EAST MARINE VIEW DRIVE WIDENING
AND
LEGION MEMORIAL GOLF COURSE IMPROVEMENT

INDEPENDENT REMEDIAL ACTION REPORT

City of Everett Public Works and Parks and Recreation Departments
EVERETT, WASHINGTON

Prepared for:
Mr. Dave Davis, Public Works Department
and
Mr. Jay Magill, Parks and Recreation Department
City of Everett
Everett, Washington

Prepared By:
Hydrometrics, Inc.
5219 N. Shirley Street, Suite 100
Ruston, WA 98407

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OVERVIEW AND SUMMARY

An independent remedial action was conducted by the City of Everett Public Works and Parks and Recreation Departments (City) for two public transportation and recreation projects in Everett, Washington. Both projects are located within a Model Toxics Control Act (MTCA) study area that is known to have arsenic-contaminated soil, referred to as the Everett Smelter Site. The two projects are the East Marine View Drive Widening project and the Legion Memorial Golf Course Improvement project. Figure 1 depicts the site locations of the two projects and the current MTCA study area boundary.

BACKGROUND

After project planning and design had begun, the City learned that the project sites were in the Everett Smelter Site. Ecology is in the process of developing a cleanup action plan (CAP) for the Everett Smelter Site and did not see a need to delay these two important public works projects while the plan for the entire site is completed (agency correspondence is provided in Appendix B to this report). It is expected that the actions described in this report will ultimately be incorporated into Ecology's final CAP.

Ecology considers these two projects to be independent interim actions (Ecology April 1, 1997 Letter to City, Appendix B). As encouraged by Ecology, City staff coordinated their planning on these projects with the site investigation and cleanup planning underway for the Everett Smelter Site. The remedial actions that were implemented in conjunction with these two projects have been designed to be consistent with the remedial actions being considered for the overall smelter site and to enable Ecology to review an independent remedial action report and to issue a "No Further Action" letter upon completion of these two projects.

PROJECT DESCRIPTION AND REMEDIAL ACTIONS PERFORMED

East Marine View Drive serves as a major arterial that connects north Snohomish County at Broadway with the Everett waterfront. The City's comprehensive plan adopted under the Growth Management Act identifies the need to widen East Marine View Drive to provide additional transportation capacity to the Everett waterfront and is a key component and the last transportation improvement for the U.S. Navy Homeport project at Everett. The widening is identified as a mitigation measure in the Homeport environmental impact statement and is being funded with state and federal funds.

The East Marine View Drive project consists of widening the roadway from two lanes to three and four lanes to five from approximate Stations 10 (east) to 54 (west) as shown in Figure 2. The roadway was widened approximately 10 to 12 feet on both the north and south sides of the existing roadway. The south side was cut while the north side required fill. A sidewalk was constructed along the north side.

The remedial work was accomplished as part of the construction of the roadway project. Most excavated soil with arsenic concentrations above MTCA Method A residential soil cleanup levels was used for backfill or for subgrade bed for the widened roadway. Approximately 1,650 cubic yards of excavated soil was stockpiled and then transported to the ASARCO Incorporated (Asarco) Smelter Site in Tacoma, Washington. Utility trenches were backfilled with clean material. Table 1 summarizes activities performed, explains any differences from the work plan, and provides completion dates for various project subtasks. The project was completed in November, 1998.

The Legion Memorial Golf Course project consisted of repairing and rehabilitating the 145 acre golf course to support the needs of a growing population. The improvements implemented the Legion Golf Course Master Plan, approved in 1996, and the Parks and Recreation Comprehensive Plan, amended in 1996. The improvements consisted of re-locating greens, re-grading fairways and tees, landscaping, and improving drainage. An

addition to the clubhouse was constructed along with expanding the size of the parking lot.

The remedial work was accomplished as part of the regrading of the golf course renovations. In general, as greens and tees were rebuilt and fairways regraded, four-to-six inches of sand, followed by topsoil and sod, were used to cap the underlying soils. All excavated soil with arsenic concentrations above MTCA Method A residential soil cleanup levels were incorporated into the landscaping under berms and mounds in the rough. Utility trenches were backfilled with clean material. Confirmational monitoring will be conducted in the new drainage ponds (see Section 1.6). Table 2 summarizes activities performed, explains any differences from the work plan, and provides completion dates for various project subtasks. It is anticipated that all construction activities will be completed in early 1999. Remaining tasks are not directly associated with remedial activities and therefore, do not affect submittal of this independent remedial action report.

Before proceeding with the two projects and development of the remedial design work plans, Ecology suggested that the City characterize the arsenic and lead concentrations in soils more thoroughly than existing data allowed. The City retained Hydrometrics, Inc. to complete soil sampling in order to more completely characterize both site locations and develop independent remedial action work plans (Hydrometrics 1996 and Hydrometrics 1997). Each work plan was submitted to Ecology and included the laboratory data and tasks that would be completed to provide appropriate remedial actions. Appropriate remedial actions were discussed between the City and Ecology to ensure that they would be consistent with the remedial actions being considered in the CAP for the Everett Smelter Site. Public and agency review was also provided on both projects through the SEPA process (see Section 2.2 and Appendix F).

Consistent with Ecology's technical advice, the remedial actions performed reduced or eliminated short and long term potential for exposure to arsenic-contaminated soils. In addition, the actions do not affect or foreclose cleanup options for the remaining Everett Smelter Site.

REPORT FORMAT

This report describes the work conducted during the construction activities performed at both projects and was prepared using the Independent Remedial Action Program (IRAP) guidelines set forth in Ecology guidance (Ecology 1994). This program, also called the voluntary cleanup program, allows Ecology to issue a "No Further Action" letter and to re-designate sites upon satisfactory review of the project's remedial actions.

Ecology's IRAP guidance for reports contains two sections. Section 1 of the report provides minimum information required for Ecology's review while Section 2 provides additional information on groundwater, regulatory records/permits, hazardous substance management, and corrective actions at dangerous waste facilities. Ecology's IRAP guidance also requires the completion of the Site Summary Form which is included in Appendix A. Relevant correspondence that occurred with agencies is included as Appendix B.

TABLE 1
EAST MARINE VIEW DRIVE
COMPLETED REMEDIAL WORK PLAN
TASK SCHEDULE

Task Completed	Date Task Completed	Comparison To Work Plan
• Conducted 24 hour safety training for workers coming in contact with soils and an additional 8 hours for supervisors.	• August, 1997	• Same
• Trees, brush, and shrubs were cut at the ground surface and reused as hog fuel.	• September, 1997 and March, 1998	• Same
• Excavated stumps, removed clinging soil, and reused as hog fuel.	• September to October, 1997 and February to March, 1998	• Same
• Stripped organic material, sampled the stockpile, and transported to Tacoma Smelter.	• Stripped on September, 1997 and March, 1998 and hauled on June, 1998	• Upon receiving approval from EPA and Ecology, the organic material classified as problem waste was managed at Tacoma Smelter rather than a Subtitle D facility.
• Reused excavated soil from the south side as backfill on the north side. • Excavated clean glacial till (estimated 12,000 cy) for reuse by the City (estimated 5,000 cy) and the Port of Everett (estimated 7,000 cy). • Nine till samples were collected from test pits prior to excavation with additional samples being collected from the stockpile at the Port of Everett's Baywood site.	• September, 1997 to November, 1997 • March to May, 1998 • Test pit samples were collected August, 1996. Stockpile samples were collected twice in June, 1998.	• Approximately 4,700 cubic yards (cy) was removed from the south side. About 2,000 cy was used as fill on the north side per plan. Because the project needed more imported structural fill than originally anticipated, not all of the soil could be reused on-site. Approximately 1,000 cy was glacial till with arsenic concentrations below 20 ppm and was stockpiled at the Port of Everett for reuse (see next bullet). The remaining 1,700 cy was topsoil classified as problem waste and was managed with the organic material, because sampling indicated that arsenic concentrations were greater than 20 ppm. This material went to the Tacoma Smelter facility (see previous bullet). • Approximately 14,000 cy of clean glacial till was excavated for reuse (4,000 cy stockpiled at the City's old landfill and 10,000 cy stockpiled at the Port of Everett). • Till samples were not collected every 50 linear feet. An initial nine samples were collected prior to excavation with subsequent samples being collected from the Port of Everett stockpile.

TABLE 1 Continued
EAST MARINE VIEW DRIVE
COMPLETED WORK PLAN TASK SCHEDULE

Task Completed	Date Task Completed	Comparison To Work Plan
• The storm drain and natural gas trenches were excavated and backfilled with clean import material.	• September to November, 1997	• Same
• Capped entire roadway and installed a shallow groundwater interceptor drain.	• September, 1997 to July, 1998	• Same
• Applied water suppressant for dust control.	• July, 1998	• Same
• Conducted air quality monitoring.	• Twice in September, 1997 and once in May, 1998.	• Same
• Did not disturb soils in ROW currently under structures or impermeable barriers.	• November, 1998	• Same
• Did not disturb soils covered with an impervious surface in residential properties that are adjacent to the roadway.	• November, 1998	• Same
• No brick or debris were encountered during excavation.	• NA.	• NA
• Implemented institutional controls.	• Ongoing.	• Same

TABLE 2
LEGION MEMORIAL GOLF COURSE
COMPLETED REMEDIAL WORK PLAN
TASK SCHEDULE

Task Completed	Date Task Completed	Comparison To Work Plan
• Conducted 24 safety training for workers coming in contact with soils and an additional 8 hours for supervisors.	• June, 1997	• Same
• *Drain tile trenches were excavated and backfilled with clean import material.	• June, 1998	• Same
• *Installed and routed drain tile to collector lines and drainage ponds to capture surface water infiltration and to discharge into the City's secondary treatment plant.	• June, 1998	• Same
• *Any trees, shrubs, and bushes that required removal were relocated on-site.	• Early 1999	• Same
• At least four inches of sand along with top soil and sod were added to the fairways, greens, and tees.	• June, 1998	• Fairway 12 will be top dressed periodically rather than being capped.
• Covered sample location S302 (identified in the work plan) near the main parking lot with asphalt while expanding the parking lot.	• September, 1997	• The area near sample location S201 (identified in the work plan) was not covered with asphalt because the City elected not to construct the trailer parking lot.
• Soils were not disposed off-site; therefore, waste categories were not an issue.	• NA	• NA
• *Conducted air quality monitoring.	• Three times in June, 1997; five times in July, 1997; five times in August, 1997; and once in September, 1997.	• Same
• Implemented institutional controls including a deed restriction.	• Fall/Winter, 1998	• Same
• The three drainage ponds will be sampled annually and analyzed for arsenic for the next five years.	• December, 1998 to December, 2002	• Same

* Added to work plan prior to commencement of work.

SECTION ONE

1.0 PROJECT BACKGROUND / SITE DESCRIPTION

The East Marine View Drive project consisted of widening the current two lane portion of the roadway to three lanes and the current four lane to five lanes from Stations 10 (east) to 54 (west) as shown in Figure 2 and constructing a sidewalk along the north side. The roadway was widened approximately 10 to 12 feet on both the north and south sides of the existing roadway. Generally, the south side was cut while the north side required fill. The widening was necessary to provide additional transportation capacity to the Everett waterfront and is the last transportation improvement for the U.S. Navy Homeport project at Everett.

The Legion Memorial Golf Course project consisted of repairing and rehabilitating the 145 acre golf course to support the needs of a growing population. The improvements consisted of re-grading the fairways, adding new tees and greens, adding new sand traps, and improving the drainage system. The clubhouse was remodeled to include additional restaurant space and the parking lot was expanded.

Additional project background is presented in the Overview and Summary. The Site Summary Form is included as Appendix A, as noted above.

1.0.1 Location

A.1. Site Name - East Marine View Drive Widening Project.

B.1. Current Land Use - public street; Zoned: M-2 (heavy manufacturing).

C.1. Street Address - East Marine View Drive from Alverson Boulevard to Broadway.

D.1. Phone Number - (425) 257-8800; Dave Davis, Public Works Department.

E.1. Map of Site Location - see Figure 1.

A.2. Site Name - Legion Memorial Golf Course Improvement Project.

B.2. Current Land Use - public park; Zoned: Park.

C.2. Street Address - 144 West Marine View Drive.

D.2. Phone Number - (425) 257-8300; Jay Magill, Parks and Recreation Department.

E.2. Map of Site Location - see Figure 1.

1.0.2 Topography and Geology

A. Site Diagram

Both projects are located in northeast Everett (see Figure 1). The East Marine View Drive project begins at approximate Station 10 (west) and extends east to approximate Station 54. Legion Memorial Golf Course is an 18 hole course with a clubhouse and parking lot that comprises approximately 145 acres. A large segment of the East Marine View Drive project (approximate Stations 10 to 34) is adjacent to the northern boundary of the Legion Memorial Golf Course.

Several figures were needed to provide the requested information for site diagrams in a legible form. A brief overview of these figures may assist the reader:

- Figures 2 through 6 are large-scale figures (see pockets at end of report) showing the projects as-builts, utilities with clean backfill, the topography, and the sampling locations. The first three figures show the site following construction, Figure 5 shows the site prior to construction, and Figure 6 shows the layout before and after construction.

- Figures 7 through 14 show the arsenic concentrations in soil. Figures 7 through 10 show arsenic concentration contour lines based on sampling results prior to project construction, and will, therefore, not reflect the exact depth under current (post-project) conditions. Figures 11 through 13 show the location of residual contamination, which reflects current conditions. Figure 14 shows the stockpile sampling locations. The current golf course layout is also shown in relation to the isopleths on Figures 7 through 10. This information was included on these figures so that they can be used in the future to help locate the isopleths on the site, if necessary, even though the contaminated soils are actually at a greater depth than shown (because of the capping work described in this report and shown on other figures).

The following provides a more detail description of Figures 2 through 5. Figure 2 shows the site diagram for the East Marine View Drive project as constructed including:

- Site boundary.
- Area that is capped with asphalt and concrete.
- Surface structures including a newly constructed rock wall and retaining wall.

Figure 3 shows the site diagram for Legion Memorial Golf Course as constructed including:

- Site boundary.
- Newly constructed drainage ponds (areas of excavation).
- Newly constructed fairways, greens, tees, and sand traps (areas of excavation and capped areas).
- Clubhouse.
- Expanded parking lot (capped area).

Figure 4 shows new utility trenches that were excavated and backfilled with clean import material for both projects. These utility trenches comprise the relevant subsurface structures. The East Marine View Drive area had the following utilities installed with clean backfill:

- Storm drain line.
- Storm drain line /groundwater interceptor drain.
- Natural gas line.

Legion Memorial Golf Course had the following utilities installed with clean backfill:

- Drain tile associated with the three drainage ponds.
- PUD/GTE lines.
- Interceptor drain lines (note that these lines were installed prior to the recent construction activities).

Figure 5 shows the site surface topography prior to completing these two projects (note that data are not currently available for a small area along East Marine View Drive). A steep bluff exists north of East Marine View Drive. The remaining site generally slopes gently down from the eastern portion of the golf course toward the northeast, north, northwest, and west.

B. Site Soil Types

Soil within the project area is characterized as glacial sediments deposited during the last advance of glaciers. Generally, the project locations are underlain by a thick layer of glacial till over by a deeper sequence of advance outwash deposits. The till is covered at the surface by a layer of fill comprised of silt, and sand and gravel (Hydrometrics 1995).

In the golf course, samples were collected to a depth of two feet and the lithology was not logged. For the East Marine View Drive project, three borings were advanced to depths up to 24.5 feet (GeoEngineers 1995). In addition, GeoEngineers also advanced 30 shallow hand borings (GeoEngineers 1996). The hand boring logs were attached as Appendix A in the East Marine View Drive Independent Remedial Action work plan (Hydrometrics, 1996).

C. Other Site Information

Surface water was not identified at either project location. The only surface water features that exists in the site are the three new drainage ponds constructed by the City for the golf course (identified as lakes in Figure 3). Surface water runoff is generally collected in catch basins or the ponds which is routed through the combined storm-sanitary sewer to the Everett Sewage Treatment Plant.

Shallow groundwater was not encountered at any locations. Only one boring from GeoEngineers investigation indicated groundwater at a depth of 17 feet. However, GeoEngineers stated that groundwater conditions will fluctuate seasonally and a perched groundwater condition could be expected along a portion of East Marine View Drive. Therefore, the City installed a groundwater interceptor drain along this portion of East Marine View consisting of a french drain (see Figure 4). Groundwater was not noted in the french drain during construction.

1.1 RELEASE INFORMATION / SITE CHARACTERIZATION

A. Release Information

Background information regarding contaminant releases and site characterization relative to the Everett Smelter Site is contained in the Everett Smelter Site Remedial Investigation (Hydrometrics 1995) and supplemental studies (Ecology 1998). Prior to commencing the East Marine View Drive and Legion Memorial Golf Course projects, the City learned that

some portion of both projects were located within the Everett Smelter Site. In November, 1997, Ecology expanded the study area based on data it collected which resulted in the entire area of both projects being located within the Everett Smelter Site as shown in Figure 1.

Upon learning the projects were located within the Everett Smelter Site, the City undertook further site characterization. GeoEngineers and Hydrometrics performed pre-remedial sampling investigations followed by the development of independent remedial action work plans for both projects (Hydrometrics 1996 and Hydrometrics 1997). Section 2.1 in both of these work plans present soil data collected and subsequent site characterization. The work plans, developed in consultation with Ecology, were submitted to Ecology. In addition, any pre-remedial sampling data collected after the submittal of the work plans was submitted to Ecology (see Section 1.2).

Samples were collected from a total of 59 locations at the East Marine View Drive site and 120 locations at the Legion Memorial Golf Course. Data is summarized in Tables 3 and 4 for East Marine View Drive and Legion Memorial Golf Course, respectively. Sampling locations for both projects are shown in Figure 6.

B. Contaminants of Concern

Contaminants of concerns for both projects are arsenic and lead in soil.

C. Extent of Contamination

Soil is the media affected by the contaminants of concern. Soil data is discussed in more detail in Section 1.2. Generally, most of the southern side of the East Marine View Drive site has arsenic concentrations greater than Method A residential soil cleanup levels to at least four feet in depth in some areas. Most of the northern side of East Marine View Drive does not have arsenic concentrations greater than Method A residential soil cleanup levels until approximately Station 30. Here, arsenic extends to a depth of at least two feet in some areas. Significant data was not collected below depths of four feet on the south

side and below two feet on the north side because native till was encountered below these depths. A summary of the data is listed in Table 3.

Approximately one-third to one-half of Legion Memorial Golf Course had arsenic concentrations greater than Method A residential soil cleanup levels, depending on the soil depth. In general, most of the soil with arsenic concentration that is greater than Method A residential soil cleanup levels is on the upper, northeastern portion of the course within the top 12 inches. Along the eastern edge (including short holes 12 and 13), arsenic concentrations greater than Method A residential soil cleanup levels have been detected to depths of at least four feet. A summary of the data is listed in Table 4.

Pre-construction arsenic iso-contours for both projects for depths of 0 to 6 inches, 6 to 12 inches, 12 to 18 inches, and greater than 18 inches are shown on Figures 7 through 10 respectively. The methodology for establishing iso-contours is described in Appendix C of the Legion Memorial Golf Course Independent Remedial Action work plan (Hydrometrics 1997).

Please note that although these data were obtained prior to the project, the current golf course layout is shown in relation to the isopleths on Figures 7 through 10. It would have been confusing to show the data relative to physical features that no longer exist, especially for agency staff and maintenance personnel who did not know the golf course layout prior to its renovation. This information was included on these figures so that the figures can be useful in the future to help locate the isopleths on the site, if necessary, even though the contaminated soils are actually at a somewhat greater depth than shown.

Laboratory data indicates that a few isolated areas contain lead concentrations greater than Method A residential soil cleanup levels, mostly along East Marine View Drive. However, sufficient occurrences were not detected to generate meaningful figures for lead iso-contours. In addition, isolated areas that contain lead concentrations greater than

Method A residential soil cleanup levels generally contain arsenic concentrations greater than Method A residential soil cleanup levels.

D. Sensitive Species or Environments

No known sensitive species or environments are threatened by the arsenic and lead concentrations detected in soils.

E. Potential Threats to Public Health

For greater discussion on potential threats to public health, see the Everett Smelter Site Remedial Investigation (Hydrometrics 1995). With respect to these two City projects, Ecology determined that these projects were independent interim actions (Ecology April 1, 1997 Letter to City, see Appendix B); interim actions are taken to reduce potential threats to human health and the environment (WAC 173-340-430(1)).

1.2 PREVIOUS INVESTIGATIONS

Pre-remedial sampling information in addition to the Everett Smelter Site studies (Hydrometrics 1995), the independent remedial work plans (Hydrometrics 1996 and Hydrometrics 1997), and supplemental studies (Ecology 1998) includes test pit sampling on the south side of East Marine View Drive and Asarco's analyses of archived Legion Memorial Golf Course samples (see Appendix B).

1.3 SELECTION OF CLEANUP STANDARDS

A. Cleanup Levels

In a letter from Ecology to the City dated December 18, 1995, Ecology stated the cleanup level for the site was 7 parts per million (ppm) for arsenic (based on background levels) and 250 ppm for lead (based on Method A residential soil cleanup level) (see Appendix B). In 1996, Ecology changed the cleanup level for arsenic to Method A which

established a cleanup level of 20 ppm. Therefore, the resulting cleanup level for arsenic in soil is 20 ppm and 250 ppm for lead.

The cleanup level is one component of the cleanup standard. As part of the establishment of cleanup standards and selection of remedy in the CAP, an action level establishes contaminant concentrations related to site specific remedial activities, including any institutional controls. Ecology has not yet established final action levels for different areas in the Everett Smelter Site, such as residential properties, right-of-ways, commercial sites, parks, and industrial sites; these will be identified in Ecology's CAP.

B. Points of Compliance

As noted in Section 1.1 A, the entire site including East Marine View Drive and Legion Memorial Golf Course is within the Everett Smelter Site. Although the point of compliance would be a depth of 15 feet as specified in WAC 173-340-740(6)(c), cleanup actions that involve containment will not be met at that depth, as noted in WAC 173-340-740(6)(d). The cleanup may be determined to meet cleanup standards under this section if the remedial action includes long term monitoring and institutional controls.

C. ARARs

Snohomish Health District regulates the management of material classified as problem waste. The Snohomish Health District has defined problem waste as soil from the Everett Smelter Site Study Area that contains contaminant concentrations above state cleanup levels and below state dangerous waste levels. Therefore, soils may be classified as problem wastes if all of the following conditions are met:

- Soil is excavated and managed off-site.
- Soil contains concentrations above the MTCA Method A residential soil cleanup levels of 20 ppm arsenic or 250 ppm lead.

- Soil contains arsenic concentrations below 760 ppm based on arsenic trioxide and lead concentrations below 10,000 ppm (state dangerous waste levels based on book designation, WAC 173-303-100 (5)(b)).

1.4 EXPLANATION OF REMEDIAL ACTIONS TAKEN AND RATIONALE FOR SELECTING THE REMEDIAL ACTION

A. Remedial Action Selected

The independent remedial action work plans identified remedial actions to be performed by the City based on available soil data and informal consultation with Ecology. A combination of remedial technologies were employed. These tasks are summarized in Tables 1 and 2 for East Marine View Drive and Legion Memorial Golf Course, respectively. In summary, the main remedial actions performed by the City involves:

- Reuse of soils with arsenic concentrations above 20 ppm in appropriate locations for backfill or subgrade bed at both project sites.
- Separation and reuse of glacial till excavated from the East Marine View Drive project site and tested for contamination.
- Off-site disposal at an approved facility for soil determined not to be suitable for reuse.
- The use of engineering controls by containing (i.e., capping) East Marine View Drive with asphalt or concrete for the main roadway and topsoil and sod or landscaping material for some of the right-of-way area.
- The use of engineering controls by containing (i.e., capping) the fairways, greens, and tees (except for fairway 12), at Legion Memorial Golf Course with a minimum of four to six inches of sand, topsoil, and sod.
- Backfilling utility trenches with clean material.
- Long-term monitoring and institutional controls (see Section 1.5).

Capping was determined appropriate for both projects due to the large volumes of problem waste that would be generated in a removal action that contain relatively low levels of hazardous substances (WAC 173-340-360 (9)(c)).

Most of the specific information regarding the performance of the remedial actions specified in the work plans are provided in Tables 1 and 2. The following subsections provide additional background or information on these tasks.

B. Reuse and Engineering Controls

The grading and remedial tasks for both projects involved excavation and reuse of as much soil with arsenic concentrations above 20 ppm as possible as backfill material for the construction project, which was then capped. This method is similar to the accepted reuse of petroleum-contaminated soil in appropriate locations. The rationale for reuse was that the soil did not pose a threat to human health or the environment at the concentrations identified if the soil remained isolated under the roadway or clean soil, turf, and landscaping that will be maintained by the City. On the Marine View Drive project, the soil was used for the subgrade bed of the road, and then paved. In addition, some soil was used to backfill the hillside along a narrow stretch adjacent to the road which was then landscaped (see Figure 11).

On the Legion Memorial Golf Course project, the surface soils that were graded or excavated (e.g., drainage ponds) were reused as subgrade for new elevated greens and tees, which were then capped with four to six inches of sand, followed by one to two inches of topsoil and sod. All sand traps are within the sand capped areas as well; they were constructed with four to six inches of clean granular subgrade (for drainage) and sand. Where grading did occur in the rough, soils that had been graded or excavated were used to form the base of mounds, berms, sandtraps, and similar elevated or topographic

features, followed by topsoil and sod for the mounds and berms and sand for the sandtraps. Where grading did not otherwise occur, soils in the rough were not disturbed.

In general, the entire course lying southwest of a line roughly drawn between the center of the 1st, 6th, and 14th fairways (the "lower" portion of the course) was regraded. Because of the mature trees on the northeast ("upper") portion of the course, the tees, fairways, and greens were the main areas regraded, rather than the rough. As noted on Table 1, the entire fairway 12 did not receive a sand cap (note that the tees and greens were rebuilt with sand caps). The City will regularly topdress this fairway with clean sand and soil in its golf course maintenance to maintain the protective layer, as part of institutional controls (see Section 1.5).

Figure 11 shows the approximate areas that contain residual soils with arsenic concentrations greater than 20 ppm for East Marine View Drive. Some areas that indicated arsenic concentrations greater than 20 ppm from pre-remedial sampling at any depth are shown as well as an area on the north side that used soils cut from the south side as fill (approximate Station 22 to Skyline). Also, two areas on the south side (approximate Station 17 to the golf course entrance and Skyline to the overpass ramp) had soil removed to depths below 7 feet which was well into the till. Therefore, based on sampling of till (see test pit results in Table 3), the City believes that these areas do not contain soil with arsenic concentrations greater than 20 ppm. Lastly, the southern landscaped portion of East Marine View Drive within the cloverleafs was not sampled; therefore, it is unknown if soil with arsenic concentrations greater than 20 ppm exist. However, no soils are exposed and any disturbed soils were capped by road or sidewalk construction. Figure 11 also shows that much of the East Marine View Drive area is paved.

Figures 12 and 13 show the approximate areas that contain residual soils with arsenic concentrations greater than 20 ppm for Legion Memorial Golf Course from the surface to a depth of six inches and greater than a depth of six inches, respectively. Figure 12 now illustrates that about two-thirds of Legion Memorial Golf Course does not have soil with arsenic concentrations greater than 20 ppm at the surface to a depth of six inches. Areas where arsenic concentrations are below 20 ppm are those where direct contact or exposure is most likely to occur. As shown in Figure 12, much of the remaining one-third is area that is not in play or covered with an impervious surface or structure (e.g. buildings, parking lot, peripheral areas). All peripheral areas not covered with a structure or impervious surface however, including those with arsenic concentrations above 20 ppm, are protected with a layer of turf.

Figure 13 shows the area that contains soil with arsenic concentrations greater than 20 ppm remaining at depth. Drainage ponds were excavated to depths of approximately six to 12 feet into glacial till. Therefore, the City believes that these areas do not contain soils with arsenic concentrations above 20 ppm. Areas identified in Figures 12 and 13 have been estimated based on pre-remedial sampling.

Other remedial actions that were conducted include the installation of a shallow groundwater interceptor trench (i.e., french drain) along a portion of East Marine View Drive (see Figure 4). Although groundwater was not encountered during construction activities, this action was taken in case a perched groundwater condition occurred seasonally near this portion of East Marine View Drive. At Legion Memorial Golf Course, the parking lot near the clubhouse was also expanded. This expansion capped an additional area with low permeability asphalt. Because the thickness of paving is less than six inches and the foundation of the clubhouse may contain soil with arsenic concentration above 20 ppm (e.g., crawl space), the paved parking and clubhouse area is included on Figure 12 even though the area is capped with an impervious surface.

C. Utility Trench Backfill

Utility trenches with clean import backfill were discussed in Section 1.0.2 A and are shown in Figure 4. Trenches were backfilled with clean import material to prevent future maintenance work workers from coming into contact with potentially contaminated soils and to avoid having to manage problem waste in the future. Excavated soils from the utility trenching at Legion Memorial Golf Course were used as subgrade backfill for landscaping along the fairways or as a base for berms. Excavated soil from the utility trenching at East Marine View Drive were managed off-site (see Section D below).

D. Separation, Reuse, and Off-Site Disposal

Because the majority of the work at Legion Memorial Golf Course involved increasing the surface elevation to improve drainage, off-site disposal of excavated soil was not necessary. All soils excavated during re-grading were used as subgrade backfill for landscaping at the fairways or were used as a base for berms.

For the East Marine View Drive project, some materials were disposed off-site. Trees, brush, and shrubs at East Marine View Drive were cut to the ground surface, chipped for hog fuel, and hauled to the Kimberly-Clark paper mill located adjacent to the Port of Everett's Baywood site. Due to Ecology's concern of conifer trees absorbing arsenic, a sample of a Douglas Fir was analyzed prior to chipping the material. Laboratory results indicated that arsenic was detected at a concentration of 5 ppm (see fir results in Table 3); therefore, this material was not classified as problem waste. In addition, soil was removed from stumps which were subsequently managed at Kimberly-Clark with the trees, brush, and shrubs.

The City originally intended to utilize all soil cut from the south side of the road that had arsenic concentrations greater than 20 ppm as fill on the north side. In addition to removing soil from the south side, the City also estimated that approximately 12,000 cubic yards of clean soil would result from the project and be available for reuse: 5,000 cubic yards at the City's old landfill and 7,000 cubic yards at the Port of Everett's Baywood site (see Attachment 2 of the City's January 24, 1997 letter to Ecology in Appendix B). The excavation to remove approximately 12,000 cubic yards of clean soil was needed for the following reasons:

- To complete the required grade.
- To allow space in the north side for most of the soil from the south side (fill) that had arsenic concentrations greater than 20 ppm.
- To allow sufficient space for import structural fill because the contractor determined that the topsoil cut from the south side along with the soil (fill and glacial till) present on the north side was not suitable as structural fill for the north side construction.

Upon completing the project, a total of approximately 17,700 cubic yards were excavated from the roadway (4,700 cubic yards from the south side and 13,000 cubic yards from the north side). To minimize off-site disposal of problem waste per the work plan, the City maximized as much natural glacial till in the project area with arsenic concentrations less than 20 ppm for excess material (see test pits results in Table 3) as possible. This action limited the volume of problem waste generated that required off-site disposal.

The 4,700 cubic yards cut from the south side consisted of fill, clean glacial till, and topsoil and was managed as follows:

- 2,000 cubic yards of fill with arsenic concentrations greater than 20 ppm was placed in the north side as subgrade backfill per the work plan.
- 1,000 cubic yards of clean glacial till was stockpiled at the Port of Everett's Baywood site for reuse with the material from the north side as described below.
- 1,700 cubic yards of topsoil with arsenic concentrations greater than 20 ppm was stockpiled and contained at the Port of Everett's Baywood site and managed as described below.

The 1,700 cubic yards of topsoil with arsenic concentrations greater than 20 ppm was classified as problem waste (see Section 1.6 B). This material was stockpiled at the Port of Everett's Baywood site (see topsoil stockpile in Figure 14) and temporarily contained by placing the material on plastic sheeting and covering it with polyethylene. The City negotiated with Asarco to use the material at the Tacoma Smelter Superfund Site as subgrade backfill for the Tacoma remediation. After Asarco received approval from EPA and Ecology (see Appendix B), the City hauled the material to the Tacoma Smelter in June, 1998. Copies of the scale tickets are included as Appendix C.

The 13,000 cubic yards cut from the north side consisted of clean glacial till and was stockpiled at the Port of Everett's Baywood Site (see till stockpile in Figure 14). As described above, the 1,000 cubic yards of till removed from the south side was stockpiled along with the 13,000 cubic yards of till from the north side resulting in a total of 14,000 cubic yards of clean glacial till. Approximately 4,000 cubic yards of this glacial till was subsequently hauled to the City's old landfill to be reused as intermediate cover while the remaining 10,000 cubic yards was left at the Port of Everett's Baywood site for reuse as fill by the Port (see Section 1.6 B and Figure 14).

Soil from the natural gas line trench excavated by Puget Sound Energy at East Marine View Drive was also disposed off-site. This trenching generated approximately 2,100 cubic yards of soil classified as problem waste. Asarco agreed to use the material generated by Puget Sound Energy at the Tacoma Smelter as subgrade backfill. The soils were hauled to the Tacoma Smelter in October, 1997.

1.5 INSTITUTIONAL CONTROLS

WAC 173-340-430 requires institutional controls to limit or prohibit activities that may interfere with the integrity of an interim action or cleanup action. Institutional control measures are required at sites that have residual concentrations of hazardous substances which exceed MTCA Method A residential soil cleanup levels.

The City will implement the following institutional controls for Legion Memorial Golf Course:

- The City has prepared a deed restriction which meets the requirements of WAC 197-11-440 (including review by the city planning department) to ensure notice, cap integrity, and proper management of soils during maintenance activities (see Appendix D).
- The City will provide periodic topdressing (every few years, or as needed) to fairway 12 consisting of sand, soil, and/or sod.
- The City will implement a set of protective procedures for golf course maintenance crews, including training and protective clothing. As a practical matter, these measures will generally apply to landscaping and minor course modifications in areas where contamination remains a depth (see Figure 13). Since the utility trenches were backfilled with clean material, work will not require protective measures.

Aside from standard street maintenance, the institutional control applicable to the East Marine View Drive project is the City's Right-Of-Way (ROW) Use Permit System, as noted in the independent remedial action plan, and consistent with WAC 173-340-440(4)(b). Under this permit system, any proposed excavation or disturbance of the site will require prior City approval. In addition, as noted above, utility trenches were backfilled with clean material to prevent exposure during maintenance activities.

Unlike Legion Memorial Golf Course, the East Marine View Drive project area comprises a small portion of the existing roads and streets within the Everett Smelter Site. Ecology has indicated that the CAP is not likely to require the re-excavation of the existing public roads in the area, which are already capped with impervious surfaces. Whatever institutional controls are ultimately determined to apply to the entire street system for the Everett Smelter Site would therefore apply to the East Marine View Drive project site as well.

1.6 SAMPLING AND ANALYSIS

WAC 173-340-410 contains requirements for compliance monitoring consisting of the following:

- Protection Monitoring - Confirm that human health and the environment are adequately protected during construction.
- Performance Monitoring - Confirm that the interim action has attained cleanup levels.
- Confirmational Monitoring - Confirm the long-term effectiveness of the interim action.

A. Protection Monitoring

The Health and Safety Plans contained in the independent remedial action work plans did not require air or personal monitoring due to the low arsenic concentrations at both sites. However, the City elected to perform personal and peripheral monitoring during dry periods of construction. Air monitoring results are listed in Tables 5 and 6 for East Marine View Drive and Legion Memorial Golf Course respectively. Laboratory reports and chain-of-custody forms are located in Appendix E. Results indicate that no personal samples exceeded Permissible Exposure Limits (PELs) for arsenic or lead. In addition, results indicate that no peripheral samples exceeded a trigger level established by the City that are lower than the PELs.

B. Performance Monitoring

Performance monitoring was not performed at either site because the remedial action involved capping of soils with relatively low levels of arsenic concentrations as described in Sections 1.1 and 1.4. However, the topsoil and till stockpiles at the Port of Everett's Baywood site were sampled to determine if the material was above the Method A residential soil cleanup level of 20 ppm for arsenic. The topsoil and till stockpile sampling locations are shown in Figure 14. Laboratory reports and chain-of-custody forms are included in Appendix E.

Table 7 lists results of the first sampling round of the topsoil and till stockpiles. Four grab samples were collected from the topsoil stockpile and results indicated that the material was classified as problem waste. Subsequently, as discussed in Section 1.4 B, the topsoil stockpile was hauled to the Tacoma Smelter.

Previous experience from the Everett Smelter Site and samples collected from test pits indicated the glacial till would have arsenic concentrations below the Method A residential soil cleanup level of 20 ppm. To confirm this, the till stockpile at the Port of Everett's Baywood site was segregated into six windrows (see Figure 14). Four samples were collected at varying depths within each windrow and composited. Results indicated

that the most eastern windrow (sixth) contained arsenic concentrations of 66 ppm which are above the Method A residential soil cleanup level of 20 ppm.

A second sampling round was therefore conducted for the most eastern windrow (sixth) of the till stockpile. This windrow was segregated into four subunits and four sample locations per subunit were composited at three depth intervals including 0-6, 6-12, and 12-18 inches. Results are listed in Table 8 and indicate that the area of elevated arsenic detected in the first sampling round was in the top six inches of the north subunit. Figure 14 shows that this area was immediately adjacent to the topsoil stockpile and likely included some topsoil. Subsequently, the City removed the top six inches of the north subunit of the till stockpile and hauled it to the Tacoma Smelter along with the topsoil stockpile.

In summary, performance monitoring indicated the remaining till stockpile is not classified as a problem waste and therefore can be used as non-structural fill by the City and the Port of Everett.

C. Confirmational Monitoring

Confirmational monitoring addresses the long-term effectiveness of the remedial action. In the independent remedial action work plan, the City proposed to sample the three drainage ponds annually for five years to confirm the effectiveness of the remedial actions.

The City will conduct the first annual sampling in December, 1998. Subsequent annual sampling will be conducted during the month of December in years 1999 through 2002. Analytical results for each annual sampling will be forwarded to Ecology upon receiving the laboratory report.

SECTION TWO

2.0 INTRODUCTION

As explained in Section 1, groundwater was not encountered during construction activities. Regulatory records and permits are discussed in Section 2.2. Hazardous substance management and handling is discussed in Section 1 and therefore, Section 2.3 is not further discussed. Lastly, Section 2.4 which addresses corrective action at dangerous waste management facilities does not apply to these projects.

2.1 GROUNDWATER INVESTIGATION

Groundwater was not encountered during construction activities and therefore, is not further discussed.

2.2 REGULATORY RECORDS / PERMITS

The City conducted environmental review on these two public projects under the State Environmental Policy Act (SEPA), integrating this review with its remedial action planning. In addition, these projects were discussed at various public and community meetings on the status of the Everett Smelter Site.

The proposed independent remedial actions were identified in the SEPA documents and performance of the remedial work plan was made a condition of the mitigated determination of nonsignificance (MDNS) for each project (see Appendix F). Because the proposed East Marine View Drive project had previously undergone environmental review, an Addendum to the MDNS was issued for public and agency review on January 16, 1997. An MDNS for the proposed Legion Memorial Golf Course project was issued on February 24, 1997 for public and agency review. No adverse public comments were received.

A public works permit was required for Legion Memorial Golf Course. A copy of the permit is included in Appendix F. The City did not issue a public works permit for the East Marine View Drive project because it was managed by the Public Works Department.

Documentation of agency authorization for off-site disposal at the Tacoma Smelter is included in Appendix B.

2.3 HAZARDOUS SUBSTANCE MANAGEMENT AND HANDLING PRACTICES

State designated dangerous wastes or federally designated hazardous wastes were not encountered in the projects. Some excess soil from East Marine View Drive (topsoil) was, however, designated as problem waste. Management and handling is described in Section 1.4.

2.4 CORRECTIVE ACTION AT DANGEROUS WASTE MANAGEMENT FACILITIES.

This section does not apply to these projects.

REFERENCES

GeoEngineers, 1995. Geotechnical Engineering Services Proposed Roadway Widening East Marine View Drive. December 18.

GeoEngineers, 1996. Environmental Sampling and Chemical Analytical Testing East Marine View Drive. February 29.

Hydrometrics, Inc., 1995. Everett Smelter Site Remedial Investigation. September.

Hydrometrics, Inc., 1996. Independent Remedial Action Plan for East Marine View Drive. July.

Hydrometrics, Inc., 1997. Independent Remedial Action Plan for American Legion Memorial Golf Course. January.

Washington Department of Ecology, 1994. Guidance on Preparing Independent Remedial Action Reports Under the Model Toxics Control Act, Chapter 70.105D RCW, Publication No. 94-18. March 9.

Washington Department of Ecology, 1995. Dangerous Waste Regulations, Chapter 173-303 WAC, Publication No. 92-92. November.

Washington Department of Ecology, 1996. Model Toxics Control Act Cleanup Regulation, Chapter 173-340 WAC, Publication No. 94-06. January.

Washington Department of Ecology, 1998. Supplemental site studies and reports that are available in Ecology's Smelter Site file.

TABLE 1
EAST MARINE VIEW DRIVE
COMPLETED REMEDIAL WORK PLAN
TASK SCHEDULE

Task Completed	Date Task Completed	Comparison To Work Plan
• Conducted 24 hour safety training for workers coming in contact with soils and an additional 8 hours for supervisors.	• August, 1997.	• Same
• Trees, brush, and shrubs were cut at the ground surface and reused as hog fuel.	• September, 1997 and March, 1998.	• Same
• Excavated stumps, removed clinging soil, and reused as hog fuel.	• September to October, 1997 and February to March, 1998.	• Same
• Stripped organic material, sampled the stockpile, and transported to Tacoma Smelter.	• Stripped on September, 1997 and March, 1998 and hauled on June, 1998.	• Upon receiving approval from EPA and Ecology, the organic material classified as problem waste was managed at Tacoma Smelter rather than a Subtitle D facility.
• Reused excavated soil from the south side as backfill on the north side. • Excavated clean glacial till (estimated 12,000 cy) for reuse by the City (estimated 5,000 cy) and the Port of Everett (estimated 7,000 cy). • Nine till samples were collected from test pits prior to excavation with additional samples being collected from the stockpile at the Port of Everett's Baywood site.	• September, 1997 to November, 1997. • March to May, 1998. • Test pit samples were collected August, 1996. Stockpile samples were collected twice in June, 1998.	• Approximately 4,700 cubic yards (cy) was removed from the south side. About 2,000 cy was used as fill on the north side per plan. Because the project needed more imported structural fill than originally anticipated, not all of the soil could be reused on-site. Approximately 1,000 cy was glacial till with arsenic concentrations below 20 ppm and was stockpiled at the Port of Everett for reuse (see next bullet). The remaining 1,700 cy was topsoil classified as problem waste and was managed with the organic material, because sampling indicated that arsenic concentrations were greater than 20 ppm. This material went to the Tacoma Smelter facility (see previous bullet). • Approximately 14,000 cy of clean glacial till was excavated for reuse (4,000 cy stockpiled at the City's old landfill and 10,000 cy stockpiled at the Port of Everett). • Till samples were not collected every 50 linear feet. An initial nine samples were collected prior to excavation with subsequent samples being collected from the Port of Everett stockpile.

TABLE 1 Continued
EAST MARINE VIEW DRIVE
COMPLETED WORK PLAN TASK SCHEDULE

Task Completed	Date Task Completed	Comparison To Work Plan
• The storm drain and natural gas trenches were excavated and backfilled with clean import material.	• September to November, 1997.	• Same
• Capped entire roadway and installed a shallow groundwater interceptor drain.	• September, 1997 to July, 1998.	• Same
• Applied water suppressant for dust control.	• July, 1998.	• Same
• Conducted air quality monitoring.	• Twice in September, 1997 and once in May, 1998.	• Same
• Did not disturb soils in ROW currently under structures or impermeable barriers.	• November, 1998.	• Same
• Did not disturb soils covered with an impervious surface in residential properties that are adjacent to the roadway.	• November, 1998.	• Same
• No brick or debris were encountered during excavation.	• NA.	• NA
• Implemented institutional controls.	• Ongoing.	• Same

TABLE 2
LEGION MEMORIAL GOLF COURSE
COMPLETED REMEDIAL WORK PLAN
TASK SCHEDULE

Task Completed	Date Task Completed	Comparison To Work Plan
• Conducted 24 safety training for workers coming in contact with soils and an additional 8 hours for supervisors.	• June, 1997	• Same
• *Drain tile trenches were excavated and backfilled with clean import material.	• June, 1998	• Same
• *Installed and routed drain tile to collector lines and drainage ponds to capture surface water infiltration and to discharge into the City's secondary treatment plant.	• June, 1998	• Same
• *Any trees, shrubs, and bushes that required removal were relocated on-site.	• Early 1999	• Same
• At least four inches of sand along with top soil and sod were added to the fairways, greens, and tees.	• June, 1998	• Fairway 12 will be top dressed periodically rather than being capped.
• Covered sample location S302 (identified in the work plan) near the main parking lot with asphalt while expanding the parking lot.	• September, 1997	• The area near sample location S201 (identified in the work plan) was not covered with asphalt because the City elected not to construct the trailer parking lot.
• Soils were not disposed off-site; therefore, waste categories were not an issue.	• NA	• NA
• *Conducted air quality monitoring.	• Three times in June, 1997; five times in July, 1997; five times in August, 1997; and once in September, 1997.	• Same
• Implemented institutional controls including a deed restriction.	• Fall/Winter, 1998	• Same
• The three drainage ponds will be sampled annually and analyzed for arsenic for the next five years.	• December, 1998 to December, 2002	• Same

* Added to work plan prior to commencement of work.

TABLE 3

EAST MARINE VIEW DRIVE PRE-REMOVAL SAMPLE RESULTS

Sample No. [1]	Sample Location [2]	From Fog line [3] (ft)	Surface Sample		Depth = 1 ft		Depth = 2 ft		Depth = 3 ft		Depth = 4 ft	
			Total Arsenic (mg/kg)	Total Lead (mg/kg)	Total Arsenic (mg/kg)	Total Lead (mg/kg)	Total Arsenic (mg/kg)	Total Lead (mg/kg)	Total Arsenic (mg/kg)	Total Lead (mg/kg)	Total Arsenic (mg/kg)	Total Lead (mg/kg)
G-14	13 + 00	10 R	32	16	24	<10	<10	<10				
G-1	14 + 00	6 L	<10	15	<10	28			<10	110		
G-15	15 + 00	5 R	<10	39	<10	<10			<10	<10		
G-2	16 + 00	4.5 R	<10	250	<10	<10			<10	11		
G-16	17 + 00	5 R	77	30	73	<10			<10	<10		
H-14	17 +50	8 R	200	180								
G-3	18 + 00	4 L	<10	320	15	<10			<10	<10		
G-17	19 + 00	7 R	<10	<10	<10	<10			<10	<10		
G-4	20 + 00	4.5 R	<10	360	24	<10			<10	<10		
G-18	21 + 00	6 R	31	34	<10	<10	<10	<10				
G-5	22 + 00	8 L	<10	130	<10	<10			28	39		
H-15	22 + 75	8 R	73	350								
G-19	23 + 00	6 R	150	60	<10	<10			<10	<10		
H-16	23 + 25	8 R	80	360								
G-6	24 + 00	5 L	<10	60	<10	<10			13	14		
G-20	25 + 00	7 R	49	59	<10	<10			<10	<10		
G-7	26 + 00	6 L	<10	230	24	<10			<10	13		
G-21	27 + 00	8 R	19	57	<10	<10			<10	<10		
G-8	28 + 00	5 L	<10	230	<10	<10			<10	11		
G-22	29 + 00	10 R	20	40	<10	<10			<10	<10		
H-17	29 + 75	8 R	13	440								
G-9	30 + 00	6 L	73	320	<10	<10	33	36				
H-18	30 + 25	8 R	18	410								
G-23	31 + 00	8 R	<10	52	<10	<10			<10	<10		
G-10	32 + 00	5 L	<10	250	<10	35			51	65		
H-1	32 + 00	7 R			40	250	55	16				
H-2	32 + 25	6 R			35	93	46	58				
H-3	32 + 50	6 R			77	310	26	19				
H-9	32 + 50	6 L			130	180	15	40				
H-4	32 + 75	11 R			150	60	170	150	170	120	69	18
H-10	32 + 75	7 L			46	220	25	33				
G-24	33 + 00	10 R	58	77	350	44	840	70				
H-19	33 + 00	9 R					22	50	14	49		
H-20	33 + 00	10 R					44	130	18	79		
H-11	33 + 00	5 L			69	120	39	220				
H-5	33 + 25	8 R			92	62	21	50	25	54	60	320

TABLE 3 Continued

EAST MARINE VIEW DRIVE PRE-REMOVAL SAMPLE RESULTS

Sample No. [1]	Sample Location [2]	From Fog line [3] (ft)	Surface Sample		Depth = 1 ft		Depth = 2 ft		Depth = 3 ft		Depth = 4 ft	
			Total Arsenic (mg/kg)	Total Lead (mg/kg)	Total Arsenic (mg/kg)	Total Lead (mg/kg)	Total Arsenic (mg/kg)	Total Lead (mg/kg)	Total Arsenic (mg/kg)	Total Lead (mg/kg)	Total Arsenic (mg/kg)	Total Lead (mg/kg)
H-12	33 + 25	7 L			32	170	38	110				
H-6	33 + 50	9 R			200	110	51	34	45	44	72	140
H-13	33 + 50	6 L			19	300	16	41				
H-7	33 + 75	6 R			100	200	480	180	45	36	35	100
G-11	34 + 00	8 L	<10	350	<10	<10			<10	<10		
H-8	34 + 00	11 R			100	39	140	70				
G-25	35 + 00	4 R	79	270	94	85			<10	<10		
G-12	36 + 00	3 L	<10	99	<10	15			13	30		
G-26	37 + 00	6 R	35	160	12	27			47	60		
G-30	38 + 00	5 L	<10	110	<10	<10			<10	<10		
G-27	39 + 00	6 R	<10	64	<10	<10			<10	14		
G-13	40 + 00	4 L	33	210	<10	<10			<10	<10		
G-29	42 + 00	5 L	23	280	<10	<10			<10	<10		
G-28	46 + 00	5 R	<10	250	<10	<10	<10	<10				
H-TP1	17 + 50	8 R							3	4		
H-TP2	19 + 00	8 R					3	4				
H-TP3	20 + 00	8 R					5	6				
H-TP4	21+ 00	8 R							3	4		
H-TP6	24 + 50	8 R					6	5				
H-TP7	26 + 00	8 R			8	7						
H-TP8	27 + 50	8 R					11	8				
H-TP9	29 +.00	8 R			4	4						
Fir	*		5									

Note 1: G-number is GeoEngineers sample and H-number is Hydrometrics sample.

Note 2: Sample location is approximate station location.

Note 3: R denotes distance from south fog line and L denotes distance from north fog line.

Note *: Douglas Fir sample was a grab sample of a small branch with needles, not a soil interval.

TABLE 4
LEGION MEMORIAL GOLF COURSE PRE-REMEDIAL SAMPLE RESULTS

Sample Location	Sample Number	Depth 0-6		Depth 6-12		Depth 12-18		Depth 18-24	
		Total Arsenic (mg/kg)	Total Lead (mg/kg)	Total Arsenic (mg/kg)	Total Lead (mg/kg)	Total Arsenic (mg/kg)	Total Lead (mg/kg)	Total Arsenic (mg/kg)	Total Lead (mg/kg)
Fairway 1	1	42	50	101	43	<10	<20	<10	<20
	2	70	54	119	71	<10	<20	<10	<20
	3	31	38	38	47	42	49	53	59
	4	25	43	50	57	86	83	18	<20
	5	3.2	6.8	<10	<20	<10	<20	<10	<20
	6	11	18	<10	<20	<10	<20	<10	<20
	7	14	26	<10	<20	<10	<20	<10	<20
	8	17	28	<10	<20	<10	<20	<10	<20
Fairway 2	9	20	28	<10	<20	<10	<20	11	<20
	10	6	9.5	19	21	<10	<20	27	<20
	11	9.3	53	10	<20	<10	<20	<10	<20
	12	14	36	13	23	<10	<20	<10	<20
	13	17	91	17	<20	<10	<20	<10	<20
	14	10	49	<10	32	<10	<20	<10	<20
	15	13	34	<10	<20	<10	<20	<10	<20
Fairway 3	16	10	35	<10	<20	10	<20	15	<20
	17	16	40	<10	<20	<10	<20	<10	<20
	18	20	38	<10	<20	<10	<20	<10	<20
Fairway 4	19	17	35	10	<20	<10	<20	<10	<20
	20	10	23	<10	<20	<10	<20	<10	<20
	21	9.2	22	<10	<20	<10	<20	<10	<20
	22	8.5	21	13	<20	<10	<20	<10	<20
	23	24	46	26	38	14	<20	<10	<20
Fairway 5	24	6.4	13	11	<20	<10	<20	13	<20
	25	15	30	<10	<20	<10	<20	13	<20
	26	22	40	18	30	<10	<20	<10	<20
	27	15	25	<10	<20	<10	<20	<10	<20
	28	13	22	13	44	<10	<20	10	<20
	29	17	46	21	27	16	20	<10	<20
Fairway 6	30	29	59	31	44	<10	<20	<10	<20
	31	40	50	43	50	15	<20	<10	<20
	32	39	54	12	<20	<10	<20	<10	<20
	33	54	93	38	56	<10	<20	<10	<20
	34	48	64	24	29	<10	<20	<10	<20
	35	49	44	36	46	<10	<20	<10	<20

TABLE 4 Continued
LEGION MEMORIAL GOLF COURSE PRE-REMEDIAL SAMPLE RESULTS

Sample Location	Sample Number	Depth 0-6		Depth 6-12		Depth 12-18		Depth 18-24	
		Total Arsenic (mg/kg)	Total Lead (mg/kg)	Total Arsenic (mg/kg)	Total Lead (mg/kg)	Total Arsenic (mg/kg)	Total Lead (mg/kg)	Total Arsenic (mg/kg)	Total Lead (mg/kg)
Fairway 7	36	110	93	47	70	13	<20	<10	<20
	37	46	45	<10	<20	<10	<20	<10	<20
	38	93	64	16	<20	<10	<20	<10	<20
	39	77	70	56	47	<10	<20	<10	<20
	40	7.5	5.7	76	60	16	<20	<10	<20
Fairway 8	41	46	50	73	62	66	43	31	24
	42	7.7	13	12	<20	26	<20	38	23
	43	90	74	40	35	<10	<20	<10	<20
	44	65	61	24	44	21	<20	<10	<20
	45	120	92	220	72	55	<20	<10	<20
	46	23	34	11	<20	<10	<20	<10	<20
	47	50	61	51	51	16	<20	<10	<20
Fairway 9	48	92	120	76	93	<10	<20	<10	<20
	49	75	81	65	60	27	<20	<10	<20
	50	80	83	120	107	43	36	34	28
Fairway 10	51	18	9.3	17	<20	15	<20	19	<20
	52	62	85	26	32	25	<20	<10	<20
	53	110	140	110	142	200	341	140	200
	54	45	29	13	<20	3.4	≤20	≤10	<20
	55	63	71	138	115	71	62	17	<20
	56	13	44	21	83	22	148	21	93
Fairway 11	57	140	200	230	425	190	148	37	<20
	58	46	38	5.4	<20	<10	<20	<10	<20
	59	83	83	176	137	36	24	<10	<20
	60	60	60	59	47	166	184	110	59
	61	120	120	55	46	12	<20	<10	<20
	62	58	70	129	125	155	159	27	<20
	63	14	130	22	64	<10	<20	<10	<20
Fairway 12	64	83	120	292	335	497	421	48	<20
	65	160	120	160	91	7.6	<20	<10	<20
	66	200	210	180	181	25	24	12	<20
	67	200	180	310	220	130	42	4.3	<20
	68	200	180	220	203	39	46	48	45
Fairway 13	69	25	59	28	83	35	84	62	66
	70	250	190	140	67	8	<20	<10	<20
	71	370	240	290	225	52	108	49	<20
	72	42	42	18	20	12	<20	14	<20

TABLE 4 Continued
LEGION MEMORIAL GOLF COURSE PRE-REMEDIAL SAMPLE RESULTS

Sample Location	Sample Number	Depth 0-6		Depth 6-12		Depth 12-18		Depth 18-24	
		Total Arsenic (mg/kg)	Total Lead (mg/kg)	Total Arsenic (mg/kg)	Total Lead (mg/kg)	Total Arsenic (mg/kg)	Total Lead (mg/kg)	Total Arsenic (mg/kg)	Total Lead (mg/kg)
Fairway 14	73	42	45	<10	<20	<10	<20	<10	<20
	74	40	39	11	<20	10	<20	<10	<20
	75	65	65	125	115	56	48	<10	<20
Fairway 15	76	81	65	72	51	<10	<20	<10	<20
	77	4	5.8	<10	<20	91	67	91	80
	78	51	79	85	81	51	57	50	<20
	79	68	76	29	28	<10	<20	11	<20
	80	32	37	33	26	<10	<20	<10	<20
	81	47	48	27	25	<10	<20	<10	<20
	82	17	23	<10	<20	<10	<20	<10	<20
	83	26	44	29	53	14	<20	<10	<20
Fairway 16	84	33	43	20	20	<10	<20	<10	<20
	85	19	31	11	<20	<10	<20	13	<20
	86	36	50	<10	<20	<10	<20	<10	<20
	87	20	32	11	<20	<10	<20	<10	<20
	88	19	43	13	<20	<10	<20	11	<20
	89	15	63	<10	<20	<10	<20	10	<20
	90	6.1	24	<10	<20	<10	<20	<10	<20
Fairway 17	91	4.9	14	<10	<20	<10	<20	<10	<20
	92	2.2	5.6	<10	20	10	<20	<10	<20
	93	29	94	<10	<20	<10	<20	<10	<20
	94	35	54	13	<20	<10	<20	<10	<20
	95	16	30	11	<20	<10	<20	<10	<20
Fairway 18	96	24	43	51	52	12	<20	<10	<20
	97	29	44	37	37	17	<20	<10	<20
	98	54	67	17	20	12	<20	11	<20
	99	55	61	15	20	<10	<20	<10	<20
	100	52	48	64	36	18	<20	<10	<20
	101	56	68	36	32	<10	<20	<10	<20
	102	68	67	46	38	12	<20	<10	<20
	103	97	100	124	119	71	78	12	<20

TABLE 4 Continued
LEGION MEMORIAL GOLF COURSE PRE-REMEDIAL SAMPLE RESULTS

Sample Location	Sample Number	Depth 0-6		Depth 6-12		Depth 12-18		Depth 18-24	
		Total Arsenic (mg/kg)	Total Lead (mg/kg)	Total Arsenic (mg/kg)	Total Lead (mg/kg)	Total Arsenic (mg/kg)	Total Lead (mg/kg)	Total Arsenic (mg/kg)	Total Lead (mg/kg)
Lake 15	150	12	32	2.3	8.5	<10	<20	10	<20
	151	13	35	7	15	<10	<20	<10	<20
	152	11	22	4.7	9	<10	<20	<10	<20
	153	12	34	16	42	<10	<20	<10	<20
	154	13	31	3.3	9.3	<10	<20	<10	<20
Lake 5	155	29	56	21	31	<10	<20	17	<20
	156	4.4	32	12	58	12	<20	<10	<20
	157	12	28	13	22	<10	<20	10	<20
	158	21	41	27	44	17	43	<10	<20
	159	6.7	13	2.9	4.1	<10	<20	<10	<20
Lake 6	160	25	35	5.3	7.5	<10	<20	15	<20
	161	61	60	30	22	<10	<20	<10	<20
	162	49	72	48	41	15	<20	<10	<20
	163	66	89	18	31	<10	<20	<10	<20
	164	39	41	25	26	13	<20	<10	<20
Clubhouse Sidewalk	502	29	52						
	503			46	49				
New Footing by Clubhouse	504	101	61						
	505			64	<20				
	506					<18	<20		

TABLE 5
EAST MARINE VIEW DRIVE
AIR MONITORING RESULTS

	PERSONAL AIR MONITORING[1]			PERIPHERAL AIR MONITORING[2]			
	Sample 1			Sample 1		Sample 2	
DATE	Arsenic (ug/m^3)	Lead (ug/m^3)	Sample ID	Arsenic (ug/m^3)	Sample ID	Arsenic (ug/m^3)	Sample ID
9/3/97	0.08	0.44	MVD-01	<0.078	MVD-02	<0.078	MVD-03
9/10/97	0.08	3.5	MVD-06	<0.08	MVD-04	<0.08	MVD-05
5/4/98	<0.08	0.87	700-05-03	<0.08	700-05-01	<0.08	700-05-02

Note 1: PEL's for personnel monitoring are 10 ug/m^3 for arsenic and 50 ug/m3 for lead.

Note 2: The trigger level for peripheral monitoring is 0.2 ug/m^3 for arsenic.

TABLE 6
LEGION MEMORIAL GOLF COURSE
AIR MONITORING RESULTS

	PERSONAL AIR MONITORING[1]			PERIPHERAL AIR MONITORING[2]	
Date	Arsenic (ug/m^3)	Lead (ug/m^3)	Sample ID	Arsenic (ug/m^3)	Sample ID
6/13/97	<3.4	<3.4	729-06-02	<0.15	729-06-01
6/16/97	*	*		<0.07	729-06-03
6/27/97	<0.35	<0.35	LMGC-01	<0.08	LMGC-02
7/2/97	<0.32	<0.32	LMGC-03	<0.08	LMGC-04
7/11/97	*	*		<0.086	LMGC-05
7/19/97	<0.38	<0.38	LMGC-07	<0.08	LMGC-06
7/24/97	<0.32	<0.32	LMGC-09	<0.067	LMGC-08
7/31/97	<0.30	<0.30	LMGC-11	<0.063	LMGC-10
8/7/97	<0.3	<0.3	LMGC-13	<0.08	LMGC-12
8/14/97	<0.4	<0.4	LMGC-15	<0.08	LMGC-14
8/21/97	<0.36	<0.36	LMGC-17	0.14	LMGC-16
8/28/97	<0.4	<0.4	LMGC-19	<0.08	LMGC-18
9/4/97	<0.35	<0.35	LMGC-21	<0.07	LMGC-20

Note 1: PEL's for personnel monitoring are 10 ug/m^3 for arsenic and 50 ug/m3 for lead.

Note 2: The trigger level for peripheral monitoring is 0.2 ug/m^3 for arsenic.

Note *: Sampler Malfunction

TABLE 7
EAST MARINE VIEW DRIVE STOCKPILE SAMPLE RESULTS
(First Round)

Sample Location	Sample Number	Total Arsenic (mg/kg)	Total Lead (mg/kg)
Topsoil Stockpile	OSP-2	43	49
Topsoil Stockpile	OSP-3	48	43
Topsoil Stockpile	OSP-4	36	72
Topsoil Stockpile	OSP-5	87	130
First Windrow of Till (west side)	EVT-9806-100	5	
Second Windrow of Till	EVT-9806-101	4	
Third Windrow of Till	EVT-9806-102	12	
Fourth Windrow of Till	EVT-9806-103	19	
Fifth Windrow of Till	EVT-9806-104	10	
Sixth Windrow of Till (east side)	EVT-9806-105	66	

TABLE 8
EAST MARINE VIEW DRIVE STOCKPILE SAMPLE RESULTS
(Second Round)

Sample Location	Sample Number	Depth 0-6		Depth 6-12		Depth 12-18	
		Total Arsenic (mg/kg)	Total Lead (mg/kg)	Total Arsenic (mg/kg)	Total Lead (mg/kg)	Total Arsenic (mg/kg)	Total Lead (mg/kg)
Sixth Windrow (subunit 1 - south end)	EVT-9806-106 to EVT-9806-108	12	12	12	15	16	26
Sixth Windrow (subunit 2 - to north)	EVT-9806-109 to EVT-9806-111	12	19	10	15	12	20
Sixth Windrow (subunit 3 - to north)	EVT-9806-112 to EVT-9806-114	15	24	17	20	17	28
Sixth Windrow (subunit 4 - north end)	EVT-9806-115 to EVT-9806-118	65	120	13	15	9	13