Field ID	Matrix	Sampled	Method	Notes
72159-3	SD11-C	Soil	4/29/04 9:29	EPA 6010B/7471A 13 Priority Pollutant Metals EPA 8270C PAHs EPA 9060 Mod Total Organic Carbon	

Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship
C501786	250 mL Glass	Greenwood	BX11473	None	n/a	n/a	n/a

Lab ID	Field ID	Matrix	Sampled	Method	Notes
72159-4	Dup 7	Soil	4/29/04 0:00	EPA 6010B/7471A 13 Priority Pollutant Metals EPA 8270C PAHs EPA 9060 Mod Total Organic Carbon	

Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship
C501771	250 mL Glass	Greenwood	BX11473	None	n/a	n/a	n/a

Lab ID	Field ID	Matrix	Sampled	Method	Notes
72159-5	Dup 8	Soil	4/29/04 0:00	EPA 6010B/7471A 13 Priority Pollutant Metals EPA 8270C PAHs EPA 9060 Mod Total Organic Carbon	

Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship
C501769	250 mL Glass	Greenwood	BX11473	None	n/a	n/a	n/a

Lab ID	Field ID	Matrix	Sampled	Method	Notes
72159-6	SD12-A	Soil	4/29/04 10:31	EPA 6010B/7471A 13 Priority Pollutant Metals EPA 8270C PAHs EPA 9060 Mod Total Organic Carbon	

Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship
C501780	250 mL Glass	Greenwood	BX11473	None	n/a	n/a	n/a

Lab ID	Field ID	Matrix	Sampled	Method	Notes
72159-7	SD12-B	Soil	4/29/04 10:33	EPA 6010B/7471A 13 Priority Pollutant Metals EPA 8270C PAHs EPA 9060 Mod Total Organic Carbon	

Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship
C501781	250 mL Glass	Greenwood	BX11473	None	n/a	n/a	n/a

GROUNDWATER ANALYTICAL

Sample Receipt Report (Continued)

Project: **Saugus Iron Works/316337**
Client: **CH2M Hill**
Lab ID: **72159**

Delivery: **GWA Courier**
Airbill: **n/a**
Lab Receipt: **04-29-04**

Temperature: **5.3'C**
Chain of Custody: **Present**
Custody Seal(s): **n/a**

Lab ID	Field ID		Matrix	Sampled	Method				Notes
72159-8	SD12-C		Soil	4/29/04 10:35	EPA 6010B/7471A 13 Priority Pollutant Metals EPA 8270C PAHs EPA 9060 Mod Total Organic Carbon				
Con ID	**Container**	**Vendor**	**QC Lot**	**Preserv**	**QC Lot**	**Prep**	**Ship**		
C501784	250 mL Glass	Greenwood	BX11473	None	n/a	n/a	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
72159-9	SD16-A		Soil	4/29/04 14:01	EPA 6010B/7471A 13 Priority Pollutant Metals EPA 8270C PAHs EPA 9060 Mod Total Organic Carbon				
Con ID	**Container**	**Vendor**	**QC Lot**	**Preserv**	**QC Lot**	**Prep**	**Ship**		
C501775	250 mL Glass	Greenwood	BX11473	None	n/a	n/a	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
72159-10	SD16-B		Soil	4/29/04 14:03	EPA 6010B/7471A 13 Priority Pollutant Metals EPA 8270C PAHs EPA 9060 Mod Total Organic Carbon				
Con ID	**Container**	**Vendor**	**QC Lot**	**Preserv**	**QC Lot**	**Prep**	**Ship**		
C501785	250 mL Glass	Greenwood	BX11473	None	n/a	n/a	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
72159-11	SD16-C		Soil	4/29/04 14:05	EPA 6010B/7471A 13 Priority Pollutant Metals EPA 8270C PAHs EPA 9060 Mod Total Organic Carbon				
Con ID	**Container**	**Vendor**	**QC Lot**	**Preserv**	**QC Lot**	**Prep**	**Ship**		
C501779	250 mL Glass	Greenwood	BX11473	None	n/a	n/a	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
72159-12	EB4		Aqueous	4/29/04 14:10	EPA 8270C Semivolatile Organics				
Con ID	**Container**	**Vendor**	**QC Lot**	**Preserv**	**QC Lot**	**Prep**	**Ship**		
C433455	1 L Amber Glass	Proline	BX12196	None	n/a	n/a	n/a		
C331440	1 L Amber Glass	Proline	BX10083	None	n/a	n/a	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
72159-13	EB4		Aqueous	4/29/04 14:10	EPA 6010/7470A 13 Priority Pollutant Metals				
Con ID	**Container**	**Vendor**	**QC Lot**	**Preserv**	**QC Lot**	**Prep**	**Ship**		
C311718	250 mL Plastic	Proline	BX10723	HNO3	R-3884A	02-02-04	n/a		

GROUNDWATER ANALYTICAL

Data Certification

Project: **Saugus Iron Works/316337**
Client: **CH2M Hill**

Lab ID: **72159**
Received: **04-29-04 19:00**

MA DEP Compendium of Analytical Methods

Project Location: **n/a** MA DEP RTN: **n/a**

This Form provides certifications for the following data set:

EPA 8270C: 72159-01,-02,-03,-04,-05,-06,-07,-08,-09,-10,-11,-12
EPA 6010B: 72159-01,-02,-03,-04,-05,-06,-07,-08,-09,-10,-11,-13
EPA 7470A/1A: 72159-01,-02,-03,-04,-05,-06,-07,-08,-09,-10,-11,-13

Sample Matrices:	Groundwater (X)	Soil/Sediment (X)	Drinking Water ( )	Other ( )	
MCP SW-846 Methods Used:	8260B ( )	8151A ( )	8330 ( )	6010B (X)	7470A/1A (X)
	8270C (X)	8081A ( )	VPH ( )	6020 ( )	9012A[2] ( )
As specified in MA DEP Compendium of Analytical Methods: check all that apply	8082 ( )	8021B ( )	EPH ( )	7000 S[3] ( )	Other ( )

1. List Release Tracking Number (RTN), if known
2. SW-846 Method 9012A (Equivalent to 9014) or MA DEP Physiologically Available Cyanide (PAC) Method
3. 5. SW-846 Methods 7000 Series. List individual method and analyte.

An affirmative response to questions A, B, C and D is required for "Presumptive Certainty" status.

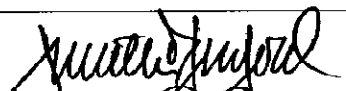
A.	Were all samples received by the laboratory in a condition consistent with that described on the Chain-of-Custody documentation for the data set?	Yes
B.	Were all QA/QC procedures required for the specified analytical method(s) included in this report followed, including the requirement to note and discuss in a narrative QC data that did not meet appropriate performance standards or guidelines?	Yes
C.	Does the analytical data included in this report meet all the requirements for "Presumptive Certainty," as described in Section 2.0 of the MA DEP document CAM VII A, *Quality Assurance and Quality Control Guidelines for the Acquisition and Reporting of Analytical Data*?	Yes
D.	VPH and EPH methods only: Was the VPH or EPH method run without significant modifications, as specified in Section 11.3?	n/a

A response to questions E and F below is required for "Presumptive Certainty" status.

E.	Were all QC performance standards and recommendations for the specified methods achieved?	Yes
F.	Were results for all analyte-list compounds/elements for the specified method(s) reported?	No

All No answers are addressed in the attached Project Narrative.

I, the undersigned, attest under the pains and penalties of perjury that, based upon my personal inquiry of those responsible for obtaining the information, the material contained in this analytical report is, to the best of my knowledge and belief, accurate and complete.

Signature: 
Position: President
Printed Name: Jonathan R. Sanford
Date: 05-13-04

GROUNDWATER ANALYTICAL

Inorganic Chemistry

Field ID: **SD11-A**
Project: **Saugus Iron Works/316337**
Client: **CH2M Hill**

Matrix: **Soil**
Received: **04-29-04 19:00**

Lab ID: **72159-01** Sampled: **04-29-04 09:25** % Solids: **32** Container: **250 mL Glass** Preservation: **Cool**

Analyte	Result	Units	RL	DF	Weight	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	**510,000**	mg/Kg	46,000	145	0.28 mg	05-06-04 16:26	TOC-0256-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:

BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

RL Reporting Limit.

DF Dilution Factor.

1 Instrument ID: Tekmar-Dohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Inorganic Chemistry

Field ID: **SD11-B**
Project: **Saugus Iron Works/316337**
Client: **CH2M Hill**

Matrix: **Soil**
Received: **04-29-04 19:00**

Lab ID: **72159-02** Sampled: **04-29-04 09:27** % Solids: **36** Container: **250 mL Glass** Preservation: **Cool**

Analyte	Result	Units	RL	DF	Weight	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	**530,000**	mg/Kg	110,000	400	0.1 mg	05-06-04 16:44	TOC-0256-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:

BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

RL Reporting Limit.

DF Dilution Factor.

1 Instrument ID: Tekmar-Dohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Inorganic Chemistry

Field ID: **SD11-C**
Project: **Saugus Iron Works/316337**
Client: **CH2M Hill**

Matrix: **Soil**
Received: **04-29-04 19:00**

Lab ID: **72159-03** Sampled: **04-29-04 09:29** % Solids: **38** Container: **250 mL Glass** Preservation: **Cool**

Analyte	Result	Units	RL	DF	Weight	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	**240,000**	mg/Kg	33,000	123	0.33 mg	05-07-04 10:22	TOC-0257-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:

BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

RL Reporting Limit.

DF Dilution Factor.

1 Instrument ID: Tekmar-Dohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Inorganic Chemistry

Field ID: **Dup 7**
Project: **Saugus Iron Works/316337**
Client: **CH2M Hill**

Matrix: **Soil**
Received: **04-29-04 19:00**

Lab ID: **72159-04** Sampled: **04-29-04 00:00** % Solids: **31** Container: **250 mL Glass** Preservation: **Cool**

Analyte	Result	Units	RL	DF	Weight	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	**520,000**	mg/Kg	86,000	267	0.15 mg	05-07-04 10:39	TOC-0257-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:

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RL Reporting Limit.

DF Dilution Factor.

1 Instrument ID: Tekmar-Dohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Inorganic Chemistry

Field ID: **Dup 8**
Project: **Saugus Iron Works/316337**
Client: **CH2M Hill**

Matrix: **Soil**
Received: **04-29-04 19:00**

Lab ID: **72159-05** Sampled: **04-29-04 00:00** % Solids: **37** Container: **250 mL Glass** Preservation: **Cool**

Analyte	Result	Units	RL	DF	Wash	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	**580,000**	mg/Kg	110,000	400	0.1 mg	05-07-04 10:58	TOC-0257-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:

BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

RL Reporting Limit.

DF Dilution Factor.

1 Instrument ID: Tekmar-Dohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Inorganic Chemistry

Field ID: **SD12-A** Matrix: **Soil**
Project: **Saugus Iron Works/316337** Received: **04-29-04 19:00**
Client: **CH2M Hill**

Lab ID: **72159-06** Sampled: **04-29-04 10:31** % Solids: **37** Container: **250 mL Glass** Preservation: **Cool**

Analyte	Result	Units	RL	DF	Weight	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	**99,000**	mg/Kg	29,000	107	0.38 mg	05-07-04 11:30	TOC-0257-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:

BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

RL Reporting Limit.

DF Dilution Factor.

1 Instrument ID: Tekmar-Dohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Inorganic Chemistry

Field ID: **SD12-B**
Project: **Saugus Iron Works/316337**
Client: **CH2M Hill**

Matrix: **Soil**
Received: **04-29-04 19:00**

Lab ID: **72159-07** Sampled: **04-29-04 10:33** % Solids: **82** Container: **250 mL Glass** Preservation: **Cool**

Analyte	Result	Units	RL	DF	Weight	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	**2,300**	mg/Kg	480	4	10 mg	05-07-04 11:34	TOC-0257-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:

BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

RL Reporting Limit.

DF Dilution Factor.

1 Instrument ID: Tekmar-Dohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Inorganic Chemistry

Field ID: **SD12-C**
Project: **Saugus Iron Works/316337**
Client: **CH2M Hill**

Matrix: **Soil**
Received: **04-29-04 19:00**

Lab ID: **72159-08** Sampled: **04-29-04 10:35** % Solids: **39** Container: **250 mL Glass** Preservation: **Cool**

Analyte	Result	Units	RL	DF	Weight	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	**190,000**	mg/Kg	31,000	123	0.33 mg	05-07-04 13:33	TOC-0257-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:

BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

RL Reporting Limit.

DF Dilution Factor.

1 Instrument ID: Tekmar-Dohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Inorganic Chemistry

Field ID: **SD16-A**
Project: **Saugus Iron Works/316337**
Client: **CH2M Hill**

Matrix: **Soil**
Received: **04-29-04 19:00**

Lab ID: **72159-09** Sampled: **04-29-04 14:01** % Solids: **42** Container: **250 mL Glass** Preservation: **Cool**

Analyte	Result	Units	RL	DF	Weight	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	**350,000**	mg/Kg	64,000	267	0.15 mg	05-07-04 13:52	TOC-0257-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:

BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

RL Reporting Limit.

DF Dilution Factor.

1 Instrument ID: Tekmar-Dohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Inorganic Chemistry

Field ID: **SD16-B**
Project: **Saugus Iron Works/316337**
Client: **CH2M Hill**

Matrix: **Soil**
Received: **04-29-04 19:00**

Lab ID: **72159-10** Sampled: **04-29-04 14:03** % Solids: 71 Container: **250 mL Glass** Preservation: **Cool**

Analyte	Result	Units	RL	DF	Weight	Analyzed	QC Batch	Method	Test	Analyst
Organic Carbon, Total	**9,800**	mg/Kg	4,500	32	1.3 mg	05-07-04 14:34	TOC-0257-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:

BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

RL Reporting Limit.

DF Dilution Factor.

1 Instrument ID: Tekmar-Dohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Inorganic Chemistry

Field ID: **SD16-C**
Project: **Saugus Iron Works/316337**
Client: **CH2M Hill**

Matrix: **Soil**
Received: **04-29-04 19:00**

Lab ID: **72159-11** Sampled: **04-29-04 14:05** % Solids: **36** Container: **250 mL Glass** Preservation: **Cool**

Analyte	Result	Units	RL	DF	Weight	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	>290,000	mg/Kg	41,000	145	0.28 mg	05-07-04 14:56	TOC-0257-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:

BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

RL Reporting Limit.

DF Dilution Factor.

1 Instrument ID: Tekmar-Dohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Trace Metals

Field ID:	**SD11-A**	Matrix:	**Soil**
Project:	**Saugas Iron Works/316337**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72159-01**	Percent Solids:	**32**
Sampled:	**04-29-04 09:25**		
Received:	**04-29-04 19:00**		

Analysis Method	QC Batch ID	Prep Method	Prepared	Sample Weight	Instrument ID	Analyst
EPA 6010B[1]	MB-0344-S	EPA 3050B	05-03-04 11:40	0.5 g	ICP-1 PE 3000	CRL
EPA 7471A[2]	MP-1581-S	EPA 7471A	05-04-04 07:30	0.6 g	CVAA-1 PE FIMS	CRL

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit	DF	Analyzed	Method
7440-36-0	Antimony, Total	BRL		mg/Kg	3.0	1	05-03-04 17:36	EPA 6010B[1]
7440-38-2	Arsenic, Total	**12**		mg/Kg	3.0	1	05-03-04 17:36	EPA 6010B[1]
7440-41-7	Beryllium, Total	BRL		mg/Kg	1.2	1	05-03-04 17:36	EPA 6010B[1]
7440-43-9	Cadmium, Total	BRL		mg/Kg	1.5	1	05-03-04 17:36	EPA 6010B[1]
7440-47-3	Chromium, Total	**71**		mg/Kg	30	1	05-03-04 17:36	EPA 6010B[1]
7440-50-8	Copper, Total	BRL		mg/Kg	61	1	05-07-04 15:36	EPA 6010B[1]
7439-92-1	Lead, Total	**130**		mg/Kg	30	1	05-07-04 15:36	EPA 6010B[1]
7439-97-6	Mercury, Total	**0.50**		mg/Kg	0.10	1	05-04-04 12:25	EPA 7471A[2]
7440-02-0	Nickel, Total	BRL		mg/Kg	30	1	05-03-04 17:36	EPA 6010B[1]
7782-49-2	Selenium, Total	BRL		mg/Kg	61	1	05-03-04 17:36	EPA 6010B[1]
7440-22-4	Silver, Total	BRL		mg/Kg	15	1	05-03-04 17:36	EPA 6010B[1]
7440-28-0	Thallium, Total	BRL		mg/Kg	15	1	05-03-04 17:36	EPA 6010B[1]
7440-66-6	Zinc, Total	BRL		mg/Kg	150	1	05-03-04 17:36	EPA 6010B[1]

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

DF Dilution Factor.

GROUNDWATER ANALYTICAL

Trace Metals

Field ID:	**SD11-8**	Matrix:	**Soil**
Project:	**Saugas Iron Works/316337**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72159-02**	Percent Solids:	**36**
Sampled:	**04-29-04 09:27**		
Received:	**04-29-04 19:00**		

Analysis Method	QC Batch ID	Prep Method	Prepared	Sample Weight	Instrument ID	Analyst
EPA 6010B[1]	MB-0344-S	EPA 3050B	05-03-04 11:40	0.5 g	ICP-1 PE 3000	CRL
EPA 7471A[2]	MP-1581-S	EPA 7471A	05-04-04 07:30	0.6 g	CVAA-1 PE FIMS	CRL

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit	DF	Analyzed	Method
7440-36-0	Antimony, Total	BRL		mg/Kg	2.7	1	05-03-04 17:40	EPA 6010B[1]
7440-38-2	Arsenic, Total	**6.8**		mg/Kg	2.7	1	05-03-04 17:40	EPA 6010B[1]
7440-41-7	Beryllium, Total	BRL		mg/Kg	1.1	1	05-03-04 17:40	EPA 6010B[1]
7440-43-9	Cadmium, Total	BRL		mg/Kg	1.3	1	05-03-04 17:40	EPA 6010B[1]
7440-47-3	Chromium, Total	**36**		mg/Kg	27	1	05-03-04 17:40	EPA 6010B[1]
7440-50-8	Copper, Total	BRL		mg/Kg	54	1	05-07-04 15:40	EPA 6010B[1]
7439-92-1	Lead, Total	BRL		mg/Kg	27	1	05-03-04 17:40	EPA 6010B[1]
7439-97-6	Mercury, Total	BRL		mg/Kg	0.09	1	05-04-04 12:28	EPA 7471A[2]
7440-02-0	Nickel, Total	BRL		mg/Kg	27	1	05-03-04 17:40	EPA 6010B[1]
7782-49-2	Selenium, Total	BRL		mg/Kg	54	1	05-03-04 17:40	EPA 6010B[1]
7440-22-4	Silver, Total	BRL		mg/Kg	13	1	05-03-04 17:40	EPA 6010B[1]
7440-28-0	Thallium, Total	BRL		mg/Kg	13	1	05-03-04 17:40	EPA 6010B[1]
7440-66-6	Zinc, Total	BRL		mg/Kg	130	1	05-03-04 17:40	EPA 6010B[1]

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:
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DF Dilution Factor.

GROUNDWATER ANALYTICAL

Trace Metals

Field ID:	**SD11-C**	Matrix:	**Soil**
Project:	**Saugas Iron Works/316337**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72159-03**	Percent Solids:	**38**
Sampled:	**04-29-04 09:29**		
Received:	**04-29-04 19:00**		

Analysis Method	QC Batch ID	Prep Method	Prepared	Sample Weight	Instrument ID	Analyst
EPA 6010B[1]	MB-0344-S	EPA 3050B	05-03-04 11:40	0.5 g	ICP-1 PE 3000	CRL
EPA 7471A[2]	MP-1581-S	EPA 7471A	05-04-04 07:30	0.6 g	CVAA-1 PE FIMS	CRL

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit	DF	Analyzed	Method
7440-36-0	Antimony, Total	BRL		mg/Kg	2.6	1	05-03-04 17:52	EPA 6010B[1]
7440-38-2	Arsenic, Total	**8.8**		mg/Kg	2.6	1	05-03-04 17:52	EPA 6010B[1]
7440-41-7	Beryllium, Total	BRL		mg/Kg	1	1	05-03-04 17:52	EPA 6010B[1]
7440-43-9	Cadmium, Total	BRL		mg/Kg	1.3	1	05-03-04 17:52	EPA 6010B[1]
7440-47-3	Chromium, Total	**46**		mg/Kg	26	1	05-03-04 17:52	EPA 6010B[1]
7440-50-8	Copper, Total	BRL		mg/Kg	52	1	05-07-04 15:44	EPA 6010B[1]
7439-92-1	Lead, Total	BRL		mg/Kg	26	1	05-03-04 17:52	EPA 6010B[1]
7439-97-6	Mercury, Total	BRL		mg/Kg	0.086	1	05-04-04 12:31	EPA 7471A[2]
7440-02-0	Nickel, Total	**29**		mg/Kg	26	1	05-03-04 17:52	EPA 6010B[1]
7782-49-2	Selenium, Total	BRL		mg/Kg	52	1	05-03-04 17:52	EPA 6010B[1]
7440-22-4	Silver, Total	BRL		mg/Kg	13	1	05-03-04 17:52	EPA 6010B[1]
7440-28-0	Thallium, Total	BRL		mg/Kg	13	1	05-03-04 17:52	EPA 6010B[1]
7440-66-6	Zinc, Total	BRL		mg/Kg	130	1	05-03-04 17:52	EPA 6010B[1]

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Results are reported on a dry weight basis.

Report Notations:

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DF Dilution Factor.

GROUNDWATER ANALYTICAL

Trace Metals

Field ID:	Dup 7	Matrix:	Soil
Project:	Saugas Iron Works/316337	Container:	250 mL Glass
Client:	CH2M Hill	Preservation:	Cool
Laboratory ID:	72159-04	Percent Solids:	31
Sampled:	04-29-04 00:00		
Received:	04-29-04 19:00		

Analysis Method	QC Batch ID	Prep Method	Prepared	Sample Weight	Instrument ID	Analyst
EPA 6010B[1]	MB-0344-S	EPA 3050B	05-03-04 11:40	0.5 g	ICP-1 PE 3000	CRL
EPA 7471A[2]	MP-1581-S	EPA 7471A	05-04-04 07:30	0.6 g	CVAA-1 PE FIMS	CRL

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit	DF	Analyzed	Method
7440-36-0	Antimony, Total	BRL		mg/Kg	3.1	1	05-03-04 17:57	EPA 6010B[1]
7440-38-2	Arsenic, Total	4.1		mg/Kg	3.1	1	05-03-04 17:57	EPA 6010B[1]
7440-41-7	Beryllium, Total	BRL		mg/Kg	1.3	1	05-03-04 17:56	EPA 6010B[1]
7440-43-9	Cadmium, Total	BRL		mg/Kg	1.6	1	05-03-04 17:57	EPA 6010B[1]
7440-47-3	Chromium, Total	33		mg/Kg	31	1	05-03-04 17:56	EPA 6010B[1]
7440-50-8	Copper, Total	BRL		mg/Kg	63	1	05-07-04 15:48	EPA 6010B[1]
7439-92-1	Lead, Total	BRL		mg/Kg	31	1	05-03-04 17:57	EPA 6010B[1]
7439-97-6	Mercury, Total	BRL		mg/Kg	0.1	1	05-04-04 12:34	EPA 7471A[2]
7440-02-0	Nickel, Total	BRL		mg/Kg	31	1	05-03-04 17:57	EPA 6010B[1]
7782-49-2	Selenium, Total	BRL		mg/Kg	63	1	05-03-04 17:57	EPA 6010B[1]
7440-22-4	Silver, Total	BRL		mg/Kg	16	1	05-03-04 17:56	EPA 6010B[1]
7440-28-0	Thallium, Total	BRL		mg/Kg	16	1	05-03-04 17:57	EPA 6010B[1]
7440-66-6	Zinc, Total	BRL		mg/Kg	160	1	05-03-04 17:56	EPA 6010B[1]

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

DF Dilution Factor.

GROUNDWATER ANALYTICAL

Trace Metals

Field ID:	**Dup 8**	Matrix:	**Soil**
Project:	**Saugas Iron Works/316337**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72159-05**	Percent Solids:	**37**
Sampled:	**04-29-04 00:00**		
Received:	**04-29-04 19:00**		

Analysis Method	QC Batch ID	Prep Method	Prepared	Sample Weight	Instrument ID	Analyst
EPA 6010B[1]	MB-0344-S	EPA 3050B	05-03-04 11:40	0.5 g	ICP-1 PE 3000	CRL
EPA 7471A[2]	MP-1581-S	EPA 7471A	05-04-04 07:30	0.6 g	CVAA-1 PE FIMS	CRL

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit	DF	Analyzed	Method
7440-36-0	Antimony, Total	BRL		mg/Kg	2.6	1	05-03-04 18:01	EPA 6010B[1]
7440-38-2	Arsenic, Total	**8.6**		mg/Kg	2.6	1	05-03-04 18:01	EPA 6010B[1]
7440-41-7	Beryllium, Total	BRL		mg/Kg	1	1	05-03-04 18:00	EPA 6010B[1]
7440-43-9	Cadmium, Total	BRL		mg/Kg	1.3	1	05-03-04 18:01	EPA 6010B[1]
7440-47-3	Chromium, Total	**46**		mg/Kg	26	1	05-03-04 18:00	EPA 6010B[1]
7440-50-8	Copper, Total	BRL		mg/Kg	52	1	05-07-04 15:53	EPA 6010B[1]
7439-92-1	Lead, Total	BRL		mg/Kg	26	1	05-03-04 18:01	EPA 6010B[1]
7439-97-6	Mercury, Total	BRL		mg/Kg	0.088	1	05-04-04 12:37	EPA 7471A[2]
7440-02-0	Nickel, Total	**30**		mg/Kg	26	1	05-03-04 18:01	EPA 6010B[1]
7782-49-2	Selenium, Total	BRL		mg/Kg	52	1	05-03-04 18:01	EPA 6010B[1]
7440-22-4	Silver, Total	BRL		mg/Kg	13	1	05-03-04 18:00	EPA 6010B[1]
7440-28-0	Thallium, Total	BRL		mg/Kg	13	1	05-03-04 18:01	EPA 6010B[1]
7440-66-6	Zinc, Total	BRL		mg/Kg	130	1	05-03-04 18:00	EPA 6010B[1]

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

DF Dilution Factor.

GROUNDWATER ANALYTICAL

Trace Metals

Field ID:	**SD12-A**	Matrix:	**Soil**
Project:	**Saugas Iron Works/316337**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72159-06**	Percent Solids:	**37**
Sampled:	**04-29-04 10:31**		
Received:	**04-29-04 19:00**		

Analysis Method	QC Batch ID	Prep Method	Prepared	Sample Weight	Instrument ID	Analyst
EPA 6010B[1]	MB-0344-S	EPA 3050B	05-03-04 11:40	0.5 g	ICP-1 PE 3000	CRL
EPA 7471A[2]	MP-1581-S	EPA 7471A	05-04-04 07:30	0.6 g	CVAA-1 PE FIMS	CRL

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit	DF	Analyzed	Method
7440-36-0	Antimony, Total	BRL		mg/Kg	2.6	1	05-03-04 18:05	EPA 6010B[1]
7440-38-2	Arsenic, Total	**16**		mg/Kg	2.6	1	05-03-04 18:05	EPA 6010B[1]
7440-41-7	Beryllium, Total	BRL		mg/Kg	1	1	05-03-04 18:05	EPA 6010B[1]
7440-43-9	Cadmium, Total	**1.5**		mg/Kg	1.3	1	05-03-04 18:05	EPA 6010B[1]
7440-47-3	Chromium, Total	**60**		mg/Kg	26	1	05-03-04 18:05	EPA 6010B[1]
7440-50-8	Copper, Total	**66**		mg/Kg	52	1	05-07-04 15:57	EPA 6010B[1]
7439-92-1	Lead, Total	**200**		mg/Kg	26	1	05-03-04 18:05	EPA 6010B[1]
7439-97-6	Mercury, Total	**0.44**		mg/Kg	0.089	1	05-04-04 12:47	EPA 7471A[2]
7440-02-0	Nickel, Total	**52**		mg/Kg	26	1	05-03-04 18:05	EPA 6010B[1]
7782-49-2	Selenium, Total	BRL		mg/Kg	52	1	05-03-04 18:05	EPA 6010B[1]
7440-22-4	Silver, Total	BRL		mg/Kg	13	1	05-03-04 18:05	EPA 6010B[1]
7440-28-0	Thallium, Total	BRL		mg/Kg	13	1	05-03-04 18:05	EPA 6010B[1]
7440-66-6	Zinc, Total	**340**		mg/Kg	130	1	05-03-04 18:05	EPA 6010B[1]

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

DF Dilution Factor.

GROUNDWATER ANALYTICAL

Trace Metals

Field ID:	**SD12-B**	Matrix:	**Soil**
Project:	**Saugas Iron Works/316337**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72159-07**	Percent Solids:	**82**
Sampled:	**04-29-04 10:33**		
Received:	**04-29-04 19:00**		

Analysis Method	QC Batch ID	Prep Method	Prepared	Sample Weight	Instrument ID	Analyst
EPA 6010B[1]	MB-0344-S	EPA 3050B	05-03-04 11:40	0.5 g	ICP-1 PE 3000	CRL
EPA 7471A[2]	MP-1581-S	EPA 7471A	05-04-04 07:30	0.6 g	CVAA-1 PE FIMS	CRL

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit	DF	Analyzed	Method
7440-36-0	Antimony, Total	BRL		mg/Kg	1.2	1	05-03-04 18:09	EPA 6010B[1]
7440-38-2	Arsenic, Total	1.9		mg/Kg	1.2	1	05-03-04 18:09	EPA 6010B[1]
7440-41-7	Beryllium, Total	BRL		mg/Kg	0.47	1	05-03-04 18:09	EPA 6010B[1]
7440-43-9	Cadmium, Total	BRL		mg/Kg	0.58	1	05-03-04 18:09	EPA 6010B[1]
7440-47-3	Chromium, Total	15		mg/Kg	12	1	05-03-04 18:09	EPA 6010B[1]
7440-50-8	Copper, Total	BRL		mg/Kg	23	1	05-07-04 16:01	EPA 6010B[1]
7439-92-1	Lead, Total	19		mg/Kg	12	1	05-03-04 18:09	EPA 6010B[1]
7439-97-6	Mercury, Total	BRL		mg/Kg	0.04	1	05-04-04 12:50	EPA 7471A[2]
7440-02-0	Nickel, Total	14		mg/Kg	12	1	05-03-04 18:09	EPA 6010B[1]
7782-49-2	Selenium, Total	BRL		mg/Kg	23	1	05-03-04 18:09	EPA 6010B[1]
7440-22-4	Silver, Total	BRL		mg/Kg	5.8	1	05-03-04 18:09	EPA 6010B[1]
7440-28-0	Thallium, Total	BRL		mg/Kg	5.8	1	05-03-04 18:09	EPA 6010B[1]
7440-66-6	Zinc, Total	BRL		mg/Kg	58	1	05-03-04 18:09	EPA 6010B[1]

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

DF Dilution Factor.

GROUNDWATER ANALYTICAL

Trace Metals

Field ID:	**SD12-C**	Matrix:	**Soil**
Project:	**Saugas Iron Works/316337**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72159-08**	Percent Solids:	**39**
Sampled:	**04-29-04 10:35**		
Received:	**04-29-04 19:00**		

Analysis Method	QC Batch ID	Prep Method	Prepared	Sample Weight	Instrument ID	Analyst
EPA 6010B[1]	MB-0344-S	EPA 3050B	05-03-04 11:40	0.5 g	ICP-1 PE 3000	CRL
EPA 7471A[2]	MP-1581-S	EPA 7471A	05-04-04 07:30	0.6 g	CVAA-1 PE FIMS	CRL

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit	DF	Analyzed	Method
7440-36-0	Antimony, Total	BRL		mg/Kg	2.5	1	05-03-04 18:14	EPA 6010B[1]
7440-38-2	Arsenic, Total	**9.4**		mg/Kg	2.5	1	05-03-04 18:14	EPA 6010B[1]
7440-41-7	Beryllium, Total	BRL		mg/Kg	1	1	05-03-04 18:13	EPA 6010B[1]
7440-43-9	Cadmium, Total	**1.3**		mg/Kg	1.2	1	05-03-04 18:14	EPA 6010B[1]
7440-47-3	Chromium, Total	**59**		mg/Kg	25	1	05-03-04 18:13	EPA 6010B[1]
7440-50-8	Copper, Total	BRL		mg/Kg	50	1	05-07-04 16:05	EPA 6010B[1]
7439-92-1	Lead, Total	**81**		mg/Kg	25	1	05-03-04 18:14	EPA 6010B[1]
7439-97-6	Mercury, Total	**0.19**		mg/Kg	0.082	1	05-04-04 12:53	EPA 7471A[2]
7440-02-0	Nickel, Total	**41**		mg/Kg	25	1	05-03-04 18:14	EPA 6010B[1]
7782-49-2	Selenium, Total	BRL		mg/Kg	50	1	05-03-04 18:14	EPA 6010B[1]
7440-22-4	Silver, Total	BRL		mg/Kg	12	1	05-03-04 18:13	EPA 6010B[1]
7440-28-0	Thallium, Total	BRL		mg/Kg	12	1	05-03-04 18:14	EPA 6010B[1]
7440-66-6	Zinc, Total	**270**		mg/Kg	120	1	05-03-04 18:13	EPA 6010B[1]

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Results are reported on a dry weight basis.

Report Notations:

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DF Dilution Factor.

GROUNDWATER ANALYTICAL

Trace Metals

Field ID:	SD16-A	Matrix:	Soil
Project:	Saugas Iron Works/316337	Container:	250 mL Glass
Client:	CH2M Hill	Preservation:	Cool
Laboratory ID:	72159-09	Percent Solids:	42
Sampled:	04-29-04 14:01		
Received:	04-29-04 19:00		

Analysis Method	QC Batch ID	Prep Method	Prepared	Sample Weight	Instrument ID	Analyst
EPA 6010B[1]	MB-0344-S	EPA 3050B	05-03-04 11:40	0.5 g	ICP-1 PE 3000	CRL
EPA 7471A[2]	MP-1581-S	EPA 7471A	05-04-04 07:30	0.6 g	CVAA-1 PE FIMS	CRL

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit	DF	Analyzed	Method
7440-36-0	Antimony, Total	BRL		mg/Kg	2.3	1	05-03-04 18:18	EPA 6010B[1]
7440-38-2	Arsenic, Total	12		mg/Kg	2.3	1	05-03-04 18:18	EPA 6010B[1]
7440-41-7	Beryllium, Total	BRL		mg/Kg	0.92	1	05-03-04 18:17	EPA 6010B[1]
7440-43-9	Cadmium, Total	1.9		mg/Kg	1.2	1	05-03-04 18:18	EPA 6010B[1]
7440-47-3	Chromium, Total	57		mg/Kg	23	1	05-03-04 18:17	EPA 6010B[1]
7440-50-8	Copper, Total	56		mg/Kg	46	1	05-07-04 16:17	EPA 6010B[1]
7439-92-1	Lead, Total	230		mg/Kg	23	1	05-07-04 16:18	EPA 6010B[1]
7439-97-6	Mercury, Total	0.21		mg/Kg	0.077	1	05-04-04 12:56	EPA 7471A[2]
7440-02-0	Nickel, Total	47		mg/Kg	23	1	05-03-04 18:18	EPA 6010B[1]
7782-49-2	Selenium, Total	BRL		mg/Kg	46	1	05-03-04 18:18	EPA 6010B[1]
7440-22-4	Silver, Total	BRL		mg/Kg	12	1	05-03-04 18:17	EPA 6010B[1]
7440-28-0	Thallium, Total	BRL		mg/Kg	12	1	05-03-04 18:18	EPA 6010B[1]
7440-66-6	Zinc, Total	280		mg/Kg	120	1	05-03-04 18:17	EPA 6010B[1]

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

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DF Dilution Factor.

GROUNDWATER ANALYTICAL

Trace Metals

Field ID:	**SD16-B**	Matrix:	**Soil**
Project:	**Saugas Iron Works/316337**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72159-10**	Percent Solids:	**71**
Sampled:	**04-29-04 14:03**		
Received:	**04-29-04 19:00**		

Analysis Method	QC Batch ID	Prep Method	Prepared	Sample Weight	Instrument ID	Analyst
EPA 6010B[1]	MB-0344-S	EPA 3050B	05-03-04 11:40	0.5 g	ICP-1 PE 3000	CRL
EPA 7471A[2]	MP-1581-S	EPA 7471A	05-04-04 07:30	0.6 g	CVAA-1 PE FIMS	CRL

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit	DF	Analyzed	Method
7440-36-0	Antimony, Total	BRL		mg/Kg	1.4	1	05-03-04 18:22	EPA 6010B[1]
7440-38-2	Arsenic, Total	2.2		mg/Kg	1.4	1	05-03-04 18:22	EPA 6010B[1]
7440-41-7	Beryllium, Total	BRL		mg/Kg	0.54	1	05-03-04 18:21	EPA 6010B[1]
7440-43-9	Cadmium, Total	BRL		mg/Kg	0.68	1	05-03-04 18:22	EPA 6010B[1]
7440-47-3	Chromium, Total	18		mg/Kg	14	1	05-03-04 18:21	EPA 6010B[1]
7440-50-8	Copper, Total	BRL		mg/Kg	27	1	05-07-04 16:22	EPA 6010B[1]
7439-92-1	Lead, Total	17		mg/Kg	14	1	05-07-04 16:22	EPA 6010B[1]
7439-97-6	Mercury, Total	0.056		mg/Kg	0.045	1	05-04-04 12:59	EPA 7471A[2]
7440-02-0	Nickel, Total	18		mg/Kg	14	1	05-03-04 18:22	EPA 6010B[1]
7782-49-2	Selenium, Total	BRL		mg/Kg	27	1	05-03-04 18:22	EPA 6010B[1]
7440-22-4	Silver, Total	BRL		mg/Kg	6.8	1	05-03-04 18:21	EPA 6010B[1]
7440-28-0	Thallium, Total	BRL		mg/Kg	6.8	1	05-03-04 18:22	EPA 6010B[1]
7440-66-6	Zinc, Total	BRL		mg/Kg	68	1	05-03-04 18:21	EPA 6010B[1]

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:
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DF Dilution Factor.

GROUNDWATER ANALYTICAL

Trace Metals

Field ID:	SD16-C	Matrix:	Soil
Project:	Saugas Iron Works/316337	Container:	250 mL Glass
Client:	CH2M Hill	Preservation:	Cool
Laboratory ID:	72159-11	Percent Solids:	36
Sampled:	04-29-04 14:05		
Received:	04-29-04 19:00		

Analysis Method	QC Batch ID	Prep Method	Prepared	Sample Weight	Instrument ID	Analyst
EPA 6010B[1]	MB-0344-S	EPA 3050B	05-03-04 11:40	0.5 g	ICP-1 PE 3000	CRL
EPA 7471A[2]	MP-1581-S	EPA 7471A	05-04-04 07:30	0.6 g	CVAA-1 PE FIMS	CRL

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit	DF	Analyzed	Method
7440-36-0	Antimony, Total	BRL		mg/Kg	2.7	1	05-03-04 18:26	EPA 6010B[1]
7440-38-2	Arsenic, Total	32		mg/Kg	2.7	1	05-03-04 18:26	EPA 6010B[1]
7440-41-7	Beryllium, Total	BRL		mg/Kg	1.1	1	05-03-04 18:26	EPA 6010B[1]
7440-43-9	Cadmium, Total	2.6		mg/Kg	1.3	1	05-03-04 18:26	EPA 6010B[1]
7440-47-3	Chromium, Total	180		mg/Kg	27	1	05-03-04 18:26	EPA 6010B[1]
7440-50-8	Copper, Total	120		mg/Kg	54	1	05-07-04 16:26	EPA 6010B[1]
7439-92-1	Lead, Total	190		mg/Kg	27	1	05-07-04 16:26	EPA 6010B[1]
7439-97-6	Mercury, Total	0.16		mg/Kg	0.092	1	05-04-04 13:02	EPA 7471A[2]
7440-02-0	Nickel, Total	39		mg/Kg	27	1	05-03-04 18:26	EPA 6010B[1]
7782-49-2	Selenium, Total	BRL		mg/Kg	54	1	05-03-04 18:26	EPA 6010B[1]
7440-22-4	Silver, Total	BRL		mg/Kg	13	1	05-03-04 18:26	EPA 6010B[1]
7440-28-0	Thallium, Total	BRL		mg/Kg	13	1	05-03-04 18:26	EPA 6010B[1]
7440-66-6	Zinc, Total	700		mg/Kg	130	1	05-03-04 18:26	EPA 6010B[1]

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Results are reported on a dry weight basis.

Report Notations:

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DF Dilution Factor.

GROUNDWATER ANALYTICAL

Trace Metals

Field ID:	**EB4**	Matrix:	**Aqueous**
Project:	**Saugas Iron Works/316337**	Container:	**250 mL Plastic**
Client:	**CH2M Hill**	Preservation:	**HNO3 / Cool**
Laboratory ID:	**72159-13**	Preserved:	**04-29-04 14:10**
Sampled:	**04-29-04 14:10**		
Received:	**04-29-04 19:00**		

Analysis Method	QC Batch ID	Prep Method	Prepared	Sample Volume	Instrument ID	Analyst
EPA 6010B[1]	MB-1081-W	EPA 3010A	05-03-04 10:40	50 mL	ICP-2 PE 3300	MWR
EPA 7470A[2]	MP-1499-W	EPA 7470A	05-04-04 10:30	25 mL	CVAA-1 PE FIMS	CRL

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit	DF	Analyzed	Method
7440-36-0	Antimony, Total	BRL		mg/L	0.06	1	05-04-04 14:32	EPA 6010B[1]
7440-38-2	Arsenic, Total	BRL		mg/L	0.01	1	05-04-04 14:32	EPA 6010B[1]
7440-41-7	Beryllium, Total	BRL		mg/L	0.004	1	05-04-04 14:31	EPA 6010B[1]
7440-43-9	Cadmium, Total	BRL		mg/L	0.005	1	05-04-04 14:32	EPA 6010B[1]
7440-47-3	Chromium, Total	BRL		mg/L	0.01	1	05-04-04 14:31	EPA 6010B[1]
7440-50-8	Copper, Total	BRL		mg/L	0.025	1	05-04-04 14:31	EPA 6010B[1]
7439-92-1	Lead, Total	BRL		mg/L	0.005	1	05-04-04 14:32	EPA 6010B[1]
7439-97-6	Mercury, Total	BRL		mg/L	0.0002	1	05-04-04 15:01	EPA 7470A[2]
7440-02-0	Nickel, Total	BRL		mg/L	0.04	1	05-04-04 14:32	EPA 6010B[1]
7782-49-2	Selenium, Total	BRL		mg/L	0.05	1	05-04-04 14:32	EPA 6010B[1]
7440-22-4	Silver, Total	BRL		mg/L	0.007	1	05-04-04 14:31	EPA 6010B[1]
7440-28-0	Thallium, Total	BRL		mg/L	0.02	1	05-04-04 14:32	EPA 6010B[1]
7440-66-6	Zinc, Total	BRL		mg/L	0.2	1	05-04-04 14:32	EPA 6010B[1]

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

DF Dilution Factor.

GROUNDWATER ANALYTICAL

EPA Method 8270C
Polynuclear Aromatic Hydrocarbons by GC/MS

Field ID:	**SD11-A**	Matrix:	**Soil**
Project:	**Saugus Iron Works/316337**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72159-01**	QC Batch ID:	**SV-1440-P**
Sampled:	**04-29-04 09:25**	Instrument ID:	**MS-3 HP 5890**
Received:	**04-29-04 19:00**	Sample Weight:	**16 g**
Extracted:	**05-04-04 16:30**	Final Volume:	**1 mL**
Cleaned Up:	**05-07-04 11:30**	Percent Solids:	**32**
Analyzed:	**05-08-04 13:32**	Dilution Factor:	**1**
Analyst:	**JJT**		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
91-20-3	Naphthalene	BRL		ug/Kg	990
91-57-6	2-Methylnaphthalene	BRL		ug/Kg	990
208-96-8	Acenaphthylene	BRL		ug/Kg	990
83-32-9	Acenaphthene	BRL		ug/Kg	990
86-73-7	Fluorene	BRL		ug/Kg	990
85-01-8	Phenanthrene	BRL		ug/Kg	990
120-12-7	Anthracene	BRL		ug/Kg	990
206-44-0	Fluoranthene	BRL		ug/Kg	990
129-00-0	Pyrene	BRL		ug/Kg	990
56-55-3	Benzo[a]anthracene	BRL		ug/Kg	990
218-01-9	Chrysene	BRL		ug/Kg	990
205-99-2	Benzo[b]fluoranthene	BRL		ug/Kg	990
207-08-9	Benzo[k]fluoranthene	BRL		ug/Kg	990
50-32-8	Benzo[a]pyrene	BRL		ug/Kg	990
193-39-5	Indeno[1,2,3-c,d]pyrene	BRL		ug/Kg	990
53-70-3	Dibenzo[a,h]anthracene	BRL		ug/Kg	990
191-24-2	Benzo[g,h,i]perylene	BRL		ug/Kg	990

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Nitrobenzene-d5	20,000	12,000	62 %	30 - 130 %
2-Fluorobiphenyl	20,000	12,000	60 %	30 - 130 %
Terphenyl-d14	20,000	12,000	60 %	30 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample extraction performed by EPA Method 3545. Cleanup performed by EPA Method 3630C. Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8270C
Polynuclear Aromatic Hydrocarbons by GC/MS

Field ID:	**SD11-B**	Matrix:	**Soil**
Project:	**Saugus Iron Works/316337**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72159-02**	QC Batch ID:	**SV-1440-P**
Sampled:	**04-29-04 09:27**	Instrument ID:	**MS-3 HP 5890**
Received:	**04-29-04 19:00**	Sample Weight:	**16 g**
Extracted:	**05-04-04 16:30**	Final Volume:	**1 mL**
Cleaned Up:	**05-07-04 11:30**	Percent Solids:	**36**
Analyzed:	**05-08-04 14:50**	Dilution Factor:	**1**
Analyst:	**JJT**		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
91-20-3	Naphthalene	BRL		ug/Kg	870
91-57-6	2-Methylnaphthalene	BRL		ug/Kg	870
208-96-8	Acenaphthylene	BRL		ug/Kg	870
83-32-9	Acenaphthene	BRL		ug/Kg	870
86-73-7	Fluorene	BRL		ug/Kg	870
85-01-8	Phenanthrene	BRL		ug/Kg	870
120-12-7	Anthracene	BRL		ug/Kg	870
206-44-0	Fluoranthene	BRL		ug/Kg	870
129-00-0	Pyrene	BRL		ug/Kg	870
56-55-3	Benzo[a]anthracene	BRL		ug/Kg	870
218-01-9	Chrysene	BRL		ug/Kg	870
205-99-2	Benzo[b]fluoranthene	BRL		ug/Kg	870
207-08-9	Benzo[k]fluoranthene	BRL		ug/Kg	870
50-32-8	Benzo[a]pyrene	BRL		ug/Kg	870
193-39-5	Indeno[1,2,3-c,d]pyrene	BRL		ug/Kg	870
53-70-3	Dibenzo[a,h]anthracene	BRL		ug/Kg	870
191-24-2	Benzo[g,h,i]perylene	BRL		ug/Kg	870

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Nitrobenzene-d5	18,000	12,000	**65 %**	30 - 130 %
2-Fluorobiphenyl	18,000	10,000	**59 %**	30 - 130 %
Terphenyl-d14	18,000	12,000	**68 %**	30 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample extraction performed by EPA Method 3545. Cleanup performed by EPA Method 3630C. Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8270C
Polynuclear Aromatic Hydrocarbons by GC/MS

Field ID:	SD11-C	Matrix:	Soil
Project:	Saugus Iron Works/316337	Container:	250 mL Glass
Client:	CH2M Hill	Preservation:	Cool
Laboratory ID:	72159-03	QC Batch ID:	SV-1440-P
Sampled:	04-29-04 09:29	Instrument ID:	MS-3 HP 5890
Received:	04-29-04 19:00	Sample Weight:	16 g
Extracted:	05-04-04 16:30	Final Volume:	1 mL
Cleaned Up:	05-07-04 11:30	Percent Solids:	38
Analyzed:	05-08-04 16:09	Dilution Factor:	1
Analyst:	JJT		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
91-20-3	Naphthalene	BRL		ug/Kg	840
91-57-6	2-Methylnaphthalene	BRL		ug/Kg	840
208-96-8	Acenaphthylene	BRL		ug/Kg	840
83-32-9	Acenaphthene	BRL		ug/Kg	840
86-73-7	Fluorene	BRL		ug/Kg	840
85-01-8	Phenanthrene	BRL		ug/Kg	840
120-12-7	Anthracene	BRL		ug/Kg	840
206-44-0	Fluoranthene	BRL		ug/Kg	840
129-00-0	Pyrene	BRL		ug/Kg	840
56-55-3	Benzo[a]anthracene	BRL		ug/Kg	840
218-01-9	Chrysene	BRL		ug/Kg	840
205-99-2	Benzo[b]fluoranthene	BRL		ug/Kg	840
207-08-9	Benzo[k]fluoranthene	BRL		ug/Kg	840
50-32-8	Benzo[a]pyrene	BRL		ug/Kg	840
193-39-5	Indeno[1,2,3-c,d]pyrene	BRL		ug/Kg	840
53-70-3	Dibenzo[a,h]anthracene	BRL		ug/Kg	840
191-24-2	Benzo[g,h,i]perylene	BRL		ug/Kg	840

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Nitrobenzene-d5	17,000	11,000	62 %	30 - 130 %
2-Fluorobiphenyl	17,000	8,900	52 %	30 - 130 %
Terphenyl-d14	17,000	12,000	71 %	30 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample extraction performed by EPA Method 3545. Cleanup performed by EPA Method 3630C. Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8270C
Polynuclear Aromatic Hydrocarbons by GC/MS

Field ID:	Dup 7	Matrix:	Soil
Project:	Saugus Iron Works/316337	Container:	250 mL Glass
Client:	CH2M Hill	Preservation:	Cool
Laboratory ID:	72159-04	QC Batch ID:	SV-1440-P
Sampled:	04-29-04 00:00	Instrument ID:	MS-3 HP 5890
Received:	04-29-04 19:00	Sample Weight:	15 g
Extracted:	05-04-04 16:30	Final Volume:	1 mL
Cleaned Up:	05-07-04 11:30	Percent Solids:	31
Analyzed:	05-08-04 16:48	Dilution Factor:	1
Analyst:	JJT		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
91-20-3	Naphthalene	BRL		ug/Kg	1,000
91-57-6	2-Methylnaphthalene	BRL		ug/Kg	1,000
208-96-8	Acenaphthylene	BRL		ug/Kg	1,000
83-32-9	Acenaphthene	BRL		ug/Kg	1,000
86-73-7	Fluorene	BRL		ug/Kg	1,000
85-01-8	Phenanthrene	BRL		ug/Kg	1,000
120-12-7	Anthracene	BRL		ug/Kg	1,000
206-44-0	Fluoranthene	BRL		ug/Kg	1,000
129-00-0	Pyrene	BRL		ug/Kg	1,000
56-55-3	Benzo[a]anthracene	BRL		ug/Kg	1,000
218-01-9	Chrysene	BRL		ug/Kg	1,000
205-99-2	Benzo[b]fluoranthene	BRL		ug/Kg	1,000
207-08-9	Benzo[k]fluoranthene	BRL		ug/Kg	1,000
50-32-8	Benzo[a]pyrene	BRL		ug/Kg	1,000
193-39-5	Indeno[1,2,3-c,d]pyrene	BRL		ug/Kg	1,000
53-70-3	Dibenzo[a,h]anthracene	BRL		ug/Kg	1,000
191-24-2	Benzo[g,h,i]perylene	BRL		ug/Kg	1,000

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Nitrobenzene-d5	21,000	11,000	53 %	30 - 130 %
2-Fluorobiphenyl	21,000	12,000	55 %	30 - 130 %
Terphenyl-d14	21,000	14,000	69 %	30 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample extraction performed by EPA Method 3545. Cleanup performed by EPA Method 3630C. Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8270C
Polynuclear Aromatic Hydrocarbons by GC/MS

Field ID:	**Dup 8**	Matrix:	**Soil**
Project:	**Saugus Iron Works/316337**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72159-05**	QC Batch ID:	**SV-1440-P**
Sampled:	**04-29-04 00:00**	Instrument ID:	**MS-3 HP 5890**
Received:	**04-29-04 19:00**	Sample Weight:	**16 g**
Extracted:	**05-04-04 16:30**	Final Volume:	**1 mL**
Cleaned Up:	**05-07-04 11:30**	Percent Solids:	**37**
Analyzed:	**05-08-04 17:28**	Dilution Factor:	**1**
Analyst:	**JJT**		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
91-20-3	Naphthalene	BRL		ug/Kg	850
91-57-6	2-Methylnaphthalene	BRL		ug/Kg	850
208-96-8	Acenaphthylene	BRL		ug/Kg	850
83-32-9	Acenaphthene	BRL		ug/Kg	850
86-73-7	Fluorene	BRL		ug/Kg	850
85-01-8	Phenanthrene	BRL		ug/Kg	850
120-12-7	Anthracene	BRL		ug/Kg	850
206-44-0	Fluoranthene	BRL		ug/Kg	850
129-00-0	Pyrene	BRL		ug/Kg	850
56-55-3	Benzo[a]anthracene	BRL		ug/Kg	850
218-01-9	Chrysene	BRL		ug/Kg	850
205-99-2	Benzo[b]fluoranthene	BRL		ug/Kg	850
207-08-9	Benzo[k]fluoranthene	BRL		ug/Kg	850
50-32-8	Benzo[a]pyrene	BRL		ug/Kg	850
193-39-5	Indeno[1,2,3-c,d]pyrene	BRL		ug/Kg	850
53-70-3	Dibenzo[a,h]anthracene	BRL		ug/Kg	850
191-24-2	Benzo[g,h,i]perylene	BRL		ug/Kg	850

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Nitrobenzene-d5	17,000	9,400	55 %	30 - 130 %
2-Fluorobiphenyl	17,000	9,000	52 %	30 - 130 %
Terphenyl-d14	17,000	12,000	67 %	30 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample extraction performed by EPA Method 3545. Cleanup performed by EPA Method 3630C. Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8270C
Polynuclear Aromatic Hydrocarbons by GC/MS

Field ID:	**SD12-A**	Matrix:	**Soil**
Project:	**Saugus Iron Works/316337**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72159-06**	QC Batch ID:	**SV-1440-P**
Sampled:	**04-29-04 10:31**	Instrument ID:	**MS-3 HP 5890**
Received:	**04-29-04 19:00**	Sample Weight:	**15 g**
Extracted:	**05-04-04 16:30**	Final Volume:	**1 mL**
Cleaned Up:	**05-07-04 11:30**	Percent Solids:	**37**
Analyzed:	**05-10-04 14:59**	Dilution Factor:	**1**
Analyst:	**JJT**		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
91-20-3	Naphthalene	BRL		ug/Kg	880
91-57-6	2-Methylnaphthalene	BRL		ug/Kg	880
208-96-8	Acenaphthylene	BRL		ug/Kg	880
83-32-9	Acenaphthene	BRL		ug/Kg	880
86-73-7	Fluorene	BRL		ug/Kg	880
85-01-8	Phenanthrene	BRL		ug/Kg	880
120-12-7	Anthracene	BRL		ug/Kg	880
206-44-0	Fluoranthene	**1,600**		ug/Kg	880
129-00-0	Pyrene	**1,300**		ug/Kg	880
56-55-3	Benzo[a]anthracene	BRL		ug/Kg	880
218-01-9	Chrysene	BRL		ug/Kg	880
205-99-2	Benzo[b]fluoranthene	**1,200**		ug/Kg	880
207-08-9	Benzo[k]fluoranthene	BRL		ug/Kg	880
50-32-8	Benzo[a]pyrene	BRL		ug/Kg	880
193-39-5	Indeno[1,2,3-c,d]pyrene	BRL		ug/Kg	880
53-70-3	Dibenzo[a,h]anthracene	BRL		ug/Kg	880
191-24-2	Benzo[g,h,i]perylene	BRL		ug/Kg	880

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Nitrobenzene-d5	18,000	12,000	**66 %**	30 - 130 %
2-Fluorobiphenyl	18,000	11,000	**64 %**	30 - 130 %
Terphenyl-d14	18,000	13,000	**70 %**	30 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample extraction performed by EPA Method 3545. Cleanup performed by EPA Method 3630C. Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8270C
Polynuclear Aromatic Hydrocarbons by GC/MS

Field ID:	SD12-B	Matrix:	Soil
Project:	Saugus Iron Works/316337	Container:	250 mL Glass
Client:	CH2M Hill	Preservation:	Cool
Laboratory ID:	72159-07	QC Batch ID:	SV-1440-P
Sampled:	04-29-04 10:33	Instrument ID:	MS-3 HP 5890
Received:	04-29-04 19:00	Sample Weight:	15 g
Extracted:	05-04-04 16:30	Final Volume:	1 mL
Cleaned Up:	05-07-04 11:30	Percent Solids:	82
Analyzed:	05-10-04 15:39	Dilution Factor:	1
Analyst:	JJT		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
91-20-3	Naphthalene	BRL		ug/Kg	400
91-57-6	2-Methylnaphthalene	BRL		ug/Kg	400
208-96-8	Acenaphthylene	BRL		ug/Kg	400
83-32-9	Acenaphthene	BRL		ug/Kg	400
86-73-7	Fluorene	BRL		ug/Kg	400
85-01-8	Phenanthrene	BRL		ug/Kg	400
120-12-7	Anthracene	BRL		ug/Kg	400
206-44-0	Fluoranthene	BRL		ug/Kg	400
129-00-0	Pyrene	BRL		ug/Kg	400
56-55-3	Benzo[a]anthracene	BRL		ug/Kg	400
218-01-9	Chrysene	BRL		ug/Kg	400
205-99-2	Benzo[b]fluoranthene	BRL		ug/Kg	400
207-08-9	Benzo[k]fluoranthene	BRL		ug/Kg	400
50-32-8	Benzo[a]pyrene	BRL		ug/Kg	400
193-39-5	Indeno[1,2,3-c,d]pyrene	BRL		ug/Kg	400
53-70-3	Dibenzo[a,h]anthracene	BRL		ug/Kg	400
191-24-2	Benzo[g,h,i]perylene	BRL		ug/Kg	400

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Nitrobenzene-d5	8,000	5,300	66 %	30 - 130 %
2-Fluorobiphenyl	8,000	6,000	74 %	30 - 130 %
Terphenyl-d14	8,000	6,100	76 %	30 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample extraction performed by EPA Method 3545. Cleanup performed by EPA Method 3630C. Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8270C
Polynuclear Aromatic Hydrocarbons by GC/MS

Field ID:	SD12-C	Matrix:	Soil
Project:	Saugus Iron Works/316337	Container:	250 mL Glass
Client:	CH2M Hill	Preservation:	Cool
Laboratory ID:	72159-08	QC Batch ID:	SV-1440-P
Sampled:	04-29-04 10:35	Instrument ID:	MS-3 HP 5890
Received:	04-29-04 19:00	Sample Weight:	15 g
Extracted:	05-04-04 16:30	Final Volume:	1 mL
Cleaned Up:	05-07-04 11:30	Percent Solids:	39
Analyzed:	05-10-04 16:19	Dilution Factor:	1
Analyst:	JJT		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
91-20-3	Naphthalene	BRL		ug/Kg	820
91-57-6	2-Methylnaphthalene	BRL		ug/Kg	820
208-96-8	Acenaphthylene	BRL		ug/Kg	820
83-32-9	Acenaphthene	BRL		ug/Kg	820
86-73-7	Fluorene	BRL		ug/Kg	820
85-01-8	Phenanthrene	BRL		ug/Kg	820
120-12-7	Anthracene	BRL		ug/Kg	820
206-44-0	Fluoranthene	BRL		ug/Kg	820
129-00-0	Pyrene	BRL		ug/Kg	820
56-55-3	Benzo[a]anthracene	BRL		ug/Kg	820
218-01-9	Chrysene	BRL		ug/Kg	820
205-99-2	Benzo[b]fluoranthene	BRL		ug/Kg	820
207-08-9	Benzo[k]fluoranthene	BRL		ug/Kg	820
50-32-8	Benzo[a]pyrene	BRL		ug/Kg	820
193-39-5	Indeno[1,2,3-c,d]pyrene	BRL		ug/Kg	820
53-70-3	Dibenzo[a,h]anthracene	BRL		ug/Kg	820
191-24-2	Benzo[g,h,i]perylene	BRL		ug/Kg	820

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Nitrobenzene-d5	17,000	9,100	55 %	30 - 130 %
2-Fluorobiphenyl	17,000	9,000	55 %	30 - 130 %
Terphenyl-d14	17,000	10,000	63 %	30 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample extraction performed by EPA Method 3545. Cleanup performed by EPA Method 3630C. Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8270C
Polynuclear Aromatic Hydrocarbons by GC/MS

Field ID:	SD16-A	Matrix:	Soil
Project:	Saugus Iron Works/316337	Container:	250 mL Glass
Client:	CH2M Hill	Preservation:	Cool
Laboratory ID:	72159-09	QC Batch ID:	SV-1440-P
Sampled:	04-29-04 14:01	Instrument ID:	MS-3 HP 5890
Received:	04-29-04 19:00	Sample Weight:	15 g
Extracted:	05-04-04 16:30	Final Volume:	1 mL
Cleaned Up:	05-07-04 11:30	Percent Solids:	42
Analyzed:	05-10-04 16:58	Dilution Factor:	1
Analyst:	JJT		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
91-20-3	Naphthalene	BRL		ug/Kg	770
91-57-6	2-Methylnaphthalene	BRL		ug/Kg	770
208-96-8	Acenaphthylene	BRL		ug/Kg	770
83-32-9	Acenaphthene	BRL		ug/Kg	770
86-73-7	Fluorene	BRL		ug/Kg	770
85-01-8	Phenanthrene	BRL		ug/Kg	770
120-12-7	Anthracene	BRL		ug/Kg	770
206-44-0	Fluoranthene	BRL		ug/Kg	770
129-00-0	Pyrene	BRL		ug/Kg	770
56-55-3	Benzo[a]anthracene	BRL		ug/Kg	770
218-01-9	Chrysene	BRL		ug/Kg	770
205-99-2	Benzo[b]fluoranthene	BRL		ug/Kg	770
207-08-9	Benzo[k]fluoranthene	BRL		ug/Kg	770
50-32-8	Benzo[a]pyrene	BRL		ug/Kg	770
193-39-5	Indeno[1,2,3-c,d]pyrene	BRL		ug/Kg	770
53-70-3	Dibenzo[a,h]anthracene	BRL		ug/Kg	770
191-24-2	Benzo[g,h,i]perylene	BRL		ug/Kg	770

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Nitrobenzene-d5	15,000	9,300	60 %	30 - 130 %
2-Fluorobiphenyl	15,000	8,700	56 %	30 - 130 %
Terphenyl-d14	15,000	9,500	61 %	30 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample extraction performed by EPA Method 3545. Cleanup performed by EPA Method 3630C. Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8270C
Polynuclear Aromatic Hydrocarbons by GC/MS

Field ID:	SD16-B	Matrix:	Soil
Project:	Saugus Iron Works/316337	Container:	250 mL Glass
Client:	CH2M Hill	Preservation:	Cool
Laboratory ID:	72159-10	QC Batch ID:	SV-1440-P
Sampled:	04-29-04 14:03	Instrument ID:	MS-3 HP 5890
Received:	04-29-04 19:00	Sample Weight:	16 g
Extracted:	05-04-04 16:30	Final Volume:	1 mL
Cleaned Up:	05-07-04 11:30	Percent Solids:	71
Analyzed:	05-10-04 17:38	Dilution Factor:	1
Analyst:	JJT		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
91-20-3	Naphthalene	BRL		ug/Kg	440
91-57-6	2-Methylnaphthalene	BRL		ug/Kg	440
208-96-8	Acenaphthylene	BRL		ug/Kg	440
83-32-9	Acenaphthene	450		ug/Kg	440
86-73-7	Fluorene	580		ug/Kg	440
85-01-8	Phenanthrene	3,000		ug/Kg	440
120-12-7	Anthracene	1,100		ug/Kg	440
206-44-0	Fluoranthene	2,700		ug/Kg	440
129-00-0	Pyrene	2,100		ug/Kg	440
56-55-3	Benzo[a]anthracene	1,100		ug/Kg	440
218-01-9	Chrysene	940		ug/Kg	440
205-99-2	Benzo[b]fluoranthene	1,100		ug/Kg	440
207-08-9	Benzo[k]fluoranthene	BRL		ug/Kg	440
50-32-8	Benzo[a]pyrene	950		ug/Kg	440
193-39-5	Indeno[1,2,3-c,d]pyrene	600		ug/Kg	440
53-70-3	Dibenzo[a,h]anthracene	BRL		ug/Kg	440
191-24-2	Benzo[g,h,i]perylene	520		ug/Kg	440

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Nitrobenzene-d5	8,800	6,000	68 %	30 - 130 %
2-Fluorobiphenyl	8,800	6,500	73 %	30 - 130 %
Terphenyl-d14	8,800	6,700	76 %	30 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample extraction performed by EPA Method 3545. Cleanup performed by EPA Method 3630C. Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8270C
Polynuclear Aromatic Hydrocarbons by GC/MS

Field ID:	SD16-C	Matrix:	Soil
Project:	Saugus Iron Works/316337	Container:	250 mL Glass
Client:	CH2M Hill	Preservation:	Cool
Laboratory ID:	72159-11		
Sampled:	04-29-04 14:05	QC Batch ID:	SV-1440-P
Received:	04-29-04 19:00	Instrument ID:	MS-3 HP 5890
Extracted:	05-04-04 16:30	Sample Weight:	15 g
Cleaned Up:	05-07-04 11:30	Final Volume:	1 mL
Analyzed:	05-10-04 18:17	Percent Solids:	36
Analyst:	JJT	Dilution Factor:	1

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
91-20-3	Naphthalene	BRL		ug/Kg	900
91-57-6	2-Methylnaphthalene	BRL		ug/Kg	900
208-96-8	Acenaphthylene	BRL		ug/Kg	900
83-32-9	Acenaphthene	BRL		ug/Kg	900
86-73-7	Fluorene	BRL		ug/Kg	900
85-01-8	Phenanthrene	1,200		ug/Kg	900
120-12-7	Anthracene	BRL		ug/Kg	900
206-44-0	Fluoranthene	2,100		ug/Kg	900
129-00-0	Pyrene	1,800		ug/Kg	900
56-55-3	Benzo[a]anthracene	BRL		ug/Kg	900
218-01-9	Chrysene	1,100		ug/Kg	900
205-99-2	Benzo[b]fluoranthene	1,300		ug/Kg	900
207-08-9	Benzo[k]fluoranthene	BRL		ug/Kg	900
50-32-8	Benzo[a]pyrene	920		ug/Kg	900
193-39-5	Indeno[1,2,3-c,d]pyrene	BRL		ug/Kg	900
53-70-3	Dibenzo[a,h]anthracene	BRL		ug/Kg	900
191-24-2	Benzo[g,h,i]perylene	BRL		ug/Kg	900

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Nitrobenzene-d5	18,000	12,000	65 %	30 - 130 %
2-Fluorobiphenyl	18,000	12,000	65 %	30 - 130 %
Terphenyl-d14	18,000	13,000	70 %	30 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample extraction performed by EPA Method 3545. Cleanup performed by EPA Method 3630C. Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8270C
Semivolatile Organics by GC/MS

Field ID:	EB4	Matrix:	Aqueous
Project:	Saugus Iron Works/316337	Container:	1 L Amber Glass
Client:	CH2M Hill	Preservation:	Cool
Laboratory ID:	72159-12	QC Batch ID:	SV-1490-F
Sampled:	04-29-04 14:10	Instrument ID:	MS-6 HP 6890
Received:	04-29-04 19:00	Sample Volume:	850 mL
Extracted:	05-06-04 13:00	Final Volume:	1 mL
Analyzed:	05-11-04 23:11	Dilution Factor:	1
Analyst:	JJT		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
62-75-9	N-Nitrosodimethylamine	BRL		ug/L	6
110-86-1	Pyridine	BRL		ug/L	6
108-95-2	Phenol	BRL		ug/L	6
62-53-3	Aniline	BRL		ug/L	6
111-44-4	Bis(2-chloroethyl) ether	BRL		ug/L	6
95-57-8	2-Chlorophenol	BRL		ug/L	6
541-73-1	1,3-Dichlorobenzene	BRL		ug/L	6
106-46-7	1,4-Dichlorobenzene	BRL		ug/L	6
100-51-6	Benzyl Alcohol	BRL		ug/L	6
95-50-1	1,2-Dichlorobenzene	BRL		ug/L	6
95-48-7	2-Methylphenol	BRL		ug/L	6
108-60-1	Bis(2-chloroisopropyl) ether	BRL		ug/L	6
108-39-4/106-44-5	3 and 4-Methylphenol *	BRL		ug/L	6
621-64-7	N-Nitrosodi-n-propylamine	BRL		ug/L	6
98-86-2	Acetophenone	BRL		ug/L	6
67-72-1	Hexachloroethane	BRL		ug/L	6
98-95-3	Nitrobenzene	BRL		ug/L	6
78-59-1	Isophorone	BRL		ug/L	6
88-75-5	2-Nitrophenol	BRL		ug/L	6
105-67-9	2,4-Dimethylphenol	BRL		ug/L	6
111-91-1	Bis(2-chloroethoxy) methane	BRL		ug/L	6
120-83-2	2,4-Dichlorophenol	BRL		ug/L	6
120-82-1	1,2,4-Trichlorobenzene	BRL		ug/L	6
91-20-3	Naphthalene	BRL		ug/L	6
106-47-8	4-Chloroaniline	BRL		ug/L	6
87-68-3	Hexachlorobutadiene	BRL		ug/L	6
59-50-7	4-Chloro-3-methylphenol	BRL		ug/L	6
91-57-6	2-Methylnaphthalene	BRL		ug/L	6
77-47-4	Hexachlorocyclopentadiene	BRL		ug/L	6
88-06-2	2,4,6-Trichlorophenol	BRL		ug/L	6
95-95-4	2,4,5-Trichlorophenol	BRL		ug/L	6
91-58-7	2-Chloronaphthalene	BRL		ug/L	6
88-74-4	2-Nitroaniline	BRL		ug/L	6
100-25-4	1,4-Dinitrobenzene	BRL		ug/L	6
131-11-3	Dimethyl phthalate	BRL		ug/L	6
99-65-0	1,3-Dinitrobenzene	BRL		ug/L	6
208-96-8	Acenaphthylene	BRL		ug/L	6
606-20-2	2,6-Dinitrotoluene	BRL		ug/L	6
528-29-0	1,2-Dinitrobenzene	BRL		ug/L	6
99-09-2	3-Nitroaniline	BRL		ug/L	6
83-32-9	Acenaphthene	BRL		ug/L	6
51-28-5	2,4-Dinitrophenol	BRL		ug/L	6
100-02-7	4-Nitrophenol	BRL		ug/L	6
132-64-9	Dibenzofuran	BRL		ug/L	6
121-14-2	2,4-Dinitrotoluene	BRL		ug/L	6

GROUNDWATER ANALYTICAL

EPA Method 8270C (Continued)
Semivolatile Organics by GC/MS

Field ID:	EB4	Matrix:	Aqueous
Project:	Saugus Iron Works/316337	Container:	1 L Amber Glass
Client:	CH2M Hill	Preservation:	Cool
Laboratory ID:	72159-12	QC Batch ID:	SV-1490-F
Sampled:	04-29-04 14:10	Instrument ID:	MS-6 HP 6890
Received:	04-29-04 19:00	Sample Volume:	850 mL
Extracted:	05-06-04 13:00	Final Volume:	1 mL
Analyzed:	05-11-04 23:11	Dilution Factor:	1
Analyst:	JJT		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
84-66-2	Diethyl phthalate	BRL		ug/L	6
7005-72-3	4-Chlorophenyl phenyl ether	BRL		ug/L	6
86-73-7	Fluorene	BRL		ug/L	6
100-01-6	4-Nitroaniline	BRL		ug/L	6
534-52-1	4,6-Dinitro-2-methylphenol	BRL		ug/L	6
86-30-6	N-Nitrosodiphenylamine †	BRL		ug/L	6
122-66-7	1,2-Diphenylhydrazine ◊	BRL		ug/L	6
101-55-3	4-Bromophenyl phenyl ether	BRL		ug/L	6
118-74-1	Hexachlorobenzene	BRL		ug/L	6
87-86-5	Pentachlorophenol	BRL		ug/L	6
85-01-8	Phenanthrene	BRL		ug/L	6
120-12-7	Anthracene	BRL		ug/L	6
86-74-8	Carbazole	BRL		ug/L	6
84-74-2	Di-*n*-butyl phthalate	BRL		ug/L	6
206-44-0	Fluoranthene	BRL		ug/L	6
129-00-0	Pyrene	BRL		ug/L	6
85-68-7	Butyl benzyl phthalate	BRL		ug/L	6
91-94-1	3,3'-Dichlorobenzidine	BRL		ug/L	6
56-55-3	Benzo[a]anthracene	BRL		ug/L	6
218-01-9	Chrysene	BRL		ug/L	6
117-81-7	Bis(2-ethylhexyl) phthalate	BRL		ug/L	6
117-84-0	Di-*n*-octyl phthalate	BRL		ug/L	6
205-99-2	Benzo[b]fluoranthene	BRL		ug/L	6
207-08-9	Benzo[k]fluoranthene	BRL		ug/L	6
50-32-8	Benzo[a]pyrene	BRL		ug/L	6
193-39-5	Indeno[1,2,3-c,d]pyrene	BRL		ug/L	6
53-70-3	Dibenzo[a,h]anthracene	BRL		ug/L	6
191-24-2	Benzo[g,h,i]perylene	BRL		ug/L	6

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
2-Fluorophenol	240	170	73 %	15 - 110 %
Phenol-d5	240	170	74 %	15 - 110 %
Nitrobenzene-d5	120	84	71 %	30 - 130 %
2-Fluorobiphenyl	120	77	65 %	30 - 130 %
2,4,6-Tribromophenol	240	140	58 %	15 - 110 %
Terphenyl-d14	120	85	72 %	30 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample extraction performed by EPA Method 3510C.

Report Notations:

BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

* Analyzed as 4-Methylphenol.

† Reported as sum of N-Nitrosodiphenylamine and Diphenylamine.

◊ Analyzed as Azobenzene.

GROUNDWATER ANALYTICAL

Project Narrative

Project: **Saugus Iron Works/316337**
Client: **CH2M Hill**

Lab ID: **72159**
Received: **04-29-04 19:00**

A. Documentation and Client Communication

The following documentation discrepancies, and client changes or amendments were noted for this project:

1. No documentation discrepancies, changes, or amendments were noted.

B. Method Modifications, Non-Conformances and Observations

The sample(s) in this project were analyzed by the references analytical method(s), and no method modifications, non-conformances or analytical issues were noted, except as indicated below:

1. EPA 6010B Note: Samples 72159-01,-02,-03,-04,-05,-06,-07,-08,-09,-10,-11,-13. Samples were analyzed for selected target analytes, as requested by client.

2. EPA 8270C Note: Samples 72159-01,-02,-03,-04,-05,-06,-07,-08,-09,-10,-11. Samples were analyzed for only selected polynuclear aromatic hydrocarbons (PAH) target analytes, as requested by client.

3. EPA 8270C Note: Sample 72159-12. Quadratic equations were used in the calculations of selected analytes: N-Nitrosodimethylamine, Pyridine, 2-Fluorophenol, Phenol-d5, Bis(2-Chloroethyl)ether, Phenol, 2-Chlorophenol, Aniline, 1,3-Dichlorobenzene, 1,4-Dichlorobenzene, 1,2-Dichlorobenzene, Benzyl alcohol, 2,2'-Oxybis(1-Chloropropane), 2-Methylphenol, Hexachloroethane, Acetophenone, 2-Nitrophenol, 1,4-Dinitrobenzene, 2,4-Dinitrophenol, 1,2-Dinitrobenzene, 4-Nitroaniline, and Carbazole.

GROUNDWATER ANALYTICAL

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www.groundwateranalytical.com

CHAIN-OF-CUSTODY RECORD AND WORK ORDER

1 of 2

№ 089365

Project Name: Saugus Iron Works	Firm: CH2M Hill
Project Number: 816337	Address: 25 New Chardon St
Sampler Name: Ryan Loveridge	City / State / Zip: Boston, MA 02114
Project Manager: John Burgess	Telephone: 617/523-2260

INSTRUCTIONS: Use separate line for each container (except replicates).

TURNAROUND

- [X] STANDARD (10 Business Days)
- [ ] PRIORITY (5 Business Days)
- [ ] RUSH (RAN- _____)
  (Rush requires Rush Authorization Number)
- [ ] Please Email to: _____
- [ ] Please FAX to: _____

BILLING

- [ ] Purchase Order No.: _____
- [ ] Third Party Billing: _____
- [ ] GWA Quote: _____

ANALYSIS REQUEST

OPTIONS: Volatiles: ☐ TIC Search | Semivolatiles: ☐ ACID Only ☐ B/N Only ☐ TIC Search | Past/Herb/PCBs Extractable Vol. | Metals: Specify For Water Samples: ☐ Total ☐ Dissolved

SOXHLET: Volatiles: ☐ 5242-MTBE | Semivolatiles: ☐ 3525.2 | Past/Herb/PCBs Extractable: ☐ 1656 ☐ 508 | Vol.: ☐ 5311 | ☐ 515.1 | Metals: ☐ Lead and Copper

BPPOS: Volatiles: ☐ 624 | ☐ 8260-MTBE | ☐ 601 | ☐ 601/602-MTBE | Semivolatiles: ☐ 625 | Past/Herb/PCBs Extractable: ☐ 625 PAHs only ☐ 608 Pesticides ☐ 608 PCBs | Vol.: ☐ 515 | ☐ 504.1 EDB/DBCP | Metals: ☐ 13 Priority Pollutant

REPACT/E: Volatiles: ☐ 8260B TCL+MTBE ☐ 8260B 1M1 PETROLEUM ☐ ICAOS | ☐ 8021B Aromatics | ☐ 8021B Halocarbons | ☐ 8021B | ☐ 8270C | Semivolatiles: 8270C | Past/Herb/PCBs Extractable: ☐ 8270C PAHs only ☐ 8081A Pesticides ☐ 8082 PCBs | Vol.: ☐ 8151A Herbicides | ☐ 8011 EDB/DBCP | Metals: ☐ 8 RCRA ☐ 5 RCRA ☐ MA List Metals ☐ 23 TAL | ☐ Specify:

Petroleum Hydrocarbons: Ext. TPH: ☐ Diesel Range Organics (DRO) ☐ ME DRO ☐ CT ETPH ☐ MA DEP EPH w/All targets ☐ EPH Carbon Ranges only ☐ EPH w/4 PAHs ☐ Hydrocarbon Fingerprint (GC/FID by ASTM D3328-90-Mod.) ☐ TPH by GC/FID, 261/8B Mod) Oxygenates Only | Vol. TPH: ☐ Gasoline Range Organics (GRO) ☐ ME GRO ☐ MA DEP VPH w/All targets ☐ VPH Carbon ranges only

Haz. Waste: ☐ TCLP ☐ SPLP ☐ 8 Metals ☐ Pb only ☐ VOA ☐ Semi VOA ☐ Pesticides ☐ Herbicides ☐ Corrosivity (as pH) ☐ Reactivity ☐ Ignitability (as Flashpoint) ☐ Paint Filter ☐ MA Base Disposal Criteria 82608, TPH by GC, PCBs, 6 Metals, Corrosivity, Ignitability, Reactivity

General Chemistry: ☐ Nitrate ☐ Nitrite ☐ Chloride ☐ Fluoride ☐ Sulfate ☐ Dissolved Phosphorus ☐ Arsenic ☐ TKN ☐ Total Phosphorus ☐ Total N (as NO3/NO2/TKN) ☐ Oil & Grease ☐ COD ☐ TOC ☐ TDS ☐ TSS ☐ TSTS ☐ Alkalinity ☐ Cyanide, Total ☐ Cyanide, Physiologically Available ☐ DH ☐ Dissolved Oxygen ☐ Turbidity

Sampling DATE	Sampling TIME	SAMPLE IDENTIFICATION	Matrix	Type	Container(s)	Preservation	Filtered	LABORATORY NUMBER (Lab Use Only)
4/16/04	0925	SD11-A	WW	COMPOSITE	8oz-G	Sodium Bisulfate	YES	1
	0927	SD11-B	WW					2
	0929	SD11-C	WW					3
	—	DUP7	WW					4
	—	DUP8	WW					5
	1037	SD12-A	WW					6
	1039	SD12-B	WW					7
	1039	SD12-C	WW					8
	1401	SD16-A	WW					9
	1403	SD16-B	WW					10
	1405	SD16-C	WW					11
↓	1410	EB4	WW					12

REMARKS / SPECIAL INSTRUCTIONS

MA DEP MCP Data Enhancement Affirmation

☐YES ☐NO MCP Data Certification is required.

☐YES ☐NO MCP minimum Field QC requirements have been met for this project.
(Metals, hexavalent chromium and cyanide analyses require one matrix spike per 20 samples)

☐YES ☐NO MCP Drinking Water samples required.
(Require collection of contingent duplicate samples. Trip blanks are also required, if VOA samples collected)

Signature: _____

DATA QUALITY OBJECTIVES

Regulatory Program

State	Standard	Deliverables
☐ CT	[X] MCP GW-1/S-1	☐ PWS Form
☐ ME	☐ MCP GW-2/S-2	☐ MWRA
[X] MA	☐ NY STARS	☐ _____
☐ NH	☐ Drinking Water	
☐ NY	☐ Wastewater	
☐ RI	☐ Waste Disposal	
☐ VT	☐ Dredge Material	
☐ ___	☐ _____	

Project Specific QC

Many regulatory programs and EPA methods require project specific QC. Project specific QC includes Sample Duplicates, Matrix Spikes, and/or Matrix Spike Duplicates. Laboratory QC is not project specific unless prearranged. Project specific QC samples are charged on a per sample basis. **Each MS, MSD and Sample Duplicate requires an additional sample aliquot.**

Project Specific QC Required	Selection of QC Sample
[X] Sample Duplicate	☐ Please use sample:
☐ Matrix Spike	_____
☐ Matrix Spike Duplicate	

CHAIN-OF-CUSTODY RECORD

NOTE: All samples submitted subject to Standard Terms and Conditions on reverse hereof.

	Date	Time	Received by:	
Relinquished by Sampler:	4/16/04	1500	Alan Maddigan	Receipt Temperature: ☐ Ice ☐ Refrigerated 5.3 °C Recommended
Relinquished by: Alan Maddigan	4/29/04	7:00		Container Count: 13
Relinquished by:	Date	Time	Received by/Laboratory:	Shipping/Airbill Number:

Method of Shipment: [X] GWA Courier ☐ Express Mail ☐ Federal Express ☐ UPS ☐ Hand ☐ _____

Custody Seal Number:

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CHAIN-OF-CUSTODY RECORD AND WORK ORDER

№ 089366

Project Name:	Firm:
Saugus Iron	CH2M Hill
Project Number:	**Address:**
316337	25 New Chardon St
Sampler Name:	**City / State / Zip:**
Ryan Laveridge	Boston, MA 02114
Project Manager:	**Telephone:**
John Burgess	617/523-2260

INSTRUCTIONS: Use separate line for each container (except replicates).

TURNAROUND

- [X] STANDARD (10 Business Days)
- [ ] PRIORITY (5 Business Days)
- [ ] RUSH (RAN- _____)
  (Rush requires Rush Authorization Number)
- [ ] Please Email to: _____
- [ ] Please FAX to: _____

BILLING

- [ ] Purchase Order No.: _____
- [ ] Third Party Billing: _____
- [ ] GWA Quote: _____

ANALYSIS REQUEST

OPTIONS: [ ] TIC Search

Volatiles: [ ] 524.2+MTBE

Semivolatiles: [ ] Acid Only [ ] BN Only [ ] TIC Search; [ ] 525.2; [ ] 8270C (PAHs only); [ ] 8270C; [ ] 8270C (PAHs only); [ ] 8081A Pesticides; [ ] 8082 PCBs; [ ] 8151A Herbicides; [ ] 8011 EDB/DBCP; [ ] 8 RCRA; [ ] 5 RCRA; [ ] MA Ltd. Metals; [ ] 23 TAL; [ ] Specify:

Pest/Herb/PCBs (Complete Pkg.): [ ] 505 [ ] 508; [ ] 531.1; [ ] 515.1; [ ] 504.1 EDB/DBCP

Metals: Specify For Water Samples: [ ] Total [ ] Dissolved; [ ] Lead and Copper

Petroleum Hydrocarbon Ext. TPH: [ ] Diesel Range Organics (DRO) [ ] ME DRO; [ ] CT ETPH; [ ] MA DEP EPH w/all targets [ ] EPH Carbon Ranges only [ ] EPH w/o PAHs; [ ] Hydrocarbon Fingerprint (GC/FID) by ASTM D3328-00 Mod.; [ ] TPH by GC/FID (8015B Mod) Quantitative Only; [ ] Gasoline Range Organics (GRO) [ ] ME GRO; [ ] MA DEP VPH w/all targets [ ] VPH Carbon ranges only

Vol. TPH: [ ] TCLP (1,1)/SPLP [ ] 5 Metals [ ] Pb only [ ] VOA [ ] Comm VOA [ ] Pest Cides [ ] Herbicides; [ ] Corrosivity (as pH) [ ] Reactivity [ ] Ignitability (as Flashpoint) [ ] Paint Filter; [ ] MA Base Neutral Criteria: 8260B TPH by GC, PCBs, 5 Metals, Corrosivity, Ignitability, Reactivity

Haz. Waste: [ ] Nitrate [ ] Nitrite [ ] Chloride [ ] Fluoride [ ] Sulfide

General Chemistry: [ ] Dissolved Phosphorus; [ ] Ammonia [ ] TKN [ ] Total Phosphorus [ ] Total N (as NO3/NO2/TKN); [ ] Oil & Grease; [ ] COD [ ] TOC; [ ] BOD [ ] TSS [ ] TDS [ ] Alkalinity; [ ] Cyanide, Total [ ] Cyanide, Physiologically Available; [ ] pH [ ] Dissolved Oxygen [ ] Turbidity; [ ] Total Coliform [ ] Fecal Coliform [ ] HPC

RCRA/21E: [ ] 8260B TCL+MTBE; [ ] 8260B MA PETROLEUM; [ ] 8260B; [ ] 8021B Aromatics; [ ] 8021B Halocarbons; [ ] 8021B; [ ] 8270C

NPDES: [ ] RGA; [ ] 502.2+MTBE; [ ] 601; [ ] 601/602+MTBE; [ ] 625; [ ] Priority Pollutant

SCWSA: [ ] 524.2+MTBE

Sampling			Matrix						Type	Container(s)										Preservation					Filtered		LABORATORY NUMBER (Lab Use Only)
DATE	TIME	SAMPLE IDENTIFICATION	GROUNDWATER	DRINKING WATER	WASTEWATER	SOIL	OTHER SOLID	CHLORINATED LIQUID	COMPOSITE	GRAB	NUMBER	40mL VOA Vial	60mL/2 oz Glass	120mL/4 oz Amber Glass	250mL/8 oz Glass	500mL/16 oz Glass	1L/32 oz Amber Glass	250mL/8 oz Plastic	500mL/16 oz Plastic	1L/32 oz Plastic	125mL Sterile	HCl	HNO3	H2SO4	NaOH	Methanol	Sodium Bisulfite	ICE	YES	NO	
4/29	1410	EB4						X	X	X	1							X				X				X	X	X	13	

REMARKS / SPECIAL INSTRUCTIONS

MA DEP MCP Data Enhancement Affirmation

☐ YES ☐ NO MCP Data Certification is required.

☐ YES ☐ NO MCP minimum Field QC requirements have been met for this project.
(Metals, hexavalent chromium and cyanide analyses require one matrix spike per 20 samples)

☐ YES ☐ NO MCP Drinking Water samples required.
(Require collection of contingent duplicate samples. Trip blanks are also required, if VOA samples collected)

Signature: _____

DATA QUALITY OBJECTIVES

Regulatory Program

State	Standard	Deliverables
☐ CT	[X] MCP GW-1/S-1	☐ PWS Form
☐ ME	☐ MCP GW-2/S-2	☐ MWRA
[X] MA	☐ NY STARS	☐ _____
☐ NH	☐ Drinking Water	
☐ NY	☐ Wastewater	
☐ RI	☐ Waste Disposal	
☐ VT	☐ Dredge Material	
☐ ___	☐ _____	

Project Specific QC

Many regulatory programs and EPA methods require project specific QC. Project specific QC includes Sample Duplicates, Matrix Spikes, and/or Matrix Spike Duplicates. Laboratory QC is not project specific unless prearranged. Project specific QC samples are charged on a per sample basis. **Each MS, MSD and Sample Duplicate requires an additional sample aliquot.**

Project Specific QC Required
- ☐ Sample Duplicate
- ☐ Matrix Spike
- ☐ Matrix Spike Duplicate

Selection of QC Sample
- ☐ Please use sample: _____

CHAIN-OF-CUSTODY RECORD

NOTE: All samples submitted subject to Standard Terms and Conditions on reverse hereof.

	Date	Time		
Relinquished by Sampler:	4/30/09	1500	Received by:	Receipt Temperature: 2°C Refrigerated 4°C Recommended 5.3°
Relinquished by:	Date	Time	Received by:	Container Count: 1
Relinquished by:	Date	Time	Received by Laboratory:	Shipping/Airbill Number:

Method of Shipment: [X] GWA Courier ☐ Express Mail ☐ Federal Express ☐ UPS ☐ Hand ☐ _____

Custody Seal Number:

GROUNDWATER ANALYTICAL

Quality Assurance/Quality Control

A. Program Overview

Groundwater Analytical conducts an active Quality Assurance program to ensure the production of high quality, valid data. This program closely follows the guidance provided by *Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans*, US EPA QAMS-005/80 (1980), and *Test Methods for Evaluating Solid Waste*, US EPA, SW-846, Update III (1996).

Quality Control protocols include written Standard Operating Procedures (SOPs) developed for each analytical method. SOPs are derived from US EPA methodologies and other established references. Standards are prepared from commercially obtained reference materials of certified purity, and documented for traceability.

Quality Assessment protocols for most organic analyses include a minimum of one laboratory control sample, one method blank, one matrix spike sample, and one sample duplicate for each sample preparation batch. All samples, standards, blanks, laboratory control samples, matrix spikes and sample duplicates are spiked with internal standards and surrogate compounds. All instrument sequences begin with an initial calibration verification standard and a blank; and excepting GC/MS sequences, all sequences close with a continuing calibration standard. GC/MS systems are tuned to appropriate ion abundance criteria daily, or for each 12 hour operating period, whichever is more frequent.

Quality Assessment protocols for most inorganic analyses include a minimum of one laboratory control sample, one method blank, one matrix spike sample, and one sample duplicate for each sample preparation batch. Standard curves are derived from one reagent blank and four concentration levels. Curve validity is verified by standard recoveries within plus or minus ten percent of the curve.

B. Definitions

Batches are used as the basic unit for Quality Assessment. A Batch is defined as twenty or fewer samples of the same matrix which are prepared together for the same analysis, using the same lots of reagents and the same techniques or manipulations, all within the same continuum of time, up to but not exceeding 24 hours.

Laboratory Control Samples are used to assess the accuracy of the analytical method. A Laboratory Control Sample consists of reagent water or sodium sulfate spiked with a group of target analytes representative of the method analytes. Accuracy is defined as the degree of agreement of the measured value with the true or expected value. Perent Recoveries for the Laboratory Control Samples are calculated to assess accuracy.

Method Blanks are used to assess the level of contamination present in the analytical system. Method Blanks consist of reagent water or an aliquot of sodium sulfate. Method Blanks are taken through all the appropriate steps of an analytical method. Sample data reported is not corrected for blank contamination.

Surrogate Compounds are used to assess the effectiveness of an analytical method in dealing with each sample matrix. Surrogate Compounds are organic compounds which are similar to the target analytes of interest in chemical behavior, but which are not normally found in environmental samples. Percent Recoveries are calculated for each Surrogate Compound.

GROUNDWATER ANALYTICAL

Quality Control Report
Laboratory Control Sample

Category: **Inorganic Chemistry**
Matrix: **Soil**

Analyte	Units	Spiked	Measured	Recovery	QC Limits	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	mg/Kg	500	520	103 %	80 - 120 %	05-06-04 13:48	TOC-0256-S	EPA 9060 Mod	1	AVB
Organic Carbon, Total	mg/Kg	500	470	94 %	80 - 120 %	05-07-04 09:28	TOC-0257-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).

Report Notations: All calculations performed prior to rounding. Quality Control Limits are defined by the methodology, or alternatively based upon the historical average recovery plus or minus three standard deviation units.

1 Instrument ID: Tekmar-Hohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Quality Control Report
Method Blank

Category: **Inorganic Chemistry**
Matrix: **Soil**

Analyte	Result	Units	RL	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	BRL	mg/Kg	100	05-06-04 13:48	TOC-0256-S	EPA 9060 Mod	1	AVB
Organic Carbon, Total	BRL	mg/Kg	50	05-07-04 09:28	TOC-0257-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).

Report Notations:

BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

RL Reporting Limit.

1 Instrument ID: Tekmar-Hohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Quality Control Report
Laboratory Control Sample

Category: **Metals**
Matrix: **Soil**
Units: **mg/Kg**

Analysis Method	QC Batch ID	Prep Method	Prepared	Instrument ID	Analyst
EPA 6010B	MB-0344-SL	EPA 3050B	04-23-04 08:00	ICP-1 PE 3000	CRL
EPA 7471A	MP-1581-SL	EPA 7471A	05-04-04 07:30	CVAA-1 PE FIMS	CRL

CAS Number	Analyte	Spiked	Measured	Recovery	QC Limits	Analyzed	Method
7440-36-0	Antimony	76	58	77 %	1-222 %	05-03-04 17:19	EPA 6010B
7440-38-2	Arsenic	140	120	88 %	80-120 %	05-03-04 17:19	EPA 6010B
7440-41-7	Beryllium	67	58	86 %	82-118 %	05-03-04 17:19	EPA 6010B
7440-43-9	Cadmium	250	200	83 %	81-119 %	05-03-04 17:19	EPA 6010B
7440-47-3	Chromium	96	82	86 %	78-122 %	05-03-04 17:19	EPA 6010B
7440-50-8	Copper	66	61	92 %	82-118 %	05-07-04 15:32	EPA 6010B
7439-92-1	Lead	74	65	87 %	81-120 %	05-07-04 15:32	EPA 6010B
7439-97-6	Mercury	4.0	4.2	103 %	68-132 %	05-04-04 12:13	EPA 7471A
7440-02-0	Nickel	73	61	84 %	82-118 %	05-03-04 17:19	EPA 6010B
7782-49-2	Selenium	80	73	91 %	75-125 %	05-03-04 17:19	EPA 6010B
7440-22-4	Silver	130	110	89 %	61-139 %	05-03-04 17:19	EPA 6010B
7440-28-0	Thallium	120	94	78 %	76-124 %	05-03-04 17:19	EPA 6010B
7440-66-6	Zinc	140	120	87 %	79-121 %	05-03-04 17:19	EPA 6010B

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).

Report Notations: All calculations performed prior to rounding. Quality Control Limits are defined by the methodology, or alternatively based upon the historical average recovery plus or minus three standard deviation units.

GROUNDWATER ANALYTICAL

Quality Control Report
Method Blank

Category: **Metals**
Matrix: **Soil**

Analysis Method	QC Batch ID	Prep Method	Prepared	Sample Volume	Instrument ID	Analyst
EPA 6010B	MB-0344-SB	EPA 3050B	04-23-04 08:00	0.5 g	ICP-1 PE 3000	CRL
EPA 7471A	MP-1581-SB	EPA 7471A	05-04-04 07:30	0.6 g	CVAA-1 PE FIMS	CRL

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit	DF	Analyzed	Method
7440-36-0	Antimony	BRL		mg/Kg	1.0	1	05-03-04 17:15	EPA 6010B
7440-38-2	Arsenic	BRL		mg/Kg	5.0	1	05-03-04 17:15	EPA 6010B
7440-41-7	Beryllium	BRL		mg/Kg	0.40	1	05-03-04 17:15	EPA 6010B
7440-43-9	Cadmium	BRL		mg/Kg	0.50	1	05-03-04 17:15	EPA 6010B
7440-47-3	Chromium	BRL		mg/Kg	10	1	05-03-04 17:15	EPA 6010B
7440-50-8	Copper	BRL		mg/Kg	20	1	05-07-04 15:27	EPA 6010B
7439-92-1	Lead	BRL		mg/Kg	10	1	05-07-04 15:28	EPA 6010B
7439-97-6	Mercury	BRL		mg/Kg	0.033	1	05-04-04 12:13	EPA 7471A
7440-02-0	Nickel	BRL		mg/Kg	10	1	05-03-04 17:15	EPA 6010B
7782-49-2	Selenium	BRL		mg/Kg	10	1	05-03-04 17:15	EPA 6010B
7440-22-4	Silver	BRL		mg/Kg	5.0	1	05-03-04 17:15	EPA 6010B
7440-28-0	Thallium	BRL		mg/Kg	5.0	1	05-03-04 17:15	EPA 6010B
7440-66-6	Zinc	BRL		mg/Kg	50	1	05-03-04 17:15	EPA 6010B

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

DF Dilution Factor.

GROUNDWATER ANALYTICAL

Quality Control Report
Laboratory Control Sample

Category: **Metals**
Matrix: **Aqueous**
Units: **mg/L**

Analysis Method	QC Batch ID	Prep Method	Prepared	Instrument ID	Analyst
EPA 6010B	MB-1081-WL	EPA 3010A	05-03-04 10:40	ICP-2 PE 3300	MWR
EPA 7470A	MP-1499-WL	EPA 7470A	05-04-04 10:30	CVAA-1 PE FIMS	CRL

CAS Number	Analyte	Spiked	Measured	Recovery	QC Limits	Analyzed	Method
7440-36-0	Antimony	1.0	0.96	**96 %**	80-120 %	05-04-04 13:59	EPA 6010B
7440-38-2	Arsenic	1.0	0.97	**97 %**	80-120 %	05-04-04 13:59	EPA 6010B
7440-41-7	Beryllium	1.0	0.96	**96 %**	80-120 %	05-04-04 13:58	EPA 6010B
7440-43-9	Cadmium	1.0	0.94	**94 %**	80-120 %	05-04-04 13:59	EPA 6010B
7440-47-3	Chromium	1.0	0.96	**96 %**	80-120 %	05-04-04 13:59	EPA 6010B
7440-50-8	Copper	1.0	1.0	**103 %**	80-120 %	05-05-04 10:40	EPA 6010B
7439-92-1	Lead	1.0	1.0	**102 %**	80-120 %	05-04-04 13:59	EPA 6010B
7439-97-6	Mercury	0.0010	0.0010	**101 %**	80-120 %	05-04-04 14:41	EPA 7470A
7440-02-0	Nickel	1.0	0.96	**96 %**	80-120 %	05-04-04 13:59	EPA 6010B
7782-49-2	Selenium	1.0	0.99	**99 %**	80-120 %	05-04-04 13:59	EPA 6010B
7440-22-4	Silver	1.0	1.0	**101 %**	80-120 %	05-04-04 13:59	EPA 6010B
7440-28-0	Thallium	1.0	0.99	**99 %**	80-120 %	05-04-04 13:59	EPA 6010B
7440-66-6	Zinc	1.0	0.93	**93 %**	80-120 %	05-04-04 13:59	EPA 6010B

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).

Report Notations: All calculations performed prior to rounding. Quality Control Limits are defined by the methodology, or alternatively based upon the historical average recovery plus or minus three standard deviation units.

GROUNDWATER ANALYTICAL

Quality Control Report
Method Blank

Category: Metals
Matrix: Aqueous

Analysis Method	QC Batch ID	Prep Method	Prepared	Sample Volume	Instrument ID	Analyst
EPA 6010B	MB-1081-WB	EPA 3010A	05-03-04 10:40	50 mL	ICP-2 PE 3300	MWR
EPA 7470A	MP-1499-WB	EPA 7470A	05-04-04 10:30	25 mL	CVAA-1 PE FIMS	CRL

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit	DF	Analyzed	Method
7440-36-0	Antimony	BRL		mg/L	0.06	1	05-04-04 13:55	EPA 6010B
7440-38-2	Arsenic	BRL		mg/L	0.01	1	05-04-04 13:55	EPA 6010B
7440-41-7	Beryllium	BRL		mg/L	0.004	1	05-04-04 13:54	EPA 6010B
7440-43-9	Cadmium	BRL		mg/L	0.005	1	05-04-04 13:55	EPA 6010B
7440-47-3	Chromium	BRL		mg/L	0.01	1	05-04-04 13:55	EPA 6010B
7440-50-8	Copper	BRL		mg/L	0.025	1	05-05-04 10:35	EPA 6010B
7439-92-1	Lead	BRL		mg/L	0.005	1	05-04-04 13:55	EPA 6010B
7439-97-6	Mercury	BRL		mg/L	0.0002	1	05-04-04 14:41	EPA 7470A
7440-02-0	Nickel	BRL		mg/L	0.04	1	05-04-04 13:55	EPA 6010B
7782-49-2	Selenium	BRL		mg/L	0.05	1	05-04-04 13:55	EPA 6010B
7440-22-4	Silver	BRL		mg/L	0.007	1	05-04-04 13:55	EPA 6010B
7440-28-0	Thallium	BRL		mg/L	0.02	1	05-04-04 13:55	EPA 6010B
7440-66-6	Zinc	BRL		mg/L	0.2	1	05-04-04 13:55	EPA 6010B

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).

Report Notations:
BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.
DF Dilution Factor.

GROUNDWATER ANALYTICAL

Quality Control Report
Laboratory Control Sample

Category:	EPA Method 8270C PAHs	Instrument ID:	MS-3 HP 5890
QC Batch ID:	SV-1440-P	Extracted:	05-04-04 16:30
Matrix:	Soil	Cleaned Up:	05-07-04 11:30
Units:	ug/Kg	Analyzed:	05-08-04 12:53
		Analyst:	JJT

CAS Number	Analyte	Spiked	Measured	Recovery	QC Limits
91-20-3	Naphthalene	3,300	2,400	71 %	40 - 140 %
91-57-6	2-Methylnaphthalene	3,300	2,700	80 %	40 - 140 %
208-96-8	Acenaphthylene	3,300	2,900	86 %	40 - 140 %
83-32-9	Acenaphthene	3,300	2,700	82 %	40 - 140 %
86-73-7	Fluorene	3,300	2,800	83 %	40 - 140 %
85-01-8	Phenanthrene	3,300	2,800	85 %	40 - 140 %
120-12-7	Anthracene	3,300	2,900	88 %	40 - 140 %
206-44-0	Fluoranthene	3,300	2,900	88 %	40 - 140 %
129-00-0	Pyrene	3,300	2,900	86 %	40 - 140 %
56-55-3	Benzo[a]anthracene	3,300	2,900	86 %	40 - 140 %
218-01-9	Chrysene	3,300	2,800	85 %	40 - 140 %
205-99-2	Benzo[b]fluoranthene	3,300	2,800	85 %	40 - 140 %
207-08-9	Benzo[k]fluoranthene	3,300	2,900	87 %	40 - 140 %
50-32-8	Benzo[a]pyrene	3,300	3,100	92 %	40 - 140 %
193-39-5	Indeno[1,2,3-c,d]pyrene	3,300	3,100	92 %	40 - 140 %
53-70-3	Dibenzo[a,h]anthracene	3,300	3,200	97 %	40 - 140 %
191-24-2	Benzo[g,h,i]perylene	3,300	3,000	89 %	40 - 140 %

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Nitrobenzene-d5	6,700	4,400	66 %	30 - 130 %
2-Fluorobiphenyl	6,700	5,000	75 %	30 - 130 %
Terphenyl-d14	6,700	5,200	77 %	30 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample extraction performed Sample extraction performed by EPA Method 3545. Cleanup performed by EPA Method 3630C.

Report Notations: All calculations performed prior to rounding. Quality Control Limits are defined by the methodology, or alternatively based upon the historical average recovery plus or minus three standard deviation units.

GROUNDWATER ANALYTICAL

Quality Control Report
Method Blank

Category: **EPA Method 8270C PAHs**
QC Batch ID: **SV-1440-P**
Matrix: **Soil**

Instrument ID: **MS-3 HP 5890**
Extracted: **05-04-04 16:30**
Cleaned Up: **05-07-04 11:30**
Analyzed: **05-08-04 12:14**
Analyst: **JJT**

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
91-20-3	Naphthalene	BRL		ug/Kg	330
91-57-6	2-Methylnaphthalene	BRL		ug/Kg	330
208-96-8	Acenaphthylene	BRL		ug/Kg	330
83-32-9	Acenaphthene	BRL		ug/Kg	330
86-73-7	Fluorene	BRL		ug/Kg	330
85-01-8	Phenanthrene	BRL		ug/Kg	330
120-12-7	Anthracene	BRL		ug/Kg	330
206-44-0	Fluoranthene	BRL		ug/Kg	330
129-00-0	Pyrene	BRL		ug/Kg	330
56-55-3	Benzo[a]anthracene	BRL		ug/Kg	330
218-01-9	Chrysene	BRL		ug/Kg	330
205-99-2	Benzo[b]fluoranthene	BRL		ug/Kg	330
207-08-9	Benzo[k]fluoranthene	BRL		ug/Kg	330
50-32-8	Benzo[a]pyrene	BRL		ug/Kg	330
193-39-5	Indeno[1,2,3-c,d]pyrene	BRL		ug/Kg	330
53-70-3	Dibenzo[a,h]anthracene	BRL		ug/Kg	330
191-24-2	Benzo[g,h,i]perylene	BRL		ug/Kg	330

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Nitrobenzene-d5	6,700	4,600	69 %	30 - 130 %
2-Fluorobiphenyl	6,700	5,000	76 %	30 - 130 %
Terphenyl-d14	6,700	5,100	76 %	30 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample extraction performed Sample extraction performed by EPA Method 3545. Cleanup performed by EPA Method 3630C.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

GROUNDWATER ANALYTICAL

Quality Control Report
Laboratory Control Sample

Category:	EPA Method 8270C	Instrument ID:	MS-6 HP 6890
QC Batch ID:	SV-1490-F	Extracted:	05-06-04 13:00
Matrix:	Aqueous	Analyzed:	05-11-04 21:53
Units:	ug/L	Analyst:	JJT

CAS Number	Analyte	Spiked	Measured	Recovery	QC Limits
62-75-9	N-Nitrosodimethylamine	50	31	61 %	40 - 140 %
110-86-1	Pyridine	50	30	61 %	40 - 140 %
108-95-2	Phenol	50	22	44 %	30 - 130 %
62-53-3	Aniline	50	54	108 %	40 - 140 %
111-44-4	Bis(2-chloroethyl) ether	50	35	70 %	40 - 140 %
95-57-8	2-Chlorophenol	50	36	72 %	30 - 130 %
541-73-1	1,3-Dichlorobenzene	50	36	72 %	40 - 140 %
106-46-7	1,4-Dichlorobenzene	50	36	72 %	40 - 140 %
100-51-6	Benzyl Alcohol	50	37	74 %	40 - 140 %
95-50-1	1,2-Dichlorobenzene	50	34	68 %	40 - 140 %
95-48-7	2-Methylphenol	50	39	78 %	30 - 130 %
108-60-1	Bis(2-chloroisopropyl) ether	50	37	73 %	40 - 140 %
106-44-5	4-Methylphenol	50	37	74 %	30 - 130 %
621-64-7	N-Nitrosodi-n-propylamine	50	39	79 %	40 - 140 %
98-86-2	Acetophenone	50	39	78 %	40 - 140 %
67-72-1	Hexachloroethane	50	36	73 %	40 - 140 %
98-95-3	Nitrobenzene	50	40	80 %	40 - 140 %
78-59-1	Isophorone	50	39	78 %	40 - 140 %
88-75-5	2-Nitrophenol	50	37	74 %	30 - 130 %
105-67-9	2,4-Dimethylphenol	50	45	89 %	30 - 130 %
111-91-1	Bis(2-chloroethoxy) methane	50	38	75 %	40 - 140 %
120-83-2	2,4-Dichlorophenol	50	40	80 %	30 - 130 %
120-82-1	1,2,4-Trichlorobenzene	50	37	73 %	40 - 140 %
91-20-3	Naphthalene	50	35	69 %	40 - 140 %
106-47-8	4-Chloroaniline	50	46	92 %	40 - 140 %
87-68-3	Hexachlorobutadiene	50	38	76 %	40 - 140 %
59-50-7	4-Chloro-3-methylphenol	50	41	81 %	30 - 130 %
91-57-6	2-Methylnaphthalene	50	39	78 %	40 - 140 %
77-47-4	Hexachlorocyclopentadiene	50	37	74 %	40 - 140 %
88-06-2	2,4,6-Trichlorophenol	50	41	82 %	30 - 130 %
95-95-4	2,4,5-Trichlorophenol	50	44	88 %	30 - 130 %
91-58-7	2-Chloronaphthalene	50	37	74 %	40 - 140 %
88-74-4	2-Nitroaniline	50	42	83 %	40 - 140 %
100-25-4	1,4-Dinitrobenzene	50	42	84 %	40 - 140 %
131-11-3	Dimethyl phthalate	50	37	74 %	40 - 140 %
99-65-0	1,3-Dinitrobenzene	50	40	80 %	40 - 140 %
208-96-8	Acenaphthylene	50	39	78 %	40 - 140 %
606-20-2	2,6-Dinitrotoluene	50	43	86 %	40 - 140 %
528-29-0	1,2-Dinitrobenzene	50	48	95 %	40 - 140 %
99-09-2	3-Nitroaniline	50	50	99 %	40 - 140 %
83-32-9	Acenaphthene	50	38	76 %	40 - 140 %
51-28-5	2,4-Dinitrophenol	50	42	85 %	30 - 130 %
100-02-7	4-Nitrophenol	50	28	56 %	30 - 130 %
132-64-9	Dibenzofuran	50	38	77 %	40 - 140 %
121-14-2	2,4-Dinitrotoluene	50	41	83 %	40 - 140 %
84-66-2	Diethyl phthalate	50	40	79 %	40 - 140 %
7005-72-3	4-Chlorophenyl phenyl ether	50	38	77 %	40 - 140 %
86-73-7	Fluorene	50	37	74 %	40 - 140 %
100-01-6	4-Nitroaniline	50	48	96 %	40 - 140 %

GROUNDWATER ANALYTICAL

Quality Control Report
Laboratory Control Sample

Category:	EPA Method 8270C	Instrument ID:	MS-6 HP 6890
QC Batch ID:	SV-1490-F	Extracted:	05-06-04 13:00
Matrix:	Aqueous	Analyzed:	05-11-04 21:53
Units:	ug/L	Analyst:	JJT

CAS Number	Analyte	Spiked	Measured	Recovery	QC Limits
534-52-1	4,6-Dinitro-2-methylphenol	50	39	78 %	30 - 130 %
86-30-6	N-Nitrosodiphenylamine †	50	44	88 %	40 - 140 %
122-66-7	1,2-Diphenylhydrazine ◊	50	44	88 %	40 - 140 %
101-55-3	4-Bromophenyl phenyl ether	50	40	80 %	40 - 140 %
118-74-1	Hexachlorobenzene	50	40	80 %	40 - 140 %
87-86-5	Pentachlorophenol	50	37	75 %	30 - 130 %
85-01-8	Phenanthrene	50	38	76 %	40 - 140 %
120-12-7	Anthracene	50	39	78 %	40 - 140 %
86-74-8	Carbazole	50	34	68 %	40 - 140 %
84-74-2	Di-*n*-butyl phthalate	50	43	86 %	40 - 140 %
206-44-0	Fluoranthene	50	38	77 %	40 - 140 %
129-00-0	Pyrene	50	40	80 %	40 - 140 %
85-68-7	Butyl benzyl phthalate	50	40	80 %	40 - 140 %
91-94-1	3,3'-Dichlorobenzidine	50	69	137 %	40 - 140 %
56-55-3	Benzo[a]anthracene	50	38	77 %	40 - 140 %
218-01-9	Chrysene	50	38	75 %	40 - 140 %
117-81-7	Bis(2-ethylhexyl) phthalate	50	45	89 %	40 - 140 %
117-84-0	Di-*n*-octyl phthalate	50	44	87 %	40 - 140 %
205-99-2	Benzo[b]fluoranthene	50	37	74 %	40 - 140 %
207-08-9	Benzo[k]fluoranthene	50	38	76 %	40 - 140 %
50-32-8	Benzo[a]pyrene	50	41	83 %	40 - 140 %
193-39-5	Indeno[1,2,3-c,d]pyrene	50	39	78 %	40 - 140 %
53-70-3	Dibenzo[a,h]anthracene	50	41	82 %	40 - 140 %
191-24-2	Benzo[g,h,i]perylene	50	40	79 %	40 - 140 %

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
2-Fluorophenol	200	130	66 %	15 - 110 %
Phenol-d5	200	110	54 %	15 - 110 %
Nitrobenzene-d5	100	75	75 %	30 - 130 %
2-Fluorobiphenyl	100	65	65 %	30 - 130 %
2,4,6-Tribromophenol	200	130	64 %	15 - 110 %
Terphenyl-d14	100	71	71 %	30 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample extraction performed by EPA Method 3510C.

Report Notations: All calculations performed prior to rounding. Quality Control Limits are defined by the methodology, or alternatively based upon the historical average recovery plus or minus three standard deviation units.

† Reported as sum of N-Nitrosodiphenylamine and Diphenylamine.

◊ Analyzed as Azobenzene.

GROUNDWATER ANALYTICAL

Quality Control Report
Method Blank

Category: EPA Method 8270C
QC Batch ID: SV-1490-F
Matrix: Aqueous

Instrument ID: MS-6 HP 6890
Extracted: 05-06-04 13:00
Analyzed: 05-11-04 21:14
Analyst: JJT

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
62-75-9	N-Nitrosodimethylamine	BRL		ug/L	5
110-86-1	Pyridine	BRL		ug/L	5
108-95-2	Phenol	BRL		ug/L	5
62-53-3	Aniline	BRL		ug/L	5
111-44-4	Bis(2-chloroethyl) ether	BRL		ug/L	5
95-57-8	2-Chlorophenol	BRL		ug/L	5
541-73-1	1,3-Dichlorobenzene	BRL		ug/L	5
106-46-7	1,4-Dichlorobenzene	BRL		ug/L	5
100-51-6	Benzyl Alcohol	BRL		ug/L	5
95-50-1	1,2-Dichlorobenzene	BRL		ug/L	5
95-48-7	2-Methylphenol	BRL		ug/L	5
108-60-1	Bis(2-chloroisopropyl) ether	BRL		ug/L	5
108-39-4/106-44-5	3 and 4-Methylphenol *	BRL		ug/L	5
621-64-7	N-Nitrosodi-n-propylamine	BRL		ug/L	5
98-86-2	Acetophenone	BRL		ug/L	5
67-72-1	Hexachloroethane	BRL		ug/L	5
98-95-3	Nitrobenzene	BRL		ug/L	5
78-59-1	Isophorone	BRL		ug/L	5
88-75-5	2-Nitrophenol	BRL		ug/L	5
105-67-9	2,4-Dimethylphenol	BRL		ug/L	5
111-91-1	Bis(2-chloroethoxy) methane	BRL		ug/L	5
120-83-2	2,4-Dichlorophenol	BRL		ug/L	5
120-82-1	1,2,4-Trichlorobenzene	BRL		ug/L	5
91-20-3	Naphthalene	BRL		ug/L	5
106-47-8	4-Chloroaniline	BRL		ug/L	5
87-68-3	Hexachlorobutadiene	BRL		ug/L	5
59-50-7	4-Chloro-3-methylphenol	BRL		ug/L	5
91-57-6	2-Methylnaphthalene	BRL		ug/L	5
77-47-4	Hexachlorocyclopentadiene	BRL		ug/L	5
88-06-2	2,4,6-Trichlorophenol	BRL		ug/L	5
95-95-4	2,4,5-Trichlorophenol	BRL		ug/L	5
91-58-7	2-Chloronaphthalene	BRL		ug/L	5
88-74-4	2-Nitroaniline	BRL		ug/L	5
100-25-4	1,4-Dinitrobenzene	BRL		ug/L	5
131-11-3	Dimethyl phthalate	BRL		ug/L	5
99-65-0	1,3-Dinitrobenzene	BRL		ug/L	5
208-96-8	Acenaphthylene	BRL		ug/L	5
606-20-2	2,6-Dinitrotoluene	BRL		ug/L	5
528-29-0	1,2-Dinitrobenzene	BRL		ug/L	5
99-09-2	3-Nitroaniline	BRL		ug/L	5
83-32-9	Acenaphthene	BRL		ug/L	5
51-28-5	2,4-Dinitrophenol	BRL		ug/L	5
100-02-7	4-Nitrophenol	BRL		ug/L	5
132-64-9	Dibenzofuran	BRL		ug/L	5
121-14-2	2,4-Dinitrotoluene	BRL		ug/L	5
84-66-2	Diethyl phthalate	BRL		ug/L	5
7005-72-3	4-Chlorophenyl phenyl ether	BRL		ug/L	5
86-73-7	Fluorene	BRL		ug/L	5
100-01-6	4-Nitroaniline	BRL		ug/L	5

GROUNDWATER ANALYTICAL

Quality Control Report
Method Blank

Category: EPA Method 8270C
QC Batch ID: SV-1490-F
Matrix: Aqueous

Instrument ID: MS-6 HP 6890
Extracted: 05-06-04 13:00
Analyzed: 05-11-04 21:14
Analyst: JJT

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
534-52-1	4,6-Dinitro-2-methylphenol	BRL		ug/L	5
86-30-6	N-Nitrosodiphenylamine †	BRL		ug/L	5
122-66-7	1,2-Diphenylhydrazine ◊	BRL		ug/L	5
101-55-3	4-Bromophenyl phenyl ether	BRL		ug/L	5
118-74-1	Hexachlorobenzene	BRL		ug/L	5
87-86-5	Pentachlorophenol	BRL		ug/L	5
85-01-8	Phenanthrene	BRL		ug/L	5
120-12-7	Anthracene	BRL		ug/L	5
86-74-8	Carbazole	BRL		ug/L	5
84-74-2	Di-*n*-butyl phthalate	BRL		ug/L	5
206-44-0	Fluoranthene	BRL		ug/L	5
129-00-0	Pyrene	BRL		ug/L	5
85-68-7	Butyl benzyl phthalate	BRL		ug/L	5
91-94-1	3,3'-Dichlorobenzidine	BRL		ug/L	5
56-55-3	Benzo[a]anthracene	BRL		ug/L	5
218-01-9	Chrysene	BRL		ug/L	5
117-81-7	Bis(2-ethylhexyl) phthalate	BRL		ug/L	5
117-84-0	Di-*n*-octyl phthalate	BRL		ug/L	5
205-99-2	Benzo[b]fluoranthene	BRL		ug/L	5
207-08-9	Benzo[k]fluoranthene	BRL		ug/L	5
50-32-8	Benzo[a]pyrene	BRL		ug/L	5
193-39-5	Indeno[1,2,3-c,d]pyrene	BRL		ug/L	5
53-70-3	Dibenzo[a,h]anthracene	BRL		ug/L	5
191-24-2	Benzo[g,h,i]perylene	BRL		ug/L	5

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
2-Fluorophenol	200	160	79 %	15 - 110 %
Phenol-d5	200	150	75 %	15 - 110 %
Nitrobenzene-d5	100	80	80 %	30 - 130 %
2-Fluorobiphenyl	100	73	73 %	30 - 130 %
2,4,6-Tribromophenol	200	130	65 %	15 - 110 %
Terphenyl-d14	100	81	81 %	30 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Sample extraction performed by EPA Method 3510C.

Report Notations:
BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.
* Analyzed as 4-Methylphenol.
† Reported as sum of N-Nitrosodiphenylamine and Diphenylamine.
◊ Analyzed as Azobenzene.

GROUNDWATER ANALYTICAL

Certifications and Approvals

Groundwater Analytical maintains environmental laboratory certification in a variety of states. Copies of our current certificates may be obtained from our website:

http://www.groundwateranalytical.com/qualifications.htm

CONNECTICUT, Department of Health Services, PH-0586

Categories: Potable Water, Wastewater, Solid Waste and Soil
http://www.dph.state.ct.us/BRS/Environmental_Lab/OutStateLabList.htm

FLORIDA, Department of Health, Bureau of Laboratories, E87643

Categories: SDWA, CWA, RCRA/CERCLA
http://www.floridadep.org/labs/qa/dohforms.htm

MAINE, Department of Human Services, MA103

Categories: Drinking Water and Wastewater
http://www.state.me.us/dhs/eng/water/Compliance.htm

MASSACHUSETTS, Department of Environmental Protection, M-MA-103

Categories: Potable Water and Non-Potable Water
http://www.state.ma.us/dep/bspt/wes/files/certlabs.pdf

NEW HAMPSHIRE, Department of Environmental Services, 202703

Categories: Drinking Water and Wastewater
http://www.des.state.nh.us/asp/NHELAP/labsview.asp

NEW YORK, Department of Health, 11754

Categories: Potable Water, Non-Potable Water and Solid Waste
http://www.wadsworth.org/labcert/elap/comm.html

PENNSYLVANIA, Department of Environmental Protection, 68-665

Environmental Laboratory Registration (Non-drinking water and Non-wastewater)
http://www.dep.state.pa.us/Labs/Registered/

RHODE ISLAND, Department of Health, 54

Categories: Surface Water, Air, Wastewater, Potable Water, Sewage
http://www.healthri.org/labs/labsCT_MA.htm

U.S. Department of Agriculture, Soil Permit, S-53921

Foreign soil import permit

VERMONT, Department of Environmental Conservation, Water Supply Division

Category: Drinking Water
http://www.vermontdrinkingwater.org/wsops/labtable.PDF

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Buzzards Bay, MA 02532

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GROUNDWATER ANALYTICAL

e-mail

To:	John Burgess	**From:**	e-mail reporting GWA
	CH2M Hill	**Pages:**	46
e-mail:	jburgess@ch2m.com	**Date:**	05/20/2004 04:07:15 PM
Re:	72173	**CC:**	

NOTE

The format or contents of this e-mail transmission may not meet all applicable National Environmental Laboratory Accreditation Conference (NELAC) Standards for data reporting.

- **Comments:** Project Number: 72173

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May 14, 2004

Mr. John Burgess
CH2M Hill
25 New Chardon Street
Suite 500
Boston, MA 02114

LABORATORY REPORT

Project: **Saugus Iron Works/316337.02.02**
Lab ID: **72173**
Received: **04-30-04**

Dear John:

Enclosed are the analytical results for the above referenced project. The project was processed for Standard turnaround.

This letter authorizes the release of the analytical results, and should be considered a part of this report. This report contains a sample receipt report detailing the samples received, a project narrative indicating project changes and non-conformances, a quality control report, and a statement of our state certifications.

The analytical results contained in this report meet all applicable NELAC standards, except as may be specifically noted, or described in the project narrative. This report may only be used or reproduced in its entirety.

I attest under the pains and penalties of perjury that, based upon my inquiry of those individuals immediately responsible for obtaining the information, the material contained in this report is, to the best of my knowledge and belief, accurate and complete.

Should you have any questions concerning this report, please do not hesitate to contact me.

Sincerely,

Jonathan R. Sanford
President

JRS/kal
Enclosures

GROUNDWATER ANALYTICAL

Sample Receipt Report

Project: **Saugus Iron Works/316337.02.02**
Client: **CH2M Hill**
Lab ID: **72173**

Delivery: **GWA Courier**
Airbill: **n/a**
Lab Receipt: **04-30-04**

Temperature: **2.3°C**
Chain of Custody: **Present**
Custody Seal(s): **n/a**

Lab ID	Field ID	Matrix	Sampled	Method	Notes
72173-1	SD20A	Soil	4/30/04 9:01	EPA 6010B/7471A 13 Priority Pollutant Metals EPA 8270C PAHs EPA 9060 Mod Total Organic Carbon	

Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship		
C501589	250 mL Glass	Greenwood	BX11496	None	n/a	n/a	n/a		

Lab ID	Field ID	Matrix	Sampled	Method	Notes
72173-2	SD20B	Soil	4/30/04 9:03	EPA 6010B/7471A 13 Priority Pollutant Metals EPA 8270C PAHs EPA 9060 Mod Total Organic Carbon	

Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship		
C501593	250 mL Glass	Greenwood	BX11496	None	n/a	n/a	n/a		

Lab ID	Field ID	Matrix	Sampled	Method	Notes
72173-3	SD19A	Soil	4/30/04 9:45	EPA 6010B/7471A 13 Priority Pollutant Metals EPA 8270C PAHs EPA 9060 Mod Total Organic Carbon	

Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship		
C501583	250 mL Glass	Greenwood	BX11496	None	n/a	n/a	n/a		

Lab ID	Field ID	Matrix	Sampled	Method	Notes
72173-4	SD19B	Soil	4/30/04 9:47	EPA 6010B/7471A 13 Priority Pollutant Metals EPA 8270C PAHs EPA 9060 Mod Total Organic Carbon	

Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship		
C501591	250 mL Glass	Greenwood	BX11496	None	n/a	n/a	n/a		

Lab ID	Field ID	Matrix	Sampled	Method	Notes
72173-5	SD15A	Soil	4/30/04 11:31	EPA 6010B/7471A 13 Priority Pollutant Metals EPA 8270C PAHs EPA 9060 Mod Total Organic Carbon	

Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship		
C501584	250 mL Glass	Greenwood	BX11496	None	n/a	n/a	n/a		

Lab ID	Field ID	Matrix	Sampled	Method	Notes
72173-6	SD15B	Soil	4/30/04 12:03	EPA 6010B/7471A 13 Priority Pollutant Metals EPA 8270C PAHs EPA 9060 Mod Total Organic Carbon	

Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship		
C501592	250 mL Glass	Greenwood	BX11496	None	n/a	n/a	n/a		

Lab ID	Field ID	Matrix	Sampled	Method	Notes
72173-7	SD15C	Soil	4/30/04 12:01	EPA 6010B/7471A 13 Priority Pollutant Metals EPA 8270C PAHs EPA 9060 Mod Total Organic Carbon	

Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship		
C501588	250 mL Glass	Greenwood	BX11496	None	n/a	n/a	n/a		

GROUNDWATER ANALYTICAL

Sample Receipt Report (Continued)

Project: **Saugus Iron Works/316337.02.02**
Client: **CH2M Hill**
Lab ID: **72173**

Delivery: **GWA Courier**
Airbill: **n/a**
Lab Receipt: **04-30-04**

Temperature: **2.3°C**
Chain of Custody: **Present**
Custody Seal(s): **n/a**

Lab ID	Field ID	Matrix	Sampled	Method	Notes
72173-8	SD17A	Soil	4/30/04 11:45	EPA 6010B/7471A 13 Priority Pollutant Metals EPA 8270C PAHs EPA 9060 Mod Total Organic Carbon	

Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship	
C501587	250 mL Glass	Greenwood	BX11496	None	n/a	n/a	n/a	

Lab ID	Field ID	Matrix	Sampled	Method	Notes
72173-9	SD17B	Soil	4/30/04 12:05	EPA 6010B/7471A 13 Priority Pollutant Metals EPA 8270C PAHs EPA 9060 Mod Total Organic Carbon	

Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship	
C501580	250 mL Glass	Greenwood	BX11496	None	n/a	n/a	n/a	

Lab ID	Field ID	Matrix	Sampled	Method	Notes
72173-10	EB05	Aqueous	4/30/04 14:03	EPA 8270C PAHs Low Level SIM	

Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship	
C331445	1 L Amber Glass	Proline	BX10083	None	n/a	n/a	n/a	
C284116	1 L Amber Glass	Proline	BX7946	None	n/a	n/a	n/a	

Lab ID	Field ID	Matrix	Sampled	Method	Notes
72173-11	EB05	Aqueous	4/30/04 14:03	EPA 6010/7470A 13 Priority Pollutant Metals	

Con ID	Container	Vendor	QC Lot	Preserv	QC Lot	Prep	Ship	
C311778	250 mL Plastic	Proline	BX10723	HNO3	R-3884A	02-02-04	n/a	

GROUNDWATER ANALYTICAL

Data Certification

Project: **Saugus Iron Works/316337.02.02**
Client: **CH2M Hill**

Lab ID: **72173**
Received: **04-30-04 19:00**

MA DEP Compendium of Analytical Methods

Project Location: **n/a** MA DEP RTN: **n/a**

This Form provides certifications for the following data set:

EPA 8270C: 72173-01,-02,-03,-04,-05,-06,-07,-08,-09,-10
EPA 6010B: 72173-01,-02,-03,-04,-05,-06,-07,-08,-09,-11,-11
EPA 7470A/1A: 72173-01,-02,-03,-04,-05,-06,-07,-08,-09,-11,-11

Sample Matrices:	Groundwater (X)	Soil/Sediment (X)	Drinking Water ( )	Other ( )	
MA DEP Compendium of Analytical Methods Used (check all that apply)	8260B ( )	8151A ( )	8330 ( )	6010B (X)	7470A/1A (X)
	8270C (X)	8081A ( )	VPH ( )	6020 ( )	9012A[2] ( )
	8082 ( )	8021B ( )	EPH ( )	7000 S[3] ( )	Other ( )

1: Laboratory Standard Operating Procedure(s) (SOP) Number(s):
2: SW-846 Method 9012A Cyanide by Flow Injection (FIA) Amperometric Gas Diffusion (Cyanide/SPC) Method
3: SW-846 Methods 7000 Series: List individual method and analyte

An affirmative response to questions A, B, C and D is required for "Presumptive Certainty" status.

A.	Were all samples received by the laboratory in a condition consistent with that described on the Chain-of-Custody documentation for the data set?	Yes
B.	Were all QA/QC procedures required for the specified analytical method(s) included in this report followed, including the requirement to note and discuss in a narrative QC data that did not meet appropriate performance standards or guidelines?	Yes
C.	Does the analytical data included in this report meet all the requirements for "Presumptive Certainty," as described in Section 2.0 of the MA DEP document CAM VII A, *Quality Assurance and Quality Control Guidelines for the Acquisition and Reporting of Analytical Data*?	Yes
D.	VPH and EPH methods only: Was the VPH or EPH method run without significant modifications, as specified in Section 11.3?	n/a

A response to questions E and F below is required for "Presumptive Certainty" status.

E.	Were all QC performance standards and recommendations for the specified methods achieved?	Yes
F.	Were results for all analyte-list compounds/elements for the specified method(s) reported?	No

All No answers are addressed in the attached Project Narrative.

I, the undersigned, attest under the pains and penalties of perjury that, based upon my personal inquiry of those responsible for obtaining the information, the material contained in this analytical report is, to the best of my knowledge and belief, accurate and complete.

Signature: Jonathan R. Sanford
Printed Name: Jonathan R. Sanford
Position: President
Date: 05-14-04

GROUNDWATER ANALYTICAL

EPA Method 8270C
Polynuclear Aromatic Hydrocarbons by GC/MS

Field ID:	SD20A	Matrix:	Soil
Project:	Saugus Iron Works/316337.02.02	Container:	250 mL Glass
Client:	CH2M Hill	Preservation:	Cool
Laboratory ID:	72173-01	QC Batch ID:	SV-1440-P
Sampled:	04-30-04 09:01	Instrument ID:	MS-3 HP 5890
Received:	04-30-04 19:00	Sample Weight:	16 g
Extracted:	05-04-04 16:30	Final Volume:	1 mL
Cleaned Up:	05-07-04 11:30	Percent Solids:	40
Analyzed:	05-10-04 18:56	Dilution Factor:	1
Analyst:	JJT		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
91-20-3	Naphthalene	BRL		ug/Kg	790
91-57-6	2-Methylnaphthalene	BRL		ug/Kg	790
208-96-8	Acenaphthylene	BRL		ug/Kg	790
83-32-9	Acenaphthene	BRL		ug/Kg	790
86-73-7	Fluorene	BRL		ug/Kg	790
85-01-8	Phenanthrene	BRL		ug/Kg	790
120-12-7	Anthracene	BRL		ug/Kg	790
206-44-0	Fluoranthene	1,400		ug/Kg	790
129-00-0	Pyrene	1,200		ug/Kg	790
56-55-3	Benzo[a]anthracene	BRL		ug/Kg	790
218-01-9	Chrysene	BRL		ug/Kg	790
205-99-2	Benzo[b]fluoranthene	1,000		ug/Kg	790
207-08-9	Benzo[k]fluoranthene	BRL		ug/Kg	790
50-32-8	Benzo[a]pyrene	BRL		ug/Kg	790
193-39-5	Indeno[1,2,3-c,d]pyrene	BRL		ug/Kg	790
53-70-3	Dibenzo[a,h]anthracene	BRL		ug/Kg	790
191-24-2	Benzo[g,h,i]perylene	BRL		ug/Kg	790

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Nitrobenzene-d5	16,000	10,000	65 %	30 - 130 %
2-Fluorobiphenyl	16,000	11,000	70 %	30 - 130 %
Terphenyl-d14	16,000	11,000	70 %	30 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample extraction performed by EPA Method 3545. Cleanup performed by EPA Method 3630C. Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8270C
Polynuclear Aromatic Hydrocarbons by GC/MS

Field ID:	SD20B	Matrix:	Soil
Project:	Saugus Iron Works/316337.02.02	Container:	250 mL Glass
Client:	CH2M Hill	Preservation:	Cool
Laboratory ID:	72173-02	QC Batch ID:	SV-1440-P
Sampled:	04-30-04 09:03	Instrument ID:	MS-3 HP 5890
Received:	04-30-04 19:00	Sample Weight:	15 g
Extracted:	05-04-04 16:30	Final Volume:	1 mL
Cleaned Up:	05-07-04 11:30	Percent Solids:	52
Analyzed:	05-10-04 19:36	Dilution Factor:	1
Analyst:	JJT		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
91-20-3	Naphthalene	BRL		ug/Kg	620
91-57-6	2-Methylnaphthalene	BRL		ug/Kg	620
208-96-8	Acenaphthylene	BRL		ug/Kg	620
83-32-9	Acenaphthene	BRL		ug/Kg	620
86-73-7	Fluorene	BRL		ug/Kg	620
85-01-8	Phenanthrene	BRL		ug/Kg	620
120-12-7	Anthracene	BRL		ug/Kg	620
206-44-0	Fluoranthene	BRL		ug/Kg	620
129-00-0	Pyrene	BRL		ug/Kg	620
56-55-3	Benzo[a]anthracene	BRL		ug/Kg	620
218-01-9	Chrysene	BRL		ug/Kg	620
205-99-2	Benzo[b]fluoranthene	BRL		ug/Kg	620
207-08-9	Benzo[k]fluoranthene	BRL		ug/Kg	620
50-32-8	Benzo[a]pyrene	BRL		ug/Kg	620
193-39-5	Indeno[1,2,3-c,d]pyrene	BRL		ug/Kg	620
53-70-3	Dibenzo[a,h]anthracene	BRL		ug/Kg	620
191-24-2	Benzo[g,h,i]perylene	BRL		ug/Kg	620

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Nitrobenzene-d5	13,000	8,500	67 %	30 - 130 %
2-Fluorobiphenyl	13,000	8,500	67 %	30 - 130 %
Terphenyl-d14	13,000	9,600	77 %	30 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample extraction performed by EPA Method 3545. Cleanup performed by EPA Method 3630C. Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8270C
Polynuclear Aromatic Hydrocarbons by GC/MS

Field ID:	SD19A	Matrix:	Soil
Project:	Saugus Iron Works/316337.02.02	Container:	250 mL Glass
Client:	CH2M Hill	Preservation:	Cool
Laboratory ID:	72173-03	QC Batch ID:	SV-1440-P
Sampled:	04-30-04 09:45	Instrument ID:	MS-3 HP 5890
Received:	04-30-04 19:00	Sample Weight:	16 g
Extracted:	05-04-04 16:30	Final Volume:	1 mL
Cleaned Up:	05-07-04 11:30	Percent Solids:	45
Analyzed:	05-10-04 20:15	Dilution Factor:	1
Analyst:	JJT		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
91-20-3	Naphthalene	BRL		ug/Kg	710
91-57-6	2-Methylnaphthalene	BRL		ug/Kg	710
208-96-8	Acenaphthylene	BRL		ug/Kg	710
83-32-9	Acenaphthene	BRL		ug/Kg	710
86-73-7	Fluorene	BRL		ug/Kg	710
85-01-8	Phenanthrene	BRL		ug/Kg	710
120-12-7	Anthracene	BRL		ug/Kg	710
206-44-0	Fluoranthene	850		ug/Kg	710
129-00-0	Pyrene	720		ug/Kg	710
56-55-3	Benzo[a]anthracene	BRL		ug/Kg	710
218-01-9	Chrysene	BRL		ug/Kg	710
205-99-2	Benzo[b]fluoranthene	BRL		ug/Kg	710
207-08-9	Benzo[k]fluoranthene	BRL		ug/Kg	710
50-32-8	Benzo[a]pyrene	BRL		ug/Kg	710
193-39-5	Indeno[1,2,3-c,d]pyrene	BRL		ug/Kg	710
53-70-3	Dibenzo[a,h]anthracene	BRL		ug/Kg	710
191-24-2	Benzo[g,h,i]perylene	BRL		ug/Kg	710

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Nitrobenzene-d5	14,000	9,200	64 %	30 - 130 %
2-Fluorobiphenyl	14,000	8,500	59 %	30 - 130 %
Terphenyl-d14	14,000	8,900	62 %	30 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample extraction performed by EPA Method 3545. Cleanup performed by EPA Method 3630C. Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8270C
Polynuclear Aromatic Hydrocarbons by GC/MS

Field ID:	**SD19B**	Matrix:	**Soil**
Project:	**Saugus Iron Works/316337.02.02**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72173-04**	QC Batch ID:	**SV-1440-P**
Sampled:	**04-30-04 09:47**	Instrument ID:	**MS-3 HP 5890**
Received:	**04-30-04 19:00**	Sample Weight:	**16 g**
Extracted:	**05-04-04 16:30**	Final Volume:	**1 mL**
Cleaned Up:	**05-07-04 11:30**	Percent Solids:	**85**
Analyzed:	**05-10-04 20:55**	Dilution Factor:	**1**
Analyst:	**JJT**		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
91-20-3	Naphthalene	BRL		ug/Kg	370
91-57-6	2-Methylnaphthalene	BRL		ug/Kg	370
208-96-8	Acenaphthylene	BRL		ug/Kg	370
83-32-9	Acenaphthene	BRL		ug/Kg	370
86-73-7	Fluorene	BRL		ug/Kg	370
85-01-8	Phenanthrene	BRL		ug/Kg	370
120-12-7	Anthracene	BRL		ug/Kg	370
206-44-0	Fluoranthene	BRL		ug/Kg	370
129-00-0	Pyrene	BRL		ug/Kg	370
56-55-3	Benzo[a]anthracene	BRL		ug/Kg	370
218-01-9	Chrysene	BRL		ug/Kg	370
205-99-2	Benzo[b]fluoranthene	BRL		ug/Kg	370
207-08-9	Benzo[k]fluoranthene	BRL		ug/Kg	370
50-32-8	Benzo[a]pyrene	BRL		ug/Kg	370
193-39-5	Indeno[1,2,3-c,d]pyrene	BRL		ug/Kg	370
53-70-3	Dibenzo[a,h]anthracene	BRL		ug/Kg	370
191-24-2	Benzo[g,h,i]perylene	BRL		ug/Kg	370

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Nitrobenzene-d5	7,500	5,300	71 %	30 - 130 %
2-Fluorobiphenyl	7,500	5,500	73 %	30 - 130 %
Terphenyl-d14	7,500	5,700	76 %	30 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample extraction performed by EPA Method 3545. Cleanup performed by EPA Method 3630C. Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8270C
Polynuclear Aromatic Hydrocarbons by GC/MS

Field ID:	SD15A	Matrix:	Soil
Project:	Saugus Iron Works/316337.02.02	Container:	250 mL Glass
Client:	CH2M Hill	Preservation:	Cool
Laboratory ID:	72173-05	QC Batch ID:	SV-1440-P
Sampled:	04-30-04 11:31	Instrument ID:	MS-3 HP 5890
Received:	04-30-04 19:00	Sample Weight:	16 g
Extracted:	05-04-04 16:30	Final Volume:	1 mL
Cleaned Up:	05-07-04 11:30	Percent Solids:	22
Analyzed:	05-10-04 21:34	Dilution Factor:	1
Analyst:	JJT		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
91-20-3	Naphthalene	BRL		ug/Kg	1,400
91-57-6	2-Methylnaphthalene	BRL		ug/Kg	1,400
208-96-8	Acenaphthylene	BRL		ug/Kg	1,400
83-32-9	Acenaphthene	BRL		ug/Kg	1,400
86-73-7	Fluorene	BRL		ug/Kg	1,400
85-01-8	Phenanthrene	BRL		ug/Kg	1,400
120-12-7	Anthracene	BRL		ug/Kg	1,400
206-44-0	Fluoranthene	BRL		ug/Kg	1,400
129-00-0	Pyrene	BRL		ug/Kg	1,400
56-55-3	Benzo[a]anthracene	BRL		ug/Kg	1,400
218-01-9	Chrysene	BRL		ug/Kg	1,400
205-99-2	Benzo[b]fluoranthene	BRL		ug/Kg	1,400
207-08-9	Benzo[k]fluoranthene	BRL		ug/Kg	1,400
50-32-8	Benzo[a]pyrene	BRL		ug/Kg	1,400
193-39-5	Indeno[1,2,3-c,d]pyrene	BRL		ug/Kg	1,400
53-70-3	Dibenzo[a,h]anthracene	BRL		ug/Kg	1,400
191-24-2	Benzo[g,h,i]perylene	BRL		ug/Kg	1,400

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Nitrobenzene-d5	28,000	17,000	61 %	30 - 130 %
2-Fluorobiphenyl	28,000	19,000	67 %	30 - 130 %
Terphenyl-d14	28,000	18,000	65 %	30 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample extraction performed by EPA Method 3545. Cleanup performed by EPA Method 3630C. Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8270C
Polynuclear Aromatic Hydrocarbons by GC/MS

Field ID:	**SD15B**	Matrix:	**Soil**
Project:	**Saugus Iron Works/316337.02.02**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72173-06**	QC Batch ID:	**SV-1440-P**
Sampled:	**04-30-04 12:03**	Instrument ID:	**MS-3 HP 5890**
Received:	**04-30-04 19:00**	Sample Weight:	**15 g**
Extracted:	**05-04-04 16:30**	Final Volume:	**1 mL**
Cleaned Up:	**05-07-04 11:30**	Percent Solids:	**24**
Analyzed:	**05-10-04 22:13**	Dilution Factor:	**1**
Analyst:	**JJT**		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
91-20-3	Naphthalene	BRL		ug/Kg	1,400
91-57-6	2-Methylnaphthalene	BRL		ug/Kg	1,400
208-96-8	Acenaphthylene	BRL		ug/Kg	1,400
83-32-9	Acenaphthene	BRL		ug/Kg	1,400
86-73-7	Fluorene	BRL		ug/Kg	1,400
85-01-8	Phenanthrene	BRL		ug/Kg	1,400
120-12-7	Anthracene	BRL		ug/Kg	1,400
206-44-0	Fluoranthene	BRL		ug/Kg	1,400
129-00-0	Pyrene	BRL		ug/Kg	1,400
56-55-3	Benzo[a]anthracene	BRL		ug/Kg	1,400
218-01-9	Chrysene	BRL		ug/Kg	1,400
205-99-2	Benzo[b]fluoranthene	BRL		ug/Kg	1,400
207-08-9	Benzo[k]fluoranthene	BRL		ug/Kg	1,400
50-32-8	Benzo[a]pyrene	BRL		ug/Kg	1,400
193-39-5	Indeno[1,2,3-c,d]pyrene	BRL		ug/Kg	1,400
53-70-3	Dibenzo[a,h]anthracene	BRL		ug/Kg	1,400
191-24-2	Benzo[g,h,i]perylene	BRL		ug/Kg	1,400

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Nitrobenzene-d5	27,000	13,000	**47 %**	30 - 130 %
2-Fluorobiphenyl	27,000	14,000	**51 %**	30 - 130 %
Terphenyl-d14	27,000	18,000	**66 %**	30 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample extraction performed by EPA Method 3545. Cleanup performed by EPA Method 3630C. Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8270C
Polynuclear Aromatic Hydrocarbons by GC/MS

Field ID:	SD15C	Matrix:	Soil
Project:	Saugus Iron Works/316337.02.02	Container:	250 mL Glass
Client:	CH2M Hill	Preservation:	Cool
Laboratory ID:	72173-07	QC Batch ID:	SV-1440-P
Sampled:	04-30-04 12:01	Instrument ID:	MS-3 HP 5890
Received:	04-30-04 19:00	Sample Weight:	15 g
Extracted:	05-04-04 16:30	Final Volume:	1 mL
Cleaned Up:	05-07-04 11:30	Percent Solids:	48
Analyzed:	05-10-04 22:53	Dilution Factor:	1
Analyst:	JJT		

CAS Number	Analyte	Concentration	Note	Units	Reporting Limit
91-20-3	Naphthalene	BRL		ug/Kg	680
91-57-6	2-Methylnaphthalene	BRL		ug/Kg	680
208-96-8	Acenaphthylene	BRL		ug/Kg	680
83-32-9	Acenaphthene	BRL		ug/Kg	680
86-73-7	Fluorene	BRL		ug/Kg	680
85-01-8	Phenanthrene	BRL		ug/Kg	680
120-12-7	Anthracene	BRL		ug/Kg	680
206-44-0	Fluoranthene	BRL		ug/Kg	680
129-00-0	Pyrene	BRL		ug/Kg	680
56-55-3	Benzo[a]anthracene	BRL		ug/Kg	680
218-01-9	Chrysene	BRL		ug/Kg	680
205-99-2	Benzo[b]fluoranthene	BRL		ug/Kg	680
207-08-9	Benzo[k]fluoranthene	BRL		ug/Kg	680
50-32-8	Benzo[a]pyrene	BRL		ug/Kg	680
193-39-5	Indeno[1,2,3-c,d]pyrene	BRL		ug/Kg	680
53-70-3	Dibenzo[a,h]anthracene	BRL		ug/Kg	680
191-24-2	Benzo[g,h,i]perylene	BRL		ug/Kg	680

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Nitrobenzene-d5	14,000	8,300	61 %	30 - 130 %
2-Fluorobiphenyl	14,000	8,100	59 %	30 - 130 %
Terphenyl-d14	14,000	9,100	67 %	30 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample extraction performed by EPA Method 3545. Cleanup performed by EPA Method 3630C. Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8270C
Polynuclear Aromatic Hydrocarbons by GC/MS

Field ID:	**SD17A**	Matrix:	**Soil**
Project:	**Saugus Iron Works/316337.02.02**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72173-08**	QC Batch ID:	**SV-1440-P**
Sampled:	**04-30-04 11:45**	Instrument ID:	**MS-3 HP 5890**
Received:	**04-30-04 19:00**	Sample Weight:	**16 g**
Extracted:	**05-04-04 16:30**	Final Volume:	**1 mL**
Cleaned Up:	**05-07-04 11:30**	Percent Solids:	**17**
Analyzed:	**05-10-04 23:32**	Dilution Factor:	**1**
Analyst:	**JJT**		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
91-20-3	Naphthalene	BRL		ug/Kg	1,900
91-57-6	2-Methylnaphthalene	BRL		ug/Kg	1,900
208-96-8	Acenaphthylene	BRL		ug/Kg	1,900
83-32-9	Acenaphthene	BRL		ug/Kg	1,900
86-73-7	Fluorene	BRL		ug/Kg	1,900
85-01-8	Phenanthrene	BRL		ug/Kg	1,900
120-12-7	Anthracene	BRL		ug/Kg	1,900
206-44-0	Fluoranthene	BRL		ug/Kg	1,900
129-00-0	Pyrene	BRL		ug/Kg	1,900
56-55-3	Benzo[a]anthracene	BRL		ug/Kg	1,900
218-01-9	Chrysene	BRL		ug/Kg	1,900
205-99-2	Benzo[b]fluoranthene	BRL		ug/Kg	1,900
207-08-9	Benzo[k]fluoranthene	BRL		ug/Kg	1,900
50-32-8	Benzo[a]pyrene	BRL		ug/Kg	1,900
193-39-5	Indeno[1,2,3-c,d]pyrene	BRL		ug/Kg	1,900
53-70-3	Dibenzo[a,h]anthracene	BRL		ug/Kg	1,900
191-24-2	Benzo[g,h,i]perylene	BRL		ug/Kg	1,900

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Nitrobenzene-d5	38,000	22,000	57 %	30 - 130 %
2-Fluorobiphenyl	38,000	25,000	67 %	30 - 130 %
Terphenyl-d14	38,000	27,000	71 %	30 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample extraction performed by EPA Method 3545. Cleanup performed by EPA Method 3630C. Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8270C
Polynuclear Aromatic Hydrocarbons by GC/MS

Field ID:	**SD17B**	Matrix:	**Soil**
Project:	**Saugus Iron Works/316337.02.02**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72173-09**	QC Batch ID:	**SV-1440-P**
Sampled:	**04-30-04 12:05**	Instrument ID:	**MS-3 HP 5890**
Received:	**04-30-04 19:00**	Sample Weight:	**15 g**
Extracted:	**05-04-04 16:30**	Final Volume:	**1 mL**
Cleaned Up:	**05-07-04 11:30**	Percent Solids:	**20**
Analyzed:	**05-11-04 00:11**	Dilution Factor:	**1**
Analyst:	**JJT**		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
91-20-3	Naphthalene	BRL		ug/Kg	1,600
91-57-6	2-Methylnaphthalene	BRL		ug/Kg	1,600
208-96-8	Acenaphthylene	BRL		ug/Kg	1,600
83-32-9	Acenaphthene	BRL		ug/Kg	1,600
86-73-7	Fluorene	BRL		ug/Kg	1,600
85-01-8	Phenanthrene	BRL		ug/Kg	1,600
120-12-7	Anthracene	BRL		ug/Kg	1,600
206-44-0	Fluoranthene	BRL		ug/Kg	1,600
129-00-0	Pyrene	BRL		ug/Kg	1,600
56-55-3	Benzo[a]anthracene	BRL		ug/Kg	1,600
218-01-9	Chrysene	BRL		ug/Kg	1,600
205-99-2	Benzo[b]fluoranthene	BRL		ug/Kg	1,600
207-08-9	Benzo[k]fluoranthene	BRL		ug/Kg	1,600
50-32-8	Benzo[a]pyrene	BRL		ug/Kg	1,600
193-39-5	Indeno[1,2,3-c,d]pyrene	BRL		ug/Kg	1,600
53-70-3	Dibenzo[a,h]anthracene	BRL		ug/Kg	1,600
191-24-2	Benzo[g,h,i]perylene	BRL		ug/Kg	1,600

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Nitrobenzene-d5	32,000	17,000	52 %	30 - 130 %
2-Fluorobiphenyl	32,000	17,000	52 %	30 - 130 %
Terphenyl-d14	32,000	19,000	58 %	30 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample extraction performed by EPA Method 3545. Cleanup performed by EPA Method 3630C. Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8270C
Polynuclear Aromatic Hydrocarbons by GC/MS-SIM

Field ID:	**EB05**	Matrix:	**Aqueous**
Project:	**Saugus Iron Works/316337.02.02**	Container:	**1 L Amber Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72173-10**	QC Batch ID:	**SV-1489-F**
Sampled:	**04-30-04 14:03**	Instrument ID:	**MS-6 HP 6890**
Received:	**04-30-04 19:00**	Sample Volume:	**1000 mL**
Extracted:	**05-04-04 11:00**	Final Volume:	**1 mL**
Analyzed:	**05-07-04 00:57**	Dilution Factor:	**1**
Analyst:	**JJT**		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
91-20-3	Naphthalene	BRL		ug/L	0.5
91-57-6	2-Methylnaphthalene	BRL		ug/L	0.5
208-96-8	Acenaphthylene	BRL		ug/L	0.5
83-32-9	Acenaphthene	BRL		ug/L	0.5
86-73-7	Fluorene	BRL		ug/L	0.5
85-01-8	Phenanthrene	BRL		ug/L	0.5
120-12-7	Anthracene	BRL		ug/L	0.5
206-44-0	Fluoranthene	BRL		ug/L	0.5
129-00-0	Pyrene	BRL		ug/L	0.5
56-55-3	Benzo[a]anthracene	BRL		ug/L	0.1
218-01-9	Chrysene	BRL		ug/L	0.1
205-99-2	Benzo[b]fluoranthene	BRL		ug/L	0.1
207-08-9	Benzo[k]fluoranthene	BRL		ug/L	0.1
50-32-8	Benzo[a]pyrene	BRL		ug/L	0.1
193-39-5	Indeno[1,2,3-c,d]pyrene	BRL		ug/L	0.1
53-70-3	Dibenzo[a,h]anthracene	BRL		ug/L	0.1
191-24-2	Benzo[g,h,i]perylene	BRL		ug/L	0.1

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Nitrobenzene-d5	10	9.1	**91 %**	30 - 130 %
2-Fluorobiphenyl	10	6.8	**68 %**	30 - 130 %
Terphenyl-d14	10	8.3	**83 %**	30 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Method modified by use of selected ion monitoring (SIM) in accordance with Section 7.5.5 of the method.
Sample extraction performed by EPA Method 3510C.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

GROUNDWATER ANALYTICAL

Trace Metals

Field ID:	**SD20A**	Matrix:	**Soil**
Project:	**Saugus Iron Works/316337.02.02**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72173-01**	Percent Solids:	**40**
Sampled:	**04-30-04 09:01**		
Received:	**04-30-04 19:00**		

Analysis Method	QC Batch ID	Prep Method	Prepared	Sample Weight	Instrument ID	Analyst
EPA 6010B[1]	MB-0345-S	EPA 3050B	05-03-04 12:15	0.5 g	ICP-1 PE 3000	CRL
EPA 7471A[2]	MP-1581-S	EPA 7471A	05-04-04 07:30	0.6 g	CVAA-1 PE FIMS	CRL

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit	DF	Analyzed	Method
7440-36-0	Antimony, Total	BRL		mg/Kg	2.5	1	05-03-04 19:11	EPA 6010B[1]
7440-38-2	Arsenic, Total	**14**		mg/Kg	2.5	1	05-03-04 19:11	EPA 6010B[1]
7440-41-7	Beryllium, Total	BRL		mg/Kg	0.99	1	05-03-04 19:11	EPA 6010B[1]
7440-43-9	Cadmium, Total	**1.6**		mg/Kg	1.2	1	05-03-04 19:11	EPA 6010B[1]
7440-47-3	Chromium, Total	**69**		mg/Kg	25	1	05-03-04 19:11	EPA 6010B[1]
7440-50-8	Copper, Total	**60**		mg/Kg	49	1	05-07-04 16:39	EPA 6010B[1]
7439-92-1	Lead, Total	**210**		mg/Kg	25	1	05-03-04 19:11	EPA 6010B[1]
7439-97-6	Mercury, Total	**0.42**		mg/Kg	0.081	1	05-04-04 13:05	EPA 7471A[2]
7440-02-0	Nickel, Total	**46**		mg/Kg	25	1	05-03-04 19:11	EPA 6010B[1]
7782-49-2	Selenium, Total	BRL		mg/Kg	49	1	05-03-04 19:11	EPA 6010B[1]
7440-22-4	Silver, Total	BRL		mg/Kg	12	1	05-03-04 19:11	EPA 6010B[1]
7440-28-0	Thallium, Total	BRL		mg/Kg	12	1	05-03-04 19:11	EPA 6010B[1]
7440-66-6	Zinc, Total	**300**		mg/Kg	120	1	05-03-04 19:11	EPA 6010B[1]

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

DF Dilution Factor.

GROUNDWATER ANALYTICAL

Trace Metals

Field ID:	SD20B	Matrix:	Soil
Project:	Saugus Iron Works/316337.02.02	Container:	250 mL Glass
Client:	CH2M Hill	Preservation:	Cool
Laboratory ID:	72173-02	Percent Solids:	52
Sampled:	04-30-04 09:03		
Received:	04-30-04 19:00		

Analysis Method	QC Batch ID	Prep Method	Prepared	Sample Weight	Instrument ID	Analyst
EPA 6010B[1]	MB-0345-S	EPA 3050B	05-03-04 12:15	0.5 g	ICP-1 PE 3000	CRL
EPA 7471A[2]	MP-1581-S	EPA 7471A	05-04-04 07:30	0.6 g	CVAA-1 PE FIMS	CRL

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit	DF	Analyzed	Method
7440-36-0	Antimony, Total	BRL		mg/Kg	1.9	1	05-03-04 19:32	EPA 6010B[1]
7440-38-2	Arsenic, Total	6.1		mg/Kg	1.9	1	05-03-04 19:32	EPA 6010B[1]
7440-41-7	Beryllium, Total	BRL		mg/Kg	0.77	1	05-03-04 19:32	EPA 6010B[1]
7440-43-9	Cadmium, Total	BRL		mg/Kg	0.96	1	05-03-04 19:32	EPA 6010B[1]
7440-47-3	Chromium, Total	42		mg/Kg	19	1	05-03-04 19:32	EPA 6010B[1]
7440-50-8	Copper, Total	BRL		mg/Kg	38	1	05-07-04 16:51	EPA 6010B[1]
7439-92-1	Lead, Total	BRL		mg/Kg	19	1	05-03-04 19:32	EPA 6010B[1]
7439-97-6	Mercury, Total	BRL		mg/Kg	0.063	1	05-04-04 13:08	EPA 7471A[2]
7440-02-0	Nickel, Total	21		mg/Kg	19	1	05-03-04 19:32	EPA 6010B[1]
7782-49-2	Selenium, Total	BRL		mg/Kg	38	1	05-03-04 19:32	EPA 6010B[1]
7440-22-4	Silver, Total	BRL		mg/Kg	9.6	1	05-03-04 19:32	EPA 6010B[1]
7440-28-0	Thallium, Total	BRL		mg/Kg	9.6	1	05-03-04 19:32	EPA 6010B[1]
7440-66-6	Zinc, Total	BRL		mg/Kg	96	1	05-03-04 19:32	EPA 6010B[1]

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:
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DF Dilution Factor.

GROUNDWATER ANALYTICAL

Trace Metals

Field ID:	**SD19A**	Matrix:	**Soil**
Project:	**Saugus Iron Works/316337.02.02**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72173-03**	Percent Solids:	**45**
Sampled:	**04-30-04 09:45**		
Received:	**04-30-04 19:00**		

Analysis Method	QC Batch ID	Prep Method	Prepared	Sample Weight	Instrument ID	Analyst
EPA 6010B[1]	MB-0345-S	EPA 3050B	05-03-04 12:15	0.5 g	ICP-1 PE 3000	CRL
EPA 7471A[2]	MP-1581-S	EPA 7471A	05-04-04 07:30	0.6 g	CVAA-1 PE FIMS	CRL

CAS Number	Analyte	Concentration	Note	Units	Reporting Limit	DF	Analyzed	Method
7440-36-0	Antimony, Total	BRL		mg/Kg	2.1	1	05-03-04 19:36	EPA 6010B[1]
7440-38-2	Arsenic, Total	17		mg/Kg	2.1	1	05-03-04 19:36	EPA 6010B[1]
7440-41-7	Beryllium, Total	BRL		mg/Kg	0.86	1	05-03-04 19:36	EPA 6010B[1]
7440-43-9	Cadmium, Total	1.1		mg/Kg	1.1	1	05-03-04 19:36	EPA 6010B[1]
7440-47-3	Chromium, Total	110		mg/Kg	21	1	05-03-04 19:36	EPA 6010B[1]
7440-50-8	Copper, Total	76		mg/Kg	43	1	05-07-04 16:55	EPA 6010B[1]
7439-92-1	Lead, Total	170		mg/Kg	21	1	05-03-04 19:36	EPA 6010B[1]
7439-97-6	Mercury, Total	0.37		mg/Kg	0.073	1	05-04-04 13:11	EPA 7471A[2]
7440-02-0	Nickel, Total	50		mg/Kg	21	1	05-03-04 19:36	EPA 6010B[1]
7782-49-2	Selenium, Total	BRL		mg/Kg	43	1	05-03-04 19:36	EPA 6010B[1]
7440-22-4	Silver, Total	BRL		mg/Kg	11	1	05-03-04 19:36	EPA 6010B[1]
7440-28-0	Thallium, Total	BRL		mg/Kg	11	1	05-03-04 19:36	EPA 6010B[1]
7440-66-6	Zinc, Total	320		mg/Kg	110	1	05-03-04 19:36	EPA 6010B[1]

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

DF Dilution Factor.

GROUNDWATER ANALYTICAL

Trace Metals

Field ID:	**SD19B**	Matrix:	**Soil**
Project:	**Saugus Iron Works/316337.02.02**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72173-04**	Percent Solids:	**85**
Sampled:	**04-30-04 09:47**		
Received:	**04-30-04 19:00**		

Analysis Method	QC Batch ID	Prep Method	Prepared	Sample Weight	Instrument ID	Analyst
EPA 6010B[1]	MB-0345-S	EPA 3050B	05-03-04 12:15	0.5 g	ICP-1 PE 3000	CRL
EPA 7471A[2]	MP-1581-S	EPA 7471A	05-04-04 07:30	0.6 g	CVAA-1 PE FIMS	CRL

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit	DF	Analyzed	Method
7440-36-0	Antimony, Total	BRL		mg/Kg	1.1	1	05-03-04 19:41	EPA 6010B[1]
7440-38-2	Arsenic, Total	**5.0**		mg/Kg	1.1	1	05-03-04 19:41	EPA 6010B[1]
7440-41-7	Beryllium, Total	BRL		mg/Kg	0.45	1	05-03-04 19:40	EPA 6010B[1]
7440-43-9	Cadmium, Total	BRL		mg/Kg	0.57	1	05-03-04 19:41	EPA 6010B[1]
7440-47-3	Chromium, Total	27		mg/Kg	11	1	05-03-04 19:40	EPA 6010B[1]
7440-50-8	Copper, Total	BRL		mg/Kg	23	1	05-07-04 17:08	EPA 6010B[1]
7439-92-1	Lead, Total	**13**		mg/Kg	11	1	05-07-04 17:09	EPA 6010B[1]
7439-97-6	Mercury, Total	BRL		mg/Kg	0.039	1	05-04-04 13:14	EPA 7471A[2]
7440-02-0	Nickel, Total	**40**		mg/Kg	11	1	05-03-04 19:40	EPA 6010B[1]
7782-49-2	Selenium, Total	BRL		mg/Kg	23	1	05-03-04 19:41	EPA 6010B[1]
7440-22-4	Silver, Total	BRL		mg/Kg	5.7	1	05-03-04 19:40	EPA 6010B[1]
7440-28-0	Thallium, Total	BRL		mg/Kg	5.7	1	05-03-04 19:41	EPA 6010B[1]
7440-66-6	Zinc, Total	BRL		mg/Kg	57	1	05-03-04 19:40	EPA 6010B[1]

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:
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DF Dilution Factor.

GROUNDWATER ANALYTICAL

Trace Metals

Field ID:	**SD15A**	Matrix:	**Soil**
Project:	**Saugus Iron Works/316337.02.02**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72173-05**	Percent Solids:	**22**
Sampled:	**04-30-04 11:31**		
Received:	**04-30-04 19:00**		

Analysis Method	QC Batch ID	Prep Method	Prepared	Sample Weight	Instrument ID	Analyst
EPA 6010B[1]	MB-0345-S	EPA 3050B	05-03-04 12:15	0.5 g	ICP-1 PE 3000	CRL
EPA 7471A[2]	MP-1581-S	EPA 7471A	05-04-04 07:30	0.6 g	CVAA-1 PE FIMS	CRL

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit	DF	Analyzed	Method
7440-36-0	Antimony, Total	BRL		mg/Kg	4.3	1	05-03-04 19:45	EPA 6010B[1]
7440-38-2	Arsenic, Total	**9.6**		mg/Kg	4.3	1	05-03-04 19:45	EPA 6010B[1]
7440-41-7	Beryllium, Total	BRL		mg/Kg	1.7	1	05-03-04 19:44	EPA 6010B[1]
7440-43-9	Cadmium, Total	BRL		mg/Kg	2.2	1	05-03-04 19:45	EPA 6010B[1]
7440-47-3	Chromium, Total	BRL		mg/Kg	43	1	05-03-04 19:44	EPA 6010B[1]
7440-50-8	Copper, Total	BRL		mg/Kg	86	1	05-07-04 17:13	EPA 6010B[1]
7439-92-1	Lead, Total	**95**		mg/Kg	43	1	05-07-04 17:13	EPA 6010B[1]
7439-97-6	Mercury, Total	**0.26**		mg/Kg	0.14	1	05-04-04 13:24	EPA 7471A[2]
7440-02-0	Nickel, Total	BRL		mg/Kg	43	1	05-03-04 19:45	EPA 6010B[1]
7782-49-2	Selenium, Total	BRL		mg/Kg	86	1	05-03-04 19:45	EPA 6010B[1]
7440-22-4	Silver, Total	BRL		mg/Kg	22	1	05-03-04 19:44	EPA 6010B[1]
7440-28-0	Thallium, Total	BRL		mg/Kg	22	1	05-03-04 19:45	EPA 6010B[1]
7440-66-6	Zinc, Total	BRL		mg/Kg	220	1	05-03-04 19:44	EPA 6010B[1]

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

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DF Dilution Factor.

GROUNDWATER ANALYTICAL

Trace Metals

Field ID:	**SD15B**	Matrix:	**Soil**
Project:	**Saugus Iron Works/316337.02.02**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72173-06**	Percent Solids:	**24**
Sampled:	**04-30-04 12:03**		
Received:	**04-30-04 19:00**		

Analysis Method	QC Batch ID	Prep Method	Prepared	Sample Weight	Instrument ID	Analyst
EPA 6010B[1]	MB-0345-S	EPA 3050B	05-03-04 12:15	0.5 g	ICP-1 PE 3000	CRL
EPA 7471A[2]	MP-1581-S	EPA 7471A	05-04-04 07:30	0.6 g	CVAA-1 PE FIMS	CRL

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit	DF	Analyzed	Method
7440-36-0	Antimony, Total	BRL		mg/Kg	4.0	1	05-03-04 19:49	EPA 6010B[1]
7440-38-2	Arsenic, Total	4.0		mg/Kg	4.0	1	05-03-04 19:49	EPA 6010B[1]
7440-41-7	Beryllium, Total	BRL		mg/Kg	1.6	1	05-03-04 19:49	EPA 6010B[1]
7440-43-9	Cadmium, Total	BRL		mg/Kg	2	1	05-03-04 19:49	EPA 6010B[1]
7440-47-3	Chromium, Total	BRL		mg/Kg	40	1	05-03-04 19:49	EPA 6010B[1]
7440-50-8	Copper, Total	BRL		mg/Kg	80	1	05-07-04 17:17	EPA 6010B[1]
7439-92-1	Lead, Total	BRL		mg/Kg	40	1	05-07-04 17:17	EPA 6010B[1]
7439-97-6	Mercury, Total	BRL		mg/Kg	0.13	1	05-04-04 13:27	EPA 7471A[2]
7440-02-0	Nickel, Total	BRL		mg/Kg	40	1	05-03-04 19:49	EPA 6010B[1]
7782-49-2	Selenium, Total	BRL		mg/Kg	80	1	05-03-04 19:49	EPA 6010B[1]
7440-22-4	Silver, Total	BRL		mg/Kg	20	1	05-03-04 19:49	EPA 6010B[1]
7440-28-0	Thallium, Total	BRL		mg/Kg	20	1	05-03-04 19:49	EPA 6010B[1]
7440-66-6	Zinc, Total	BRL		mg/Kg	200	1	05-03-04 19:49	EPA 6010B[1]

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:
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DF Dilution Factor.

GROUNDWATER ANALYTICAL

Trace Metals

Field ID:	**SD15C**	Matrix:	**Soil**
Project:	**Saugus Iron Works/316337.02.02**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72173-07**	Percent Solids:	**48**
Sampled:	**04-30-04 12:01**		
Received:	**04-30-04 19:00**		

Analysis Method	QC Batch ID	Prep Method	Prepared	Sample Weight	Instrument ID	Analyst
EPA 6010B[1]	MB-0345-S	EPA 3050B	05-03-04 12:15	0.5 g	ICP-1 PE 3000	CRL
EPA 7471A[2]	MP-1581-S	EPA 7471A	05-04-04 07:30	0.6 g	CVAA-1 PE FIMS	CRL

CAS Number	Analyte	Concentration	Note	Units	Reporting Limit	DF	Analyzed	Method
7440-36-0	Antimony, Total	BRL		mg/Kg	2.1	1	05-03-04 19:53	EPA 6010B[1]
7440-38-2	Arsenic, Total	4.6		mg/Kg	2.1	1	05-03-04 19:53	EPA 6010B[1]
7440-41-7	Beryllium, Total	BRL		mg/Kg	0.83	1	05-03-04 19:53	EPA 6010B[1]
7440-43-9	Cadmium, Total	BRL		mg/Kg	1	1	05-03-04 19:53	EPA 6010B[1]
7440-47-3	Chromium, Total	34		mg/Kg	21	1	05-03-04 19:53	EPA 6010B[1]
7440-50-8	Copper, Total	BRL		mg/Kg	42	1	05-07-04 17:21	EPA 6010B[1]
7439-92-1	Lead, Total	BRL		mg/Kg	21	1	05-07-04 17:21	EPA 6010B[1]
7439-97-6	Mercury, Total	BRL		mg/Kg	0.068	1	05-04-04 13:30	EPA 7471A[2]
7440-02-0	Nickel, Total	25		mg/Kg	21	1	05-03-04 19:53	EPA 6010B[1]
7782-49-2	Selenium, Total	BRL		mg/Kg	42	1	05-03-04 19:53	EPA 6010B[1]
7440-22-4	Silver, Total	BRL		mg/Kg	10	1	05-03-04 19:53	EPA 6010B[1]
7440-28-0	Thallium, Total	BRL		mg/Kg	10	1	05-03-04 19:53	EPA 6010B[1]
7440-66-6	Zinc, Total	BRL		mg/Kg	100	1	05-03-04 19:53	EPA 6010B[1]

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

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DF Dilution Factor.

GROUNDWATER ANALYTICAL

Trace Metals

Field ID:	SD17A	Matrix:	Soil
Project:	Saugus Iron Works/316337.02.02	Container:	250 mL Glass
Client:	CH2M Hill	Preservation:	Cool
Laboratory ID:	72173-08	Percent Solids:	17
Sampled:	04-30-04 11:45		
Received:	04-30-04 19:00		

Analysis Method	QC Batch ID	Prep Method	Prepared	Sample Weight	Instrument ID	Analyst
EPA 6010B[1]	MB-0345-S	EPA 3050B	05-03-04 12:15	0.5 g	ICP-1 PE 3000	CRL
EPA 7471A[2]	MP-1581-S	EPA 7471A	05-04-04 07:30	0.6 g	CVAA-1 PE FIMS	CRL

CAS Number	Analyte	Concentration	Notes	Units	Dilution Factor	DF	Analyzed	Method
7440-36-0	Antimony, Total	BRL		mg/Kg	5.8	1	05-03-04 19:57	EPA 6010B[1]
7440-38-2	Arsenic, Total	BRL		mg/Kg	5.8	1	05-03-04 19:57	EPA 6010B[1]
7440-41-7	Beryllium, Total	BRL		mg/Kg	2.3	1	05-03-04 19:57	EPA 6010B[1]
7440-43-9	Cadmium, Total	BRL		mg/Kg	2.9	1	05-03-04 19:57	EPA 6010B[1]
7440-47-3	Chromium, Total	BRL		mg/Kg	58	1	05-03-04 19:57	EPA 6010B[1]
7440-50-8	Copper, Total	BRL		mg/Kg	120	1	05-07-04 17:25	EPA 6010B[1]
7439-92-1	Lead, Total	BRL		mg/Kg	58	1	05-07-04 17:26	EPA 6010B[1]
7439-97-6	Mercury, Total	BRL		mg/Kg	0.19	1	05-04-04 13:33	EPA 7471A[2]
7440-02-0	Nickel, Total	BRL		mg/Kg	58	1	05-03-04 19:57	EPA 6010B[1]
7782-49-2	Selenium, Total	BRL		mg/Kg	120	1	05-03-04 19:57	EPA 6010B[1]
7440-22-4	Silver, Total	BRL		mg/Kg	29	1	05-03-04 19:57	EPA 6010B[1]
7440-28-0	Thallium, Total	BRL		mg/Kg	29	1	05-03-04 19:57	EPA 6010B[1]
7440-66-6	Zinc, Total	BRL		mg/Kg	290	1	05-03-04 19:57	EPA 6010B[1]

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:
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DF Dilution Factor.

GROUNDWATER ANALYTICAL

Trace Metals

Field ID:	**SD17B**	Matrix:	**Soil**
Project:	**Saugus Iron Works/316337.02.02**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72173-09**	Percent Solids:	**20**
Sampled:	**04-30-04 12:05**		
Received:	**04-30-04 19:00**		

Analysis Method	QC Batch ID	Prep Method	Prepared	Sample Weight	Instrument ID	Analyst
EPA 6010B[1]	MB-0345-S	EPA 3050B	05-03-04 12:15	0.5 g	ICP-1 PE 3000	CRL
EPA 7471A[2]	MP-1582-S	EPA 7471A	05-04-04 15:30	0.6 g	CVAA-1 PE FIMS	CRL

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit	DF	Analyzed	Method
7440-36-0	Antimony, Total	BRL		mg/Kg	4.7	1	05-03-04 20:09	EPA 6010B[1]
7440-38-2	Arsenic, Total	BRL		mg/Kg	4.7	1	05-03-04 20:09	EPA 6010B[1]
7440-41-7	Beryllium, Total	BRL		mg/Kg	1.9	1	05-03-04 20:09	EPA 6010B[1]
7440-43-9	Cadmium, Total	BRL		mg/Kg	2.4	1	05-03-04 20:09	EPA 6010B[1]
7440-47-3	Chromium, Total	BRL		mg/Kg	47	1	05-03-04 20:09	EPA 6010B[1]
7440-50-8	Copper, Total	BRL		mg/Kg	94	1	05-07-04 17:29	EPA 6010B[1]
7439-92-1	Lead, Total	BRL		mg/Kg	47	1	05-07-04 17:30	EPA 6010B[1]
7439-97-6	Mercury, Total	BRL		mg/Kg	0.16	1	05-05-04 10:33	EPA 7471A[2]
7440-02-0	Nickel, Total	BRL		mg/Kg	47	1	05-07-04 17:30	EPA 6010B[1]
7782-49-2	Selenium, Total	BRL		mg/Kg	94	1	05-03-04 20:09	EPA 6010B[1]
7440-22-4	Silver, Total	BRL		mg/Kg	24	1	05-03-04 20:09	EPA 6010B[1]
7440-28-0	Thallium, Total	BRL		mg/Kg	24	1	05-07-04 17:30	EPA 6010B[1]
7440-66-6	Zinc, Total	BRL		mg/Kg	240	1	05-03-04 20:09	EPA 6010B[1]

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

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DF Dilution Factor.

GROUNDWATER ANALYTICAL

Trace Metals

Field ID:	EB05	Matrix:	Aqueous
Project:	Saugus Iron Works/316337.02.02	Container:	250 mL Plastic
Client:	CH2M Hill	Preservation:	HNO3 / Cool
Laboratory ID:	72173-11	Preserved:	04-30-04 14:03
Sampled:	04-30-04 14:03		
Received:	04-30-04 19:00		

Analysis Method	QC Batch ID	Prep Method	Prepared	Sample Volume	Instrument ID	Analyst
EPA 6010B[1]	MB-1081-W	EPA 3010A	05-03-04 10:40	50 mL	ICP-2 PE 3300	MWR
EPA 7470A[2]	MP-1499-W	EPA 7470A	05-04-04 10:30	25 mL	CVAA-1 PE FIMS	CRL

CAS Number	Analyte	Concentration	Note	Units	Reporting Limit	DF	Analyzed	Method
7440-36-0	Antimony, Total	BRL		mg/L	0.06	1	05-04-04 14:51	EPA 6010B[1]
7440-38-2	Arsenic, Total	BRL		mg/L	0.01	1	05-04-04 14:51	EPA 6010B[1]
7440-41-7	Beryllium, Total	BRL		mg/L	0.004	1	05-04-04 14:50	EPA 6010B[1]
7440-43-9	Cadmium, Total	BRL		mg/L	0.005	1	05-04-04 14:51	EPA 6010B[1]
7440-47-3	Chromium, Total	BRL		mg/L	0.01	1	05-04-04 14:51	EPA 6010B[1]
7440-50-8	Copper, Total	BRL		mg/L	0.025	1	05-04-04 14:51	EPA 6010B[1]
7439-92-1	Lead, Total	BRL		mg/L	0.005	1	05-05-04 11:03	EPA 6010B[1]
7439-97-6	Mercury, Total	BRL		mg/L	0.0002	1	05-04-04 15:04	EPA 7470A[2]
7440-02-0	Nickel, Total	BRL		mg/L	0.04	1	05-04-04 14:51	EPA 6010B[1]
7782-49-2	Selenium, Total	BRL		mg/L	0.05	1	05-04-04 14:51	EPA 6010B[1]
7440-22-4	Silver, Total	BRL		mg/L	0.007	1	05-04-04 14:51	EPA 6010B[1]
7440-28-0	Thallium, Total	BRL		mg/L	0.02	1	05-04-04 14:51	EPA 6010B[1]
7440-66-6	Zinc, Total	BRL		mg/L	0.2	1	05-04-04 14:51	EPA 6010B[1]

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).

Report Notations:
BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.
DF Dilution Factor.

GROUNDWATER ANALYTICAL

Inorganic Chemistry

Field ID: **SD20A**
Project: **Saugus Iron Works/316337.02.02**
Client: **CH2M Hill**

Matrix: **Soil**
Received: **04-30-04 19:00**

Lab ID: **72173-1** Sampled: **04-30-04 09:01** % Solids: **40** Container: **250 mL Glass** Preservation: **Cool**

Analyte	Result	Units	RL	DF	Wt/Vol	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	**430,000**	mg/Kg	70,000	267	0.15 mg	05-07-04 15:18	TOC-0257-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:

BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

RL Reporting Limit.

DF Dilution Factor.

1 Instrument ID: Tekmar-Dohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Inorganic Chemistry

Field ID: **SD20B**
Project: **Saugus Iron Works/316337.02.02**
Client: **CH2M Hill**

Matrix: **Soil**
Received: **04-30-04 19:00**

Lab ID: **72173-2** Sampled: **04-30-04 09:03** % Solids: **52** Container: **250 mL Glass** Preservation: **Cool**

Analyte	Result	Units	RL	DF	Wgt	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	**190,000**	mg/Kg	30,000	133	0.3 mg	05-07-04 15:38	TOC-0257-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:

BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

RL Reporting Limit.

DF Dilution Factor.

1 Instrument ID: Tekmar-Dohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Inorganic Chemistry

Field ID: **SD19A**
Project: **Saugus Iron Works/316337.02.02**
Client: **CH2M Hill**

Matrix: **Soil**
Received: **04-30-04 19:00**

Lab ID: **72173-3** Sampled: **04-30-04 09:45** % Solids: **45** Container: **250 mL Glass** Preservation: **Cool**

Analyte	Result	Units	RL	DF	Weight	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	**340,000**	mg/Kg	30,000	133	0.3 mg	05-07-04 15:56	TOC-0257-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:

BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

RL Reporting Limit.

DF Dilution Factor.

1 Instrument ID: Tekmar-Dohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Inorganic Chemistry

Field ID: **SD19B**
Project: **Saugus Iron Works/316337.02.02**
Client: **CH2M Hill**

Matrix: **Soil**
Received: **04-30-04 19:00**

Lab ID: **72173-4** Sampled: **04-30-04 09:47** % Solids: **85** Container: **250 mL Glass** Preservation: **Cool**

Analyte	Result	Units	RL	DF	Dweight	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	**11,000**	mg/Kg	3,000	21	1.9 mg	05-07-04 16:14	TOC-0257-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:

BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

RL Reporting Limit.

DF Dilution Factor.

1 Instrument ID: Tekmar-Dohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Inorganic Chemistry

Field ID: **SD15A**
Project: **Saugus Iron Works/316337.02.02**
Client: **CH2M Hill**

Matrix: **Soil**
Received: **04-30-04 19:00**

Lab ID: **72173-5** Sampled: **04-30-04 11:31** % Solids: **22** Container: **250 mL Glass** Preservation: **Cool**

Analyte	Result	Units	RL	DF	Prep	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	**520,000**	mg/Kg	60,000	133	0.3 mg	05-07-04 00:00	TOC-0257-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:

BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

RL Reporting Limit.

DF Dilution Factor.

1 Instrument ID: Tekmar-Dohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Inorganic Chemistry

Field ID: **SD15B** Matrix: **Soil**
Project: **Saugus Iron Works/316337.02.02** Received: **04-30-04 19:00**
Client: **CH2M Hill**

Lab ID: **72173-6** Sampled: **04-30-04 12:03** % Solids: **24** Container: **250 mL Glass** Preservation: **Cool**

Analyte	Result	Units	RL	DF	Wet Wt	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	**1,110,000**	mg/Kg	100,000	320	0.13 mg	05-12-04 10:46	TOC-0258-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:

BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

RL Reporting Limit.

DF Dilution Factor.

1 Instrument ID: Tekmar-Dohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Inorganic Chemistry

Field ID: **SD15C**
Project: **Saugus Iron Works/316337.02.02**
Client: **CH2M Hill**

Matrix: **Soil**
Received: **04-30-04 19:00**

Lab ID: **72173-7** Sampled: **04-30-04 12:01** % Solids: **48** Container: **250 mL Glass** Preservation: **Cool**

Analyte	Result	Units	RL	DF	Wt/Vol	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	**400,000**	mg/Kg	60,000	267	0.15 mg	05-12-04 11:22	TOC-0258-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:

BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

RL Reporting Limit.

DF Dilution Factor.

1 Instrument ID: Tekmar-Dohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Inorganic Chemistry

Field ID: **SD17A**
Project: **Saugus Iron Works/316337.02.02**
Client: **CH2M Hill**

Matrix: **Soil**
Received: **04-30-04 19:00**

Lab ID: **72173-8** Sampled: **04-30-04 11:45** % Solids: **17** Container: **250 mL Glass** Preservation: **Cool**

Analyte	Result	Units	RL	DF	Weight	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	**890,000**	mg/Kg	200,000	267	0.15 mg	05-12-04 11:43	TOC-0258-5	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:

BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

RL Reporting Limit.

DF Dilution Factor.

1 Instrument ID: Tekmar-Dohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Inorganic Chemistry

Field ID: **SD17B** Matrix: **Soil**
Project: **Saugus Iron Works/316337.02.02** Received: **04-30-04 19:00**
Client: **CH2M Hill**

Lab ID: **72173-9** Sampled: **04-30-04 12:05** % Solids: **20** Container: **250 mL Glass** Preservation: **Cool**

Analyte	Result	Units	RL	DF	Prep	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	**440,000**	mg/Kg	100,000	267	0.13 mg	05-12-04 12:05	TOC-0258-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:
BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.
RL Reporting Limit.
DF Dilution Factor.
1 Instrument ID: Tekmar-Dohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Project Narrative

Project:	**Saugus Iron Works/316337.02.02**	Lab ID:	**72173**
Client:	**CH2M Hill**	Received:	**04-30-04 19:00**

A. Documentation and Client Communication

The following documentation discrepancies, and client changes or amendments were noted for this project:

1. No documentation discrepancies, changes, or amendments were noted.

B. Method Modifications, Non-Conformances and Observations

The sample(s) in this project were analyzed by the references analytical method(s), and no method modifications, non-conformances or analytical issues were noted, except as indicated below:

1. EPA 8270C Modification: Samples 72173-10. Method modified by use of selected ion monitoring (SIM) in accordance with Section 7.5.5 of the method. GC/MS-SIM was used to achieve low quantification limits necessary for regulatory compliance.

GROUNDWATER ANALYTICAL

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Buzzards Bay, MA 02532
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www.groundwateranalytical.com

CHAIN-OF-CUSTODY RECORD AND WORK ORDER

№ 089370

Project Name: Saugus Iron Works	Firm: CH2M HILL
Project Number: 316337.02.02	Address: 25 New Chardon St., Ste. 500
Sampler Name: CP/RL/JB	City / State / Zip: Boston, MA 02114
Project Manager: John Burgess	Telephone: 617.523.2260

INSTRUCTIONS: Use separate line for each container (except replicates).

TURNAROUND

- ☑ STANDARD (10 Business Days)
- ☐ PRIORITY (5 Business Days)
- ☐ RUSH (RAN- _____)
  (Rush requires Rush Authorization Number)
- ☐ Please Email to: _____
- ☐ Please FAX to: _____

BILLING

- ☐ Purchase Order No.: _____
- ☐ Third Party Billing: _____
- ☐ GWA Quote: _____

ANALYSIS REQUEST

OPTIONS: ☐ TIC Search

VOCs: ☐ 524.2-MTBE

SVOCs: ☐ 524.2-MTBE ☐ 625-MTBE ☐ 8021 ☐ 8011/8021-MTBE ☐ 625

Semivolatiles: ☐ Acid Only ☐ BNA Only ☐ TIC Search ☐ 8270C PAHs only ☐ 8270C Pesticides ☐ 8082 PCBs ☐ 8151A Herbicides ☐ 8011 EDB/DBCP

Pest/Herb/PCBs Extractable Vol.: ☐ 505 ☐ 508 ☐ 531.1 ☐ 515.4 ☐ 504.1 EDB/DBCP

Metals: Specify for Metal Samples ☐ Total ☐ Dissolved ☐ Lead and Copper ☐ 13 Priority Pollutant Metals

RCRA/TCLP: ☐ 8260B TCL-MTBE ☐ 8260B 8H PETROLEUM ☐ 8260B ☐ 8021B Aromatics ☐ 8021B Halocarbons ☐ 8021B ☐ 8270C ☐ Specify:

Petroleum Hydrocarbons: Ext. TPH: ☐ Diesel Range Organics (DRO) ☐ ME (DRO) ☐ GT EPH ☐ MA DEP EPH w/all targets ☐ EPH Carbon Ranges only ☐ EPH w/4 Phcs ☐ Hydrocarbon Fingerprint (8270/8) by ASTM D3328-(40 Med.) ☐ EPH by GC/FID (8015B Mod) Quantitative Only ☐ Gasoline Range Organics (GRO) ☐ ME GRO ☐ MA DEP VPH w/all targets ☐ VPH Carbon ranges only ☐ TPH: IR

Haz. Waste: ☐ TCLP ☐ SPLP ☐ 8 Metals ☐ Ph. only ☐ VOA ☐ Semi VOA ☐ Pesticides ☐ Herbicides ☐ Corrosivity (as pH) ☐ Reactivity ☐ Ignitability (as Flashpoint) ☐ Paint Filter ☐ MA Solid Disposal Criteria: 8260B, TPH by GC, PCBs, 8 Metals, Corrosivity, Ignitability, Reactivity ☐ Metals ☐ Alkalinity ☐ Chloride ☐ Fluoride ☐ Sulfide

General Chemistry: ☐ Dissolved Phosphorus ☐ Ammonia ☐ TKN ☐ Total Phosphorus ☐ Total N (as NO3/NO2/TKN) ☐ Oil & Grease ☐ COD ☐ TOC ☐ BOD ☐ TSS ☐ TS ☐ Alkalinity ☐ Cyanide, Total ☐ Cyanide, Physiologically Available ☐ pH ☐ Dissolved Oxygen ☐ Turbidity ☐ Total Coliform ☐ Fecal Coliform ☐ HPC

Other

Sampling DATE	Sampling TIME	SAMPLE IDENTIFICATION	Matrix	Type	Container(s)	Preservation	Filtered	LABORATORY NUMBER (Lab Use Only)
4/30/04	0901	SD20A	SOIL	COMPOSITE	1	ICE		1
	0903	SD20B	SOIL	COMPOSITE	1	ICE		2
	0945	SD19A	SOIL	COMPOSITE	1	ICE		3
	0947	SD19B	SOIL	COMPOSITE	1	ICE		4
	1131	SD15A	SOIL	COMPOSITE	1	ICE		5
	1203	SD15B	SOIL	COMPOSITE	1	ICE		6
	1201	SD15C	SOIL	COMPOSITE	1	ICE		7
	1145	SD17A	SOIL	COMPOSITE	1	ICE		8
	1205	SD17B	SOIL	COMPOSITE	1	ICE		9
	1403	EB05	OTHER SOLID	GRAB	2	ICE		10
↓	1403	EB05	AQUEOUS	GRAB	1	HCl		11

REMARKS / SPECIAL INSTRUCTIONS

MA DEP MCP Data Enhancement Affirmation

☐ YES ☐ NO MCP Data Certification is required.

☐ YES ☐ NO MCP minimum Field QC requirements have been met for this project.
(Metals, hexavalent chromium and cyanide analyses require one matrix spike per 20 samples)

☐ YES ☐ NO MCP Drinking Water samples required.
(Require collection of contingent duplicate samples. Trip blanks are also required, if VOA samples collected)

Signature: _____

DATA QUALITY OBJECTIVES

Regulatory Program

State	Standard	Deliverables
☐ CT	☑ MCP GW-1/S-1	☐ PWS Form
☐ ME	☐ MCP GW-2/S-2	☐ MWRA
☑ MA	☐ NY STARS	☐ _____
☐ NH	☐ Drinking Water	
☐ NY	☐ Wastewater	
☐ RI	☐ Waste Disposal	
☐ VT	☐ Dredge Material	
☐ ___	☐ _____	

Project Specific QC

Many regulatory programs and EPA methods require project specific QC. Project specific QC includes Sample Duplicates, Matrix Spikes, and/or Matrix Spike Duplicates. Laboratory QC is not project specific unless prearranged. Project specific QC samples are charged on a per sample basis. **Each MS, MSD and Sample Duplicate requires an additional sample aliquot.**

Project Specific QC Required
- ☐ Sample Duplicate
- ☐ Matrix Spike
- ☐ Matrix Spike Duplicate

Selection of QC Sample
- ☐ Please use sample: _____

CHAIN-OF-CUSTODY RECORD

NOTE: All samples submitted subject to Standard Terms and Conditions on reverse hereof.

	Date	Time		
Relinquished by Sampler: [illegible]	4/30/04	1600	Received by: Alan Maddigan	Receipt Temperature: ☐ Ice ☐ Refrigerated 0-6°C Recommended 2.3 °C
Relinquished by: Alan Maddigan	4/30/04	7:00	Received by:	Container Count: 12
Relinquished by:	Date	Time	Received by Laboratory:	Shipping/Airbill Number:

Method of Shipment: ☑ GWA Courier ☐ Express Mail ☐ Federal Express ☐ UPS ☐ Hand ☐ _____

Custody Seal Number:

GROUNDWATER ANALYTICAL

Quality Assurance/Quality Control

A. Program Overview

Groundwater Analytical conducts an active Quality Assurance program to ensure the production of high quality, valid data. This program closely follows the guidance provided by *Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans,* US EPA QAMS-005/80 (1980), and *Test Methods for Evaluating Solid Waste,* US EPA, SW-846, Update III (1996).

Quality Control protocols include written Standard Operating Procedures (SOPs) developed for each analytical method. SOPs are derived from US EPA methodologies and other established references. Standards are prepared from commercially obtained reference materials of certified purity, and documented for traceability.

Quality Assessment protocols for most organic analyses include a minimum of one laboratory control sample, one method blank, one matrix spike sample, and one sample duplicate for each sample preparation batch. All samples, standards, blanks, laboratory control samples, matrix spikes and sample duplicates are spiked with internal standards and surrogate compounds. All instrument sequences begin with an initial calibration verification standard and a blank; and excepting GC/MS sequences, all sequences close with a continuing calibration standard. GC/MS systems are tuned to appropriate ion abundance criteria daily, or for each 12 hour operating period, whichever is more frequent.

Quality Assessment protocols for most inorganic analyses include a minimum of one laboratory control sample, one method blank, one matrix spike sample, and one sample duplicate for each sample preparation batch. Standard curves are derived from one reagent blank and four concentration levels. Curve validity is verified by standard recoveries within plus or minus ten percent of the curve.

B. Definitions

Batches are used as the basic unit for Quality Assessment. A Batch is defined as twenty or fewer samples of the same matrix which are prepared together for the same analysis, using the same lots of reagents and the same techniques or manipulations, all within the same continuum of time, up to but not exceeding 24 hours.

Laboratory Control Samples are used to assess the accuracy of the analytical method. A Laboratory Control Sample consists of reagent water or sodium sulfate spiked with a group of target analytes representative of the method analytes. Accuracy is defined as the degree of agreement of the measured value with the true or expected value. Perent Recoveries for the Laboratory Control Samples are calculated to assess accuracy.

Method Blanks are used to assess the level of contamination present in the analytical system. Method Blanks consist of reagent water or an aliquot of sodium sulfate. Method Blanks are taken through all the appropriate steps of an analytical method. Sample data reported is not corrected for blank contamination.

Surrogate Compounds are used to assess the effectiveness of an analytical method in dealing with each sample matrix. Surrogate Compounds are organic compounds which are similar to the target analytes of interest in chemical behavior, but which are not normally found in environmental samples. Percent Recoveries are calculated for each Surrogate Compound.

GROUNDWATER ANALYTICAL

Quality Control Report
Laboratory Control Sample

Category:	**EPA Method 8270C PAHs**	Instrument ID:	**MS-3 HP 5890**
QC Batch ID:	**SV-1440-P**	Extracted:	**05-04-04 16:30**
Matrix:	**Soil**	Cleaned Up:	**05-07-04 11:30**
Units:	**ug/Kg**	Analyzed:	**05-08-04 12:53**
		Analyst:	**JJT**

CAS Number	Analyte	Spiked	Measured	Recovery	QC Limits
91-20-3	Naphthalene	3,300	2,400	**71 %**	40 - 140 %
91-57-6	2-Methylnaphthalene	3,300	2,700	**80 %**	40 - 140 %
208-96-8	Acenaphthylene	3,300	2,900	**86 %**	40 - 140 %
83-32-9	Acenaphthene	3,300	2,700	**82 %**	40 - 140 %
86-73-7	Fluorene	3,300	2,800	**83 %**	40 - 140 %
85-01-8	Phenanthrene	3,300	2,800	**85 %**	40 - 140 %
120-12-7	Anthracene	3,300	2,900	**88 %**	40 - 140 %
206-44-0	Fluoranthene	3,300	2,900	**88 %**	40 - 140 %
129-00-0	Pyrene	3,300	2,900	**86 %**	40 - 140 %
56-55-3	Benzo[a]anthracene	3,300	2,900	**86 %**	40 - 140 %
218-01-9	Chrysene	3,300	2,800	**85 %**	40 - 140 %
205-99-2	Benzo[b]fluoranthene	3,300	2,800	**85 %**	40 - 140 %
207-08-9	Benzo[k]fluoranthene	3,300	2,900	**87 %**	40 - 140 %
50-32-8	Benzo[a]pyrene	3,300	3,100	**92 %**	40 - 140 %
193-39-5	Indeno[1,2,3-c,d]pyrene	3,300	3,100	**92 %**	40 - 140 %
53-70-3	Dibenzo[a,h]anthracene	3,300	3,200	**97 %**	40 - 140 %
191-24-2	Benzo[g,h,i]perylene	3,300	3,000	**89 %**	40 - 140 %

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Nitrobenzene-d5	6,700	4,400	**66 %**	30 - 130 %
2-Fluorobiphenyl	6,700	5,000	**75 %**	30 - 130 %
Terphenyl-d14	6,700	5,200	**77 %**	30 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample extraction performed Sample extraction performed by EPA Method 3545. Cleanup performed by EPA Method 3630C.

Report Notations: All calculations performed prior to rounding. Quality Control Limits are defined by the methodology, or alternatively based upon the historical average recovery plus or minus three standard deviation units.

GROUNDWATER ANALYTICAL

Quality Control Report
Method Blank

Category: **EPA Method 8270C PAHs**
QC Batch ID: **SV-1440-P**
Matrix: **Soil**

Instrument ID: **MS-3 HP 5890**
Extracted: **05-04-04 16:30**
Cleaned Up: **05-07-04 11:30**
Analyzed: **05-08-04 12:14**
Analyst: **JJT**

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
91-20-3	Naphthalene	BRL		ug/Kg	330
91-57-6	2-Methylnaphthalene	BRL		ug/Kg	330
208-96-8	Acenaphthylene	BRL		ug/Kg	330
83-32-9	Acenaphthene	BRL		ug/Kg	330
86-73-7	Fluorene	BRL		ug/Kg	330
85-01-8	Phenanthrene	BRL		ug/Kg	330
120-12-7	Anthracene	BRL		ug/Kg	330
206-44-0	Fluoranthene	BRL		ug/Kg	330
129-00-0	Pyrene	BRL		ug/Kg	330
56-55-3	Benzo[a]anthracene	BRL		ug/Kg	330
218-01-9	Chrysene	BRL		ug/Kg	330
205-99-2	Benzo[b]fluoranthene	BRL		ug/Kg	330
207-08-9	Benzo[k]fluoranthene	BRL		ug/Kg	330
50-32-8	Benzo[a]pyrene	BRL		ug/Kg	330
193-39-5	Indeno[1,2,3-c,d]pyrene	BRL		ug/Kg	330
53-70-3	Dibenzo[a,h]anthracene	BRL		ug/Kg	330
191-24-2	Benzo[g,h,i]perylene	BRL		ug/Kg	330

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Nitrobenzene-d5	6,700	4,600	69 %	30 - 130 %
2-Fluorobiphenyl	6,700	5,000	76 %	30 - 130 %
Terphenyl-d14	6,700	5,100	76 %	30 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample extraction performed Sample extraction performed by EPA Method 3545. Cleanup performed by EPA Method 3630C.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

GROUNDWATER ANALYTICAL

Quality Control Report
Laboratory Control Sample

Category: **Metals**
Matrix: **Aqueous**
Units: **mg/L**

Analysis Method	QC Batch ID	Prep Method	Prepared	Instrument ID	Analyst
EPA 6010B	MB-1081-WL	EPA 3010A	05-03-04 10:40	ICP-2 PE 3300	MWR
EPA 7470A	MP-1499-WL	EPA 7470A	05-04-04 10:30	CVAA-1 PE FIMS	CRL

CAS Number	Analyte	Spiked	Measured	Recovery	QC Limits	Analyzed	Method
7440-36-0	Antimony	1.0	0.96	**96 %**	80-120 %	05-04-04 13:59	EPA 6010B
7440-38-2	Arsenic	1.0	0.97	**97 %**	80-120 %	05-04-04 13:59	EPA 6010B
7440-41-7	Beryllium	1.0	0.96	**96 %**	80-120 %	05-04-04 13:58	EPA 6010B
7440-43-9	Cadmium	1.0	0.94	**94 %**	80-120 %	05-04-04 13:59	EPA 6010B
7440-47-3	Chromium	1.0	0.96	**96 %**	80-120 %	05-04-04 13:59	EPA 6010B
7440-50-8	Copper	1.0	1.0	**103 %**	80-120 %	05-05-04 10:40	EPA 6010B
7439-92-1	Lead	1.0	1.0	**102 %**	80-120 %	05-04-04 13:59	EPA 6010B
7439-97-6	Mercury	0.0010	0.0010	**101 %**	80-120 %	05-04-04 14:41	EPA 7470A
7440-02-0	Nickel	1.0	1.0	**96 %**	80-120 %	05-04-04 13:59	EPA 6010B
7782-49-2	Selenium	1.0	0.99	**99 %**	80-120 %	05-04-04 13:59	EPA 6010B
7440-22-4	Silver	1.0	1.0	**101 %**	80-120 %	05-04-04 13:59	EPA 6010B
7440-28-0	Thallium	1.0	0.99	**99 %**	80-120 %	05-04-04 13:59	EPA 6010B
7440-66-6	Zinc	1.0	0.9	**93 %**	80-120 %	05-04-04 13:59	EPA 6010B

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).

Report Notations: All calculations performed prior to rounding. Quality Control Limits are defined by the methodology, or alternatively based upon the historical average recovery plus or minus three standard deviation units.

GROUNDWATER ANALYTICAL

Quality Control Report
Method Blank

Category: **Metals**
Matrix: **Aqueous**

Analysis Method	QC Batch ID	Prep Method	Prepared	Sample Volume	Instrument ID	Analyst
EPA 6010B	MB-1081-WB	EPA 3010A	05-03-04 10:40	50 mL	ICP.2 PE 3300	MWR
EPA 7470A	MP-1499-WB	EPA 7470A	05-04-04 10:30	25 mL	CVAA-1 PE FIMS	CRL

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit	DF	Analyzed	Method
7440-36-0	Antimony	BRL		mg/L	0.06	1	05-04-04 13:55	EPA 6010B
7440-38-2	Arsenic	BRL		mg/L	0.01	1	05-04-04 13:55	EPA 6010B
7440-41-7	Beryllium	BRL		mg/L	0.004	1	05-04-04 13:54	EPA 6010B
7440-43-9	Cadmium	BRL		mg/L	0.005	1	05-04-04 13:55	EPA 6010B
7440-47-3	Chromium	BRL		mg/L	0.01	1	05-04-04 13:55	EPA 6010B
7440-50-8	Copper	BRL		mg/L	0.025	1	05-05-04 10:35	EPA 6010B
7439-92-1	Lead	BRL		mg/L	0.005	1	05-04-04 13:55	EPA 6010B
7439-97-6	Mercury	BRL		mg/L	0.0002	1	05-04-04 14:41	EPA 7470A
7440-02-0	Nickel	BRL		mg/L	0.04	1	05-04-04 13:55	EPA 6010B
7782-49-2	Selenium	BRL		mg/L	0.05	1	05-04-04 13:55	EPA 6010B
7440-22-4	Silver	BRL		mg/L	0.007	1	05-04-04 13:55	EPA 6010B
7440-28-0	Thallium	BRL		mg/L	0.02	1	05-04-04 13:55	EPA 6010B
7440-66-6	Zinc	BRL		mg/L	0.2	1	05-04-04 13:55	EPA 6010B

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).

Report Notations:
BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.
DF Dilution Factor.

GROUNDWATER ANALYTICAL

Quality Control Report
Laboratory Control Sample

Category: **Metals**
Matrix: **Soil**
Units: **mg/Kg**

Analysis Method	QC Batch ID	Prep Method	Prepared	Instrument ID	Analyst
EPA 6010B	MB-0345-SL	EPA 3050B	05-03-04 12:15	ICP-1 PE 3000	CRL
EPA 7471A	MP-1581-SL	EPA 7471A	05-04-04 07:30	CVAA-1 PE FIMS	CRL

CAS Number	Analyte	Spiked	Measured	Recovery	QC Limits	Analyzed	Method
7440-36-0	Antimony	76	60	**80 %**	1-222 %	05-07-04 16:35	EPA 6010B
7440-38-2	Arsenic	140	120	**88 %**	80-120 %	05-07-04 16:35	EPA 6010B
7440-41-7	Beryllium	67	61	**92 %**	82-118 %	05-07-04 16:34	EPA 6010B
7440-43-9	Cadmium	250	210	**84 %**	81-119 %	05-07-04 16:34	EPA 6010B
7440-47-3	Chromium	96	86	**90 %**	78-122 %	05-07-04 16:34	EPA 6010B
7440-50-8	Copper	66	53	**80 %**	80-118 %	05-07-04 16:34	EPA 6010B
7439-92-1	Lead	74	62	**84 %**	81-120 %	05-07-04 16:35	EPA 6010B
7439-97-6	Mercury	4.0	4.2	**103 %**	68-132 %	05-04-04 12:13	EPA 7471A
7440-02-0	Nickel	73	63	**87 %**	82-118 %	05-07-04 16:34	EPA 6010B
7782-49-2	Selenium	80	73	**91 %**	75-125 %	05-07-04 16:35	EPA 6010B
7440-22-4	Silver	130	120	**91 %**	61-139 %	05-07-04 16:34	EPA 6010B
7440-28-0	Thallium	120	99	**83 %**	76-124 %	05-07-04 16:35	EPA 6010B
7440-66-6	Zinc	140	120	**85 %**	79-121 %	05-07-04 16:34	EPA 6010B

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).

Report Notations: All calculations performed prior to rounding. Quality Control Limits are defined by the methodology, or alternatively based upon the historical average recovery plus or minus three standard deviation units.

GROUNDWATER ANALYTICAL

Quality Control Report
Method Blank

Category: **Metals**
Matrix: **Soil**

Analysis Method	QC Batch ID	Prep Method	Prepared	Sample Volume	Instrument ID	Analyst
EPA 6010B	MB-0345-SB	EPA 3050B	05-03-04 12:15	0.5 g	ICP-1 PE 3000	CRL
EPA 7471A	MP-1581-SB	EPA 7471A	05-04-04 07:30	0.6 g	CVAA-1 PE FIMS	CRL

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit	DF	Analyzed	Method
7440-36-0	Antimony	BRL		mg/Kg	1	1	05-07-04 16:30	EPA 6010B
7440-38-2	Arsenic	BRL		mg/Kg	5	1	05-07-04 16:30	EPA 6010B
7440-41-7	Beryllium	BRL		mg/Kg	0.4	1	05-07-04 16:30	EPA 6010B
7440-43-9	Cadmium	BRL		mg/Kg	0.5	1	05-07-04 16:30	EPA 6010B
7440-47-3	Chromium	BRL		mg/Kg	10	1	05-07-04 16:30	EPA 6010B
7440-50-8	Copper	BRL		mg/Kg	20	1	05-07-04 16:30	EPA 6010B
7439-92-1	Lead	BRL		mg/Kg	10	1	05-07-04 16:30	EPA 6010B
7439-97-6	Mercury	BRL		mg/Kg	0.033	1	05-04-04 12:13	EPA 7471A
7440-02-0	Nickel	BRL		mg/Kg	10	1	05-07-04 16:30	EPA 6010B
7782-49-2	Selenium	BRL		mg/Kg	10	1	05-07-04 16:30	EPA 6010B
7440-22-4	Silver	BRL		mg/Kg	5	1	05-07-04 16:30	EPA 6010B
7440-28-0	Thallium	BRL		mg/Kg	5	1	05-07-04 16:30	EPA 6010B
7440-66-6	Zinc	BRL		mg/Kg	50	1	05-07-04 16:30	EPA 6010B

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

DF Dilution Factor.

GROUNDWATER ANALYTICAL

Quality Control Report
Laboratory Control Sample

Category: **Inorganic Chemistry**
Matrix: **Soil**

Analyte	Units	Spiked	Measured	Recovery	QC Limits	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	mg/Kg	500	470	94 %	80 - 120 %	05-07-04 09:28	TOC-0257-S	EPA 9060 Mod	1	AVB
Organic Carbon, Total	mg/Kg	500	470	94 %	80 - 120 %	05-12-04 09:48	TOC-0258-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).

Report Notations: All calculations performed prior to rounding. Quality Control Limits are defined by the methodology, or alternatively based upon the historical average recovery plus or minus three standard deviation units.

1 Instrument ID: Tekmar-Hohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Quality Control Report
Method Blank

Category: **Inorganic Chemistry**
Matrix: **Soil**

Analyte	Result	Units	RL	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	BRL	mg/Kg	50	05-07-04 09:28	TOC-0257-S	EPA 9060 Mod	1	AVB
Organic Carbon, Total	BRL	mg/Kg	50	05-12-04 09:48	TOC-0258-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).

Report Notations:
BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.
RL Reporting Limit.
1 Instrument ID: Tekmar-Hohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Certifications and Approvals

Groundwater Analytical maintains environmental laboratory certification in a variety of states. Copies of our current certificates may be obtained from our website:

http://www.groundwateranalytical.com/qualifications.htm

CONNECTICUT, Department of Health Services, PH-0586

Categories: Potable Water, Wastewater, Solid Waste and Soil
http://www.dph.state.ct.us/BRS/Environmental_Lab/OutStateLabList.htm

FLORIDA, Department of Health, Bureau of Laboratories, E87643

Categories: SDWA, CWA, RCRA/CERCLA
http://www.floridadep.org/labs/qa/dohforms.htm

MAINE, Department of Human Services, MA103

Categories: Drinking Water and Wastewater
http://www.state.me.us/dhs/eng/water/Compliance.htm

MASSACHUSETTS, Department of Environmental Protection, M-MA-103

Categories: Potable Water and Non-Potable Water
http://www.state.ma.us/dep/bspt/wes/files/certlabs.pdf

NEW HAMPSHIRE, Department of Environmental Services, 202703

Categories: Drinking Water and Wastewater
http://www.des.state.nh.us/asp/NHELAP/labsview.asp

NEW YORK, Department of Health, 11754

Categories: Potable Water, Non-Potable Water and Solid Waste
http://www.wadsworth.org/labcert/elap/comm.html

PENNSYLVANIA, Department of Environmental Protection, 68-665

Environmental Laboratory Registration (Non-drinking water and Non-wastewater)
http://www.dep.state.pa.us/Labs/Registered/

RHODE ISLAND, Department of Health, 54

Categories: Surface Water, Air, Wastewater, Potable Water, Sewage
http://www.healthri.org/labs/labsCT_MA.htm

U.S. Department of Agriculture, Soil Permit, S-53921

Foreign soil import permit

VERMONT, Department of Environmental Conservation, Water Supply Division

Category: Drinking Water
http://www.vermontdrinkingwater.org/wsops/labtable.PDF

Groundwater Analytical, Inc.
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228 Main Street
Buzzards Bay, MA 02532

Telephone: (508) 759-4441
FAX: (508) 759-4475

GROUNDWATER ANALYTICAL

e-mail

To:	John Burgess	**From:**	e-mail reporting GWA
	CH2M Hill	**Pages:**	23
e-mail:	jburgess@ch2m.com	**Date:**	05/20/2004 04:06:54 PM
Re:	72179	**CC:**	

NOTE

The format or contents of this e-mail transmission may not meet all applicable National Environmental Laboratory Accreditation Conference (NELAC) Standards for data reporting.

- **Comments:** Project Number: 72179

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www.groundwateranalytical.com

May 14, 2004

Mr. John Burgess
CH2M Hill
25 New Chardon Street
Suite 500
Boston, MA 02114

LABORATORY REPORT

Project: **Saugus Iron Works/316337.02.02**
Lab ID: **72179**
Received: **04-30-04**

Dear John:

Enclosed are the analytical results for the above referenced project. The project was processed for Standard turnaround.

This letter authorizes the release of the analytical results, and should be considered a part of this report. This report contains a sample receipt report detailing the samples received, a project narrative indicating project changes and non-conformances, a quality control report, and a statement of our state certifications.

The analytical results contained in this report meet all applicable NELAC standards, except as may be specifically noted, or described in the project narrative. This report may only be used or reproduced in its entirety.

I attest under the pains and penalties of perjury that, based upon my inquiry of those individuals immediately responsible for obtaining the information, the material contained in this report is, to the best of my knowledge and belief, accurate and complete.

Should you have any questions concerning this report, please do not hesitate to contact me.

Sincerely,

Jonathan R. Sanford
President

JRS/kal
Enclosures

GROUNDWATER ANALYTICAL

Sample Receipt Report

Project:	**Saugus Iron Works/316337.02.02**	Delivery:	**GWA Courier**	Temperature:	**2.3'C**
Client:	**CH2M Hill**	Airbill:	**n/a**	Chain of Custody:	**Present**
Lab ID:	**72179**	Lab Receipt:	**04-30-04**	Custody Seal(s):	**n/a**

Lab ID	Field ID		Matrix	Sampled	Method				Notes
72179-1	SD18A		Soil	4/29/04 15:45	EPA 6010B/7471A 13 Priority Pollutant Metals EPA 8270C PAHs EPA 9060 Mod Total Organic Carbon				
Con ID	**Container**	**Vendor**	**QC Lot**	**Preserv**	**QC Lot**	**Prep**	**Ship**		
C501783	250 mL Glass	Greenwood	BX11473	None	n/a	n/a	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
72179-2	SD18B		Soil	4/29/04 15:47	EPA 6010B/7471A 13 Priority Pollutant Metals EPA 8270C PAHs EPA 9060 Mod Total Organic Carbon				
Con ID	**Container**	**Vendor**	**QC Lot**	**Preserv**	**QC Lot**	**Prep**	**Ship**		
C501768	250 mL Glass	Greenwood	BX11473	None	n/a	n/a	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
72179-3	SD18C		Soil	4/29/04 15:49	EPA 6010B/7471A 13 Priority Pollutant Metals EPA 8270C PAHs EPA 9060 Mod Total Organic Carbon				
Con ID	**Container**	**Vendor**	**QC Lot**	**Preserv**	**QC Lot**	**Prep**	**Ship**		
C501776	250 mL Glass	Greenwood	BX11473	None	n/a	n/a	n/a		

GROUNDWATER ANALYTICAL

Data Certification

Project: **Saugus Iron Works/316337.02.02** Lab ID: **72179**
Client: **CH2M Hill** Received: **04-30-04 19:00**

MA DEP Compendium of Analytical Methods

Project Location: **n/a** MA DEP RTN: **n/a**

This Form provides certifications for the following data set:

EPA 8270C: 72179-01,-02,-03
EPA 6010B: 72179-01,-02,-03
EPA 7470A/1A: 72179-01,-02,-03

Sample Matrices:	Groundwater ( )	Soil/Sediment (X)	Drinking Water ( )	Other ( )	
MCP SW-846 Methods Used	8260B ( )	8151A ( )	8330 ( )	6010B (X)	7470A/1A (X)
	8270C (X)	8081A ( )	VPH ( )	6020 ( )	9012A[2] ( )
As specified in MA DEP Compendium of Analytical Methods (check all that apply)	8082 ( )	8021B ( )	EPH ( )	7000 S[3] ( )	Other ( )

1. List Release Tracking Number (RTN), if known.
2. SW-846 Method 9012A (Equivalent to 9014) or MA DEP Physiologically Available Cyanide (PAC) Method
3. S - SW-846 Methods 7000 Series. List individual method and analyte.

An affirmative response to questions A, B, C and D is required for "Presumptive Certainty" status.

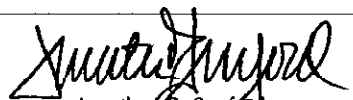
A.	Were all samples received by the laboratory in a condition consistent with that described on the Chain-of-Custody documentation for the data set?	Yes
B.	Were all QA/QC procedures required for the specified analytical method(s) included in this report followed, including the requirement to note and discuss in a narrative QC data that did not meet appropriate performance standards or guidelines?	Yes
C.	Does the analytical data included in this report meet all the requirements for "Presumptive Certainty," as described in Section 2.0 of the MA DEP document CAM VII A, *Quality Assurance and Quality Control Guidelines for the Acquisition and Reporting of Analytical Data*?	Yes
D.	VPH and EPH methods only: Was the VPH or EPH method run without significant modifications, as specified in Section 11.3?	n/a

A response to questions E and F below is required for "Presumptive Certainty" status.

E.	Were all QC performance standards and recommendations for the specified methods achieved?	Yes
F.	Were results for all analyte-list compounds/elements for the specified method(s) reported?	No

All No answers are addressed in the attached Project Narrative.

I, the undersigned, attest under the pains and penalties of perjury that, based upon my personal inquiry of those responsible for obtaining the information, the material contained in this analytical report is, to the best of my knowledge and belief, accurate and complete.

Signature:  Position: President
Printed Name: Jonathan R. Sanford Date: 05-14-04

GROUNDWATER ANALYTICAL

Trace Metals

Field ID:	**SD18A**	Matrix:	**Soil**
Project:	**Saugus Iron Works/316337.02.02**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72179-01**	Percent Solids:	**48**
Sampled:	**04-29-04 15:45**		
Received:	**04-30-04 19:00**		

Analysis Method	QC Batch ID	Prep Method	Prepared	Sample Weight	Instrument ID	Analyst
EPA 6010B[1]	MB-0346-S	EPA 3050B	05-04-04 12:00	0.5 g	ICP-1 PE 3000	CRL
EPA 7471A[2]	MP-1582-S	EPA 7471A	05-04-04 15:30	0.6 g	CVAA-1 PE FIMS	CRL

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit	DF	Analyzed	Method
7440-36-0	Antimony, Total	BRL		mg/Kg	2	1	05-05-04 14:03	EPA 6010B[1]
7440-38-2	Arsenic, Total	**14**		mg/Kg	2	1	05-05-04 14:03	EPA 6010B[1]
7440-41-7	Beryllium, Total	BRL		mg/Kg	0.8	1	05-05-04 14:03	EPA 6010B[1]
7440-43-9	Cadmium, Total	BRL		mg/Kg	1	1	05-05-04 14:03	EPA 6010B[1]
7440-47-3	Chromium, Total	**62**		mg/Kg	20	1	05-05-04 14:03	EPA 6010B[1]
7440-50-8	Copper, Total	**51**		mg/Kg	40	1	05-07-04 17:42	EPA 6010B[1]
7439-92-1	Lead, Total	**150**		mg/Kg	20	1	05-05-04 14:03	EPA 6010B[1]
7439-97-6	Mercury, Total	**0.17**		mg/Kg	0.07	1	05-05-04 10:42	EPA 7471A[2]
7440-02-0	Nickel, Total	**29**		mg/Kg	20	1	05-05-04 14:03	EPA 6010B[1]
7782-49-2	Selenium, Total	BRL		mg/Kg	40	1	05-05-04 14:03	EPA 6010B[1]
7440-22-4	Silver, Total	BRL		mg/Kg	10	1	05-05-04 14:03	EPA 6010B[1]
7440-28-0	Thallium, Total	BRL		mg/Kg	10	1	05-05-04 14:03	EPA 6010B[1]
7440-66-6	Zinc, Total	**150**		mg/Kg	100	1	05-05-04 14:03	EPA 6010B[1]

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:
BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.
DF Dilution Factor.

GROUNDWATER ANALYTICAL

Trace Metals

Field ID:	**SD18B**	Matrix:	**Soil**
Project:	**Saugus Iron Works/316337.02.02**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72179-02**	Percent Solids:	**38**
Sampled:	**04-29-04 15:47**		
Received:	**04-30-04 19:00**		

Analysis Method	QC Batch ID	Prep Method	Prepared	Sample Weight	Instrument ID	Analyst
EPA 6010B[1]	MB-0346-S	EPA 3050B	05-04-04 12:00	0.5 g	ICP-1 PE 3000	CRL
EPA 7471A[2]	MP-1582-S	EPA 7471A	05-04-04 15:30	0.6 g	CVAA-1 PE FIMS	CRL

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit	DF	Analyzed	Method
7440-36-0	Antimony, Total	BRL		mg/Kg	2.7	1	05-05-04 14:07	EPA 6010B[1]
7440-38-2	Arsenic, Total	6.7		mg/Kg	2.7	1	05-05-04 14:07	EPA 6010B[1]
7440-41-7	Beryllium, Total	BRL		mg/Kg	1.1	1	05-05-04 14:07	EPA 6010B[1]
7440-43-9	Cadmium, Total	BRL		mg/Kg	1.3	1	05-05-04 14:07	EPA 6010B[1]
7440-47-3	Chromium, Total	39		mg/Kg	27	1	05-05-04 14:07	EPA 6010B[1]
7440-50-8	Copper, Total	BRL		mg/Kg	53	1	05-07-04 17:54	EPA 6010B[1]
7439-92-1	Lead, Total	BRL		mg/Kg	27	1	05-05-04 14:07	EPA 6010B[1]
7439-97-6	Mercury, Total	0.19		mg/Kg	0.087	1	05-05-04 10:45	EPA 7471A[2]
7440-02-0	Nickel, Total	BRL		mg/Kg	27	1	05-05-04 14:07	EPA 6010B[1]
7782-49-2	Selenium, Total	BRL		mg/Kg	53	1	05-05-04 14:07	EPA 6010B[1]
7440-22-4	Silver, Total	BRL		mg/Kg	13	1	05-05-04 14:07	EPA 6010B[1]
7440-28-0	Thallium, Total	BRL		mg/Kg	13	1	05-05-04 14:07	EPA 6010B[1]
7440-66-6	Zinc, Total	BRL		mg/Kg	130	1	05-05-04 14:07	EPA 6010B[1]

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Results are reported on a dry weight basis.

Report Notations:

BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

DF Dilution Factor.

GROUNDWATER ANALYTICAL

Trace Metals

Field ID:	**SD18C**	Matrix:	**Soil**
Project:	**Saugus Iron Works/316337.02.02**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72179-03**	Percent Solids:	**38**
Sampled:	**04-29-04 15:49**		
Received:	**04-30-04 19:00**		

Analysis Method	QC Batch ID	Prep Method	Prepared	Sample Weight	Instrument ID	Analyst
EPA 6010B[1]	MB-0346-S	EPA 3050B	05-04-04 12:00	0.5 g	ICP-1 PE 3000	CRL
EPA 7471A[2]	MP-1582-S	EPA 7471A	05-04-04 15:30	0.6 g	CVAA-1 PE FIMS	CRL

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit	DF	Analyzed	Method
7440-36-0	Antimony, Total	BRL		mg/Kg	2.6	1	05-05-04 14:11	EPA 6010B[1]
7440-38-2	Arsenic, Total	**6.9**		mg/Kg	2.6	1	05-05-04 14:11	EPA 6010B[1]
7440-41-7	Beryllium, Total	BRL		mg/Kg	1	1	05-05-04 14:11	EPA 6010B[1]
7440-43-9	Cadmium, Total	BRL		mg/Kg	1.3	1	05-05-04 14:11	EPA 6010B[1]
7440-47-3	Chromium, Total	**40**		mg/Kg	26	1	05-05-04 14:11	EPA 6010B[1]
7440-50-8	Copper, Total	BRL		mg/Kg	51	1	05-07-04 17:58	EPA 6010B[1]
7439-92-1	Lead, Total	BRL		mg/Kg	26	1	05-05-04 14:11	EPA 6010B[1]
7439-97-6	Mercury, Total	BRL		mg/Kg	0.086	1	05-05-04 10:49	EPA 7471A[2]
7440-02-0	Nickel, Total	BRL		mg/Kg	26	1	05-05-04 14:11	EPA 6010B[1]
7782-49-2	Selenium, Total	BRL		mg/Kg	51	1	05-05-04 14:11	EPA 6010B[1]
7440-22-4	Silver, Total	BRL		mg/Kg	13	1	05-05-04 14:11	EPA 6010B[1]
7440-28-0	Thallium, Total	BRL		mg/Kg	13	1	05-05-04 14:11	EPA 6010B[1]
7440-66-6	Zinc, Total	BRL		mg/Kg	130	1	05-05-04 14:11	EPA 6010B[1]

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

DF Dilution Factor.

GROUNDWATER ANALYTICAL

EPA Method 8270C
Polynuclear Aromatic Hydrocarbons by GC/MS

Field ID:	SD18A	Matrix:	Soil
Project:	Saugus Iron Works/316337.02.02	Container:	250 mL Glass
Client:	CH2M Hill	Preservation:	Cool
Laboratory ID:	72179-01	QC Batch ID:	SV-1441-P
Sampled:	04-29-04 15:45	Instrument ID:	MS-3 HP 5890
Received:	04-30-04 19:00	Sample Weight:	15 g
Extracted:	05-06-04 08:00	Final Volume:	1 mL
Cleaned Up:	05-06-04 10:30	Percent Solids:	48
Analyzed:	05-11-04 02:48	Dilution Factor:	1
Analyst:	JJT		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
91-20-3	Naphthalene	BRL		ug/Kg	670
91-57-6	2-Methylnaphthalene	BRL		ug/Kg	670
208-96-8	Acenaphthylene	BRL		ug/Kg	670
83-32-9	Acenaphthene	BRL		ug/Kg	670
86-73-7	Fluorene	BRL		ug/Kg	670
85-01-8	Phenanthrene	BRL		ug/Kg	670
120-12-7	Anthracene	BRL		ug/Kg	670
206-44-0	Fluoranthene	BRL		ug/Kg	670
129-00-0	Pyrene	BRL		ug/Kg	670
56-55-3	Benzo[a]anthracene	BRL		ug/Kg	670
218-01-9	Chrysene	BRL		ug/Kg	670
205-99-2	Benzo[b]fluoranthene	BRL		ug/Kg	670
207-08-9	Benzo[k]fluoranthene	BRL		ug/Kg	670
50-32-8	Benzo[a]pyrene	BRL		ug/Kg	670
193-39-5	Indeno[1,2,3-c,d]pyrene	BRL		ug/Kg	670
53-70-3	Dibenzo[a,h]anthracene	BRL		ug/Kg	670
191-24-2	Benzo[g,h,i]perylene	BRL		ug/Kg	670

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Nitrobenzene-d5	14,000	8,800	64 %	30 - 130 %
2-Fluorobiphenyl	14,000	8,800	65 %	30 - 130 %
Terphenyl-d14	14,000	9,400	69 %	30 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample extraction performed by EPA Method 3545. Cleanup performed by EPA Method 3630C. Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8270C
Polynuclear Aromatic Hydrocarbons by GC/MS

Field ID:	**SD18B**	Matrix:	**Soil**
Project:	**Saugus Iron Works/316337.02.02**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72179-02**	QC Batch ID:	**SV-1441-P**
Sampled:	**04-29-04 15:47**	Instrument ID:	**MS-3 HP 5890**
Received:	**04-30-04 19:00**	Sample Weight:	**16 g**
Extracted:	**05-06-04 08:00**	Final Volume:	**1 mL**
Cleaned Up:	**05-06-04 10:30**	Percent Solids:	**38**
Analyzed:	**05-11-04 03:28**	Dilution Factor:	**1**
Analyst:	**JJT**		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
91-20-3	Naphthalene	BRL		ug/Kg	830
91-57-6	2-Methylnaphthalene	BRL		ug/Kg	830
208-96-8	Acenaphthylene	BRL		ug/Kg	830
83-32-9	Acenaphthene	BRL		ug/Kg	830
86-73-7	Fluorene	BRL		ug/Kg	830
85-01-8	Phenanthrene	BRL		ug/Kg	830
120-12-7	Anthracene	BRL		ug/Kg	830
206-44-0	Fluoranthene	BRL		ug/Kg	830
129-00-0	Pyrene	BRL		ug/Kg	830
56-55-3	Benzo[a]anthracene	BRL		ug/Kg	830
218-01-9	Chrysene	BRL		ug/Kg	830
205-99-2	Benzo[b]fluoranthene	BRL		ug/Kg	830
207-08-9	Benzo[k]fluoranthene	BRL		ug/Kg	830
50-32-8	Benzo[a]pyrene	BRL		ug/Kg	830
193-39-5	Indeno[1,2,3-c,d]pyrene	BRL		ug/Kg	830
53-70-3	Dibenzo[a,h]anthracene	BRL		ug/Kg	830
191-24-2	Benzo[g,h,i]perylene	BRL		ug/Kg	830

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Nitrobenzene-d5	17,000	8,900	53 %	30 - 130 %
2-Fluorobiphenyl	17,000	8,600	51 %	30 - 130 %
Terphenyl-d14	17,000	12,000	70 %	30 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample extraction performed by EPA Method 3545. Cleanup performed by EPA Method 3630C. Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8270C
Polynuclear Aromatic Hydrocarbons by GC/MS

Field ID:	SD18C	Matrix:	Soil
Project:	Saugus Iron Works/316337.02.02	Container:	250 mL Glass
Client:	CH2M Hill	Preservation:	Cool
Laboratory ID:	72179-03	QC Batch ID:	SV-1441-P
Sampled:	04-29-04 15:49	Instrument ID:	MS-3 HP 5890
Received:	04-30-04 19:00	Sample Weight:	16 g
Extracted:	05-06-04 08:00	Final Volume:	1 mL
Cleaned Up:	05-06-04 10:30	Percent Solids:	38
Analyzed:	05-11-04 04:46	Dilution Factor:	1
Analyst:	JJT		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
91-20-3	Naphthalene	BRL		ug/Kg	830
91-57-6	2-Methylnaphthalene	BRL		ug/Kg	830
208-96-8	Acenaphthylene	BRL		ug/Kg	830
83-32-9	Acenaphthene	BRL		ug/Kg	830
86-73-7	Fluorene	BRL		ug/Kg	830
85-01-8	Phenanthrene	BRL		ug/Kg	830
120-12-7	Anthracene	BRL		ug/Kg	830
206-44-0	Fluoranthene	BRL		ug/Kg	830
129-00-0	Pyrene	BRL		ug/Kg	830
56-55-3	Benzo[a]anthracene	BRL		ug/Kg	830
218-01-9	Chrysene	BRL		ug/Kg	830
205-99-2	Benzo[b]fluoranthene	BRL		ug/Kg	830
207-08-9	Benzo[k]fluoranthene	BRL		ug/Kg	830
50-32-8	Benzo[a]pyrene	BRL		ug/Kg	830
193-39-5	Indeno[1,2,3-c,d]pyrene	BRL		ug/Kg	830
53-70-3	Dibenzo[a,h]anthracene	BRL		ug/Kg	830
191-24-2	Benzo[g,h,i]perylene	BRL		ug/Kg	830

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Nitrobenzene-d5	17,000	9,500	56 %	30 - 130 %
2-Fluorobiphenyl	17,000	8,400	50 %	30 - 130 %
Terphenyl-d14	17,000	12,000	69 %	30 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample extraction performed by EPA Method 3545. Cleanup performed by EPA Method 3630C. Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

GROUNDWATER ANALYTICAL

Inorganic Chemistry

Field ID: **SD18A**
Project: **Saugus Iron Works/316337.02.02**
Client: **CH2M Hill**

Matrix: **Soil**
Received: **04-30-04 19:00**

Lab ID: **72179-1** Sampled: **04-29-04 15:45** % Solids: **48** Container: **250 mL Glass** Preservation: **Cool**

Analyte	Result	Units	RL	DF	Weight	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	**270,000**	mg/Kg	30,000	160	0.25 mg	05-12-04 12:27	TOC-0258-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:

BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

RL Reporting Limit.

DF Dilution Factor.

1 Instrument ID: Tekmar-Dohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Inorganic Chemistry

Field ID: **SD18B**
Project: **Saugus Iron Works/316337.02.02**
Client: **CH2M Hill**

Matrix: **Soil**
Received: **04-30-04 19:00**

Lab ID: **72179-2** Sampled: **04-29-04 15:47** % Solids: **38** Container: **250 mL Glass** Preservation: **Cool**

Analyte	Result	Units	RL	DF	Weight	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	**200,000**	mg/Kg	30,000	107	0.38 mg	05-12-04 14:04	TOC-0258-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:

BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

RL Reporting Limit.

DF Dilution Factor.

1 Instrument ID: Tekmar-Dohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Inorganic Chemistry

Field ID: **SD18C**
Project: **Saugus Iron Works/316337.02.02**
Client: **CH2M Hill**

Matrix: **Soil**
Received: **04-30-04 19:00**

Lab ID: **72179-3** Sampled: **04-29-04 15:49** % Solids: **38** Container: **250 mL Glass** Preservation: **Cool**

Analyte	Result	Units	RL	DF	Wt/Vol	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	**120,000**	mg/Kg	40,000	145	0.28 mg	05-12-04 14:24	TOC-0258-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:

BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

RL Reporting Limit.

DF Dilution Factor.

1 Instrument ID: Tekmar-Dohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Project Narrative

Project:	**Saugus Iron Works/316337.02.02**	Lab ID:	**72179**
Client:	**CH2M Hill**	Received:	**04-30-04 19:00**

A. Documentation and Client Communication

The following documentation discrepancies, and client changes or amendments were noted for this project:

1. No documentation discrepancies, changes, or amendments were noted.

B. Method Modifications, Non-Conformances and Observations

The sample(s) in this project were analyzed by the references analytical method(s), and no method modifications, non-conformances or analytical issues were noted, except as indicated below:

1. No method modifications, non-conformances or analytical issues were noted.

GROUNDWATER ANALYTICAL

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www.groundwateranalytical.com

CHAIN-OF-CUSTODY RECORD AND WORK ORDER

№ 089371

ne:	Firm:
usion works	CH2M HILL
nber:	Address:
337.02.02	25 New Chardon St. Ste. 500
me:	City / State / Zip:
/ CP / TB	Boston, MA 02114
nager:	Telephone:
n Burgess	617 523-2260

TIONS: Use separate line for each container (except replicates).

TURNAROUND

- [x] STANDARD (10 Business Days)
- [ ] PRIORITY (5 Business Days)
- [ ] RUSH (RAN- _____)
  (Rush requires Rush Authorization Number)
- [ ] Please Email to: _____
- [ ] Please FAX to: _____

BILLING

- [ ] Purchase Order No.: _____
- [ ] Third Party Billing: _____
- [ ] GWA Quote: _____

ANALYSIS REQUEST

OPTIONS: Volatiles — ☐ TIC Search; Semivolatiles — ☐ Acid Only ☐ B/N Only ☐ TIC Search; Pest/Herb/PCBs Extractable Vol.; Metals — Specify For Water Samples ☐ Total ☐ Dissolved

EDWIA: ☐ 524.2-MTBE; ☐ 502.2; ☐ 505 ☐ 508; ☐ 551.1; ☐ 515.1; ☐ 504.1 EBD/DBCP; ☐ Lead and Copper

NPDES: ☐ 624; ☐ 602-MTBE; ☐ 601; ☐ 601/602-MTBE; ☐ 625; ☐ 625 PAHs only; ☐ 608 Pesticides; ☐ 608 PCBs; ☐ 615; ☐ 8151A Herbicides; ☐ 8011 EBD/DBCP; ☐ 13 Priority Pollutant; ☐ Lead and Copper

MCP/RCRA: ☐ 8260B TCL-MTBE; ☐ 8260B 16+ PETROLEUM; ☐ 8260B; ☐ 8021B Aromatics; ☐ 8021B Halocarbons; ☐ 8021B; ☐ 8270C; ☐ 8270C PAHs only; ☐ 8081A Pesticides; ☐ 8082 PCBs; ☐ 8151A Herbicides; ☐ 8011 EBD/DBCP; ☐ 8 RCRA; ☐ 9 MCP; ☐ MA List Metals; ☐ 23 TAL; ☐ Specify:

Petroleum Hydrocarbons — Ext. TPH: ☐ TPH-IR; ☐ Diesel Range Organics (DRO); ☐ ME-TPH; ☐ CT ETPH; ☐ MA DEP EPH w/all targets; ☐ EPH Carbon Ranges only; ☐ EPH w/4 PAHs; ☐ Hydrocarbon Fingerprint (GC/FID by ASTM D3328-00 Mod.); ☐ TPH by GC/FID (8015B Mod) Quantitative Only; ☐ Gasoline Range Organics (GRO); ☐ ME GRO; ☐ MA DEP VPH w/all targets; ☐ VPH Carbon ranges only. Vol. TPH: ☐ TCLP; ☐ SPLP; ☐ 8 Metals; ☐ Pb only; ☐ VOA; ☐ Semi VOA; ☐ Pesticides; ☐ Herbicides

Haz. Waste: ☐ Corrosivity (as pH); ☐ Reactivity; ☐ Ignitability (as Flashpoint); ☐ Paint Filter; ☐ Mat Basis Disposal Criteria: 8260B, TPH by GC, PCBs, 9 Metals, Corrosivity, Ignitability, Reactivity

General Chemistry: ☐ Nitrate; ☐ Nitrite; ☐ Chloride; ☐ Fluoride; ☐ Sulfate; ☐ Dissolved Phosphorus; ☐ Ammonia; ☐ TKN; ☐ Total Phosphorus; ☐ Total N (as NO3/NO2/TKN); ☐ Oil & Grease; ☐ COD; ☐ TOC; ☐ BOD; ☐ TSS; ☐ TS; ☐ Alkalinity; ☐ Cyanide, Total; ☐ Cyanide, Physiologically Available; ☐ pH; ☐ Dissolved Oxygen; ☐ Turbidity; ☐ Total Coliform; ☐ Fecal Coliform; ☐ HPC

Other

	SAMPLE IDENTIFICATION	Matrix: GROUNDWATER / DRINKING WATER / WASTEWATER / SOIL / OTHER SOLID / OIL/ORGANIC LIQUID	Type: COMPOSITE / GRAB	Container(s): NUMBER	40mL VOA Vial	60mL/2 oz Glass	120mL/4 oz Amber Glass	250mL/8 oz Glass	500mL/16 oz Glass	1L/32 oz Amber Glass	250mL/8 oz Plastic	500mL/16 oz Plastic	1L/32 oz Plastic	120mL Sterile	Preservation: HCl / HNO3 / H2SO4 / NaOH / Methanol / Sodium Bisulfate / ICE	Filtered: YES / NO	LABORATORY NUMBER (Lab Use Only)
5	SD18A	X	X	1			X								X		72179
7	SD18B	X	X	1			X								X		
9	SD18C	X	X	1			X								X		

KS / SPECIAL INSTRUCTIONS

ata Enhancement Affirmation

MCP Data Certification is required.

MCP minimum Field QC requirements ave been met for this project. Metals, hexavalent chromium and cyanide analyses require one matrix spike per 20 samples)

MCP Drinking Water samples required. Require collection of contiagent duplicate samples. ip blanks are also required, if VOA samples collected)

DATA QUALITY OBJECTIVES

Regulatory Program

State	Standard	Deliverables
☐ CT	☒ MCP GW-1/S-1	☐ PWS Form
☐ ME	☐ MCP GW-2/S-2	☐ MWRA
☒ MA	☐ NY STARS	☐ _____
☐ NH	☐ Drinking Water	
☐ NY	☐ Wastewater	
☐ RI	☐ Waste Disposal	
☐ VT	☐ Dredge Material	
☐ ___	☐ _____	

Project Specific QC

Many regulatory programs and EPA methods require project specific QC. Project specific QC includes Sample Duplicates, Matrix Spikes, and/or Matrix Spike Duplicates. Laboratory QC is not project specific unless prearranged. Project specific QC samples are charged on a per sample basis. **Each MS, MSD and Sample Duplicate requires an additional sample aliquot.**

Project Specific QC Required	Selection of QC Sample
☐ Sample Duplicate	☐ Please use sample
☐ Matrix Spike	_____
☐ Matrix Spike Duplicate	

CHAIN-OF-CUSTODY RECORD

NOTE: All samples submitted subject to Standard Terms and Conditions on reverse hereof.

	Date	Time		
Relinquished by Sampler:	4/30/04	1600	Received by: Alan Maddigan	Receipt Temperature: ☒ Ice ☐ Refrigerated 2.3°C (2-8°C Recommended)
Relinquished by: Alan Maddigan	4/30/04	7:00	Received by:	Container Count: 3
Relinquished by:			Received by Laboratory:	Shipping/Airbill Number:
Method of Shipment: ☒ GWA Courier ☐ Express Mail ☐ Federal Express ☐ UPS ☐ Hand ☐ _____				Custody Seal Number:

GROUNDWATER ANALYTICAL

Quality Assurance/Quality Control

A. Program Overview

Groundwater Analytical conducts an active Quality Assurance program to ensure the production of high quality, valid data. This program closely follows the guidance provided by *Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans,* US EPA QAMS-005/80 (1980), and *Test Methods for Evaluating Solid Waste,* US EPA, SW-846, Update III (1996).

Quality Control protocols include written Standard Operating Procedures (SOPs) developed for each analytical method. SOPs are derived from US EPA methodologies and other established references. Standards are prepared from commercially obtained reference materials of certified purity, and documented for traceability.

Quality Assessment protocols for most organic analyses include a minimum of one laboratory control sample, one method blank, one matrix spike sample, and one sample duplicate for each sample preparation batch. All samples, standards, blanks, laboratory control samples, matrix spikes and sample duplicates are spiked with internal standards and surrogate compounds. All instrument sequences begin with an initial calibration verification standard and a blank; and excepting GC/MS sequences, all sequences close with a continuing calibration standard. GC/MS systems are tuned to appropriate ion abundance criteria daily, or for each 12 hour operating period, whichever is more frequent.

Quality Assessment protocols for most inorganic analyses include a minimum of one laboratory control sample, one method blank, one matrix spike sample, and one sample duplicate for each sample preparation batch. Standard curves are derived from one reagent blank and four concentration levels. Curve validity is verified by standard recoveries within plus or minus ten percent of the curve.

B. Definitions

Batches are used as the basic unit for Quality Assessment. A Batch is defined as twenty or fewer samples of the same matrix which are prepared together for the same analysis, using the same lots of reagents and the same techniques or manipulations, all within the same continuum of time, up to but not exceeding 24 hours.

Laboratory Control Samples are used to assess the accuracy of the analytical method. A Laboratory Control Sample consists of reagent water or sodium sulfate spiked with a group of target analytes representative of the method analytes. Accuracy is defined as the degree of agreement of the measured value with the true or expected value. Perent Recoveries for the Laboratory Control Samples are calculated to assess accuracy.

Method Blanks are used to assess the level of contamination present in the analytical system. Method Blanks consist of reagent water or an aliquot of sodium sulfate. Method Blanks are taken through all the appropriate steps of an analytical method. Sample data reported is not corrected for blank contamination.

Surrogate Compounds are used to assess the effectiveness of an analytical method in dealing with each sample matrix. Surrogate Compounds are organic compounds which are similar to the target analytes of interest in chemical behavior, but which are not normally found in environmental samples. Percent Recoveries are calculated for each Surrogate Compound.

GROUNDWATER ANALYTICAL

Quality Control Report
Laboratory Control Sample

Category: **Metals**
Matrix: **Soil**
Units: **mg/Kg**

Analysis Method	QC Batch ID	Prep Method	Prepared	Instrument ID	Analyst
EPA 6010B	MB-0346-SL	EPA 3050B	05-04-04 12:00	ICP-1 PE 3000	CRL
EPA 7471A	MP-1582-SL	EPA 7471A	05-04-04 15:30	CVAA-1 PE FIMS	CRL

CAS Number	Analyte	Spiked	Measured	Recovery	QC Limits	Analyzed	Method
7440-36-0	Antimony	76	69	**91 %**	1-222 %	05-07-04 17:38	EPA 6010B
7440-38-2	Arsenic	140	130	**99 %**	80-120 %	05-07-04 17:38	EPA 6010B
7440-41-7	Beryllium	67	67	**101 %**	82-118 %	05-07-04 17:38	EPA 6010B
7440-43-9	Cadmium	250	230	**92 %**	81-119 %	05-07-04 17:38	EPA 6010B
7440-47-3	Chromium	96	92	**96 %**	78-122 %	05-07-04 17:38	EPA 6010B
7440-50-8	Copper	66	70	**106 %**	82-118 %	05-07-04 17:38	EPA 6010B
7439-92-1	Lead	74	69	**94 %**	81-120 %	05-07-04 17:38	EPA 6010B
7439-97-6	Mercury	4.0	4.2	**104 %**	68-132 %	05-05-04 10:30	EPA 7471A
7440-02-0	Nickel	73	68	**94 %**	82-118 %	05-07-04 17:38	EPA 6010B
7782-49-2	Selenium	80	82	**102 %**	75-125 %	05-07-04 17:38	EPA 6010B
7440-22-4	Silver	130	130	**99 %**	61-139 %	05-07-04 17:38	EPA 6010B
7440-28-0	Thallium	120	110	**89 %**	76-124 %	05-07-04 17:38	EPA 6010B
7440-66-6	Zinc	140	130	**96 %**	79-121 %	05-07-04 17:38	EPA 6010B

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).

Report Notations: All calculations performed prior to rounding. Quality Control Limits are defined by the methodology, or alternatively based upon the historical average recovery plus or minus three standard deviation units.

GROUNDWATER ANALYTICAL

Quality Control Report
Method Blank

Category: **Metals**
Matrix: **Soil**

Analysis Method	QC Batch ID	Prep Method	Prepared	Sample Volume	Instrument ID	Analyst
EPA 6010B	MB-0346-SB	EPA 3050B	05-04-04 12:00	0.5 g	ICP-1 PE 3000	CRL
EPA 7471A	MP-1582-SB	EPA 7471A	05-04-04 15:30	0.6 g	CVAA-1 PE FIMS	CRL

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit	DF	Analyzed	Method
7440-36-0	Antimony	BRL		mg/Kg	1	1	05-07-04 17:34	EPA 6010B
7440-38-2	Arsenic	BRL		mg/Kg	5	1	05-07-04 17:34	EPA 6010B
7440-41-7	Beryllium	BRL		mg/Kg	0.4	1	05-07-04 17:34	EPA 6010B
7440-43-9	Cadmium	BRL		mg/Kg	0.5	1	05-07-04 17:34	EPA 6010B
7440-47-3	Chromium	BRL		mg/Kg	10	1	05-07-04 17:34	EPA 6010B
7440-50-8	Copper	BRL		mg/Kg	20	1	05-07-04 17:34	EPA 6010B
7439-92-1	Lead	BRL		mg/Kg	10	1	05-05-04 13:42	EPA 6010B
7439-97-6	Mercury	BRL		mg/Kg	0.033	1	05-05-04 10:30	EPA 7471A
7440-02-0	Nickel	BRL		mg/Kg	10	1	05-07-04 17:34	EPA 6010B
7782-49-2	Selenium	BRL		mg/Kg	10	1	05-07-04 17:34	EPA 6010B
7440-22-4	Silver	BRL		mg/Kg	5	1	05-07-04 17:34	EPA 6010B
7440-28-0	Thallium	BRL		mg/Kg	5	1	05-07-04 17:34	EPA 6010B
7440-66-6	Zinc	BRL		mg/Kg	50	1	05-07-04 17:34	EPA 6010B

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).

Report Notations:
BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.
DF Dilution Factor.

GROUNDWATER ANALYTICAL

Quality Control Report
Laboratory Control Sample

Category: **Inorganic Chemistry**
Matrix: **Soil**

Analyte	Units	Spiked	Measured	Recovery	QC Limits	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	mg/Kg	500	470	94 %	80 - 120 %	05-12-04 09:48	TOC-0258-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).

Report Notations: All calculations performed prior to rounding. Quality Control Limits are defined by the methodology, or alternatively based upon the historical average recovery plus or minus three standard deviation units.

1 Instrument ID: Tekmar-Hohmann Apollo 9000

GROUNDWATER ANALYTICAL

Quality Control Report
Method Blank

Category: **Inorganic Chemistry**
Matrix: **Soil**

Analyte	Result	Units	RL	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	BRL	mg/Kg	50	05-12-04 09:48	TOC-0258-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).

Report Notations:

BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

RL Reporting Limit.

1 Instrument ID: Tekmar-Hohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Quality Control Report
Laboratory Control Sample

Category:	**EPA Method 8270C PAHs**	Instrument ID:	**MS-3 HP 5890**
QC Batch ID:	**SV-1441-P**	Extracted:	**05-06-04 08:00**
Matrix:	**Soil**	Cleaned Up:	**05-06-04 10:30**
Units:	**ug/Kg**	Analyzed:	**05-06-04 13:41**
		Analyst:	**JJT**

CAS Number	Analyte	Spiked	Measured	Recovery	QC Limits
91-20-3	Naphthalene	3,300	2,200	**67 %**	40 - 140 %
91-57-6	2-Methylnaphthalene	3,300	2,500	**75 %**	40 - 140 %
208-96-8	Acenaphthylene	3,300	2,600	**78 %**	40 - 140 %
83-32-9	Acenaphthene	3,300	2,500	**75 %**	40 - 140 %
86-73-7	Fluorene	3,300	2,600	**78 %**	40 - 140 %
85-01-8	Phenanthrene	3,300	2,700	**81 %**	40 - 140 %
120-12-7	Anthracene	3,300	2,800	**84 %**	40 - 140 %
206-44-0	Fluoranthene	3,300	2,800	**84 %**	40 - 140 %
129-00-0	Pyrene	3,300	2,800	**84 %**	40 - 140 %
56-55-3	Benzo[a]anthracene	3,300	2,800	**85 %**	40 - 140 %
218-01-9	Chrysene	3,300	2,800	**84 %**	40 - 140 %
205-99-2	Benzo[b]fluoranthene	3,300	2,800	**84 %**	40 - 140 %
207-08-9	Benzo[k]fluoranthene	3,300	2,900	**86 %**	40 - 140 %
50-32-8	Benzo[a]pyrene	3,300	2,900	**88 %**	40 - 140 %
193-39-5	Indeno[1,2,3-c,d]pyrene	3,300	2,800	**83 %**	40 - 140 %
53-70-3	Dibenzo[a,h]anthracene	3,300	2,900	**88 %**	40 - 140 %
191-24-2	Benzo[g,h,i]perylene	3,300	2,800	**83 %**	40 - 140 %

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Nitrobenzene-d5	6,700	3,900	**59 %**	30 - 130 %
2-Fluorobiphenyl	6,700	4,600	**69 %**	30 - 130 %
Terphenyl-d14	6,700	5,200	**78 %**	30 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample extraction performed Sample extraction performed by EPA Method 3545. Cleanup performed by EPA Method 3630C.

Report Notations: All calculations performed prior to rounding. Quality Control Limits are defined by the methodology, or alternatively based upon the historical average recovery plus or minus three standard deviation units.

GROUNDWATER ANALYTICAL

Quality Control Report
Method Blank

Category: **EPA Method 8270C PAHs**
QC Batch ID: **SV-1441-P**
Matrix: **Soil**

Instrument ID: **MS-3 HP 5890**
Extracted: **05-06-04 08:00**
Cleaned Up: **05-06-04 10:30**
Analyzed: **05-06-04 13:01**
Analyst: **JJT**

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
91-20-3	Naphthalene	BRL		ug/Kg	330
91-57-6	2-Methylnaphthalene	BRL		ug/Kg	330
208-96-8	Acenaphthylene	BRL		ug/Kg	330
83-32-9	Acenaphthene	BRL		ug/Kg	330
86-73-7	Fluorene	BRL		ug/Kg	330
85-01-8	Phenanthrene	BRL		ug/Kg	330
120-12-7	Anthracene	BRL		ug/Kg	330
206-44-0	Fluoranthene	BRL		ug/Kg	330
129-00-0	Pyrene	BRL		ug/Kg	330
56-55-3	Benzo[a]anthracene	BRL		ug/Kg	330
218-01-9	Chrysene	BRL		ug/Kg	330
205-99-2	Benzo[b]fluoranthene	BRL		ug/Kg	330
207-08-9	Benzo[k]fluoranthene	BRL		ug/Kg	330
50-32-8	Benzo[a]pyrene	BRL		ug/Kg	330
193-39-5	Indeno[1,2,3-c,d]pyrene	BRL		ug/Kg	330
53-70-3	Dibenzo[a,h]anthracene	BRL		ug/Kg	330
191-24-2	Benzo[g,h,i]perylene	BRL		ug/Kg	330

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Nitrobenzene-d5	6,700	4,000	60 %	30 - 130 %
2-Fluorobiphenyl	6,700	4,300	65 %	30 - 130 %
Terphenyl-d14	6,700	4,700	71 %	30 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample extraction performed Sample extraction performed by EPA Method 3545. Cleanup performed by EPA Method 3630C.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

GROUNDWATER ANALYTICAL

Certifications and Approvals

Groundwater Analytical maintains environmental laboratory certification in a variety of states. Copies of our current certificates may be obtained from our website:

http://www.groundwateranalytical.com/qualifications.htm

CONNECTICUT, Department of Health Services, PH-0586

Categories: Potable Water, Wastewater, Solid Waste and Soil
http://www.dph.state.ct.us/BRS/Environmental_Lab/OutStateLabList.htm

FLORIDA, Department of Health, Bureau of Laboratories, E87643

Categories: SDWA, CWA, RCRA/CERCLA
http://www.floridadep.org/labs/qa/dohforms.htm

MAINE, Department of Human Services, MA103

Categories: Drinking Water and Wastewater
http://www.state.me.us/dhs/eng/water/Compliance.htm

MASSACHUSETTS, Department of Environmental Protection, M-MA-103

Categories: Potable Water and Non-Potable Water
http://www.state.ma.us/dep/bspt/wes/files/certlabs.pdf

NEW HAMPSHIRE, Department of Environmental Services, 202703

Categories: Drinking Water and Wastewater
http://www.des.state.nh.us/asp/NHELAP/labsview.asp

NEW YORK, Department of Health, 11754

Categories: Potable Water, Non-Potable Water and Solid Waste
http://www.wadsworth.org/labcert/elap/comm.html

PENNSYLVANIA, Department of Environmental Protection, 68-665

Environmental Laboratory Registration (Non-drinking water and Non-wastewater)
http://www.dep.state.pa.us/Labs/Registered/

RHODE ISLAND, Department of Health, 54

Categories: Surface Water, Air, Wastewater, Potable Water, Sewage
http://www.healthri.org/labs/labsCT_MA.htm

U.S. Department of Agriculture, Soil Permit, S-53921

Foreign soil import permit

VERMONT, Department of Environmental Conservation, Water Supply Division

Category: Drinking Water
http://www.vermontdrinkingwater.org/wsops/labtable.PDF

Groundwater Analytical, Inc.
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228 Main Street
Buzzards Bay, MA 02532

Telephone: (508) 759-4441
FAX: (508) 759-4475

GROUNDWATER ANALYTICAL

e-mail

To:	John Burgess	**From:**	e-mail reporting GWA
	CH2M Hill	**Pages:**	29
e-mail:	jburgess@ch2m.com	**Date:**	05/20/2004 04:06:26 PM
Re:	72196	**CC:**	

NOTE

The format or contents of this e-mail transmission may not meet all applicable National Environmental Laboratory Accreditation Conference (NELAC) Standards for data reporting.

- **Comments:** Project Number: 72196

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GROUNDWATER ANALYTICAL

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www.groundwateranalytical.com

May 17, 2004

Mr. John Burgess
CH2M Hill
25 New Chardon Street
Suite 500
Boston, MA 02114

LABORATORY REPORT

Project: **Saugus Iron Works/316337.02.02**
Lab ID: **72196**
Received: **05-01-04**

Dear John:

Enclosed are the analytical results for the above referenced project. The project was processed for Standard turnaround.

This letter authorizes the release of the analytical results, and should be considered a part of this report. This report contains a sample receipt report detailing the samples received, a project narrative indicating project changes and non-conformances, a quality control report, and a statement of our state certifications.

The analytical results contained in this report meet all applicable NELAC standards, except as may be specifically noted, or described in the project narrative. This report may only be used or reproduced in its entirety.

I attest under the pains and penalties of perjury that, based upon my inquiry of those individuals immediately responsible for obtaining the information, the material contained in this report is, to the best of my knowledge and belief, accurate and complete.

Should you have any questions concerning this report, please do not hesitate to contact me.

Sincerely,

Jonathan R. Sanford
President

JRS/smd
Enclosures

GROUNDWATER ANALYTICAL

Sample Receipt Report

Project: **Saugus Iron Works/316337.02.02** Delivery: **FEDEX** Temperature: **2.0°C**
Client: **CH2M Hill** Airbill: **8464 1842 2403** Chain of Custody: **Present**
Lab ID: **72196** Lab Receipt: **05-01-04** Custody Seal(s): **n/a**

Lab ID	Field ID		Matrix	Sampled	Method				Notes
72196-1	SD14A		Soil	4/30/04 15:31	EPA 6010B/7471A 13 Priority Pollutant Metals EPA 8270C PAHs EPA 9060 Mod Total Organic Carbon				
Con ID	**Container**	**Vendor**	**QC Lot**	**Preserv**	**QC Lot**	**Prep**	**Ship**		
C501579	250 mL Glass	Greenwood	BX11496	None	n/a	n/a	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
72196-2	SD14B		Soil	4/30/04 16:21	EPA 6010B/7471A 13 Priority Pollutant Metals EPA 8270C PAHs EPA 9060 Mod Total Organic Carbon				
Con ID	**Container**	**Vendor**	**QC Lot**	**Preserv**	**QC Lot**	**Prep**	**Ship**		
C501594	250 mL Glass	Greenwood	BX11496	None	n/a	n/a	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
72196-3	SD13B		Soil	4/30/04 16:23	EPA 6010B/7471A 13 Priority Pollutant Metals EPA 8270C PAHs EPA 9060 Mod Total Organic Carbon				
Con ID	**Container**	**Vendor**	**QC Lot**	**Preserv**	**QC Lot**	**Prep**	**Ship**		
C501585	250 mL Glass	Greenwood	BX11496	None	n/a	n/a	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
72196-4	SD13A		Soil	4/30/04 16:01	EPA 6010B/7471A 13 Priority Pollutant Metals EPA 8270C PAHs EPA 9060 Mod Total Organic Carbon				
Con ID	**Container**	**Vendor**	**QC Lot**	**Preserv**	**QC Lot**	**Prep**	**Ship**		
C501582	250 mL Glass	Greenwood	BX11496	None	n/a	n/a	n/a		

Lab ID	Field ID		Matrix	Sampled	Method				Notes
72196-5	SD13C		Soil	4/30/04 16:25	EPA 6010B/7471A 13 Priority Pollutant Metals EPA 8270C PAHs EPA 9060 Mod Total Organic Carbon				
Con ID	**Container**	**Vendor**	**QC Lot**	**Preserv**	**QC Lot**	**Prep**	**Ship**		
C501590	250 mL Glass	Greenwood	BX11496	None	n/a	n/a	n/a		

GROUNDWATER ANALYTICAL

Data Certification

Project: **Saugus Iron Works/316337.02.02** Lab ID: **72196**
Client: **CH2M Hill** Received: **05-01-04 12:00**

MA DEP Compendium of Analytical Methods

Project Location: **n/a** MA DEP RTN: **n/a**

This Form provides certifications for the following data set:

EPA 8270C: 72196-01,-02,-03,-04,-05
EPA 6010B: 72196-01,-02,-03,-04,-05
EPA 7470A/1A: 72196-01,-02,-03,-04,-05

Sample Matrices:	Groundwater ( )	Soil/Sediment (X)	Drinking Water ( )	Other ( )	
MCP SW-846 Methods Used	8260B ( )	8151A ( )	8330 ( )	6010B (X)	7470A/1A (X)
	8270C (X)	8081A ( )	VPH ( )	6020 ( )	9012A[2] ( )
As specified in MA DEP Compendium of Analytical Methods: (check all that apply)	8082 ( )	8021B ( )	EPH ( )	7000 S[3] ( )	Other ( )
	1. List Release Tracking Number (RTN), if known.				
	2. SW-846 Method 9012A (Equivalent to 9014) or MA DEP Physiologically Available Cyanide (PAC) Method				
	3. S - SW-846 Methods 7000 Series. List individual method and analyte				

An affirmative response to questions A, B, C and D is required for "Presumptive Certainty" status.

A.	Were all samples received by the laboratory in a condition consistent with that described on the Chain-of-Custody documentation for the data set?	Yes
B.	Were all QA/QC procedures required for the specified analytical method(s) included in this report followed, including the requirement to note and discuss in a narrative QC data that did not meet appropriate performance standards or guidelines?	Yes
C.	Does the analytical data included in this report meet all the requirements for "Presumptive Certainty," as described in Section 2.0 of the MA DEP document CAM VII A, *Quality Assurance and Quality Control Guidelines for the Acquisition and Reporting of Analytical Data*?	Yes
D.	VPH and EPH methods only: Was the VPH or EPH method run without significant modifications, as specified in Section 11.3?	n/a

A response to questions E and F below is required for "Presumptive Certainty" status.

E.	Were all QC performance standards and recommendations for the specified methods achieved?	Yes
F.	Were results for all analyte-list compounds/elements for the specified method(s) reported?	No

All No answers are addressed in the attached Project Narrative.

I, the undersigned, attest under the pains and penalties of perjury that, based upon my personal inquiry of those responsible for obtaining the information, the material contained in this analytical report is, to the best of my knowledge and belief, accurate and complete.

Signature: 
Position: President
Printed Name: Jonathan R. Sanford
Date: 05-17-04

GROUNDWATER ANALYTICAL

EPA Method 8270C
Polynuclear Aromatic Hydrocarbons by GC/MS

Field ID:	**SD14A**	Matrix:	**Soil**
Project:	**Saugus Iron Works/316337.02.02**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72196-01**	QC Batch ID:	**SV-1441-P**
Sampled:	**04-30-04 15:31**	Instrument ID:	**MS-3 HP 5890**
Received:	**05-01-04 12:00**	Sample Weight:	**16 g**
Extracted:	**05-06-04 08:00**	Final Volume:	**1 mL**
Cleaned Up:	**05-06-04 10:30**	Percent Solids:	**35**
Analyzed:	**05-11-04 06:05**	Dilution Factor:	**1**
Analyst:	**JJT**		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
91-20-3	Naphthalene	BRL		ug/Kg	890
91-57-6	2-Methylnaphthalene	BRL		ug/Kg	890
208-96-8	Acenaphthylene	BRL		ug/Kg	890
83-32-9	Acenaphthene	BRL		ug/Kg	890
86-73-7	Fluorene	BRL		ug/Kg	890
85-01-8	Phenanthrene	BRL		ug/Kg	890
120-12-7	Anthracene	BRL		ug/Kg	890
206-44-0	Fluoranthene	BRL		ug/Kg	890
129-00-0	Pyrene	BRL		ug/Kg	890
56-55-3	Benzo[a]anthracene	BRL		ug/Kg	890
218-01-9	Chrysene	BRL		ug/Kg	890
205-99-2	Benzo[b]fluoranthene	BRL		ug/Kg	890
207-08-9	Benzo[k]fluoranthene	BRL		ug/Kg	890
50-32-8	Benzo[a]pyrene	BRL		ug/Kg	890
193-39-5	Indeno[1,2,3-c,d]pyrene	BRL		ug/Kg	890
53-70-3	Dibenzo[a,h]anthracene	BRL		ug/Kg	890
191-24-2	Benzo[g,h,i]perylene	BRL		ug/Kg	890

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Nitrobenzene-d5	18,000	10,000	**58 %**	30 - 130 %
2-Fluorobiphenyl	18,000	11,000	**60 %**	30 - 130 %
Terphenyl-d14	18,000	12,000	**66 %**	30 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample extraction performed by EPA Method 3545. Cleanup performed by EPA Method 3630C. Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8270C
Polynuclear Aromatic Hydrocarbons by GC/MS

Field ID:	**SD14B**	Matrix:	**Soil**
Project:	**Saugus Iron Works/316337.02.02**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72196-02**	QC Batch ID:	**SV-1441-P**
Sampled:	**04-30-04 16:21**	Instrument ID:	**MS-3 HP 5890**
Received:	**05-01-04 12:00**	Sample Weight:	**16 g**
Extracted:	**05-06-04 08:00**	Final Volume:	**1 mL**
Cleaned Up:	**05-06-04 10:30**	Percent Solids:	**74**
Analyzed:	**05-11-04 06:44**	Dilution Factor:	**1**
Analyst:	**JJT**		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
91-20-3	Naphthalene	BRL		ug/Kg	430
91-57-6	2-Methylnaphthalene	BRL		ug/Kg	430
208-96-8	Acenaphthylene	BRL		ug/Kg	430
83-32-9	Acenaphthene	BRL		ug/Kg	430
86-73-7	Fluorene	BRL		ug/Kg	430
85-01-8	Phenanthrene	BRL		ug/Kg	430
120-12-7	Anthracene	BRL		ug/Kg	430
206-44-0	Fluoranthene	BRL		ug/Kg	430
129-00-0	Pyrene	BRL		ug/Kg	430
56-55-3	Benzo[a]anthracene	BRL		ug/Kg	430
218-01-9	Chrysene	BRL		ug/Kg	430
205-99-2	Benzo[b]fluoranthene	BRL		ug/Kg	430
207-08-9	Benzo[k]fluoranthene	BRL		ug/Kg	430
50-32-8	Benzo[a]pyrene	BRL		ug/Kg	430
193-39-5	Indeno[1,2,3-c,d]pyrene	BRL		ug/Kg	430
53-70-3	Dibenzo[a,h]anthracene	BRL		ug/Kg	430
191-24-2	Benzo[g,h,i]perylene	BRL		ug/Kg	430

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Nitrobenzene-d5	8,700	5,700	66 %	30 - 130 %
2-Fluorobiphenyl	8,700	6,100	70 %	30 - 130 %
Terphenyl-d14	8,700	6,600	76 %	30 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample extraction performed by EPA Method 3545. Cleanup performed by EPA Method 3630C. Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8270C
Polynuclear Aromatic Hydrocarbons by GC/MS

Field ID:	**SD13B**	Matrix:	**Soil**
Project:	**Saugus Iron Works/316337.02.02**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72196-03**	QC Batch ID:	**SV-1441-P**
Sampled:	**04-30-04 16:23**	Instrument ID:	**MS-3 HP 5890**
Received:	**05-01-04 12:00**	Sample Weight:	**16 g**
Extracted:	**05-06-04 08:00**	Final Volume:	**1 mL**
Cleaned Up:	**05-06-04 10:30**	Percent Solids:	**28**
Analyzed:	**05-11-04 07:24**	Dilution Factor:	**1**
Analyst:	**JJT**		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
91-20-3	Naphthalene	BRL		ug/Kg	1,100
91-57-6	2-Methylnaphthalene	BRL		ug/Kg	1,100
208-96-8	Acenaphthylene	BRL		ug/Kg	1,100
83-32-9	Acenaphthene	BRL		ug/Kg	1,100
86-73-7	Fluorene	BRL		ug/Kg	1,100
85-01-8	Phenanthrene	BRL		ug/Kg	1,100
120-12-7	Anthracene	BRL		ug/Kg	1,100
206-44-0	Fluoranthene	BRL		ug/Kg	1,100
129-00-0	Pyrene	BRL		ug/Kg	1,100
56-55-3	Benzo[a]anthracene	BRL		ug/Kg	1,100
218-01-9	Chrysene	BRL		ug/Kg	1,100
205-99-2	Benzo[b]fluoranthene	BRL		ug/Kg	1,100
207-08-9	Benzo[k]fluoranthene	BRL		ug/Kg	1,100
50-32-8	Benzo[a]pyrene	BRL		ug/Kg	1,100
193-39-5	Indeno[1,2,3-c,d]pyrene	BRL		ug/Kg	1,100
53-70-3	Dibenzo[a,h]anthracene	BRL		ug/Kg	1,100
191-24-2	Benzo[g,h,i]perylene	BRL		ug/Kg	1,100

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Nitrobenzene-d5	23,000	12,000	52 %	30 - 130 %
2-Fluorobiphenyl	23,000	11,000	46 %	30 - 130 %
Terphenyl-d14	23,000	14,000	60 %	30 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample extraction performed by EPA Method 3545. Cleanup performed by EPA Method 3630C. Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8270C
Polynuclear Aromatic Hydrocarbons by GC/MS

Field ID:	**SD13A**	Matrix:	**Soil**
Project:	**Saugus Iron Works/316337.02.02**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72196-04**	QC Batch ID:	**SV-1441-P**
Sampled:	**04-30-04 16:01**	Instrument ID:	**MS-3 HP 5890**
Received:	**05-01-04 12:00**	Sample Weight:	**16 g**
Extracted:	**05-06-04 08:00**	Final Volume:	**1 mL**
Cleaned Up:	**05-06-04 10:30**	Percent Solids:	**17**
Analyzed:	**05-11-04 08:03**	Dilution Factor:	**1**
Analyst:	**JJT**		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
91-20-3	Naphthalene	BRL		ug/Kg	1,800
91-57-6	2-Methylnaphthalene	BRL		ug/Kg	1,800
208-96-8	Acenaphthylene	BRL		ug/Kg	1,800
83-32-9	Acenaphthene	BRL		ug/Kg	1,800
86-73-7	Fluorene	BRL		ug/Kg	1,800
85-01-8	Phenanthrene	BRL		ug/Kg	1,800
120-12-7	Anthracene	BRL		ug/Kg	1,800
206-44-0	Fluoranthene	BRL		ug/Kg	1,800
129-00-0	Pyrene	BRL		ug/Kg	1,800
56-55-3	Benzo[a]anthracene	BRL		ug/Kg	1,800
218-01-9	Chrysene	BRL		ug/Kg	1,800
205-99-2	Benzo[b]fluoranthene	BRL		ug/Kg	1,800
207-08-9	Benzo[k]fluoranthene	BRL		ug/Kg	1,800
50-32-8	Benzo[a]pyrene	BRL		ug/Kg	1,800
193-39-5	Indeno[1,2,3-c,d]pyrene	BRL		ug/Kg	1,800
53-70-3	Dibenzo[a,h]anthracene	BRL		ug/Kg	1,800
191-24-2	Benzo[g,h,i]perylene	BRL		ug/Kg	1,800

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Nitrobenzene-d5	37,000	23,000	**63 %**	30 - 130 %
2-Fluorobiphenyl	37,000	23,000	**62 %**	30 - 130 %
Terphenyl-d14	37,000	24,000	**66 %**	30 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample extraction performed by EPA Method 3545. Cleanup performed by EPA Method 3630C. Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

GROUNDWATER ANALYTICAL

EPA Method 8270C
Polynuclear Aromatic Hydrocarbons by GC/MS

Field ID:	SD13C	Matrix:	Soil
Project:	Saugus Iron Works/316337.02.02	Container:	250 mL Glass
Client:	CH2M Hill	Preservation:	Cool
Laboratory ID:	72196-05	QC Batch ID:	SV-1441-P
Sampled:	04-30-04 16:25	Instrument ID:	MS-3 HP 5890
Received:	05-01-04 12:00	Sample Weight:	15 g
Extracted:	05-06-04 08:00	Final Volume:	1 mL
Cleaned Up:	05-06-04 10:30	Percent Solids:	70
Analyzed:	05-11-04 08:42	Dilution Factor:	1
Analyst:	JJT		

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
91-20-3	Naphthalene	BRL		ug/Kg	460
91-57-6	2-Methylnaphthalene	BRL		ug/Kg	460
208-96-8	Acenaphthylene	BRL		ug/Kg	460
83-32-9	Acenaphthene	BRL		ug/Kg	460
86-73-7	Fluorene	BRL		ug/Kg	460
85-01-8	Phenanthrene	BRL		ug/Kg	460
120-12-7	Anthracene	BRL		ug/Kg	460
206-44-0	Fluoranthene	BRL		ug/Kg	460
129-00-0	Pyrene	BRL		ug/Kg	460
56-55-3	Benzo[a]anthracene	BRL		ug/Kg	460
218-01-9	Chrysene	BRL		ug/Kg	460
205-99-2	Benzo[b]fluoranthene	BRL		ug/Kg	460
207-08-9	Benzo[k]fluoranthene	BRL		ug/Kg	460
50-32-8	Benzo[a]pyrene	BRL		ug/Kg	460
193-39-5	Indeno[1,2,3-c,d]pyrene	BRL		ug/Kg	460
53-70-3	Dibenzo[a,h]anthracene	BRL		ug/Kg	460
191-24-2	Benzo[g,h,i]perylene	BRL		ug/Kg	460

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Nitrobenzene-d5	9,300	5,400	58 %	30 - 130 %
2-Fluorobiphenyl	9,300	5,100	55 %	30 - 130 %
Terphenyl-d14	9,300	6,200	67 %	30 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample extraction performed by EPA Method 3545. Cleanup performed by EPA Method 3630C. Results are reported on a dry weight basis.

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GROUNDWATER ANALYTICAL

Trace Metals

Field ID:	**SD14A**	Matrix:	**Soil**
Project:	**Saugus Iron Works/316337.02.02**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72196-01**	Percent Solids:	**28**
Sampled:	**04-30-04 15:31**		
Received:	**05-01-04 12:00**		

Analysis Method	QC Batch ID	Prep Method	Prepared	Sample Weight	Instrument ID	Analyst
EPA 6010B[1]	MB-0346-S	EPA 3050B	05-04-04 12:00	0.5 g	ICP-1 PE 3000	CRL
EPA 7471A[2]	MP-1582-S	EPA 7471A	05-04-04 15:30	0.6 g	CVAA-1 PE FIMS	CRL

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit	DF	Analyzed	Method
7440-36-0	Antimony, Total	BRL		mg/Kg	3.7	1	05-05-04 15:10	EPA 6010B[1]
7440-38-2	Arsenic, Total	**15**		mg/Kg	3.7	1	05-05-04 15:10	EPA 6010B[1]
7440-41-7	Beryllium, Total	BRL		mg/Kg	1.5	1	05-05-04 15:10	EPA 6010B[1]
7440-43-9	Cadmium, Total	BRL		mg/Kg	1.8	1	05-05-04 15:10	EPA 6010B[1]
7440-47-3	Chromium, Total	**59**		mg/Kg	37	1	05-05-04 15:10	EPA 6010B[1]
7440-50-8	Copper, Total	BRL		mg/Kg	73	1	05-07-04 18:02	EPA 6010B[1]
7439-92-1	Lead, Total	**180**		mg/Kg	37	1	05-05-04 15:10	EPA 6010B[1]
7439-97-6	Mercury, Total	**0.36**		mg/Kg	0.12	1	05-05-04 11:32	EPA 7471A[2]
7440-02-0	Nickel, Total	**44**		mg/Kg	37	1	05-05-04 15:10	EPA 6010B[1]
7782-49-2	Selenium, Total	BRL		mg/Kg	73	1	05-05-04 15:10	EPA 6010B[1]
7440-22-4	Silver, Total	BRL		mg/Kg	18	1	05-05-04 15:10	EPA 6010B[1]
7440-28-0	Thallium, Total	BRL		mg/Kg	18	1	05-05-04 15:10	EPA 6010B[1]
7440-66-6	Zinc, Total	**210**		mg/Kg	180	1	05-05-04 15:10	EPA 6010B[1]

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

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DF Dilution Factor.

GROUNDWATER ANALYTICAL

Trace Metals

Field ID:	**SD14B**	Matrix:	**Soil**
Project:	**Saugus Iron Works/316337.02.02**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72196-02**	Percent Solids:	**74**
Sampled:	**04-30-04 16:21**		
Received:	**05-01-04 12:00**		

Analysis Method	QC Batch ID	Prep Method	Prepared	Sample Weight	Instrument ID	Analyst
EPA 6010B[1]	MB-0346-S	EPA 3050B	05-04-04 12:00	0.5 g	ICP-1 PE 3000	CRL
EPA 7471A[2]	MP-1582-S	EPA 7471A	05-04-04 15:30	0.6 g	CVAA-1 PE FIMS	CRL

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit	DF	Analyzed	Method
7440-36-0	Antimony, Total	**1.6**		mg/Kg	1.3	1	05-05-04 15:22	EPA 6010B[1]
7440-38-2	Arsenic, Total	**2.1**		mg/Kg	1.3	1	05-05-04 15:22	EPA 6010B[1]
7440-41-7	Beryllium, Total	BRL		mg/Kg	0.52	1	05-05-04 15:22	EPA 6010B[1]
7440-43-9	Cadmium, Total	BRL		mg/Kg	0.65	1	05-05-04 15:22	EPA 6010B[1]
7440-47-3	Chromium, Total	**41**		mg/Kg	13	1	05-05-04 15:22	EPA 6010B[1]
7440-50-8	Copper, Total	BRL		mg/Kg	26	1	05-07-04 18:07	EPA 6010B[1]
7439-92-1	Lead, Total	**15**		mg/Kg	13	1	05-05-04 15:22	EPA 6010B[1]
7439-97-6	Mercury, Total	BRL		mg/Kg	0.045	1	05-05-04 11:41	EPA 7471A[2]
7440-02-0	Nickel, Total	**39**		mg/Kg	13	1	05-05-04 15:22	EPA 6010B[1]
7782-49-2	Selenium, Total	BRL		mg/Kg	26	1	05-05-04 15:22	EPA 6010B[1]
7440-22-4	Silver, Total	BRL		mg/Kg	6.5	1	05-05-04 15:22	EPA 6010B[1]
7440-28-0	Thallium, Total	BRL		mg/Kg	6.5	1	05-05-04 15:22	EPA 6010B[1]
7440-66-6	Zinc, Total	BRL		mg/Kg	65	1	05-07-04 18:07	EPA 6010B[1]

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

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DF Dilution Factor.

GROUNDWATER ANALYTICAL

Trace Metals

Field ID:	**SD13B**	Matrix:	**Soil**
Project:	**Saugus Iron Works/316337.02.02**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72196-03**	Percent Solids:	**28**
Sampled:	**04-30-04 16:23**		
Received:	**05-01-04 12:00**		

Analysis Method	QC Batch ID	Prep Method	Prepared	Sample Weight	Instrument ID	Analyst
EPA 6010B[1]	MB-0346-S	EPA 3050B	05-04-04 12:00	0.5 g	ICP-1 PE 3000	CRL
EPA 7471A[2]	MP-1582-S	EPA 7471A	05-04-04 15:30	0.6 g	CVAA-1 PE FIMS	CRL

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit	DF	Analyzed	Method
7440-36-0	Antimony, Total	BRL		mg/Kg	3.5	1	05-05-04 15:26	EPA 6010B[1]
7440-38-2	Arsenic, Total	**4.8**		mg/Kg	3.5	1	05-05-04 15:26	EPA 6010B[1]
7440-41-7	Beryllium, Total	BRL		mg/Kg	1.4	1	05-05-04 15:26	EPA 6010B[1]
7440-43-9	Cadmium, Total	BRL		mg/Kg	1.7	1	05-05-04 15:26	EPA 6010B[1]
7440-47-3	Chromium, Total	BRL		mg/Kg	35	1	05-05-04 15:26	EPA 6010B[1]
7440-50-8	Copper, Total	BRL		mg/Kg	70	1	05-07-04 18:11	EPA 6010B[1]
7439-92-1	Lead, Total	BRL		mg/Kg	35	1	05-05-04 15:26	EPA 6010B[1]
7439-97-6	Mercury, Total	BRL		mg/Kg	0.12	1	05-05-04 11:45	EPA 7471A[2]
7440-02-0	Nickel, Total	BRL		mg/Kg	35	1	05-05-04 15:26	EPA 6010B[1]
7782-49-2	Selenium, Total	BRL		mg/Kg	70	1	05-05-04 15:26	EPA 6010B[1]
7440-22-4	Silver, Total	BRL		mg/Kg	17	1	05-05-04 15:26	EPA 6010B[1]
7440-28-0	Thallium, Total	BRL		mg/Kg	17	1	05-05-04 15:26	EPA 6010B[1]
7440-66-6	Zinc, Total	BRL		mg/Kg	170	1	05-07-04 18:11	EPA 6010B[1]

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
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DF Dilution Factor.

GROUNDWATER ANALYTICAL

Trace Metals

Field ID:	**SD13A**	Matrix:	**Soil**
Project:	**Saugus Iron Works/316337.02.02**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72196-04**	Percent Solids:	**17**
Sampled:	**04-30-04 16:01**		
Received:	**05-01-04 12:00**		

Analysis Method	QC Batch ID	Prep Method	Prepared	Sample Weight	Instrument ID	Analyst
EPA 6010B[1]	MB-0347-S	EPA 3050B	05-04-04 13:30	0.5 g	ICP-1 PE 3000	CRL
EPA 7471A[2]	MP-1582-S	EPA 7471A	05-04-04 15:30	0.6 g	CVAA-1 PE FIMS	CRL

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit	DF	Analyzed	Method
7440-36-0	Antimony, Total	BRL		mg/Kg	5.5	1	05-05-04 15:39	EPA 6010B[1]
7440-38-2	Arsenic, Total	BRL		mg/Kg	5.5	1	05-05-04 15:39	EPA 6010B[1]
7440-41-7	Beryllium, Total	BRL		mg/Kg	2.2	1	05-05-04 15:39	EPA 6010B[1]
7440-43-9	Cadmium, Total	BRL		mg/Kg	2.8	1	05-05-04 15:39	EPA 6010B[1]
7440-47-3	Chromium, Total	BRL		mg/Kg	55	1	05-05-04 15:39	EPA 6010B[1]
7440-50-8	Copper, Total	BRL		mg/Kg	110	1	05-07-04 18:28	EPA 6010B[1]
7439-92-1	Lead, Total	64		mg/Kg	55	1	05-05-04 15:39	EPA 6010B[1]
7439-97-6	Mercury, Total	BRL		mg/Kg	0.19	1	05-05-04 11:48	EPA 7471A[2]
7440-02-0	Nickel, Total	BRL		mg/Kg	55	1	05-05-04 15:39	EPA 6010B[1]
7782-49-2	Selenium, Total	BRL		mg/Kg	110	1	05-05-04 15:39	EPA 6010B[1]
7440-22-4	Silver, Total	BRL		mg/Kg	28	1	05-05-04 15:39	EPA 6010B[1]
7440-28-0	Thallium, Total	BRL		mg/Kg	28	1	05-05-04 15:39	EPA 6010B[1]
7440-66-6	Zinc, Total	BRL		mg/Kg	280	1	05-07-04 18:28	EPA 6010B[1]

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

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DF Dilution Factor.

GROUNDWATER ANALYTICAL

Trace Metals

Field ID:	**SD13C**	Matrix:	**Soil**
Project:	**Saugus Iron Works/316337.02.02**	Container:	**250 mL Glass**
Client:	**CH2M Hill**	Preservation:	**Cool**
Laboratory ID:	**72196-05**	Percent Solids:	**70**
Sampled:	**04-30-04 16:25**		
Received:	**05-01-04 12:00**		

Analysis Method	QC Batch ID	Prep Method	Prepared	Sample Weight	Instrument ID	Analyst
EPA 6010B[1]	MB-0347-S	EPA 3050B	05-04-04 13:30	0.5 g	ICP-1 PE 3000	CRL
EPA 7471A[2]	MP-1582-S	EPA 7471A	05-04-04 15:30	0.6 g	CVAA-1 PE FIMS	CRL

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit	DF	Analyzed	Method
7440-36-0	Antimony, Total	BRL		mg/Kg	1.4	1	05-05-04 15:52	EPA 6010B[1]
7440-38-2	Arsenic, Total	**2.7**		mg/Kg	1.4	1	05-05-04 15:52	EPA 6010B[1]
7440-41-7	Beryllium, Total	BRL		mg/Kg	0.55	1	05-05-04 15:51	EPA 6010B[1]
7440-43-9	Cadmium, Total	BRL		mg/Kg	0.69	1	05-05-04 15:52	EPA 6010B[1]
7440-47-3	Chromium, Total	**34**		mg/Kg	14	1	05-05-04 15:51	EPA 6010B[1]
7440-50-8	Copper, Total	BRL		mg/Kg	27	1	05-07-04 18:48	EPA 6010B[1]
7439-92-1	Lead, Total	BRL		mg/Kg	14	1	05-05-04 15:52	EPA 6010B[1]
7439-97-6	Mercury, Total	BRL		mg/Kg	0.047	1	05-05-04 11:51	EPA 7471A[2]
7440-02-0	Nickel, Total	**22**		mg/Kg	14	1	05-05-04 15:52	EPA 6010B[1]
7782-49-2	Selenium, Total	BRL		mg/Kg	27	1	05-05-04 15:52	EPA 6010B[1]
7440-22-4	Silver, Total	BRL		mg/Kg	6.9	1	05-05-04 15:51	EPA 6010B[1]
7440-28-0	Thallium, Total	BRL		mg/Kg	6.9	1	05-05-04 15:52	EPA 6010B[1]
7440-66-6	Zinc, Total	BRL		mg/Kg	69	1	05-07-04 18:48	EPA 6010B[1]

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:
BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.
DF Dilution Factor.

GROUNDWATER ANALYTICAL

Inorganic Chemistry

Field ID: **SD14A** Matrix: **Soil**
Project: **Saugus Iron Works/316337.02.02** Received: **05-01-04 12:00**
Client: **CH2M Hill**

Lab ID: **72196-01** Sampled: **04-30-04 15:31** % Solids: **35** Container: **250 mL Glass** Preservation: **Cool**

Analyte	Result	Units	RL	DF	Weight	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	**130,000**	mg/Kg	30,000	114	0.35 mg	05-12-04 14:45	TOC-0258-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:

BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

RL Reporting Limit.

DF Dilution Factor.

1 Instrument ID: Tekmar-Dohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Inorganic Chemistry

Field ID: **SD14B**
Project: **Saugus Iron Works/316337.02.02**
Client: **CH2M Hill**

Matrix: **Soil**
Received: **05-01-04 12:00**

Lab ID: **72196-02** Sampled: **04-30-04 16:21** % Solids: **74** Container: **250 mL Glass** Preservation: **Cool**

Analyte	Result	Units	RL	DF	Weight	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	3,200	mg/Kg	500	4	11 mg	05-12-04 15:28	TOC-0258-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:

BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

RL Reporting Limit.

DF Dilution Factor.

1 Instrument ID: Tekmar-Dohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Inorganic Chemistry

Field ID: **SD13B** Matrix: **Soil**
Project: **Saugus Iron Works/316337.02.02** Received: **05-01-04 12:00**
Client: **CH2M Hill**

Lab ID: **72196-03** Sampled: **04-30-04 16:23** % Solids: **28** Container: **250 mL Glass** Preservation: **Cool**

Analyte	Result	Units	RL	DF	Weight	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	**140,000**	mg/Kg	20,000	64	0.63 mg	05-12-04 16:54	TOC-0258-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:

BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

RL Reporting Limit.

DF Dilution Factor.

1 Instrument ID: Tekmar-Dohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Inorganic Chemistry

Field ID: **SD13A** Matrix: **Soil**
Project: **Saugus Iron Works/316337.02.02** Received: **05-01-04 12:00**
Client: **CH2M Hill**

Lab ID: **72196-04** Sampled: **04-30-04 16:01** % Solids: **17** Container: **250 mL Glass** Preservation: **Cool**

Analyte	Result	Units	RL	DF	Wet Wt	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	**1,000,000**	mg/Kg	100,000	178	0.23 mg	05-12-04 17:12	TOC-0258-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:

BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

RL Reporting Limit.

DF Dilution Factor.

1 Instrument ID: Tekmar-Dohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Inorganic Chemistry

Field ID: **SD13C** Matrix: **Soil**
Project: **Saugus Iron Works/316337.02.02** Received: **05-01-04 12:00**
Client: **CH2M Hill**

Lab ID: **72196-05** Sampled: **04-30-04 16:25** % Solids: **70** Container: **250 mL Glass** Preservation: **Cool**

Analyte	Result	Units	RL	DF	Weight	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	**34,000**	mg/Kg	10,000	73	0.55 mg	05-12-04 00:00	TOC-0258-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations:

BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

RL Reporting Limit.

DF Dilution Factor.

1 Instrument ID: Tekmar-Dohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Project Narrative

Project:	**Saugus Iron Works/316337.02.02**	Lab ID:	**72196**
Client:	**CH2M Hill**	Received:	**05-01-04 12:00**

A. Documentation and Client Communication

The following documentation discrepancies, and client changes or amendments were noted for this project:

1. No documentation discrepancies, changes, or amendments were noted.

B. Method Modifications, Non-Conformances and Observations

The sample(s) in this project were analyzed by the references analytical method(s), and no method modifications, non-conformances or analytical issues were noted, except as indicated below:

1. EPA 6010B Note: Samples 72196-01,-02,-03,-04,-05. Samples were analyzed for selected target analytes, as requested by client.

2. EPA 8270C Note: Samples 72196-01,-02,-03,-04,-05. Samples were analyzed for only selected polynuclear aromatic hydrocarbons (PAH) target analytes, as requested by client.

GROUNDWATER ANALYTICAL

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CHAIN-OF-CUSTODY RECORD AND WORK ORDER

№ 089372

Project Name: Saugus Iron Works	Firm: CH2M HILL
Project Number: 316337.02.02	Address: 25 New Chardon St. Ste 500
Sampler Name: CP/RL/JB	City / State / Zip: Boston, MA 02114
Project Manager: John Burgess	Telephone: 617.523.2260

INSTRUCTIONS: Use separate line for each container (except replicates).

TURNAROUND

- ☑ STANDARD (10 Business Days)
- ☐ PRIORITY (5 Business Days)
- ☐ RUSH (RAN-_____)
  (Rush requires Rush Authorization Number)
- ☐ Please Email to: _____
- ☐ Please FAX to: _____

BILLING

- ☐ Purchase Order No.: _____
- ☐ Third Party Billing: _____
- ☐ GWA Quote: _____

ANALYSIS REQUEST

OPTIONS: ☐ TIC Search
VOA: ☐ 524.2+MTBE
SVOA: ☐ 625.1 ☐ 525.2 ☐ 625 PAHs only ☐ 8270C PAHs only ☐ 8270C SIM ☐ 8270C
PEST/HERB/PCB: ☐ 505/608 ☐ 508/608 ☐ 508A/608 ☐ 515.1 ☐ 515.4 ☐ 8151A ☐ 8081A/8082 ☐ 504.1 EDB/DBCP
METALS: ☐ 6010 ☐ 7000 Series ☐ Specify for Water Samples ☐ Total ☐ Dissolved ☐ Lead and Copper ☐ 13 Priority Pollutant ☐ 8 RCRA ☐ 6 RCRA ☐ MA List Metals ☐ 23 TAL ☐ Specify:
PETROLEUM HYDROCARBONS: Ext. TPH / Vol. TPH ☐ TPH-IR ☐ Diesel Range Organics (DRO) ☐ ME DRO ☐ GC 3 TPH ☐ MA DEP EPH w/o PAHs ☐ EPH Carbon ranges only ☐ EPH w/4 PAHs ☐ Hydrocarbon Fingerprint (GC/FID by ASTM D3328-00 Mod.) ☐ TPH by GC/FID (8015B Mod) Quantitative Only ☐ Gasoline Range Organics (GRO) ☐ ME GRO ☐ MA DEP VPH w/all Targets ☐ VPH Carbon ranges only
HAZ. WASTE: ☐ TCLP ☐ RCLP ☐ 8 Metals ☐ Pb only ☐ VOA ☐ Semi VOA ☐ Pesticides ☐ Herbicides ☐ Corrosivity (as pH) ☐ Reactivity ☐ Ignitability (as Flashpoint) ☐ Paint Filter ☐ MA Basic Disposal Criteria: 8260B, TPH by GC, PCBs, 5 Metals, Corrosivity, Ignitability, Reactivity
GENERAL CHEMISTRY: ☐ Metals ☐ Nitrate ☐ Chloride ☐ Fluoride ☐ Sulfide ☐ Dissolved Phosphorus ☐ Ammonia ☐ TKN ☐ Total Phosphorus ☐ Total N (as NH3/NO3/TKN) ☐ Oil & Grease ☐ COD 410.4/SM5220C ☐ BOD ☐ TSS ☐ NSS ☐ TS ☐ Alkalinity ☐ Osmotic, Total ☐ Cyanide, Physiologically Available ☐ pH ☐ Dissolved Oxygen ☐ Turbidity ☐ Total Coliforms ☐ Fecal Coliforms ☐ HPC
OTHER:

Sampling DATE	Sampling TIME	SAMPLE IDENTIFICATION	Matrix	Type	Container(s)	Preservation	Filtered	LABORATORY NUMBER (Lab Use Only)
3/30/04	1531	SD14A	SOIL	COMPOSITE	4 oz. Amber Glass	ICE	YES	72196-1
	1621	SD14B	SOIL	COMPOSITE	4 oz. Amber Glass	ICE	YES	-2
	1623	SD13B	SOIL	COMPOSITE	4 oz. Amber Glass	ICE	YES	-3
	1601	SD13A	SOIL	COMPOSITE	4 oz. Amber Glass	ICE	YES	-4
↓	1625	SD13C	SOIL	COMPOSITE	4 oz. Amber Glass	ICE	YES	-5

REMARKS / SPECIAL INSTRUCTIONS

MA DEP MCP Data Enhancement Affirmation

☐ YES ☐ NO MCP Data Certification is required.

☐ YES ☐ NO MCP minimum Field QC requirements have been met for this project.
(Metals, hexavalent chromium and cyanide analyses require one matrix spike per 20 samples)

☐ YES ☐ NO MCP Drinking Water samples required.
(Require collection of contingent duplicate samples. Trip blanks are also required, if VOA samples collected)

Signature: _____

DATA QUALITY OBJECTIVES

Regulatory Program

State	Standard	Deliverables
☐ CT	☑ MCP GW-1/S-1	☐ PWS Form
☐ ME	☐ MCP GW-2/S-2	☐ MWRA
☑ MA	☐ NY STARS	☐ _____
☐ NH	☐ Drinking Water	
☐ NY	☐ Wastewater	
☐ RI	☐ Waste Disposal	
☐ VT	☐ Dredge Material	
☐ _____	☐ _____	

Project Specific QC

Many regulatory programs and EPA methods require project specific QC. Project specific QC includes Sample Duplicates, Matrix Spikes, and/or Matrix Spike Duplicates. Laboratory QC is not project specific unless prearranged. Project specific QC samples are charged on a per sample basis. **Each MS, MSD and Sample Duplicate requires an additional sample aliquot.**

Project Specific QC Required
- ☐ Sample Duplicate
- ☐ Matrix Spike
- ☐ Matrix Spike Duplicate

Selection of QC Sample
- ☐ Please use sample: _____

CHAIN-OF-CUSTODY RECORD

NOTE: All samples submitted subject to Standard Terms and Conditions on reverse hereof.

	Date	Time		
Relinquished by Sampler:	4/30/04	1700	Received by:	Receipt Temperature: 2.0°C (3105 ☐ Refrigerated 2-6°C Recommended)
Relinquished by:	Date	Time	Received by:	Container Count:
Relinquished by:	Date 5/1/04	Time 1200	Received by Laboratory:	Shipping/Airbill Number: 8464 1842 2403

Method of Shipment: ☐ GWA Courier ☐ Express Mail ☑ Federal Express ☐ UPS ☐ Hand ☐ _____

Custody Seal Number:

GROUNDWATER ANALYTICAL

Quality Assurance/Quality Control

A. Program Overview

Groundwater Analytical conducts an active Quality Assurance program to ensure the production of high quality, valid data. This program closely follows the guidance provided by *Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans,* US EPA QAMS-005/80 (1980), and *Test Methods for Evaluating Solid Waste,* US EPA, SW-846, Update III (1996).

Quality Control protocols include written Standard Operating Procedures (SOPs) developed for each analytical method. SOPs are derived from US EPA methodologies and other established references. Standards are prepared from commercially obtained reference materials of certified purity, and documented for traceability.

Quality Assessment protocols for most organic analyses include a minimum of one laboratory control sample, one method blank, one matrix spike sample, and one sample duplicate for each sample preparation batch. All samples, standards, blanks, laboratory control samples, matrix spikes and sample duplicates are spiked with internal standards and surrogate compounds. All instrument sequences begin with an initial calibration verification standard and a blank; and excepting GC/MS sequences, all sequences close with a continuing calibration standard. GC/MS systems are tuned to appropriate ion abundance criteria daily, or for each 12 hour operating period, whichever is more frequent.

Quality Assessment protocols for most inorganic analyses include a minimum of one laboratory control sample, one method blank, one matrix spike sample, and one sample duplicate for each sample preparation batch. Standard curves are derived from one reagent blank and four concentration levels. Curve validity is verified by standard recoveries within plus or minus ten percent of the curve.

B. Definitions

Batches are used as the basic unit for Quality Assessment. A Batch is defined as twenty or fewer samples of the same matrix which are prepared together for the same analysis, using the same lots of reagents and the same techniques or manipulations, all within the same continuum of time, up to but not exceeding 24 hours.

Laboratory Control Samples are used to assess the accuracy of the analytical method. A Laboratory Control Sample consists of reagent water or sodium sulfate spiked with a group of target analytes representative of the method analytes. Accuracy is defined as the degree of agreement of the measured value with the true or expected value. Perent Recoveries for the Laboratory Control Samples are calculated to assess accuracy.

Method Blanks are used to assess the level of contamination present in the analytical system. Method Blanks consist of reagent water or an aliquot of sodium sulfate. Method Blanks are taken through all the appropriate steps of an analytical method. Sample data reported is not corrected for blank contamination.

Surrogate Compounds are used to assess the effectiveness of an analytical method in dealing with each sample matrix. Surrogate Compounds are organic compounds which are similar to the target analytes of interest in chemical behavior, but which are not normally found in environmental samples. Percent Recoveries are calculated for each Surrogate Compound.

GROUNDWATER ANALYTICAL

Quality Control Report
Laboratory Control Sample

Category:	**EPA Method 8270C PAHs**	Instrument ID:	**MS-3 HP 5890**
QC Batch ID:	**SV-1441-P**	Extracted:	**05-06-04 08:00**
Matrix:	**Soil**	Cleaned Up:	**05-06-04 10:30**
Units:	**ug/Kg**	Analyzed:	**05-06-04 13:41**
		Analyst:	**JJT**

CAS Number	Analyte	Spiked	Measured	Recovery	QC Limits
91-20-3	Naphthalene	3,300	2,200	67 %	40 - 140 %
91-57-6	2-Methylnaphthalene	3,300	2,500	75 %	40 - 140 %
208-96-8	Acenaphthylene	3,300	2,600	78 %	40 - 140 %
83-32-9	Acenaphthene	3,300	2,500	75 %	40 - 140 %
86-73-7	Fluorene	3,300	2,600	78 %	40 - 140 %
85-01-8	Phenanthrene	3,300	2,700	81 %	40 - 140 %
120-12-7	Anthracene	3,300	2,800	84 %	40 - 140 %
206-44-0	Fluoranthene	3,300	2,800	84 %	40 - 140 %
129-00-0	Pyrene	3,300	2,800	84 %	40 - 140 %
56-55-3	Benzo[a]anthracene	3,300	2,800	85 %	40 - 140 %
218-01-9	Chrysene	3,300	2,800	84 %	40 - 140 %
205-99-2	Benzo[b]fluoranthene	3,300	2,800	84 %	40 - 140 %
207-08-9	Benzo[k]fluoranthene	3,300	2,900	86 %	40 - 140 %
50-32-8	Benzo[a]pyrene	3,300	2,900	88 %	40 - 140 %
193-39-5	Indeno[1,2,3-c,d]pyrene	3,300	2,800	83 %	40 - 140 %
53-70-3	Dibenzo[a,h]anthracene	3,300	2,900	88 %	40 - 140 %
191-24-2	Benzo[g,h,i]perylene	3,300	2,800	83 %	40 - 140 %

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Nitrobenzene-d5	6,700	3,900	59 %	30 - 130 %
2-Fluorobiphenyl	6,700	4,600	69 %	30 - 130 %
Terphenyl-d14	6,700	5,200	78 %	30 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample extraction performed Sample extraction performed by EPA Method 3545. Cleanup performed by EPA Method 3630C.

Report Notations: All calculations performed prior to rounding. Quality Control Limits are defined by the methodology, or alternatively based upon the historical average recovery plus or minus three standard deviation units.

GROUNDWATER ANALYTICAL

Quality Control Report
Method Blank

Category:	EPA Method 8270C PAHs	Instrument ID:	MS-3 HP 5890
QC Batch ID:	SV-1441-P	Extracted:	05-06-04 08:00
Matrix:	Soil	Cleaned Up:	05-06-04 10:30
		Analyzed:	05-06-04 13:01
		Analyst:	JJT

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit
91-20-3	Naphthalene	BRL		ug/Kg	330
91-57-6	2-Methylnaphthalene	BRL		ug/Kg	330
208-96-8	Acenaphthylene	BRL		ug/Kg	330
83-32-9	Acenaphthene	BRL		ug/Kg	330
86-73-7	Fluorene	BRL		ug/Kg	330
85-01-8	Phenanthrene	BRL		ug/Kg	330
120-12-7	Anthracene	BRL		ug/Kg	330
206-44-0	Fluoranthene	BRL		ug/Kg	330
129-00-0	Pyrene	BRL		ug/Kg	330
56-55-3	Benzo[a]anthracene	BRL		ug/Kg	330
218-01-9	Chrysene	BRL		ug/Kg	330
205-99-2	Benzo[b]fluoranthene	BRL		ug/Kg	330
207-08-9	Benzo[k]fluoranthene	BRL		ug/Kg	330
50-32-8	Benzo[a]pyrene	BRL		ug/Kg	330
193-39-5	Indeno[1,2,3-c,d]pyrene	BRL		ug/Kg	330
53-70-3	Dibenzo[a,h]anthracene	BRL		ug/Kg	330
191-24-2	Benzo[g,h,i]perylene	BRL		ug/Kg	330

QC Surrogate Compound	Spiked	Measured	Recovery	QC Limits
Nitrobenzene-d5	6,700	4,000	60 %	30 - 130 %
2-Fluorobiphenyl	6,700	4,300	65 %	30 - 130 %
Terphenyl-d14	6,700	4,700	71 %	30 - 130 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Sample extraction performed Sample extraction performed by EPA Method 3545. Cleanup performed by EPA Method 3630C.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

GROUNDWATER ANALYTICAL

Quality Control Report
Laboratory Control Sample

Category: **Inorganic Chemistry**
Matrix: **Soil**

Analyte	Units	Spiked	Measured	Recovery	QC Limits	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	mg/Kg	500	470	94 %	80 - 120 %	05-12-04 09:48	TOC-0258-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).

Report Notations: All calculations performed prior to rounding. Quality Control Limits are defined by the methodology, or alternatively based upon the historical average recovery plus or minus three standard deviation units.

1 Instrument ID: Tekmar-Hohrmann Apollo 9000

GROUNDWATER ANALYTICAL

Quality Control Report
Method Blank

Category: **Inorganic Chemistry**
Matrix: **Soil**

Analyte	Result	Units	RL	Analyzed	QC Batch	Method	Inst	Analyst
Organic Carbon, Total	BRL	mg/Kg	50	05-12-04 09:48	TOC-0258-S	EPA 9060 Mod	1	AVB

Method Reference: Methods for Chemical Analysis of Water and Wastes, US EPA, EPA-600/4-790-020 (Revised 1983), and Methods for the Determination of Inorganic Substances in Environmental Samples, US EPA, EPA/600/R-93/100 (1993), and Standard Methods for the Examination of Water and Wastewater, APHA, Twentieth Edition (1998), and Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).

Report Notations:

BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

RL Reporting Limit.

1 Instrument ID: Tekmar-Hohmann Apollo 9000

GROUNDWATER ANALYTICAL

Quality Control Report
Laboratory Control Sample

Category: **Metals**
Matrix: **Soil**
Units: **mg/Kg**

Analysis Method	QC Batch ID	Prep Method	Prepared	Instrument ID	Analyst
EPA 6010B	MB-0346-SL	EPA 3050B	05-04-04 12:00	ICP-1 PE 3000	CRL
EPA 7471A	MP-1582-SL	EPA 7471A	05-04-04 15:30	CVAA-1 PE FIMS	CRL

CAS Number	Analyte	Spiked	Measured	Recovery	QC Limits	Analyzed	Method
7440-36-0	Antimony	76	69	**91 %**	1-222 %	05-07-04 17:38	EPA 6010B
7440-38-2	Arsenic	140	130	**99 %**	80-120 %	05-07-04 17:38	EPA 6010B
7440-39-3	Barium	140	140	**96 %**	82-118 %	05-07-04 17:38	EPA 6010B
7440-41-7	Beryllium	67	67	**101 %**	82-118 %	05-07-04 17:38	EPA 6010B
7440-43-9	Cadmium	250	230	**92 %**	81-119 %	05-07-04 17:38	EPA 6010B
7440-47-3	Chromium	96	92	**96 %**	78-122 %	05-07-04 17:38	EPA 6010B
7439-92-1	Lead	74	69	**94 %**	81-120 %	05-07-04 17:38	EPA 6010B
7439-97-6	Mercury	4.0	4.2	**104 %**	68-132 %	05-05-04 10:30	EPA 7471A
7440-02-0	Nickel	73	68	**94 %**	82-118 %	05-07-04 17:38	EPA 6010B
7782-49-2	Selenium	80	82	**102 %**	75-125 %	05-07-04 17:38	EPA 6010B
7440-22-4	Silver	130	130	**99 %**	61-139 %	05-07-04 17:38	EPA 6010B
7440-28-0	Thallium	120	110	**89 %**	76-124 %	05-07-04 17:38	EPA 6010B
7440-62-2	Vanadium	110	110	**100 %**	75-125 %	05-07-04 17:38	EPA 6010B
7440-66-6	Zinc	140	130	**96 %**	79-121 %	05-07-04 17:38	EPA 6010B

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).

Report Notations: All calculations performed prior to rounding. Quality Control Limits are defined by the methodology, or alternatively based upon the historical average recovery plus or minus three standard deviation units.

GROUNDWATER ANALYTICAL

Quality Control Report
Method Blank

Category: **Metals**
Matrix: **Soil**

Analysis Method	QC Batch ID	Prep Method	Prepared	Sample Volume	Instrument ID	Analyst
EPA 6010B	MB-0346-SB	EPA 3050B	05-04-04 12:00	0.5 g	ICP-1 PE 3000	CRL
EPA 7471A	MP-1582-SB	EPA 7471A	05-04-04 15:30	0.6 g	CVAA-1 PE FIMS	CRL

CAS Number	Analyte	Concentration	Notes	Units	Reporting Limit	DF	Analyzed	Method
7440-36-0	Antimony	BRL		mg/Kg	1	1	05-07-04 17:34	EPA 6010B
7440-38-2	Arsenic	BRL		mg/Kg	5	1	05-07-04 17:34	EPA 6010B
7440-39-3	Barium	BRL		mg/Kg	20	1	05-07-04 17:34	EPA 6010B
7440-41-7	Beryllium	BRL		mg/Kg	0.4	1	05-07-04 17:34	EPA 6010B
7440-43-9	Cadmium	BRL		mg/Kg	0.5	1	05-07-04 17:34	EPA 6010B
7440-47-3	Chromium	BRL		mg/Kg	10	1	05-07-04 17:34	EPA 6010B
7439-92-1	Lead	BRL		mg/Kg	10	1	05-05-04 13:42	EPA 6010B
7439-97-6	Mercury	BRL		mg/Kg	0.033	1	05-05-04 10:30	EPA 7471A
7440-02-0	Nickel	BRL		mg/Kg	10	1	05-07-04 17:34	EPA 6010B
7782-49-2	Selenium	BRL		mg/Kg	10	1	05-07-04 17:34	EPA 6010B
7440-22-4	Silver	BRL		mg/Kg	5	1	05-07-04 17:34	EPA 6010B
7440-28-0	Thallium	BRL		mg/Kg	5	1	05-07-04 17:34	EPA 6010B
7440-62-2	Vanadium	BRL		mg/Kg	0.5	1	05-07-04 17:34	EPA 6010B
7440-66-6	Zinc	BRL		mg/Kg	50	1	05-07-04 17:34	EPA 6010B

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).

Report Notations:
BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.
DF Dilution Factor.

Certifications and Approvals

Groundwater Analytical maintains environmental laboratory certification in a variety of states. Copies of our current certificates may be obtained from our website:

http://www.groundwateranalytical.com/qualifications.htm

CONNECTICUT, Department of Health Services, PH-0586

Categories: Potable Water, Wastewater, Solid Waste and Soil
http://www.dph.state.ct.us/BRS/Environmental_Lab/OutStateLabList.htm

FLORIDA, Department of Health, Bureau of Laboratories, E87643

Categories: SDWA, CWA, RCRA/CERCLA
http://www.floridadep.org/labs/qa/dohforms.htm

MAINE, Department of Human Services, MA103

Categories: Drinking Water and Wastewater
http://www.state.me.us/dhs/eng/water/Compliance.htm

MASSACHUSETTS, Department of Environmental Protection, M-MA-103

Categories: Potable Water and Non-Potable Water
http://www.state.ma.us/dep/bspt/wes/files/certlabs.pdf

NEW HAMPSHIRE, Department of Environmental Services, 202703

Categories: Drinking Water and Wastewater
http://www.des.state.nh.us/asp/NHELAP/labsview.asp

NEW YORK, Department of Health, 11754

Categories: Potable Water, Non-Potable Water and Solid Waste
http://www.wadsworth.org/labcert/elap/comm.html

PENNSYLVANIA, Department of Environmental Protection, 68-665

Environmental Laboratory Registration (Non-drinking water and Non-wastewater)
http://www.dep.state.pa.us/Labs/Registered/

RHODE ISLAND, Department of Health, 54

Categories: Surface Water, Air, Wastewater, Potable Water, Sewage
http://www.healthri.org/labs/labsCT_MA.htm

U.S. Department of Agriculture, Soil Permit, S-53921

Foreign soil import permit

VERMONT, Department of Environmental Conservation, Water Supply Division

Category: Drinking Water
http://www.vermontdrinkingwater.org/wsops/labtable.PDF

Appendix C

Turning Basin Excavation Alternatives Technical Memorandum

Turning Basin Excavation Alternatives - Saugus Iron Works National Historical Site, Saugus, Massachusetts

PREPARED FOR: National Park Service

PREPARED BY: Edward R. Underwood
John Burgess

DATE: May 25, 2004

Purpose

The purpose of the technical memorandum is to evaluate alternatives for excavating the turning basin at the Saugus Iron Works National Historical Site (SAIR) in a manner which minimize impacts on the environment, community, and mission and operations of the historical site.

Background

SAIR is the location of the first integrated ironworks in North America, which operated from 1646 to 1668. It includes the reconstructed blast furnace, forge, rolling mill, and a restored seventeenth century house.

The site's resources are the best evidence and demonstration of the earliest development of iron manufacturing in colonial America. The technology employed at Saugus was dispersed throughout the colonies and was critical to the development of iron manufacturing in America. The site is the southern gateway to the Essex National Heritage Area, linking thousands of historic places in Essex County related to three primary historic themes - colonial settlement, maritime trade, and early industrialization.

With the archeological site of the seventeenth-century iron-making plant, the museum collection, the seventeenth-century Iron Works House, and the reconstructed iron works complex, Saugus Iron Works National Historic Site illustrates the critical role of iron making to seventeenth-century settlement and its legacy in shaping the early history of the nation. The site's enclave setting on the Saugus River, featuring an open-air museum with working waterwheels, evokes a unique experience for park visitors. These resources demonstrate seventeenth-century engineering and design methods, iron-making technology and operations, local and overseas trade, and life and work in the Massachusetts Bay Colony.

The original manufacturing site served as a training ground for skilled iron workers for what would become America's iron and steel industry. Iron making provided the infrastructure for the rise of other colonial industries. Called, "the forerunner of America's industrial giants," the site served as a center for technology, innovation and invention. The site interprets early industrial manufacturing, with its enduring social, political and environmental ramifications.

Directly to the south of the reconstructed industrial facilities is a tidal basin formed along the western side of the Saugus River channel. The river and tidal basin provided a natural channel and turning basin for ships accessing the iron works. Along the northern end of the tidal basin are reconstructed native timber bulkhead and dock structures demonstrating seventeenth-century waterfront construction methods and interpreting the Saugus River as a shipping lane for company products.

Existing Tidal Basin Conditions

The tidal basin within the historical site boundary has an area of approximately 5 acres. It consists of two distinct areas. The northernmost area is a 1-acre area bounded on the north by the reconstructed waterfront facilities for the historical site and to the west and south by the Saugus River. This area, referred to as the "turning basin", provided access to the bulkhead and dock facilities. During site reconstruction in the early 1950's, the dredge line for the turning basin was at the approximate base elevation of the reconstructed timber bulkhead. A deepened harbor area was constructed along the western side of the dock to replicate the boat basin that existed here in the 17th century.

The southernmost area is located south of the turning basin and is bounded on the west and south by the Saugus River. This area referred to in this document as the "southern area" covers an area of approximately 4 acres.

Damage to an upstream dam in 1957 resulted in the deposition of debris and silt in both areas of the tidal basin. Silt and debris which may have been deposited between the two areas has since been eroded away by the Saugus River channel. The remaining sediment has depleted the depth of the tidal basin and has created a shallow swamp-like environment conducive to the growth of Phragmites and other invasive,non-native plants. In addition, it is believed that the sediment may contain contaminants from upstream industrial operations.

Sediment conditions were investigated with 20 sediment corings taken the week of April 26,2004. . The purpose of the corings was to determine, if possible, the interface between the pre-1957 sediment level and the post-1957 sediment level, determine the types and consistency of materials present, and to obtain samples for chemical analysis. Results of the sampling program are summarized in the Marsh Characterization Report.

Existing sediment in the turning basin area was investigated by 3 deep corings with depths ranging from 12 to 16 feet and 7 shallow corings with depths ranging from 3.75 to 5 feet. In general, the upper 24 to 36 inches of recovered sediment materials consisted of 0 to 10 inches of plant and organic materials, and layers of coarse to fine sand and organic silt and clay, with shallow organic silt and clay materials being generally located along the western and southern portions of the area. Deeper deposits, as identified in the deep soil boring along the western side of the area near the slag pile, were predominately fine to coarse sand with layers of organic, silt, and clay materials. It was very difficult from the boring logs alone to determine the possible interface between the pre-1957 and post-1957 sediment. However, very low TOC concentrations in a course sand layer noted in corings 4, 5, and 6 suggest this may denote the sediment which was deposited during the 1957 dam breach. The bottom of this deposit is located at a depth of about 3.5 feet.

Sediment in the southern area was investigated by ten shallow corings ranging from 1 to 5 feet deep, based on the location where refusal was reached. Sediment recoveries, however, were much less, ranging from 12 to 43 inches. Within the recovered interval, the uppermost layer in the southern area generally consisted of vegetative, and peat materials with depths ranging from approximatley 0.5 to 2.5 ft. The thickest organic/peat layer was generally found in the cores located away from the river, closer to the uplands. Below this layer are various layers of organic, organic silt, and sand layers. With the possible exception of a coarse sand layer (ranging from approximatley 8 to 12 inches thick) noted in some corings, it was difficult to determine where the interface between the pre-1957 and post-1957 materials might exist. The top of the coarse sand layer was found at depths ranging from approximately 16 inches to 36 inches below ground surface (bgs). The coarse sand layer also contained very little total organic carbon (TOC), with values ranging from 0.2 to 3.4% TOC, in contrast to TOC values above and below the sand layer, which ranged from 19 to 100%TOC. Thus, although the interface between the pre-1957 and post-1957 sediments could not definitively identified, the evidence does suggests that the pre-1957 sediments are likely found at a depth greater than 2 ft over the majority of the southern area.

Observations during the coring program indicated that personnel and some equipment could get out on the proposed work areas. For instance, the 3200-lb coring rig was able to access the turning basin area using plywood mats. It appears that primary supporting strata include substantial deposits of sand in turning basin area and thick root and peat materials in the southern area .

Goals and Requirements of Sediment Excavation

Primary goals of proposed sediment excavation efforts include:

- Restoration of the tidal basin to the approximate bottom configuration at the end of historical site reconstruction in 1954
- Removal of contaminated sediments, if any, to minimize future risks
- Provide sufficient permanent water depth to prevent future intrusion by invasive, non-native plants

Specific requirements of the sediment excavation effort include:

- Minimal impacts on the Saugus River channel, both within the limits of the work area and downstream
- Minimal disruption of park resources, operations, and historic artifacts
- Minimal impacts on the community
- Cost effectiveness

Estimated Base of Excavation

Preliminary excavation requirements within the turning basin and southern areas were estimated on the basis of the study of various pieces of information, including:

- Stratigraphic data and observations from the recent sediment corings

- Current base elevations for the Saugus River channel
- Proposed excavation depth information from the 1950-vintage design drawings

It is estimated that the depth of excavation will vary from 0.6 to 5.6 feet. The average depth is about 2.3 feet. Although actual depths may vary depending upon further analysis and site conditions noted during construction, these preliminary estimates are sufficient to evaluate applicable excavation alternatives and considerations.

Excavation Alternatives Considered

Three alternatives were considered for the project. These included:

- Wet dredging
- Dry dredging
- Conventional wet excavation

Wet Dredging

Wet dredging includes the use of conventional floating dredge similar to equipment used for channel and harbor dredging. Due to the small size of the site, a small dredge system, such as the Mudcat Dredge system , would be required. The Mudcat system is a small cutter dredge mounted on a 36-foot by 12-foot barge. It has been used successfully in small lake, river, and harbor dredging applications. It has a draft of about 2.7 feet and can accommodate excavations from 3 to 20 feet in depth.

Cuttings from a wet dredging operation are pumped as a slurry from the cutter head to a dewatering area where the materials must be dewatered for subsequent excavation and hauling. The dewatering area can be a diked pond, tanks, or more recently, a geotube system. Due to the large volume of water in the slurry (approximately 90% water), sizeable ponds and tanks may be required to perform dewatering operations at a rate consistent with the required production rate of the dredge. Geotubes, which consist of pervious geotextile bladders into which the slurry is pumped and dewatered, provide a space-saving alternative to conventional ponds and dikes. If contaminants are present, large quantities of water may have to be treated with either of the dewatering systems.

Dry Dredging

Dry dredging is similar to the wet dredge system, except that a proprietary cutter head is used to cut and pump cuttings at a much lower water content, thus eliminating much of the dewatering potential water treatment requirements. Contacts with a Boston-firm who was associated with the process indicated that the dry dredge technology is no longer being marketed due to lack of interest in the engineering and contracting community.

Conventional Wet Excavation

Conventional wet excavation includes excavation of sediment with conventional construction equipment such as excavators (backhoes), front-end loaders, clamshells, etc. It is considered "wet excavation" since it involves operation at or below the water table and the removal of wet sediment materials. This generally requires:

- Dewatering of the work area to the extent necessary to support the operation

- Low ground pressure equipment and/or equipment mats
- Excavated material dewatering pad and loadout area

Water treatment may be necessary if contaminants are present in the materials. However, the volume of water to be treated is generally lower than with the wet dredging technique.

Comparison of Alternatives

The dry dredge process can be eliminated from further consideration since it is no longer available. On the basis of the following comparison, the conventional wet excavation process appears to be the most applicable to this site:

- The wet dredge process is limited to a minimum excavation depth of approximately 3 feet. The conventional method is capable of excavating areas less than three feet deep.
- The wet dredge process requires at least 2.7 feet of water, or more than the average depth of the currently-proposed excavation, to float and operate the dredge. The conventional wet excavation process is not dependent upon a minimum water depth.
- The current subsurface appears to be capable of supporting a conventional wet excavation process. Excavation and other preparation measures would be required to get the wet dredge system in operation at this site.
- The wet dredge process requires substantial dewatering facilities or equipment. The conventional excavation process can accommodate gravity drainage in a smaller and more flexible drying area.
- The wet dredge process has the potential for generating more water, which may require treatment.

In addition, the conventional wet excavation method provides greater flexibility, more opportunities for accomodating site-specific limitations, and greater control over the limits and depths of excavation. These factors are especially important in light of special requirements for this project.

Other Considerations

The Saugus River is a tidal stream, which is a breeding ground for native fish species. Consequently, it is critical that the work involves minimum disturbance to the existing stream channel and that no sediment or contaminants be added to the stream. In light of this, site access and sediment controls are major design considerations due to the configuration of the work area relative to the river.

Access Considerations

It was agreed in the initial project workshop that the proposed work areas cannot be accessed across the river channel, including no fords, fills, or culverts. In order to meet this requirement, the turning basin area will have to be accessed by way of the maintenance road and trail at the northeastern corner of the historic area. This will require the evaluation and reinforcement of two bridges to accommodate construction equipment and loaded dump trucks. A ramp and temporary loading area will have to be installed in the northern end of the basin to the east of the wharf area for dewatering, staging, and loading of

materials. Due to the sandy nature of much of the sediment in the basin, it appears that the loading area can be made of excavated materials. It will be removed last as the excavation equipment works out of the basin.

The southern area will have to be accessed by way of town streets and an existing gate located located approximately 700 feet south of the existing maintenance area. Preparation of this area will require removal of trees and installation of a temporary access trail into work area. Environmental considerations require that the access trail include reinforcement, geotextiles, and other features to minimize compaction and disturbance of the existing ground by equipment. Conceptually, a temporary loading area will be installed along the edge of the tidal basin for dewatering, staging, and loading of materials. Exact configuration and operational requirements will have to be further detailed during subsequent design activities due to the topography in the vicinity of this access point.

Access to both areas will have a potential impact on the public. Within the historic area, the work area and associated access trails will have to be cordoned off from public access with security fencing or other measures. The southern area will require traffic controls, barriers, flagmen, and other controls to minimize conflicts with the community.

Sediment Control Considerations

Excavation and other disturbances within the proposed work areas will generate sediment which can be transported as suspended solids in impounded water or in runoff. To prevent the transport of these suspended solids into the river, silt barriers will have to be provided along the perimeter of all work areas. Alternatives include:

- Earth or stone dikes
- Silt Curtains
- Portable dikes
- Silt Fence
- Straw Bale Dikes

Earth or stone dikes may be constructed along the perimeter of the excavation to contain and/or filter water. The cost of earth and stone dikes varies with size, materials, and difficulty in construction and removal. They are probably not appropriate for this project, except in limited areas where they can be constructed of excavated materials. If used, they will have to be augmented with other erosion and sediment controls.

Silt curtains consist of a floating boom with a skirt which extends into the water column to contain silt and other contaminants. The Massachusetts Erosion and Sediment Control Manual lists these devices as a primary method of protecting rivers, lakes, etc., from sediment generated in adjacent areas. The minimum depth of a conventional silt curtains is typically about 3 feet, with the bottom of the curtain suspended about 1 foot above the bottom. Since tThe depth of water within the subject work area is expected to be less than 3, a conventional silt curtain is probably not applicable. A vendor of silt curtains suggested that, if a silt curtain must be used, a curtain with a geotextile skirt, anchored to the bottom , could be used. The vendor indicated that the typical cost of a floating silt curtain with 3-foot conventional or geotextile skirt is approximately $6 per linear foot, plus installation and contractor markup costs.

Portable dikes consist of pre-fabricated dike systems which can be mobilized and installed at the work site. They are applicable mainly where a low permeability barrier is required to retain water within an excavation, prevent water from entering an excavation. The Aqua Dam system is geomembrane tube-like structure which is filled with water to form a temporary dike. Information from the supplier indicates that it is expensive, approximately $25 to $40 per linear foot, plus installation and contractor markups, for a 3-foot to 4-foot dike. The PortaDam system consists of a structural frame with a geomembrane diaphragm. It is somewhat complicated and generally requires installation by the manufacturer. A quote on the system has been requested, but not yet received.

A silt fence contains and filters sediment and prevents it from leaving the work area. A conventional silt fence is generally applicable for small upland areas where they would not be subject to substantial hydraulic pressures. A super silt fence, which consists of a silt fence with metal posts and heavy wire backing, is applicable where loading conditions would be more severe. A typical cost for a conventional silt fence is in the range of $2 to $3 per linear foot, depending upon installation requirements. Super silt fence is much more expensive, $7 to $9 per linear foot, depending upon the actual design and installation conditions.

Straw bale dikes contain silt and provide some filtering. However, they have limited effectiveness and are falling out of favor in some jurisdictions. Mobilization and demobilization of materials could also be a difficult. Although they may not be applicable for the entire barrier system, they may be useful in replacing or augmenting other measures in limited areas.

Evaluation of the various sediment control measures above suggest the following conclusions:

- The sensitive environment requires that appropriate erosion and sediment controls must be provided around all work areas, no matter how small.
- Conventional silt fence should be installed downgradient of all disturbed areas associated with access, dewatering and loading areas, earth diking, etc., not subject to stream flow conditions.
- Current information does not suggest the presence of contamination requiring full containment of water within the excavation. As a result, a permeable silt barrier between the excavation and the river is proposed.
- Projected site conditions suggest that a super silt fence may be the most practical sediment barrier along the Saugus River channel. It must be appropriately designed and reinforced to withstand expected flooding and flow conditions.
- If future design information or regulary requirements require the use of a silt curtain in lieu of a super silt fence, a curtain with a geotextile skirt anchored to the stream bottom should be used. The installation should conform with details in the Massachusetts Erosion and Sediment Control Manual.
- If containment of water within or outside the excavation is deemed to be necessary, structural dike systems such as those dscussed should be considered. Since these

systems have similar capabilities, the final decision will likley depend upon cost and least disturbance to the adjacent stream channel.

Appendix D

Slag Pile Technical Memorandum

Slag Pile Containment Alternatives Evaluation - Saugus Iron Works National Historical Site, Saugus, Massachusetts

PREPARED FOR: National Park Service

PREPARED BY: Edward R. Underwood, P.E.

DATE: April 19, 2004

Purpose

The purpose of the technical memorandum is to evaluate containment alternatives for the existing slag pile at the Saugus Iron Works National Historical Site (SAIR) in a manner which minimizes future human health and environmental risk, while minimizing impacts on the mission and operations of the historical site.

Background

SAIR is the location of the first integrated ironworks in North America, which operated from 1646 to 1668. It includes the reconstructed blast furnace, forge, rolling mill, and a restored seventeenth century house.

The site's resources are the best evidence and demonstration of the earliest development of iron manufacturing in colonial America. The technology employed at Saugus was dispersed throughout the colonies and was critical to the development of iron manufacturing in America. The site is the southern gateway to the Essex National Heritage Area, linking thousands of historic places in Essex County related to three primary historic themes - colonial settlement, maritime trade, and early industrialization.

With the archeological site of the seventeenth-century iron-making plant, the museum collection, the seventeenth-century Iron Works House, and the reconstructed iron works complex, Saugus Iron Works National Historic Site illustrates the critical role of iron making to seventeenth-century settlement and its legacy in shaping the early history of the nation. The site's enclave setting on the Saugus River, featuring an open-air museum with working waterwheels, evokes a unique experience for park visitors. These resources demonstrate seventeenth-century engineering and design methods, iron-making technology and operations, local and overseas trade, and life and work in the Massachusetts Bay Colony.

The original manufacturing site served as a training ground for skilled iron workers for what would become America's iron and steel industry. Iron making provided the infrastructure for the rise of other colonial industries. Called, "the forerunner of America's industrial giants," the site served as a center for technology, innovation and invention. The site interprets early industrial manufacturing, with its enduring social, political and environmental ramifications.

Directly to the south of the reconstructed industrial facilities is a tidal basin formed along the western side of the Saugus River channel. The river and tidal basin provided a natural channel and turning basin for ships accessing the iron works. Along the northern end of the tidal basin are reconstructed wharf and pier facilities demonstrating seventeenth-century waterfront construction methods and interpreting the Saugus River as a shipping lane for company products.

Existing Slag Pile

The only existing remnant of the original iron making operations is slag pile located to the south of the reconstructed blast furnace. Slag is an aggregate-like waste material produced in the iron-making process. During site operations, this material was removed from the blast furnace and dumped in a ridge-like pile at the northwestern corner of the tidal basin.

The slag pile, as it currently exists, is approximately 150 feet long, 50 feet wide, and 12 feet high. It has a narrow crest width, ranging from 5 to 7 feet, and steep sidelopes, ranging from 1.5 H:1V (1.5 horizontal to 1 vertical) to 1.8 H:1V. It is CH2M HILL's understanding that the current configuration of the pile may be the result of regrading which occurred during site restoration activities in the early 1950's.

Approximately 40 percent of the slag pile surface is covered with grass, brush, and briers. The remainder of the surface is bare slag with a high percentage of aggregate materials in the gravel to cobble size range.

Observations during the site visit which occurred on April 8 to 9, 2004, indicated that the slag pile is generally stable and relatively clear of erosional damage, even after heavy rains immediately prior to the site visit. Discussions with SAIR personnel indicate that the slag pile requires little to no maintenance. There were, however, signs of past erosional damage in the drainage swale where the western side of the slag pile abuts the natural hillside. Although the area is predominately vegetated, some exposed slag is present.

Existing Risk

In June, 1998, the State of Massachusetts issued a Notice of Activity and Use Limitation for the slag pile due to the presence of priority pollutant metals and polycyclic aromatic hydrocarbons in exposed marshland sediments and arsenic in the earth mound (slag pile). A copy of the Notice of Activity and Use Limitation is attached. Exhibit C of the document states the following:

> *Varying concentrations of priority pollutant metals and polycyclic aromatic hydrocarbons (PAHs) were detected in the sediments and slag pile soils on the site. The metal contaminants are believed to have been released when ore processing slag was deposited in the marshlands. The PAHs are likely from upgradient industrially contaminated soil deposited on the subject site from massive soil and sediment influx during two historically documented dam failures. Goff-Chem, Inc., conducted a Method 3 Site-Specific Risk Characterization for all identified contaminants at the site in accordance with the requirements set forth in 310 CMR 40.0992 of the revised Massachusetts Contingency Plan (MCP).*
>
> *The site is currently used as a public open-air museum for historical structures and colonial iron ore processing. Future plans for the site remain the same. Based on the site-specific risk characterization, the levels of contaminants in soil, sediment, and groundwater at the site are*

> *not considered to present a "Significant Risk" of harm to human health, public welfare, safety, and the environment, under both current and future foreseeable site uses and activities. However, exposure point concentrationsfor contaminants in the deposited slag material and sedments exceed the Method 1 S-1/GW-3 soil standards. Therefore, if the site use changes to residential use, or other use with an S-1 standard, a condition of "Significant Risk" of harm to human health, public welfare, and the environment will exist. This Activity and Use Limitation has been developed to control potential future exposure scenarios and to maintain a condition of "No Significant Risk".*

Specific activities and uses deemed to be inconsistent with the objectives of the Activity and Use Limitation, and which may result in a significant risk of harm to health, safety, and public welfare, or the environment, include the following:

- Any residential uses, including vegetable gardens
- Any uses where a child's frequency or intensity of use is considered high, such as a playground or school
- Any public uses where frequency and/or intensity of use is considered high, and access to subsurface soils and sediments is likely, such as digging or recreational sports on a continuing basis

Specific obligations and conditions set forth in the Activity and Use Limitation include the following:

- Maintenance of landscaped areas, similar to existing conditions, to limit human exposure/access to underlying slag pile soils or marshland sediments
- Soil excavation and other soil removal activities shall be performed as follows:
  a. a health and safety plan shall be developed and implemented prior to the start of activities;
  b. such activities shall be monitored by an LSP on-site periodically;
  c. such other precautions shall be taken which, in the opinion of an LSP, shall be required at the time to insure that the activities to be performed present no significant risk of harm to health, safety, public welfare, or the environment.
- Any excavated soils shall be tested and disposed pursuant to the appropriate and applicable state and federal guidelines.

SAIR currently has a sign posted at the entrance to the slag pile forbidding access onto the pile. It is SAIR's current understanding that this restriction meets the requirements of the current Activity and Use Limitation.

Evaluation of Alternatives

Objectives

Discussions with SAIR representatives at the site meetings on April 8 and 9, 2004, indicated that the appropriate containment alternative(s) should meet the following objectives:

- Maximize, to the extent possible, the existing configuration, historical character, and view of the existing slag pile
- Minimize long-term operations and maintenance requirements
- Minimize impacts to the surrounding area
- Maintain restrictions and conformance with the existing Activity and Use Limitation

Alternatives

Four containment alternatives were selected for evaluation. Major components of each alternative are discussed below:

- Alternative 1: Maintain Slag Pile in Current Condition - This alternative represents the "no action" alternative with current inspection and maintenance activities. Existing access restrictons would remain in effect.
- Alternative 2: Existing Slag Pile with Toe Armoring - This alternative is similar to Alternative 1, except that the portion of the toe area within tidal influence would be armored with riprap or stone paving to protect the toe from erosion during tidal fluctuations or wave action.
- Alternative 3: Soil Cover and Vegetation over Entire Slag Pile - This alternative would include stripping the existing vegetation, minor regrading, placement of armored toe area, placement of soil cover over the pile, seeding, and placement of erosion protection.
- Alternative 4: Geotextile Layer with Exposed Slag Surface - This alternative would include stripping the existing vegetation, partial excavation, segregation, and regrading of slag, placement of a geotextile filter layer, and placement of selected slag materials on the surface.

Evaluation of Alternatives

The evaluation of alternatives was conducted using a "SWOT" process which compares the basic strengths, weaknesses, opportunities, threats of the various alternatives being considered. The evaluation of each alternative was conducted with emphasis on conformance with the objectives discussed above. A side-by-side comparison of the alternatives is presented in the Technical SWOT Evaluation Table. The last column of the table includes comparative costs to assist in the final evaluation and comparison of alternatives.

Results of the evaluation indicate that Alternative 1, Maintain Slag Pile in Current Condition, is capable of meeting all of the project objectives at a low cost. Its primary disadvantage is the potential for future toe erosion once the turning basin has been restored. This potential, however, is speculative since the portion of the toe most vulnerable to erosion by tidal action is currently covered with sediment and evidence of past erosion damage, if any, is unobservable.

Alternative 2, Existing Slag Pile with Toe Armoring, is similar to Alternative 1, except that it includes erosion protection along the toe of the pile to mitigate the erosion potential associated with Alternative 1. It is more costly due to the added work required and has

possible issues with wetland encroachment and a "non-historical" look if not carefully implemented.

Alternatives 3 is the least conforming with the project objectives and is also expected to have a high implementation cost. Although this alternative would have the greatest "containment" value, it does not appear to be necessary to meet the requirements of the current Activity and Use Limitation.

Alternative 4 has the potential for providing limited containment while providing an exposed slag surface. This alternative does not appear to provide substantial advantage over the current condition and has the potential for undue worker exposure during construction, regulatory issues with re-using "waste", and greater maintenance requirements. It could also be expensive to implement.

Preferred Alternative

Results of the evaluation suggest that Alternative 1, Maintain Slag Pile in Current Condition, should be the basis for the preferred alternative. It conforms with the project objectives and has the least impact on the current operations of the historical site.

Recommendations

It is recommended that:

- Alternative 1, Maintain Slag Pile in Current Condition, be maintained as the preferred alternative.
- Alternative 2, Existing Slag Pile with Toe Armoring, however, be used as the basis for construction contingencies and cost estimates to provide sufficient funding in the event that observations during construction reveal evidence of past erosion and the need for erosion protection at the toe.
- Special care should be provided in developing excavation limits and specifications for work in the vicinity of the base of the slag pile. Stability evaluations should be conducted to ensure that the work does not de-stabilize the pile.
- The final design should include regrading and stabilization of the drainage swale to the west of the slag pile to minimize the potential for flow concentrations, erosion, and transport of slag materials from upland drainage which passes through the area.
- The Park Service should continue to maintain and enforce the current access restriction to maintain conformance with the existing Activity and Use Limitation.
- Contract specifications for intrusive work on or adjacent to the exposed slag pile should clearly state the potential hazards and should include provisions for appropriately-trained personnel and appropriate safety and environmental monitoring and controls.

Technical SWOT Evaluation – Slag Pile Containment Alternatives, SAIR

Containment Alternative	Strength	Weaknesses	Opportunity	Threat	Relative Cost
1 – Maintain Slag Pile in Current Condition	Maintains existing configuration, historical character and view. Maintains current level of maintenance. Minimizes impacts to surrounding area. Maintains restrictions and conforms with Activity and Use Limitation. Minimal disturbance and effects of adjacent area.	Potential for some toe erosion, instability, and future maintenance increase, especially when turning basin is cleaned out. Minimal protection against infiltration, leaching, and erosion of slag components into the basin.	Opportunity to maintain conditions as they now exist.	Potential additional stability and maintenance issues in the event of greater toe erosion once basin is cleaned out.	Low.
2 – Existing Slag Pile with Toe Armoring	Maintains existing configuration, historical character and view. Maintains restrictions and conforms with Activity and Use Limitation. Potential for reduced future maintenance, especially in the toe area.	Some loss of historical "view" near the water line. Minimal protection against infiltration, leaching, and erosion of slag components into the basin.	Opportunity to maintain conditions essentially as they now exist.	Possible wetland encroachment issues, depending on the type and limits of toe protection.	Low to moderate, depending upon type and extent of toe protection.
3 – Soil Cover and Vegetation over Entire Slag Pile	Maximizes potential for minimizing infiltration and containing slag constituents. Minimizes contact of personnel with slag constituents, regardless of access restriction.	Would be difficult to implement. Would have major negative impacts on historical character, view, and adjacent areas.	Provides the opportunity to minimize potential environmental and health impacts, even with reduced restrictions.	Possible wetland encroachment issues. Greater worker exposure. Potential for long-term stability and erosion issues/intensive maintenance until area finally stabilizes.	High.
4 – Geotextile Layer with Exposed Slag	Provides some containment of deeper fines in slag pile. Maximizes the view since slag would be fully exposed.	Provides minimal protection against infiltration, leaching, and erosion of slag components. Destroys current protection from existing vegetation.	Opportunity to maximize exposure of slag for viewing.	Greater worker exposure and risk during construction. Potential issue with re-use of slag. Potentially greater and more difficult stability, erosion, and maintenance until surface stabilizes.	High

Attachment

Notice of Activity and Use Limitation

Appendix E

Data Validation Report

(Due to Schedule constraints, the Data Validation Report was not included in the Draft Report, but will be included in the Final Report)

MEMORANDUM CH2MHILL

Data Validation Summary – Saugus Iron Works, June 2004

TO: John Burgess / CH2M HILL / BOS

FROM: Dan Lucas / CH2M HILL / GNV
Herb Kelly / CH2M HILL / GNV

DATE: June 3, 2004

The purpose of this memorandum is to present the results of the data validation process for the samples collected for Saugus Iron Works. The samples were collected between the dates of April 27 and 30, 2004.

The specific samples and analytical fractions reviewed are summarized below in Table 1.

The Quality Control areas that were reviewed and the resulting findings are documented within each subsection that follows. This data was validated for compliance with the analytical method requirements. This process also included a review of the data to assess the accuracy, precision, and completeness based upon procedures described in the guidance documents such as the Environmental Protection Agency (EPA) National Functional Guidelines for Inorganic Data Review (EPA 2002) and National Functional Guidelines for Organic Data Review (EPA 1999). Quality assurance / quality control (QA / QC) summary forms and data reports were reviewed.

Samples were submitted to Groundwater Analytical, Inc., in Buzzards Bay, Massachusetts, for the following analyses: Semi-Volatile Organic Compounds (SVOCs) Poly Aromatic Hydrocarbons (PAHs) by method SW846-8070C, Metals (Priority Pollutant List) by method SW846-7471A and SW846-6010B and Total Organic Carbon (TOCs) by method SW846-9060 Modified.

Sample results that were not within the acceptance limits were appended with a qualifying flag, which consisted of a single- or double-letter code that indicated a possible problem with the data. The qualifying flags originated during the data review and validation processes. These also include the secondary, or the two / three-digit "sub-qualifier" flags. The secondary qualifiers provide the reasoning behind the assignment of a qualifier flag to the data. The secondary qualifiers are presented and defined below.

Attachment 1 lists the changes in data qualifiers, due to the validation process.

The following primary flags were used to qualify the data:

[=] Detected. The analyte was analyzed for and detected at the concentration shown.

[J] Estimated. The analyte was present but the reported value may not be accurate or precise.

[U] Undetected. The analyte was analyzed for but not detected above the method detection limit.

[UJ] Detection limit estimated. The analyte was analyzed for but qualified as not detected; the result is estimated.

[R] Rejected. The data is not useable.

Secondary Qualifier Codes

Code	Definition
2C	Second Column (Confirmation)
2SH	Second Source Accuracy High
2SL	Second Source Accuracy Low
BD	Blank Spike/Blank Spike Duplicate (LCS/LCSD) Precision
BL	Blank
BSH	Blank Spike/LCS Recovery High
BSL	Blank Spike/LCS Recovery Low
CCH	Continuing Calibration Verification Accuracy High
CCL	Continuing Calibration Verification Accuracy Low
DL	Dilution
FD	Field Duplicate
HT	Holding Time
IB	In Between (Metals - B's J's)
ICH	Initial Calibration High
ICL	Initial Calibration Low
ISH	Internal Standard Area Response High
ISL	Internal Standard Area Response Low
LD	Lab Duplicate
LR	Linear Range (Exceeded calibration range)
MD	Matrix Spike/Matrix Spike Duplicate Precision
MSH	Matrix Spike and/or Matrix Spike Duplicate Recovery High
MSL	Matrix Spike and/or Matrix Spike Duplicate Recovery Low
OT	Other
PD	Pesticide Degradation
PSH	Post Spike Recovery High
PSL	Post Spike Recovery Low
RE	Re-extraction
SD	Serial Dilution
SSH	Spiked Surrogate Recovery High
SSL	Spiked Surrogate Recovery Low
TD	Dissolved metal concentration exceeds total metal concentration.
TN	Tune

Table 1 - Chemical Analytical Methods – Field and Quality Control Samples

SDG	Matrix	LabSampleID	SampleID	Sample Type	StationID	Date Collected	EPA 6010B	EPA 7470A	EPA 7471A	EPA 8270C	EPA 8270C Mod	EPA 9060 Mod
72023	WQ	72023-22	EB01	EB	FIELDQC	4/26/04					X	
72023	WQ	72023-23	EB01	EB	FIELDQC	4/26/04	X	X				
72023	WQ	72023-24	EB02	EB	FIELDQC	4/27/04					X	
72023	WQ	72023-25	EB02	EB	FIELDQC	4/27/04	X	X				
72079	WQ	72079-55	EB03	EB	FIELDQC	4/28/04	X	X			X	
72159	WQ	72159-12	EB4	EB	FIELDQC	4/29/04				X		
72159	WQ	72159-13	EB4	EB	FIELDQC	4/29/04	X	X				
72173	WQ	72173-10	EB05	EB	FIELDQC	4/30/04					X	
72173	WQ	72173-11	EB05	EB	FIELDQC	4/30/04	X	X				
72023	SD	72023-1	SD05A	N	SD05	4/27/04	X		X	X		X
72023	SD	72023-2	SD05B	N	SD05	4/27/04	X		X	X		X
72023	SD	72023-3	SD05C	N	SD05	4/27/04	X		X	X		X
72023	SD	72023-4	SD06A	N	SD06	4/27/04	X		X	X		X
72023	SD	72023-5	SD06B	N	SD06	4/27/04	X		X	X		X
72023	SD	72023-6	SD06C	N	SD06	4/27/04	X		X	X		X
72023	SD	72023-7	SD09A	N	SD09	4/27/04	X		X	X		X
72023	SD	72023-8	SD09B	N	SD09	4/27/04	X		X	X		X
72023	SD	72023-9	SD09C	N	SD09	4/27/04	X		X	X		X
72023	SD	72023-10	SD08A	N	SD08	4/27/04	X		X	X		X
72023	SD	72023-11	SD08B	N	SD08	4/27/04	X		X	X		X
72023	SD	72023-12	SD08C	N	SD08	4/27/04	X		X	X		X
72023	SD	72023-13	SD07A	N	SD07	4/26/04	X		X	X		X
72023	SD	72023-14	SD07B	N	SD07	4/26/04	X		X	X		X
72023	SD	72023-15	SD07C	N	SD07	4/26/04	X		X	X		X
72023	SD	72023-16	SD04A	N	SD04	4/26/04	X		X	X		X
72023	SD	72023-17	SD04B	N	SD04	4/26/04	X		X	X		X
72023	SD	72023-18	SD04C	N	SD04	4/26/04	X		X	X		X
72023	SD	72023-19	SD10A	N	SD10	4/26/04	X		X	X		X

Table 1 - Chemical Analytical Methods – Field and Quality Control Samples

SDG	Matrix	LabSampleID	SampleID	Sample Type	StationID	Date Collected	EPA 6010B	EPA 7470A	EPA 7471A	EPA 8270C	EPA 8270C Mod	EPA 9060 Mod
72023	SD	72023-20	SD10B	N	SD10	4/26/04	X		X	X		X
72023	SD	72023-21	SD10C	N	SD10	4/26/04	X		X	X		X
72079	SD	72079-01	SD0100	N	SD0100	4/28/04						X
72079	SD	72079-02	SD0101	N	SD0101	4/28/04						X
72079	SD	72079-03	SD0105	N	SD0105	4/28/04						X
72079	SD	72079-04	SD0106	N	SD0106	4/28/04						X
72079	SD	72079-05	SD0107	N	SD0107	4/28/04						X
72079	SD	72079-06	SD0108	N	SD0108	4/28/04						X
72079	SD	72079-07	SD0109	N	SD0109	4/28/04						X
72079	SD	72079-08	SD0110	N	SD0110	4/28/04						X
72079	SD	72079-09	SD0111	N	SD0111	4/28/04						X
72079	SD	72079-10	SD0112	N	SD0112	4/28/04						X
72079	SD	72079-11	SD0113	N	SD0113	4/28/04						X
72079	SD	72079-12	SD0114	N	SD0114	4/28/04						X
72079	SD	72079-13	SD0115	N	SD0115	4/28/04						X
72079	SD	72079-14	SD02TOC1	N	SD02	4/28/04						X
72079	SD	72079-15	SD02TOC2	N	SD02	4/28/04						X
72079	SD	72079-16	SD02TOC3	N	SD02	4/28/04						X
72079	SD	72079-17	SD02TOC4	N	SD02	4/28/04						X
72079	SD	72079-18	SD02TOC5	N	SD02	4/28/04						X
72079	SD	72079-19	SD02TOC6	N	SD02	4/28/04						X
72079	SD	72079-20	SD02TOC7	N	SD02	4/28/04						X
72079	SD	72079-21	SD03TOC1	N	SD03	4/28/04						X
72079	SD	72079-22	SD03DUP1	FD	SD03	4/28/04						X
72079	SD	72079-23	SD03TOC2	N	SD03	4/28/04						X
72079	SD	72079-24	SD03TOC3	N	SD03	4/28/04						X
72079	SD	72079-25MS	SD03TOC3	MS	SD03	4/28/04						X
72079	SD	72079-25MSD	SD03TOC3	MSD	SD03	4/28/04						X

Table 1 - Chemical Analytical Methods – Field and Quality Control Samples

SDG	Matrix	LabSampleID	SampleID	Sample Type	StationID	Date Collected	EPA 6010B	EPA 7470A	EPA 7471A	EPA 8270C	EPA 8270C Mod	EPA 9060 Mod
72079	SD	72079-26	SD03TOC4	N	SD03	4/28/04						X
72079	SD	72079-27	SD03DUP2	FD	SD03	4/28/04						X
72079	SD	72079-28	SD03TOC5	N	SD03	4/28/04						X
72079	SD	72079-29	SD03TOC6	N	SD03	4/28/04						X
72079	SD	72079-30	SD03TOC7	N	SD03	4/28/04						X
72079	SD	72079-31	SD03DUP3	FD	SD03	4/28/04						X
72079	SD	72079-32	SD03TOC8	N	SD03	4/28/04						X
72079	SD	72079-33MS	SD03TOC8	MS	SD03	4/28/04						X
72079	SD	72079-33MSD	SD03TOC8	MSD	SD03	4/28/04						X
72079	SD	72079-34	SD03TOC9	N	SD03	4/28/04						X
72079	SD	72079-35	SD03TOC10	N	SD03	4/28/04						X
72079	SD	72079-36	SD03TOC11	N	SD03	4/28/04						X
72079	SD	72079-37	SD03TOC12	N	SD03	4/28/04						X
72079	SD	72079-38MS	SD03TOC12	MS	SD03	4/28/04						X
72079	SD	72079-38MSD	SD03TOC12	MSD	SD03	4/28/04						X
72079	SD	72079-39	SD0104	N	SD0104	4/28/04	X		X	X		
72079	SD	72079-40	SD0148	N	SD0148	4/28/04	X		X	X		
72079	SD	72079-41	SD01812	N	SD01812	4/28/04	X		X	X		
72079	SD	72079-42	SD011215	N	SD011215	4/28/04	X		X	X		
72079	SD	72079-43	SD0204	N	SD0204	4/28/04	X		X	X		
72079	SD	72079-44	SD0248	N	SD0248	4/28/04	X		X	X		
72079	SD	72079-45	SD02812	N	SD02812	4/28/04	X		X	X		
72079	SD	72079-46	SD0304	N	SD0304	4/28/04	X		X	X		
72079	SD	72079-47	SD03DUP4	FD	SD0304	4/28/04	X		X	X		
72079	SD	72079-48MS	SD0304	MS	SD0304	4/28/04	X		X	X		
72079	SD	72079-48MSD	SD0304	MSD	SD0304	4/28/04	X		X	X		
72079	SD	72079-49	SD03048	N	SD03048	4/28/04	X		X	X		
72079	SD	72079-50MS	SD03048	MS	SD03048	4/28/04	X		X	X		

Table 1 - Chemical Analytical Methods – Field and Quality Control Samples

SDG	Matrix	LabSampleID	SampleID	Sample Type	StationID	Date Collected	EPA 6010B	EPA 7470A	EPA 7471A	EPA 8270C	EPA 8270C Mod	EPA 9060 Mod
72079	SD	72079-50MSD	SD03048	MSD	SD03048	4/28/04	X		X	X		
72079	SD	72079-51	SD03DUP5	FD	SD03048	4/28/04	X		X	X		
72079	SD	72079-52	SD03812	N	SD03812	4/28/04	X		X	X		
72079	SD	72079-53	SD03DUP6	FD	SD03812	4/28/04	X		X	X		
72079	SD	72079-54	SD031215	N	SD031215	4/28/04	X		X	X		
72159	SD	72159-1	SD11-A	N	SD11	4/29/04	X		X	X		X
72159	SD	72159-2	SD11-B	N	SD11	4/29/04	X		X	X		X
72159	SD	72159-3	SD11-C	N	SD11	4/29/04	X		X	X		X
72159	SD	72159-4	Dup 7	FD	SD11	4/29/04	X		X	X		X
72159	SD	72159-5	Dup 8	FD	SD11	4/29/04	X		X	X		X
72159	SD	72159-6	SD12-A	N	SD12	4/29/04	X		X	X		X
72159	SD	72159-7	SD12-B	N	SD12	4/29/04	X		X	X		X
72159	SD	72159-8	SD12-C	N	SD12	4/29/04	X		X	X		X
72159	SD	72159-9	SD16-A	N	SD16	4/29/04	X		X	X		X
72159	SD	72159-10	SD16-B	N	SD16	4/29/04	X		X	X		X
72159	SD	72159-11	SD16-C	N	SD16	4/29/04	X		X	X		X
72173	SD	72173-1	SD20A	N	SD20	4/30/04	X		X	X		X
72173	SD	72173-2	SD20B	N	SD20	4/30/04	X		X	X		X
72173	SD	72173-3	SD19A	N	SD19	4/30/04	X		X	X		X
72173	SD	72173-4	SD19B	N	SD19	4/30/04	X		X	X		X
72173	SD	72173-5	SD15A	N	SD15	4/30/04	X		X	X		X
72173	SD	72173-6	SD15B	N	SD15	4/30/04	X		X	X		X
72173	SD	72173-7	SD15C	N	SD15	4/30/04	X		X	X		X
72173	SD	72173-8	SD17A	N	SD17	4/30/04	X		X	X		X
72173	SD	72173-9	SD17B	N	SD17	4/30/04	X		X	X		X
72179	SD	72179-1	SD18A	N	SD18	4/29/04	X		X	X		X
72179	SD	72179-2	SD18B	N	SD18	4/29/04	X		X	X		X
72179	SD	72179-3	SD18C	N	SD18	4/29/04	X		X	X		X

Table 1 - Chemical Analytical Methods – Field and Quality Control Samples

SDG	Matrix	LabSampleID	SampleID	Sample Type	StationID	Date Collected	EPA 6010B	EPA 7470A	EPA 7471A	EPA 8270C	EPA 8270C Mod	EPA 9060 Mod
72196	SD	72196-1	SD14A	N	SD14	4/30/04	X		X	X		X
72196	SD	72196-2	SD14B	N	SD14	4/30/04	X		X	X		X
72196	SD	72196-3	SD13B	N	SD13	4/30/04	X		X	X		X
72196	SD	72196-4	SD13A	N	SD13	4/30/04	X		X	X		X
72196	SD	72196-5	SD13C	N	SD13	4/30/04	X		X	X		X

MATRIX CODE

SD – Sediment
WQ – Water QC Samples

SAMPLE TYPE CODE

EB – Equipment Blank
N - Native Sample
FD – Field Duplicate
MS – Matrix Spike
MSD – Matrix Spike Duplicate

Organic Parameters

Quality Control Review

The following list represents the QA / QC measures that were reviewed during the data quality evaluation procedure for organic data.

- **Holding Times** – The holding times are evaluated to verify that samples were extracted and analyzed within holding times.
- **Blank samples** – Method blank equipment blank and trip blank samples were provided for this project. Blank samples enable the reviewer to determine if an analyte may be attributed to sampling or laboratory procedures, rather than environmental contamination from site activities.
- **Surrogate Recoveries** – Surrogate Compounds are added to each sample and the recoveries are used to monitor lab performance and possible matrix interference.
- **Lab Control Sample / Lab Control Sample Duplicate (LCS/LCSD)** – This sample is a "controlled matrix", either laboratory reagent water or Ottawa sand, in which target compounds have been added prior to extraction / analysis. The recoveries serve as a monitor of the overall performance of each step during the analysis, including sample preparation.
- **Matrix Spike/Matrix Spike Duplicate (MS/MSD) Samples** – Spike recovery is used to evaluate potential matrix interferences, as well as accuracy. Precision information is also determined by calculating the reproducibility between the recoveries of each spiked parameter.
- **Field Duplicate Samples** – These samples are collected to determine precision between a native and its duplicate. This information can only be determined when target compounds are detected.

Semi Volatile Organic Compounds (SVOCs) Poly Aromatic Hydrocarbons (PAHs) Analyses

The QA / QC parameters for SVOC / PAH analyses for all of the samples were within acceptable control limits, except as listed below.

Native/Field Duplicate Precision

Native / field duplicate soil precision criteria (<35%) was not met for samples SD0304 / SD03DUP4. The Relative Percent Difference (RPD) for Fluoranthene = 47.9%, and Pyrene = 200.0%. No data were qualified.

Inorganic Parameters

Quality Control Review

The following list represents the QA/QC measures that are typically reviewed during the data quality evaluation procedure for inorganic parameters.

- **Holding Times** – The holding times are evaluated to verify that samples were extracted and analyzed within holding times.
- **Blank samples** – Sample preparation and initial calibration blanks/continuing calibration blanks were provided for this project. Blank samples enable the reviewer to determine if an analyte may be attributed to sampling or laboratory procedures, rather than environmental contamination from site activities.
- **Lab Control Sample (LCS)** – This sample is a "controlled matrix", in which target parameters have been added prior to digestion/analysis. The recoveries serve as a monitor of the overall performance of each step during the analysis, including sample preparation.
- **Pre/Post Digestion Spike (MS/MSD)** – Spike recovery is used to evaluate potential matrix interferences, as well as accuracy. Precision information is also determined by calculating the reproducibility between the recoveries of each spiked parameter.
- **Field Duplicate Samples** – These samples are collected to determine precision between a native and its duplicate. This information can only be determined when target compounds are detected.

Metals Analyses

The QA/QC parameters for the Metals (6010B) analyses for all of the samples were within acceptable control limits, except as listed below.

Matrix Spike/Matrix Spike Duplicate

In native sample SD0304, the MS/MSD results for Antimony were 67%/68%, (QC limits 75%-125%) and Nickel were 77%/71%, (QC limits 75%-125%). Detected results were flagged "J" and non-detected results "UJ", as estimated, in associated samples 72079-39 to 47, 49, and 51 to 55.

In native sample SD03048, the MS/MSD results for Antimony were 65%/67%, (QC limits 75%-125%) and Zinc were 69%/77%, (QC limits 75%-125%). Detected results were flagged "J" and non-detected results "UJ", as estimated, in associated samples 72079-39 to 47, 49, and 51 to 55.

The sample results qualified due to the MS/MSD results are listed in Attachment 1.

Native/Field Duplicate Precision

Native/field duplicate soil precision criteria (<35%) was not met for samples SD0304/SD03DUP4. The Relative Percent Difference (RPD) for Chromium = 75.3%, Copper = 200.0%, Lead = 44.4%, and Nickel = 68.6%. No data were qualified.

Native / field duplicate soil precision criteria (<35%) was not met for samples SD03048 / SD03DUP5. The Relative Percent Difference (RPD) for Lead = 200.0%. No data were qualified.

General Chemistry Analyses (TOC)

The QA / QC parameters for the General Chemistry analyses listed above, were within acceptable control limits, except as listed below.

Matrix Spike/Matrix Spike Duplicate

In native sample SD03TOC3, the MS / MSD results for TOC were 58% / 68%, (QC limits 75%-125%). Detected results were flagged "J" and non-detected results "UJ", as estimated, in associated samples 72079-01 to 24, 26 to 32, and 34 to 37.

In native sample SD03TOC12, the MS / MSD results for TOC were 55% / 63%, (QC limits 75%-125%). Detected results were flagged "J" and non-detected results "UJ", as estimated, in associated samples 72079-01 to 24, 26 to 32, and 34 to 37.

The sample results qualified due to the MS / MSD results are listed in Attachment 1.

Native/Field Duplicate Precision

Native / field duplicate soil precision criteria (<35%) was not met for samples SD03TOC4 / SD03DUP2. The Relative Percent Difference (RPD) for TOC = 50.0%. No data were qualified.

Rejected Data

No data were rejected based upon the validation process for this sampling event.

Conclusion

A review of the analytical data submitted regarding the investigation of Saugus Iron Works by CH2M HILL has been completed. An overall evaluation of the data indicates that the sample handling, shipment, and analytical procedures have been adequately completed, and that the analytical results should be considered usable as qualified.

The analytical data had minor QC concerns as indicated above, however, it did not affect data usability for those specific results. The validation review demonstrated that the analytical systems were generally in control and the data results can be used in the decision making process.

Attachment 1 - Changed Qualifiers and Results
Saugus Iron Works - Data Validation June 2004.

Parameter Class	Analytical Method	Parameter	SDG	Sample ID	Lab Sample ID	Matrix	Lab Result	Lab Qual	Final Result	Final Qual	Units	Reasons
Metals	6010B	Antimony	72079	SD0104	72079-39	SS	1.2	U	1.2	UJ	mg/Kg	MSL
Metals	6010B	Nickel	72079	SD0104	72079-39	SS	18	=	18	J	mg/Kg	MSL
Metals	6010B	Zinc	72079	SD0104	72079-39	SS	61	U	61	UJ	mg/Kg	MSL
Metals	6010B	Antimony	72079	SD0148	72079-40	SS	1.4	U	1.4	UJ	mg/Kg	MSL
Metals	6010B	Nickel	72079	SD0148	72079-40	SS	22	=	22	J	mg/Kg	MSL
Metals	6010B	Zinc	72079	SD0148	72079-40	SS	70	U	70	UJ	mg/Kg	MSL
Metals	6010B	Antimony	72079	SD01812	72079-41	SS	1.2	U	1.2	UJ	mg/Kg	MSL
Metals	6010B	Nickel	72079	SD01812	72079-41	SS	15	=	15	J	mg/Kg	MSL
Metals	6010B	Zinc	72079	SD01812	72079-41	SS	61	U	61	UJ	mg/Kg	MSL
Metals	6010B	Antimony	72079	SD011215	72079-42	SS	1.3	U	1.3	UJ	mg/Kg	MSL
Metals	6010B	Nickel	72079	SD011215	72079-42	SS	13	U	13	UJ	mg/Kg	MSL
Metals	6010B	Zinc	72079	SD011215	72079-42	SS	64	U	64	UJ	mg/Kg	MSL
Metals	6010B	Antimony	72079	SD0204	72079-43	SS	1.7	U	1.7	UJ	mg/Kg	MSL
Metals	6010B	Nickel	72079	SD0204	72079-43	SS	20	=	20	J	mg/Kg	MSL
Metals	6010B	Zinc	72079	SD0204	72079-43	SS	160	=	160	J	mg/Kg	MSL
Metals	6010B	Antimony	72079	SD0248	72079-44	SS	1.4	U	1.4	UJ	mg/Kg	MSL
Metals	6010B	Nickel	72079	SD0248	72079-44	SS	38	=	38	J	mg/Kg	MSL
Metals	6010B	Zinc	72079	SD0248	72079-44	SS	68	U	68	UJ	mg/Kg	MSL
Metals	6010B	Antimony	72079	SD02812	72079-45	SS	1.5	U	1.5	UJ	mg/Kg	MSL
Metals	6010B	Nickel	72079	SD02812	72079-45	SS	19	=	19	J	mg/Kg	MSL
Metals	6010B	Zinc	72079	SD02812	72079-45	SS	74	U	74	UJ	mg/Kg	MSL
Metals	6010B	Antimony	72079	SD0304	72079-46	SS	2.1	U	2.1	UJ	mg/Kg	MSL
Metals	6010B	Nickel	72079	SD0304	72079-46	SS	47	=	47	J	mg/Kg	MSL
Metals	6010B	Zinc	72079	SD0304	72079-46	SS	130	=	130	J	mg/Kg	MSL
Metals	6010B	Antimony	72079	SD03DUP4	72079-47	SS	1.5	U	1.5	UJ	mg/Kg	MSL
Metals	6010B	Nickel	72079	SD03DUP4	72079-47	SS	23	=	23	J	mg/Kg	MSL
Metals	6010B	Zinc	72079	SD03DUP4	72079-47	SS	97	=	97	J	mg/Kg	MSL
Metals	6010B	Antimony	72079	SD03048	72079-49	SS	1.3	U	1.3	UJ	mg/Kg	MSL
Metals	6010B	Nickel	72079	SD03048	72079-49	SS	21	=	21	J	mg/Kg	MSL
Metals	6010B	Zinc	72079	SD03048	72079-49	SS	63	U	63	UJ	mg/Kg	MSL

Parameter Class	Analytical Method	Parameter	SDG	Sample ID	Lab Sample ID	Matrix	Lab Result	Lab Qual	Final Result	Final Qual	Units	Reasons
Metals	6010B	Antimony	72079	SD03DUP5	72079-51	SS	1.4	U	1.4	UJ	mg/Kg	MSL
Metals	6010B	Nickel	72079	SD03DUP5	72079-51	SS	26	=	26	J	mg/Kg	MSL
Metals	6010B	Zinc	72079	SD03DUP5	72079-51	SS	71	U	71	UJ	mg/Kg	MSL
Metals	6010B	Antimony	72079	SD03812	72079-52	SS	1.4	U	1.4	UJ	mg/Kg	MSL
Metals	6010B	Nickel	72079	SD03812	72079-52	SS	14	U	14	UJ	mg/Kg	MSL
Metals	6010B	Zinc	72079	SD03812	72079-52	SS	71	U	71	UJ	mg/Kg	MSL
Metals	6010B	Antimony	72079	SD03DUP6	72079-53	SS	1.3	U	1.3	UJ	mg/Kg	MSL
Metals	6010B	Nickel	72079	SD03DUP6	72079-53	SS	13	U	13	UJ	mg/Kg	MSL
Metals	6010B	Zinc	72079	SD03DUP6	72079-53	SS	64	U	64	UJ	mg/Kg	MSL
Metals	6010B	Antimony	72079	SD031215	72079-54	SS	1.1	U	1.1	UJ	mg/Kg	MSL
Metals	6010B	Nickel	72079	SD031215	72079-54	SS	14	=	14	J	mg/Kg	MSL
Metals	6010B	Zinc	72079	SD031215	72079-54	SS	57	U	57	UJ	mg/Kg	MSL
Gen Chem	9060	Total Organic Carbon	72079	SD0100	72079-01	SS	>320000	=	>320000	J	mg/Kg	MSL
Gen Chem	9060	Total Organic Carbon	72079	SD0101	72079-02	SS	350	=	350	J	mg/Kg	MSL
Gen Chem	9060	Total Organic Carbon	72079	SD0105	72079-03	SS	730	=	730	J	mg/Kg	MSL
Gen Chem	9060	Total Organic Carbon	72079	SD0106	72079-04	SS	890	=	890	J	mg/Kg	MSL
Gen Chem	9060	Total Organic Carbon	72079	SD0107	72079-05	SS	13000	=	13000	J	mg/Kg	MSL
Gen Chem	9060	Total Organic Carbon	72079	SD0108	72079-06	SS	110000	=	110000	J	mg/Kg	MSL
Gen Chem	9060	Total Organic Carbon	72079	SD0109	72079-07	SS	1300	=	1300	J	mg/Kg	MSL
Gen Chem	9060	Total Organic Carbon	72079	SD0110	72079-08	SS	86000	=	86000	J	mg/Kg	MSL
Gen Chem	9060	Total Organic Carbon	72079	SD0111	72079-09	SS	140000	=	140000	J	mg/Kg	MSL
Gen Chem	9060	Total Organic Carbon	72079	SD0112	72079-10	SS	3600	=	3600	J	mg/Kg	MSL
Gen Chem	9060	Total Organic Carbon	72079	SD0113	72079-11	SS	8200	=	8200	J	mg/Kg	MSL
Gen Chem	9060	Total Organic Carbon	72079	SD0114	72079-12	SS	1700	=	1700	J	mg/Kg	MSL
Gen Chem	9060	Total Organic Carbon	72079	SD0115	72079-13	SS	190	=	190	J	mg/Kg	MSL
Gen Chem	9060	Total Organic Carbon	72079	SD02TOC1	72079-14	SS	>74000	=	>74000	J	mg/Kg	MSL
Gen Chem	9060	Total Organic Carbon	72079	SD02TOC2	72079-15	SS	82000	=	82000	J	mg/Kg	MSL
Gen Chem	9060	Total Organic Carbon	72079	SD02TOC3	72079-16	SS	37000	=	37000	J	mg/Kg	MSL
Gen Chem	9060	Total Organic Carbon	72079	SD02TOC4	72079-17	SS	27000	=	27000	J	mg/Kg	MSL
Gen Chem	9060	Total Organic Carbon	72079	SD02TOC5	72079-18	SS	8200	=	8200	J	mg/Kg	MSL

Parameter Class	Analytical Method	Parameter	SDG	Sample ID	Lab Sample ID	Matrix	Lab Result	Lab Qual	Final Result	Final Qual	Units	Reasons
Gen Chem	9060	Total Organic Carbon	72079	SD02TOC6	72079-19	SS	30000	=	30000	J	mg/Kg	MSL
Gen Chem	9060	Total Organic Carbon	72079	SD02TOC7	72079-20	SS	77000	=	77000	J	mg/Kg	MSL
Gen Chem	9060	Total Organic Carbon	72079	SD03TOC1	72079-21	SS	22000	=	22000	J	mg/Kg	MSL
Gen Chem	9060	Total Organic Carbon	72079	SD03DUP1	72079-22	SS	25000	=	25000	J	mg/Kg	MSL
Gen Chem	9060	Total Organic Carbon	72079	SD03TOC2	72079-23	SS	470000	=	470000	J	mg/Kg	MSL
Gen Chem	9060	Total Organic Carbon	72079	SD03TOC3	72079-24	SS	17000	=	17000	J	mg/Kg	MSL
Gen Chem	9060	Total Organic Carbon	72079	SD03TOC4	72079-26	SS	140000	=	140000	J	mg/Kg	MSL
Gen Chem	9060	Total Organic Carbon	72079	SD03DUP2	72079-27	SS	84000	=	84000	J	mg/Kg	MSL
Gen Chem	9060	Total Organic Carbon	72079	SD03TOC5	72079-28	SS	240000	=	240000	J	mg/Kg	MSL
Gen Chem	9060	Total Organic Carbon	72079	SD03TOC6	72079-29	SS	360000	=	360000	J	mg/Kg	MSL
Gen Chem	9060	Total Organic Carbon	72079	SD03TOC7	72079-30	SS	13000	=	13000	J	mg/Kg	MSL
Gen Chem	9060	Total Organic Carbon	72079	SD03DUP3	72079-31	SS	15000	=	15000	J	mg/Kg	MSL
Gen Chem	9060	Total Organic Carbon	72079	SD03TOC8	72079-32	SS	28000	=	28000	J	mg/Kg	MSL
Gen Chem	9060	Total Organic Carbon	72079	SD03TOC9	72079-34	SS	1800	=	1800	J	mg/Kg	MSL
Gen Chem	9060	Total Organic Carbon	72079	SD03TOC10	72079-35	SS	1900	=	1900	J	mg/Kg	MSL
Gen Chem	9060	Total Organic Carbon	72079	SD03TOC11	72079-36	SS	2300	=	2300	J	mg/Kg	MSL
Gen Chem	9060	Total Organic Carbon	72079	SD03TOC12	72079-37	SS	1500	=	1500	J	mg/Kg	MSL