FINAL WORK PLAN

GROUNDWATER EVALUATION
ANCHOR LITH KEM LO SITE
Site Number: 1-30-021

Work Assignment No.
D004436-08

Prepared for:

SUPERFUND STANDBY PROGRAM
New York State
Department of Environmental Conservation
625 Broadway
Albany, New York 12233

November 2007

Prepared by:

Earth Tech Northeast, Inc.
300 Broadacres Drive
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New York State Department of Environmental Conservation

MEMORANDUM

To: **File**
From: Patricia Kappeller, Contract Manager, CPS, BPM, DER
Subject: Review of Cost Sections for EarthTech Work Assignment **#D004436-08** Final Work Plan for the Anchor Lith Kem Ko Site (1-30-021)

Date: December 5, 2007

I have reviewed the cost sections for the above referenced WA. The cost sections appear to be reasonable and satisfactorily completed. The following checklist outlines the review process and review comments. Please see me if you have any questions.

	GENERAL COST REVIEW CHECKLIST	**Yes**	**No**	**Comments**
	Are the costs for Task 1 and the total WA within the budget on the Conceptual Approval?	X		
	Is there a complete set of 2.11 Schedules (a) through (h)?	X		
1.	**Schedule 2.11(a)**			
	Do rates for indirect costs and fixed-fee match contract rates? (Are sliding rates applicable?)	X		
	Do numbers add up?	X		
2.	**Schedule 2.11(b) - Direct Labor Hours**			
	Are average reimbursement rates used for each year? (Check rates in contract vs. time period of WA.)	X		
	Are hours segregated by year?	X		
	Is total cost for each NSPE level shown?	X		
	Does total direct labor costs match amount on Schedule 2.11(a)?	X		
	Do total hours match hours on Schedule 2.11(h)?	X		
	Is the Principal's (NSPE level 9) time less than 2% of total time?	X		
3.	**Schedule 2.11(b-1) - Direct Administrative Labor Hours**			
	Is breakdown of Schedule 2.11(b-1) reasonable (i.e. within the acceptable guidelines of 4% administrative hours and 2% for Principal, both out of total project hours)? If not, did Consultant submit acceptable justification?	X		
4.	**Schedules 2.11©) and (d) - Direct Non-Salary**			
	Are rates listed in Schedule 2.11©) consistent with contract?	X		
	Are rates for in-house and/or miscellaneous costs in their contract (Schedule 2.10(b))? If not, are quotes included for any item (<u>including</u> equipment purchases & rentals; <u>excluding</u> air fare) >$1k? (For estimated cost, not unit cost.)	X		
	Are there any unallowable costs? (e.g. Telephone and shipping cannot be reimbursed as a direct cost if included in ICR; if an item is not in ICR, it should be on 2.10(b) or 2.10©).)		X	
	Are appropriate lodging/per diem rates used?	X		
	Are rates approved for consultant-owned equipment (Schedule 2.10©))?			N/A
	Does total direct non-salary costs match amount on Schedule 2.11(a)?	X		

	GENERAL COST REVIEW CHECKLIST	Yes	No	Comments
	Are other direct costs (# of travel days, lodging, and field equipment usage) reasonable based on field work schedule or supporting documentation from consultant? (Ask PM)	X		
5.	**Schedule 2.11(e) - Cost-plus-fixed-fee subcontracts** (typically don't need quotes)			
	Is proposed subconsultant on standby? If not, does proposed subconsultant have DEC approved rates with another standby consultant?	X		
	Is subconsultant contract active and do rates (direct salary costs, indirect costs, direct non-salary costs, and fixed-fee) match?	X		
	Is there a breakdown of direct non-salary costs (i.e. are additional Sch. 2.11's needed)?	X		
	Does total subcontract amount match Schedule 2.11(a)?	X		
	Has subcontractor justified/obtained adequate quotes for any further subcontracted work?	X		
6.	**Schedule 2.11(f) - Unit Price Subcontracts** (aka per diem, lump sum)			
	Are proposed subcontractors on standby? If not, are there quotes for subcontracts >$1k? Bids should be comparable (quantities and items) and provide unit costs plus job total.	X		
	Standby Drillers (Two-step process) - Are costs from at least 3 standbys compared? If not, an additional quote from a non-standby driller may be needed. Are proper unit costs and mob/demob costs used?			NA
	Standby Lab and Data Validators (Used on a rotational basis) - Do unit cost per sample match unit cost in standby contract?	X		
	Other - Standard solicitation rules (quotes) apply for services >$1k.			NA
	M/WBE - Are sole-source M/WBE contracts <$5k and cost-reasonableness documented?			NA
	Is management fee calculated only on non-professional unit priced subs >$10k? Appropriate rate? (Fee cannot be calculated on professional engineers, architects, or surveyors.)	X		
7.	**Schedule 2.11(g) - Cost Control Report**			
	Do individual 2.11(g)s equal the summary 2.11(g) and do those costs match 2.11(a)?	X		
8.	**Supplemental 2.11(g) - Cost Control Report (subs)**			
	Do schedules include all applicable subcontracts and management fee? (Unit price only.)	X		
9.	**Schedule 2.11(h) - Summary of Labor Hours**			
	Do hours on 2.11(h) match those on 2.11(b)?	X		
10	**Supplemental Supporting Cost Information**			
	Has additional cost info. been supplied which has not been incorporated into WA budget documentation? List: **** Subcontractor Quotes: Need 3 quotes from standby subcontractors. Need 5 quotes, if subcontractors are not standby.** ****For amendments to work assignments, please refer to requirements of Article 5(b) when changing the Fixed Fee. Additionally, the Fixed Fee should not be changed for any rebudget (only for amendments where the percent change of (add specific percentage) is triggered)**			See attached justification for the drill bid

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1.0 INTRODUCTION

Earth Tech Northeast, Inc. (Earth Tech) has been issued Work Assignment # D004436-08 under the New York State Department of Environmental Conservation (NYSDEC) State Superfund Standby Program. The Site under this work assignment is Anchor Lith Kem Ko (Site # 1-30-021). The location of the Site is shown on Figure 1.

The specific objective of this work assignment, as defined by the NYSDEC, is to conduct a groundwater evaluation in order to determine if contamination is emanating from the site. The work will be performed in accordance with NYSDEC Division of Environmental Remediation Draft DER-10 Technical Guidance for Site Investigation and Remediation, dated December 2002.

Earth Tech has developed and submitted this management plan for NYSDEC's review and approval. It includes a detailed budget based upon the scope of work outlined in the work assignment (WA) letter issued by the Department on June 28, 2007. In addition, this submittal includes a staffing plan and proposed schedule and a subcontractor utilization plan including a Minority/Women Business Enterprise (M/WBE) utilization plan.

1.1 Site Description

Information on the location, history, previous investigations, and site geology are provided in the subsections below.

1.1.1 General/Location

The Anchor Lith Kem Ko (Anchor Chemical) site (herein identified as the site) is located at 500 West John Street in the Village of Hicksville, Town of Oyster Bay, Nassau County, New York (Section 11: Block 499, Lot 87). The site covers approximately 1.5 acres (100 feet by 400 feet) and includes a 28,850 square foot, two-story masonry structure. The remainder of the site is covered by pavement except for a small grassy area adjacent to West John Street. The site is currently occupied by the Cookie Factory Outlet.

The surrounding area is predominantly industrial with a recreational area to the northeast. The site is bordered to the west and east by commercial property, to the south by West John Street and to the north by Cantiague Park, a 125 acre recreational facility which includes a golf course. The aerial photograph provided on Figure 1 depicts the general conditions of the site and the adjacent properties.

A groundwater recharge basin lies to the east of the Site. Public water is available to everyone in the area, but the contaminated groundwater is a potential threat to the water supply wells. These water districts are located less than 6,500 feet south of the site.

1.1.2 Operational/Disposal History

Anchor Chemicals operated at the John Street location from 1964 to 1986. In 1978, Anchor Chemical was purchased by Chessco Industries and the facility name was changed to Anchor Lith Kem Ko. This facility blended and packed chemicals for the graphic art industries. The property has continued to change hands and has been utilized for various purposes. The last known use of the building was as a cookie factory.

Contamination at the site is generally attributed to the building's past use as a chemical blending and packaging operation. The chemicals utilized at the site were stored in seven above ground storage tanks

(ASTs) and seventeen underground storage tanks (USTs). The ASTs ranged from 550 to 1,500 gallons. The USTs were located beneath the concrete floor of the building with capacities ranging from 500 to 4,000 gallons. In the 1980s, six USTs were removed and determined to have been compromised. Investigations indicated that several on-site dry wells were contaminated due to site operations. From 1981 to 1991, all the known USTs were emptied and abandoned in place, and the ASTs were removed.

1.1.3 Remedial History

In 1977, the Nassau County Department of Health (NCDOH) discovered 1,1,1-trichloroethane (1,1,1-TCA), trichloroethene (TCE), and tetrachloroethene (PCE) in samples from a drywell located north of the building in the parking lot. The facility utilized nine dry wells and one drain, which are located within the paved areas, to handle the stormwater.

In August 1981, the Nassau County Fire Marshal's (NCFM) office pressure-tested 14 USTs that contained flammable materials. Based on the pressure test results, five USTs were determined to be compromised. The contents of the five compromised USTs were emptied and the USTs were taken out of service. The contents of the compromised USTs consisted of naphthol spirits, acetone, mineral spirits, isopropyl alcohol, and textile spirits. Three other USTs containing methylene chloride, diethylene glycol, and 1,1,1-TCA were not tested because they did not contain flammable material and thus did not fall under the jurisdiction of the NCFM.

In July 1982, a meeting was organized and the facility schematics from 1965 to 1975 indicated that 1,1,1-TCA was stored in Tank #8, which contained mineral spirits at the time of the pressure test conducted by NCFM in August 1981. The pressure test results indicated that the UST was compromised.

In September 1982, soil and groundwater samples were collected. Based on the laboratory data, the primary contaminants were 1,1,1-TCA, methylene chloride, and PCE.

In December 1982, three monitoring wells, identified as MW-1, MW-2, and MW-3, were sampled to confirm the initial results and the three USTs that were not tested by NCFM were pressure tested. Analytical data indicate that 1,1,1-TCA was detected at 800 µg/L, 6 µg/L, and 24,000 µg/L in groundwater samples from MW-1, MW-2, and MW-3, respectively. The pressure tests indicated that one UST containing methylene chloride was compromised. The contents of the compromised UST were emptied and the UST was taken out of service.

In 1983, the six compromised USTs were filled with concrete and abandoned in place.

In January 1983, the site was included in on the New York State Department of Environmental Conservation (NYSDEC) list of hazardous waste sites. The site was included in the registry as a Class 2 site due to a consequential amount of hazardous waste that was released to the environment and constitutes a significant threat to the public health and environment.

In June 1983, monitoring wells MW-1, MW-2, and MW-3 were re-sampled. Based on the laboratory results, 1,1,1-TCA was detected at 180 µg/L, less than 1 µg/L and 7,000 µg/L at MW-1 through MW-3, respectively. When these wells were sampled again in January 1984 the laboratory results were 80 µg/L, 3 µg/L and 1,000 µg/L.

In 1985, the seven ASTs were removed.

In June 1986, the United States Environmental Protection Agency (USEPA) listed the site on the National Priorities List (NPL). Following the listing of the site on the NPL, USEPA issued administrative orders

on consent to the potential responsible parties to undertake a remedial investigation/feasibility study (RI/FS). The investigation activities included the items listed below.

- Inspection and closure of 11 USTs;
- Installation of four shallow and four deep groundwater monitoring wells;
- Three rounds of groundwater samples;
- Two rounds of soil samples from under the USTs; and
- One round of sediment samples from nine dry wells, on drain, and two cesspools.

In June 1991, the remaining 11 USTs were filled with concrete and abandoned in place.

In September 1995, NCDOH requested the EPA conduct an off-site groundwater monitoring program due to the significant levels of VOCs and metals in the groundwater at the site and the close proximity of the public supply wells.

A summary of the elevated concentrations of 1,1,1-TCA, chromium, and lead in groundwater and soil samples is presented below.

Groundwater Contaminants of Concern:

- 1,1,1-TCA — April 1992: MW-3 (8 µg/L); Nov. 1992: MW-4 (2 µg/L); and Feb. 1995: MW-5S (29 µg/L);
- Chromium — April 1992: MW-2 (317 µg/L), MW-3 (227 µg/L), and MW-1D (132 µg/L); Nov. 1992: MW-2 (1,440 µg/L), and MW-3 (1,150 ppb);
- Lead — April 1992: MW-2 (74.7 µg/L), and MW-3 (30.2 µg/L); Nov. 1992: MW-2 (240 µg/L), and MW-3 (71.5 µg/L).

Soil Contaminants of Concern:

- 1,1,1-TCA — DW-2 (3,300 µg/kg)
- Chromium — DW-2 (463 mg/kg), DW-3 (101 mg/kg), DW-6 (240 mg/kg), and DW-8 (198 mg/kg); and
- Lead — DW-2 (1,210 mg/kg), DW-3 (607 mg/kg), DW-6 (1,120 mg/kg), and DW-8 (1,620 mg/kg).

After the excavation of soils contaminated with 1,1,1-TCA, chromium, and lead from four dry wells to prevent further groundwater contamination, a Record of Decision (ROD) was issued for this site on September 29, 1995, calling for no further action. In April 1996 and July 1997, EPA collected confirmatory groundwater samples from MW-4, MW-5S, MW-5D, MW-6S, and MW-6D to evaluate the groundwater quality on-site. Based on the sample results, EPA removed the site from the NPL in September 1999.

In September 2003, groundwater investigations were conducted to evaluate groundwater quality downgradient of the nearby Sylvania site, located to the west of Anchor Lith Kem Ko. 1,1,1,-TCA was detected at a concentration of 57 ppb at one location, identified as P30, at a depth of 100 feet below ground surface (ft bgs).

In October 2005 NYSDEC inspected the condition of nine of the eleven monitoring wells located at the site. Based on the site inspection, five of the monitoring wells, identified as MW-4, MW-5S, MW-5D, MW-6S, and MW-6D, were determined to be in "good" condition and were included in sampling program conducted in December, 2005. The other four monitoring wells inspected, identified as MW-2, MW-3, MW-7S, and MW-7D, were determined to be compromised due to either their location within a

low lying area of collection of debris within the monitoring well housing; therefore, they were not included in the proposed sampling program because of the potential from surface contaminants to impact the monitoring wells. The locations of the monitoring wells are shown on Site Plan (Figure 2).

In December 2005, NYSDEC sampled the five existing groundwater monitoring wells determined to be in "good" condition, identified as MW-4, MW-5S, MW-5D, MW-6S, and MW-6D; the results of this sampling event suggests that the on-site groundwater underlying the site is no longer contaminated. However, low concentrations of 1,1,1-TCA were detected in public wells located in the region from 1977 to 2005. Due to the lack of an off-site groundwater evaluation performed during the remedial investigation, a preliminary investigation of the aquifer downgradient of the site is necessary to determine if contaminated groundwater has migrated off-site.

On February 4, 2005 the site was included on the List of Inactive Hazardous Waste Sites with Pre-2003 Remedial Decisions where Disposal of Chlorinated Hydrocarbons Occurred (vapor intrusion legacy site list). The site owner has agreed to evaluate the vapor intrusion concerns. This work plan addresses the state-funded groundwater investigation.

1.1.4 Site Geology and Hydrogeology

Previous reports indicate that subsurface materials at the site consist of fine sandy granular soils.

Based on documented groundwater measurements, the depth to groundwater was approximately 60 ft bgs and the groundwater flow direction is towards the south-southwest.

1.2 Work Plan Organization

This volume, the Work Plan proper, provides the background information, administrative information including subcontracting, schedule, and budget (provided as Appendix 1 to this volume). Additional project plans which are an integral component of the project documents are provided as attachments to this Work Plan and include:

Field Activities Plan – Attachment A

Quality Assurance Project Plan – Attachment B

Health and Safety Plan – Attachment C

The scope and content of each of these plans is summarized in Section 2 of this Work Plan.

2.0 SCOPE OF WORK

The following scope of work has been developed in accordance with the Work Assignment narrative provided by NYSDEC. The scope is divided into five tasks:

- Task 1 – Work Plan Development;
- Task 2 – Off-Site Groundwater Evaluation – Phase I,
- Task 3 – Off-Site Groundwater Evaluation – Phase II,
- Task 4 – Surveying & Investigative Derived Waste Disposal, and
- Task 5 – Field Documentation and Reporting.

2.1 Task 1 - Work Plan Development

A meeting will be held at the site to discuss this work assignment and the requirements of the work plan. During the on-site meeting Earth Tech will attempt to locate and verify the condition of the on-site monitoring wells. Based on the meeting, Earth Tech will prepare a dynamic work plan to evaluate groundwater conditions.

The Work Plan document consists of the following components:

- Site Specific Field Activities Plan;
- Site-Specific Quality Assurance Project;
- Site-Specific Health and Safety Plan;
- Detailed Work Assignment Budget
- Final Progress Schedule

These items are discussed below.

2.1.1 Field Activities Plan

The Draft Field Activities Plan (FAP) provided as Attachment A, describes the planned field activities. The major field activities include locating and accessing 11 existing wells, the installation and development of 7 permanent Solinst CMT multilevel systems (seven channel systems) and sampling the existing and new wells. The objective of these field activities is to evaluate groundwater at the site to determine if contamination is emanating from the site. The FAP provides sufficient detail for field personnel to complete the tasks. The FAP will include a discussion of each of the activities to be completed including rationale, methodology, numbers of samples to be collected, disposal of IDW, etc. This information will also be summarized on tables and figures (type and number of samples, analyses, etc.).

To minimize redundancy, required items which are described in detail elsewhere will not be repeated in the FAP, but the relevant plan (and section) where the information is located will be cited.

2.1.2 Quality Assurance Project Plan

A site-specific Quality Assurance Project Plan (QAPP), provided as Attachment B, has been developed to address QA/QC requirements for this Work Assignment. The QAPP will include descriptions of the following:

- Project Management and Organization - This will include project personnel and responsibilities, identification of subcontractors, and schedule;
- Sample handling, including sample identification, bottles and custody;
- Data Quality Requirements - This will include definition of the data quality objectives, type and frequency of field QA/QC samples and field and laboratory QA/QC;
- Custody Documentation Requirements;
- Laboratory Equipment Maintenance Requirements;
- Data Reduction, Validation and Reporting; and
- Audits and quality assurance reporting requirements.

To minimize redundancy, required items which are described in detail elsewhere will not be repeated in the QAPP, but the relevant plan (and section) where the information is located will be cited.

The estimated number of samples to be collected, including QA/QC samples, is shown on QAPP Table 2.

All samples collected will be analyzed by Hampton-Clarke Laboratory of Fairfield, New Jersey, a New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP) certified laboratory. Hampton-Clarke will provide analytical data in a NYSDEC Analytical Services Protocol Category B data deliverable format. Preliminary sample results will be provided in two weeks and final sample results will be provided within standard turnaround time (30 days). Laboratory data will be validated by a third party independent of the analytical laboratory and Earth Tech. The resume of the data validator will be provided for approval prior to initiating sampling activities. A data usability summary report (DUSR) will be submitted to the NYSDEC.

2.1.3 Health and Safety Plan

The site-specific worker health and safety requirements will be evaluated. A site-specific draft Health and Safety Plan (HASP) has been developed and is provided in Attachment C.

The HASP will include descriptions of the following:

- Project Management - This will include project personnel and responsibilities, and identification of subcontractors;
- An evaluation of the work to be performed including an assessment of risks and protective measures;
- Definition of Monitoring Requirements and Action Levels;
- Site control, Decontamination and Disposal Procedures;
- Emergency Contingency Plan; and,
- Administrative and reporting requirements.

To minimize redundancy, required items which are described in detail elsewhere will not be repeated in the HASP, but the relevant plan (and section) where the information is located will be cited.

Unless otherwise noted, it is assumed that all field work will be completed at USEPA level D personal protection in accordance with the Health and Safety Plan. Field activities will be monitored by an Earth Tech representative.

2.1.4 Detailed Budget

A detailed budget estimate for completing Task 1 through Task 5 has been developed in the required 2.11 series cost schedules and are presented in Appendix 1 of this Plan.

2.1.5 Final Progress Schedule

A progress schedule for completing the required tasks is presented in Section 3 of this Plan. The schedule identifies milestones and deliverables. The progress schedule is relative to the date of the Notice to Proceed. For purposes of developing the schedule, this date has been assumed to be November 16, 2007 per the Schedule in Figure 5. In addition, the schedule includes estimated time periods for NYSDEC review of submittals. The actual progress schedule may vary depending on the actual date of the Notice to Proceed and NYSDEC review of submittals within estimated time periods.

2.2 Task 2 – Phase I Evaluation of Off-Site Groundwater

The activities that will be performed under this task involve the assessment of groundwater quality within the anticipated off-site plume. Due to the potential for contamination to have migrated off-site via groundwater, the assessment will be performed in a manner capable of profiling the migration pathway to link the off-site contamination to the site. The approximate locations of the proposed groundwater sampling points are shown on Figure 2 (on-site monitoring well locations) and Figure 3 (off-site CMT locations).

This task will include:

- Installation of 7 Solinst CMT Multilevel Sampling Systems (seven channels per location) located downgradient of the site to a depth ranging from 130 to 220 feet below ground surface (bgs);
- Each of the Solinst CMTs will have seven discrete sampling ports in order to accurately profile the groundwater column. Sample ports will be spaced approximately 10 to 25 feet apart depending on the location. The first screen interval will be located approximately five ft below the groundwater interface: PW-01 will extend to approximately 130 ft bgs with screens spaced 10 ft apart; PW-02 through PW-04 will extend to approximately 160 ft bgs with screens spaced 15 ft apart; and PW-05 through PW-07 will extend to approximately 220 ft bgs with screens spaced 25 ft apart.
- Collection and analysis of 60 groundwater samples for volatile organic compounds (VOCs) and metals from the seven new Solinst CMTs (seven channels each for a total of 49 samples) and the 11 existing monitoring wells (MW-1S, MW-1D, MW-2, MW-3, MW-4, MW-5S, MW-5D, MW-6S, MW-6D, MW-7S and MW-7D).

Detailed information on the execution of this Task is provided in the FAP and QAPP.

2.2.1 Groundwater Profiling

Earth Tech will assess the groundwater quality vertically at the identified groundwater profile points shown of Figure 3. Solinst CMTs will be installed to obtain 7 discrete samples in order to profile the groundwater column. The clusters will be located within the anticipated limits of the groundwater contamination to properly evaluate the groundwater quality. Groundwater sampling ports associated with PW01 will be spaced approximately 10 ft apart vertically, beginning five ft below groundwater interface (approximately 60 ft bgs) and extending to an approximate depth of 130 ft bgs. Groundwater sampling ports associated with PW02 through PW04 will be spaced approximately 15 ft apart vertically, beginning at groundwater interface and extending to an approximate depth of 160 ft bgs. Groundwater sampling ports associated with PW05 through PW07 will be spaced approximately 25 feet apart vertically, beginning at groundwater interface and extending to an approximate depth of 220 ft bgs. The screened interval will span approximately two feet at each sampling port. Well construction will be performed in a manner that limits vertical migration of contaminants between the sample ports. Each monitoring well will be developed after installation.

2.2.2 Groundwater Monitoring Well Sampling

Fourteen days after installation and development of the proposed monitoring wells, Earth Tech will gauge the depth to water in the proposed off-site monitoring wells and from the existing on-site monitoring wells to provide information on groundwater flow in the vicinity of the site. Based on field measurements and established survey datum, a groundwater flow contour will be provided by Earth Tech. Low flow sampling techniques in accordance with EPA Region II sampling protocols will be collected from the 11 existing on-site shallow and deep monitoring wells, identified as MW-1 through MW-7. Solinst CMTs will be sampled in accordance with Solinst CMT protocols described in the FAP. A total of 60 groundwater sample locations will be collected during Phase I. Samples will be analyzed for VOCs and metals. In low yield wells, the samples may be collected after well recharge if purged dry.

2.3 Task 3 – Phase II Define Off-Site Groundwater Contamination

Pending findings from Task 2, the installation of supplemental monitoring well clusters will be evaluated and if necessary performed to define the horizontal and vertical extents of the off-site groundwater contamination. Potential locations of supplemental monitoring well clusters are shown of Figure 3, but actual locations will be determined, if necessary, after Task 2 is completed. Installation of monitoring wells adjacent to Phase I locations may be necessary to refine the limits of the contamination detected as part of Phase I.

Anticipated tasks include:

- Refine the horizontal and vertical extents of contamination by installing up to 11 monitoring well clusters;
- Each monitoring well cluster will be capable of providing 7 discrete sample points in order to accurately profile the groundwater column; and
- Collect and analyze approximately 87 groundwater samples for VOCs and metals from approximately 11 new monitoring well clusters and approximately 10 confirmatory samples from monitoring well locations previously sampled under Task 3.

Detailed information on the execution of this Task is provided in the FAP and QAPP.

2.3.1 Groundwater Profiling

Supplemental monitoring well clusters, tentatively identified in Figure 3 as PW08 through PW18, will be installed, if necessary, based on the results from Task 2 to further investigate potential concerns and/or to delineate the extents of the contamination. Based on the analytical results and spacing of the Phase I samples, one of the proposed eleven supplemental monitoring well clusters may be located adjacent to a Phase I monitoring well cluster to refine the vertical extent of contamination. Each groundwater profile point is anticipated to obtain approximately seven discrete samples in order to profile the groundwater column, but actual monitoring well construction will be determined based on the results of Task 2.

2.3.2 Groundwater Monitoring Well Sampling

Fourteen days after installation and development of the proposed monitoring wells, Earth Tech will gauge the depth to water in the proposed off-site monitoring wells and from the existing on-site monitoring wells to provide information on groundwater flow in the vicinity of the site. Based on field measurements and established survey datum, a groundwater flow contour will be provided by Earth Tech. Low flow sampling techniques in accordance with EPA Region II sampling protocols will be collected from 11 monitoring well clusters (77 off-site monitoring wells) and approximately 10 confirmatory samples from previously-sampled monitoring wells, for a total of 87 groundwater samples. In low yield wells, the samples may be collected after well recharge if purged dry.

2.4 Task 4 – Surveying & Investigative Derived Waste Disposal

Pending findings from Tasks 2 and 3, the monitoring wells installed will be surveyed and investigative derived waste (IDW) will be processed and disposed accordingly.

Anticipated tasks include:

- Survey existing and new monitoring well locations; and
- Coordinate the transportation and disposal of IDW.

2.4.1 Survey Sampling Locations

The locations of all sample points and newly installed monitoring wells will be surveyed. The horizontal positions will be tied into the North American Datum of 1983 and UTM Zone 18 N coordinate system. The vertical position will be tied to the North American Vertical Datum of 1988. The measuring point associated with the existing monitoring wells will be recorded to a vertical accuracy of ±0.01 ft. Three benchmarks will be established on existing site features. The site survey information will be provided on the aerial photograph that indicates current site features (i.e., roads, buildings, etc.) and can be utilized as a base map to illustrate site conditions.

2.4.2 Investigative Derived Wastes

IDW consisting of soil cuttings and purge water will be staged in appropriate containers and analyzed to determine the waste classification and appropriate disposal methods. Based on the analytical results, Earth Tech will dispose of the IDW at a NYSDEC-approved disposal facility.

2.5 Task 5 - Field Documentation and Reporting

2.5.1 Field Documentation Procedures

Field notebooks will be used during all on-site work. A dedicated field notebook will be maintained by the Earth Tech representative overseeing the site activities. In addition to the notebook, any and all sampling forms and purge forms used during the field activities will be submitted to the NYSDEC as part of the final letter report. Field and sampling procedures, including installation of the monitoring wells, groundwater sampling, etc. will be photo-documented.

2.5.2 Reporting

A total of four copies of a draft letter report will be submitted that documents the work conducted and presents the results of the sample analysis for review and comment by NYSDEC and NYSDOH. Upon receipt of the comments, Earth Tech will revise the draft letter report and print the requested number of final copies indicated in the comment letter. One copy of the final letter report; text, tables, maps, photos, etc., will be submitted as a single bookmarked pdf file. The electronic files will be submitted to NYSDEC on a compact disc. The laboratory analytical data will be submitted in NYSDEC EZ-EDD format, as specified in Section 2.0 of Exhibit H of the July 2005 Analytical Services Protocol.

3.0 STAFFING PLAN AND SCHEDULE

An organizational chart is presented on Figure 4.

A tentative schedule for this assignment is presented on Figure 5.

4.0 SUBCONTRACTING AND M/WBE PLAN

It is likely that the services of subcontractors will be required in the following areas:

- Land Surveying by YEC, Inc. (MBE)
- Drilling services for the installation of monitoring wells
- Installation and development services for multi-port wells
- Laboratory analyses
- Data validation

Earth Tech will make a good faith effort to use Minority Business Enterprises (MBE) and Women Business Enterprises (WBE) for at least 15 percent and 5 percent of the dollar value of the work, respectively.

5.0 PROJECT BUDGET

A summary of the proposed project level of effort and budget is presented in the attached 2.11 schedules for this assignment.

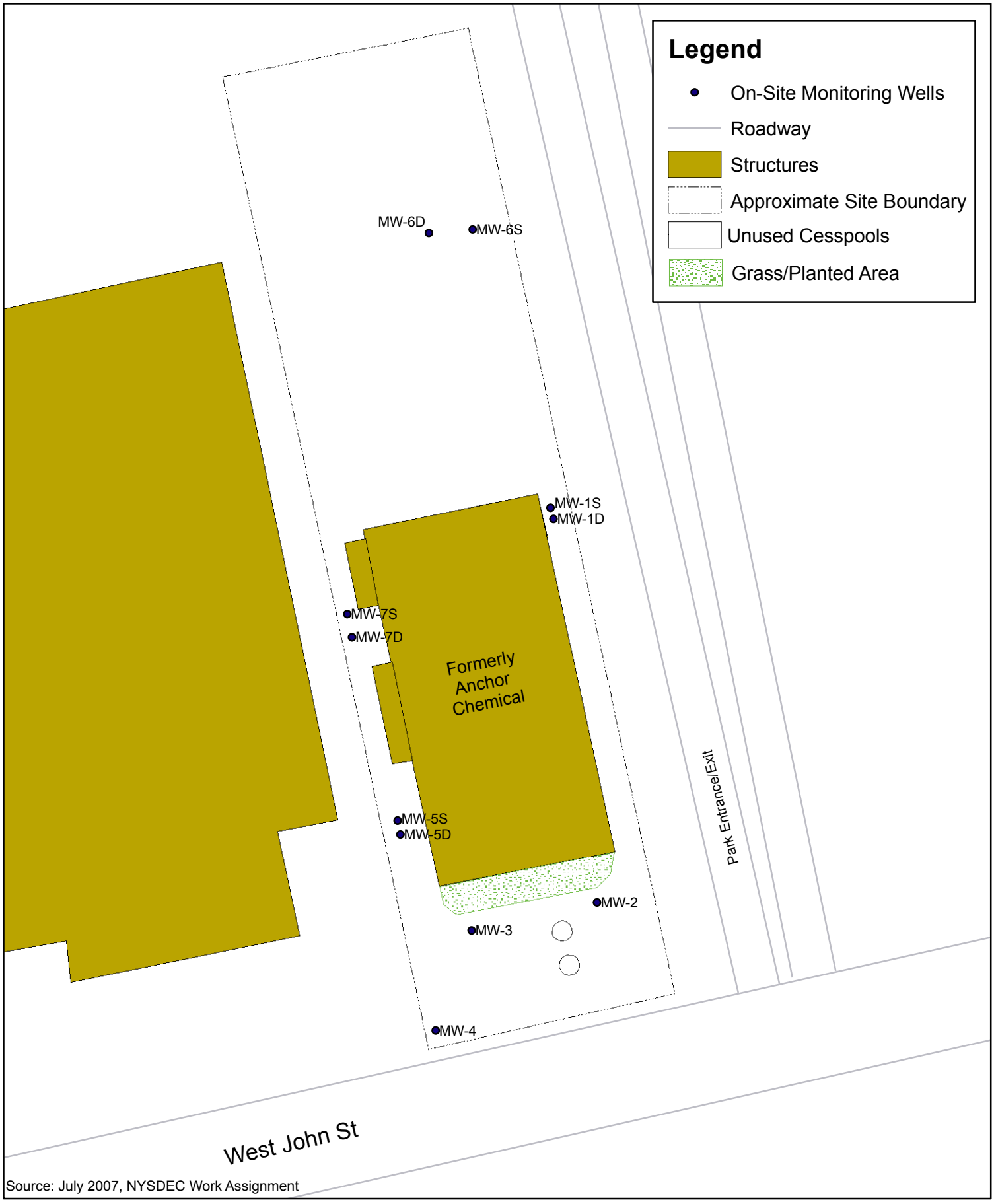
0 400,000 800,000 1,600,000 Feet

N W E S

NYSDEC Site No. 1-30-021
Anchor Lith Kem Ko Site
Hicksville, Nassau County, NY

Figure 1
Site Location

EarthTech
A tyco International Ltd. Company



Source: July 2007, NYSDEC Work Assignment

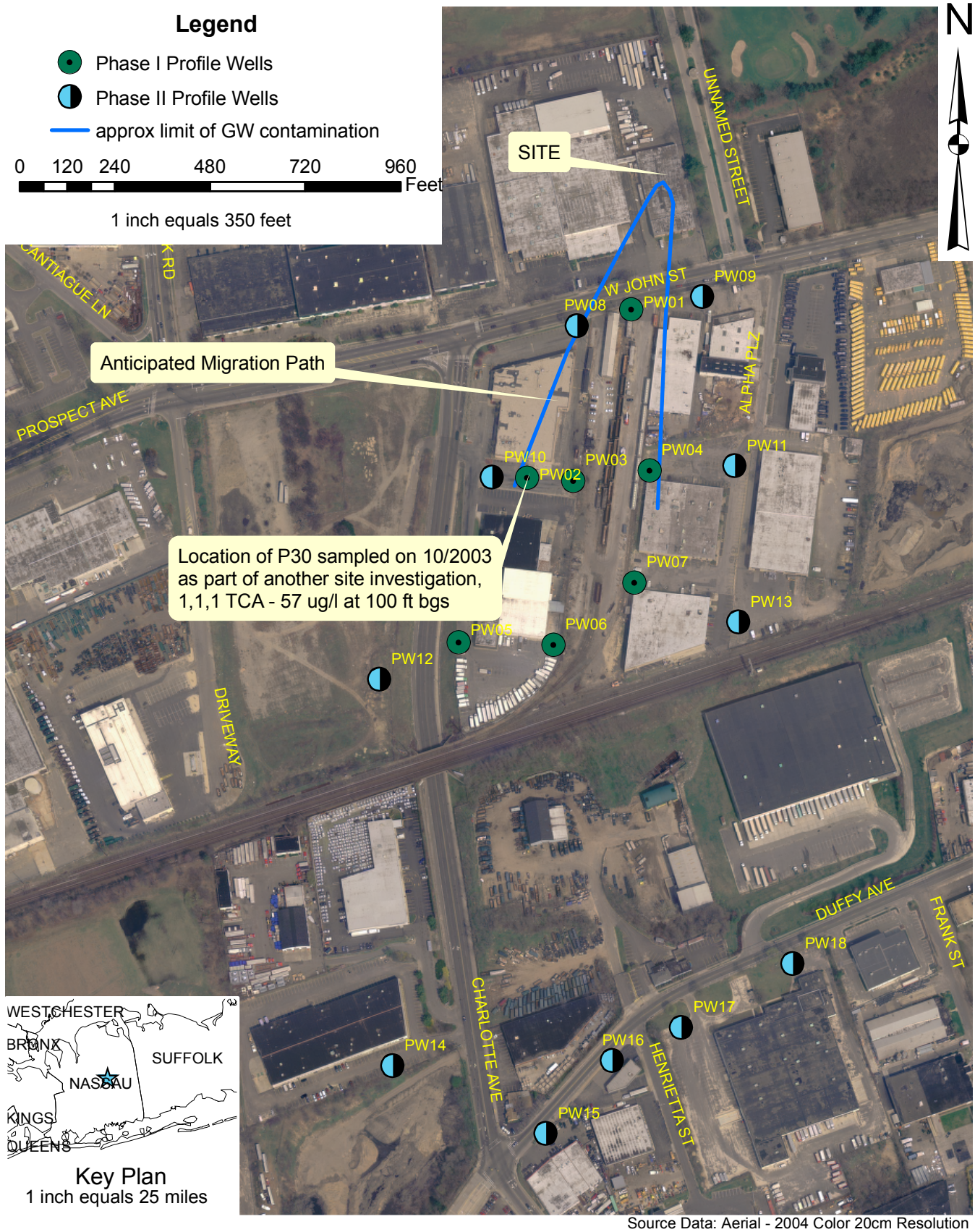
0 20 40 80 120 160 Feet

N W E S

NYSDEC
Anchor Lith Kem Ko
Site No. 1-30-021
Nassau County, NY

Figure 2
Site Plan

EarthTech
A tyco International Ltd. Company



Source Data: Aerial - 2004 Color 20cm Resolution

New York State Department of Environmental Conservation
Proposed Sample Locations
Anchor Lith Kem Ko, Site No. 1-30-021
Hicksville, Nassau County, New York

Created by: BFJ

Date: 6/26/06

Figure 3

FIGURE 4
PROJECT ORGANIZATION CHART
ANCHOR LITH KEM KO SITE
WORK ASSIGNMENT No. D004436-08

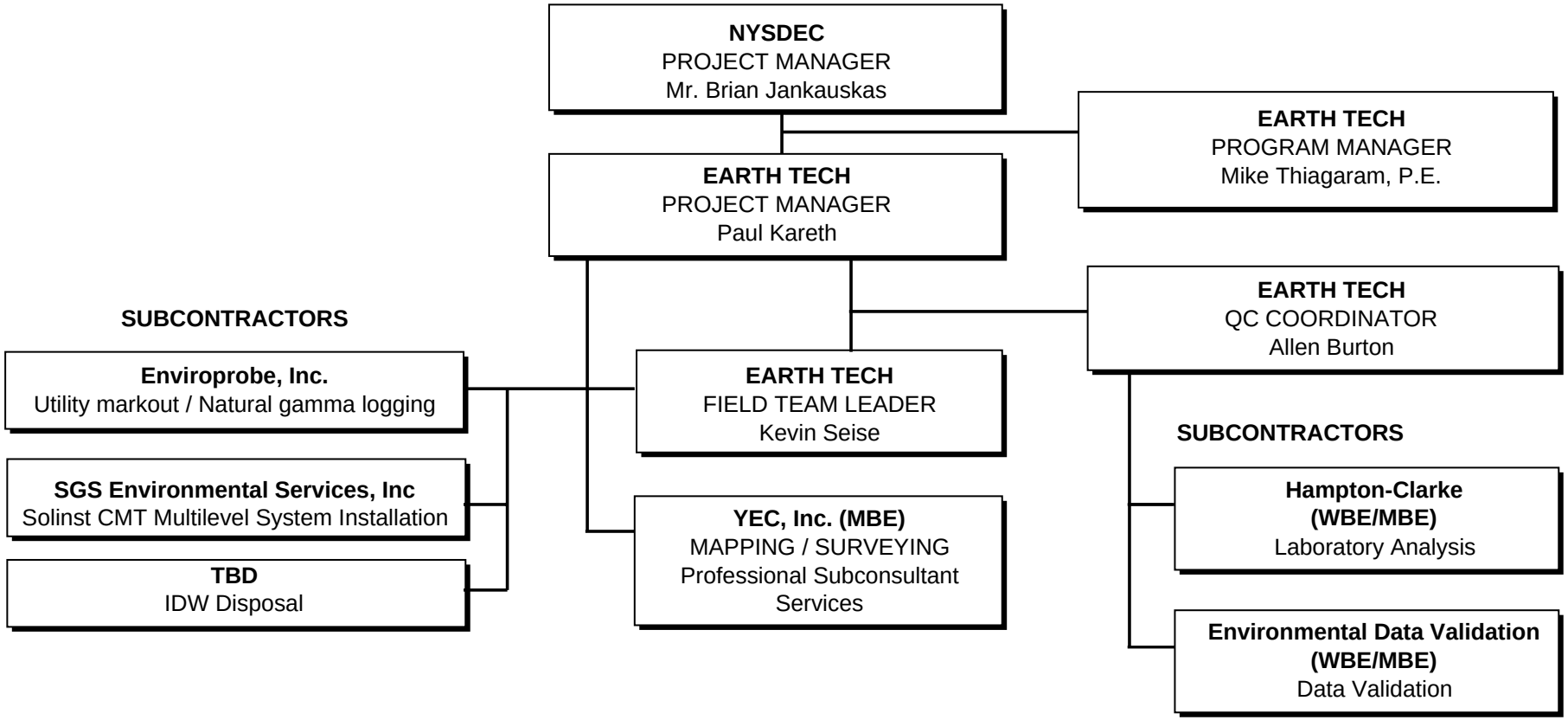
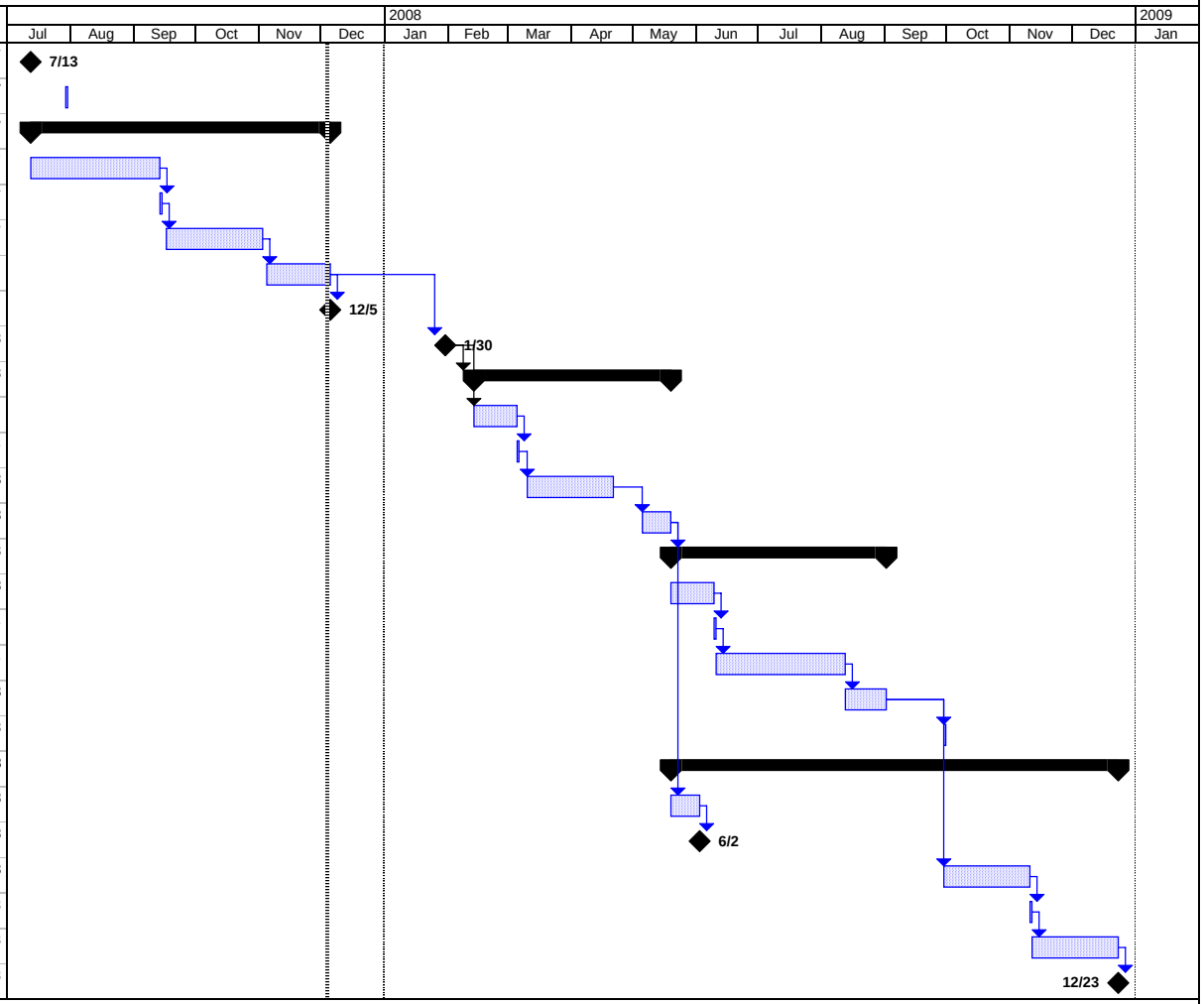


FIGURE 5 - PROJECT SCHEDULE

ID	Task Name	Duration	Start	Finish
1	Acceptance of Work Assignment	0 days	Fri 7/13/07	Fri 7/13/07
2	Site Visit	1 day	Mon 7/30/07	Mon 7/30/07
3	**Task 1 - Work Plan**	**104 days**	**Fri 7/13/07**	**Wed 12/5/07**
4	Work Plan Development Session	45 days	Fri 7/13/07	Thu 9/13/07
5	Submit Draft Work Plan	1 day	Fri 9/14/07	Fri 9/14/07
6	NYSDEC Work Plan Review	35 days	Mon 9/17/07	Fri 11/2/07
7	Prepare Final Work Plan	23 days	Mon 11/5/07	Wed 12/5/07
8	Submit Final Work Plan	0 days	Wed 12/5/07	Wed 12/5/07
9	**Notice to Proceed**	**0 days**	**Wed 1/30/08**	**Wed 1/30/08**
10	**Task 2 Field Work**	**68 days**	**Thu 2/14/08**	**Mon 5/19/08**
11	NYSDEC access agreements	15 days	Thu 2/14/08	Wed 3/5/08
12	Utility markout	1 day	Thu 3/6/08	Thu 3/6/08
13	Solinst CMT Installation	30 days	Tue 3/11/08	Mon 4/21/08
14	Groundwater Sampling	10 days	Tue 5/6/08	Mon 5/19/08
15	**Task 3 Field Work (If necessary)**	**75 days**	**Tue 5/20/08**	**Mon 9/1/08**
16	NYSDEC access agreements	15 days	Tue 5/20/08	Mon 6/9/08
17	Utility markout	1 day	Tue 6/10/08	Tue 6/10/08
18	Solinst CMT Installation	45 days	Wed 6/11/08	Tue 8/12/08
19	Groundwater Sampling	14 days	Wed 8/13/08	Mon 9/1/08
20	**Task 4 - IDW Disposal**	**1 day**	**Tue 9/30/08**	**Tue 9/30/08**
21	**Task 5 - Reporting**	**156 days**	**Tue 5/20/08**	**Tue 12/23/08**
22	Draft Progress Report - Task 2	10 days	Tue 5/20/08	Mon 6/2/08
23	Submit Progress Report	0 days	Mon 6/2/08	Mon 6/2/08
24	Prepare Draft Letter Report	30 days	Tue 9/30/08	Mon 11/10/08
25	Submit Draft Letter Report	1 day	Tue 11/11/08	Tue 11/11/08
26	NYSDEC Report Review	30 days	Wed 11/12/08	Tue 12/23/08
27	Submit Final Letter Report	0 days	Tue 12/23/08	Tue 12/23/08



Project: Anchor Lith Kem Ko
(Site No. 1-30-021)

Task
Split
Progress
Milestone
Summary
Rolled Up Task
Rolled Up Split
Rolled Up Milestone
Rolled Up Progress
External Tasks
Project Summary

Anchor Lith Kem Ko (Site # 1-30-021)
WA D004436-08

Justification for the Selection of SGS Environmental Services, Inc for the Drilling

A cost comparison of the three drilling bids is included. The NYSDEC work assignment specifically stipulated that a multi-channel sampling system be used for the installation of monitoring points. Earth Tech Northeast (Earth Tech) solicited three vendors of this technology: Solinst, Westbay and FLUTe™. After consultation with Brian Jankauskas, the NSYDEC PM, the decision was made to proceed with Solinst based on overall cost.

Based on this decision, the pool of potential bidders was limited to those drillers who are certified Solinst CMT installers. After reviewing the Solinst website, three drilling vendors were located in the tri-State area with this experience: SGS Environmental (SGS), Parratt Wolff, and Boart Longyear (formerly Prosonic). Besides these three drillers, Earth Tech solicited other drilling firms and only Aztech Technologies agreed to obtain Solinst training on the installation of CMTs for this project if selected. Parratt Wolff, after reviewing the bid specifications declined to bid since Long Island was too far from their home office in East Syracuse, NY. Consequently, Earth Tech received only three drilling bids for this work assignment. The three bids are compared on the attached table.

The bids were evaluated on three parameters: overall cost, time to completion and the driller's ability to complete the work assignment.

Overall cost: Aztech was the low bidder by $8,520, followed by SGS and Prosonic.

Time to completion: Prosonic stated they could complete the work in approximately 3 weeks versus six weeks for SGS and Aztech. A rough estimate of Earth Tech's field time for oversight works out to approximately $6,500 per week (assuming a 50 hour work week at Level IV, per diems and field incidentals). The savings of three weeks of Earth Tech's field effort did not off-set the higher costs of Prosonic.

Ability to complete the work as proposed: As both Prosonic and SGS are familiar with the installation of Solinst CMTs, and are reputable drillers familiar to Earth Tech Northeast, both were considered to be capable of completing the work assignment in the allotted time. Since Aztech has never installed CMTs, their ability to complete the assignment within their proposed budget and timeframe was not as reliable when compared to Prosonic and SGS. Essentially Aztech informed Earth Tech that they would have Solinst in the field teaching them how to install the monitoring points. Earth Tech is concerned that this increased risk of completing the work as proposed and any time overruns would result in additional field time by Earth Tech personnel significantly increasing the overall project budget. As these are very deep installations (200 ft bgs) the implications for potential problems and the extension of the overall field schedule is significant if Aztech were to be awarded the work.

Selection of SGS Environmental Services: Earth Tech has determined that the most qualified driller is SGS based on their experience in the installation of the Solinst system resulting in a lower risk to the project schedule and budget. Prosonic was the high bidder and deemed too costly when compared to SGS or Aztech. Aztech was eliminated due to the lack of experience in installing the system and the potential for increased schedule and budget risk which outweighs the estimated cost savings of $8,500 versus SGS.

ANCHOR LITH KEM KO SITE (1-30-021)
HICKSVILLE, NASSAU COUNTY, NY

DRILLING BID FORM

Activity	Unit	Estimated Quantity	SGS (revised) Unit Rate	SGS (revised) Total	Prosonic (revised) Unit Rate	Prosonic (revised) Total	Aztech Unit Rate	Aztech Total
1) Mobilization/Demobilization: Mob/Demob of all equipment for the entire work period including drilling rig, support vehicles and equipment, incidental materials, water retrieval, lodging and meals. This item shall include expenses incurred in obtaining permits, utility locations, and level D PPE.	lump sum	1	$2,675.00	$2,675.00	$10,835.00	$10,835.00	$10,120.00	$10,120.00
2) Drill and install one 7-channel Solinst CMT well to 130 ft bgs. Sampling ports will be 2 ft in length and spaced approximately 10 ft apart.	unit rate	1	$11,750.00	$11,750.00	$13,260.00	$13,260.00	$7,670.00	$7,670.00
3) Drill and install three 7-channel Solinst CMT to 160 ft bgs. Sampling ports will be 2 ft in length and spaced approximately 15 ft apart.	unit rate	3	$12,000.00	$36,000.00	$16,320.00	$48,960.00	$9,440.00	$28,320.00
4) Drill and install three 7-channel Solinst CMT to 220 ft bgs. Sampling ports will be 2 ft in length and spaced approximately 25 ft apart.	unit rate	3	$13,250.00	$39,750.00	$22,440.00	$67,320.00	$12,980.00	$38,940.00
5) flushmount protective casing	each	7	$300.00	$2,100.00	$500.00	$3,500.00	$98.00	$686.00
6) Construction of temporary decontamination pad	lump sum	1	$450.00	$450.00	$1,000.00	$1,000.00	$420.00	$420.00
7) Decontamination	hour	7	$300.00	$2,100.00	$500.00	$3,500.00	$135.00	$945.00
8) New DOT 55-gallon drum	drum	3	$55.00	$165.00	$75.00	$225.00	$48.00	$144.00
9) Additional Items (specify)		1	Hicksville WD permit $775.00	$775.00	$0.00	$0.00		$0.00
				$95,765.00		$148,600.00		$87,245.00
estimated time to complete the work				6 weeks		3 weeks		5-6 weeks

Parratt Wolff (East Syracuse, NY) declined to bid
The SGS revised bid included addition drums for disposal (toal cost = $5,475.00); Earth Tech plans to get a rolloff for soil disposal.

GEOPHYSICAL SURVEY BID FORM
ANCHOR LITH KEM KO SITE (1-30-021)
HICKSVILLE, NASSAU COUNTY, NY
TECHNICAL SPECIFICATIONS FOR UTILITY CLEARANCE AND DOWNHOLE GEOPHYSICS

Activity	Unit	Estimated Quantity	Enviroscan, Inc. Unit Rate	Enviroscan, Inc. Total	Enviroprobe, Inc. Unit Rate	Enviroprobe, Inc. Total	Hager-Richter Unit Rate	Hager-Richter Total
1) Mobilization/Demobilization: Mob/Demob of all equipment for the entire work period including geophysical instruments, support vehicles, incidental materials, lodging and meals. This item shall include expenses incurred, and level D PPE.	lump sum	1	$1,880.00	$1,880.00	$300.00	$300.00	$700.00	$700.00
2) 10-hour field day to complete 7 locations	day	1	$1,730.00	$1,730.00	$1,600.00	$1,600.00	$2,500.00	$2,500.00
3) Natural gamma downhole logging at one boring location (approximately 220 ft deep)	per boring	1	$1,450.00	$1,450.00	$2,400.00	$2,400.00	$2,950.00	$2,950.00
3) Field survey of additional locations (if required), or hours in excess of a 10-hr day	hour	2	$200.00	$400.00	$400.00	$800.00	$150.00	$300.00
4) Additional Item (Specify)		1	report $680.00	$680.00		$0.00		$0.00
			Total Cost:	$6,140.00	Total Cost:	$5,100.00	Total Cost:	$6,450.00

Work Assignment No: D004436-08
Engineer: Earth Tech Northeast, Inc.
Site ID No: 1-30-021

Site Name: Anchor Lith Kem Ko
Project No: 101351
Date Prepared: 12/4/07

EARTH TECH NORTHEAST, INC.
TABLE 1.0
SUMMARY OF BUDGETED PROJECT COSTS

TASK	Direct Labor (a)	Indirect Costs 1.468%	Fixed Fee 10.5%	Travel & Subsistence (b)	Other Direct Costs(c)	Fixed Fee (d) Subcontractor	Unit Price (e) Subcontractor	Mark-up on Unit Price Subs (5%)	TOTAL COLUMNS (1A-5)
Task 1 - Work Plan Development	**$5,790.42**	**$8,500.34**	**$1,500.53**						**$15,791.29**
Task 2 - Off-Site Groundwater Evaluation - Phase I	**$18,268.20**	**$26,817.72**	**$4,734.02**	**$15,362.60**	**$8,502.95**		**$143,995.00**	**$6,944.75**	**$224,625.24**
Subtask 2A - Utility Clearance	$355.80	$522.31	$92.20	$231.60	$23.00		$7,342.00	$112.10	$8,679.01
Subtask 2B - Solinst CMT Installation / Geophysical	$10,788.20	$15,837.08	$2,795.65	$8,944.00	$4,380.00		$112,298.00	$5,614.90	$160,657.83
Subtask 2C - Solinst CMT Sampling/Well Sampling	$7,124.20	$10,458.33	$1,846.17	$6,187.00	$4,099.95		$24,355.00	$1,217.75	$55,288.40
Task 3 - Off-Site GW Evaluation - Phase II (if directed)	**$24,749.85**	**$36,332.78**	**$6,413.68**	**$21,306.55**	**$11,968.93**		**$212,275.75**	**$10,388.79**	**$323,436.33**
Subtask 3A - Utility Clearance	$515.73	$757.09	$133.65	$579.80	$46.00		$4,500.00	$164.50	$6,696.77
Subtask 3B - Solinst CMT Installation	$14,737.63	$21,634.84	$3,819.11	$12,025.00	$8,066.73		$182,365.75	$9,118.29	$251,767.35
Subtask 3C - Solinst CMT Sampling/well sampling	$9,496.49	$13,940.85	$2,460.92	$8,701.75	$3,856.20		$25,410.00	$1,106.00	$64,972.21
Task 4 - Surveying and IDW Disposal	**$807.82**	**$1,185.88**	**$209.33**	**$172.20**	**$23.00**	**$19,379.88**	**$26,834.00**	**$1,341.70**	**$49,953.81**
Subtask 4A - Surveying	$159.93	$234.78	$41.44			$19,379.88			$19,816.03
Subtask 4B - IDW Disposal	$647.89	$951.10	$167.89	$172.20	$23.00		$26,834.00	$1,341.70	$30,137.78
Task 5 - Field Documentation & Reporting	**$21,483.14**	**$31,537.25**	**$5,567.14**						**$58,587.53**
Subtask 5A - Progress Report for Phase I	$5,313.35	$7,800.00	$1,376.90						$14,490.25
Subtask 5B - Draft and Final Report (Phase I & II)	$16,169.79	$23,737.25	$4,190.24						$44,097.28
TOTALS	**$71,099.43**	**$104,373.97**	**$18,424.70**	**$36,841.35**	**$20,494.88**	**$19,379.88**	**$383,104.75**	**$18,675.24**	**$672,394.19**

Work Assignment No: D004436-08
Engineer: Earth Tech Northeast, Inc.
Site ID No: 1-30-021

Site Name: Anchor Lith Kem Ko
Project No: 101351
Date Prepared: 12/4/07

EARTH TECH NORTHEAST, INC.
SCHEDULE 2.11(a)
SUMMARY OF WORK ASSIGNMENT PRICE

1.	DIRECT SALARY COSTS (Schedules 2.10(a) and 2.11(b)	$71,099
2.	INDIRECT COSTS (Schedule 2.10(g))	$104,374
3.	DIRECT NON-SALARY COSTS (Schedules 2.10(d)(e)(f) and 2.11(c)(d)	$57,336

SUBCONTRACT COSTS
COST-PLUS-FIXED-FEE SUBCONTRACTS
(Schedule 2.10(e) and 2.11(e))

NAME OF SUBCONTRACTOR	SERVICES TO BE PERFORMED	SUBCONTRACT PRICE
YEC, Inc. (MBE)	Field Assistance	$19,380
4.	TOTAL COST-PLUS-FIXED-FEE SUBCONTRACTS	$19,380

UNIT PRICE SUBCONTRACTS
(Schedule 2.10(f) and 2.11(f))

NAME OF SUBCONTRACTOR	SERVICES TO BE PERFORMED	SUBCONTRACT PRICE
Hampton-Clarke Veritech (WBE)	Analysis of water samples and waste disposal samples	$43,194
Solinst	CMT Multilevel Systems	$53,199
SGS, Inc.	Solinst CMT Multilevel System Installation	$253,580
Enviroprobe Service, Inc.	Geophysical Surveys	$9,600
TBD	Invesitgation Derived Waste Disposal	$18,000
Analytical Assurance Associates (WBE)	Data Validation	$5,532
		$0
	Subcontract Management Fee (5% on M/WBE or >$10K)	$18,675
5.	TOTAL UNIT PRICE SUBCONTRACTS	$401,780
6.	TOTAL SUBCONTRACT COSTS (Lines 4 + 5)	$421,160
7.	FIXED FEE (Schedule 2.10(h))	$18,425
8.	TOTAL WORK ASSIGNMENT PRICE (Lines 1 + 2+ 3+ 6 + 7)	**$672,394**

Work Assignment No: D004436-08
Engineer: Earth Tech Northeast, Inc.
Site ID No: 1-30-021

Site Name: Anchor Lith Kem Ko
Project No: 101351
Date Prepared: 12/4/07

EARTH TECH NORTHEAST, INC.
NSPE
SCHEDULE 2.11(b)
DIRECT LABOR HOURS BUDGETED
2007

LABOR CLASSIFICATION 2007 AVERAGE RAW LABOR RATE	IX $63.67	VIII $62.25	VII $49.60	VI $41.84	V $37.36	IV $30.36	III $27.20	II $24.02	I $16.55	LABOR HOURS	DIRECT LABOR
Task 1 - Work Plan Development	**4.00**		**8.00**	**50.00**		**40.00**	**40.00**			**142.00**	**$5,045.88**
Task 2 - Off-Site Groundwater Evaluation - Phase I											
Subtask 2A - Utility Clearance											
Subtask 2B - Solinst CMT Installation / Geophysical											
Subtask 2C - Solinst CMT Sampling/Well Sampling											
Task 3 - Off-Site GW Evaluation - Phase II (if directed)											
Subtask 3A - Utility Clearance											
Subtask 3B - Solinst CMT Installation											
Subtask 3C - Solinst CMT Sampling/well sampling											
Task 4 - Surveying and IDW Disposal											
Subtask 4A - Surveying											
Subtask 4B - IDW Disposal											
Task 5 - Field Documentation & Reporting											
Subtask 5A - Progress Report for Phase I											
Subtask 5B - Draft and Final Report (Phase I & II)											
TOTAL LABOR HOURS	4.00		8.00	50.00		40.00	40.00			142.00	
TOTAL LABOR DOLLARS	$254.68		$396.80	$2,092.00		$1,214.40	$1,088.00				$5,045.88

Work Assignment No: D004436-08
Engineer: Earth Tech Northeast, Inc.
Site ID No: 1-30-021

Site Name: Anchor Lith Kem Ko
Project No: 101351
Date Prepared: 12/4/07

EARTH TECH NORTHEAST, INC.
NSPE
SCHEDULE 2.11(b)
DIRECT LABOR HOURS BUDGETED
2008

LABOR CLASSIFICATION 2008 AVERAGE RAW LABOR RATE	IX $65.58	VIII $64.12	VII $51.09	VI $43.10	V $38.48	IV $31.27	III $28.02	II $24.74	I $17.05	LABOR HOURS	DIRECT LABOR
Task 1 - Work Plan Development											
Task 2 - Off-Site Groundwater Evaluation - Phase I	**2.00**			**17.00**		**446.00**	**112.00**			**577.00**	**$17,948.35**
Subtask 2A - Utility Clearance				1.00		10.00				11.00	$355.80
Subtask 2B - Solinst CMT Installation / Geophysical	1.00			10.00		324.00				335.00	$10,628.27
Subtask 2C - Solinst CMT Sampling/Well Sampling	1.00			6.00		112.00	112.00			231.00	$6,964.27
Task 3 - Off-Site GW Evaluation - Phase II (if directed)	**4.00**			**25.00**		**598.00**	**148.00**			**775.00**	**$24,186.01**
Subtask 3A - Utility Clearance				1.00		10.00				11.00	$355.80
Subtask 3B - Solinst CMT Installation	2.00			14.00		440.00				456.00	$14,493.65
Subtask 3C - Solinst CMT Sampling/well sampling	2.00			10.00		148.00	148.00			308.00	$9,336.56
Task 4 - Surveying and IDW Disposal	**1.00**			**2.00**			**12.00**			**15.00**	**$487.96**
Subtask 4A - Surveying											
Subtask 4B - IDW Disposal	1.00			2.00			12.00			15.00	$487.96
Task 5 - Field Documentation & Reporting	**12.00**		**30.00**	**120.00**		**84.00**	**200.00**	**200.00**		**646.00**	**$20,669.09**
Subtask 5A - Progress Report for Phase I	4.00		6.00	40.00		24.00	40.00	40.00		154.00	$5,153.42
Subtask 5B - Draft and Final Report (Phase I & II)	8.00		24.00	80.00		60.00	160.00	160.00		492.00	$15,515.67
TOTAL LABOR HOURS	19.00		30.00	164.00		1128.00	472.00	200.00		2013.00	
TOTAL LABOR DOLLARS	$1,246.02		$1,532.64	$7,067.61		$35,273.46	$13,223.55	$4,948.12			$63,291.41

escalation: 2007 rates times 3%

Work Assignment No: D004436-08
Engineer: Earth Tech Northeast, Inc.
Site ID No: 1-30-021

Site Name: Anchor Lith Kem Ko
Project No: 101351
Date Prepared: 12/4/07

EARTH TECH NORTHEAST, INC.
NSPE
SCHEDULE 2.11(b)
DIRECT LABOR HOURS BUDGETED
2009

LABOR CLASSIFICATION 2009 AVERAGE RAW LABOR RATE	IX $67.55	VIII $66.04	VII $52.62	VI $44.39	V $39.64	IV $32.21	III $28.86	II $25.48	I $17.56	LABOR HOURS	DIRECT LABOR
Task 1 - Work Plan Development											
Task 2 - Off-Site Groundwater Evaluation - Phase I											
Subtask 2A - Utility Clearance											
Subtask 2B - Solinst CMT Installation / Geophysical											
Subtask 2C - Solinst CMT Sampling/Well Sampling											
Task 3 - Off-Site GW Evaluation - Phase II (if directed)											
Subtask 3A - Utility Clearance											
Subtask 3B - Solinst CMT Installation											
Subtask 3C - Solinst CMT Sampling/well sampling											
Task 4 - Surveying and IDW Disposal											
Subtask 4A - Surveying											
Subtask 4B - IDW Disposal											
Task 5 - Field Documentation & Reporting											
Subtask 5A - Progress Report for Phase I											
Subtask 5B - Draft and Final Report (Phase I & II)											
TOTAL LABOR HOURS											
TOTAL LABOR DOLLARS											

escalation: 2008 rates times 3%

Work Assignment No: D004436-08
Engineer: Earth Tech Northeast, Inc.
Site ID No: 1-30-021

Site Name: Anchor Lith Kem Ko
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Date Prepared: 12/4/07

EARTH TECH NORTHEAST, INC.
NSPE
SCHEDULE 2.11(b)
DIRECT LABOR HOURS BUDGETED
TOTAL

LABOR CLASSIFICATION AVERAGE RAW LABOR RATE	IX	VIII	VII	VI	V	IV	III	II	I	LABOR HOURS	DIRECT LABOR
Task 1 - Work Plan Development	**4.00**		**8.00**	**50.00**		**40.00**	**40.00**			**142.00**	**$5,045.88**
Task 2 - Off-Site Groundwater Evaluation - Phase I	**2.00**			**17.00**		**446.00**	**112.00**			**577.00**	**$17,948.35**
Subtask 2A - Utility Clearance				1.00		10.00				11.00	$355.80
Subtask 2B - Solinst CMT Installation / Geophysical	1.00			10.00		324.00				335.00	$10,628.27
Subtask 2C - Solinst CMT Sampling/Well Sampling	1.00			6.00		112.00	112.00			231.00	$6,964.27
Task 3 - Off-Site GW Evaluation - Phase II (if directed)	**4.00**			**25.00**		**598.00**	**148.00**			**775.00**	**$24,186.01**
Subtask 3A - Utility Clearance				1.00		10.00				11.00	$355.80
Subtask 3B - Solinst CMT Installation	2.00			14.00		440.00				456.00	$14,493.65
Subtask 3C - Solinst CMT Sampling/well sampling	2.00			10.00		148.00	148.00			308.00	$9,336.56
Task 4 - Surveying and IDW Disposal	**1.00**			**2.00**			**12.00**			**15.00**	**$487.96**
Subtask 4A - Surveying											
Subtask 4B - IDW Disposal	1.00			2.00			12.00			15.00	$487.96
Task 5 - Field Documentation & Reporting	**12.00**		**30.00**	**120.00**		**84.00**	**200.00**	**200.00**		**646.00**	**$20,669.09**
Subtask 5A - Progress Report for Phase I	4.00		6.00	40.00		24.00	40.00	40.00		154.00	$5,153.42
Subtask 5B - Draft and Final Report (Phase I & II)	8.00		24.00	80.00		60.00	160.00	160.00		492.00	$15,515.67
TOTAL LABOR HOURS	23.00		38.00	214.00		1168.00	512.00	200.00		2155.00	
TOTAL LABOR DOLLARS	$1,500.70		$1,929.44	$9,159.61		$36,487.86	$14,311.55	$4,948.12			$68,337.29

Work Assignment No: D004436-08
Engineer: Earth Tech Northeast, Inc.
Site ID No: 1-30-021

Site Name: Anchor Lith Kem Ko
Project No: 101351
Date Prepared: 12/4/07

SCHEDULE 2.11(b)
TOTAL DIRECT ADMINISTRATIVE LABOR HOURS BUDGETED
TOTAL

LABOR CLASSIFICATION AVERAGE RAW LABOR RATE	IX	VIII	VII	VI	V	IV	III	II	I	LABOR HOURS	DIRECT LABOR
Task 1 - Work Plan Development	**2.00**			**5.00**			**15.00**			**22.00**	**$744.54**
Task 2 - Off-Site Groundwater Evaluation - Phase I	**1.00**			**2.00**			**6.00**			**9.00**	**$319.87**
Subtask 2A - Utility Clearance											
Subtask 2B - Solinst CMT Installation / Geophysical	0.50			1.00			3.00			4.50	$159.93
Subtask 2C - Solinst CMT Sampling/Well Sampling	0.50			1.00			3.00			4.50	$159.93
Task 3 - Off-Site GW Evaluation - Phase II (if directed)	**1.50**			**3.00**			**12.00**			**16.50**	**$563.85**
Subtask 3A - Utility Clearance	0.50			1.00			3.00			4.50	$159.93
Subtask 3B - Solinst CMT Installation	0.50			1.00			6.00			7.50	$243.98
Subtask 3C - Solinst CMT Sampling/well sampling	0.50			1.00			3.00			4.50	$159.93
Task 4 - Surveying and IDW Disposal	**1.00**			**2.00**			**6.00**			**9.00**	**$319.87**
Subtask 4A - Surveying	0.50			1.00			3.00			4.50	$159.93
Subtask 4B - IDW Disposal	0.50			1.00			3.00			4.50	$159.93
Task 5 - Field Documentation & Reporting	**2.50**			**5.00**			**15.00**			**22.50**	**$814.06**
Subtask 5A - Progress Report for Phase I	0.50			1.00			3.00			4.50	$159.93
Subtask 5B - Draft and Final Report (Phase I & II)	2.00			4.00			12.00			18.00	$654.12
TOTAL LABOR HOURS	8.00			17.00			54.00			79.00	
TOTAL LABOR DOLLARS	$523.77			$730.22			$1,508.19				$2,762.18

Work Assignment No: D004436-08
Engineer: Earth Tech Northeast, Inc.
Site ID No: 1-30-021

Site Name: Anchor Lith Kem Ko
Project No: 101351
Date Prepared: 12/4/07

SCHEDULE 2.11(b)
TOTAL DIRECT ADMINISTRATIVE LABOR HOURS BUDGETED
TOTAL

The work assignment duration is three years.
Subject to contract allowability, project adminsitrative hours would include but not necessarily be limited to the following activites:

1. Work Plan Development
 - Conflict of Interest Check
 - Develop budget schedules and supporting documentation
2. Review work assignment (WA) progress
 - Conduct progress reviews
 - Prepare monthly project report and update WA progess schedule
 - M/WBE Activities
 - Program Management
 - Manage Subcontracts
3. CAP Preparation
 - Prepare monthly cost control report and CAP
 - Oversee CAP preparation
4. Miscellaneous
 - NSPE List Updates
 - Equipment use and inventory
 - Word Processing and Report Preparation

Contract/Project administration hours would not include activities such as:

1. QA/QC reviews
2. Technical oversight by management
3. Develop subcontracts
4. Work plan development
 (other than COI and budget preparation)
5. Review of deliverables

Work Assignment No: D004436-08
Engineer: Earth Tech Northeast, Inc.
Site ID No: 1-30-021

Site Name: Anchor Lith Kem Ko
Project No: 101351
Date Prepared: 12/4/07

EARTH TECH NORTHEAST, INC.
SCHEDULE 2.11(c)
DIRECT NON-SALARY COSTS

ITEM	MAXIMUM REIMBURSEMENT RATE	UNIT	ESTIMATED NUMBER OF UNITS	TOTAL ESTIMATED COST
Travel Costs				
Task 1 - Work Plan Development				
Task 2 - Off-Site Groundwater Evaluation - Phase I				
Subtask 2A - Utility Clearance				
a. Business Mileage	$0.485	Miles	200	$97.00
b. Per Diem - Meals	$64.00	Day		
- Hotel	$159.00	Day		
c. Rental Van/Truck	$60.00	Day	1	$60.00
d. Parking and Tolls	$25.00	Day	2	$50.00
e. Cellphone	$0.80	min	30	$24.00
f. Copies	$0.06	copy	10	$0.60
g. Shipping (samples)	$100.00	Actual Cost		
h. Miscellaneous Supplies (e.g. Ice bags)	$200.00	LS		
i LVE	$0.80	hr	10	$8.00
j PPE	$15.00	day	1	$15.00
Total 2A				**$254.60**
Subtask 2B - Solinst CMT Installation / Geophysical				
a. Business Mileage	$0.485	Miles	1,200	$582.00
b. Per Diem - Meals	$64.00	Day	30	$1,920.00
- Hotel	$159.00	Day	24	$3,816.00
c. Rental Van/Truck	$60.00	Day	30	$1,800.00
d. Parking and Tolls	$25.00	Day	12	$300.00
e. Cellphone	$0.80	min	400	$320.00
f. Copies	$0.06	copy	100	$6.00
g. Shipping (samples)	$100.00	Actual Cost		
h. Miscellaneous Supplies (e.g. Ice bags)	$200.00	LS	1	$200.00
i LVE	$0.80	hr	300	$240.00
j PPE	$15.00	day	30	$450.00
Total 2B				**$9,634.00**
Subtask 2C - Solinst CMT Sampling/Well Sampling				
a. Business Mileage	$0.485	Miles	600	$291.00
b. Per Diem - Meals	$64.00	Day	20	$1,280.00
- Hotel	$159.00	Day	16	$2,544.00
c. Rental Van/Truck	$60.00	Day	10	$600.00
d. Parking and Tolls	$25.00	Day	4	$100.00
e. Cellphone	$0.80	min	200	$160.00
f. Copies	$0.06	copy	200	$12.00
g. Shipping (samples)	$100.00	Actual Cost	10	$1,000.00
h. Miscellaneous Supplies (e.g. Ice bags)	$200.00	LS	1	$200.00
i LVE	$0.80	hr	200	$160.00
j PPE	$15.00	day	20	$300.00
Total 2C				**$6,647.00**

EARTH TECH NORTHEAST, INC.
SCHEDULE 2.11(c)
DIRECT NON-SALARY COSTS

ITEM	MAXIMUM REIMBURSEMENT RATE	UNIT	ESTIMATED NUMBER OF UNITS	TOTAL ESTIMATED COST
Travel Costs				
Task 3 - Off-Site GW Evaluation - Phase II (if directed)				
Subtask 3A - Utility Clearance				
a. Business Mileage	$0.485	Miles	200	$97.00
b. Per Diem - Meals	$64.00	Day	2	$128.00
- Hotel	$159.00	Day	1	$159.00
c. Rental Van/Truck	$60.00	Day	2	$120.00
d. Parking and Tolls	$25.00	Day	2	$50.00
e. Cellphone	$0.80	min	30	$24.00
f. Copies	$0.06	copy	30	$1.80
g. Shipping (samples)		Actual Cost		
h. Miscellaneous Supplies (e.g. Ice bags)	$200.00	LS		
i. LVE	$0.80	hr	20	$16.00
j. PPE	$15.00	day	2	$30.00
Total 3A				**$625.80**
Subtask 3B - Solinst CMT Installation				
a. Business Mileage	$0.485	Miles	1,800	$873.00
b. Per Diem - Meals	$64.00	Day	40	$2,560.00
- Hotel	$159.00	Day	32	$5,088.00
c. Rental Van/Truck	$60.00	Day	40	$2,400.00
d. Parking and Tolls	$25.00	Day	16	$400.00
e. Cellphone	$0.80	min	600	$480.00
f. Copies	$0.06	copy	400	$24.00
g. Shipping (samples)	$100.00	Actual Cost		
h. Miscellaneous Supplies (e.g. Ice bags)	$200.00	LS	1	$200.00
i. LVE	$0.80	hr	400	$320.00
j. PPE	$15.00	day	40	$600.00
Total 3B				**$12,945.00**
Subtask 3C - Solinst CMT Sampling/well sampling				
a. Business Mileage	$0.485	Miles	750	$363.75
b. Per Diem - Meals	$64.00	Day	28	$1,792.00
- Hotel	$159.00	Day	22	$3,498.00
c. Rental Van/Truck	$60.00	Day	14	$840.00
d. Parking and Tolls	$25.00	Day	6	$150.00
e. Cellphone	$0.80	min	300	$240.00
f. Copies	$0.06	copy	300	$18.00
g. Shipping (samples)	$100.00	Actual Cost	14	$1,400.00
h. Miscellaneous Supplies (e.g. Ice bags)	$400.00	LS	1	$400.00
i. LVE	$0.80	hr	264	$211.20
j. PPE	$15.00	day	28	$420.00
Total 3C				**$9,332.95**

EARTH TECH NORTHEAST, INC.
SCHEDULE 2.11(c)
DIRECT NON-SALARY COSTS

ITEM	MAXIMUM REIMBURSEMENT RATE	UNIT	ESTIMATED NUMBER OF UNITS	TOTAL ESTIMATED COST
Travel Costs				
Subtask 4B - IDW Disposal				
a. Business Mileage	$0.485	Miles	200	$97.00
b. Per Diem - Meals	$64.00	Day		
- Hotel	$159.00	Day		
c. Rental Van/Truck	$60.00	Day		
d. Parking and Tolls	$25.00	Day	2	$50.00
e. Cellphone	$0.80	min	30	$24.00
f. Copies	$0.06	copy	20	$1.20
g. Shipping (samples)	$100.00	Actual Cost		
h. Miscellaneous Supplies (e.g. Ice bags)	$200.00	LS		
i. LVE	$0.80	hr	10	$8.00
j. PPE	$15.00	day	1	$15.00
Total 4B				**$195.20**
Task 5 - Field Documentation & Reporting				
			Total:	**$39,634.55**

Work Assignment No: D004436-08
Engineer: Earth Tech Northeast, Inc.
Site ID No: 1-30-021

Site Name: Anchor Lith Kem Ko
Project No: 101351
Date Prepared: 12/4/07

EARTH TECH NORTHEAST, INC.
SCHEDULE 2.11(d)2
MAXIMUM REIMBURSEMENT RATES FOR CONSULTANT/SUBCONSULTANT-OWNED EQUIPMENT

ITEM	PURCHASE PRICE (x 85%)	USAGE RATE ($/Unit of Time)	ESTIMATED USAGE (Unit of Time)	ESTIMATED USAGE COST

Work Assignment No: D004436-08
Engineer: Earth Tech Northeast, Inc.
Site ID No: 1-30-021

Site Name: Anchor Lith Kem Ko
Project No: 101351
Date Prepared: 12/4/07

EARTH TECH NORTHEAST, INC.
SCHEDULE 2.11(d)3
Vendor Rented Equipment

ITEM	ESTIMATED QUANTITY		UNIT COST	TOTAL BUDGET COST
Task 2 - Off-Site Groundwater Evaluation - Phase I				
Subtask 2A - Utility Clearance				
Subtask 2B - Solinst CMT Installation / Geophysical				
a. Water Quality Meter	6	Week	$400.00	$2,400.00
b. Water Level Indicator	6	Week	$65.00	$390.00
c. PID	6	Week	$150.00	$900.00
Total				**$3,690.00**
Subtask 2C - Solinst CMT Sampling/Well Sampling				
a. Water Quality Meter	2	Week	$125.00	$250.00
b. Solinst pump control unit	2	Week	$65.00	$130.00
c. Solinst compressor	2	Week	$75.00	$150.00
d. Water Level Indicator	2	Week	$35.00	$70.00
e. Solinst compressor	2	Week	$75.00	$150.00
f. Compressed Gas	1	Week	$400.00	$400.00
g. QED Bladder pump	1	Week	$150.00	$150.00
h. QED MP10 control unit	1	Week	$225.00	$225.00
i. QED 3020 Compressor	1	Week	$75.00	$75.00
j. PID	3	Week	$150.00	$450.00
Total				**$2,050.00**
Task 3 - Off-Site GW Evaluation - Phase II (if directed)				
Subtask 3A - Utility Clearance				
Subtask 3B - Solinst CMT Installation				
a. Water Quality Meter	8	Week	$400.00	$3,200.00
b. Water Level Indicator	8	Week	$65.00	$520.00
c. PID	8	Week	$150.00	$1,200.00
Total				**$4,920.00**
Subtask 3C - Solinst CMT Sampling/well sampling				
a. Water Quality Meter	3	Week	$125.00	$375.00
b. Solinst pump control unit	3	Week	$65.00	$195.00
c. Solinst compressor	3	Week	$75.00	$225.00
d. Water Level Indicator	3	Week	$35.00	$105.00
e. Solinst compressor	3	Week	$75.00	$225.00
f. Compressed Gas	3	Week	$400.00	$1,200.00
g. QED Bladder pump	1	Week	$150.00	$150.00
h. QED MP10 control unit	1	Week	$225.00	$225.00
i. QED 3020 Compressor	1	Week	$75.00	$75.00
j. PID	3	Week	$150.00	$450.00
Total				**$3,225.00**
			Total:	**$13,885.00**

Work Assignment No: D004436-08
Engineer: Earth Tech Northeast, Inc.
Site ID No: 1-30-021

Site Name: Anchor Lith Kem Ko
Project No: 101351
Date Prepared: 12/4/07

EARTH TECH NORTHEAST, INC.
SCHEDULE 2.11(d)5
CONSUMABLE SUPPLIES

ITEM	ESTIMATED QUANTITY		UNIT COST	TOTAL BUDGET COST
Subtask 2B - Solinst CMT Installation / Geophysical				
1 Ziploc Bags		Box	$3.00	
2 Towels, Paper		Roll	$0.99	
3 Teflon tubing		100 ft. roll	$190.00	
4 Poly tubing		100 ft. roll	$30.00	
			Task 2B Total:	
Subtask 2C - Solinst CMT Sampling/Well Sampling				
1 Ziploc Bags	15	Box	$3.00	$45.00
2 Towels, Paper	5	Roll	$0.99	$4.95
3 Teflon tubing	7	100 ft. roll	$190.00	$1,330.00
4 Poly tubing	7	100 ft. roll	$30.00	$210.00
			Task 2C Total:	**$1,589.95**
Task 3 - Off-Site GW Evaluation - Phase II (if directed)				
1 Ziploc Bags	20	Box	$0.99	$19.80
2 Towels, Paper	7	Roll	$0.99	$6.93
3 Teflon tubing	10	100 ft. roll	$190.00	$1,900.00
4 Poly tubing	10	100 ft. roll	$30.00	$300.00
			Task 3 Total:	**$2,226.73**
			Total:	**$3,816.68**

Work Assignment No: D004436-08
Engineer: Earth Tech Northeast, Inc.
Site ID No: 1-30-021

Site Name: Anchor Lith Kem Ko
Project No: 101351
Date Prepared: 12/4/07

YEC, INC.
NSPE
SCHEDULE 2.11(b)
TOTAL DIRECT LABOR HOURS BUDGETED

LABOR CLASSIFICATION AVERAGE RAW LABOR RATE	IX	VIII	VII	VI	V	IV	III	II	I	LABOR HOURS	DIRECT LABOR
Task 1 - Work Plan Development											
Task 2 - Off-Site Groundwater Evaluation - Phase I											
Subtask 2A - Utility Clearance											
Subtask 2B - Solinst CMT Installation / Geophysical											
Subtask 2C - Solinst CMT Sampling/Well Sampling											
Task 3 - Off-Site GW Evaluation - Phase II (if directed)											
Subtask 3A - Utility Clearance											
Subtask 3B - Solinst CMT Installation											
Subtask 3C - Solinst CMT Sampling/well sampling											
Task 4 - Surveying and IDW Disposal		**4.00**			**72.00**		**6.00**	**72.00**	**72.00**	**226.00**	**7057.46**
Subtask 4A - Surveying		4.00			72.00		6.00	72.00	72.00	226.00	7057.46
Subtask 4B - IDW Disposal											
Task 5 - Field Documentation & Reporting											
Subtask 5A - Progress Report for Phase I											
Subtask 5B - Draft and Final Report (Phase I & II)											
TOTAL LABOR HOURS		4.00			72.00		6.00	72.00	72.00	226.00	
TOTAL LABOR DOLLARS		$268.29			$3,193.33		$200.79	$1,781.32	$1,613.72		$7,057.46

Work Assignment No: D004436-08
Engineer: Earth Tech Northeast, Inc.
Site ID No: 1-30-021

Site Name: Anchor Lith Kem Ko
Project No: 101351
Date Prepared: 12/4/07

YEC, INC.
SCHEDULE 2.11(b)
DIRECT LABOR HOURS BUDGETED
2007

LABOR CLASSIFICATION 2007 AVERAGE RAW LABOR RATE	IX	VIII $65.12	VII	VI	V $43.06	IV $37.40	III $32.49	II $24.02	I $21.76	LABOR HOURS	DIRECT LABOR
Task 1 - Work Plan Development											
Task 2 - Off-Site Groundwater Evaluation - Phase I											
Subtask 2A - Utility Clearance											
Subtask 2B - Solinst CMT Installation / Geophysical											
Subtask 2C - Solinst CMT Sampling/Well Sampling											
Task 3 - Off-Site GW Evaluation - Phase II (if directed)											
Subtask 3A - Utility Clearance											
Subtask 3B - Solinst CMT Installation											
Subtask 3C - Solinst CMT Sampling/well sampling											
Task 4 - Surveying and IDW Disposal											
Subtask 4A - Surveying											
Subtask 4B - IDW Disposal											
Task 5 - Field Documentation & Reporting											
Subtask 5A - Progress Report for Phase I											
Subtask 5B - Draft and Final Report (Phase I & II)											
TOTAL LABOR HOURS											
TOTAL LABOR DOLLARS											

Work Assignment No: D004436-08
Engineer: Earth Tech Northeast, Inc.
Site ID No: 1-30-021

Site Name: Anchor Lith Kem Ko
Project No: 101351
Date Prepared: 12/4/07

YEC, INC.
SCHEDULE 2.11(b)
DIRECT LABOR HOURS BUDGETED
2008

LABOR CLASSIFICATION 2008 AVERAGE RAW LABOR RATE	IX	VIII $67.07	VII	VI	V $44.35	IV $38.52	III $33.46	II $24.74	I $22.41	LABOR HOURS	DIRECT LABOR
Task 1 - Work Plan Development											
Task 2 - Off-Site Groundwater Evaluation - Phase I											
Subtask 2A - Utility Clearance											
Subtask 2B - Solinst CMT Installation / Geophysical											
Subtask 2C - Solinst CMT Sampling/Well Sampling											
Task 3 - Off-Site GW Evaluation - Phase II (if directed)											
Subtask 3A - Utility Clearance											
Subtask 3B - Solinst CMT Installation											
Subtask 3C - Solinst CMT Sampling/well sampling											
Task 4 - Surveying and IDW Disposal		**4.00**			**72.00**		**6.00**	**72.00**	**72.00**	**226.00**	**$7,057.46**
Subtask 4A - Surveying		4.00			72.00		6.00	72.00	72.00	226.00	$7,057.46
Subtask 4B - IDW Disposal											
Task 5 - Field Documentation & Reporting											
Subtask 5A - Progress Report for Phase I											
Subtask 5B - Draft and Final Report (Phase I & II)											
TOTAL LABOR HOURS		4.00			72.00		6.00	72.00	72.00	226.00	
TOTAL LABOR DOLLARS		$268.29			$3,193.33		$200.79	$1,781.32	$1,613.72		$7,057.46

Work Assignment No: D004436-08
Engineer: Earth Tech Northeast, Inc.
Site ID No: 1-30-021

Site Name: Anchor Lith Kem Ko
Project No: 101351
Date Prepared: 12/4/07

YEC, INC.
SCHEDULE 2.11(b)
DIRECT LABOR HOURS BUDGETED
2009

LABOR CLASSIFICATION 2009 AVERAGE RAW LABOR RATE	IX	VIII $65.35	VII	VI $44.31	V $44.31	IV $38.49	III $33.43	II $24.72	I $22.39	LABOR HOURS	DIRECT LABOR
Task 1 - Work Plan Development											
Task 2 - Off-Site Groundwater Evaluation - Phase I											
Subtask 2A - Utility Clearance											
Subtask 2B - Solinst CMT Installation / Geophysical											
Subtask 2C - Solinst CMT Sampling/Well Sampling											
Task 3 - Off-Site GW Evaluation - Phase II (if directed)											
Subtask 3A - Utility Clearance											
Subtask 3B - Solinst CMT Installation											
Subtask 3C - Solinst CMT Sampling/well sampling											
Task 4 - Surveying and IDW Disposal											
Subtask 4A - Surveying											
Subtask 4B - IDW Disposal											
Task 5 - Field Documentation & Reporting											
Subtask 5A - Progress Report for Phase I											
Subtask 5B - Draft and Final Report (Phase I & II)											
TOTAL LABOR HOURS											
TOTAL LABOR DOLLARS											

Work Assignment No: D004436-08
Engineer: Earth Tech Northeast, Inc.
Site ID No: 1-30-021

Site Name: Anchor Lith Kem Ko
Project No: 101351
Date Prepared: 12/4/07

SCHEDULE 2.11(e)
COST-PLUS-FIXED-FEE SUBCONTRACTS

NAME OF SUBCONTRACTOR	SERVICES TO BE PERFORMED	SUBCONTRACT PRICE
YEC, Inc. (MBE)	Field Assistance	$19,379.88

A. Direct Salary Costs

Professional Responsibility Level	Labor Classification					Estimated No. of Hours	Total Estimated Direct Salary Cost
Project Manager	NSPE VIII					4	$268.29
Sr. Project Eng., Surveyor	NSPE V					72	$3,193.33
Project Engineer/Geol.	NSPE IV					0	$0.00
Technician III	NSPE III					6	$200.79
Technician II	NSPE II					72	$1,781.32
Technician I	NSPE I					72	$1,613.72
Total Direct Salary Costs						**226**	**$7,057.46**

B. Indirect Costs

Indirect costs shall be paid based on a percentage of direct salary costs incurred which shall not exceed a maximum of 117% or the actual rate calculated in accordance with 48 CFR Federal Acquisition Regulation, whichever is lower.

Budget for indirect costs is **$8,257.22**

C. Maximum Reimbursement Rates for Direct Non-Salary Costs

Item	Maximum Reimbursement Rate (Specify Unit)		Estimated No. of Units	Total Estimated Costs
Equipment Charges - Miscellaneous Supplies				
Task 3 - Off-Site GW Evaluation - Phase II (if directed)	$0.00	event		$0.00
Subtask 3B - Solinst CMT Installation	$0.00	event		$0.00
Subtask 3C - Solinst CMT Sampling/well sampling	$0.00	event		$0.00
Task 4 - Surveying and IDW Disposal	$0.00	event		$0.00
Subtask 4A - Surveying	$1,260.00	event	1	$1,260.00
Travel Costs				
Task 3 - Off-Site GW Evaluation - Phase II (if directed)				
Subtask 3B - Solinst CMT Installation	$0.00	event		$0.00
Subtask 3C - Solinst CMT Sampling/well sampling	$0.00	event		$0.00
Subtask 4A - Surveying	$508.00	event	1	$508.00
Total Direct Non-Salary Costs				**$1,768.00**

D. Fixed Fee (15%)

The fixed fee is **$2,297.20**

Work Assignment No: D004436-08
Engineer: Earth Tech Northeast, Inc.
Site ID No: 1-30-021

Site Name: Anchor Lith Kem Ko
Project No: 101351
Date Prepared: 12/4/07

EARTH TECH NORTHEAST, INC.
SCHEDULE 2.11(f)
UNIT PRICE SUBCONTRACTS

NAME OF SUBCONTRACTOR	SERVICES TO BE PERFORMED		SUBCONTRACT PRICE
Hampton-Clarke Veritech (WBE)	Analysis of water samples and waste disposal samples subcontract management fee (5%) Total:		$43,194.00 $2,159.70 $45,353.70
Item	Maximum Reimbursement Rate (Specify Unit)	Estimated No. of Units	Total Estimated Costs
Subtask 2C - Solinst CMT Sampling/Well Sampling			
1. Water - Volatile Organics - 8260	$75 per sample	81	$6,075.00
2. Water - TAL Metals 6010/7471	$110 per sample	71	$7,810.00
		Task 2C Total	**$13,885.00**
Subtask 3C - Solinst CMT Sampling/well sampling			
1. Water - Volatile Organics - 8260	$75 per sample	119	$8,925.00
2. Water - TAL Metals 6010/7471	$110 per sample	105	$11,550.00
		Task 3C Total	**$20,475.00**
Subtask 4B - IDW Disposal			
1. Soil - Volatile Organics 8260	$75 per sample	8	$600.00
2. Soil - Semivolatile Organics 8270	$180 per sample	8	$1,440.00
3. Soil - Pesticides 8081	$50 per sample	8	$400.00
4. Soil - PCBs 8082	$50 per sample	8	$400.00
5. Soil - Metals 6010/7471	$110 per sample	8	$880.00
6. Soil - TCLP (full suite) 1311 + anlaysis	$470 per sample	8	$3,760.00
7. Soil - Gen Chem (9030/9045)	$18 per sample	8	$144.00
8. Soil - Reactivity (old SW 846 7.3.3.2)	$35 per sample	8	$280.00
9. Water - Volatile Organics 8260	$75 per sample	2	$150.00
10. Water - Semivolatile Organics 8270	$180 per sample	2	$360.00
11. Water - Pesticides 8081	50 per sample	2	$100.00
12. Water - PCBs 8082	50 per sample	2	$100.00
13. Water - Metals 6010/7411	110 per sample	2	$220.00
		Task 4B Total	**$8,834.00**
		Total	**$43,194.00**

Work Assignment No: D004436-08
Engineer: Earth Tech Northeast, Inc.
Site ID No: 1-30-021

Site Name: Anchor Lith Kem Ko
Project No: 101351
Date Prepared: 12/4/07

EARTH TECH NORTHEAST, INC.
SCHEDULE 2.11(f)
UNIT PRICE SUBCONTRACTS

NAME OF SUBCONTRACTOR	SERVICES TO BE PERFORMED		SUBCONTRACT PRICE
Solinst	CMT Multilevel Systems		$53,199.00
	subcontract management fee (5%)		$2,659.95
	Total:		$55,858.95
Item	Maximum Reimbursement Rate (Specify Unit)	Estimated No. of Units	Total Estimated Costs
Task 2 - Off-Site Groundwater Evaluation - Phase I			
Subtask 2B - Solinst CMT Installation / Geophysical			
403 1.7" CMT tubing - 7 channel (200 ft)	$1,190.00	4	$4,760.00
403 1.7" CMT tubing - 7 channel (300 ft)	$1,785.00	3	$5,355.00
403 7CH Guide point port	$72.00	7	$504.00
403 7CH Standard port assembly	$36.00	49	$1,764.00
403 centralizers	$11.00	140	$1,540.00
403 system support clamp - 7CH	$10.00	2	$20.00
403 standard wellhead for CMT 7CH	$70.00	7	$490.00
			$14,433.00
Subtask 2C - Solinst CMT Sampling/Well Sampling			
408M 240 ft PTFE assembly	$1,500.00	3	$4,500.00
408M 140 ft PTFE assembly	$970.00	3	$2,910.00
408M 90 ft PTFE assembly	$705.00	3	$2,115.00
403 CMT-7CH screen Set (5 pack)	$16.00	27	$432.00
403 MCT-7CH screen clamp set	$19.00	27	$513.00
			$10,470.00
		Task 2 Total	**$24,903.00**

Work Assignment No: D004436-08
Engineer: Earth Tech Northeast, Inc.
Site ID No: 1-30-021

Site Name: Anchor Lith Kem Ko
Project No: 101351
Date Prepared: 12/4/07

EARTH TECH NORTHEAST, INC.
SCHEDULE 2.11(f)
UNIT PRICE SUBCONTRACTS

NAME OF SUBCONTRACTOR	SERVICES TO BE PERFORMED		SUBCONTRACT PRICE
Solinst	CMT Multilevel Systems		$53,199.00
	subcontract management fee (5%)		$2,659.95
	Total:		$55,858.95
Item	Maximum Reimbursement Rate (Specify Unit)	Estimated No. of Units	Total Estimated Costs
Task 3 - Off-Site GW Evaluation - Phase II (if directed)			
Subtask 3B - Solinst CMT Installation			
403 1.7" CMT tubing - 7 channel (300 ft)	$1,785.00	11	$19,635.00
403 7CH Guide point port	$72.00	11	$792.00
403 7CH Standard port assembly	$36.00	77	$2,772.00
403 centralizers	$11.00	242	$2,662.00
403 system support clamp - 7CH	$10.00	2	$20.00
403 standard wellhead for CMT 7CH	$70.00	11	$770.00
			$26,651.00
Subtask 3C - Solinst CMT Sampling/well sampling			
403 CMT-7CH screen Set (5 pack)	$16.00	47	$752.00
403 MCT-7CH screen clamp set	$19.00	47	$893.00
			$1,645.00
		Task 3 Total	**$28,296.00**
		Total	**$53,199.00**

Work Assignment No: D004436-08
Engineer: Earth Tech Northeast, Inc.
Site ID No: 1-30-021

Site Name: Anchor Lith Kem Ko
Project No: 101351
Date Prepared: 12/4/07

EARTH TECH NORTHEAST, INC.
SCHEDULE 2.11(f)
UNIT PRICE SUBCONTRACTS

NAME OF SUBCONTRACTOR	SERVICES TO BE PERFORMED	SUBCONTRACT PRICE
SGS, Inc.	Solinst CMT Multilevel System Installation	$253,579.75
	subcontract management fee (5%)	$12,678.99
	Total:	$266,258.74

Item	Maximum Reimbursement Rate (Specify Unit)		Estimated No. of Units	Total Estimated Costs
Task 2 - Off-Site Groundwater Evaluation - Phase I				
Subtask 2B - Solinst CMT Installation / Geophysical				
1. Mobilization	$2,675	lump sum	1	$2,675.00
2. 130 ft CMT	$11,750	per well	1	$11,750.00
3. 160 ft CMT	$12,000	per well	3	$36,000.00
4. 220 ft CMT	$13,250	per well	3	$39,750.00
5. Flushmount covers - installed	$300	each	7	$2,100.00
6. Decon pad construction	$450	lump sum	1	$450.00
7. Equipment Decontamination	$300	hour	14	$4,200.00
8. Overtime (in excess of 8-hour day)	$300	per hour	0	$0.00
9. 55-gallon drums	$55	each	3	$165.00
10. water permits	$775	lump sum	1	$775.00
			Subtask 2B Total	**$97,865.00**
Task 3 - Off-Site GW Evaluation - Phase II (if directed)				
Subtask 3B - Solinst CMT Installation				
1. Mobilization	$4,200	lump sum	1	$4,199.75
2. 130 ft CMT	$11,750	per well	2	$23,500.00
3. 160 ft CMT	$12,000	per well	2	$24,000.00
4. 220 ft CMT	$13,250	per well	7	$92,750.00
5. Flushmount covers - installed	$300	each	11	$3,300.00
6. Decon pad construction	$450	lump sum	1	$450.00
7. Equipment Decontamination	$300	hour	21	$6,300.00
8. Overtime (in excess of 8-hour day)	$300	per hour	0	$0.00
9. 55-gallon drums	$55	each	8	$440.00
10. water permits	$775	lump sum	1	$775.00
			Subtask 3B Total	**$155,714.75**
			Total	**$253,579.75**

Work Assignment No: D004436-08
Engineer: Earth Tech Northeast, Inc.
Site ID No: 1-30-021

Site Name: Anchor Lith Kem Ko
Project No: 101351
Date Prepared: 12/4/07

EARTH TECH NORTHEAST, INC.
SCHEDULE 2.11(f)
UNIT PRICE SUBCONTRACTS

NAME OF SUBCONTRACTOR	SERVICES TO BE PERFORMED		SUBCONTRACT PRICE
Enviroprobe Service, Inc.	Geophysical Surveys		$9,600.00
Item	Maximum Reimbursement Rate (Specify Unit)	Estimated No. of Units	Total Estimated Costs
Task 2 - Off-Site Groundwater Evaluation - Phase I			
Subtask 2A - Utility Clearance			
1. Mobilization	$300 lump sum	1	$300.00
2. Utility Clearance (7 locations)	$1,600 day rate	1	$1,600.00
3. Natural Gamma downhole logging (one location)	$2,400 per boring	1	$2,400.00
4. Additional hours in excess of 10-hour day	$400 hour	2	$800.00
		Subtask 2A Total	**$5,100.00**
Task 3 - Off-Site GW Evaluation - Phase II (if directed)			
Subtask 3A - Utility Clearance			
1. Mobilization	$500 lump sum	1	$500.00
2. Utility Clearance (7 locations)	$1,600 day rate	2	$3,200.00
3. Additional hours in excess of 10-hour day	$400 hour	2	$800.00
		Subtask 3A Total	**$4,500.00**

Work Assignment No: D004436-08
Engineer: Earth Tech Northeast, Inc.
Site ID No: 1-30-021

Site Name: Anchor Lith Kem Ko
Project No: 101351
Date Prepared: 12/4/07

EARTH TECH NORTHEAST, INC.
SCHEDULE 2.11(f)
UNIT PRICE SUBCONTRACTS

NAME OF SUBCONTRACTOR	SERVICES TO BE PERFORMED		SUBCONTRACT PRICE
TBD	Invesitgation Derived Waste Disposal		$18,000.00
	subcontract management fee (5%)		$900.00
	Total:		$18,900.00

Item	Maximum Reimbursement Rate (Specify Unit)		Estimated No. of Units	Total Estimated Costs
Task 4 - Surveying and IDW Disposal				
Subtask 4B - IDW Disposal				
1.	$18,000	Unit rates	1	$18,000.00
2.		Unit rates	0	$0.00
3.		Unit rates	0	$0.00
4.		Unit rates	0	$0.00
			Subtask 4B Total	**$18,000.00**
			TOTAL TASK 4	**$18,000.00**

Work Assignment No: D004436-08
Engineer: Earth Tech Northeast, Inc.
Site ID No: 1-30-021

Site Name: Anchor Lith Kem Ko
Project No: 101351
Date Prepared: 12/4/07

EARTH TECH NORTHEAST, INC.
SCHEDULE 2.11(f)
UNIT PRICE SUBCONTRACTS

NAME OF SUBCONTRACTOR	SERVICES TO BE PERFORMED	SUBCONTRACT PRICE
Analytical Assurance Associates (WBE)	Data Validation subcontract management fee (5%) Total:	$5,532.00 $276.60 $5,808.60

Item	Maximum Reimbursement Rate (Specify Unit)		Estimated No. of Units	Total Estimated Costs
Subtask 2C - Solinst CMT Sampling/Well Sampling				
1. Water - Volatile Organics - 8260	$14	per sample	79	$1,106.00
2. Water - TAL Metals 6010/7471	$16	per sample	71	$1,136.00
			Subtask 2A total	**$2,242.00**
Subtask 3C - Solinst CMT Sampling/well sampling				
1. Water - Volatile Organics - 8260	$14	per sample	115	$1,610.00
2. Water - TAL Metals 6010/7471	$16	per sample	105	$1,680.00
			Subtask 3A total	**$3,290.00**
			Total	**$5,532.00**

Work Assignment No: D004436-08
Engineer: Earth Tech Northeast, Inc.
Site ID No: 1-30-021

Site Name: Anchor Lith Kem Ko
Project No: 101351
Date Prepared: 12/4/07

SCHEDULE 2.11(g)
MONTHLY COST CONTROL REPORT
SUMMARY OF FISCAL INFORMATION

Total Assignment

Expenditure Category	A Costs Claimed This Period	B Paid To Date	C Total Disallowed To Date	D Total Costs Incurred To Date (A+B+C)	E Estimated Costs To Completion	F Estimated Total Work Assignment Price (A+B+E)	G Approved Budget	H Estimated Under/(Over) (G-F)
1 Direct Salary Costs							$71,099.43	
2 Indirect Costs (156%)							$104,373.97	
3 Subtotal Direct Salary Costs and Indirect Costs							$175,473.40	
4 Travel							$36,841.35	
5 Other Non-Salary Costs							$20,494.88	
6 Subtotal Direct Non-Salary Costs							$57,336.23	
7 Subcontractors							$402,484.63	
8 Total Work Assignment Cost							$635,294.25	
9 Fixed Fee (10.5%)							$18,424.70	
10 5% Markup on Subs							$18,675.24	
11 Total Work Assignment Price							**$672,394.19**	

Project Manager (Engineer) _____ Date _____

Work Assignment No: D004436-08
Engineer: Earth Tech Northeast, Inc.
Site ID No: 1-30-021

Site Name: Anchor Lith Kem Ko
Project No: 101351
Date Prepared: 12/4/07

SCHEDULE 2.11(g)
MONTHLY COST CONTROL REPORT
SUMMARY OF FISCAL INFORMATION

Task 1 - Work Plan Development

Expenditure Category	A Costs Claimed This Period	B Paid To Date	C Total Disallowed To Date	D Total Costs Incurred To Date (A+B+C)	E Estimated Costs To Completion	F Estimated Total Work Assignment Price (A+B+E)	G Approved Budget	H Estimated Under/(Over) (G-F)
1 Direct Salary Costs							$5,790.42	
2 Indirect Costs (146.8%)							$8,500.34	
3 Subtotal Direct Salary Costs and Indirect Costs							$14,290.76	
4 Travel								
5 Other Non-Salary Costs								
6 Subtotal Direct Non-Salary Costs								
7 Subcontractors								
8 Total Work Assignment Cost							$14,290.76	
9 Fixed Fee (10.5%)							$1,500.53	
10 5% Markup on Subs								
11 Total Work Assignment Price							**$15,791.29**	

Work Assignment No: D004436-08
Engineer: Earth Tech Northeast, Inc.
Site ID No: 1-30-021

Site Name: Anchor Lith Kem Ko
Project No: 101351
Date Prepared: 12/4/07

SCHEDULE 2.11(g)
MONTHLY COST CONTROL REPORT
SUMMARY OF FISCAL INFORMATION

Task 2 - Off-Site Groundwater Evaluation - Phase I

Expenditure Category	A Costs Claimed This Period	B Paid To Date	C Total Disallowed To Date	D Total Costs Incurred To Date (A+B+C)	E Estimated Costs To Completion	F Estimated Total Work Assignment Price (A+B+E)	G Approved Budget	H Estimated Under/(Over) (G-F)
1 Direct Salary Costs							$18,268.20	
2 Indirect Costs (146.8%)							$26,817.72	
3 Subtotal Direct Salary Costs and Indirect Costs							$45,085.92	
4 Travel							$15,362.60	
5 Other Non-Salary Costs							$8,502.95	
6 Subtotal Direct Non-Salary Costs							$23,865.55	
7 Subcontractors							$143,995.00	
8 Total Work Assignment Cost							$212,946.47	
9 Fixed Fee (10.5%)							$4,734.02	
10 5% Markup on Subs							$6,944.75	
11 Total Work Assignment Price							**$224,625.24**	

Work Assignment No: D004436-08
Engineer: Earth Tech Northeast, Inc.
Site ID No: 1-30-021

Site Name: Anchor Lith Kem Ko
Project No: 101351
Date Prepared: 12/4/07

SCHEDULE 2.11(g)
MONTHLY COST CONTROL REPORT
SUMMARY OF FISCAL INFORMATION

Task 3 - Off-Site GW Evaluation - Phase II (if directed)

Expenditure Category	A Costs Claimed This Period	B Paid To Date	C Total Disallowed To Date	D Total Costs Incurred To Date (A+B+C)	E Estimated Costs To Completion	F Estimated Total Work Assignment Price (A+B+E)	G Approved Budget	H Estimated Under/(Over) (G-F)
1 Direct Salary Costs							$24,749.85	
2 Indirect Costs (146.8%)							$36,332.78	
3 Subtotal Direct Salary Costs and Indirect Costs							$61,082.63	
4 Travel							$21,306.55	
5 Other Non-Salary Costs							$11,968.93	
6 Subtotal Direct Non-Salary Costs							$33,275.48	
7 Subcontractors							$212,275.75	
8 Total Work Assignment Cost							$306,633.86	
9 Fixed Fee (10.5%)							$6,413.68	
10 5% Markup on Subs							$10,388.79	
11 Total Work Assignment Price							**$323,436.33**	

Work Assignment No: D004436-08
Engineer: Earth Tech Northeast, Inc.
Site ID No: 1-30-021

Site Name: Anchor Lith Kem Ko
Project No: 101351
Date Prepared: 12/4/07

SCHEDULE 2.11(g)
MONTHLY COST CONTROL REPORT
SUMMARY OF FISCAL INFORMATION

Task 4 - Surveying and IDW Disposal

Expenditure Category	A Costs Claimed This Period	B Paid To Date	C Total Disallowed To Date	D Total Costs Incurred To Date (A+B+C)	E Estimated Costs To Completion	F Estimated Total Work Assignment Price (A+B+E)	G Approved Budget	H Estimated Under/(Over) (G-F)
1 Direct Salary Costs							$807.82	
2 Indirect Costs (146.8%)							$1,185.88	
3 Subtotal Direct Salary Costs and Indirect Costs							$1,993.70	
4 Travel							$172.20	
5 Other Non-Salary Costs							$23.00	
6 Subtotal Direct Non-Salary Costs							$195.20	
7 Subcontractors							$46,213.88	
8 Total Work Assignment Cost							$48,402.78	
9 Fixed Fee (10.5%)							$209.33	
10 5% Markup on Subs							$1,341.70	
11 Total Work Assignment Price							**$49,953.81**	

Work Assignment No: D004436-08
Engineer: Earth Tech Northeast, Inc.
Site ID No: 1-30-021

Site Name: Anchor Lith Kem Ko
Project No: 101351
Date Prepared: 12/4/07

SCHEDULE 2.11(g)
MONTHLY COST CONTROL REPORT
SUMMARY OF FISCAL INFORMATION

Task 5 - Field Documentation & Reporting

Expenditure Category	A Costs Claimed This Period	B Paid To Date	C Total Disallowed To Date	D Total Costs Incurred To Date (A+B+C)	E Estimated Costs To Completion	F Estimated Total Work Assignment Price (A+B+E)	G Approved Budget	H Estimated Under/(Over) (G-F)
1 Direct Salary Costs							$21,483.14	
2 Indirect Costs (146.8%)							$31,537.25	
3 Subtotal Direct Salary Costs and Indirect Costs							$53,020.39	
4 Travel								
5 Other Non-Salary Costs								
6 Subtotal Direct Non-Salary Costs								
7 Subcontractors								
8 Total Work Assignment Cost							$53,020.39	
9 Fixed Fee (10.5%)							$5,567.14	
10 5% Markup on Subs								
11 Total Work Assignment Price							**$58,587.53**	

Work Assignment No: D004436-08
Engineer: Earth Tech Northeast, Inc.
Site ID No: 1-30-021

Site Name: Anchor Lith Kem Ko
Project No: 101351
Date Prepared: 12/4/07

MONTHLY COST CONTROL REPORT
SCHEDULE 2.11(h)
SUMMARY OF LABOR HOURS
NUMBER OF DIRECT LABOR HOURS EXPENDED TO DATE/ ESTIMATED NUMBER OF DIRECT LABOR HOURS TO COMPLETION

LABOR CLASS	IX		VIII		VII		VI		V		IV		III		II		I		TOTAL NO. OF DIRECT LABOR HOURS	
TASK NO.	Exp	Est.	Exp	Est.	Exp	Est.	Exp	Est.	Exp	Est.	Exp	Est.	Exp	Est.	Exp	Est.	Exp	Est.	Exp	Est.
1		6.0				8.0		55.0				40.0		55.0						164.0
2		3.0						19.0				446.0		118.0						586.0
3		5.5						28.0				598.0		160.0						791.5
4		2.0						4.0						18.0						24.0
5		14.5				30.0		125.0				84.0		215.0		200.0				668.5
TOTAL		31.0				38.0		231.0				1168.0		566.0		200.0				2234.0

ATTACHMENT A
FINAL FIELD ACTIVITIES PLAN

GROUNDWATER EVALUATION
ANCHOR LITH KEM KO SITE
Site Number: 1-30-021

Work Assignment No.
D004436-08

Prepared for:

SUPERFUND STANDBY PROGRAM
New York State
Department of Environmental Conservation
625 Broadway
Albany, New York 12233

November 2007

Prepared by:

Earth Tech Northeast, Inc.
300 Broadacres Drive
Bloomfield, NJ 07003-3153

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FIGURES

APPENDICES

1.0 INTRODUCTION

1.1 PURPOSE OF THE WORK ASSIGNMENT

The purpose of this Field Activities Plan (FAP), Attachment A to the Work Plan, is to describe activities planned for the field sampling and related activities portions of the site investigation at the Anchor Lith Kem Ko site (hereafter referred to as the "site"). The site is an Inactive New York State Superfund site (Site No. 1-30-021). The work will be performed in accordance with NYSDEC Division of Environmental Remediation Draft DER-10 Technical Guidance for Site Investigation and Remediation (NYSDEC, 2002) and the scope of work specified in the Work Assignment Issuance letter (NYSDEC, July 2007).

The work described in this FAP is being performed under the Earth Tech Northeast, Inc. (Earth Tech) NYSDEC Superfund Standby Contract Work Assignment No. D004436-08. The FAP provides the detailed procedures for the installation of monitoring wells and the collection of environmental samples.

The quality assurance protocols applicable to this project are presented in the Quality Assurance Project Plan (QAPP), provided as Attachment B to the Work Plan. The health and safety plan (HASP) is provided as Attachment C to the Work Plan.

The objective of the work assignment is to conduct a groundwater evaluation in order to determine if contamination is emanating from the site.

1.2 SITE DESCRIPTION

The Anchor Kem Ko site is located at 500 West John Street in the Village of Hicksville, Town of Oyster Bay, Nassau County, New York (Section 11: Block 499, Lot 87). The site covers approximately 1.5 acres (100 feet by 400 feet) and includes a 28,850 square foot, two-story masonry structure. The remaining portions of the site are mainly covered by pavement except for a localized grassy area adjacent to West John Street. The site is currently occupied by the Cookie Factory Outlet.

The surrounding area is predominantly industrial with a recreational area to the northeast. The site is bordered to the west and east by commercial property, to the south by West John Street, and to the north by Cantiague Park, a 125-acre recreational facility which includes a golf course. The aerial photograph provided on Figure 1 depicts the general conditions of the site and the adjacent properties.

A groundwater recharge basin lies to the east of the Site. Public water is available to everyone in the area, but the contaminated groundwater is a potential threat to the water supply wells. These water districts are located less than 6,500 feet south of the site.

1.2.1 Operational/Disposal History

Anchor Chemicals operated at the John Street location from 1964 to 1986. In 1978, Anchor Chemical was purchased by Chessco Industries and the facility name was changed to Anchor Lith Kem Ko. This facility blended and packed chemicals for the graphic art industries. Contamination at the site is generally attributed to the building's past use as a chemical blending and packaging operation. The chemicals utilized at the site were stored in seven above ground storage tanks (ASTs) and seventeen underground storage tanks (USTs). The ASTs ranged from 550 to 1,500 gallons. The USTs were located beneath the concrete floor of the building with capacities ranging from 500 to 4,000 gallons. From 1981 to 1991, all the known USTs were emptied and abandoned in place, and the ASTs were removed.

1.2.2 Remedial History

Soil and groundwater samples results taken since 1977 indicate the primary contaminants are 1,1,1-trichloroethane (1,1,1-TCA), trichloroethene, methylene chloride, and tetrachloroethene (PCE).

In September 1995, a Record of Decision (ROD) was issued for this site, which required soils contaminated with 1,1,1-TCA, chromium, and lead be removed from four dry wells to prevent further groundwater contamination. The contaminated material within the dry wells was removed on September 29, 1995. Elevated groundwater 1,1,1-TCA concentrations ranges from 2 to 8 parts per billion (ppb). In groundwater chromium concentrations ranged from 132 to 1,440 ppb and lead concentrations ranged from 30.2 to 240 ppb. In the soil samples 1,1,1-TCA was detected at 3,300 ppb, chromium concentrations ranged from 101 parts per million (ppm) to 463 ppm and lead concentrations ranged from 607 to 1,620 ppm.

In April 1996 and July 1997, USEPA collected confirmatory groundwater samples from MW-4, MW-5S, MW-5D, MW-6S, and MW-6D to evaluate the groundwater quality on-site. Based on the sample results, EPA deleted the site from the NPL in September 1999.

In December 2005, NYSDEC sampled the five existing groundwater monitoring wells determined to be in "good" condition, identified as MW-4, MW-5S, MW-5D, MW-6S, and MW-6D; the results of this sampling event suggests that the on-site groundwater underlying the site is no longer contaminated.

However, low levels of 1,1,1-TCA were detected in public wells located in the region from 1977 to 2005. Due to the lack of an off-site groundwater evaluation performed during the remedial investigation, a preliminary investigation of the aquifer down-gradient of the site is necessary to determine if contaminated groundwater has migrated off-site.

A more detailed site description and site history is provided in Section 1 of the Work Plan.

1.3 SITE ACCESS

NYSDEC will obtain permission from the current owners of the site for the installation of temporary soil vapor and groundwater sampling. The remaining sampling locations are on the right-of-way. Permits will be obtained from Hicksville to install and/or sample from the sidewalk or roadway.

2.0 GENERAL FIELD ACTIVITIES

General field activities include mobilization, implementing the site health and safety plan (included in Attachment C to the Work Plan), decontamination procedures and handling of investigation derived waste, utility clearance procedures and a site survey. The QAPP is presented as Attachment B to the Work Plan

2.1 MOBILIZATION

Following authorization to proceed with the field investigation from NYSDEC, Earth Tech will mobilize necessary materials and equipment to the Site.

A project kick-off meeting will be held prior to initiating field work to orient field team members and subcontractors with the Site and to familiarize Earth Tech personnel and our subcontractor personnel with site background, scope of work, potential dangers, health and safety requirements, emergency contingencies and other field procedures.

2.2 HEALTH AND SAFETY

It is anticipated that the work to be completed at the Site will be performed in level D personal protection. See Attachment C for the HASP.

2.3 DECONTAMINATION PROCEDURES AND HANDLING OF INVESTIGATION DERIVED WASTE

All drilling equipment will be steam cleaned prior to installation of the next monitoring well. All dedicated equipment and tools used to develop monitoring wells or collect samples for chemical analysis will be decontaminated prior to and between each sample interval using a Alconox rinse and potable water rinse prior to reuse.

Investigation derived waste (IDW) consisting of soil cuttings and purge water will be staged in appropriate containers and analyzed to determine the appropriate disposal methods. Based on the analytical results Earth Tech will dispose of the IDW at a NYSDEC approved disposal facility.

2.4 UTILITY CLEARANCE

Prior to the initiation of subsurface borings or penetrations, a utility markout will be ordered by the contractor performing the penetrations or borings. In addition, a location-specific utility survey will be performed by Enviroprobe, Inc.

2.5 SITE SURVEY

Earth Tech will utilize available aerial photography to develop a site plan depicting general (existing) site features (i.e., buildings, roadways, etc.) within the vicinity of the site. The locations of all sample points and existing monitoring wells will be surveyed by a subcontractor, YEC. The horizontal and vertical positions will be tied in to the North American Datum 1983 and UTM Zone 18N coordinate system. The vertical positions will be tied to the North American Vertical Datum 1988 (NAVD88) or an established site datum identified on the site plan. The measuring point associated with the existing monitoring wells will be recorded to a vertical accuracy of 0.01 ft.

3.0 PHASE I WELL INSTALLATION AND GROUNDWATER SAMPLING (TASK 2)

This section outlines the procedures that will be used in the installation of seven Solinst CMT Multilevel Systems and sampling of monitoring wells 11 locations in the vicinity of the site. These activities will be conducted to determine if contamination is emanating from the site via groundwater.

3.1 SOLINST CMT MULTILEVEL SYSTEM INSTALLATION

Seven Solinst CMT Multilevel Systems will be installed by Solinst certified driller/installer. Earth Tech will observe the installation at each location.

Each CMT boring will be advanced using a combination of hollow stem augers (HSAs) and spin casing. HSAs will be advanced into the water table (approximately 70 ft bgs) in order to seal off the unsaturated soils. The boring will continue with spin casing to the targeted depth. The CMT device will then be installed in the casing in accordance with the Solinst CMT Multilevel System Assembly Manual included in Appendix 1. The driller, SGS Environmental Services, Inc., is a certified Solinst installation contractor. Once the CMT device has been placed in the cased borehole, the driller will install sand pack around each two foot screen interval. Bentonite will be placed on top of the screened interval to the next screened interval. This process will be repeated for each of the seven CMT sampling ports. The remaining annual space will be grouted to the ground surface. A flush-mounted well cover will be installed in a cement pad at ground surface. Each CMT will be developed to the extent practical. A well development form is provided in Appendix 2.

Soil cuttings generated from the boreholes will be logged and documented by a geologist or engineer. Notes will be kept in both bound field books and boring logs. The Unified Soil Classification System will be used to describe the soil. Cuttings will also be screened for VOCs using an organic vapor analyzer equipped with a photoionization detector (PID).

3.2 SOLINST CMT WELL DEVELOPMENT

Once drilling operations are completed, the Solinst certified driller will develop each CMT sampling port. An appropriate Solinst pump will be used to purge each point. The goal of the development effort will be to achieve a turbid free or low turbid flow of groundwater from the sampling port. Development efforts will be limited to approximately one-half hour per sampling port.

3.3 WATER LEVEL SURVEY

Immediately prior to the groundwater sampling, the depth to water in each monitoring well and CMT will be gauged to provide information on groundwater flow in the vicinity of the site. Water level measurements will be recorded in the field notebook and on the form included in Appendix 2 (Field Forms) of this FAP. Based on field measurements and an established survey datum, Earth Tech will generate a groundwater elevation contour map.

3.4 GROUNDWATER SAMPLING

Approximately fourteen days after the installation and development of the proposed CMTs, an initial round of groundwater samples will be collected from each of the seven ports in the seven new CMT locations shown in Figure 3. Sampling will be conducted in addition to 11 existing monitoring wells shown in Figure 2.

CMTs will be sampled using low-flow techniques to the extent practical; depth to water cannot be measured during purging because the CMT channels are too narrow to accommodate the sampling tube and a water level probe but the field parameters will be recorded to determine when to collect each sample. If low flow techniques cannot be used, the CMTs will be sampled in accordance with the procedures outlined in the CMT Manual in Appendix 1. Monitoring wells will be purged via low flow sampling methods (in low yield wells, the sample may be collected after well recharges if purged dry) as

outlined in Appendix 3 of this FAP. These forms include purge logs which will provide details on the groundwater conditions prior to sampling.

3.5 ANALYSES OF GROUNDWATER SAMPLES

Groundwater samples will be analyzed for volatile organic compounds (VOCs) by EPA Method 8260 and TAL metals by EPA method 6010/7141. The analytical samples required are summarized in Table 2 of the QAPP (Work Plan Attachment B); with further detail on the analytical requirement provided in the QAPP.

3.6 PHASE II WELL INSTALLATION AND GROUNDWATER SAMPLING

The Phase II investigation will be conducted similar to the Phase I if implemented.

4.0 FIELD EQUIPMENT CALIBRATION AND MAINTENANCE

Field testing of groundwater will be performed during purging of wells prior to sampling for laboratory samples. Field QC checks of control limits for pH, specific conductance (conductivity), temperature and turbidity are detailed below. The calibration frequencies discussed below are the minimum. Field personnel will check calibration more frequently in adverse conditions, if anomalous readings are obtained, or subjective observations of instrument performance suggest the possibility of erroneous readings.

4.1 PH METER

The pH meter will be calibrated each morning prior to initial use, using two standards bracketing the range of interest (generally 4.0 and 7.0). If the pH QC control sample (a pH buffer, which may be the same or different than those used to initially calibrate the instrument) exceeds $\pm$ 0.1 pH units from the true value, the source of the error will be determined and the instrument recalibrated. If a continuing calibration check with pH 7.0 buffer is off by $\pm$ 0.1 pH units, the instrument will be recalibrated. Expired buffer solutions will not be used.

Note that gel-type probes take longer to equilibrate (up to 15 minutes at near-freezing temperatures); this must be taken into account in calibrating the instrument and reading samples and standards.

4.2 SPECIFIC CONDUCTIVITY

A vendor-provided conductivity standard will be used to check the calibration of the conductivity meter each morning prior to initial use. Specific conductance QC samples will be on the order of 0.01 or 0.1 molar potassium chloride solutions in accordance with manufacturer's recommendations.

4.3 TURBIDITY

The turbidity meter will be calibrated using a standard as close as possible to 50 nephelometric turbidity units (NTU) (the critical value for determining effectiveness of well development and evacuation). The turbidity meter will be calibrated and checked prior to initial use. The turbidity QC sample will be a commercially prepared polymer standard (Advanced Polymer System, Inc., or similar).

4.4 TEMPERATURE

Temperature probes associated with instruments (such as the YSI SCT-33 conductivity and temperature meter) are not subject to field calibration, but the calibration should be checked to monitor instrument performance. It is recommended that the instrument's temperature reading be checked against a NBS-traceable thermometer concurrently with checking the conductivity calibration. The instrument manual will be referenced for corrective actions if accurate readings cannot be obtained.

5.0 SAMPLE IDENTIFICATION, NUMBERING, AND LABELING

Groundwater samples will be identified by the CMT monitoring well number from which they are collected (e.g., PW02). New monitoring wells will be numbered PW01 through PW07 (PW08 through PW18 for Phase II). Each port on the CMT will be designated by the top of screened interval in ft below ground surface. So for example, the third sampling port for PW04 (assuming the depth to the top of the fourth port/screen is 130 ft bgs) will be labeled PW04-130.

Field duplicates will have the same number as the original sample, with 50 added. For example, the field duplicate of PW12 will be labeled as PW62.

Trip blanks will be identified as "TB" followed by a six-digit date code indicating the date of shipment. For example, the trip blank shipped on November 15, 2007 will be labeled TB091507.

Field (rinsate) blanks will be identified as "FB" followed by a matrix code (as only groundwater field blanks are planned, the code will be "GW") and the six-digit date code.

Pre-printed sample labels will be provided by the laboratory along with the sample containers. Sample labels will be completed and will, as a minimum, include the site name or number, sample ID, date of sample, and the Site name.

6.0 EQUIPMENT DECONTAMINATION AND IDW DISPOSAL

All non-dedicated hand equipment and tools will be decontaminated using the following procedures:

- Scrub/wash with a laboratory grade detergent (e.g., Alconox);
- Tap water rinse or distilled/de-ionized water rinse;
- Distilled/de-ionized water rinse.

If equipment is to be stored for future use, it will be allowed to air dry, and then wrapped in aluminum foil or sealed in plastic bags.

General trash generated during the investigation (e.g., packaging materials, personal protective equipment which is not grossly contaminated) will be bagged and disposed as ordinary solid waste.

IDW consisting of soil cuttings and purge water will be staged in appropriate containers and analyzed to determine the appropriate disposal methods. Based on the analytical results Earth Tech will dispose of the IDW at a NYSDEC approved disposal facility.

Decontamination fluid will be discharged directly to the ground away from any surface water. As a contingency, the boring contractor will have drums available for containerization of site IDW if necessary.

7.0 FIELD DOCUMENTATION

Field notebooks will be initiated at the start of on-site work. The field notebook will include the following daily information for all site activities (except that information that is recorded on standard forms need not be repeated in the log book):

- Date;
- Meteorological conditions (temperature, wind, precipitation);
- Site conditions (e.g., dry, damp, dusty, etc.);
- Identification of crew members (Earth Tech and subcontractor present) and other personnel (e.g., agency or site owner) present;
- Description of field activities;
- Location(s) where work is performed;
- Problems encountered and corrective actions taken;
- Records of field measurements or descriptions recorded; and
- Notice of modifications to the scope of work.

During sampling of wells, field samplers will add the following:

- Sampling point locations and test results such as pH, conductance, etc.;
- Information about sample collection (e.g., duplicate sample location);
- Chain of custody information; and
- Field equipment calibration.

Field Forms will be used to standardize data collection and documentation, including the following:

- Well construction logs will be provided for temporary/permanent monitoring wells and soil vapor points;
- Purge logs will be provided for groundwater and soil vapor sample collection; and
- A photo log will be developed that documents site conditions, sampling procedures, etc.

Except for the photo log, copies of the field forms are provided in Appendix 2 to the FAP.

8.0 SITE INVESTIGATION REPORT (TASK 5)

Subsequent to the completion of the site investigation and receipt of the data, Earth Tech will submit a site investigation report, as described in greater detail in the Work Plan (Section 2.5).

0 400,000 800,000 1,600,000 Feet

N W E S

NYSDEC Site No. 1-30-021
Anchor Lith Kem Ko Site
Hicksville, Nassau County, NY

Figure 1
Site Location

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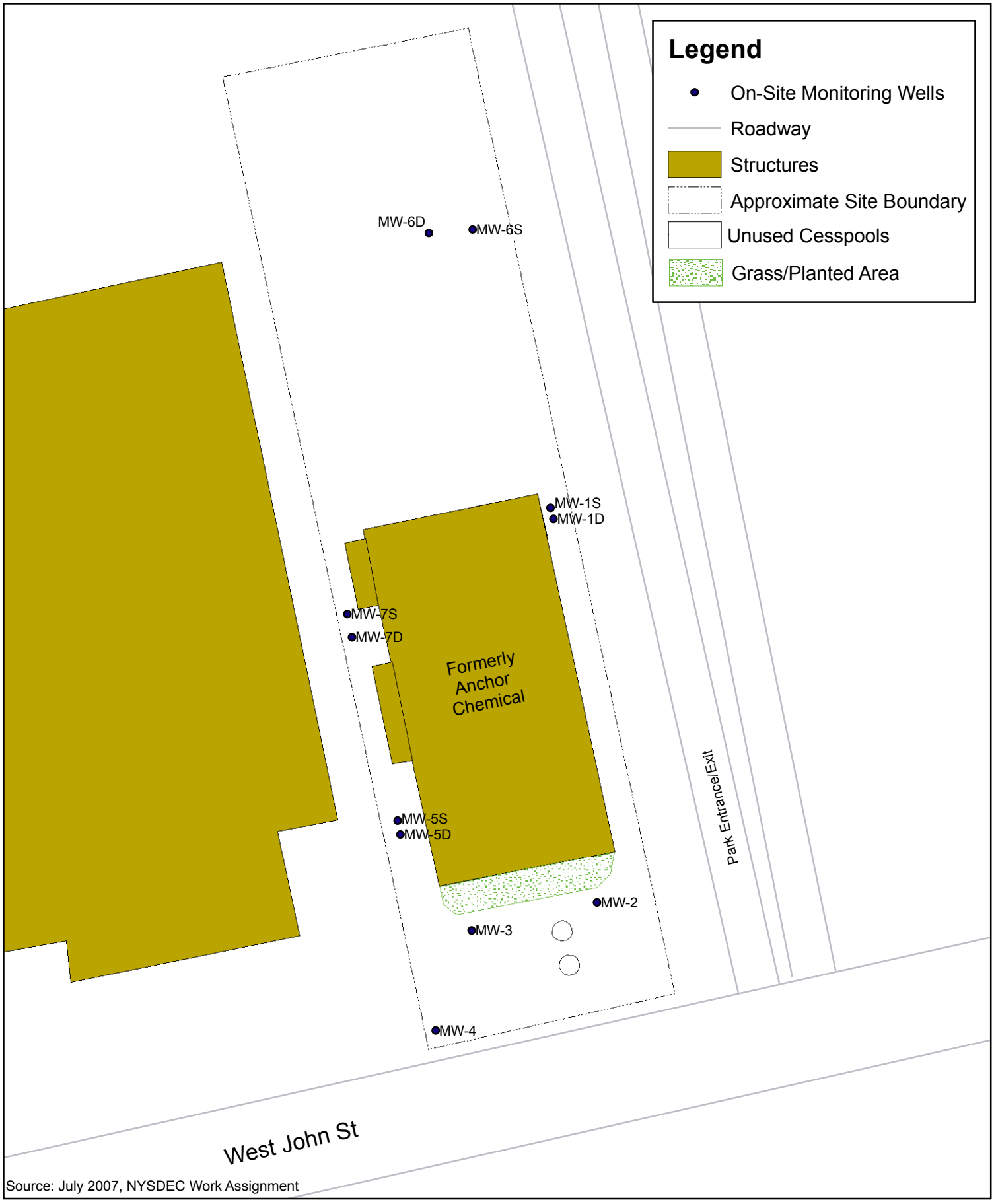


Source: July 2007, NYSDEC Work Assignment

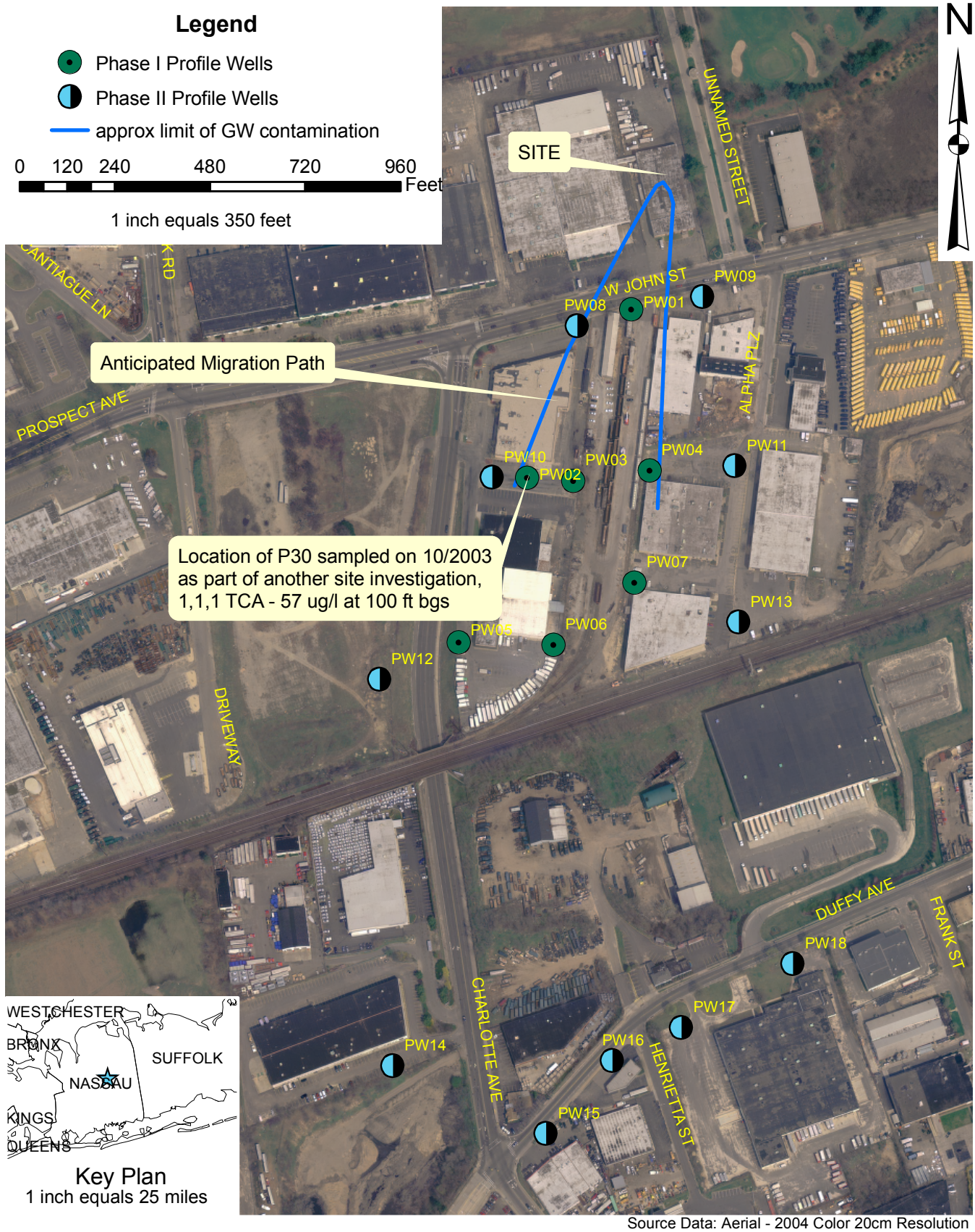
0 20 40 80 120 160 Feet

N W E S

NYSDEC
Anchor Lith Kem Ko
Site No. 1-30-021
Nassau County, NY

Figure 2
Site Plan

EarthTech
A tyco International Ltd. Company



Source Data: Aerial - 2004 Color 20cm Resolution

New York State Department of Environmental Conservation
Proposed Sample Locations
Anchor Lith Kem Ko, Site No. 1-30-021
Hicksville, Nassau County, New York

Created by: BFJ

Date: 6/26/06

Figure 3

APPENDIX 1

Solinst CMT Multilevel System Assembly Manual

Solinst®

CMT Multilevel System Assembly Manual

CMT® Multilevel
Continuous Multichannel Tubing

Printed in Canada
11/2004

Solinst®

CMT Manual Table of Contents

CMT Multilevel System Pre-installation Requirements

Please complete this form to verify that proper consideration has been given to design and borehole specifications for each CMT Multilevel System to be installed. (CMT tubing 1.7" OD, Guide Point Port 1.75" OD, Guide Point Port with Anchor 3.75" OD).

1/ **Minimum information required for effective design of the CMT Multilevel System:**

Accurate borehole depth _____ Borehole Angle _____

Depth to which CMT System is to be installed _____

Borehole geology _____

Drilling Method _____

Casing size (minimum ID) _____

Depth to base of well casing _____

Number of Monitoring Zones _____

Approximate Depth to Static Water Level _____

Expected Maximum Pressure Heads at each Port location _____

Site Conditions (eg. dry field, bush, swamp, paved, etc.) _____

Any special surface requirements for completion _____
of installation (eg. flush mounted, angled, etc)

Solinst can assist the client in the design and component selection for the CMT Multilevel System based on the above requested information, but final design and installation details remain the responsibility of the purchaser.

2/ **Ensure that these additional items are available on site during installation:**

- CMT Installation Toolkit (as shown at right)
- Measuring tape
- Hacksaw
- Marking pen or wax pencil
- Model 103 Tag line for checking backfill depths
- Model 101M or 102 Water Level Meters
- At least two client representatives to supervise and assist with installation. Solinst can provide a technician to assist with the installation upon request.
- Support stand (if purchased separately)
- Adjustable wrench

Introduction

The Solinst Model 403 CMT Multilevel monitoring well system represents a revolution in multilevel groundwater monitoring. The CMT System provides the simplicity of a bundle type installation with the benefits of backfilling or sealing around a single tube.

This manual describes the above-ground assembly of CMT wells. This consists of creating intake ports in the various channels at the desired depths, installing water-tight plugs below each intake port, adding mesh screens, sealing the bottom of the tubing, and attaching low-profile borehole centralizers to the tubing. For installations in bedrock or cased 2" wells, inflatable packers can be attached to the CMT tubing to seal the borehole between the various intake ports.

Tip: Practice making one or two ports in a short section of CMT before starting out on the real thing.

Assembling CMT wells is straightforward and can be performed by either drilling contractors or environmental consultants. The wells can be assembled on site after the borehole is being drilled or off site and then transported to the job location. While the assembly of CMT wells is not difficult, it is important to follow all of the steps described in this manual. It is especially important when creating the monitoring ports to avoid cutting into one of the adjacent channels. Doing so creates a hydraulic connection between the two channels that cannot be repaired. Please read this manual carefully before assembling your first CMT well. In addition we suggest that you practice making one or two ports in a short section of CMT tubing before starting out on the real thing.

Preparation

Before making any ports in the CMT tubing, make a sketch of the desired well design. Show the depths of the desired monitoring zones and centralizers (if used) in feet/meters below ground surface. Also, show the depths of the desired lifts of sand and bentonite graphically on the figure. This will come in handy when you are measuring the depths of the backfill materials when you are building the well. If you are building a CMT well where alternating layers of sand and bentonite backfill are added from the surface, try to allow for two feet or more of sand above and below the monitoring ports to ensure that the bentonite does not cover the monitoring ports.

Remember to allow sufficient wellhead access when you install the protective cover over the well. Plan on using a large well cover (greater than 4" diameter is recommended) to allow plenty of room to access the wellhead. A diagram showing suggested dimensions of the wellhead and protective cover is shown in Figure 1 for flushmount and above ground completions.

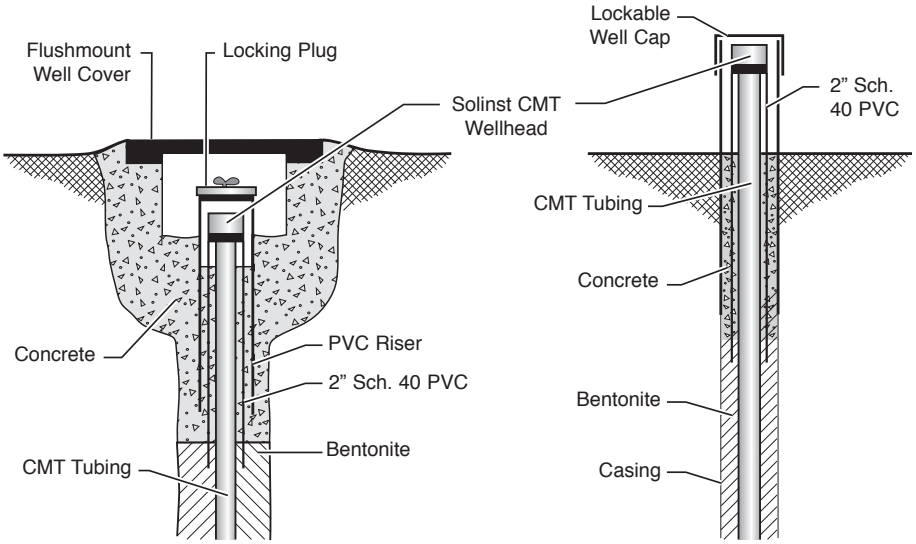


Figure 1

Example 1: Assembling Standard CMT Multilevel Systems

Table 1 shows the design of a hypothetical CMT Multilevel System designated well "ML-1." Each channel in this well can be used for both collecting a groundwater sample (with either a peristaltic pump, inertial pump or micro double valve pump) and measuring the depth to water. Each channel therefore functions both as a sampling port and an observation port.

Table 1
Hypothetical Design for a Standard CMT Well (Well ML-1)

Example

Monitored Zone	Channel Number	Depth to Center of Port (from ground surface)
1	1	23
2	2	34
3	3	48
4	4	55
5	5	69
6	6	77
7	7	92

Note: Newly uncoiled CMT tubing has a memory which can make it difficult to lay out straight. Sand bags help to hold down the ends of the tubing. The "memory" goes away relatively quickly, especially in warm weather. Placing the tubing on black plastic sheeting can warm the tubing, helping it straighten out more quickly.

Note: The channel identifier on the CMT tubing is intentionally subtle to avoid being a conduit for vertical leakage.

Note: The Channel 1 identifier is a low profile repetitive marking "<< CMT >>".

Marking the CMT Tubing with the Locations of the Monitoring Ports and Cutting the Tubing to the Proper Length

Uncoil the CMT tubing on the ground or other flat surface. Stretch out a measuring tape at least as long as the depth of the well, next to the CMT tubing.

Allowing for your desired wellhead stick up (2-3 feet above ground surface), place the end of the measuring tape below the length of tubing you want above ground. This is your measuring point which represents ground surface and all depths below this point use depths below ground surface.

3) The next step is to make marks on the CMT tubing at the depths corresponding to the midpoint of the desired monitoring ports. Before you do this, you will note that there is a faint channel identifier, a low profile repetitive marking "<< CMT >>" that runs along the entire length of the CMT tubing opposite one of the outer channels. This channel identifier facilitates identification of the various internal channels anywhere along the length of the tubing. The channel that has the identifier is always Channel 1. By convention, Channel 1 corresponds to the shallowest monitoring zone. The other five outer channels are numbered clockwise from 2 through 6 as you are looking down on the completed well from above. The center channel is Channel 7 and is always the deepest monitoring zone.

4) Make a mark across Channel 1 on the exterior of the CMT tubing at the depth corresponding to the center of the uppermost monitored port (23 feet below ground surface in our hypothetical example; Figure 2). A permanent marker or a "China marker" wax pencil works well for this. Write "Port 1" on the CMT tubing about 6 inches above the mark.

Figure 2

5) Next, draw a line along the Channel 1 identifier (i.e., parallel with the tubing) extending approximately 6" above and 6" below the depth mark (Figure 3). You will use this line (and other similar lines drawn at the other port depths) to index the Port Cutting Guide. This ensures that you cut holes only in the intended channels corresponding to the desired monitoring zones (as shown in Table 1).

Figure 3

6) Make similar marks at the depths corresponding to the next five monitoring zones (i.e., 34, 48, 55, 69, and 77 feet below ground surface). Make the marks identical to the ones you drew at Port 1. That is, draw the depth mark across Channel 1 and draw the longitudinal line along the Channel 1 identifier. The Port Cutting Guide has been indexed so that it always references the Channel 1 identifier when it is used to cut holes in the five other outer channels. Label these depth marks as Port 2, Port 3, etc..... about 6 inches above each mark. Finally, make a mark at the depth of the deepest monitoring port (i.e., the internal channel, Port 7), which is also the bottom of the well, at 92 feet. Cut the CMT tubing at this mark using a hacksaw, sharp knife, or PVC cutter.

Figure 4

7) The design of the well has now been transferred to the CMT tubing.

Cutting the Outer Ports and Vent Holes

8) Slide the Port Cutting Guide over the CMT tubing down to Port 1. Align the notch stamped "1" on the Port Cutting Guide with the line you drew along the Channel 1 identifier. Position the Port Cutting Guide so that the depth mark "+" (indicating the centre of the Port) is visible in the window in the center of the Port Cutting Guide (Figure 5). Secure the Port Cutting Guide to the CMT tubing by tightening the knurled Locking Bolts on the underside of the guide (Figure 6). Tighten the bolts, **by hand only**, to prevent the Port Cutting Guide from moving.

Note: When using the Port Cutting Guide, ensure that the cutting bolts are located below the number 1 on the front of the Guide. The locking bolts go below the number 4 on the back of the Port Cutting Guide.

Figure 5

Figure 6

9) Next, cut three holes, as described below into Channel 1 using the cutting bolts screwed into the Port Cutting Guide.

Start by threading a cutting bolt into one of the holes located on the same side as the window. Use the hex wrench to tighten the Cutting Bolt. Tighten the bolt a few revolutions, then loosen it one revolution. Continue doing this until the Cutting Bolt "bottoms out" (Figure 7). Remove the Cutting Bolt. There should be a plastic disk inside of the cutting bolt. If there isn't, re-insert the cutting bolt and repeat the cutting process (make sure that the knurled Locking Bolts are tight). Push out the piece of plastic from the inside of the Cutting Bolt by inserting an Allen wrench through the small hole drilled in the head of the Cutting Bolt (Figure 8). Repeat this process to cut all three holes. The two upper holes will provide the port plug access and the lowest hole is the vent hole (Figure 9).

Figure 7

Figure 8

Figure 9

Note: The two upper holes allow you to use snips to cut away a panel of plastic between the two holes, creating a 3-inch-long port in Channel 1. The bottom hole is a vent hole. A vent hole is needed to allow air to escape from the channel beneath the monitoring port when the CMT tubing is inserted into the water-filled borehole during well installation.

Note: The vent hole does not allow cross connection with other monitoring zones because the bottom of the channel is sealed with a water-tight plug.

10) Loosen the cutting tool and move it "down" the CMT and out of the way. Next, use the snips as shown in Figure 10 to cut out the panel of plastic between the upper two port holes. **Do this carefully and keep the snips parallel to the channel side wall to avoid cutting into the walls separating Channel 1 from Channels 2 and 6**. Make the opening as large as possible to facilitate the insertion of the expansion plug as described in the next step.

Figure 10

11) Insert an expansion plug through the opening (Figure 11) so that it seals Channel 1 below the monitoring port and above the vent hole. If necessary, use the torque driver to gently push the plug into place (Figure 12). Use the snips to trim the port opening if you have difficulty inserting the plug. Tighten the plug to a torque of 10 inch-pounds using the supplied torque driver.

Figure 11

Figure 12

12) The last step in making the Channel 1 port consists of wrapping the stainless steel mesh around the port, forming a well screen over the opening. Center the mesh over the port opening and wrap it tightly around the CMT tubing (Figure 13). Use the low profile Oetiker clamps and pliers to firmly secure the mesh to the tubing. Use two clamps for each monitoring port (Figure 14). Construction of Port 1 is now finished. You are now ready to make Port number 2.

Figure 13

Figure 14

Note: To avoid installing ports in the wrong channels start by positioning the Port Cutting Guide so that the depth mark is visible in the window, then rotate the guide so that the appropriate number (corresponding to the port number) is indexed against the line you drew earlier along the longitudinal Channel 1 identifier. This step is very important

13) Slide the Port Cutting Guide down to Port 2. Position the Port Cutting Guide exactly as you did for Port 1. The depth mark should be visible in the window of the Port Cutting Guide and the longitudinal Channel 1 identifier should be indexed to the number "1" stamped on the guide (Figure 15). Now, rotate the Port Cutting Guide (without moving its position along the CMT tubing) so that the longitudinal line is now indexed to the number "2" stamped on the guide (Figure 16). This positions the Port Cutting Guide so that the cutting bolts will cut holes only into Channel 2. Secure the Port Cutting Guide using the knurled Locking Bolts as before. Cut the two port holes and one vent hole into Channel 2. Next, loosen the cutting tool and slide it down the tubing out of the way.

Figure 15

Figure 16

Note: At some sites, you may decide that it is not necessary to monitor every channel. In that case, only cut ports in the desired channels.

When constructing the bottom assembly, only insert the expandable plugs into the monitored channels, leaving the other channels open so that they can fill with water as the CMT tubing is inserted into the borehole (e.g. If only three channels are monitored, only those channels should have plugs inserted at the base.) This reduces buoyancy during well installation.

14) Snip away the panel of plastic between the upper two holes, creating an opening for Port 2.

15) Next, insert an expansion plug though the opening, positioning it below the monitoring port, and tighten it to 10 inch-pounds as before. Finally, wrap a piece of stainless steel mesh around the opening and secure it with two stainless steel clamps. You have now finished constructing Port 2.

16) Continue the steps described above for Ports 3 through 6.

Configuring the Bottom of the CMT Tubing (Zone 7)

17) Insert an expansion plug into each of the six channels. (Figure 17) Tighten each to a torque of 10 inch-pounds using the torque driver.

18) Slide the Guide Point Port Assembly (Figure 18) over the end of the CMT tubing and secure it to the tubing with two stainless steel clamps (Figure 19). The end of the Guide Point Port Assembly is tapered to prevent the bottom of the CMT tubing from getting snagged on a rock ledge or casing joints as it is being inserted into a borehole.

Figure 17

Figure 18

Figure 19

19) If desired, an anchor (3.75" diameter) can be attached to the Guide Point Port using a hex bolt (Figure 20). An anchor is used during installations where it is helpful to secure the bottom of the CMT to keep it from moving during well construction. Once the tubing has been inserted, use sand placed on top of the anchor to secure the well. This will prevent it from being pulled up as drive casing or augers are withdrawn from the borehole. Holes have been drilled in the anchor to allow water in the borehole to pass through the anchor when the CMT well is inserted.

Figure 20

Note: Solinst has developed special tubing centralizers that ensure that the tubing is centered in the borehole during well construction. The fins on the centralizers are low-profile to prevent them from obstructing the tremie tube, or sand and bentonite pellets poured from the surface.

Attaching Tubing Centralizers

20) Place the centralizers over the CMT tubing at the desired depths. Centralizers are generally placed along the CMT tubing at intervals ranging from every 5 to every 15 feet. Attach the centralizers securely to the CMT tubing using two stainless steel clamps (Figure 21).

The CMT well is now ready to be inserted into the borehole.

Figure 21

Note: The Solinst Tag Line, (Model 103), is recommended for accurate sand and bentonite placement.

Note: On the underside of the wellhead is a groove to fit 2" dia. PVC riser pipe.

Figure 22

CMT Placement

21) Lower the assembled CMT System into the borehole slowly.

If buoyancy is a problem, wait, as the channels below water level will slowly fill and allow the system to be lowered further. To speed this process along, pour or pump clean water into the vent holes.

When the required depth is reached, suspend the system with the System Support Clamp to prevent it from moving during well construction (Figure 22).

22) Complete the installation by carefully pouring or using a tremie to place sand and bentonite at appropriate levels to seal the borehole annulus

Attaching the Standard Wellhead (after the well has been installed)
23) After the well has been built, cut the CMT tubing to the final elevation. You may choose to finish your CMT installation off above ground surface. If so, you can leave the CMT stick-up as is and install the standard wellhead or "house" the CMT inside a cut length of 2" dia. PVC riser pipe (not supplied). On the underside of the wellhead cap is a groove which is designed to allow a 2" dia PVC riser pipe to "key" into the wellhead. Locate Channel 1 and slide the Standard Wellhead over the tubing (Figure 22). Remember, Channel 1 has the identifier on the outside of the tubing. Secure the wellhead to the CMT tubing by tightening the hex screw on the side of the wellhead.

Optional Flow Control Monitoring Assembly
Under flowing artesian conditions or for vapor sampling, the CMT can be fitted with a special flow control monitoring assembly to allow the user to collect a sample, measure hydraulic or pneumatic pressure, and prevent uncontrolled flow from the well.

Monitoring Options

Water levels and samples can be accurately obtained using the following high quality Solinst instruments:

Water Level Measurement

Model 102 Water Level Meter

A narrow coaxial cable Model 102 Water Level Meter with a 1/4" dia probe can be used to monitor water levels in any CMT Channel.

Well Completion

Model 103 Tag Line

The Model 103 Tagline is ideal to aid accurate placement of sand and bentonite during borehole completion.

Sampling Methods

Depending on your site's depth to water and your sampling protocol, Solinst offers various sampling options.

Model 410 Peristalitic Pump

Ideal for sample retrieval from shallow water levels less than 30ft (9m).

Mini Inertial Pump

Mechanical pump used inside 1/4" LDPE tubing. Typical flow rates of 50 to 250mL/min. If your site's water level is deeper than 50ft (15m), Teflon tubing is recommended

Model 408M 3/8" Dia. Flexible Micro Double Valve Pump

Small and flexible design makes this gas drive pump ideal for delivering high quality samples, in combination with the Model 466 Electronic Control Unit. Flow rates of 20 to 150mL/min make the 408M suitable for low flow sampling applications. Constructed of Stainless Steel and LDPE for lengths less than 50ft (15m) and Teflon tubing for any depths up to 200ft (60m) applications. This is the only viable option in wells with depth to water over 150 ft.

Model 403 Well Head Seal Assembly

For flowing conditions or vapor monitoring, Solinst offers a monitoring assembly, which applies a pressure seal to the individual CMT channel. This facilitates sampling through the well head at the surface.

408 Accessories

Multi-purge Manifold

A multi-purge manifold can be considered for purging multiple CMT channels simultaneously using 408M Micro Double Valve Pumps

Model 466 Electronic Control Unit

The 408M is durable and easy to operate using the presets and fine tuning capabilities built into the Solinst Model 466 Electronic Control Unit.

APPENDIX 2

Field Sampling Forms

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BORING LOG

Boring No.: (MW-)

PROJECT:	CONTRACTOR:	PAGE 1 OF 4
PROJECT No.:	LOCATION:	DATE:
SURFACE ELEVATION:	DATUM: DRILLER:	ET REP.:

WATER LEVELS			DRILLING AND SAMPLING				
DATE	TIME	DEPTH	CASING		SAMPLER	CORE	TUBE
			TYPE	Steel			
			I.D.	6-inch			
			WT./Fall	--			

Depth (ft)	Sample Number & Time	Blows per/6"	Rec. (feet)	PID Readings (ppm)	SAMPLE DESCRIPTION, REMARKS, AND STRATUM CHANGES
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

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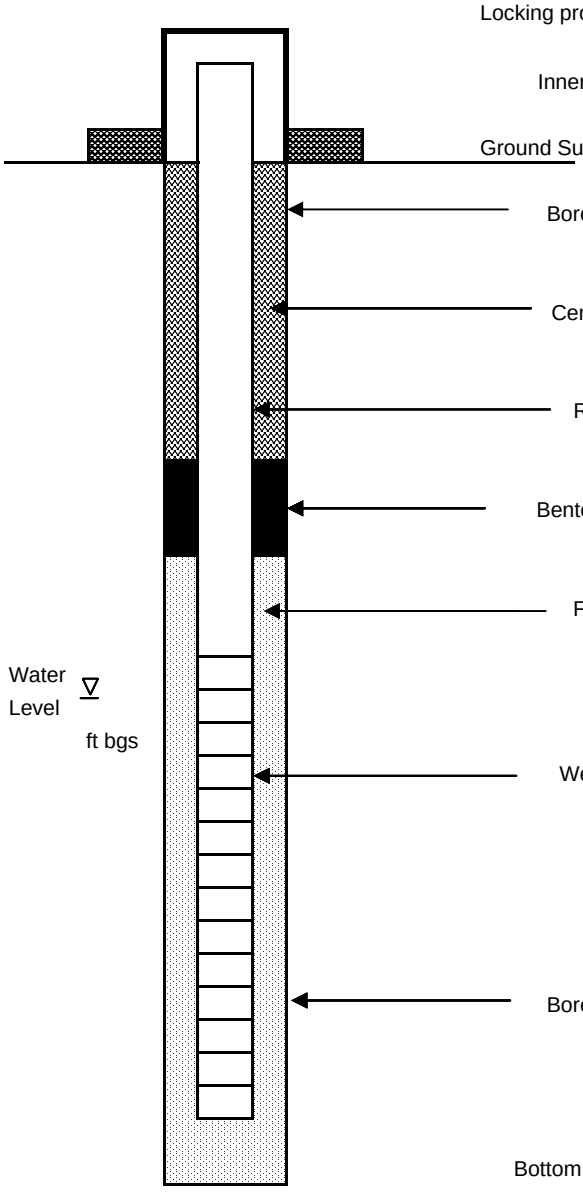
Well No.

Project:	Location:	Page 1 of 1		
Earth Tech Project No.:	Subcontractor:	Water Levels		
Surface Elevation: Ft	Driller:	Date	Time	Depth
Top of PVC	Well Permit No.:			
Casing Elevation: Ft	Earth Tech Rep.:			
Datum: NGVD 1988	Date of Completion:			



Locking protective stickup with concrete pad, three bollards

Inner casing stickup _____ ft to _____ ft

Ground Surface

Borehole diameter _____ inches

Cement-bentonite grout from _____ ft to _____ ft

Riser Pipe from _____ ft to _____ ft

Bentonite seal from _____ ft to _____ ft

Filter pack from _____ ft to _____ ft

Sand Size _____

Well screen from _____ ft to _____ ft

Diameter _____ inches

Slot size _____ inches

Type _____

Borehole diameter _____ inches

Bottom Cap at _____ ft

Bottom of Borehole at _____ ft

Note: All measurements based on ground surface at 0.0 feet. (+) above grade. (-) below grade.

(NOT TO SCALE)

EarthTech

A tyco International Ltd. Company

WELL NO.

WELL DEVELOPMENT FORM	PROJECT	PROJECT No.	SHEET SHEETS OF
1. LOCATION	4. DATE WELL STARTED		5. DATE WELL COMPLETED
2. CLIENT	6. NAME OF INSPECTOR		
3. DRILLING COMPANY	7. SIGNATURE OF INSPECTOR		

ONE WELL VOLUME : WELL TD: PUMP INTAKE:

Time	Depth to Water (ft)	Purge Rate (gal/min)	FIELD MEASUREMENTS						REMARKS
			Temp. (C)	Conduct. (ms/cm)	DO (mg/L)	pH	ORP	Turbidity (ntu)	
									Static water level
									pump on

Pump Type: _____

Analytical Parameters: _____

EarthTech

A tyco International Ltd. Company

WELL NO.

WELL SAMPLING FORM	PROJECT	PROJECT No.	SHEET / SHEETS OF
LOCATION		DATE WELL STARTED	DATE WELL COMPLETED
CLIENT		NAME OF INSPECTOR	
DRILLING COMPANY		SIGNATURE OF INSPECTOR	

ONE WELL VOLUME : WELL TD: PUMP INTAKE DEPTH:

Time	Depth to Water (ft)	Purge Rate (gal/min)	FIELD MEASUREMENTS						REMARKS
			Temp. (C)	Conduct. (ms/cm)	DO (mg/L)	pH	ORP	Turbidity (ntu)	
									Static water level
									pump on

Pump Type: _____

Analytical Parameters: _____

APPENDIX 3

Low-Flow Sampling Guidance

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION II

GROUND WATER SAMPLING PROCEDURE
LOW STRESS (Low Flow) PURGING AND SAMPLING

I. SCOPE & APPLICATION

This Low Stress (or Low-Flow) Purging and Sampling Procedure is the EPA Region II standard method for collecting low stress (low flow) ground water samples from monitoring wells. Low stress Purging and Sampling results in collection of ground water samples from monitoring wells that are representative of ground water conditions in the geological formation. This is accomplished by minimizing stress on the geological formation and minimizing disturbance of sediment that has collected in the well. The procedure applies to monitoring wells that have an inner casing with a diameter of 2.0 inches or greater, and maximum screened intervals of ten feet unless multiple intervals are sampled. The procedure is appropriate for collection of ground water samples that will be analyzed for volatile and semi-volatile organic compounds (VOCs and SVOCs), pesticides, polychlorinated biphenyls (PCBs), metals, and microbiological and other contaminants in association with all EPA programs.

This procedure does not address the collection of light or dense non-aqueous phase liquids (LNAPL or DNAPL) samples, and should be used for aqueous samples only. For sampling NAPLs, the reader is referred to the following EPA publications: DNAPL Site Evaluation (Cohen & Mercer, 1993) and the RCRA Ground-Water Monitoring: Draft Technical Guidance (EPA/530-R-93-001), and references therein.

II. METHOD SUMMARY

The purpose of the low stress purging and sampling procedure is to collect ground water samples from monitoring wells that are representative of ground water conditions in the geological formation. This is accomplished by setting the intake velocity of the sampling pump to a flow rate that limits drawdown inside the well casing.

Sampling at the prescribed (low) flow rate has three primary benefits. First, it minimizes disturbance of sediment in the bottom of the well, thereby producing a sample with low turbidity (i.e., low concentration of suspended particles). Typically, this saves time and analytical costs by eliminating the need for collecting and analyzing an additional filtered sample from the same well. Second, this procedure minimizes aeration of the ground water during sample collection, which improves the sample quality for VOC analysis. Third, in most cases the procedure significantly reduces the volume of ground water purged from a well and the costs associated with its proper treatment and disposal.

III. ADDRESSING POTENTIAL PROBLEMS

Problems that may be encountered using this technique include a) difficulty in sampling wells with insufficient yield; b) failure of one or more key indicator parameters to stabilize; c) cascading of water and/or formation of air bubbles in the tubing; and d) cross-contamination between wells.

Insufficient Yield

Wells with insufficient yield (i.e., low recharge rate of the well) may dewater during purging. Care should be taken to avoid loss of pressure in the tubing line due to dewatering of the well below the level of the pump's intake. Purging should be interrupted before the water level in the well drops below the top of the pump, as this may induce cascading of the sand pack. Pumping the well dry should therefore be avoided to the extent possible in all cases. Sampling should commence as soon as the volume in the well has recovered sufficiently to allow collection of samples. Alternatively, ground water samples may be obtained with techniques designed for the unsaturated zone, such as lysimeters.

Failure to Stabilize Key Indicator Parameters

If one or more key indicator parameters fails to stabilize after 4 hours, one of four options should be considered: a) continue purging in an attempt to achieve stabilization; b) discontinue purging, do not collect samples, and document attempts to reach stabilization in the log book; c) discontinue purging, collect samples, and document attempts to reach stabilization in the log book; or d) Secure the well, purge and collect samples the next day (preferred). The key indicator parameter for samples to be analyzed for VOCs is dissolved oxygen. The key indicator parameter for all other samples is turbidity.

Cascading

To prevent cascading and/or air bubble formation in the tubing, care should be taken to ensure that the flow rate is sufficient to maintain pump suction. Minimize the length and diameter of tubing (i.e., 1/4 or 3/8 inch ID) to ensure that the tubing remains filled with ground water during sampling.

Cross-Contamination

To prevent cross-contamination between wells, it is strongly recommended that dedicated, in-place pumps be used. As an alternative, the potential for cross-contamination can be reduced by performing the more thorough "daily" decontamination procedures between sampling of each well in addition to the start of each sampling day (see Section VII, below).

Equipment Failure

Adequate equipment should be on-hand so that equipment failures do not adversely impact sampling activities.

IV. PLANNING DOCUMENTATION AND EQUIPMENT

- Approved site-specific Field Sampling Plan/Quality Assurance Project Plan (QAPP). This plan must specify the type of pump and other equipment to be used. The QAPP must also specify the depth to which the pump intake should be lowered in each well. Generally, the target depth will correspond to the mid-point of the most permeable zone in the screened interval. Borehole geologic and geophysical logs can be used to help select the most permeable zone. However, in some cases, other criteria may be used to select the target depth

for the pump intake. In all cases, the target depth must be approved by the EPA hydrogeologist or EPA project scientist.

- Well construction data, location map, field data from last sampling event.

- Polyethylene sheeting.
- Flame Ionization Detector (FID) and Photo Ionization Detector (PID).

- Adjustable rate, positive displacement ground water sampling pump (e.g., centrifugal or bladder pumps constructed of stainless steel or Teflon). A peristaltic pump may only be used for inorganic sample collection.

- Interface probe or equivalent device for determining the presence or absence of NAPL.

- Teflon or Teflon-lined polyethylene tubing to collect samples for organic analysis. Teflon or Teflon-lined polyethylene, PVC, Tygon or polyethylene tubing to collect samples for inorganic analysis. Sufficient tubing of the appropriate material must be available so that each well has dedicated tubing.

- Water level measuring device, minimum 0.01 foot accuracy, (electronic preferred for tracking water level drawdown during all pumping operations).

- Flow measurement supplies (e.g., graduated cylinder and stop watch or in-line flow meter).

- Power source (generator, nitrogen tank, etc.).

- Monitoring instruments for indicator parameters. Eh and dissolved oxygen must be monitored in-line using an instrument with a continuous readout display. Specific conductance, pH, and temperature may be monitored either in-line or using separate probes. A nephalometer is used to measure turbidity.

- Decontamination supplies (see Section VII, below).

- Logbook (see Section VIII, below).

- Sample bottles.

- Sample preservation supplies (as required by the analytical methods).

- Sample tags or labels, chain of custody.

V. SAMPLING PROCEDURES

Pre-Sampling Activities

1. Start at the well known or believed to have the least contaminated ground water and proceed systematically to the well with the most contaminated ground water. Check the well, the lock, and the locking cap for damage or evidence of tampering. Record observations.

2. Lay out sheet of polyethylene for placement of monitoring and sampling equipment.

3. Measure VOCs at the rim of the unopened well with a PID and FID instrument and record the reading in the field log book.

4. Remove well cap.

5. Measure VOCs at the rim of the opened well with a PID and an FID instrument and record the reading in the field log book.

6. If the well casing does not have a reference point (usually a V-cut or indelible mark in the well casing), make one. Note that the reference point should be surveyed for correction of ground water elevations to the mean geodesic datum (MSL).

7. Measure and record the depth to water (to 0.01 ft) in all wells to be sampled prior to purging. Care should be taken to minimize disturbance in the water column and dislodging of any particulate matter attached to the sides or settled at the bottom of the well.

8. If desired, measure and record the depth of any NAPLs using an interface probe. Care should be taken to minimize disturbance of any sediment that has accumulated at the bottom of the well. Record the observations in the log book. If LNAPLs and/or DNAPLs are detected, install the pump at this time, as described in step 9, below. Allow the well to sit for several days between the measurement or sampling of any DNAPLs and the low-stress purging and sampling of the ground water.

Sampling Procedures

9. Install Pump: Slowly lower the pump, safety cable, tubing and electrical lines into the well to the depth specified for that well in the EPA-approved QAPP or a depth otherwise approved by the EPA hydrogeologist or EPA project scientist. The pump intake must be kept at least two (2) feet above the bottom of the well to prevent disturbance and resuspension of any sediment or NAPL present in the bottom of the well. Record the depth to which the pump is lowered.

10. Measure Water Level: Before starting the pump, measure the water level again with the pump in the well. Leave the water level measuring device in the well.

11. Purge Well: Start pumping the well at 200 to 500 milliliters per minute (ml/min). The water level should be monitored approximately every five minutes. Ideally, a steady flow rate should be maintained that results in a stabilized water level (drawdown of 0.3 ft or less). Pumping rates should, if needed, be reduced to the minimum capabilities of the pump to ensure stabilization of the water level. As noted above, care should be taken to maintain pump suction and to avoid entrainment of air in the tubing. Record each adjustment made to the pumping rate and the water level measured immediately after each adjustment.

12. Monitor Indicator Parameters: During purging of the well, monitor and record the field indicator parameters (turbidity, temperature, specific conductance, pH, Eh, and DO) approximately every five minutes. The well is considered stabilized and ready for sample collection when the indicator parameters have stabilized for three consecutive readings as follows (Puls and Barcelona, 1996):

    ±0.1 for pH
    ±3% for specific conductance (conductivity)
    ±10 mv for redox potential
    ±10% for DO and turbidity

    Dissolved oxygen and turbidity usually require the longest time to achieve stabilization. The pump must not be removed from the well between purging and sampling.

13. Collect Samples: Collect samples at a flow rate between 100 and 250 ml/min and such that drawdown of the water level within the well does not exceed the maximum allowable drawdown of 0.3 ft. VOC samples must be collected first and directly into sample containers. All sample containers should be filled with minimal turbulence by allowing the ground water to flow from the tubing gently down the inside of the container.

    Ground water samples to be analyzed for volatile organic compounds (VOCs) require pH adjustment. The appropriate EPA Program Guidance should be consulted to determine whether pH adjustment is necessary. If pH adjustment is necessary for VOC sample preservation, the amount of acid to be added to each sample vial prior to sampling should be determined, drop by drop, on a separate and equal volume of water (e.g., 40 ml). Ground water purged from the well prior to sampling can be used for this purpose.

14. Remove Pump and Tubing: After collection of the samples, the tubing, unless permanently installed, must be properly discarded or dedicated to the well for resampling by hanging the tubing inside the well.

15. Measure and record well depth.

16. Close and lock the well.

VI. FIELD QUALITY CONTROL SAMPLES

Quality control samples must be collected to determine if sample collection and handling procedures have adversely affected the quality of the ground water samples. The appropriate EPA Program Guidance should be consulted in preparing the field QC sample requirements of the site-specific QAPP.

All field quality control samples must be prepared exactly as regular investigation samples with regard to sample volume, containers, and preservation. The following quality control samples should be collected during the sampling event:

- Field duplicates
- Trip blanks for VOCs only
- Equipment blank (not necessary if equipment is dedicated to the well)

As noted above, ground water samples should be collected systematically from wells with the lowest level of contamination through to wells with highest level of contamination. The equipment blank should be collected after sampling from the most contaminated well.

VII. DECONTAMINATION

Non-disposable sampling equipment, including the pump and support cable and electrical wires which contact the sample, must be decontaminated thoroughly each day before use ("daily decon") and after each well is sampled ("between-well decon"). Dedicated, in-place pumps and tubing must be thoroughly decontaminated using "daily decon" procedures (see #17, below) prior to their initial use. For centrifugal pumps, it is strongly recommended that non-disposable sampling equipment, including the pump and support cable and electrical wires in contact with the sample, be decontaminated thoroughly each day before use ("daily decon").

EPA's field experience indicates that the life of centrifugal pumps may be extended by removing entrained grit. This also permits inspection and replacement of the cooling water in centrifugal pumps. All non-dedicated sampling equipment (pumps, tubing, etc.) must be decontaminated after each well is sampled ("between-well decon," see #18 below).

17. <u>Daily Decon</u>

A) Pre-rinse: Operate pump in a deep basin containing 8 to 10 gallons of potable water for 5 minutes and flush other equipment with potable water for 5 minutes.

B) Wash: Operate pump in a deep basin containing 8 to 10 gallons of a non-phosphate detergent solution, such as Alconox, for 5 minutes and flush other equipment with fresh detergent solution for 5 minutes. Use the detergent sparingly.

C) Rinse: Operate pump in a deep basin of potable water for 5 minutes and flush other equipment with potable water for 5 minutes.

D) Disassemble pump.

E) Wash pump parts: Place the disassembled parts of the pump into a deep basin containing 8 to 10 gallons of non-phosphate detergent solution. Scrub all pump parts with a test tube brush.

F) Rinse pump parts with potable water.

G) Rinse the following pump parts with distilled/ deionized water: inlet screen, the shaft, the suction interconnector, the motor lead assembly, and the stator housing.

H) Place impeller assembly in a large glass beaker and rinse with 1% nitric acid (HNO_3).

I) Rinse impeller assembly with potable water.

J) Place impeller assembly in a large glass bleaker and rinse with isopropanol.

K) Rinse impeller assembly with distilled/deionized water.

18. **Between-Well Decon**

A) Pre-rinse: Operate pump in a deep basin containing 8 to 10 gallons of potable water for 5 minutes and flush other equipment with potable water for 5 minutes.

B) Wash: Operate pump in a deep basin containing 8 to 10 gallons of a non-phosphate detergent solution, such as Alconox, for 5 minutes and flush other equipment with fresh detergent solution for 5 minutes. Use the detergent sparingly.

C) Rinse: Operate pump in a deep basin of potable water for 5 minutes and flush other equipment with potable water for 5 minutes.

D) Final Rinse: Operate pump in a deep basin of distilled/deionized water to pump out 1 to 2 gallons of this final rinse water.

VIII. FIELD LOG BOOK

A field log book must be kept each time ground water monitoring activities are conducted in the field. The field log book should document the following:

- Well identification number and physical condition.
- Well depth, and measurement technique.
- Static water level depth, date, time, and measurement technique.
- Presence and thickness of immiscible liquid layers and detection method.
- Collection method for immiscible liquid layers.
- Pumping rate, drawdown, indicator parameters values, and clock time, at three to five minute intervals; calculate or measure total volume pumped.
- Well sampling sequence and time of sample collection.
- Types of sample bottles used and sample identification numbers.
- Preservatives used.
- Parameters requested for analysis.

- Field observations of sampling event.
- Name of sample collector(s).
- Weather conditions.
- QA/QC data for field instruments.

IX. REFERENCES

Cohen, R.M. and J.W. Mercer, 1993, DNAPL Site Evaluation, C.K. Smoley Press, Boca Raton, Florida.

Puls, R.W. and M.J. Barcelona, 1996, Low-Flow (Minimal Drawdown) Ground-water Sampling Procedures, EPA/540/S-95/504.

U.S. EPA, 1993, RCRA Ground-Water Monitoring: Draft Technical Guidance, EPA/530-R-93-001.

U.S. EPA Region II, 1989, CERCLA Quality Assurance Manual.

ATTACHMENT B
FINAL QUALITY ASSURANCE PROJECT PLAN

GROUNDWATER EVALUATION
ANCHOR LITH KEM KO SITE
Site Number: 1-30-021

Work Assignment No.
D004436-08

Prepared for:

SUPERFUND STANDBY PROGRAM
New York State
Department of Environmental Conservation
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November 2007

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1.0 INTRODUCTION

1.1 Purpose And Objective

The purpose of this Quality Assurance Project Plan (QAPP) is to document planned investigative activities and establish the criteria for performing these activities at a pre-determined quality at the Anchor Lith Kem Ko Site in the Town of Oyster Bay, Nassau County, New York. The work will be completed by Earth Tech Northeast, Inc (Earth Tech) under Earth Tech/New York State Department of Environmental Conservation (NYSDEC) Superfund Standby Contract Work Assignment No. D004436-08.

Project work to be conducted is specified in the NYSDEC Work Assignment (July, 2007) and will be implemented in general accordance with Technical Guidance for Site Remediation and Investigation (Draft), DER-10, NYSDEC Division of Environmental Remediation, December 2002.

The objective of the work assignment is to conduct a groundwater evaluation in order to determine if contamination is emanating from the site.

1.2 Summary Of Previous Investigations

Information on site history and previous investigations has been summarized in detail in Sections 1.2.1 and 1.2.2 of the WP; this information is not repeated here.

1.3 Project Description

This QAPP is based on the scope of work which is described in the Work Plan. As identified in the WP, the major tasks comprising this work assignment are:

- Task 1 – Work Plan Development
- Task 2 – Phase I Evaluation of Off-Site Groundwater
- Task 3 – Phase II Define of Off-Site Groundwater
- Task 4 – Surveying & Investigative Derived Waste Disposal
- Task 5 – Field Documentation and Reporting

1.4 Project Management And Organization

1.4.1 Personnel

The general responsibilities of key project personnel are listed below.

Program Manager	M. Thiagaram, P.E. (Earth Tech), Program Manager will have responsibility for overall program management.
Project Manager	P. Kareth (Earth Tech), Project Manager, will have responsibility for overall project management, coordination with NYSDEC and coordination of subcontractors to complete the work.
Field Team Leader	Kevin Seise will have overall responsibility of implementing and coordinating field activities.
QA Officer	A. Burton will serve as Quality Assurance Officer, and will be responsible for laboratory and data validation subcontractor procurement and assignment, as well as

providing overall direction for the QC/AC program (including the QAPP and the final data usability assessment).

H & S Officer — B. Poll, Earth Tech Northeast Safety Manger, will oversee the health and safety aspects of this assignment. He, or his designee, will have the responsibility for approval of the project health and safety plan, and tracking of its implementation. He will also verify that on-site subcontractors either have their own (acceptable) HASP; or confirm in writing that the subcontractors will abide by the provisions of the Earth Tech HASP.

1.4.2 Subcontractors

Earth Tech has obtained subcontractors for laboratory/analytical services, data validation/data usability reports, probe installation, and utility clearance. The planned subcontractors for utilization for this project are:

- Land Surveying - Earth Tech will utilize YEC, Inc., a NY ESD-certified MBE firm, will provide a NYS-licensed surveyor and will prepare
- Laboratory Analysis – Earth Tech tentatively plans to utilize Hampton-Clarke, a NY ESD-certified MBE firm. Hampton-Clarke is certified by NYSDOH Wadsworth ELAP for all applicable parameters and matrices, including the air and emissions category.
- Data Validation – Earth Tech tentatively plans to utilize Environmental Data Services, Inc., a NY ESD-certified WBE firm, for data validation and preparation of the data usability report.
- Drilling Services – Earth Tech tentatively plans to use SGS Environmental Services, Inc., for installation of the Solinst CMT Multilevel Systems.

2.0 SITE INVESTIGATION PROCEDURES

Environmental sampling and other field activities will be performed as specified by NYSDEC in the Work Assignment and detailed in the Field Activities Plan (Work Plan Attachment A) and in general accordance with the appropriate techniques presented in the following guidance document.

- Technical Guidance for Site Remediation and Investigation (Draft), DER-10, NYSDEC Division of Environmental Remediation, December 2002.

Table 1 contains a list of the various media to be sampled and the expected number of samples for each matrix.

3.0 SAMPLE HANDLING

3.1 Sample Identification/Labeling

Sample identification and labeling requirements are presented in FAP Section 6 and are not repeated here.

3.2 Sample Preservation And Holding Time

Sample container, preservation, and holding time requirements are summarized on Table 1.

SW-846 Methods will be used for VOCs in soil and groundwater, SVOCs in soil, and metals in soil.

3.2.1 Sample Preservation

Groundwater samples submitted for VOC analysis will be preserved to a pH of ≤2 with hydrochloric acid (HCl). The laboratory will provide pre-preserved 40-mL VOA vials for this purpose.

3.2.2 Holding Times

Holding times are judged from the verified time of sample receipt (VTSR) by the laboratory. Samples will be shipped from the field to arrive at the laboratory by the day after the sample is collected. Samples collected on Friday will be shipped for Saturday delivery.

For the purposes of determining holding time conformance, trip blanks will be considered to have been generated on the same day as the environmental samples with which they are shipped and delivered.

3.3 Chain Of Custody And Shipping

A chain-of-custody form will trace the path of sample containers from the project site to the laboratory. A sample Chain-of-Custody form is included in Appendix 1. Sample/bottle tracking sheets or the chain-of-custody will be used to document the custody of the samples within the laboratory from sample receipt though completion of analysis. The project manager will notify the laboratory of upcoming field sampling events and the subsequent transfer of samples. This notification will include information concerning the number and type of samples, and the anticipated date of arrival. Sample shipping containers will be provided by the laboratory for shipping samples. All sample containers within each shipping container will be individually labeled with an adhesive identification label provided by the laboratory.

In addition, each sample shipping container will be sealed with two adhesive custody seals. The custody seals will be initialed by a member of the field sampling team.

4.0 DATA QUALITY REQUIREMENTS

Analytical methods and data quality requirements are discussed below. All sample containers (including Summa canisters) and sample analyses will be provided by Chemtech, a NYSDOH ELAP-certified laboratory.

4.1 Analytical Methods

Groundwater samples will be analyzed for VOCs by SW-846 Method 8260B (low level option).

Soil samples will be analyzed for VOCs by SW-846 Method 8260B; for SVOCs by method 8270C; and for TAL methods by 6010B (except mercury, by method 7471).

4.2 Quality Assurance Objectives

Data quality objectives (DQOs) for measurement data in terms of sensitivity and the PARCC parameters (precision, accuracy, representativeness, comparability, and completeness) are established so that the data collected are sufficient and of adequate quality for their intended use. Data collected and analyzed in conformance with the DQO process described in this QA/QCP will be used in assessing the uncertainty associated with decisions related to this site.

4.2.1 Sensitivity

For VOCs in groundwater, a, a reporting limit (RL) goal of 1 µg/L has been established for the contaminants of concern (chlorinated solvents, especially TCE, PCE, 1,2-DCE, and 1,1,1-TCA; and BTX compounds) to adequately assess contaminant migration and potential degradation products, and also for comparability with existing data. USEPA Method SW-846 Method 8260B with a 25 mL purge volume can meet this goal; as the low level calibration standard is set to 1 µg/L, and the method detection limits (MDLs) typically a factor of five or ten lower than the RL.

Reporting limits for VOCs, SVOCs, and metals in soil will be the default (standard) limits for the methods; the analyte-specific RLs and MDLs are shown in Appendix 2. It should be noted that although the RDLs for VOCs in soil by 8260B are 5 µg/kg, the MDLs for the site-related contaminants are all well below 1.0 µg/kg. Therefore, the laboratory can and will report detections of these analytes down to 1 µg/kg or lower; reported detections at concentration less than the lowest calibration standard (5 µg/kg) will be qualified as estimated (flagged "J").

4.2.2 Precision

Precision measures the reproducibility of measurements under a given set of conditions. Specifically, it is a quantitative measure of the variability of a group of measurements compared to their average value. The overall precision of measurement data is a mixture of sampling and analytical factors. Analytical precision is easier to control and quantify than sampling precision; there are more historical data related to individual method performance and the "universe" is not limited to the samples received in the laboratory. In contrast, sampling precision is unique to each site or project.

Overall system (sampling plus analytical) precision will be determined by analysis of field duplicate samples. Analytical results from laboratory duplicate samples will provide data on measurement (analytical) precision.

The laboratory objective for precision is to equal or exceed the precision demonstrated for the applied analytical methods on similar samples. Precision is evaluated by the analyses of laboratory and field duplicates. Field duplicates will be collected at a frequency of one per 10 environmental samples of each type.

Relative Percent Difference (RPD) criteria are used to evaluate precision between duplicates, using the equation below

$$RPD = 100 \times [2(X_1 - X_2) / (X_1 + X_2)]$$

where:

X_1 and X_2 are reported concentrations for each duplicate sample and subtracted differences represent absolute values.

Criteria for evaluation of laboratory duplicates are specified in the applicable methods. The objective for field duplicate precision is $\leq$ 50% RPD for all matrices. Precision is not calculable where the analyte is not detected in one or both of the sample and duplicate. The absolute difference between the results ($X_1 - X_2$) may be a more appropriate measure of analytical precision where the reported concentrations are low (i.e., less than five times the RL).

4.2.3 Accuracy

The laboratory objective for accuracy is to equal or exceed the accuracy demonstrated for the applied analytical method on similar samples. Percent Recovery Criteria, published by the NYSDEC as part of the ASP, and those determined from laboratory performance data are used to evaluate accuracy in matrix (sample) spike and blank spike quality control samples. A matrix spike and blank spike will be performed once for every sample delivery group (SDG) as specified in the ASP-CLP. Other method-specific laboratory QC samples (such as laboratory control samples and continuing calibration standards) may also be used in the assessment of analytical accuracy. Sample (matrix) spike recovery is calculated as:

$$\%R = (SSR-SR)/SA \times 100,$$

where:

SSR = Spiked sample Result

SR = Sample Result, and

SA = Spike Added

4.2.4 Representativeness

The representativeness of data is only as good as the representativeness of the samples collected. Sampling and handling procedures, and laboratory practices are designed to provide a standard set of performance-driven criteria to provide data of the same quality as other analyses of similar matrices using the same methods under similar conditions.

Representativeness is assessed qualitatively (there are no equations or numerical criteria for this data quality indicator).

4.2.5 Comparability

Comparability of analytical data among laboratories becomes more accurate and reliable when all labs follow the same procedure and share information for program enhancement. Some of these procedures include:

- Instrument standards traceable to National Institute of Standards and Technology (NIST), USEPA, or the New York State Department of Health or Environmental Conservation;
- Using standard methodologies;
- Reporting results for similar matrices in consistent units;

- Applying appropriate levels of quality control within the context of the laboratory quality assurance program; and,
- Participation in inter-laboratory studies to document laboratory performance.

By using traceable standards and standard methods, the analytical results can be compared to other labs operating similarly. The QA Program documents internal performance. Periodic laboratory proficiency studies are instituted as a means of monitoring intra-laboratory performance.

Comparability is assessed qualitatively (there are no equations or numerical criteria for this data quality indicator).

4.2.6 Completeness

The goal of completeness is to generate the maximum amount possible of valid data. The highest degree of completeness would be to find all deliverables flawless, valid, and acceptable. The lowest level of completeness is excessive failure to meet established acceptance criteria and consequent rejection of data. The completeness goal is 95 percent useable data. However, it is acknowledged that this goal may not be fully achievable; for example, individual analytes may be rejected within an otherwise acceptable analysis; or some sampling locations may not be accessible. The impact of rejected or unusable data will be made on a case-by-case basis. If the study can be completed without the missing datum or data, no further action would be necessary. However, loss of critical data may require re-sampling or reanalysis.

4.3 Field Quality Assurance

Field quality assurance/quality control samples associated with the generation of environmental data typically include field (equipment rinsate) blanks; field duplicates; and trip blanks. The rationale and frequency of each of these are discussed below.

4.3.1 Equipment (Rinsate) Blanks

Equipment blanks are not required when laboratory-decontaminated, dedicated sampling equipment is used. One equipment rinsate blank will be collected each week for the sampling equipment used to collect groundwater samples in order to verify that it has not become contaminated through shipment and storage. NYSDEC has also indicated that field blanks are not required for this project for soil samples, as all the soil samples are for waste characterization purposes.

4.3.2 Field Duplicate Samples

Duplicates will be collected at a frequency of one per 20 (or fewer) samples of each type, and will be analyzed for the same parameters as the environmental sample.

Duplicate groundwater samples will be collected by alternately filling laboratory-provided VOA vials and pre-preserved bottles for metals.

4.3.3 Trip Blanks

The purpose of a trip blank is to place a mechanism of control on sample container preparation, quality, and sample handling. The trip blank travels from the lab to the site with the empty sample container and back from the site with the collected samples. One trip blank will be submitted with each sample shipment of water samples (currently, estimated to be 15) and analyzed for VOCs.

4.4 Laboratory Quality Assurance

Method-required laboratory quality assurance includes an instrument performance check; calibration check; and method blank analysis for each group of 20 or fewer samples. In addition, internal standards are added to every sample (environmental samples and laboratory QA/QC samples).

Laboratories typically perform additional QC, such as spikes, laboratory duplicates, and laboratory control samples. The frequency of these analyses is specified in the laboratory's analytical SOP for the method.

4.4.1 Instrument Performance Check

The instrument performance check verifies the operation of the GC/MS and verifies that it meets tuning and mass spectral abundance criteria prior to sample data acquisition.

4.4.2 Calibration Checks

An initial five-point calibration check must be performed after the instrument performance check but prior to the analysis of blanks and samples. Concentrations of the calibration standards should be selected to span the concentration range of interest. One of the concentrations of the initial calibration must be the same as the daily calibration check.

On a daily basis, a single-point calibration check must be analyzed (with each group of 20 or fewer samples). The percent difference (%D) for each compound in the daily calibration check should be within ±30 percent of the response determined in the initial calibration in order to proceed with sample analysis. If the %D criteria are not met, a new 5-point calibration should be performed.

4.4.3 Method Blanks

Method blanks are used to assess the background variability of the method and to assess the introduction of contamination to the samples by the method, technique, or instrument as the sample is prepared and analyzed in the laboratory.

The method blank should not contain any target analytic at a concentration greater than its quantitation level (reporting limit; typically, three times the MDL) or its action level, whichever is more stringent. Method blanks are analyzed at a frequency of one for every 20 samples analyzed, or every analytical batch, whichever is more frequent.

4.4.4 Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Site-specific MS/MSD samples will be submitted during sampling at a rate of one per 20 samples.

4.4.5 Internal Standards

Internal standards (IS) are added to every sample analyzed for VOCs (in any matrix) and SVOCs. Sample-specific IS recovery should be ±40 percent of the mean response in the most recent valid calibration.

5.0 DATA DOCUMENTATION

5.1 Field Notebook

Field notebooks will be utilized to record information not recorded on standard forms. The use and completion of field notebooks is described in the FAP (Section 7) and is not repeated in the QAPP.

5.2 Field Reporting Forms

Field reporting forms (or their equivalent) to be utilized in this investigation include the following are specified in the FAP (Attachment A to the WP) and examples are provided in FAP Appendix 2.

Custody documentation will documented from time of sample collection through arrival at the laboratory with a chain Chain-of-Custody Form (example provided in Appendix 1).

These forms, when completed, will become part of the project file.

6.0 LABORATORY EQUIPMENT CALIBRATION AND MAINTENANCE

Laboratory equipment will be calibrated according to the requirements of the NYSDEC ASP, Superfund Contract Laboratory Program for each parameter or group of similar parameters, and maintained following professional judgment and the manufacturer's specifications.

7.0 CORRECTIVE ACTIONS

If instrument performance or data fall outside acceptable limits, then corrective actions will be taken. These actions may include recalibration or standardization of instruments, acquiring new standards, replacing equipment, repairing equipment, and reanalyzing samples or redoing sections of work.

Subcontractors providing analytical services should perform their own internal laboratory audits and calibration procedures with data review conducted at a frequency so that errors and problems are detected early, thus avoiding the prospect of redoing large segments of work. In addition, maintaining the necessary certification (e.g., ELAP; NELAP) requires that the laboratories be subject to third-party audits and also achieve acceptable results on proficiency (performance evaluation) samples.

Situations related to this project requiring corrective action will be documented and made part of the project file. For each measurement system identified requiring corrective action, the responsible individual for initiating the corrective action and also the individual responsible for approving the corrective action, if necessary, will be identified.

8.0 DATA REDUCTION, VALIDATION, AND REPORTING

The guidance followed to perform quality data validation, and the methods and procedures outlined herein and elsewhere in the Work Plan, pertain to initiating and performing data validation, as well as reviewing data validation performed by others (if applicable). An outline of the data validation process is presented here, followed by a description of data validation review summaries.

8.1 Laboratory Data Reporting And Reduction

The laboratory will meet the applicable documentation, data reduction, and reporting protocols as specified in the NYSDEC ASP Category B deliverable requirements.

In addition to the hard copy of the data report, the laboratory will be asked to provide the sample data in spreadsheet form on computer diskette. The diskette will be generated to the extent possible directly from the laboratory's electronic files or information management system to minimize possible transcription errors resulting from the manual transcription of data.

The laboratory will also provide the electronic deliverable in NYSDEC "EZ-EDD" format, as described in ASP 2005 Exhibit H, Section 1.1.1.

8.2 Data Validation

A subcontractor to Earth Tech will review and validate the groundwater data (VOCs by 8260B data), and soil data (VOCs, SVOCs, and TAL metals). The data validator will be independent of the laboratory and independent of Earth Tech. Data validation will be performed by following guidelines established in the specific USEPA Region 2 SOPs, as indicated below.

- Volatile organic data generated by SW-846 method 8260B will be validated in accordance with HW-24, "Standard Operating Procedure for the Validation of Organic Data Acquired Using SW-846 Method 82660B" (Revision 1, January 1999).
- Semivolatile organic data generated by SW-846 method 8270C will be validated in accordance with HW-24, "Standard Operating Procedure for the Validation of Organic Data Acquired Using SW-846 Method 8270C" (Revision 2, June 2001).
- Metals data will be validated in accordance with HW-2, "Evaluation of Metals for the Contract Laboratory Program based on SOW IL05.3" (Revision 13, September 2005). The use of this SOP will be adapted to conform to the specific requirements of the NYSDEC ASP (e.g., NYSDEC/ASP holding time requirements) and of Method SW-846 Method 7471 (for mercury) and 6010 (for all other TAL metals).

Where necessary and appropriate, supplemental validation criteria may be derived from the EPA Functional Guidelines (USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review, EPA 540/R-99/008; October 1999, and National Functional Guidelines for Inorganic Data Review, EPA 540/R-04-004; October 2004), as appropriate.

Validation reports will consist of text results of the review and marked up copies of Form I (results with qualifiers applied by the validator). Validation will consist of target and non-target compounds with corresponding method blank data, spike and surrogate recoveries, sample data, and a final note of validation decision or qualification, along with any pertinent footnote references. Qualifiers applied to the data will be documented in the report text. The results of the data validation will be presented in a data Usability Summary Report (DUSR) prepared by the validation subcontractor.

8.3 Data Usability

Subsequent to review of the items evaluated in the subcontractor DUSR and accompanying tables, Earth Tech then prepares a brief data usability summary. The data usability summary, which will be provided as part of the site investigation letter report, encompasses both quantitative and qualitative aspects, although the qualitative element is the most significant.

The quantitative aspect is a summary of the data quality as expressed by qualifiers applied to the data; the percent rejected, qualified (i.e., estimated), missing, and fully acceptable data are reported. As appropriate, this quantitative summary is broken down by matrix, laboratory, or analytical fraction or method.

The qualitative element of the data usability summary is the QA officer's translation and summary of the validation reports into a discussion useful to data users. The qualitative aspect will discuss the significance of the qualifications applied to the data, especially in terms of those most relevant to the intended use of the data. The usability report will also indicate whether there is a suspected bias (high or low) in qualified data, and will also provide a subjective overall assessment of the data quality.

8.4 Field Data

Field data collected during the field activity will be presented in tabular form with any necessary supporting text. Unless activities resulted in significant unexpected results, field data comments can be added as footnotes to the tables.

9.0 PERFORMANCE AND SYSTEM AUDITS

As part of the laboratory subcontractor procurement process under the Earth Tech/NYSDEC Contract, the laboratory assigned to this project has been verified to be certified by the NYSDOH Environmental Laboratory Approval Program for the analytical protocols to be used. Therefore, no laboratory audit specific to this study will be performed unless warranted by a problem(s) that cannot be resolved by any other means, or at the discretion of Earth Tech and the NYSDEC.

Due to the short duration and limited scope of the field investigation, no field systems audit is planned for this project.

10.0 QUALITY ASSURANCE REPORTS TO MANAGEMENT

Quality assurance reporting for this project is limited to the DUSR (prepared by subcontract data validator) and the QA/QC summary narrative provided in the site investigation letter report.

The project manager, through task managers, will be responsible for verifying that records and files related to this project are stored appropriately and are retrievable.

The laboratory will submit any memoranda or correspondence related to quality control of this project's samples as part of its deliverables package.

Table 1
Sample Bottle, Volume, Preservation, and Holding Time Summary
Quality Assurance Project Plan
Anchor Lith Kem Ko (Site 1-30-021)

MATRIX/ANALYSIS	Sample Prep Method[1]	Analytical Method	Sample Bottles (2)				Minimum	Preservation	Holding Time (3, 4)		Comment
			Mat'l	Size	Qty	Source	Vol Rqd	(3)	Extraction	Analysis	
Task 2 Samples											
Water - Volatile Organics	SW 846 5030B	SW 846 8260B	G	40 mL	2	HCV	40 mL	HCl to pH ≤ 2	NA	14 days	
Water - Metals	SW 846 3005A/3010A	SW 846 6010/7471	P	250 mL	1	HCV	200 mL	HNO_3 to pH ≤ 2	NA	28/180 days	28 days for Hg; 180 days for all other TAL metals.
Task 3 Samples											
Water - Volatile Organics	SW 846 5030B	SW 846 8260B	G	40 mL	2	HCV	40 mL	HCl to pH ≤ 2	NA	14 days	
Water - Metals	SW 846 3005A/3010A	SW 846 6010/7471	P	250 mL	1	HCV	200 mL	HNO_3 to pH ≤ 2	NA	28/180 days	28 days for Hg; 180 days for all other TAL metals.
Task 4 Samples											
Soil - Volatile Organics	SW 846 5035	SW 846 8260B	Encore	25 g	1	ET Vendor	25 g	None	NA	48 hours[9]	
Soil - Semivolatile Organics	SW 846 3550C	SW 846 8270C	G	8 oz (6)	1	HCV	30 g	None	14 days	40 days	
Soil - Pesticides	SW 846 3545C	SW 846 8081	G	"	"	HCV	30 g	None	14 days	40 days	
Soil - PCBs	SW 846 3545C	SW 846 8082	G	"	"	HCV	30 g	None	14 days	40 days	
Soil - Metals	SW 846 3050B	SW 846 6010/7471	G	"	"	HCV	2 - 200 g	None	NA	28/180 days	28 days for Hg; 180 days for all other TAL metals.
Soil - TCLP (full suite)	SW-846 1311	8260/8270/8081/8151/6010	G	16 oz (7)	1	HCV	325 g	None	14 days	Varies	14 day HT for TCLP extraction; then method limits
Soil - Gen Chem[8]	NA	SW846 Chapter 8	G	"	"	HCV	100 g	None	NA	28 days	No HT specified in SW-846.
Water - Volatile Organics	SW 846 5030B	SW 846 8260B	G	40 mL	2	HCV	40 mL	HCl to pH ≤ 2	NA	14 days	
Water - Semivolatile Organics	SW 846 3510C	SW 846 8270C	G	1 L	2	HCV	1 L	None	7 days	40 days	
Water - Pesticides	SW 846 3510C	SW 846 8081	G	1 L	2	HCV	1 L	None	7 days	40 days	
Water - PCBs	SW 846 3510C	SW 846 8082	G	1 L	2	HCV	1 L	None	7 days	40 days	
Water - Metals	SW 846 3005A/3010A	SW 846 6010/7471	P	250 mL	1	HCV	200 mL	HNO_3 to pH ≤ 2	NA	28/180 days	28 days for Hg; 180 days for all other TAL metals.

(1) Laboratory may propose alternate extraction/preparation methods, subject to Earth Tech approval.
(2) Bottles as planned by laboratory (HCV). Earth Tech will acquire and provide EnCore samplers for VOCs in soil.
(3) All samples for chemical analysis should be held at 4 degrees C in addition to any chemical preservation required.
(4) Holding time for calculated from day of collection, unless noted as being from time of extraction. Holding time from VTSR generally two days shorter per ASP 2005 Exhibit I Table 3.
(5) Preliminary data to be reported within 14 days of sample receipt.
(6) A single 8-oz sample is sufficient for SVOCs, pesticides, PCBs, and metals.
(7) A single 8-oz sample is sufficient for TCLP and general chemistry (characteristics) analysis.
(8) General Chemistry analyses for soil will be hazardous characteristics corrosivity (EPA 9045D) and ignitability (EPA 9030B).
(9) Sample must be analyzed or preserved at laboratory within 48 hours of collection; total time from collection to analysis not to exceed 14 days.
G = Glass

SW-846: Test Methods for Evaluating Solid Waste, Physical/Chemical Methods. USEPA SW-846. Complete through Update IIIB, November 2004.

Table 2
Field Sample and QA/QC Sample Quantity Summary
Quality Assurance Project Plan
Anchor Lith Kem Ko (Site 1-30-021)

MATRIX/ANALYSIS	Analytical Method	Laboratory	Reporting Limit Goal (units as specified)	Field Sample Quantity	Matrix Spike (MS)[3]	MS Duplicate or Matrix Duplicate[3]	Field Duplicate[3]	Equipment Blank[6]	Trip Blank[5]	Total Billable Analyses
Task 2 Samples										
Water - Volatile Organics	SW 846 8260B	HCV	1 - 5 µg/L [2]	60	3	3	3	2	8	79
Water - Metals	SW 846 6010/7471	HCV	Analyte-specific	60	3	3	3	2	0	71
Task 3 Samples										
Water - Volatile Organics	SW 846 8260	HCV	1 - 5 µg/L [2]	87	4	4	5	3	12	115
Water - Metals	SW 846 6010/7471	HCV	Analyte-specific	87	5	5	5	3	0	105
Task 4 Samples [2]										
Soil - Volatile Organics	SW 846 8260B	HCV	1 - 2 µg/kg (typical) [1]	3	0	0	0	0	0	3
Soil - Semivolatile Organics	SW 846 8270C	HCV	330 µg/kg (typical) [1]	3	0	0	0	0	0	3
Soil - Pesticides	SW 846 8081	HCV	3 - 25 µg/kg [1]	3	0	0	0	0	0	3
Soil - PCBs	SW 846 8082	HCV	25 µg/kg [1]	3	0	0	0	0	0	3
Soil - Metals	SW 846 6010/7471	HCV	Analyte-specific	3	0	0	0	0	0	3
Soil - TCLP (full suite)	SW846 1311 + analytical	HCV	40 CFR 261.24 Table 1	3	0	0	0	0	0	3
Soil - Gen Chem	SW846 Chapter 8	HCV	NA	3	0	0	0	0	0	3
Water - Volatile Organics	SW 846 8260B	HCV	1 - 5 µg/L [2]	1	0	0	0	0	0	1
Water - Semivolatile Organics	SW 846 8270C	HCV	10 µg/L [2]	1	0	0	0	0	0	1
Water - Pesticides	SW 846 8081	HCV	.025 - 0.25 µg/L [2]	1	0	0	0	0	0	1
Water - PCBs	SW 846 8082	HCV	0.25 µg/L	1	0	0	0	0	0	1
Water - Metals	SW 846 6010/7471	HCV	Analyte-specific	1	0	0	0	0	0	1

1 HCV, October 2007. Reporting limits for soils, when adjusted for dry weight, will be higher. Detections above the MDL but less than reporting limits will be reported and flagged estimated (J).
2 HCV, October 2007. Reporting limits are typical of most analytes in this fraction; RLs may be higher for some compounds.
3 Field duplicate and MS/MSD frequency based on one per 20 environmental samples.
4 Field blank frequency - one per week, assuming pre-cleaned (dedicated) sampling equipment is used. Frequency is higher if on-site decontamination is performed.
5 Trip blank frequency - one per each day water samples for VOC analysis are shipped.
6 Task 4 samples/analyses are for waste characterization and as such no additional QA/QC is required.

0 400,000 800,000 1,600,000 Feet

N W E S

NYSDEC Site No. 1-30-021
Anchor Lith Kem Ko Site
Hicksville, Nassau County, NY

Figure 1
Site Location

EarthTech
A tyco International Ltd. Company

APPENDIX 1

Chain of Custody Form

EarthTech
A tyco International Ltd. Company

Chain of Custody and Analytical Request

Page _____ of _____

Project Number: _____
WBS Number: _____
Chain of Custody Number (1): _____
LIMS Number: _____

Facility / Air Force Base ID:

Project Name / Site Name:

Client Name:

Collected by:

Field Sample ID (30 Characters Max)	ERPIMS LOCID (15 Characters Max)	Date Collected (dd-mm-yyyy)	Time Collected (Military) (hh-mm)	Sample Depth (beginning - ending)	SA Code (2)	Sample Number (3)	Sample Matrix (4)	Sample Analysis Requested (5): Number of containers								Quality Assurance Samples (6): Ambient Blank Lot Control Number	Equipment Blank Lot Control Number	Trip Blank Lot Control Number	Cooler ID
				-															
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Comments

Custody Transfers Prior to Receipt by Laboratory

Relinquished By (Signed) Date Time — Received by (signed) Date Time

1._____ 1._____
2._____ 2._____
3._____ 3._____

Sample Delivery Details / Laboratory Receipt

Delivered Directly to Lab: _____ Shipped: _____
Method of Shipment:_____ Airbill #:_____
Analytical Lab:_____ Location:_____
Lab Recipient:_____ Date:_____ Time:_____

1.) Chain of Custody Number = date collected + custody number (e.g. 09-02-1999-01)

2.) Sample Type (SA) Codes: N = Normal Sample, TB = Trip Blank (-c) Sample, FD = Field Duplicate (-a) Samples, FR = Field Replicate (-b) Samples, EB = Equipment Blank (-d) Samples, MS = Matrix Spike Samples, SD = Matrix Spike Duplicate Samples

3.) Sample Number: Unique sample number collected from a particular location per day. (e.g. Groundwater sample collected from MW-1 on 10/10/99 = 01, if sampled again on 10/10/99 = 02, etc.)

4.) Matrix Codes: GS = Soil Gas, WG = Groundwater, WS = Surface Water, SO = Soil, SE = Sediment, SL = Sludge, SS = Surface Soil Samples, WQ = Aqueous Blank Samples (trip, equipment, ambient, etc), SQ = Soil Blanks

5.) Sample Analysis Requested: Analytical method requested and number of containers provided for each.

6.) Quality assurance samples are assigned by date (ddmmyy) and the sample number associated with the sample (01, 02, etc) (e.g. Equipment blank collected in association with MW-1 on 10/10/99 will be designated 10109901 in the Equipment Blank Lot Control Number field).

ATTACHMENT C
FINAL HEALTH AND SAFETY PLAN

GROUNDWATER EVALUATION
ANCHOR LITH KEM KO SITE
Site Number: 1-30-021

Work Assignment No.
D004436-08

Prepared for:

SUPERFUND STANDBY PROGRAM
New York State
Department of Environmental Conservation
625 Broadway
Albany, New York 12233

November 2007

Prepared by:

Earth Tech Northeast, Inc.
300 Broadacres Drive
Bloomfield, NJ 07003-3153

HEALTH AND SAFETY PLAN APPROVAL

This Health and Safety Plan (HASP) was prepared for employees performing a specific, limited scope of work. It was prepared based on the best available information regarding the physical and chemical hazards known or suspected to be present on the project site. While it is not possible to discover, evaluate, and protect in advance against all possible hazards, which may be encountered during the completion of this project, adherence to the requirements of the HASP will significantly reduce the potential for occupational injury.

By signing below, I acknowledge that I have reviewed and hereby approve the HASP for the Anchor Lith Kem Ko Site. This HASP has been written for the exclusive use of Earth Tech, Inc., its employees, and subcontractors. The plan is written for specified site conditions, dates, and personnel, and must be amended if these conditions change.

Written by:

Celeste Foster
Environmental Engineer
973-337-4209

Date

Reviewed by:

Brett D. Hodgson, OHST
Safety & Health Professional
616-940-4444

Date

Concurrence by:

Paul Kareth
Project Manager
973-337-4215

Date

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APPENDICES

1.0 INTRODUCTION

This Health and Safety Plan (HASP) provides a general description of the levels of personal protection and safe operating guidelines expected of each employee or subcontractor associated with the environmental services being conducted in the vicinity of the Anchor Lith Kem Ko Site, located at 500 West John Street, Town of Oyster Bay, Nassau County, New York.

This HASP also identifies chemical and physical hazards known to be associated with the Earth Tech-managed activities addressed in this document.

HASP Supplements will be generated as necessary to address any additional activities or changes in site conditions, which may occur during field operations.

1.1 GENERAL

The provisions of this HASP are mandatory for all Earth Tech personnel engaged in fieldwork associated with the environmental services being conducted at the subject site. A copy of this HASP, any applicable HASP Supplements and the Earth Tech Consolidated Safety, Health, and Environmental (SH&E) Manual shall be maintained on site and available for review at all times. Record keeping will be maintained in accordance with this HASP and the applicable Standard Operating Procedures (SOPs). In the event of a conflict between this HASP, the SOPs and federal, state, and local regulations, workers shall follow the most stringent/protective requirements.

1.2 POLICY STATEMENT

It is the policy of Earth Tech to provide a safe and healthy work environment for all of its employees. Earth Tech considers no phase of operations or administration is of greater importance than injury and illness prevention. Safety takes precedence over expediency or shortcuts. Every accident and every injury is avoidable. We will take every reasonable step to reduce the possibility of injury, illness, or accident. This policy is detailed in SH&E 001, *Safety, Health, and Environmental Policy Statement* (Appendix 1).

The practices and procedures presented in this HASP and any supplemental documents associated with this HASP are binding on all Earth Tech employees while engaged in the subject work. In addition, all site visitors shall abide by these procedures as the minimum acceptable standard for the work site. Operational changes to this HASP and supplements that could affect the health or safety of personnel, the community, or the environment will not be made without prior approval of the Earth Tech Project Manager (PM) and the assigned Earth Tech Safety Professional.

1.3 REFERENCES

This HASP conforms to the regulatory requirements and guidelines established in the following documents:

- Title 29, Part 1910 of the Code of Federal Regulations (29 CFR 1910), *Occupational Safety and Health Standards* (with special attention to Section 120, *Hazardous Waste Operations and Emergency Response*).
- Title 29, Part 1926 of the Code of Federal Regulations (29 CFR 1926), *Safety and Health Regulations for Construction*.
- National Institute for Occupational Safety and Health (NIOSH)/OSHA/U.S. Coast Guard (USCG)/EPA, *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities*, Publication No. 85-115, 1985.

The requirements in this HASP also conform to Earth Tech's Corporate Safety Program requirements as specified in Earth Tech's *Consolidated Safety, Health, and Environmental Manual*, a copy of which will be maintained on site at all times.

1.3.1 Earth Tech Safety, Health and Environmental Website

Earth Tech's Safety Website is located on the Earth Tech Corporate Intranet, and is available for all Earth Tech employees as a resource for safety information, updates, and procedures. Project management and employees are encouraged to visit the website for key safety items and information, such as:

- The Earth Tech Employee Orientation,
- Defensive Driver Awareness Training (DDAT)
- Contact information for Earth Tech's Safety Department staff,
- Safety Forms,
- Safety Program Manuals,
- Safety Alerts and other communications,
- Accident, Injury, and Near-Miss Reporting Requirements,
- Links to safety and regulatory information,
- Training Resources,
- Ergonomics Information, and
- A feedback link to the Earth Tech Safety Director.

The website[1] is located at the following web address:

http://etonline.earthtech.com/etonline/healthsafety/

[1] Please note that the website can only be accessed when connected to Earth Tech's Wide-Area Network (e.g., via iPass).

2.0 SITE INFORMATION AND SCOPE OF WORK

Earth Tech will conduct environmental services at the Anchor Lith Kem Ko site. Work will be performed in accordance with the applicable Statement of Work (SOW) and associated Work Plans developed for the properties. Deviations from the listed SOW will require that a Safety Professional review and changes made to this HASP, to ensure adequate protection of personnel and other property.

The following is a summary of relevant data concerning the properties, and the work procedures to be performed. The Work Plan prepared by Earth Tech as a companion document to this HASP provides significantly greater details concerning both site history and planned work operations.

2.1 SITE INFORMATION

2.1.1 General Description

The Anchor Lith Kem Ko site (herein identified as the "site") is a former chemical blending and packaging facility located at 500 West John Street, Town of Oyster Bay, Nassau County, New York. The site covers approximately 1.5 acres. The surrounding area is predominantly industrial with a recreational area to the northeast.

Anchor Chemicals operated the facility from 1964 to 1978 at which time the property was purchased by Chessco Industries, wherein the firm name was changed to Anchor Lith Kem Ko, Inc. The property has continued to change hands and has been utilized for various purposes. The site is currently occupied by the Cookie Factory Outlet. Contamination at the site is generally attributed to the building's past use as a chemical blending and packaging operation.

2.1.2 Remedial History

Please see Section 1.1 of the Work Plan.

2.2 SCOPE OF WORK

As part of the Phase I site investigation, seven multi-level monitoring wells will be installed and developed. These new wells and 11 existing wells will be sampled. As part of Phase II, if necessary, eleven multi-level monitoring wells will be installed and developed. These new wells and existing wells will be sampled.

Details of the each field activity necessary to implement this work are presented in the FAP (Attachment A to the Work Plan).

2.2.1 Geophysical Survey

Prior to commencement of the sampling and well installation, Earth Tech's drilling subcontractor will notify the New York State One Call Utility for utility clearance.

2.2.2 Monitoring Well Installation

Seven multi-level monitoring wells will be installed as part of Phase I and eleven multi-level monitoring wells will be installed as part of Phase II in the vicinity of the site. The wells will be installed by a drilling subcontractor and multi-level well provider with a representative from Earth Tech present.

2.2.3 Site Restoration

Upon completion of monitoring well installation, an Earth Tech' subcontractor will repair the ground surface to restore the work area to its previous conditions.

2.2.4 Monitoring Well Development

Each permanent well will be developed in accordance with NYSDEC protocols. A minimum of 8 hours will be allowed to pass before development occurs. Well development will be performed by a licensed well driller. The groundwater sampling will be performed no sooner than two weeks after well development.

2.2.5 Groundwater Sampling

Approximately 14 days after the installation of the two monitoring wells, Earth Tech will sample the new and existing wells. Groundwater samples will be collected as described in the Field Activities Plan.

2.2.6 Additional Work Operations

The following additional tasks will also be performed as necessary in support of planned site activities: Refer to Appendix 2 for the associated THA.

Mobilization/Demobilization: Mobilization and demobilization represent limited pre- and post-task activities.

Utilities Identification: Various forms of aboveground/underground utility lines or pipes may be encountered during subsurface soil vapor sampling. Prior to the start of invasive site operations, all utilities must be located with the New York One Call System. Should intrusive operations come into contact with utility lines, the Site Safety Officer and the Safety Professional, defined in **Section 3.0**, will be notified immediately. Work will be suspended until the [NY] Underground Plant Protection Service is contacted and the appropriate actions for the particular situations can be taken.

Investigative-Derived Waste (IDW) Management: Soil cuttings and purge water shall be staged in appropriate containers and analyzed to determine the appropriate disposal methods. Based on the analytical results Earth Tech will dispose of the IDW at a NYSDEC approved disposal facility.

3.0 PROJECT HEALTH AND SAFETY ORGANIZATION

3.1 PROJECT MANAGER – PAUL KARETH

The Project Manager (PM) has overall management authority and responsibility for all site operations, including safety. The specific safety responsibilities for the PM are listed in Section 2.2 of SH&E 002, *Operational SH&E Structure and Responsibilities*. The PM will provide the site supervisor with work plans, staff, and budgetary resources, which are appropriate to meet the safety needs of the project operations.

3.2 SAFETY PROFESSIONAL – ROBERT POLL, CIH, CSP

The Safety Professional is the member of the Earth Tech Safety, Health and Environmental Department assigned to oversee health and safety requirements for the project and provide any needed technical support. The Safety Professional will be the first point-of-contact for all of the project's health and safety matters. He, or his designee, will have the responsibility for approval of the project health and safety plan, and tracking of its implementation. He will also verify that on-site subcontractors either have their own (acceptable) HASP; or confirm in writing that the subcontractors will abide by the provisions of the Earth Tech HASP.

3.3 SITE SUPERVISOR – KEVIN SEISE

The site supervisor has the overall responsibility and authority to direct work operations at the job site according to the provided work plans. The PM may act as the site supervisor while on site.

3.3.1 Responsibilities

The site supervisor is responsible to:

- Discuss deviations from the work plan with the SSO and PM.
- Discuss safety issues with the PM, SSO, and field personnel.
- Assist the SSO with the development and implementation of corrective actions for site safety deficiencies.
- Assist the SSO with the implementation of this HASP and ensuring compliance.
- Assist the SSO with inspections of the site for compliance with this HASP and applicable SOPs.

3.3.2 Authority

The site supervisor has authority to:

- Verify that all operations are in compliance with the requirements of this HASP, and halt any activity that poses a potential hazard to personnel, property, or the environment.
- Temporarily suspend individuals from field activities for infractions against the HASP pending consideration by the SSO, the Safety Professional, and the PM.

3.3.3 Qualifications

In addition to being HAZWOPER-qualified, the SSHO has completed the 8-hour HAZWOPER Supervisor Training Course in accordance with 29 CFR 1910.120 (e)(4), has several years experience with health and safety at HAZWOPER sites, has participated in personal and work zone air monitoring programs at HAZWOPER sites.

3.4 SITE SAFETY OFFICER – CELESTE FOSTER

3.4.1 Responsibilities

The SSO is responsible to:

- Update the site-specific HASP to reflect changes in site conditions or the scope of work. HASP updates must be reviewed and approved by the Safety Professional.
- Be aware of changes in Earth Tech Safety Policy. Changes are posted on the Earth Tech Safety Website (see Section 1.3 of this HASP).
- Monitor the lost time incidence rate for this project and work toward improving it.
- Inspect the site for compliance with this HASP and the SOPs.
- Work with the site supervisor and PM to develop and implement corrective action plans to correct deficiencies discovered during site inspections. Deficiencies will be discussed with project management to determine appropriate corrective action(s).
- Contact the Safety Professional for technical advice regarding safety issues.
- Provide a means for employees to communicate safety issues to management in a discreet manner (i.e., suggestion box, etc.).
- Determine emergency evacuation routes, establishing and posting local emergency telephone numbers, and arranging emergency transportation.
- Ensure that all site personnel and visitors have received the proper training and medical clearance prior to entering the site.
- Establish any necessary controlled work areas (as designated in this HASP or other safety documentation).
- Discuss potential health and safety hazards with the Site Supervisor, the Safety Professional, and the PM.
- Select an alternate SSO by name and inform him/her of their duties, in the event that the SSO must leave or is absent from the site.

3.4.2 Authority

The SSO has authority to:

- Verify that all operations are in compliance with the requirements of this HASP.
- Issue a "Stop Work Order" under the conditions set forth in Section 4.7 of this HASP.
- Temporarily suspend individuals from field activities for infractions against the HASP pending consideration by the Safety Professional and the PM.

3.4.3 Qualifications

In addition to being HAZWOPER-qualified (see Section 4.1), the SSO is required to have completed the 8-hour HAZWOPER Supervisor Training Course in accordance with 29 CFR 1910.120 (e) (4).

3.5 EMPLOYEES

3.5.1 Employee Responsibilities

Responsibilities of employees associated with this project include, but are not limited to:

- Understanding and abiding by the policies and procedures specified in the HASP and other applicable safety policies, and clarifying those areas where understanding is incomplete.
- Providing feedback to health and safety management relating to omissions and modifications in the HASP or other safety policies.

- Notifying the SSO, in writing, of unsafe conditions and acts.

3.5.2 Employee Authority

The health and safety authority of each employee assigned to the site includes the following:

- The right to refuse to work and/or stop work authority when the employee feels that the work is unsafe (including subcontractors or team contractors), or where specified safety precautions are not adequate or fully understood.
- The right to refuse to work on any site or operation where the safety procedures specified in this HASP or other safety policies are not being followed.
- The right to contact the SSO or the Safety Professional at any time to discuss potential concerns.

3.6 SUBCONTRACTORS

The requirements for subcontractor selection and subcontractor safety responsibilities are outlined in SH&E 207, *Contractor and Subcontractor SH&E Requirements*. Each Earth Tech subcontractor is responsible for assigning specific work tasks to their employees. Each subcontractor's management will provide qualified employees and allocate sufficient time, materials, and equipment to safely complete assigned tasks. In particular, each subcontractor is responsible for equipping its personnel with any required personnel protective equipment (PPE).

Earth Tech considers each subcontractor to be an expert in all aspects of the work operations for which they are tasked to provide, and each subcontractor is responsible for compliance with the regulatory requirements that pertain to those services. Each subcontractor is expected to perform its operations in accordance with its own unique safety policies and procedures, in order to ensure that hazards associated with the performance of the work activities are properly controlled. Copies of any required safety documentation for a subcontractor's work activities will be provided to Earth Tech for review prior to the start of onsite activities, if required.

Hazards not listed in this HASP but known to any subcontractor, or known to be associated with a subcontractor's services, must be identified and addressed to the Earth Tech PM or the Site Supervisor prior to beginning work operations. The Site Supervisor or authorized representative has the authority to halt any subcontractor operations, and to remove any subcontractor or subcontractor employee from the site for failure to comply with established health and safety procedures or for operating in an unsafe manner.

3.7 VISITORS

Authorized visitors (e.g., client representatives, regulators, Earth Tech management staff, etc.) requiring entry to any work location on the Site will be briefed by the PM on the hazards present at that location. Visitors will be escorted at all times at the work location and will be responsible for compliance with their employer's health and safety policies. In addition, this HASP specifies the minimum acceptable qualifications, training and personal protective equipment which hare required for entry to any controlled work area; visitors must comply with these requirements at all times.

Unauthorized visitors, and visitors not meeting the specified qualifications, will not be permitted within established controlled work areas.

4.0 SAFETY PROGRAMS

4.1 HAZWOPER QUALIFICATIONS

Personnel performing work at the job site must be qualified as HAZWOPER workers (unless otherwise noted in specific THAs or by the SSO), and must meet the medical monitoring and training requirements specified in the following safety procedures:

- SH&E 202, *Safety Meetings*
- SH&E 115, *Hazard Communication Program*
- SH&E 114, *Safety Training Programs*
- SH&E 301, *Hazardous Waste Operations (HAZWOPER)*
- SH&E 108, *SH&E Medical Monitoring and Surveillance*

Personnel must have successfully completed training meeting the provisions established in 29 CFR 1910.120 (e) (2) and (e) (3) (40-hour initial training). As appropriate, personnel must also have completed annual refresher training in accordance with 29 CFR 1910.120 (e) (8); each person's most recent training course must have been completed within the previous 365 days. Personnel must also have completed a physical exam in accordance with the requirements of 29 CFR 1910.120 (f), where the medical evaluation includes a judgment of the employee's ability to use respiratory protective equipment and to participate in hazardous waste site activities. These requirements are further discussed in SH&E 301, *Hazardous Waste Operations (HAZWOPER)*.

If site monitoring procedures indicate that a possible exposure has occurred above the OSHA permissible exposure limit (PEL), employees may be required to receive supplemental medical testing to document specific to the particular materials present.

4.2 SITE-SPECIFIC SAFETY TRAINING

All personnel performing field activities at the site will be trained in accordance with SH&E 114, *Safety Training Programs*. For this project, training will include the requirements specified in the following:

1. SH&E 202, *Safety Meetings*
2. SH&E 115, *Hazard Communication Program*
3. SH&E 109, *Hearing Conservation*
4. SH&E 113, *Personal Protective Equipment*
5. SH&E 116, *Driver and Vehicle Safety*
6. SH&E 204, *Task Hazard Analyses*
7. SH&E 205, *Emergency Action Planning and Prevention*

For this project, the training required to perform work includes:

1. HAZWOPER 40-hour and current 8-hour refresher,
2. Hearing Conservation,
3. First Aid/CPR training (at least one person on site).

In addition to the general health and safety training programs, personnel will be:

- Instructed on the contents of applicable portions of this HASP and any supplemental health and safety information developed for the tasks to be performed.
- Informed about the potential routes of exposure, protective clothing, precautionary measures, and symptoms or signs of chemical exposure and heat stress.
- Made aware of task-specific physical hazards and other hazards that may be encountered during site work. This includes any client-specific required training for health and safety.
- Made aware of fire prevention measures, fire extinguishing methods, and evacuation procedures.

The site-specific training will be performed prior to the worker performing the subject task or handling the impacted materials and on an as-needed basis thereafter. Training will be conducted by the SSO (or his/her designee) and will be documented on the form attached to SH&E 202, *Safety Meetings*.

4.2.1 Competent-Person Training Requirements

No OSHA-designated competent persons will be required for this project.

4.3 HAZARD COMMUNICATION

Section 5.2 provides information concerning the materials that may be encountered as environmental contaminants during the work activities. In addition, any organization wishing to bring any hazardous material onto any Earth Tech-controlled work site must first provide a copy of the item's Material Safety Data Sheet (MSDS) to the SSO for approval and filing (the SSO will maintain copies of all MSDSs on site). MSDSs may not be available for locally-obtained products, in which case some alternate form of product hazard documentation will be acceptable. In accordance with the requirements of SH&E 115, *Hazard Communication Program*, all personnel shall be briefed on the hazards of any chemical product they use, and shall be aware of and have access to all MSDSs.

All containers [if any] on site shall be properly labeled to indicate their contents. Labeling on any containers not intended for single-day, individual use shall contain additional information indicating potential health and safety hazards (flammability, reactivity, etc.).

Appendix 3 provides copies of MSDS for those items planned to be brought on site at the time this HASP is prepared. This information will be updated as required during site operations.

4.4 CONFINED SPACE ENTRY

No confined space entry is expected for this project. Should confined space entry be required, the following information will apply: The SSO/site supervisor shall identify all potential confined spaces in accordance with SH&E 118, *Confined Space Entry Program*. In addition, the SSO/site supervisor will inform all employees of the location of confined spaces. Confined space entry procedures and training requirements are listed in SH&E 118.

4.5 HAZARDOUS, SOLID, OR MUNICIPAL WASTE

If hazardous, solid, and/or municipal wastes are generated during any phase of the project, the waste shall be accumulated, labeled, and disposed of in accordance with applicable Federal, State, and/or local regulations.

4.6 GENERAL SAFETY RULES

All site personnel shall adhere to SH&E 201, *General Safety Rules*, during site operations. In addition, the housekeeping, sanitation, and personal hygiene requirements in SH&E 208, *General Housekeeping, Hygiene, and Sanitation* will observed. Specific excerpts from SH&E 208 are listed below.

4.6.1 Housekeeping

During site activities, work areas will be continuously policed for identification of excess trash and unnecessary debris. Excess debris and trash will be collected and stored in an appropriate container (e.g., plastic trash bags, garbage can, roll-off bin) prior to disposal. At no time will debris or trash be intermingled with waste PPE or contaminated materials.

4.6.2 Smoking, Eating, or Drinking

Smoking, eating and drinking will not be permitted inside any controlled work area at any time. Field workers will first wash hands and face immediately after leaving controlled work areas (and always prior to eating or drinking). Consumption of alcoholic beverages is prohibited at any Earth Tech site.

4.6.3 Buddy System

All field personnel will use the buddy system when working within any controlled work area. Personnel belonging to another organization on site can serve as "buddies" for Earth Tech personnel. Under no circumstances will any employee be present alone in a controlled work area.

4.6.4 Heat and Cold Stress

Heat and cold stress may vary based upon work activities, PPE/clothing selection, geographical locations, and weather conditions. To reduce the potential of developing heat/cold stress, be aware of the signs and symptoms of heat/cold stress and watch fellow employees for signs of heat/cold stress. For additional requirements, refer to SH&E 124, *Heat Stress Prevention Program*.

Heat stress can be a significant field site hazard, particularly for non-acclimated personnel operating in a hot, humid setting. Site personnel will be instructed in the identification of a heat stress victim, the first-aid treatment procedures for the victim and the prevention of heat stress casualties. Work-rest cycles will be determined and the appropriate measures taken to prevent heat stress as outlined in SH&E 124, *Heat Stress Prevention Program*.

Responding to Heat-Related Illness

The guidance below will be used in identifying and treating heat-related illness.

Table 4-1: Identification and Treatment of Heat-Related Illness

Type of Heat-Related Illness	Description	First Aid
Mild Heat Strain	The mildest form of heat-related illness. Victims exhibit irritability, lethargy, and significant sweating. The victim may complain of headache or nausea. This is the initial stage of overheating, and prompt action at this point may prevent more severe heat-related illness from occurring.	Provide the victim with a work break during which he/she may relax, remove any excess protective clothing, and drink cool fluids. If an air-conditioned spot is available, this is an ideal break location. Once the victim shows improvement, he/she may resume working; however, the work pace should be moderated to prevent recurrence of the symptoms.
Heat Exhaustion	Usually begins with muscular weakness and cramping, dizziness, staggering gait, and nausea. The victim will have pale, clammy moist skin and may perspire profusely. The pulse is weak and fast and the victim may faint unless they lie down. The bowels may move involuntarily.	Immediately remove the victim from the work area to a shady or cool area with good air circulation (avoid drafts or sudden chilling). Remove all protective outerwear. Call a physician. Treat the victim for shock. (Make the victim lie down, raise his or her feet 6–12 inches, and keep him or her cool by loosening all clothing). If the victim is conscious, it may be helpful to give him or her sips of water. Transport victim to a medical facility as soon as possible.

Type of Heat-Related Illness	Description	First Aid
Heat Stroke	The most serious of heat illness, heat stroke represents the collapse of the body's cooling mechanisms. As a result, body temperature may rise to 104 degrees Fahrenheit or higher. As the victim progresses toward heat stroke, symptoms such as headache, dizziness, nausea can be noted, and the skin is observed to be dry, red, and hot. Sudden collapse and loss of consciousness follows quickly and death is imminent if exposure continues. Heat stroke can occur suddenly.	Immediately evacuate the victim to a cool and shady area. Remove all protective outerwear and as much personal clothing as decency permits. Lay the victim on his or her back with the feet slightly elevated. Apply cold wet towels or ice bags to the head, armpits, and thighs. Sponge off the bare skin with cool water or rubbing alcohol, if available. The main objective is to cool without chilling the victim. Give no stimulants or hot drinks. Since heat stroke is a severe medical condition requiring professional medical attention, emergency medical help should be summoned immediately to provide onsite treatment of the victim and proper transport to a medical facility.

Solar Protection

To protect against exposure to solar radiation, workers will observe the following requirements:

1. All workers will wear sunglass-type safety glasses at all times when working outdoors during daylight hours.
2. Workers will utilize a commercial sunblock with a minimum solar protection factor (SPF) of 15.

4.7 USE OF UTILITY KNIVES OR OTHER OPEN-BLADED CUTTING TOOLS

All utility knives with manually retracting blades (including "pocket knives" and other "collapsible, open-blade cutting tools") are no longer permitted on any Earth Tech jobsite, unless specifically authorized on a task-specific basis in this HASP and associated THA. The only acceptable type of utility knife will be those with automatically retracting blades. Other "cutters" must be equipped with a completely enclosed and guarded blade. Additional recommendations regarding the use of cutting tools can be found in SH&E 506, *Manual Hand Tools*.

4.8 STOP WORK AUTHORITY

All employees have the right and duty to stop work when conditions are unsafe, and to assist in correcting these conditions. Whenever the SSO determines that workplace conditions present an uncontrolled risk of injury or illness to employees, immediate resolution with the appropriate supervisor shall be sought. Should the supervisor be unable or unwilling to correct the unsafe conditions, the SSO is authorized and

required to stop work, which shall be immediately binding on all affected Earth Tech employees and subcontractors.

Upon issuing the stop work order, the SSO shall implement corrective actions so that operations may be safely resumed. Resumption of safe operations is the primary objective; however, operations shall not resume until the Safety Professional has concurred that workplace conditions meet acceptable safety standards.

4.9 CLIENT SPECIFIC SAFETY REQUIREMENTS

A community air monitoring plan is included as Appendix 4.

5.0 HAZARD ASSESSMENT

5.1 TASK HAZARD ANALYSIS

Task hazard analysis (THA) is a technique used to identify hazards and hazard controls associated with a specific job function. THAs focus on the relationship between the workers, the task, the resources required to complete the task, and the work environment. These variables must be evaluated to identify the potential hazards associated with the task. Once identified, steps can be taken to eliminate, reduce, or control the hazards to an acceptable risk level. Guidelines for developing THAs are located in SH&E 204, *Task Hazard Analyses*.

Section 2.2 describes the work activities anticipated to be performed during this project. Individual THAs for the tasks associated with this work can be found in Appendix 2.

5.1.1 Unanticipated Work Activities/Conditions

Operations at the site may require additional tasks not identified in Section 2.2 or addressed in Appendix 2 THAs. Before performing any task not covered in this HASP a THA must be prepared, and approved by the Safety Professional.

5.2 ENVIRONMENTAL CONTAMINANT EXPOSURE HAZARDS

The following is a discussion of the hazards presented to worker personnel during this project from on-site chemical hazards known or suspected to be present on site. Hazards associated with chemical products brought to the site during work operations are addressed separately, under the Hazard Communication process described in Section 4.3.

Exposure symptoms and applicable first aid information for each suspected site contaminant are listed in the MSDS sheets in Appendix 3.

5.2.1 Acetone

Acetone is a colorless liquid with a distinct smell and taste. Extremely flammable liquid with flashing point of 20 deg C. Acetone can causes irritation to eyes, skin, and respiratory tract. It also causes central nervous system depression. Acetone may cause liver and kidney damage. Toxic effects are enhanced by ethanol. It may cause irritation of the digestive tract. May cause central nervous system depression, kidney damage, and liver damage. Symptoms may include: headache, excitement, fatigue, nausea, vomiting, stupor, and coma. Prolonged or repeated skin contact may cause dermatitis. Chronic inhalation may cause effects similar to those of acute inhalation. The OSHA PEL and the ACGIH TLV are 1000 ppm and 500 ppm with ACGIH short-term exposure limit of 750 ppm.

5.2.2 Tetrachloroethene (PCE)

PCE affects the CNS, causing loss of coordination, headache, vertigo (loss of balance), light narcosis, dizziness, and unconsciousness. Death may occur if exposed to extremely high concentrations of PCE. Various irritable effects have been attributed to PCE exposure, including eye, nose, and throat irritation, indications of nausea and intestinal gas, and possible changes to the liver and kidneys. PCE is not known to produce harmful effects in cases of skin exposure where the PCE was allowed to evaporate immediately after contact. However, in cases where skin was exposed to PCE frequently and for prolonged periods without evaporating, symptoms of dermatitis by defatting of the skin was evident. The National Toxicology Program (NTP) lists PCE as an anticipated human carcinogen. The OSHA PEL and the ACGIH TLV are 25 ppm with an ACGIH short-term exposure limit (STEL) of 100 ppm.

5.2.3 Trichloroethene (TCE)

Moderate exposures to TCE cause symptoms similar to those of alcohol inebriation. Higher concentrations cause narcotic effects. Ventricular fibrillation has been cited as the cause of death following heavy exposures. TCE-induced hepatocellular carcinomas have been detected in mice during tests conducted by the National Cancer Institute. Organ systems affected by overexposure to TCE are the CNS (euphoria, analgesia, and anesthesia), degeneration of the liver and kidneys, the lungs (tachypnea), heart (arrhythmia) and skin (irritation, vesication, and paralysis of fingers when immersed in liquid TCE). Contact with the liquid defats the skin, causing topical dermatitis. Certain people appear to experience synergistic effects from TCE exposure concomitant with exposure to caffeine, alcohol, and other drugs. Other reported symptoms of TCE exposure include abnormal fatigue, headache, irritability, gastric disturbances, and intolerance to alcohol. Both the OSHA PEL and the ACGIH STEL are 100 ppm, and the ACGIH TLV is 50 ppm.

5.2.4 1,1,1-Trichloroethane (TCA)

TCA (also known as methyl chloroform) exhibits low oral toxicity. It can defat the exposed skin of workers and cause redness and scaling. Although TCA has a low systemic toxicity, it is an anesthetic capable of causing death if inhaled at concentrations of 14,000 ppm to 15,000 ppm. Fatalities that have occurred in poorly ventilated areas (e.g., pits or tanks) are attributed to anesthesia or sensitization of the myocardium to epinephrine. Quick and complete recovery is reported upon prompt removal of unconscious exposed persons from the area of exposure. The exposure standards are set to prevent initial anesthetic effects or objections to the odor. Both the OSHA PEL and the ACGIH TLV are 350 ppm, and the OSHA and ACGIH STEL are 450 ppm.

5.2.5 Toluene

Exposure to vapors of toluene may cause irritation of the eyes, nose, upper respiratory tract, and skin. Exposure to 200 ppm for 8 hours causes mild fatigue, weakness, confusion, tearing, and a sensation of prickling, tingling, or creeping on the skin that has no objective cause. Exposure to higher concentrations may cause headache, nausea, dizziness, dilated pupils, and euphoria, and in severe cases may cause unconsciousness and death. The liquid is irritating to the eyes and the skin. Contact with the eyes may cause transient corneal damage, conjunctival irritation, and burns if not promptly removed. Repeated or prolonged contact with the skin may cause drying and cracking. Toluene may be absorbed through the skin in toxic amounts. Ingestion causes irritation of the gastrointestinal tract and may cause effects resembling those from inhalation of the vapor. Chronic overexposure to toluene may cause irreversible liver and kidney injury. The OSHA PEL is 200 ppm; the ACGIH TLV is 50 ppm.

5.2.6 Xylene

Liquid xylene is a skin irritant and causes itching, dryness, and defatting; prolonged contact may cause blistering. Inhaling xylenes can depress the CNS, and ingesting it can result in gastrointestinal disturbance and possibly hematemesis (vomiting blood). Effects on the eyes, kidneys, liver, lungs, and the CNS are also reported. Both the OSHA PEL and ACGIH TLV are 100 ppm.

5.2.7 Diesel Exhaust

When diesel fuel burns in an engine, the resulting exhaust is made up of soot and gases representing thousands of different chemical substances. 90 percent of the soot consists of particles that can be inhaled and deposited in the lungs. These particles may carry absorbed polynuclear aromatic hydrocarbons. The gases in diesel exhaust can also create health problems include:

- nitrous oxide
- nitrogen dioxide
- formaldehyde

- benzene
- sulfur dioxide
- hydrogen sulfide
- carbon dioxide
- carbon monoxide

Short-term symptoms of diesel exhaust exposure may include: irritation of the eyes, nose and throat, lightheadedness, and headaches. Chronic effects of exposure to diesel exhaust possibly include cancer.

5.3 ASSESSMENT OF EXPOSURE HAZARDS

Inhalation – No significant airborne concentration of contaminants is expected at the site, hence air monitoring is not required at the site.

Skin Contact – Drilling and other activities can produce contaminated wastes possessing significant concentrations of contaminants. This material can cause exposures to unprotected skin; therefore all handling of potentially contaminated materials will require the use of appropriate skin protection.

Ingestion – Protection against exposure via ingestion can be accomplished by performance of proper decontamination procedures when exiting contaminated work areas (see Section 8.2).

5.4 PHYSICAL HAZARDS

Physical hazards anticipated on this site include: heat or cold stress environments, which may be associated with site-specific work activities, PPE usage and geographical project locations. Site work may include: heavy lifting 49 lb. Rule, slips/trips/falls, protruding objects, hazardous noise, poor lighting in basements, severe weather, flying debris from drilling/hammering, and possibly confined spaces.

5.5 RADIOLOGICAL HAZARDS

No radioactive materials are known or suspected to be present on site.

6.0 ACTIVITY SPECIFIC REQUIREMENTS

6.1 SUPPLEMENTAL SAFETY PROCEDURES

As discussed in Section 5.0, personnel may be exposed to a variety of chemical, physical, radiological, and biological hazards resulting from task- or equipment-specific activities. The requirements for the control of many of these hazards are discussed in SOPs found in the 400 and 500 Series of the Consolidated Safety, Health, and Environmental Manual.

Specific procedures applicable to this project include:

- SH&E 403 – Hammer Drilling
- SH&E 404 - Manual Lifting
- SH&E 506 - Manual Hand Tools

In addition, the following supplemental procedures have been developed to address requirements not covered within the established Earth Tech SOPs (SH&E 400/500-series). SOPs and supplemental procedures are specified on a task-specific basis in the individual THAs found in Appendix 2.

6.1.1 Biological Hazards

Contact with animals, insects, and plants can cause injury and illness to personnel. Care must be taken to ensure that these types of injuries are avoided. Some examples of biological hazards include:

1. Wild animals, such as snakes, raccoons, squirrels, and rats. These animals not only can bite and scratch, but can carry transmittable diseases (e.g., rabies). Avoid the animals whenever possible. If bitten, go to the nearest medical facility.
2. Insects such as mosquitoes, ticks, bees, and wasps. Mosquitoes can potentially carry and transmit the West Nile Virus. Ticks can transmit Lyme disease or Rocky Mountain Spotted Fever. Bees and wasps can sting by injecting venom, which causes some individuals to experience anaphylactic shock (extreme allergic reaction). Whenever you will enter areas that provide a habitat for insects (e.g., grass areas, woods), wear light-colored clothing, long pants and shirt, and spray exposed skin areas with a DEET-containing repellent. Keep away from high grass wherever possible. Keep your eyes and ears open for bee and wasp nests. If bitten by insects, see a doctor if there is any question of an allergic reaction.
3. Plants such as poison ivy and poison oak can cause severe rashes on exposed skin. Be careful where you walk, wear long pants, and minimize touching exposed skin with your hands after walking through thickly vegetated areas until after you have thoroughly washed your hands with soap and water.

- SH&E 607, *Biohazards*
- SH&E 608, Blood-borne Pathogens

6.1.2 Vehicle Operations

Site vehicles present serious hazards to site personnel. Blind spots, failure to yield, and other situations may cause vehicles to come into contact with personnel. To reduce the possibility of contact between equipment/traffic and personnel, always adhere to the following:

- Personnel must wear a high visibility, reflective safety vest at all times when working near heavy equipment and/or other vehicle traffic.
- Personnel must always yield to equipment/vehicle traffic and stay at least 100 feet away from all equipment/vehicle traffic. Always maintain eye contact with operators.

- When feasible, place barriers between work areas and equipment/vehicle traffic.
- Always ensure reverse warning alarms are working and louder than surrounding noise. Personnel must report inoperative reverse warning alarms IMMEDIATELY.

6.1.3 Manual Lifting

Most materials associated with investigation and remedial activities are moved by hand. The human body is subject to severe damage in the forms of back injury, muscle strains, and hernia if caution is not observed in the handling process. Whenever possible, use at least two people to lift, or roll/lift with your arms as close to the body as possible. Under no circumstances should any one person lift more than 49 pounds unassisted. For additional requirements refer to SH&E - 404, *Manual Lifting*.

6.1.4 Utilities

Various forms of underground/overhead utility lines or pipes may be encountered during site activities. Prior to the start of intrusive operations, utility clearance is mandated, as well as obtaining authorization from all concerned public utility department offices. Should intrusive operations cause equipment to come into contact with utility lines, the SSO and an Earth Tech SH&E Professional will be notified immediately. Work will be suspended until the applicable utility agency is contacted and the appropriate actions for the particular situations can be taken. For this site, the applicable agency is NYC One Call. The phone number is provided in the Emergency Contacts list found in Section 8. For additional requirements, refer to SH&E 402, *Excavation & Trenching*; SH&E 403, *Hammer Drilling*; and SH&E 310, *Overhead Electrical Lines*.

6.1.5 Slips, Trips, Falls, and Protruding Objects

A variety of conditions may exist that may result in injury from slips, trips, falls, and protruding objects. Slips and trips may occur as a result of wet, slippery, or uneven walking surfaces. To prevent injuries from slips and trips, always keep work areas clean; keep walkways free of objects and debris; and report/clean up liquid spills. Serious injuries may occur as a result of falls from elevated heights. Always wear fall protection while working at heights of 6 feet or greater above the next lower level. Protruding objects are any object that extends into the path of travel or working area that may cause injury when contacted by personnel. Always be aware of protruding objects and when feasible remove or label the protruding object with an appropriate warning.

6.1.6 Electrical and Powered Equipment

Electrical and powered equipment may be used during a variety of site activities. Injuries associated with electrical and powered equipment include electric shock, cuts/lacerations, eye damage (from flying debris), and burns. To reduce the potential of injury from the hazards associated with electrical and powered equipment, always comply with the following:

- Wear ANSI-approved (Z87.1) safety glasses. Faceshields may be required to provide additional face protection from flying debris.
- Wear appropriate work gloves. Work gloves may reduce the severity of burns and cuts/lacerations.
- Use ground fault circuit interrupters (GFCIs) when using electrical powered tools/equipment. GFCIs prevent electrical shock by detecting the loss of electricity from a power cord and/or electrical device.
- Use lockout/tagout procedures when performing maintenance or repairs on equipment.

6.1.7 Noise

Hazardous noise may be produced during site activities by heavy equipment, powered tools, and other equipment or operations. Refer to SH&E 109, *Hearing Conservation Program* for requirements regarding hazardous noise and hearing protection.

7.0 PERSONAL PROTECTIVE EQUIPMENT

7.1 PERSONAL PROTECTIVE EQUIPMENT

The purpose of personal protective equipment (PPE) is to provide a barrier, which will shield or isolate individuals from the chemical and/or physical hazards that may be encountered during work activities. SH&E 113, *Personal Protective Equipment (PPE)*, lists the general requirements for selection and usage of PPE. Table 7-1 lists the minimum PPE required during site operations and additional PPE that may be necessary. The specific PPE requirements for each work task are specified in the individual THAs found in Appendix 2.

By signing this HASP you are agreeing that you have been properly trained in the use, limitations, care and maintenance of the protective equipment you will use at this project. If you have not received training on the proper use, care, and, limitations of the PPE required for this project, please see the PM/SSO for the proper training prior to signing this HASP.

Table 7-1: Personal Protective Equipment

TYPE	MATERIAL	ADDITIONAL INFORMATION
Minimum PPE:		
Safety Vest	High-visibility	Must have reflective tape and be visible from all sides
Boots	Leather	ANSI approved safety toe
Safety Glasses		ANSI Approved
Hard Hat		ANSI Approved
Work Uniform		No shorts/cutoff jeans or sleeveless shirts
Additional PPE:		
Hearing Protection	Ear plugs and/ or muffs	In hazardous noise areas
Leather Gloves		If working with sharp objects or powered equipment.
Protective Chemical Boots		Required for any potential exposure to free product.

7.2 DECONTAMINATION

All requirements for performing personal and equipment decontamination may be found in SH&E 604, *Decontaminatio*n.

7.3 PPE DOFFING AND DONNING INFORMATION

The following information is to provide field personnel with helpful hints that, when applied, make donning and doffing of PPE a more safe and manageable task:

- Never cut disposable booties from your feet with basic utility knives. This has resulted in workers cutting through the booty and the underlying sturdy leather work boot, resulting in significant cuts to the legs/ankles. Recommend using a pair of scissors or a package/letter opener (cut above and parallel with the work boot) to start a cut in the edge of the booty, then proceed by manually tearing the material down to the sole of the booty for easy removal.

- When applying duct tape to PPE interfaces (wrist, lower leg etc.) and zippers, leave approximately one inch at the end of the tape to fold over onto itself. This will make it much easier to remove the tape by providing a small handle to grab while still wearing gloves. Without this fold, trying to pull up the tape end with multiple gloves on may be difficult and result in premature tearing of the PPE.
- Have a "buddy" check your ensemble to ensure proper donning before entering controlled work areas. Without mirrors, the most obvious discrepancies can go unnoticed and may result in a potential exposure situation.
- Never perform personal decontamination with a pressure washer.

Table 7-2: Action Levels During Environmental Services

Parameter	Location and Interval	Response Level (meter units/ppm above background)	Response
Hydrocarbons (Total by PID)	Workers breathing zone immediately after drilling the hole for sub-slab sampling.	≤ 10 ppm	Continue Level D or Modified Level D work and continue monitoring.
		>10 ppm – 100 ppm	Upgrade to Level C PPE (minimum full-face APR with GMA cartridges or equivalent). Continue environmental monitoring.
		≥ 100 ppm	Cease work, exit the area, contact the SSO or SH&E Manager for guidance.

8.0 SITE CONTROL

8.1 GENERAL

The purpose of site control is to minimize potential contamination of workers, protect the public from site hazards, and prevent vandalism. The degree of site control necessary depends on the site characteristics, site size, and the surrounding community.

Controlled work areas will be established at each work location, and if required, will be established directly prior to the work being conducted. Diagrams designating specific controlled work areas will be drawn on site maps, posted in the support vehicle or trailer and discussed during the daily safety meetings. If the site layout changes, the new areas and their potential hazards will be discussed immediately after the changes are made.

8.2 CONTROLLED WORK AREAS

Each HAZWOPER controlled work area will consist of the following zone:

- Exclusion Zone: Contaminated work area.

8.2.1 Exclusion Zone

The Exclusion Zone is the area where primary activities occur, such as sampling, and cleanup work. This area must be clearly marked with hazard tape, barricades or cones, or enclosed by fences or ropes. Only personnel involved in work activities, and meeting the requirements specified in the applicable THA and Sections 4.1 and 4.2, will be allowed in an Exclusion Zone.

The extent of each area will be sufficient to ensure that personnel located at/beyond its boundaries will not be affected in any substantial way by hazards associated with sample collection activities. To meet this requirement, the following minimum distances will be used:

- **Hammer Drilling**. A distance of 10 feet will be cleared in all directions from the sampling location in order to accommodate additional sampling equipment.

All personnel should be alert to prevent unauthorized, accidental entrance into controlled-access areas (the Exclusion Zone and CRZ). If such an entry should occur, the trespasser should be immediately escorted outside the area, or all HAZWOPER-related work must cease. All personnel, equipment, and supplies that enter controlled-access areas must be decontaminated or containerized as waste prior to leaving (through the CRZ only).

8.3 SITE ACCESS DOCUMENTATION

If implemented by the PM, all personnel entering the site shall complete the "Site Entry/Exit Log" located at the site trailer or primary site support vehicle.

8.3.1 Visitor Access

Visitors to any HAZWOPER controlled-work area must comply with the health and safety requirements of this HASP, and demonstrate an acceptable need for entry into the work area. All visitors desiring to enter any controlled work area must observe the following procedures:

1. A written confirmation must be received by Earth Tech documenting that each of the visitors has received the proper training and medical monitoring required by this HASP. Verbal confirmation can be considered acceptable provided such confirmation is made by an officer or other authorized representative of the visitor's organization.
2. Each visitor will be briefed on the hazards associated with the site activities being performed and acknowledge receipt of this briefing by signing the appropriate tailgate safety briefing form.

3. All visitors must be escorted by an Earth Tech employee.

If the site visitor requires entry to any Exclusion Zone, but does not comply with the above requirements, all work activities within the Exclusion Zone must be suspended. Until these requirements have been met, entry will not be permitted.

8.4 SITE SECURITY

Site security is necessary to:

1. Prevent the exposure of unauthorized, unprotected people to site hazards.
2. Avoid the increased hazards from vandals or persons seeking to abandon other wastes on the site.
3. Prevent theft.
4. Avoid interference with safe working procedures.

To maintain site security during working hours:

1. Maintain security in the Support Zone and at access control points.
2. Establish an identification system to identify authorized persons and limitations to their approved activities.
3. Assign responsibility for enforcing authority for entry and exit requirements.
4. When feasible, install fencing or other physical barrier around the site.
5. If the site is not fenced, post signs around the perimeter and whenever possible, use guards to patrol the perimeter. Guards must be fully apprised of the hazards involved and trained in emergency procedures.
6. Have the PM approve all visitors to the site. Make sure they have valid purpose for entering the site. Have trained site personnel accompany visitors at all times and provide them with the appropriate protective equipment.

To maintain site security during off-duty hours:

1. If possible, assign trained, in-house technicians for site surveillance. They will be familiar with the site, the nature of the work, the site's hazards, and respiratory protection techniques.
2. If necessary, use security guards to patrol the site boundary. Such personnel may be less expensive than trained technicians, but will be more difficult to train in safety procedures and will be less confident in reacting to problems around hazardous substances.
3. Enlist public enforcement agencies, such as the local police department, if the site presents a significant risk to local health and safety.
4. Secure the equipment.

9.0 EMERGENCY RESPONSE PLANNING

9.1 EMERGENCY ACTION PLAN

Although the potential for an emergency to occur is remote, an emergency action plan has been prepared for this project should such critical situations arise. The only significant type of onsite emergency that may occur is physical injury or illness to a member of the Earth Tech team. The Emergency Action Plan (EAP) will be reviewed by all personnel prior to the start of field activities. A test of the EAP will be performed within the first three (3) days of the project field operations. This test will be evaluated and documented in the project records.

Three major categories of emergencies could occur during site operations:

1. Illnesses and physical injuries (including injury-causing chemical exposure)
2. Catastrophic events (fire, explosion, earthquake, or chemical)
3. Safety equipment problems

9.1.1 Emergency Response Coordinator

Prior to beginning site activities, the PM will complete Table 9-2 by filling in the names of the Emergency Coordinator (EC) and the alternate EC. The duties of the EC and the alternate EC have been specified in SH&E 003.

9.1.2 Site-Specific Emergency Procedures

Prior to the start of site operations, the EC will complete Table 9-1 with any site-specific information regarding evacuations, muster points, communication, and other site-specific emergency procedures.

Table 9-1: Emergency Planning (To be completed by SSO prior to start of site operations at safety orientation/initial briefing)

Emergency	Evacuation Route	Muster Location
Fire/Explosion	• TBD	• TBD
Tornado	• TBD	• TBD
Lightning	• TBD	• Vehicle
Additional Information		
Communication Procedures	Verbal: cell phones as necessary	
CPR/First Aid Trained Personnel	TBD	

9.1.3 Accident/Incident Reporting

All accidents and incidents that occur on-site during any field activity will be promptly reported to the SSO and the Site Supervisor in accordance with SH&E 101, *Injury, Illness, and Near-Miss Reporting*, or the appropriate District-level incident reporting procedures (i.e., Near-Miss Reporting Program).

If any Earth Tech employee is injured and requires medical treatment, the Site Supervisor will contact **Earth Tech's Incident Reporting Line at (800) 348-5046 immediately**. The Site Supervisor will initiate a written report, using the ***Supervisor's Report of Incident*** form (see SH&E 101). The Site Supervisor will complete the first two sections of this form and forward to the PM for completion of

Section 3. The report will then be provided to the Safety Professional before the end of the following shift.

If any employee of a subcontractor is injured, documentation of the incident will be accomplished in accordance with the subcontractor's procedures; however, copies of all documentation (which at a minimum must include the OSHA Form 301 or equivalent) must be provided to the SSO within 24 hours after the accident has occurred.

All accidents/incidents will be investigated in accordance with SH&E 102, *Incident Investigation & Review*. Copies of all subcontractor accident investigations, whether accomplished in accordance with their own procedures or SH&E 102, will be provided to the SSO within five (5) days of the accident/incident.

Table 9-2 Emergency Contact Information

Emergency Coordinators / Key Personnel			
Name	**Title/Workstation**	**Telephone Number**	**Mobile Phone**
Incident Reporting	Incident Reporting Line	(800) 348-5046	
Brian Jankouskas	NYSDEC Project Manager/ Client Contact	(518) 402-9626 (Office)	
Paul Kareth	Project Manager	(973) 337-4215 (Office)	
?	Site Supervisor/SSHO	? (Office)	?
Robert Poll, CIH	Safety and Health Manager	(518) 951-2200 (Office)	(518) 817-3089
Mike Thiagaram	Primary Emergency Coordinator	(973) 337-4242 (Office)	

Organization / Agency	
Name	**Telephone Number**
Police Department (local)	911
Fire Department (local)	911
State Police	911
Ambulance Service ***(EMT will determine appropriate hospital for treatment)***	911
Non-Emergency Hospital ***(Use by site personnel is only for non-emergency cases)***	
Poison Control Center	(800) 222-1222
Pollution Emergency	(800) 292-4706
National Response Center	(800) 424-8802
Chem-Tel	(800) 424-9300
Title 3 Hotline	(800) 535-0202

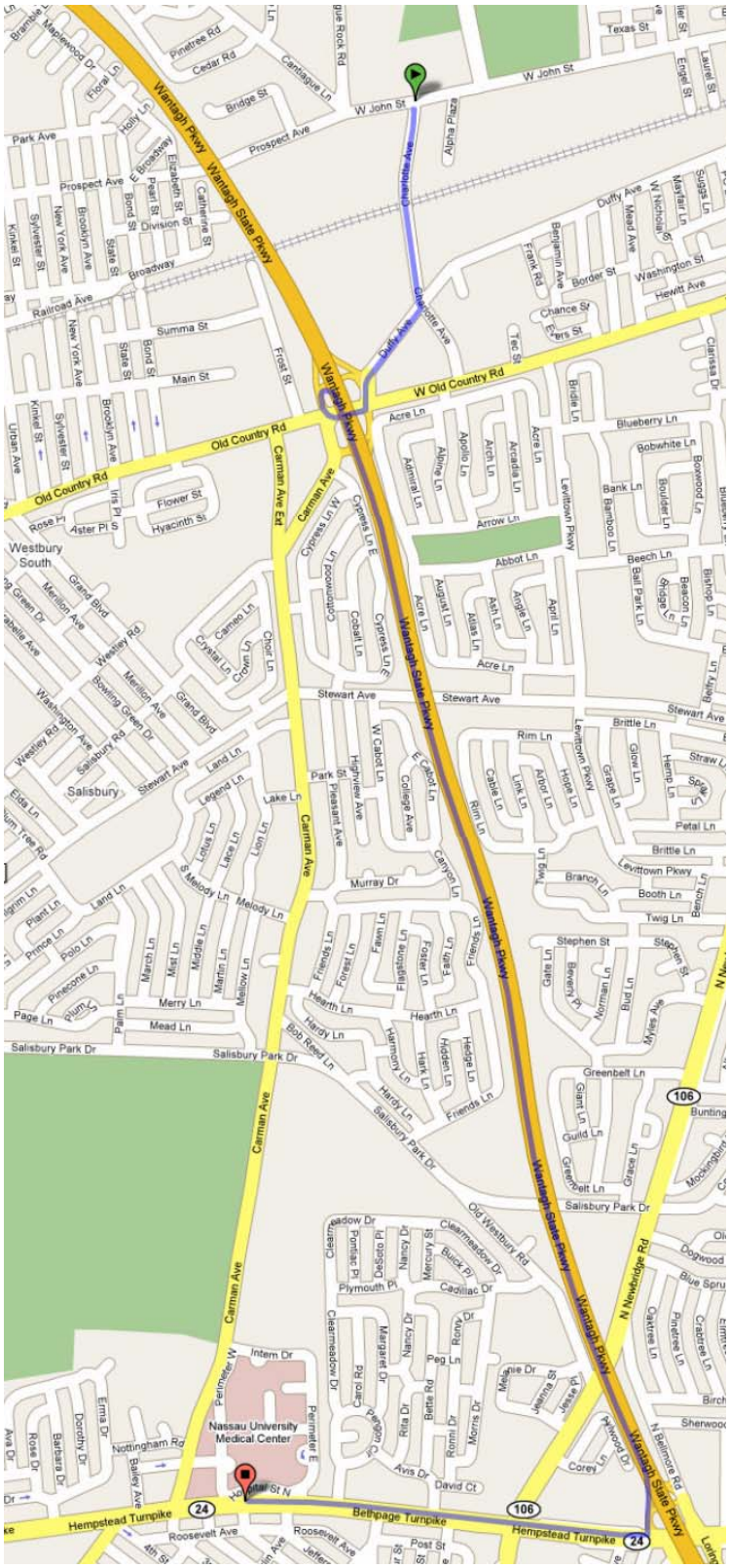
10.0 PERSONNEL ACKNOWLEDGEMENT

By signing below, the undersigned acknowledges that he/she has read and reviewed the Earth Tech Health and Safety Plan for the Anchor Lith Kem Ko site. The undersigned also acknowledges that he/she has been instructed in the contents of this document and understands the information pertaining to the specified work, and will comply with the provisions contained therein.

PRINT NAME	SIGNATURE	ORGANIZATION	DATE

Figures

EarthTech A tyco International Ltd. Company	Project: Anchor Lith Kem Ko Site 500 West John Street Oyster Bay, NY 11801	Figure 1 – Site Location



Directions to:
Nassau University Medical Center
2201 Hempstead Turnpike
East Meadow, NY 11554
Telephone: (516) 572 0123

500 W John St
Hicksville, NY 11801

1. Head east on W John St toward Charlotte Ave 7 ft
2. Turn right at Charlotte Ave 0.4 mi
3. Turn right at Duffy Ave 0.2 mi
4. Turn right at Old Country Rd 328 ft
5. Take the ramp onto Wantagh Pkwy S/Wantagh State Pkwy 2.3 mi
6. Take exit W3 W for RT-24 W toward Hempstead 0.1 mi
7. Turn right at Hempstead Turnpike/RT-24 W 0.8 mi

Nassau University Medical Center
2201 Hempstead Turnpike
East Meadow, NY 11554

Figure No: 2
Hospital Route Map

Appendix 1
Earth Tech Environmental, Health and Safety Manual

(Applicable Sections)

EarthTech A tyco International Ltd. Company **Safety, Health & Environmental Procedure**	PROCEDURE NO. SH&E 001 DATE March 22, 2004 REVISED December 29, 2006
SH&E Policy Statement	SIGNATURE: 

1.0 SCOPE

This policy applies to Earth Tech, Inc., and all its subsidiaries, affiliates and operating units.

2.0 INTENT

Earth Tech, Inc., and its subsidiaries, affiliates, and operating units (collectively, the "Company") are committed to protecting the safety and health of our employees, clients, contractors and vendors and to protecting and preserving the environment in which we operate. The Company will seek to conserve energy, water and raw materials and to recycle and reduce waste where appropriate. We will be good neighbors in our communities by ensuring that our facilities and operations do not pose unreasonable safety or environmental risks, and by participating in community-related activities that promote excellence in safety, health and environmental practices. In all our activities we will continuously strive to comply with applicable laws, legislation, licensing requirements and customer expectations. The Company will design its processes, facilities, and projects in a manner that focuses on eliminating unreasonable risks during their entire life cycle consistent with the direction and objectives of our clients.

3.0 MISSION STATEMENT/OBJECTIVES

Our goals are simple:

- ZERO work-related injuries or illnesses
- ZERO damage to property, and/or equipment from our activities
- ZERO adverse impact to the environment from our ongoing projects

4.0 STRATEGY

In order to achieve these goals each business unit manager will:

- Ensure that, at a minimum, they comply with all applicable safety, health and environmental rules and regulations at the local, state/provincial and national level. Additionally, management will ensure that specific client/customer requirements are followed. Where no specific rule or regulation exists, we will comply with appropriate accepted industry standards and practices
- Establish and implement Safety, Health & Environmental (SH&E) programs that meet or exceed the expectations outlined in this policy
- Report on performance relative to short- and long-term SH&E metrics designed to help achieve established goals

- Consult with, listen to, and respond to customers, employees and partners in order to continuously improve their SH&E performance
- Work with partners, suppliers, competitors and regulators to raise the SH&E standards of their industry
- Incorporate a “Zero Injury” and “Environmental Sustainability” philosophy into their design standards and project review processes
- Recognize those who contribute to their improved SH&E performance

More specifically, business unit management will develop and implement a safety, health and environmental management system that incorporates Earth Tech’s Core Safety Values and can demonstrate the following elements:

- **Leadership:** Individuals at all levels in the Earth Tech organization are responsible for leading and engaging our staff, contractors, suppliers and partners in meeting our goals and objectives. We will hold leaders accountable for demonstrating appropriate behavior, clearly defining roles and responsibilities, and providing necessary resources. We will also measure, review and expect continuous improvement in their overall SH&E performance.
- **Hazard Analysis:** We will employ proven techniques to assist in the recognition, evaluation and control of hazards at the project, task and activity level of our operations. We will take appropriate action to ensure that these hazards are communicated to our customers, staff and partners that may be impacted.
- **Compliance:** We will comply with applicable existing laws and regulations in all locations in which we operate. We will also strive to implement accepted industry-specific best management practices for our activities wherever we operate.
- **Training:** The skills and competencies of our staff are critical to Earth Tech's success. We will train our staff on the elements of our SH&E program and the functions we ask them to perform. We will regularly assess these skills and competencies and provide ongoing opportunities for our staff to increase their knowledge, improve their skills and enhance their performance.
- **Working with Others:** Contractors, suppliers, vendors, and business partners play an important role in our overall performance. We will work with them to ensure our overall SH&E objectives are met. We will monitor our contractors' and partners' performance to ensure they meet and/or exceed our expectations.
- **Design and Construction:** We will employ recognized standards, procedures and practices during the design and construction of all new and/or modified facilities. Our design, procurement, construction and commissioning processes will focus on delivering a safe and environmentally sustainable facility throughout the life cycle of the facility.
- **Operations and Maintenance:** We will operate and maintain all facilities and equipment in accordance with approved permits, plans, specifications and applicable safety, health, and environmental laws and regulations.
- **Change Management:** We will evaluate each change of organization, personnel, systems, procedures, equipment or materials to ensure safety, health and environmental risks are controlled and remain at an acceptable level.
- **Safety Performance Information:** We will maintain accurate safety, health and environmental performance information related to all of our operations.

- **Emergency Management:** Emergency management plans will be maintained for all our offices and facilities. The plans will identify equipment, procedures, training and personnel necessary in the event of an incident to protect employees, customers, contractors, partners, members of the public, the environment and Earth Tech's reputation.

- **Incident Reporting, Investigation and Prevention:** Incidents will be reported, investigated and analyzed to determine their root causes and to determine necessary actions to prevent reoccurrence. We will communicate the results of incident investigations throughout the organization.

- **Continual Improvement:** We will establish a process to routinely assess our compliance with the elements of our safety program. We will use both internal self-assessments and appropriate reviews from outside our organization to help us improve our performance and processes. As part of our continual improvement process we will recognize those individuals and/or work groups that exhibit exemplary contributions to our overall performance.

5.0 EMPLOYEE RESPONSIBILITY

All Earth Tech employees are responsible for:

- Conducting all tasks in accordance with regulations, standards and procedures established by the applicable safety, health and environmental management system
- Working in a manner that eliminates unreasonable risk to public health and the environment
- Notifying their supervisor, on a timely basis, of any unsafe condition, practice or other activity that creates an unreasonable risk to people, property or the environment
- Immediately reporting safety, health and/or environmental incidents to their immediate supervisor

6.0 POLICY REVIEW

This policy, and each associated procedure in a business unit SH&E management system, will be reviewed annually. However, if substantial changes occur in legislation, organization and/or other business unit drivers, changes may be made on an interim basis.

EarthTech A tyco International Ltd. Company	PROCEDURE NO. SH&E 002
	DATE March 11, 2005
Safety, Health & Environmental Procedure	REVISED December 29, 2006
SH&E Department Structure and Responsibilities	PREVIOUSLY EHS 002

This procedure applies to all U.S.-based personnel, projects, offices, business units and activities. Any exceptions to this procedure must be approved, in writing, by the responsible District/Business Unit Manager and Safety Manager.

1.0 PURPOSE

To define the organizational structure and areas of responsibility of the Safety, Health & Environmental (SH&E) Department.

2.0 RESPONSIBILITIES

2.1 Corporate SH&E Director (Director)

The Director reports to the President of Earth Tech. The Director has overall responsibility for the development and oversight of the Safety, Health & Environmental (Safety or SH&E) Program for both domestic and international operations. These responsibilities include development and implementation of company-wide SH&E programs and procedures, injury reporting and recordkeeping, workers' compensation reporting and claim management, management of the corporate medical surveillance contractor, coordination with Tyco, and overall management of Safety training programs.

2.2 Corporate Safety Staff

The Corporate Director of Safety Programs and Corporate Safety Coordinator are full-time positions reporting to the Director. In addition to these full-time positions, the following positions are filled by existing Earth Tech personnel that have other responsibilities within the organization:

- Corporate Radiation Safety Officer
- Corporate HAZMAT/Waste Coordinator
- Corporate Environmental Specialist

All of these positions provide senior-level support to all employees of Earth Tech, Safety Managers (SMs), and Safety Professionals (SPs).

2.3 Safety, Health & Environmental Manager (SM)

Each SM reports functionally to the Director and administratively to the District or Business Unit Manager. The SM is responsible for assisting these managers in implementing the SH&E Program within their assigned district and/or operation. The SM assists in communicating program procedures and administers the program for offices and project sites assigned to their respective activity/operation. Responsibilities include providing senior leadership to the district/business unit manager for SH&E matters; management of the district/business unit audit program; assisting with injury/illness review/investigation; coordinating and conducting SH&E training; development of district/business unit-specific SH&E programs and procedures; preparing and/or approving site-

specific health and safety plans and providing technical direction regarding SH&E policies and procedures. The SM also provides senior-level guidance and support to all Safety Professionals within their assigned District or Business Unit.

2.3 Safety, Health & Environmental Professional (SP)

The SP supports the line management organization and the SM in the implementation of the SH&E Program. Duties include reporting to the SM on health and safety matters; communicating SH&E procedures and programs to district/section/project/office staff; assisting project managers in compliance with established procedures; aiding in the development and delivery of SH&E programs and training; and auditing the district's/section's/business unit's programs.

3.0 PROCEDURE

An important element of the SH&E Program is the development and dissemination of environmental, safety, and health procedural information to business practices within the Company. These procedures are presented in the Safety Manual and are also available on the Earth Tech Corporate Intranet site under "Support Services," "Safety." For unique and/or activity-specific practices not summarized in this manual, the SM and SP will provide input and guidance on safe implementation of work activities to minimize risk to the employee.

EarthTech A tyco International Ltd. Company	PROCEDURE NO. SH&E 003
	DATE March 11, 2005
Safety, Health & Environmental Procedure	REVISED November 6, 2006
OPERATIONAL SH&E STRUCTURE AND RESPONSIBILITIES	PREVIOUSLY EHS 003

This procedure applies to all U.S.-based personnel, projects, offices, business units and activities. Any exceptions to this procedure must be approved, in writing, by the responsible District/Business Unit Manager and Safety Manager.

1.0 PURPOSE

Earth Tech's Safety, Health, and Environmental (SH&E) Program will be supplemented with procedures and information to comply with local requirements and provisions. Management responsible for the implementation of safety programs in their respective operation/district/section/office and all employees are required to ensure compliance with both the SH&E Program and location-specific requirements.

2.0 RESPONSIBILITIES

2.1 Safety Managers (SMs)

Earth Tech SM is responsible for:

- Providing overall direction in the development and implementation of the SH&E Program;
- Providing technical support to business unit, district, and location-specific project management personnel in the development, coordination, and implementation of supplemental procedures unique to their operation or location; and
- Updating procedures and/or authorizing changes.

2.2 Management

District Managers, Business Unit Managers, Section Managers, Business Practice Managers, Department Managers, Project Managers, and Supervisors are responsible for:

- Communicating and implementing SH&E procedures and programs, and for selecting, informing, and ensuring employee participation in required SH&E training and medical surveillance programs.
- Becoming knowledgeable of local regulations/requirements pertinent to their projects and obtaining appropriate resources to develop and implement SH&E procedures.
- Developing a process and/or system to ensure Safety is involved in the review of new proposals, projects, and on-going activities that may present safety, health and/or environmental risk.

2.3 Environmental Health & Safety Administrator (EHSA)

SH&E Program support at the local level, the designated EHSA is responsible for:

- Assisting with communication of SH&E Program materials, coordination of enrollment and documentation related to employee training and medical exams, and health and safety documentation and file maintenance; and
- Assisting local management and the SH&E Department in the coordination of location-specific programs and compliance.

2.4 Employees

All Earth Tech employees must accept personal responsibility and concern for environmental compliance, and for the health and safety of themselves, fellow employees, and visitors. Employees are responsible for:

- Updating with their supervisors, on an annual basis, the training needs assessment (TNA) form.
- Maintaining knowledge of, and compliance with, the SH&E Program, attending training programs, and complying with established procedures.
- Complying with all provisions of supplemental programs required at specific site locations and/or offices due to local and/or state regulations.

Employees who violate SH&E requirements will be disciplined according to Human Resources and/or District/Section/Business Unit Management according to business policy.

3.0 PROCEDURES

In addition to programs and procedures established in the SH&E manual, managers at each Earth Tech location/office will provide guidelines for the implementation of SH&E requirements unique to that location's operations. Managers will have the assistance of the SH&E Department, their Program and Project Managers, EHSA, and other technically competent personnel. These supplemental procedures/programs will be reviewed and approved by the responsible SM. Some of these location-specific requirements may include, but are not limited to:

- Office Safety
- Emergency Action Plan
- Fire Prevention Plan
- Hazard Communication
- Injury and Illness Prevention Program

4.0 REFERENCES

SH&E 002 Corporate SH&E Structure and Responsibilities
SH&E 004 SH&E Administrative Support

EarthTech A tyco International Ltd. Company	PROCEDURE NO. SH&E 101
	DATE March 25, 2005
Safety, Health & Environmental Procedure	REVISED February 28, 2007
INJURY, ILLNESS, AND NEAR-MISS REPORTING	PREVIOUSLY EHS 101

This procedure applies to all U.S.-based personnel, projects, offices, business units and activities. Any exceptions to this procedure must be approved, in writing, by the responsible District/Business Unit Manager and Safety Manager.

1.0 PURPOSE

All work-related injuries, illnesses, and near-miss situations, to include vehicle accidents and general liability claims, must be documented and reported to the Safety, Health & Environmental (SH&E) Department and Earth Tech management in a timely and accurate manner.

2.0 SCOPE

This procedure applies to all safety, health, and/or environmental incidents as defined below:

1. Any work-related injury or illness to an Earth Tech or subcontractor employee;
2. Fire, explosion, or flash;
3. Any accidents involving company-owned, rented, or leased vehicles (including personal vehicles used for company business);
4. Property damage resulting from any Earth Tech or subcontractor activity;
5. Unexpected release or imminent release of a hazardous material;
6. Unexpected chemical exposures to workers or the public;
7. A safety related complaint from the public regarding Earth Tech activities;
8. Incidents that could result in adverse public media interest concerning Earth Tech or an Earth Tech project;
9. Incidents that could result in, or any actual investigation by, OSHA, DOT, EPA, or any other State, Federal, or local safety, health, & environmental enforcement agency;
10. Near-Miss Incidents, defined as an incident having the potential to cause injury or property damage as described in the above categories – but did not. Examples of a near-miss include:
    - A worker steps off a ledge and falls three feet (1 meter) to the floor and is uninjured.
    - A crane drops a 1,000-pound (454 kg) beam during a lift – and nobody is hurt, no equipment is damaged.
    - A work crew is conducting a survey along the highway. A vehicle leaves the roadway (driver asleep) and the vehicle enters the survey area at 50 mph (80 kph). The vehicle misses an employee by 3-feet (1 meter), the driver recovers control of the vehicle and leaves the area.

11. Significant Learning Experience, defined as a near-miss incident that the affected group (i.e. project team, office staff, etc.) believes could have wide-ranging impacts throughout Earth Tech. Examples may include; an incident involving a chlorine distribution system used by multiple wastewater treatment plants (WWTPs); an incident involving the failure of a fall protection system used throughout Earth Tech.

3.0 PROCEDURES

The following response procedures will be followed in the event of any work-related injury, illness, incident, or near miss occurring at an Earth Tech work location as defined in Section 2.0 (Attachment 1 summarizes the Incident Reporting Procedures, to include incidents, injuries, auto accidents, and general liability claims). Incidents are to be reported to the 1-800-348-5046 hotline, or in accordance with your District/Business Unit-specific reporting procedures, after the site has been secured and/or medical treatment has been provided, and no later than the end of the work shift.

1. Affected Employee: Each injured/ill employee must notify his/her supervisor immediately that an incident (to include near misses) has occurred, the circumstances involved, the nature and extent of the injuries/illness, and whether medical treatment may be required. Except for emergency aid, affected employees will discuss their medical status with the supervisor and SH&E representative prior to obtaining medical treatment.

2. Workplace Supervisor: The workplace supervisor must **immediately** perform the following notifications:

   - In a life-threatening situation, use the emergency phone numbers and seek immediate medical care.
   - Follow the directions provided by the 1-800-348-5046 hotline to report an incident/near miss by the end of the current work shift.
   - Notify the SH&E professional listed in the contact information (provided in your HASP, emergency response listing, etc.) if immediate assistance is required.
   - Complete the applicable paperwork (e.g., Supervisor's Report of Incident [SRI], Vehicle Incident Form, General Liability Form) and fax a draft copy to Earth Tech SH&E at (562) 499-4012 by the next work day (Attachments 2-4).
   - Notify his/her manager, and secure the manager's signature on the applicable form within 48 hours. If the supervisor's manager is unavailable, obtain the signature from a designated acting manager.
   - Initiate an Incident Investigation and Review per the requirements of SH&E 102.
   - Fatalities must be reported to the appropriate SH&E Professional and Corporate SH&E Director as soon as reasonably possible but no more than 2 hours after the incident.

3. Manager: Review the applicable paperwork and forms as prepared by the workplace supervisor. Forward to the SH&E Professional within 48 hours of receipt.

4.0 RECORDKEEPING

Earth Tech records company safety statistics and generates reports to identify incident trends and recommend appropriate corrective actions to minimize risk. The Corporate Safety

Administrator maintains these records and statistics, which are also required by regulatory agencies, insurance carriers, and for client pre-qualification.

4.1 Reports and Requirements

- The Corporate SH&E Director has overall responsibility for recordkeeping and statistical reports to disseminate company-wide to identify accident trends and appropriate control measures to minimize risk to the company.
- Reports for the previous calendar year summarizing Earth Tech's Statistics are distributed for posting at all offices and project sites from February 1 – April 30. The reports will be posted in a conspicuous place, and taken down after April 30.
- Statistical reports are available from the Corporate Safety Administrator for client prequalification.
- It is imperative that injuries, incidents and near misses are reported to maintain accurate statistical data.

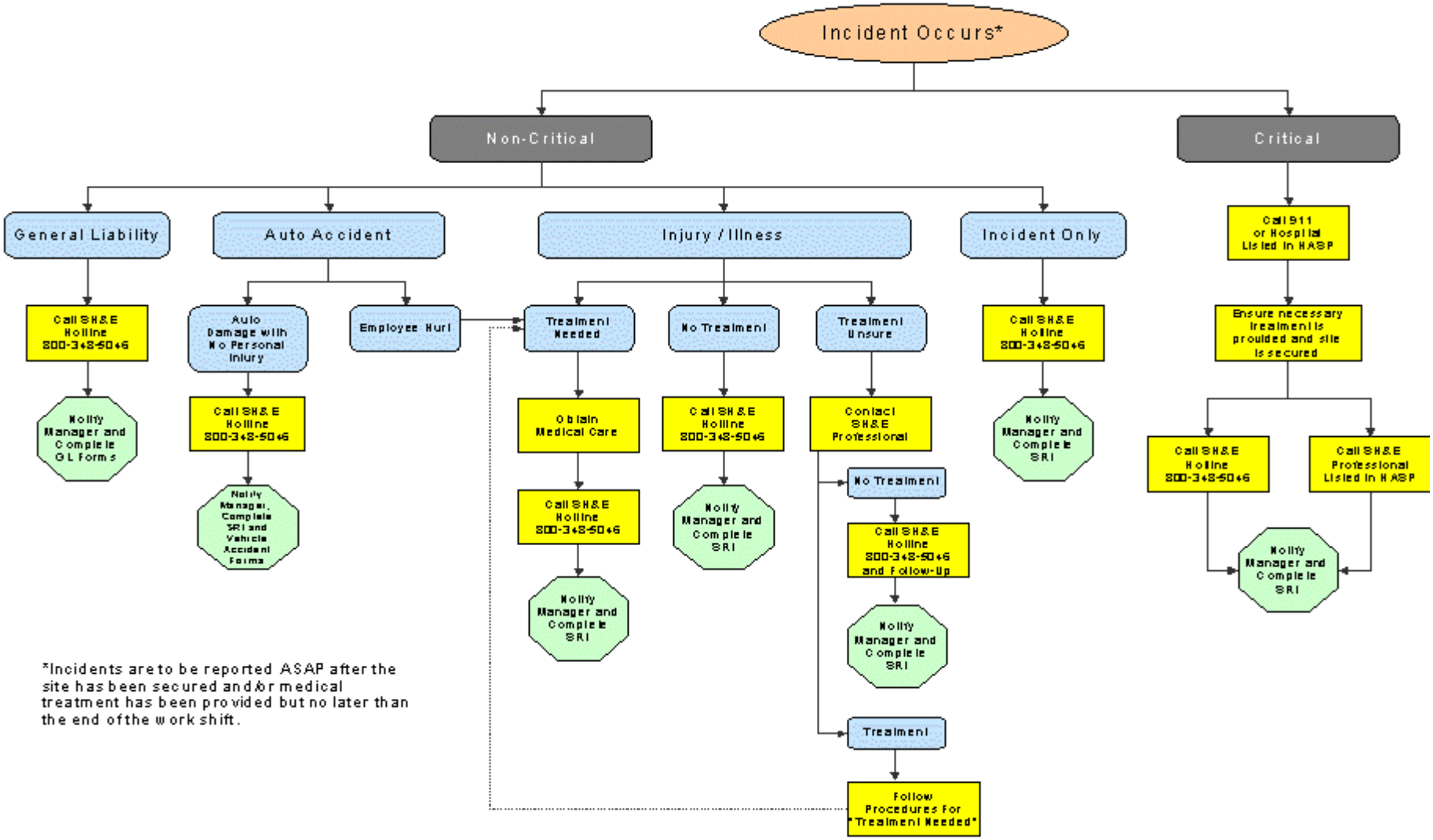
5.0 ATTACHMENTS

Attachment 1: Supervisor's Incident Reporting Procedures Flow Chart
Attachment 2: Supervisor's Report of Incident (SRI) Form
Attachment 3: Vehicle Accident Form
Attachment 4: General Liability Form

6.0 REFERENCES

SH&E 004 - Safety Administrative Support
SH&E 102 - Incident Investigation and Review

Attachment 1 – Supervisors Incident Reporting Procedure Flow Chart



Supervisor's Report of Incident

EarthTech
A Tyco International Ltd. Company

1. Seek immediate medical attention if necessary.
2. Employee must report all incidents and near misses to their supervisor **immediately**.
3. Supervisor calls the Earth Tech Incident, Injury and Near Miss Reporting Line at **(800) 348-5046** with details of the incident, injury, illness, repetitive motion or near miss. ***If your section, district, or division has an additional policy on incident reporting, that policy should be implemented concurrently.*** This form should be faxed to Earth Tech SH&E at (562) 499-4012.

Section 1

Global Organization: Global Consulting & Engineering (GC&E); Global Water Projects and Products (GWPP)	District:	Section/Dept:
Office Address:		Office Code:
Client Name:		Project Number:
Project Name:		

Section 2

☐ Near Miss ☐ Injury ☐ Vehicle Incident ☐ Cumulative Trauma ☐ Illness

☐ Property Damage ☐ Environmental Spill/Release ☐ Other (describe):

Section 3

Employee Name:		☐ Check if worker is a subcontractor ☐ Check if working through a temp agency
Work Phone:	Cell Phone:	Home Phone:
Body Part Injured:		
Nature of Injury:		
Medical Treatment/First Aid ☐ Yes ☐ No	If yes, describe treatment:	
Medical Facility (Name, Address, Phone)		

Section 4

Date/Time of Incident	Date/Time Reported to Supervisor	To Whom
Exact Location & Address of Incident:		
Employee, in own words, describes the incident, injury/near miss/spill/release, witnesses etc. Employee signs/dates statement. (use additional paper if necessary)		
Supervisor Description of Incident: (use additional paper if necessary)		
Witness Name (witnesses should attach a signed and dated statement)		

Section 5 – Signatures

Supervisor/Foreman

Print Name	Signature	Date	Telephone

Section Manager

Print Name	Signature	Date	Telephone
Comments:			

Safety, Health, & Environmental Professional

Print Name	Signature	Date	Telephone
Comments:			
OSHA Recordable ☐ Yes ☐ No ☐Pending	☐ Days Away From Work	☐ Days Restricted	
Administrator:			*WC:* ☐ *Yes* ☐ *No*

Supervisor's Report of Incident (cont.)

Incident Reporting Instructions

The following types of incidents must be reported using this form:

- Occupational Injury or Illness (includes first aid only, medical treatment, hospitalization, fatality)
- Environmental spill or release (reportable quantity [RQ] or where damage to the environment or human health is possible)
- Vehicle Incidents, Accidents and Near Misses Earth Tech owned, leased, rented or personal
- Repetitive Motion, cumulative trauma or other ergonomic-related injury (includes office and field work incidents)
- Near Miss (incident where employee(s) could have been injured) this includes vehicle incidents

INSTRUCTIONS per Corporate Policy SH&E 101 on Incident Reporting

1. Seek immediate medical attention if necessary
2. Employee must report all incidents and near misses to their supervisor **immediately**.
3. Supervisor calls the Earth Tech Injury, Illness and Near Miss Reporting Line at **(800) 348-5046** with details of the incident, injury, illness, repetitive motion or near miss by the end of the work shift. ***If your section, district, or division has an additional policy on incident reporting, that policy should be implemented concurrently.***
4. Supervisor completes the SRI. If the incident involves an employee, the employee must complete a written statement regarding the incident.
5. Supervisor verbally notifies his/her Manager.
6. Supervisor submits draft copy of SRI to Earth Tech SH&E via fax (562) 499-4012 or email to SRI@earthtech.com
7. Supervisor sends SRI to Manager for signature and comment.
8. Manager reviews and signs the SRI then forwards to the appropriate Safety, Health, & Environmental Professional for signature
9. SH&E Professional submits final SRI via fax to (562) 499-4012 or email to SRI@earthtech.com
10. Supervisor should initiate Corporate Policy SH&E 102 on Incident Investigation, if applicable.

Earth Tech Safety Contacts

Corporate

Director	Gary Beswick, CIH	**Program Administrator**	Chelsea Ryan
Coraopolis, PA	Work: (724) 695-9353 Cell: (412) 897-9180 Fax: (562) 951-7946	Richmond, VA	Work: (804) 515-8557 Cell: (804) 229-4025 Fax: (562) 499-4012

Global Consulting & Engineering

Capital District	Dale Prokopchak, CIH, CSP Work: (804) 515-8556 Cell: (804) 839-8312 Fax: (804) 515-8313	Southeast District	Herold Hannah, CIH, CSP Work: (412) 200-2028 Cell: (412) 303-1199 Fax: (562) 499-4044	Northeast District	Bob Poll, CIH, CSP Work: (518) 951-2200 Cell: (562) 884-1414 Fax: (562) 951-2086
Midwest District	Chad Ross Work: (859) 442-2300 Cell: (859) 512-7774 Fax: (859) 442-2311	Rocky Mtn District	Bart Dawson, CIH Work: (210) 253-7552 Cell: (210) 240-3898 Fax: (562) 637-7760	West District	Joseph Bermudez, CSP Work: (562) 951-2242 Cell: (562) 537-8678 Fax: (562) 637-7754

Global Water Projects and Products

North American Contract Operations **ConOps 24-Hr Incident Report Line: (888) 853-7284**		**WPT**		**Asia Pacific, Brazil & Mexico**	
Grand Rapids, MI	Kanwer Khan, PE, QEP Work: (616) 975-4579 Cell: (616) 780-3378 Fax: (616) 942-6499	Salt Lake City, UT	Andrew Peedle Work: (801) 844-4526 Cell: (801) 558-8038 Fax: (801) 973-9733	Long Beach, CA	Rita Van Ryzin Work: (562) 951-2316 Fax: (562) 951-2090

GC&E, Earth Tech Canada

Markham, ON	Ron Whitmell Work: (905) 886-7022 ext.2244 Cell: (647) 393-6045 Fax: (905) 886-9494

GWPP, Earth Tech Europe

South Yorkshire, UK	Steve Wood Wk: 011 44-1226-224466 Fax: 011 44-1226-224488

Vehicle Accident Form

EarthTech
A Tyco International Ltd. Company

1. Supervisor calls the Earth Tech Incident, Injury and Near Miss Reporting Line **(800) 348-5046**
2. Supervisor completes the Supervisor's Report of Incident first, and then completes this form.
3. Fax both forms to Earth Tech SH&E at (562) 499-4012 and submit forms to manager. Call (804) 515-8557 with questions regarding the management of any claim.

Section 1

Earth Tech Vehicle was:	☐ Earth Tech Owned		☐ Leased	☐ Rented	☐ Employee Personal Vehicle
Check all involved:	☐ Earth Tech Vehicle		☐ Another Vehicle(s)	☐ A pedestrian	☐ Property
Check all that apply:	☐ Accident	☐ Near Miss	☐ No vehicle damage	☐ Vehicle damage	☐ Vandalism/unknown cause of damage

Section 2 – Incident

Date/Time of Incident:	What was Vehicle Being Used For? ☐ Business ☐ Personal
Explain purpose for vehicle use at the time of incident/near miss (travel, client visit, site visit, field work, etc) and indicate travel origin/destination:	
Intersection/Highway of Incident/Near Miss with Closest Cross Street/Exit. If Exact location is known provide address, city, state, zip:	
Description of Incident/Near Miss:	

Section 3 – Earth Tech Driver

Earth Tech Driver Name			☐ Check if the driver is in the Earth Tech DOT program
Drivers License #	State Issued		Expiration Date
Vehicle Year/Make/Model		License Plate # and State	VIN Number
Is the Vehicle Damaged? ☐ Yes ☐ No If yes, list area(s):			Estimated Amount of Damage: ☐$0-$500 ☐$500-$1000 ☐$1000-$4000 ☐Total Loss
Were Authorities contacted? ☐ Yes ☐ No	If so, who responded?		
Any Citations Issued? ☐ Yes ☐ No	What citation and to whom?		

Vehicle Accident Form (cont.)

Section 4 – Other Driver

Name of Other *Driver*	Address City, State, Zip		
Home Phone:	Work Phone:	Cell Phone:	
Date of Birth	Drivers License #	State Issued	Expiration Date
Vehicle Year/Make/Model	VIN Number	License Plate # and State	
Name of Insurance Carrier	Policy Number		
If *Vehicle Owner* is different from Driver please complete Owner Information:	Owner Name		
	Address, City, State, Zip		
	Home Phone:	Work Phone:	Cell Phone:
Is the Vehicle Damaged? ☐ Yes ☐ No If yes, list area(s):			Estimated Amount of Damage: ☐$0-$500 ☐$500-$1000 ☐$1000-$5000 ☐more than $5000

Section 5 - Signatures

Supervisor

Print Name	Signature	Date	Telephone
Comments:			

Manager

Print Name	Signature	Date	Telephone
Comments:			

Safety, Health, & Environmental Professional

Print Name	Signature	Date	Telephone
Comments:			
Administrator:			*AL:* ☐ *Yes* ☐ *No*

General Liability Reporting Form

1. Supervisor calls the Earth Tech Incident, Injury and Near Miss Reporting Line **(800) 348-5046**
2. Supervisor completes this form. This form does not admit fault.
3. Fax this form to Earth Tech SH&E at (562) 499-4012 and submit form to manager. Call (804) 515-8557 with questions regarding the management of any claim.

Section 1

Global Organization: (Global Consulting & Engineering; Global Water Projects and Products)		
Region:	District:	Section:
Office Address:		Office Code:
Project Name:		Project Number:
Client Name:		

Section 2

Date/Time of Incident	Date incident reported to Earth Tech	By Whom:	To Whom at Earth Tech:
Where did incident occur (Address, City and State)?			
How did the incident occur?			
Were any Earth Tech employees involved? List complete names and involvement in incident.			
Were any authorities contacted? ☐ Yes ☐ No If yes, whom?			
Witness ☐ Yes ☐ No If Yes, list name and phone (witnesses should attach a signed and dated statement)			

Section 3 – Claimant

Claimant name	Home phone	Work phone	Cell Phone
Claimant's address			

General Liability Reporting Form (cont.)

Section 4 – Complete this section if the Claimant is reporting an injury. Indicate N/A if non-applicable.

What was injured doing at the time of occurrence?
What is the nature of injury and body part affected?
Doctor/hospital name, address and phone number:

Section 5 – Complete this section if the Claimant is reporting property damage. Indicate N/A if non-applicable.

Description of property?	
Where can property be seen?	
What are the damages?	Estimated Amount of Damage: ☐$0-$500 ☐$1000-$5000 ☐$500-$1000 ☐ more than $5000

Section 6 - Signatures

Supervisor

Print Name	Signature	Date	Telephone
Comments:			

Manager

Print Name	Signature	Date	Telephone
Comments:			

Safety, Health, & Environmental Professional

Print Name	Signature	Date	Telephone
Comments:			
Administrator:			*GL:* ☐ *Yes* ☐ *No*

EarthTech A tyco International Ltd. Company **Safety, Health & Environmental Procedure**	PROCEDURE NO. SH&E 102 DATE March 25, 2005 REVISED January 19, 2007
Incident Investigation and Review	Previously: EHS 102

This procedure applies to all U.S.-based personnel, projects, offices, business units and activities. Any exceptions to this procedure must be approved, in writing, by the responsible District/Business Unit Manager and Safety Manager.

1.0 PURPOSE

To establish the minimum requirements for the investigation and review of safety, health, and/or environmental incidents.

2.0 SCOPE

This procedure applies to all safety, health, and/or environmental incidents as defined below:

1. Any work-related injury or illness to an Earth Tech or subcontractor employee;
2. Fire, explosion, or flash;
3. Any accidents involving company-owned, rented, or leased vehicles (including personal vehicles used for company business);
4. Property damage resulting from any Earth Tech or subcontractor activity;
5. Unexpected release or imminent release of a hazardous material;
6. Unexpected chemical exposures to workers or the public;
7. A safety related complaint from the public regarding Earth Tech activities;
8. Incidents that could result in adverse public media interest concerning Earth Tech or an Earth Tech project;
9. Incidents that could result in, or any actual investigation by, OSHA, DOT, EPA, or any other State, Federal, or local safety, health, & environmental enforcement agency;
10. Near-Miss Incidents, defined as an incident having the potential to cause injury or property damage as described in the above categories – but did not. Examples of a near-miss include:
    - A worker steps off a ledge and falls three feet (1 meter) to the floor and is uninjured.
    - A crane drops a 1,000-pound (454 kg) beam during a lift – and nobody is hurt, no equipment is damaged.

- A work crew is conducting a survey along the highway. A vehicle leaves the roadway (driver asleep) and the vehicle enters the survey area at 50 mph (80 kph). The vehicle misses an employee by 3-feet (1 meter), the driver recovers control of the vehicle and leaves the area.

11. Significant Learning Experience, defined as a near-miss incident that the affected group (i.e. project team, office staff, etc.) believes could have wide-ranging impacts throughout Earth Tech. Examples may include; an incident involving a chlorine distribution system used by multiple waste water treatment plants (WWTPs); an incident involving the failure of a fall protection system used throughout Earth Tech.

3.0 PROCEDURE

Operations Management will investigate and review all incidents to ensure that root causes are identified and appropriate corrective measures are implemented. The procedure to be followed for these investigations and reviews is summarized below:

1. The Responsible Lead Investigator Table (Table 1 in Attachment 1) will be used to identify the management representative responsible for conducting the appropriate incident investigation. For all incidents classified as Category 3 or higher, the Responsible Lead Investigator will also be responsible for the preparation of a formal incident investigation report. A sample report format (Attachment 2) is attached as a guide. The investigation and report will focus on determining both critical factors (i.e. direct causes) and root causes (using the Earth Tech Root Cause Tool available on ETConnect) of the incident. For incidents in categories 1 and 2, the investigation report format will be at the discretion of the Responsible Lead Investigator.
2. An incident review meeting will be **scheduled and conducted** by the Responsible Lead Investigator within **10 working days** of the date of occurrence of the incident. Timeliness of this review is considered paramount in ensuring that appropriate facts are gathered and safeguards established to prevent reoccurrence.
3. The review meeting will primarily focus on the root causes identified in the incident investigation report. The meeting is also designed to gain consensus of all participants with respect to any corrective actions proposed by the Responsible Lead Investigator in the investigation report.
4. The review committee will be comprised of at least the following individuals:

   (a) The direct supervisor of the Responsible Lead Investigator,

   (b) Responsible Division, District, and/or Section Manager if the Responsible Lead Investigator is their supervisor,

   (c) Responsible Supervisor or Project Manager of the injured/involved employee.

   For example, if the Responsible Lead Investigator is a District Manager, the District Manager, Section Manager and direct Supervisor of the involved employee will be required participants. If the Responsible Lead Investigator is the Project Manager, the Section Manager and Field Supervisor would be required participants.

   Please note that the review meetings are designed to summarize the investigation findings and come to management agreement on root causes and appropriate corrective actions. Direct participation by the employee(s) involved in the incident is not necessary and requires prior approval from the Senior Manager assigned to the review committee.

Other members of the committee will be at the discretion of the most Senior Manager involved in the committee. The responsible lead investigator will extend an invitation to the Earth Tech Vice

President Safety, Health & Environmental at least 5 days prior to the scheduled review date. The Vice President Safety, Health & Environmental will extend an invitation to the following individuals based on a preliminary assessment of the incident:

- Earth Tech President
- Earth Tech General Counsel
- Earth Tech Human Resources

5. Formal meeting minutes will be prepared by the Responsible Lead Investigator and distributed to all review committee members (actual and invited) within 2 business days following the review meeting. Minutes will include a review of all final determinations including:
    - Description of the incident
    - Investigation report
    - Listing of proximate and root causes
    - Action items for corrective actions including responsible individual(s) and date(s), where applicable.
6. The Responsible Lead Investigator will formally track action items resulting from the review meeting. Weekly update reports on the status of the action items will be developed and distributed by the Responsible Lead Investigator to all review committee members and participants until all items are formally closed and accepted by the next organizational manager above the Responsible Lead Investigator.

4.0 ATTACHMENTS

Attachment 1 – Incident Investigation Protocol
Attachment 2 – Incident Investigation Report Template

5.0 REFERENCES

- SH&E 101 - Injury, Illness, and Near Miss Reporting

Unsafe conditions/actions and near-misses will be reported by project/section staff to Project/Section Manager as soon as possible. All reports from staff will be documented and thoroughly investigated by the Project/Section Manager. Investigation reports will be completed and forwarded to the Safety Manager w/in 48 hours. The investigation reports will concentrate on the identification of Root Causes (using the *Earth Tech Root Cause Tool* available on ETConnect) and suggested corrective actions. The Section/Project/Site Manager will approve final corrective actions.

All incidents (classified as category 3 or higher)

1. Employee must report all incidents and near misses to their supervisor immediately.
2. Supervisor calls the Earth Tech Injury, Illness and Near Miss Reporting Line at **(800) 348-5046** with details of the incident, injury, illness, repetitive motion or near miss by the end of the work shift.
3. Supervisor submits draft copy of SRI, within 24-hours, to Earth Tech Safety via fax (562) 499-4012 or email to HYPERLINK "mailto:SRI@earthtech.com" SRI@earthtech.com
4. Supervisor verbally notifies their Manager. Section, district, region or division specific policies on incident reporting/investigation are to be implemented concurrently.
5. The SH&E Department will determine the maximum potential classification of the incident and alert the appropriate level of management to begin the incident investigation.
6. The Responsible Lead Investigator will mobilize an investigation team and publish a preliminary incident report within 24 hours (i.e. verify and update the initial Who, What, Where, When, add other known facts, and provide a schedule for completion of the investigation).

Table 1. Responsible Lead Investigator

	Incident Classification	Project Super. or Employee Supv.	Project Manager	Section Manager	District Manager	Division Manager	Earth Tech General Counsel and President
• Unsafe Condition/Action • Near-Miss Incident	1	X					
• Significant Learning Experience • Property Damage (less than $5,000)	2		X				
• First-Aid Only Case • Non-Reportable Environmental Release	3			X			
• Recordable Injury/Illness • Property Damage over $5,000 • Regulatory NOV. (i.e. OSHA Citation, EPA NOV, etc.)	4				X		
• Restricted and/or Day Away From Work Case • Reportable Env. Release • Property Damage over $25,000	5				X		
• Employee Hospitalization • Property Damage over $100,000	6					X	**

**as recommended by Corporate VP Safety, Health, & Environmental

Executive Summary

Brief Summary:

Provide a summary of the incident that includes all critical elements of the investigation

What went wrong?

Provide a bulleted list of the most critical elements in the incident sequence that "failed"

What went well?

Provide a list of the most important elements of the incident sequence, including post-incident elements that went well

Critical Factors and Root Causes:

Critical Factors

Based on the interviews, site investigations, and other evidence gathered, identify the events, conditions, and/or actions (Critical Factors) that were directly responsible for the incident

Root Causes

Using the Earth Tech Root Cause Tool (see US SH&E Page on the ETConnect), identify the root causes of the incident

Action Items:

Identify the action items from the investigation and the elements of the Earth Tech safety program to which they correspond.

Lessons Learned:

Provide any information that the investigation team believes will assist other Earth Tech operations, projects, offices, and/or employees avoid this type of incident.

REPORT

I. General Background

Provide basic contract information as well as pertinent site information

II. Incident Description

Complete and detailed description of all aspects leading up to the incident, the incident itself, and any applicable post-incident measures that either lessened, controlled, and/or exacerbated the final outcome of the incident.

III. Investigation Results

A. People Factors

Describe and evaluate all personnel involved including their roles, responsibilities, experience, and training

B. Parts/Equipment Factors

Describe and evaluate (using pictures or drawings where necessary) all equipment and/or parts involved. Include information relative gauge levels, meter readings, physical condition, etc.

C. Position Factors

Describe and evaluate the layout of the incident area noting the location of all people, equipment, structures, etc.

D. Paper/Documentation Factors

Describe and evaluate compliance with the procedures, programs, plans, specifications, etc. applicable to the task being performed and the people performing the task. For example, Task Hazard Analysis, project safety plan, corporate and/or project procedures, training requirements, etc.

IV. Incident Analysis

For each Critical Factor identified during the investigation, identify each applicable root cause from the Earth Tech Root Cause Tool and identify them inn the table below. Use a separate table for each Critical Factor.

1. Critical Factor 1

Identified Cause	Cause Type	Cause No.	Cause Description

2. Critical Factor 2

Identified Cause	Cause Type	Cause No.	Cause Description

IV. Action Plan

Based on the investigation and root cause analysis, the following actions have been planned.

Actions to be Taken	Responsible Party	Completion Date

EarthTech A Tyco International Ltd. Company **Safety, Health & Environmental Procedure**	PROCEDURE NO. SH&E 108 DATE March 25, 2005 REVISED March 31, 2006
Medical Monitoring and Surveillance Program	PREVIOUSLY EHS 501

This procedure applies to all U.S.-based personnel, projects, offices, business units and activities. Any exceptions to this procedure must be approved, in writing, by the responsible District/Business Unit Manager and Safety Manager.

1.0 PURPOSE

All Earth Tech employees whose work assignments involve potential exposure to harmful agents must participate in the medical surveillance program. In addition, you may be required to participate in the medical surveillance program if you perform a task that requires an assessment for fitness for duty (e.g. lifting, climbing, etc.). The District/Business Unit Manager and Safety Manager will identify activities/tasks that will require fit-for-duty assessments. The program ensures that employees are physically fit to perform their assigned duties and that exposure to chemical and physical agents has not compromised their health. Earth Tech's medical surveillance program is designed to monitor the effectiveness of health and safety programs.

The medical surveillance program consists of the following types of examinations: baseline (initial), periodic (annual or biennial), special exposure-specific, contractual requirement, exit/termination, and fit-for-duty. In addition to ensuring the fitness of workers for demanding assignments and tracking the effects of exposure, the medical surveillance program satisfies regulatory requirements.

2.0 DEFINITIONS

Light Duty – Light duty work is defined as a temporary alternate job assignment other than the employee's normal essential duties, in response to physical activity restrictions established by Earth Tech's Medical Director or a designated clinical physician.

Medical Director – The Medical Director is a physician, board-certified in occupational medicine, employed by the Medical Services Contractor. The Medical Director manages the services provided by the Medical Services Contractor and provides to Earth Tech guidance on medical matters.

Medical Services Contractor – The Medical Services Contractor manages all occupational medical services, including medical surveillance programs, substance abuse prevention programs, and care for workers with occupational injuries or illness.

PEL – Permissible exposure limit

Physical Activity Restriction – To prevent aggravation of an existing condition, the Medical Director recommends a physical activity restriction to limit exposure to a chemical or class of chemicals (such as benzene); a physical agent (such as noise); or an activity (such as lifting more than 40 pounds).

PPE – Personal protective equipment

Safety-Critical – A task or position is designated as safety-critical when the task or position is such that incompetence would endanger the lives of others. Examples, but not a complete list, of positions that have been designated safety-critical by federal and state regulations include:

- Drivers of commercial vehicles
- Workers on pipelines carrying fuels or toxic or corrosive substances
- Workers at nuclear power plants
- Operators of cranes of more than 6,000-pound capacity.

3.0 RESPONSIBILITIES

3.1 Employees – Mandatory Participation

All employees designated to participate in the medical surveillance program are required to do so as a condition of employment. Employees whose duties fall within the categories listed in Section 4.2.1 will be included in the medical surveillance program. Each employee is individually responsible for ensuring that he/she maintains a current medical clearance as required for the performance of assigned work duties.

3.2 Managers

All managers must evaluate the duties of each employee and prospective employee reporting to him or her. If the employee's position meets the criteria for required participation in the medical surveillance program (see Section 4.2), the manager is responsible for ensuring that the employee is enrolled in the program.

Candidates for positions that require medical surveillance may not be hired until they have satisfactorily completed the baseline (pre-employment) medical examination.

3.3 EHSA

The EHSA provides the following administrative activities for the medical surveillance program relative to the employees they support:

1. The primary point of contact between the employee, employee's manager, the Medical Surveillance Contractor, and the SH&E Department.
2. Provides information regarding medical surveillance documentation, forms, and scheduling of services.
3. Maintain the database within e-Tracking and other associated documents.
4. Schedule examinations with approved clinics and/or assist employees and Medical Surveillance Contractor with the scheduling process.
5. Participate in initial EHSA training and subsequent reviews and updates that will provide guidance on exam protocols.

3.4 SH&E Manager

The SH&E Manager reviews employee assignments with managers in his or her line of business to ensure that all employees who should be participating in the medical surveillance program have been enrolled. The SH&E Manager provides all assistance necessary to ensure all required information is provided to the Medical Director.

3.5 Corporate SH&E Director (Director)

The Director is responsible for the issuance, revision, and maintenance of this procedure. To ensure the appropriate medical examination and testing protocol, the Director will provide the Medical Services Contractor with appropriate references (e.g., a copy of Earth Tech's Medical Surveillance Policy,

OSHA/state regulations). After consultation with the Medical Director, the Director may also designate other employees to participate in certain parameters of the medical surveillance program.

4.0 PROCEDURE

4.1 Classes of Medical Examinations

4.1.1 Baseline/Pre-Placement/Pre-Employment

The baseline medical examination is used to identify physical capabilities and medical limitations that may have an impact on the candidate's ability to perform in the position for which he/she is being considered and to provide a baseline against which periodic or project-specific monitoring can be compared. The baseline medical examination is used to determine the suitability of an existing employee for a new assignment (pre-placement) or a candidate's suitability to be hired (pre-employment).

4.1.2 Periodic/Annual/Biennial

The periodic medical examination is used to evaluate an employee's continued fitness for duty and to assess any impact occupational exposures may have on his/her health status. The periodic examination includes an update to the medical and work history, results of any occupational exposure assessments, and a detailed medical examination tailored to the job description.

The Medical Director determines the frequency of the periodic medical examinations based on regulatory requirements, the position held by the employee, and the level of exposure to physical, chemical, and biological agents.

4.1.3 Exposure/Activity/Project-Specific

The exposure-specific examination consists of medical tests to assess the impact of occupational exposures associated with a particular activity or project. The Medical Director will require an exposure-specific examination when he/she has reason to believe occupational exposures are impacting or may be impacting the health of an employee, or when he/she receives a recommendation from the SH&E Manager. Clients may recommend exposure-specific examinations for persons working on their projects. A client recommendation for an exposure-specific examination will be forwarded to the SH&E Manager who will evaluate the request, and if appropriate, forward the recommendation to the Medical Director. The Medical Director will determine the frequency of the exposure-specific medical examinations for each employee designated to participate based on sound medical practice and regulatory requirements.

4.1.4 Exit/Termination

An exit medical examination is given when an employee leaves the medical surveillance program, either because of termination of employment with Earth Tech or because of reassignment to a position not designated to participate in the medical surveillance program. This optional exit examination assesses any impact occupational exposures may have had on the employee's health status (see Section 4.5.1).

4.2 Participating Employees

4.2.1 Required Participation

Participation in the medical surveillance program is required for employees who are or may be:

- Exposed to substances at or above the PEL for 30 or more days per year and/or required to participate by regulatory provisions (e.g., asbestos, lead OSHA standards).

- Fit-tested for or wearing a respirator in the field
- Exposed above PELs in accidents or emergency situations
- Working on sites/projects with specific state or federal medical surveillance requirements
- Driving a commercial vehicle (see SH&E 117)
- Performing safety-critical tasks

Employees may be required to participate in a fit-for-duty examination under the following scenarios:

- Perform extensive physical activities (e.g. bending, lifting, climbing, pulling/pushing, etc.)
- Experience a non-work related injury or illness
- Return work after extended absence

Those employees required to participate will be identified by the District/Business Unit Manager and Safety Manager.

4.2.2 Employee

When designated to participate in the medical surveillance program, the employee completes and signs the following documents:

- Medical and Work History Questionnaire
- Medical records release form for medical records from previous examinations
- Medical records release authorizing Earth Tech to receive the results of the examination.

4.2.3 EHSA

The EHSA is responsible for providing the Medical Services Contractor with the following services:

- Facilitate the management and exchange of documentation regarding the medical surveillance program between Earth Tech (typically employee's manager) and the Medical Services Contractor.
- Schedule the initial exam for newly hired or re-assigned employees.
- Assist employees with scheduling examinations as necessary.
- Coordinate medical surveillance program information exchange between Human Resources and the Medical Resource Contractor as necessary.
- Provide information from previous examinations that may not be readily available.

4.2 Scheduling Pre-Employment Medical Examination

4.3.1 EHSA

The EHSA coordinating medical examinations will:

- Provide the candidate or Human Resource Representative with a baseline medical and work history questionnaire to include the job offer package.
- Work with the employee to identify the clinic location that is convenient for the candidate’s medical examination.
- Contact the Medical Services Contractor to obtain the name, address, telephone number, and contact person for the contract medical clinic in that geographical location.

- Coordinate the scheduling of the examination and ensure the scheduling information is provided to the Medical Services Contractor.
- Notify the employee's manager and Human Resources Representative upon receipt of the temporary medical clearance certificate.

4.3.2 Hiring Manager

The Hiring Manager/Human Resources Representative informs the candidate that the offer of employment is contingent on the candidate being physically and medically capable of performing the duties of the position for which he/she is being hired. The Manager/Human Resources Representative may not make the final offer or allow the candidate to begin work until the medical examination is successfully completed and the medical clearance certificate has been received.

4.3.3 SH&E Manager

The SH&E Manager provides such assistance as is requested by the hiring manager to ensure the job description for the position being filled adequately describes the physical, chemical, and biological stresses of the position, and the PPE used or which may be used, including respiratory protection. The SH&E Manager provides all necessary assistance to ensure that required and appropriate information is provided with the request and authorization for medical examination.

The SH&E Manager provides assistance to the hiring manager to interpret physical activity restrictions if such restrictions are noted on the medical clearance certificate.

4.4 Scheduling Periodic and Exposure-Specific Medical Examinations

4.4.1 Medical Services Contractor

The Medical Services Contractor provides notification to the EHSA approximately 30 days before the periodic or exposure-specific medical examination is due. The Medical Services Contractor will also notify the employee 30 days before the periodic or exposure-specific medical examination is due.

The Medical Services Contractor provides notification of delinquent medical examinations to the EHSA, who ensures the notification of examination due is forwarded to the employee.

4.4.2 Manager

The manager arranges work assignments so that the employee is available to take the medical examination before the medical clearance certificate expires. In the event that an employee has not completed the medical examination before the medical clearance certificate expires, the manager removes the employee from the work assignment.

4.4.3 SH&E Manager

The SH&E Manager ensures that all relevant exposure assessments have been appropriately annotated to show the applicability to the employee and forwarded to the Medical Services Contractor. The SH&E Manager also ensures employees on the delinquent medical examination list have been removed from designated assignments.

4.5 Scheduling Exit Medical Examinations

4.5.1 Human Resources Representative/EHSA

Upon notification of termination or impending termination, the employee's manager working with the Human Resources Representative notifies the EHSA to arrange for exit medical examination. If the

employee declines the opportunity to take the exit examination the EHSA will send a waiver (Attachment 2) on behalf of the employee's manager. Once the employee signs the waiver the EHSA will place the original in the employee's SH&E and file and copy the Medical Services Contractor.

4.5.2 Manager

Upon notification of termination or reassignment, the manager contacts the Human Resources Representative.

The manager releases the terminating or reassigned employee from duties as necessary to complete the exit medical examination.

4.5.3 SH&E Manager

The SH&E Manager provides assistance to ensure that terminating and reassigned employees are offered the opportunity to take an exit medical examination.

4.6 Medical Records

Medical records must be preserved and protected in accordance with 29 CFR 1910.20 (f) for the duration of employment plus 30 years. Medical records contain information that is protected by the Privacy Act. To meet the obligations of preserving the medical records and protecting the information they contain, Earth Tech has arranged for the Medical Services Contractor to manage the medical records.

4.6.1 Access to Records

An employee or designated representative may request to review his/her medical and exposure records. Such a request must be in writing, include the employee’s Social Security number, and be signed and dated. The SH&E Manager or the EHSA will forward the request to the Medical Services Contractor, who will provide the employee with a copy of the medical record.

The Medical Services Contractor will supply the copy within 15 days after the request has been submitted by the employee or designated representative.

4.6.2 Quality Control and Quality Assurance

The Medical Services Contractor performs quality control checks on all medical records to ensure examining physicians appropriately record the findings of the examination and tests.

The Director has access to all medical records to perform quality assurance checks to ensure proper recording and preservation.

4.7 Reports

4.7.1 Report of Examination

The Medical Services Contractor provides the employee with a confidential report of findings of the examination and a medical clearance certificate. Earth Tech requires the employee to preserve the medical clearance certificate in a safe place and provide copies of it to project managers and clients.

The Medical Services Contractor provides the EHSA with a copy of the medical clearance certificate.

4.7.2 Examinations Due Report

The Medical Services Contractor produces a list by organization code of employees due to be examined 30 days before the expiration of their medical clearance certificate. This list is provided to EHSAs. The EHSA ensures each manager is notified of the employees in his/her charge who are due examinations so they may be scheduled appropriately.

The Medical Services Contractor notifies each employee by letter or fax to the office of record 60 to 30 days before the periodic or exposure-specific medical examination is due.

4.7.3 Delinquent Examinations Report

The Medical Services Contractor distributes a report of delinquent medical examinations to the EHSA.

When an employee's name appears on the delinquent examination report for two consecutive months, the EHSA must notify the SH&E Manager, who will bring this to the attention of the manager for resolution. If the delinquency issue is not resolved, the Division or Section Vice President will be notified.

4.7.4 Physical Activity Restriction Report

The EHSA maintains a list of employees who have physical activity restrictions. The EHSA provides each manager in his/her area of responsibility with a list of the employees with physical activity restrictions who are assigned to their project/location.

The SH&E Manager audits locations and projects periodically to ensure employees with physical activity restrictions are not exceeding their limitations. Evidence of an employee exceeding his/her physical activity restriction is brought to the attention of the employee's manager/ supervisor for resolution.

4.7.5 Annual Reports

The Medical Services Contractor provides annual reports of utilization, medical trends, and statistical analyses. These reports are prepared to improve the service, reverse unfavorable trends, and reduce the cost of the medical surveillance program.

4.8 Cost Accounting

The Medical Services Contractor submits invoices directly to the employee's P&L center. Each examination and service invoiced includes the organization code of the employee examined or receiving the service. Departments with employees who participate in the medical surveillance program are responsible for the cost of administering the program. In addition, if special monitoring (e.g., for lead) is to be conducted for a project, the Project Manager must inform the EHSA of that project's charge code.

5.0 REFERENCES

- SH&E 111 Employee Exposure Monitoring Program
- SH&E 117 Commercial Vehicle Program

6.0 ATTACHMENTS

- Medical Surveillance Program Status
- Exit Physical Template

EarthTech
A Tyco International Ltd. Company

Employee Status: New Hire ____ Annual Review ___ Reassignment ____

Employee - Medical Surveillance Program Participation/Evaluation/Change in Status

(This form is optional and has been designed to provide managers guidance when classifying employees)

Employee Last Name:	First Name:	Middle Initial	Date:

Job Title:	Employee #:	Office Name:	Location Code:	Dept/Section #:

A. This information will be used to classify Earth Tech employees participating in the medical surveillance program.
B. The form is to be completed by the employee's supervisor at initial hire, if employee is reassigned, and during each annual review.
C. The employee's immediate supervisor is to review this form with the employee and answer the questions during the review.
D. A copy of the completed form is to be forwarded to the safety administrator supporting the section identified above.

	N/A	Yes	No	Examination if Yes
EMPLOYEE STATUS				
1. Is/has the employee being/been terminated, released, or moved to a position where participation in medical surveillance is no longer required?				1. Terminate participation in medical surveillance program with Medical Services Contractor, contact EHSA.
HAZWOPER PROJECTS (29 CFR 1910.120) – SAFETY MANAGER GUIDANCE MAY BE REQUIRED FOR THIS SECTION				
2. a. Will the employee work on a site regulated under 29 CFR 1910.120 or any other (e.g. 8 CCR for CA) HAZWOPER regulated site (hazardous waste site; HAZWASTE treatment, storage, or disposal [TSD])? b. Will the employee be onsite 30 or more days a year?				2. Initial/Annual – Ensure Business unit/Section requirements are implemeneted.
3. a. Will the employee work on a site regulated under 29 CFR 1910.120 (hazardous waste site; HAZWASTE treatment, storage, or disposal [TSD])? b. Will the employee be onsite less than 30 days a year or if onsite not exposed at or above exposure limits?				3. Biennial; with approval of Medical Services Director and Safety Manager.
COMMERCIAL DRIVER'S LICENSE (CDL) EMPLOYEES				
4. Is the employee required to operate CMV ≥ 10, 001 lbs?				4. CDL Medical Certification
5. Is the employee required to operate CMV ≥ 26, 001 lbs?				5. CDL Medical Certification and SAP Random Testing Participation
OTHER-CLEARANCES				
6. Will the employee wear a respirator or needs to be certified for respirator use? If yes, how many days per year? 1-29 30+				6. Respirator Only
7. Will the employee work on projects where they may be exposed to asbestos or regulated under 29 CFR 1910.1001 and/or 1926.1101?				7. Asbestos
8. Will the employee work on projects where they may be exposed to lead or regulated under 29 CFR 1910.1025 and or 1926.62?				8. Lead
9. Will the employee's job description place them in scenarios where they could be exposed to blood borne pathogens?				9. Blood borne Pathogens
10. Will the employee have potential to be exposed to radioactive sources? Alpha _____; Beta _____; Gamma _____?				10. Radiation
11. Site/Project specific biological monitoring or toxicological screening as specified by the project-specific health and safety plan. Contact your District Safety Manager for additional direction.				11. Miscs.
12. Does the employee: a. Perform extensive physical activities (e.g. bending, lifting, climbing, pulling/pushing, etc.) b. Experienced a non-work related injury or illness c. Returned to work after a non-work related extended absence				12. Fit-for-duty Those employees required to participate will be identified by the District/Business Unit Manager and Safety Manager.
13. Will the employee be traveling to a foreign country?				13. If yes please complete the information in 13 a.

13 a.	Originating Country	Destination Country and Region	Departure Date	Return Date	Estimate: # of Days in each country

Supervisor Printed Name:	Supervisor Signature:	Date:

(***THE EHSA IS TO DRAFT THIS LETTER ON BEHALF OF THE TERMINATING EMPLOYEES MANAGER. COPY THE DRAFT TO THE MANAGER AND OBTAIN APPROVAL TO SEND TO THE TERMINATING EMPLOYEE)***

Date

To: (*TERMINATING EMPLOYEE'S NAME)*

Copy:

From: (*TERMINATING EMPLOYEE'S MANAGER NAME)*

Subject: **Exit Physical**

All Earth Tech personnel whom fall under the medical requirements of 29 CFR 1910 (8 CCR in CA) and are terminating employment with Earth Tech are required to participate in an exit physical. Please contact me at ***(EHSA INSERT THEIR CONTACT INFORMATION HERE)*** about scheduling your exit physical as soon as possible.

If you do not wish to participate, please sign below and immediately return the form to:

Earth Tech, Inc

(INSERT EHSA CONTACT INFORMATION HERE)

Or fax to:

(INSERT EHSA FAX NUMBER HERE)

Thank you,
Earth Tech

I, _____ (name), decline to participate in the company sponsored exit physical that is required under 29 CFR 1910.120.

Signature _____ Date _____

Cc: Section EHSA
HR Representative
Employee's Manager

EarthTech A tyco International Ltd. Company **Safety, Health & Environmental Procedure**	PROCEDURE NO. SH&E 109 DATE March 25, 2005 REVISED January 3, 2007
Hearing Conservation Program	PREVIOUSLY EHS 508

This procedure applies to all U.S.-based personnel, projects, offices, business units and activities. Any exceptions to this procedure must be approved, in writing, by the responsible District/Business Unit Manager and Safety Manager.

1.0 PURPOSE

To establish a standard set of procedures to ensure personal noise exposure remains within acceptable limits. Additionally, to establish the requirements of an acceptable hearing conservation program in accordance with 29 CFR 1910.95.

2.0 SCOPE

This procedure applies to all locations/facilities/projects where employee noise exposure may equal or exceed 50 percent of the allowable noise dose or Permissible Exposure Limit (PEL). Table 1 provides information relative to the current PEL for noise exposure expressed as a time-weighted average.

Table 1
Permissible Exposure Level

SOUND LEVEL (dB A)	TIME (hours)
85	16
90	8
95	4
100	2
105	1
110	0.5
115	0.25

Table 2 provides information relative to the Action Level (or 50 percent allowable noise dose) expressed as a time-weighted average. The action levels outlined in the table below, and PELs described in Table 1, are calculated without regard to the protection afforded by the use of hearing protectors.

Table 2
Action Levels for Hearing Conservation Program

SOUND LEVEL (dB A)	TIME (hours)
85	8
90	4
95	2
100	1
105	0.5
110	0.25
115	0.125

3.0 RESPONSIBILITIES

3.1 Plant/Project/Facility Manager

- The implementation and oversight of this program.
- Ensuring that the Program Coordinator, supervisors, and employees are meeting their obligations outlined in the facility Hearing Conservation plan.
- Implementing engineering controls to reduce noise levels when such measures are considered feasible and required by regulation.

3.2 Program Coordinator

- Ensuring that noise monitoring is performed in all areas of the facility where a potential noise hazard exists.
- Ensuring that a noise survey is conducted when a change in equipment, procedures or personnel may increase employee exposure to noise.
- Informing employees of noise monitoring results when full-shift noise exposure is at or above the action level.
- Designating areas and tasks where employees' exposure is at or above the action level
- Notifying employees of local hearing protection requirements
- Placing warning signs in areas where sound levels would require the use of hearing protectors.
- Purchasing, monitoring and replenishing supply of hearing protection devices for employees.
- Ensuring individuals included in the program receive training and that the training meets the criteria outlined in this program
- Investigating and implementing corrective action to all reports of non-conformance with this procedure including reports of standard threshold shifts or employees' failure to wear hearing protectors in designated areas.

3.3 Supervisors

- Maintaining an awareness of the noise levels in work areas for which s/he is responsible.
- Requesting a noise survey be conducted when a change in equipment, procedures or personnel may increase employee exposure to noise.
- Ensuring that all employees are aware of the requirements for hearing protection for any designated area or task
- Enforcing the use of hearing protection by employees in designated areas and for designated tasks.

3.3 Employees

- Complying with the requirements of the Hearing Conservation program
- Inspecting and maintains hearing protection devices
- Wearing hearing protection devices in designated areas or for designated tasks.
- Reporting any suspected change in noise levels of work area to supervisor.
- Reporting any signs or symptoms experienced that could be the result of overexposure to noise to supervisor
- Participating in audiometric testing and hearing protection training when required.

4.0 PROCEDURE

Any facility/project where an employee may be exposed to noise at or above an action level, as defined in section 2.0 of this procedure, shall develop a written hearing conservation program that meets the requirements of this general program and all applicable state-specific regulations. Attachment 1 provides a template for use in developing these written programs.

4.1 Audiometric Testing

- All Earth Tech personnel with potential exposure greater than the action level (noise dose equivalent to an 8-hour, time-weighted average noise exposure at or above 85-dBA) will be enrolled in the Earth Tech medical surveillance program and undergo a baseline audiogram in accordance with current program requirements. Thereafter, annual audiograms will be compared with the baseline exam.

- When a Standard Threshold Shift (STS), as noted by the Corporate Medical Provider, is noted between the last valid baseline and the annual audiogram, the following steps will be taken:

    a. A retest will be conducted within 30 days to confirm the STS. The employee will not be exposed to workplace/hobby noise for 14 hours or will be provided with adequate hearing protection prior to testing.

    b. If the STS persists, ear protection will be upgraded to one with a greater Noise Reduction Rating (NRR). The minimum NRR will be 26 dBA.

    c. The employee will be counseled, and Earth Tech will obtain information regarding the employee's possible noise exposure away from the workplace or existing ear pathology.

    d. Qualified medical personnel will review the audiograms. This group will determine the need for a medical referral.

    e. The employee will be notified in writing by either the SH&E Department or Earth Tech medical provider of the STS, within 21 days of determination, as required by OSHA.

    f. The employee's supervisor will be notified of the shift in hearing threshold.

    g. If the employee who has experienced an STS is exposed to 85 dBA for 8 hours or 80 dBA for 12 hours, mandatory use of ear protection is required.

    h. Temporary employees will receive audiograms during their exit physicals if they have worked around heavy equipment or have received an exposure to noise levels in excess of 85 dBAs.

4.2 Monitoring of Noise Levels

As deemed necessary by an SH&E Professional, Earth Tech will periodically monitor personal and area noise levels using noise dosimetry and/or sound level meters.

4.3 Hearing Protectors

Selection of appropriate hearing protectors must be based on actual or anticipated exposure levels. At a minimum, hearing protectors must provide a level of protection that brings actual or anticipated exposure below the PEL established for the time period shown in the table above. Additional information relative to hearing protector use is as follows:

- Hearing protection will be mandatory for all employees exposed above a sound level for any period of time in excess of that listed in the table above.

- Hearing protection will be mandatory for all employees working in any area that has not been evaluated for noise exposure and the ambient noise level in the area is such that you must raise your voice to have a normal conversation with someone less than 5 feet from you.

- Hearing protection will be mandatory for all employees exposed to 85 dBA for 8 hours and 80 dBA for 12 hours.

- Hearing protection will be mandatory for all employees who work on or near heavy equipment unless personal dosimetry or other techniques have been used to document actual exposure.

- Hearing protectors will be made available to all employees exposed to 85 dBA for 8 hours or more.
- Hearing protection will be mandatory for all employees exposed to 85 dBA for any period of time and who have experienced an STS.

- The SH&E Department will approve all hearing protection. All employees will be trained in the proper use, care, and maintenance of the protectors.

5.0 RETENTION OF RECORDS

- Noise exposure measurement records will be retained for three years at the project/facility.

- Audiogram records will be retained in the employee's medical records per SH&E 108 for a period as directed by Earth Tech's Medical Provider.

- Annual employee training session documentation will be retained for the duration of employment.

6.0 TRAINING

- All employees with potential exposure above the action levels established in section 2.0 of this procedure, or who otherwise utilize any type of hearing protector, will be listed on the "Listing of Employees Included in the Hearing Conservation Program" and participate in an annual training program.

- The training program will include a discussion of the following:

  a. The effects of noise on hearing, recognizing hazardous noise and symptoms of overexposure to hazardous noise
  b. When and/or where hearing protectors are required to be worn
  c. The purpose of hearing protectors
  d. The advantages, disadvantages, and effectiveness of various types of protectors
  e. Instructions on how to select, use, fit and care for hearing protectors
  f. The purpose of audiometric testing, including an explanation of the test procedures
  g. Hearing Conservation Program requirements and responsibilities

  Hearing Protection Training is conducted annually for all affected employees, or more frequently for employees who do not properly use hearing protectors or otherwise fail to comply with this policy.

7.0 REFERENCES

SH&E 108 – Medical Monitoring and Surveillance

SH&E 113 – Personal Protective Equipment

8.0 ATTACHMENTS

ATTACHMENT 1 – Site-Specific Hearing Conservation Program Template

Site-Specific Hearing Conservation Program for the _____ Site

1.0 Monitoring

As per 29 CFR 1910.95, noise monitoring will be conduct by

_____

Such monitoring will consist of (check those that apply):

_____ Sound level meter surveying

_____ Noise dosimetry

Specific instrumentation to be used is (Make/Model):

Make	Model

and will be calibrated at a frequency of _____ and documented in the _____.

Monitoring strategy is as follows: (List all equipment and activities on site which may involve sound pressure levels above 80 dBA and an explanation of the strategy to document actual exposures.)

Area/Equipment	Monitoring Strategy

All monitoring will be documented utilizing the format illustrated following Section 7.0 (attach form developed for the specific site). These forms will be maintained in accordance with Section 7.0 of this program. Monitoring frequency will be in accordance with the strategy outlined above and when the following changes in site conditions/activities occur:

1.
2.
3.
4.
5.

2.0 Employee notification

All site employees exposed above the OSHA action level (85 dBA - 8 hour TWA) will be notified of the monitoring results by _____ (Name/Title) at an interval not to exceed _____ after completion of monitoring.

Notification shall be written with copy to SH&E Department. Documentation of employee notifications and corresponding signatures of notified employees will be kept in the health and safety logbook/files.

3.0 Observation of monitoring

All employees affected by the monitoring, or a designated employee representative, shall be given the opportunity to observe noise monitoring procedures. This will be achieved by:

4.0 Audiometric testing program and requirements

ET personnel who perform field activities where noise exposure above action levels is expected are required to participate in the ET audiometric testing meeting the requirements of OSHA 29 CFR 1910.95. Additionally, any subcontractors performing work on ET projects where noise levels exceeding action level will be required to provide documentation that they participate in an audiometric testing program which meets the requirements of 29 CFR 1910.95. Documentation of participation in the testing program will be maintained by _____ and will be located at _____.

5.0 Hearing protectors and estimating attenuation

A selection of suitable hearing protectors will be made available to all employees who are expected to have 8-hour TWA noise exposures above 85 dBA. The types anticipated to be available include:

Protection Type	**Attenuation**

Hearing protector attenuation will be evaluated by _____ for specific noise environments according to the following method prior to determining their suitability for use:

1.
2.
3.

The following site personnel will be required to wear hearing protectors during specific activities as determined in accordance with 29 CFR 1910.95 and the results of site-specific monitoring conducted according to Section 1.0 of this program. (This section can be completed after monitoring, if necessary.)

Employee Name	**Activity Type**	**Type of Protection**

Hearing protectors will be properly fitted by _____ upon initial distribution to site workers. Size and type of protector for each employee fitted will be recorded in the PPE form found in ET SOP _____.

Training in the use and care of hearing protectors shall be conducted by _____ during the initial site-specific health and safety training (as part of the PPE section) required by the ET Health and Safety Manual. Training contents shall be as per the requirements set forth in 29 CFR 1910.120.

Hearing protectors will be distributed by _____ from the storage location at the _____.

6.0 Access to information and training materials

All information required by 29 CFR 1910.95 to be made available to the employees will be posted by_____ (Name/Title) at the _____.

OSHA standard 29 CFR 1910.95 will also be kept on site.

7.0 Recordkeeping

Records required by 29 CFR 1910.95 shall be completed by _____ and maintained at the _____ and placed on permanent file at the _____, for the minimum duration required by the standard.

Employees can access their individual records by contacting _____(Name/Title).

All records required by this section will be transferred to any employees successive employer if ET ceases to do business.

8.0 Approvals

Project Manager: _____ Date:_____

SH&E:_____ Date: _____

EarthTech A tyco International Ltd. Company **Safety, Health & Environmental Procedure**	PROCEDURE NO. SH&E 113 DATE March 25, 2005 REVISED December 1, 2006
Personal Protective Equipment	PREVIOUSLY EHS 401

This procedure applies to all U.S.-based personnel, projects, offices, business units and activities. Any exceptions to this procedure must be approved, in writing, by the responsible District/Business Unit Manager and Safety Manager.

1.0 PURPOSE

Personal protective equipment (PPE) is specifically designed to protect select parts of the body from chemical, physical and biological hazards. Types of PPE include, but are not limited to, hard hats, safety glasses, safety shoes, full body harnesses, and coated coveralls. This written program, along with site-specific hazard analyses, will provide the requirements for the selection, use and maintenance of personal protective equipment to comply with the provisions of 29 CFR 1910, Subpart I

2.0 SCOPE

A hazard assessment must be conducted for each task being performed for the purpose of identifying the potential hazards and selecting appropriate personal protective equipment based on the identified hazards. A written certification must be in place verifying that the hazard assessment has been performed. Attachment 1 (or 1A) of this procedure contains a PPE Hazard Assessment template that can be used to document this requirement. Other formats, such as formal project-specific Health and Safety Plans (HASPs) and Task Hazard Analyses (THAs), can also be used when approved by the business unit SH&E Manager. All PPE Hazard Assessments must be reviewed annually (at a minimum) to ensure proper PPE has been identified, selected, and issued according to the identified hazards.

3.0 PROCEDURE

3.1 Hierarchy of Controls

Engineering controls are used to eliminate, stop, contain, or capture a hazard at the source or intercept it along its path to the worker. When feasible, these controls are preferred to administrative controls or the use of PPE. Administrative controls are measures to limit the duration of exposure to the hazard. With the exception of administrative controls to prevent heat-, cold-, or radiation- related exposures, the use of administrative controls requires the approval of the SH&E Department.

3.2 General Requirements

1. Earth Tech will provide suitable PPE as required for the nature of the job being performed, such as, but not limited to, steel-toe (or tech-toe if approved by SH&E Manager) boots, chemical protective clothing, respirators, eye and face protection, hardhats, and gloves.
2. Employees will use all required PPE as outlined in project-specific HASPs, THAs and/or PPE Hazard Assessments, or business unit (e.g. NACO) PPE policy.

3. All PPE will meet all applicable current OSHA, MSHA, ANSI and NIOSH standards for the particular equipment.

3.3 Minimum PPE Requirements

The following minimum requirements are mandatory as a condition of working at Earth Tech-controlled field projects, construction projects, and operating facilities (i.e. Water-, Waste Water-, or Groundwater- Treatment Plants) unless the activity is being conducted within a field trailer or facility control room and the project has established these locations as "office-like" areas. Minimum PPE requirements include:

1. Hardhats
2. Safety glasses (ANSI Z-87 w/sideshields)
3. Safety-toe boots or shoes
4. A sleeved work shirt is required to cover the upper torso, if required by the client or hazard
5. Full-length trousers (shorts are prohibited)
6. High-visibility vests – when working around heavy/mobile equipment, moving vehicles, or as required by the DSM/client. See Section 3.12 for additional information.

3.4 Hazard Assessment

1. A PPE hazard assessment of the workplace will be conducted to identify the need and type(s) of PPE to be utilized. This hazard assessment will be performed as part of the initial development of project and site health and safety plans.
2. The workplace hazard assessment must be in written form.

3.5 PPE Training

1. In accordance with SH&E 114 - Safety Training Programs, employees will receive training on the proper use, inspection, and maintenance of PPE prior to being required to utilize any assigned equipment. The training will include:

    a. Discussion of when and what PPE is required
    b. How to properly don, doff, adjust, and wear PPE
    c. Limitations of the PPE
    d. Decontamination procedures
    e. Proper care, maintenance, useful life, and disposal of the PPE

2. Employee training must be verified by a written certification. The certification must include the names of the employees trained, signature of instructor and participants, and the date of training. It must also be identified as a certification of training on the use of PPE.
3. Training documentation may include completion of Tailgate Safety Briefings with specific emphasis on PPE use and selection requirements.
4. Training will be repeated whenever the workplace hazards change, specified PPE changes, or when incorrect or incomplete use of PPE is observed, or as required by the re-training frequency.

3.6 Eye and Face Protection

3.6.1 Basic Eye Protection

Eye and face protection prevents injuries due to particulates, splashing, flying objects and certain forms of ultraviolet radiation. Forms of eye protection include safety glasses, coverall goggles (both

chipping and chemical splash), face shields, welding goggles and welding shields. Contact lenses do not meet the requirements of eye protection. All eye and face protection shall comply with the provisions of ANSI standard Z87.1 as follows:

1. Eye and face protection purchased prior to July 5, 1994 must comply with Z87.1, 1968;
2. Eye and face protection purchased after July 5, 1994 must comply with Z87.1, 1989.

All non-prescription safety glasses, goggles, and face shields shall be provided at no cost to the employee. Prescription safety glasses are provided at no charge (up to a predetermined amount) through the Earth Tech prescription safety glasses program (See Intranet).

The following are the general use requirements for eye and face protection:

1. Employees who wear prescription lenses shall either obtain prescription safety glasses with side shields, or goggles that completely cover the employees' prescription lenses without disturbing the spectacle adjustment.
2. Face and eye protection shall be comfortable and of the proper size to fit the employee.
3. All equipment shall be kept clean and in good repair by the employee. If the equipment cannot be cleaned (i.e. dried paint), or is damaged, it must be properly discarded and new equipment shall be obtained.
4. Equipment (except prescription glasses) can be used by different employees, as long as the equipment has been cleaned and disinfected between use by each person.
5. Safety glasses shall be worn under welding shields.
6. Prescription safety glasses shall be replaced as necessary (i.e. damaged, change in prescription, lost). The employee will discuss replacement of safety glasses with his/her supervisor.
7. Selection of eye and face protection shall be in accordance with Table 1 and 2 located at the end of this written program.
8. Selection of proper shade number or filter lenses for welding operations shall be in accordance with Table 3 located at the end of this written program.
9. Work around lasers is not anticipated.

3.6.2 Contact Lenses

Wearing contact lenses is prohibited at worksites where the possibility of particles and chemicals getting behind the contact lens exist. Contact lenses do not provide eye protection; contact lens wearers must use the same additional eye protection as non-lens wearers.

3.6.3 Chemical (Splash-Proof) Goggles

Chemical goggles will be used as follows:

1. Approved chemical mono-goggles will be provided to ensure protection from the hazards associated with handling or dispensing liquid chemicals.
2. The appropriate Material Safety Data Sheets (MSDS) will provide specific information for the use of chemical goggles. The MSDSs can be obtained in accordance with SH&E 115 Hazard Communications Program.
3. Basic eye protection and chemical goggles (with the exception of prescriptions glasses) will not be worn at the same time, but a face shield may be worn in conjunction with chemical goggles and may be required for certain operations.

3.6.4 Face Shield

1. An approved full-face shield will be worn to provide protection from flying particles, splashes, or mist, where required.
2. A face shield only provides protection to the face from direct impact objects, and does not provide acceptable eye protection. Additional standard eye protection or goggles must be worn in conjunction with a face shield.

3.6.5 Burning Goggles

Approved burning goggles will be worn to provide employee protection from optical radiation. Burning goggles will be worn whenever an oxy-gas torch is used for cutting or burning.

3.6.6 Welding Hood

A welding hood with either a filtered lens of number 10 shade or darker, or an auto-darkening lens providing the same shade number or darker (see applicable shading requirements), will be used to provide protection from the optical radiation produced during electric arc welding. Approved safety glasses with side shields will be worn in conjunction with the welding hood to ensure protection from popping hot slag when the hood is raised. Welding hoods will meet ANSI standards Z87 (EC;EN 187) .

3.7 Head Protection

3. 7.1 Basic Head Protection

1. Approved hardhats will include only plastic or fiberglass hats that meet ANSI Z89.1.
2. Metal hardhats or bump caps are not considered approved head protection and will not be used on Earth Tech projects.
3. Hardhats must also be worn during all cutting and welding operations; no soft caps are allowed.
4. Metal and “cowboy” style hardhats are prohibited.
5. Approved hardhats will be worn by all employees exposed to hazards that could cause injury to the head (moving equipment, falling objects, protruding objects, etc.).
6. Compliance with state and/or local requirements is mandatory (e.g., chinstrap accessory, etc).

3.7.2 Issuance of Head Protection

An approved hardhat will be issued to all employees exposed to overhead hazards. The decision to charge a fee for replacement hardhats will depend on the requirements of the individual project and will be determined by the Project Manager.

3.7.3 Color Coding

Color coding of hardhats will be at the discretion of the Site Project Manager for each individual project.

3.7.4 General Maintenance Requirements

Hardhats will conform to the approved specifications of ANSI Z89.1. Therefore, it will be forbidden for employees to:

1. Drill holes in the shell of the hardhat.

2. Alter the shape of the hardhat or bill.
3. Remove the suspension straps or cut/alter them in any way.
4. Paint the hat or cover in non-approved decals.
5. Wear hardhats with the brim to the rear; or
6. Alter hardhat in any other manner that may compromise its integrity e.g. pasting stickers other than standard Earth Tech logo.

3.8 Hearing Protection

1. Employees will not be exposed to noise in excess of the Permissible Exposure Limits (PELs) established by OSHA. SH&E 109 - Hearing Conservation Program provides guidance on hearing conservation.
2. The two types of recognized hearing protection available for use in effectively reducing noise exposure are earplugs and earmuffs.
3. In most instances, universal-fit earplugs (expandable foam) will be acceptable hearing protection. Cotton plugs are not acceptable.
4. When using earmuffs for hearing protection, special care will be taken to ensure that the muffs are disinfected before being issued to another employee.
5. The SH&E Department will indicate whether both earplugs and earmuffs must be worn to provide adequate hearing protection.

3.9 Hand Protection

Hand protection serves two purposes:

- Control of physical hazards
- Control of skin contact with hazardous materials

3.9.1 General Purpose Gloves

Where workers are exposed to physical hazards the use of standard leather or cloth work gloves will be employed. These gloves do not need to conform to any ANSI or other standard, however selected gloves should:

- Be of sturdy construction.
- Be suitable to protect against the particular hazard(s) associated with the job (e.g., insulated gloves for hot work).
- Properly fit the worker's hands.

3.9.2 Special Purpose Gloves

Gloves intended to provide chemical protection must be rated by the manufacturer as effective against the substance(s) expected to be encountered. Specific selection will be made on a task-by-task basis and approved by the SH&E Department. Special purpose gloves may at times be required when employees are performing certain tasks as indicated below:

- Working with solvents or fuels (thinners, degreasers, gasoline, safety solvents, etc.).
- Handling pesticides, herbicides, or any poison.
- Working with insulating materials.
- Assisting welders or handling hot materials.

Special purpose gloves include:

- "Hot" gloves for electrical work.
- Cut-resistant gloves.
- Chemical-resistant gloves.
- Standard rubber gloves.
- Heat-resistant gloves.

Hydrocarbon-resistant rubber gloves will be worn to protect the hands when using petroleum-based cleaning agents.

Barrier creams/moisturizing lotions can provide additional protection from minor exposure to some irritants and will be used as specified:

- Barrier creams will be evaluated to ensure the proper protection is provided for the specific task to be performed. Barrier creams are NOT a substitute for gloves.
- Moisturizing lotion/creams will be utilized to restore the natural oils to the skin removed through frequent hand washing.

3.10 Foot Protection

3.10.1 Basic Foot Protection

Safety footwear will meet the following requirements:

1. Comply with ANSI standard Z41 PT91
2. 100% leather.
3. Minimum height of 6 inches.
4. Safety-toed footwear will be worn at all job sites unless a variance is obtained from the SH&E Department.
5. Sneakers, sandals, tennis shoes, high heels, and leather-soled street or dress shoes will not be considered approved industrial or construction footwear.
6. The safety footwear program, with Red Wing shoe store information and locations, is available on the SH&E homepage under Forms. Please call the SH&E Department with any questions, comments, or concerns.

3.10.2 Special Purpose Footwear

Special footwear may be required to provide maximum protection to the employee.

1. Whenever employees may be exposed to corrosives or irritant chemicals (e.g., pouring concrete, applying form oils), they will wear the appropriate special purpose footwear.
2. Special purpose footwear may include PVC or neoprene boots, preferably with steel shanks.

3.10.3 Foot Protectors

Employees performing tasks that potentially expose them to extreme foot injury hazards (e.g., operating a ground tamper or chipping concrete with jackhammer) will wear metal foot protectors and/or metatarsal protection.

3.11 General Clothing Requirements

1. Employees performing tasks on Earth Tech projects will wear appropriate clothing. Cotton is the best all-around material to wear.
2. Synthetic materials are not recommended because some melt easily and may burn rapidly when exposed to small ignition sources.
3. Clothing will be in good condition. Frayed or tattered clothing can be a hazard to the employee.
4. Pants will fit properly and not have large cuffs or belled or frayed bottoms.
5. Tank tops or sleeveless shirts (less than 4 inches below shoulder) will not be worn.
6. If dictated by the client or the hazards, long-sleeve shirts will be required.
7. Shirts will be worn tucked in at all times. Employees flame cutting or welding must have clothing suitable for that operation (i.e., prevent slag from being caught in cuffs, waist, or pocket openings).
8. Neckties, gauntlet-type gloves, and baggy, loose, or ragged clothing will not be worn when working near or with moving machinery.
9. Jewelry such as rings, watchbands, necklaces, earrings, or the like can cause or contribute to accidents. Loose, dangling jewelry will not be allowed.
10. In situations where an employee may be exposed to hazardous materials, such as corrosives, fire, toxins, irritants, heat, or sensitizers, the task will be evaluated and the employee will wear the appropriate clothing for the hazard identified.
11. All employees or contractors working on site controlled by Earth Tech with a potential to use respiratory protection (for normal as well as emergency escape purposes) must be shaved and shall not have facial hair (long mustache, long side burns, beard) that can affect sealing of respiratory protection equipment.

3.12 High-Visibility Vests – Communication

1. Fluorescent safety vests, or other approved high-visibility clothing made with reflecting orange, white, or yellow materials, are mandatory when working around heavy equipment. The reflecting material must be visible from all angles (360 degrees).
2. Site vehicles must be parked in a safe place, away from heavy equipment traffic.
3. All personnel who leave a site vehicle to conduct work on foot in the vicinity of heavy equipment must wear a high-visibility safety vest and other appropriate PPE (e.g., hardhat, safety glasses, safety shoes).
4. Eye contact must be established with the heavy equipment operator prior to approaching the equipment. Never approach the equipment from a blind spot or blind angle.
5. Before starting any type of activity that involves site vehicles, heavy equipment, and/or ground activities, communication must be established and maintained (radio contact when possible).
6. Ground activities (e.g., soil density testing, surveying, sampling) will take place no closer than approximately 100 feet from moving heavy equipment without an approved, job-specific hazard analysis that identifies any special precautions to be taken.
7. All personnel working, visiting or attending the site shall be made aware of locations where heavy equipment operations are being undertaken.
8. High-visibility vests are also required while working in and near traffic areas and in remote areas (e.g., working near and/or adjacent to hunting grounds).

Exception: Workers may be exempt from wearing high-visibility safety vests if a hazard assessment prepared for a specific task determines that wearing such gear may introduce additional hazards (e.g., loose clothing/polyester materials). Examples of these tasks may include, but are not limited to, work involving rotating tools/equipment and open flame or spark-producing activities such as welding, cutting, or grinding.

3.13 Safety Equipment for Respiratory Protection, Elevated Work, Confined Space Entry, Electrical Safety, Work Over Water, Etc.

Please refer to the respective SH&E SOP(s) to review the PPE requirements.

4.0 STORAGE AND MAINTENANCE

4.1 Personal Items

The following PPE items will be obtained by the individual users, with costs reimbursed based on the condition and safe operating use of PPE. The employee's supervisor will approve new purchases of required PPE by the employee.

- Safety-toed boots (leather)[1]
- Prescription Safety Glasses[2]

Employees are expected to maintain this equipment in a clean, ready-to-use condition, and to perform periodic inspections to ensure that equipment is undamaged and fully functional. Any equipment which becomes unserviceable shall be replaced by the employee, subject to reimbursement in accordance with Earth Tech's PPE Allowance criteria.

4.2 Individually Issued Items

The following PPE items will be issued individually to each worker, or will be obtained by each worker at Earth Tech expense for their personal use:

- Hard hat
- Non-Prescription Safety Glasses
- Safety-toed boots (rubber)
- Respiratory Protection
- Ear Muffs/ear plugs
- Cold weather gear (NOTE: All items must be approved for purchase through the employees Section Manager prior to purchase.)

Employees are expected to maintain this equipment in a clean, ready-to-use condition, and to perform periodic inspections to ensure that equipment is undamaged and fully functional. Any problems should be identified to the site safety officer immediately so that replacements can be arranged.

---

[1] Earth Tech has established a boot purchase program with RED WING Shoes that provides for a 15% price discount and company-direct billing up to a total cost of US$100 (or as approved by Business Unit). Information about this program can be found on the SH&E Intranet website.

[2] Earth Tech has established a prescription safety eyewear program with Wal-Mart that provides for a price discount and company-direct billing up of approved eyewear frames and lenses. Information about this program can be found on the SH&E Intranet website.

Except for personal issue items, all other PPE will be stored on site and issued to workers as required for use. This includes:

- Work coveralls
- Chemically-protective outer coveralls
- Leather and chemically-protective gloves
- Face shields
- Fall protection equipment
- Specialized safety equipment

All central issue equipment will be maintained in a clean, dry condition.

4.3 Inspection

Prior to use of any safety equipment (individual issue or centrally stored) personnel must inspect each piece to ensure that it is in good working order. Equipment exhibiting any signs of wear or damage will be immediately placed out of service and repaired/replaced.

5.0 REFERENCES

SH&E 109 – Hearing Conservation Program
SH&E 112 – Respiratory Protection Program
SH&E 114 – Safety Training Programs
SH&E 115 – Hazard Communication Program
SH&E 120 – Fall Protection Program

6.0 ATTACHMENTS

Attachment 1 – PPE Hazard Assessment Template
Attachment 2 – Eye & Face Protection Selection Chart
Attachment 3 – Eye And Face Protector Selection Guide
Attachment 4 – Filter Lenses For Protection Against Radiant Energy
Attachment 5 – Sample PPE Hazard Assessment – Waste Water Plant

Attachment 1

PERSONAL PROTECTIVE EQUIPMENT HAZARD ANALYSIS

1. **Job Title(s):** This hazard analysis describes the tasks and required personal protective equipment for the following job titles:
   - ■
   - ■
   - ■
   - ■
   - ■

2. **Description of Tasks:** The tasks performed by personal in the above job titles include:
   - ■
   - ■
   - ■
   - ■
   - ■

3. **Potential Hazards and PPE Selection. (See List of Potential Hazards for assistance)**

TASK	POTENTIAL HAZARDS (1)	PPE SELECTION

(1) Refer to attached list for a list of potential hazards to consider.

Signature of certifying Manager that tasks are accurately described.

_____

Signature Date

Print Name:_____

LISTS OF POTENTIAL HAZARDS

	POTENTIAL HAZARDS
HEAD	**Falling overhead objects**
	Spark contact
	Chemical contamination
	Cold/heat
	Electrical (>600 volts)
HANDS	**Cut, puncture, abrasions**
	Burns
	Dermatitis
	Chemical absorption
	Cold
FEET	**Falling or rolling objects**
	Chemical absorption
	Dermatitis
	Burns
	Cold
	Slips, trips
FACE	**Burns (chemical, spark, UV radiation)**
	Chemical splashing
	Flying particulates
	Abrasions, cuts
EYES	**Burns (gas, liquid, spark)**
	Abrasions-flying particulates
	Absorption
	Retinal/corneal damage (UV/IR radiation)
EARS	**Noise**
	Cold
FULL BODY	**Chemical splashing**
	Burns (chemical, UV radiation)
	Absorption
	Spark contact
	cuts/abrasions/punctures
	Heat/cold stress
MISCELLANEOUS	**Insects (ticks, spiders, mosquitoes, bees/wasps**
	Animals (dogs, bears, wild boars, raccoons)
	Reptiles (snakes)
	Poisonous plants (poison ivy, sumac, poison oak)
	Biological (fungus, bacteria, fungus, viral)

Attachment 2

TABLE 1 – EYE & FACE PROTECTION SELECTION CHART

		ASSESSMENT	PROTECTOR TYPE (see Table 2)	PROTECTOR	LIMITATIONS	NOT RECOMMENDED
IMPACT	Chipping, grinding, machining, masonry work, riveting, and sanding.	Flying fragments, objects, large chips, particles, sand, dirt, etc.	B, C, D, E, F, G, H, I, J, K, L, N	Spectacles, goggles, faceshields SEE NOTES (1) (3) (5) (6) (10) For severe exposure Add N	Protective devices do not provide unlimited protection. SEE NOTE (7)	Protectors that do not provide protection from side exposure. SEE NOTE (10) Filter or tinted lenses that restrict light transmittance, unless it is determined that a glare hazard exists. Refer to OPTICAL RADIATION.
HEAT	Furnace operation, pouring, casting, hot dipping, gas cutting, and welding.	Hot sparks	B, C, D, E, F, G, H, I, J, K, L, *N *N N	Faceshields, goggles, spectacles. *For severe exposure, add N SEE NOTE (2) (3) *Faceshields worn over goggles H, K SEE NOTE (2) (3) Screen faceshields. Reflective faceshields. SEE NOTE (2) (3)	Spectacles, cup and cover type goggles do not provide unlimited facial protection. SEE NOTE (2) SEE NOTE (3)	Protectors that do not provide protection from side exposure.
		Splash from molten metals				
		High temperature exposure				
CHEMICAL	Acid and chemicals handling, degreasing, plating	Splash	G, H, K *N	Goggle, eyecup and cover types. *For severe exposure, add N	Ventilation should be adequate but well protected from splash entry	Spectacles, welding helmets, handshields
		Irritating mists	G	Special purpose goggles	SEE NOTE (3)	
DUST	Woodworking, buffing, general dusty conditions.	Nuisance dust	G, H, K	Goggles, eyecup and cover types	Atmospheric conditions and the restricted ventilation of the protector can cause lenses to fog. Frequent cleaning may be required.	

TABLE 1 – EYE & FACE PROTECTION SELECTION CHART (cont.)

	ASSESSMENT	PROTECTOR TYPE	PROTECTOR	LIMITATIONS	NOT RECOMMENDED
OPTICAL RADIATION	WELDING: Electric Arc	O, P, Q	**TECTORS** **FILTER** **LENS PRO-** **SHADE** **TECTORS** SEE NOTE (9) 10-14 Welding Helmets or Welding Shields	Protection from optical radiation is directly related to filter lens density. SEE NOTE (4). Select the darkest shade that allows adequate task performance.	Protectors that do not provide protection from optical radiation. SEE NOTE (4)
	WELDING: Gas CUTTING TORCH BRAZING	J, K, L, M, N, O, P, Q	SEE NOTE (9) 4-8 Welding Goggles or Welding Faceshield 3-6 3-4	SEE NOTE (3)	
	TORCH SOLDERING	B, C, D, E, F, N	1.5-3 Spectacles or Welding Faceshield		
	GLARE	A, B	Spectacle SEE NOTE (9) (10)	Shaded or Special Purpose lenses, as suitable. SEE NOTE (8)	

NOTES
(1) Care shall be taken to recognize the possibility of multiple and simultaneous exposure to a variety of hazards. Adequate protection against the highest level of each of the hazards must be provided.
(2) Operations involving heat may also involve optical radiation. Protection from both hazards shall be provided.
(3) Faceshields shall only be worn over primary eye protection.
(4) Filter lenses shall meet the requirements for shade designations in Table 9-2.
(5) Persons whose vision requires the use of prescription (Rx) lenses shall wear either protective devices fitted with prescription (Rx) lenses or protective devices designated to be worn over regular prescription (Rx) eyewear.
(6) Wearers of contact lenses shall also be required to wear appropriate covering eye and face protection devices in a hazardous environment. It should be recognized that dusty and/or chemical environments may represent an additional hazard to contact lens wearers.
(7) Caution should be exercised in the use of metal frame protection devices in electrical hazard areas.
(8) Refer to Section 6.5, Special Purpose Lenses. (ANSI A87.1-1989)
(9) Welding helmets or handshields shall be used only over primary eye protection.
(10) Non-sideshield spectacles are available for frontal protection only.

Attachment 3

TABLE 2 - EYE AND FACE PROTECTOR SELECTION GUIDE

A. SPECTACLE, No sideshield
B. CUP GOGGLE, Direct ventilation
C. CUP GOGGLE, Indirect ventilation
D. SPECTACLE, Headband temple
E. COVER WELDING-BURNING GOGGLES, Indirect Ventilation
F. FACESHIELD
G. WELDING HELMET, Hand held
H. WELDING HELMET, Stationary window
I. WELDING HELMET, Lift front
J. COVER GOGGLE, Direct ventilation
K. SPECTACLE, Half sideshield
L. SPECTACLE, Full sideshield
M. SPECTACLE, Detachable sideshield
N. SPECTACLE, Non-removable lens
O. SPECTACLE, Lift front
P. COVER GOGGLE, No ventilation
Q. COVER GOGGLE, Indirect ventilation

Attachment 4

TABLE 3. FILTER LENSES FOR PROTECTION AGAINST RADIANT ENERGY

OPERATIONS	ELECTRODE SIZE 1/32 INCH	ARC CURRENT	MINIMUM PROTECTIVE SHADE
Shielded metal-arc welding	Less than 3 More than 3-5 More than 5-8 More than 8	Less than 60 60-160 161-250 251-550	7 8 10 11
Gas metal arc welding and flux cored arc welding		Less than 60 60-160 161-250 251-500	7 10 10 10
Gas tungsten arc welding		Less than 50 50-150 151-500	8 8 10
Air carbon	(Light)	Less than 500	10
Air cutting	(Heavy)	500-1000	11
Plasma arc welding		Less than 20 20-100 101-400 401-800	6 8 10 11
Torch brazing			3
Torch soldering			2
Carbon arc welding			14

OPERATIONS	**PLATE THICKNESS (INCHES)**	**(MM)**	**MINIMUM* PROTECTIVE SHADE**
Gas welding:			
Light	Under 1/8	Under 3.2	4
Medium	1/8 to ½	3.2 to 12.7	5
Heavy	Over 1/2	Over 12.7	6
Oxygen cutting:			
Light	Under 1	Under 25	3
Medium	1 to 6	25 to 150	4
Heavy	Over 6	Over 151	5

Attachment 5
Sample PPE Hazard Assessment - _____Wastewater Plant

PPE Procedure Number	Individual Task	Potential Hazards Associated with Job	Eye & Face				Head	Hand	Foot		Hearing		Other	
			Safety Glasses with side shields	Goggles	Face Shield	Welding Helmet/ Shield	Class A/B Helmet	Gloves	Safety Shoes/ boots	Specialty Boots	Ear Plugs	Ear Muffs	Fall Protect	
PPE-01	Daily Operations Rounds	Jobsite Conditions, Ergonomics, Falls, Hazardous Chemicals, Contact with Objects and Equipment, Environmental.	X				X		X					
PPE-02	Daily Sampling and Testing	Jobsite Conditions, Ergonomics, Falls, Hazardous Chemicals, Hand & Power Tools, Contact with Objects or Equipment, Environmental.	X				X	X latex	X					
PPE-03	Weekly Sampling and Testing	Jobsite Conditions, Ergonomics, Falls, Hazardous Chemicals, Hand & Power Tools, Contact with Objects or Equipment, Environmental.	X				X	X latex	X					
PPE-04	Bi-Annual Sampling and Testing	Jobsite Conditions, Ergonomics, Falls, Hazardous Chemicals, Hand & Power Tools, Contact with Objects or Equipment, Environmental.	X				X	X latex	X					
PPE-05	Making Lab Reagents	Hazardous Chemicals, Hand & Power Tools, Contact with Objects or Equipment		X	X			X	X					X
PPE-06	Checking Pump Stations	Jobsite Conditions, Confined Spaces, Ergonomics, Falls, Stored Energy, Hazardous Chemicals, Hand & Power Tools, Contact with Objects or Equipment, Environmental.	X				X	X leather	X					
PPE-07	Performing Flow Calibrations	Jobsite Conditions, Confined Spaces, Ergonomics, Falls, Stored Energy, Hazardous Chemicals, Hand & Power Tools, Contact with Objects or Equipment, Environmental.	X				X		X					

PPE Procedure Number	Individual Task	Potential Hazards Associated with Job	Eye & Face				Head	Hand	Foot		Hearing		Other	
			Safety Glasses with side shields	Goggles	Face Shield	Welding Helmet/ Shield	Class A/B Helmet	Gloves	Safety Shoes/ boots	Specialty Boots	Ear Plugs	Ear Muffs	Fall Protect	
PPE-08	Transferring Sodium Bisulfite	Jobsite Conditions, Confined Spaces, Ergonomics, Falls, Stored Energy, Hazardous Chemicals, Hand & Power Tools, Contact with Objects or Equipment, Environmental.		X	X		X	X	X					X
PPE-09	Transferring Sodium Hypochlorite	Jobsite Conditions, Ergonomics, Falls, Stored Energy, Hazardous Chemicals, Hand & Power Tools, Contact with Objects or Equipment, Environmental.		X	X		X	X	X					X
PPE-10	Screw Pump Gate Valve Operation	Jobsite Conditions, Ergonomics, Falls, Stored Energy, Hazardous Chemicals, Hand & Power Tools, Contact with Objects or Equipment, Environmental.	x				X	X leather	X					
PPE-11	Calcium Nitrate Handling	Jobsite Conditions, Ergonomics, Falls, Stored Energy, Hazardous Chemicals, Hand & Power Tools, Contact with Objects or Equipment, Environmental.		X	X		X	X	X					
PPE-12	Emptying Grit Trailer	Jobsite Conditions, Ergonomics, Falls, Stored Energy, Hand & Power Tools, Contact with Objects or Equipment, Environmental.	X				X	X leather	X					

This procedure applies to all U.S.-based personnel, projects, offices, business units and activities. Any exceptions to this procedure must be approved, in writing, by the responsible District/Business Unit Manager and Safety Manager.

1.0 PURPOSE

Earth Tech's Safety, Health and Environmental (SH&E) Training Program is designed to provide training for all personnel commensurate with the safety needs of their assigned job duties and responsibilities. Major objectives of the SH&E Training Program include:

- Identify accountability, responsibility, and authority pertaining to training program requirements.
- Establish minimum training course and/or instructor criteria to ensure compliance with applicable regulatory requirements as well as Earth Tech's SH&E Program requirements
- Provide guidelines that will facilitate employee education regarding safe work practices that will reinforce the Earth Tech Safety Core Values.
- Define documentation and corresponding archive requirements for the training program.
- Maintain consistency in SH&E training content throughout Earth Tech.

2.0 SCOPE

This procedure applies to all Earth Tech business units based in the United States. The requirements included in this procedure are the minimum applicable for all Earth Tech activities. Individual business units or operating locations may revise the attachment to this procedure (upon approval of the cognizant District Safety Manager) in order to meet operational considerations or local regulatory requirements. In addition, client-mandated requirements may apply on a project-specific basis and will be addressed in supplemental documents (e.g. health and safety plans, training guides, etc.).

3.0 RESPONSIBILITIES

Earth Tech's operational management organization (line management staff) is responsible for implementing the SH&E Training Program in accordance with the requirements of this procedure, with assistance from the SH&E Department.

3.1 Division Managers

Each division manager is responsible for ensuring adequate plans are in place to facilitate implementation of this program within the Division. This includes ensuring that adequate resources (budget, training staff, etc.) are available to the business unit(s) to implement all required safety training.

3.2 District/Business Unit Managers

District/Business Unit managers are responsible for developing plans and procedures to ensure effective implementation and enforcement of this procedure at the section/department level. This includes:

- Allocating resources for the effective implementation of this program within their district/business unit.
- Establishing procedures that ensure compliance is tracked and measured.
- Developing measurable training goals for section/department managers, and monitoring these goals on a regular basis, at least annually.
- Reviewing the safety training performance of individual sections to ensure compliance with this procedure.

3.3 Section/Department Managers

Section/department managers are responsible for ensuring that all assigned personnel comply with the requirements of this program. Section managers will also:

- Utilize the eTracking database to track employee training compliance and anniversary dates. This would include oversight of eTracking data entry for section personnel.
- Ensure that accurate training needs assessments (see Section 4.0) are maintained for all section/department employees based upon their assigned job duties.
- Identify an Environmental, Health and safety Administrator (EHSA) to coordinate safety training and to administer training program data for their section/department.
- Implement corrective actions when employees fail to meet training requirements.
- Identify supplemental employee training needs based on local/client requirements.
- Ensure that training requirements are reviewed with each employee, based upon current and anticipated job functions and past performance, on a routine basis. This will include, at a minimum, a review during the annual employee review and/or any major employee re-assignment/job change.
- Identify additional employee safety training requirements based upon prudent risk management considerations and local performance issues.

3.4 Safety, Health and Environmental Department

The SH&E Department is responsible for:

- Establishing SH&E Training Program requirements and communicating these requirements to line management within each district.
- Auditing for compliance with training program requirements.
- Providing technical assistance/support as requested by district and section managers.
- Performing internal safety training classes as requested by district and section managers.
- Reviewing and approving qualifications of Earth Tech employees providing internal safety training.
- Approving external safety training vendors and on-line (Internet) training providers.
- Approving training lesson plans and course agendas for all internal training courses.
- Maintaining a list of approved SH&E Training Vendors and posting this list on the Earth Tech Intranet SH&E Page.

3.5 Earth Tech Employees

Each Earth Tech employee is responsible for maintaining accurate *Training Needs Assessment* data (see Section 4.0, below). In addition, each employee is expected to track his or her own training expiration dates and coordinate with their EHSA for appropriate refresher training to prevent expiration of any required training certifications.

4.0 PERSONAL TRAINING REQUIREMENT IDENTIFICATION

Individual training requirements are dependent on the person's job description and duties. As stated in Section 3.0, it is each employee's responsibility, along with their supervisor, to determine what training the employee is required to have to safely perform their job and comply with Earth Tech policies and requirements. This is accomplished using the *Training Needs Assessment* (TNA) tool published for the employee's Division/Business Unit by the SH&E Department.

4.1 Updating the Information

The TNA information should be reviewed by each employee, along with his or her supervisor:

- During new employee orientation
- On an annual basis after the new employee orientation
- Immediately following a major job change

At a minimum, each employee's TNA must be reviewed and verified annually, and this review must be updated in Earth Tech's online database. Any TNA older than 1 year is considered to be invalid.

4.2 Collecting Information for New Hires

For new hires a preliminary version of the TNA can be completed as part of the New Hire Request Package, and can be used as part of candidate qualification reviews during the hiring process. This preliminary information will then be reviewed with each new hires during the on-boarding process, at which time they must review, sign and return the worksheet to their supervisor before assuming their job duties.

Once the TNA is completed and signed by the supervisor a copy is to be placed in the employee's health and safety file by the EHSA, and the original provided to the employee. If there are any certificates, copies are to be obtained and provided to the EHSA and a copy placed in the individual's SH&E file.

5.0 TRAINING COURSE FORMATS

Earth Tech utilizes 3 primary formats to provide SH&E training:

1. Internal Training – Earth Tech developed training that is performed using internal resources.
   a. Intranet training – Courses that are self-taught and individually paced and delivered via ETOnline (the Earth Tech intranet) or similar format. These courses are developed and maintained by the SH&E Department.
   b. Classroom training – Courses taught by an instructor in a classroom format. Trainers are SH&E Department approved personnel (see section 6.0) using materials that were developed specifically to train Earth Tech employees. All training course curricula must be reviewed and approved by the SH&E Department prior to execution of training.

2. Internet Training – Earth Tech will use Internet training to supplement internal training courses. All Internet based safety-training courses and providers must be approved by the SH&E Department prior to employee participating in training. The primary vendor for these services is PureSafety (approved PureSafety training courses can be accessed via the SH&E Department home page), however other vendors may be selected by the SH&E Department based upon need.

3. External Vendors – External vendors conduct training that is not available through internal training sources. All external vendors are to be pre-approved by the SH&E Department prior to any employee attending a training class.

6.0 TRAINING PROGRAM MANAGEMENT

District Safety Managers will be responsible for verifying training vendors, Internet training courses, or any other external training programs used by their business units to comply with applicable regulatory guidelines and Earth Tech SH&E Program requirements. Earth Tech will not consider any training received through an unapproved vendor to be valid until reviewed and accepted by a District Safety Manager.

7.0 TRAINING DATA MANAGEMENT

Records documenting employee participation safety training will be maintained in accordance with applicable regulatory requirements and Earth Tech SH&E Program requirements. Minimum requirements are as follows:

7.1 District/Section/Business Unit Responsibility

Each district/section/business unit is responsible for maintaining documentation of course completion by each individual employee. The minimum requirements and documentation required for each employee's training file are as follows:

1. Supervisor-signed *Training Needs Assessment* form.

2. Certificate of completion for each class. Each certificate must indicate:

    a. Employee name
    b. Class Name, and applicable reference to specific regulatory standard (e.g. 29 CFR 1910.120; 40-Hour, 8-Hour Refresher; OSHA 10-Hour Construction Safety; ISO reference; etc.)
    c. Instructor's printed name and signature
    d. Date(s) of class
    e. Company name and address
    f. Contact hours for the training

Data will be maintained in one of two formats:

Electronic Records (eTracking) – eTracking is an Earth Tech-wide safety database that maintains employee safety training information (dates, course name, certificates, etc.), including training certificates, which can be scanned and placed into the database. Data will be entered by each section EHSA, and each section manager is responsible to ensure the database is current for their personnel.

Hardcopy Records – Each employee is required to maintain a personal file with hardcopies of their certification(s) from all (internal, external, intranet, Internet) training providers.

The section safety training coordinator is required to maintain an individual employee safety file with hard copies of certification from any safety training records that **are not entered in the eTracking database**.

In addition to employee training records, each Section is required to maintain records for each training course which is provided. An individual training summary will be maintained for each class which must include:

1. The Course agenda for each class, which will indicate:

    a. Course Name
    b. Date(s)
    c. Class start and stop time
    d. Course outline (list of topics discussed)

e. Instructors' name(s)
f. Provider's name and address

2. A copy of the *Student Training Sign-in Sheet* (see Attachment 1). For external vendor classes equivalent documentation is required.

7.2 SH&E Department Responsibility

The SH&E Department will maintain the following records:

- A listing of approved external training vendor firms and courses for which they are approved.
- A listing of approved Earth Tech trainers and the courses each is approved to teach.
- Earth Tech's library of Intranet-available safety training courses.

These records will be maintained on the Earth Tech Intranet Safety Page, where they will be accessible to all Earth Tech managers and personnel for use in the planning of training activities.

8.0 ATTACHMENTS

Attachment 1 – Student Training Sign-in-Sheet

STUDENT TRAINING SIGN-IN SHEET

Course Name:				**Course #:**	
City:		**State:**		**Section #:**	
Date:		**Start Time:**		**Stop Time:**	

Lead Instructor:	**Instructor 1:**	**Instructor 2:**

	Employee Name:	**Employee Signature:**	**Employee ID #:**
1.			
2.			
3.			
4.			
5.			
6.			
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26.			
27.			

Copy and add pages to the Sign-In Sheet as needed:

Page __ of __

EarthTech A tyco International Ltd. Company **Safety, Health & Environmental Procedure**	PROCEDURE NO. SH&E 115 DATE March 25, 2005 REVISED December 1, 2006
Hazard Communication	PREVIOUSLY EHS 302 / ENV 307

This procedure applies to all U.S.-based personnel, projects, offices, business units and activities. Any exceptions to this procedure must be approved, in writing, by the responsible District/Business Unit Manager and Safety Manager.

1.0 PURPOSE

The purpose of this program is to ensure that the potential hazards posed by all hazardous substances in the workplace are communicated to Earth Tech employees and subcontractors. Additionally, this program will aid in complying with the OSHA Hazard Communication Standard.

2.0 SCOPE

The requirements defined in this program apply to all Earth Tech facilities, projects, employees, and subcontractors which receive, use, handle, store, transport, or distribute hazardous substances. This program does not apply to the following:

- Any hazardous waste as defined by the Solid Waste Disposal Act, as amended by RCRA, when subject to regulations issued by the USEPA
- Tobacco or tobacco products
- Wood or wood products
- Articles
- Food, drugs, cosmetics, or alcoholic beverages packaged for sale to customers
- Food, drugs, or cosmetics intended for personal use
- Any consumer product or hazardous substance as defined by the Consumer Product Safety Act and Federal Hazardous Substance Act when used in the workplace in the same manner as normal consumer use
- Any drug, as defined by the Federal Food, Drug, and Cosmetic Act, when sold in final form for patient use

The labeling requirements defined in this program do not apply to the following when regulated by Federal requirements other than 29 CFR 1910.1200 (OSHA Hazard Communication Standard).

- Pesticides as defined by the Federal Insecticide, Fungicide, and Rodenticide Act.
- Food, drugs, cosmetics, or veterinary devices as defined by the Federal Food, Drug, and Cosmetic Act.
- Alcoholic beverages as defined by the Federal Alcohol Administration Act.
- Consumer products or hazardous substances defined by the Consumer Product Safety Act and Federal Hazardous Substance Act.

3.0 DEFINITIONS

"**Article**" means a manufactured item: (i) which is formed to a specific shape or design during manufacture; (ii) which has end use function(s) dependent in whole or in part upon its shape or design during end use; and (iii) which does not release, or otherwise result in exposure to, a hazardous substance, under normal conditions of use.

"**Consumer Product**" means any product intended for sale/use to the general public that is used in the same manner and frequency as a consumer. For example, motor oil purchased in quart containers used to service an Earth Tech vehicle will be considered a consumer product as long as it is used in the frequency (approx. once every 2-3 months) and manner (to change/add oil to a motor vehicle) as intended for consumer use. However, if the project/facility employees a mechanic that uses the motor oil on a more frequent basis (i.e. as part of her/his normal job) then the motor oil will NOT be considered a consumer product.

"**Container**" means any bag, barrel, bottle, box, can, cylinder, drum, reaction vessel, storage tank, or the like that contains a hazardous substance. For purposes of this procedure, pipes or piping systems, and engines, fuel tanks, or other operating systems in a vehicle, are not considered to be containers.

"**Exposure**" or "exposed" means that an employee is subjected to a hazardous substance in the course of employment through any route of entry (inhalation, ingestion, skin contact or absorption, etc.), and includes potential (e.g., accidental or possible) exposure.

"**Foreseeable emergency**" means any potential occurrence such as, but not limited to, equipment failure, rupture of containers, or failure of control equipment which could result in an uncontrolled release of a hazardous substance into the workplace.

"**Hazardous substance**" means any substance, not excluded by section 2.0 of this procedure, which is a physical hazard or a health hazard.

"**Hazard warning**" means any words, pictures, symbols, or combination thereof appearing on a label or other appropriate form of warning which convey the hazard(s) of the substance(s) in the container(s).

"**Health hazard**" means a substance for which there is statistically significant evidence based on at least one study conducted in accordance with established scientific principles that acute or chronic health effects may occur in exposed employees. The term "health hazard" includes substances which are carcinogens, toxic or highly toxic agents, reproductive toxins, irritants, corrosives, sensitizes, hepatotoxins, nephrotoxins, neurotoxins, agents which act on the hematopoietic system, and agents which damage the lungs, skin, eyes, or mucous membranes as defined at 29 CFR 1910.1200.

"**Immediate use**" means that the hazardous substance will be under the control of and used only by the person who transfers it from a labeled container and only within the work shift in which it is transferred.

"**Label**" means any written, printed, or graphic material, displayed on or affixed to containers of hazardous substances.

"**Material Safety Data Sheets (MSDS**)" means any technical data sheets which contain chemical identities, physical and chemical characteristics, physical hazards, health hazards, primary routes of entry, OSHA permissible exposure limits (whether chemical is listed as a carcinogen), precautions for safe handling and use, applicable control measures, emergency and first aid procedures, date of MSDS preparation, and name, address, and telephone number of manufacturer or importer. If no relevant information is found for any given section on the MSDS, that section shall not be left blank. It should be marked to indicate that it is not applicable or that no information was found.

"**Physical hazard**" means a substance for which there is scientifically valid evidence that it is a combustible liquid, a compressed gas, explosive, flammable, an organic peroxide, an oxidizer, pyrophoric, unstable (reactive) or water reactive.

"**Work area**" means a room or defined space in a workplace where hazardous substances are produced or used, and where employees are present.

"**Workplace**" means an establishment, job site, or project, at one geographical location containing one or more work areas.

4.0 PROCEDURE

4.1 Designation of a Responsible Person

Each Earth Tech office and project will have an identified *Responsible Person* who will implement the requirements of the Hazard Communication Program.

- For each office, the Section Manager will appoint the Responsible Person, in writing.
- For each project, the Project Manager (or designated subordinate) will be assigned the duties for the Responsible Person.

4.2 Hazardous Substance Inventory

All hazardous substances found in a particular workplace shall be listed on a Hazardous Substance Inventory (HSI). The HSI will be reviewed at least annually. New hazardous substances entering a workplace (e.g., project-specific materials) shall be added to the HSI upon receiving and reviewing the MSDS. The HSI includes the following information:

- Product name
- Chemical name (if different from product name)
- Manufacturer's name
- Approximate typical quantity
- Location of substance (i.e., work area)
- Description of use

An example HSI format is provided as Attachment 1. A copy of the most current HSI, along with the corresponding MSDS and a copy of this program (or site-specific program), will be available for review by all employees. The name of the material (product or chemical) on the HSI must be consistent with the MSDS for that material.

4.3 Material Safety Data Sheets

Earth Tech does not manufacture, package or distribute hazardous commodities. However, as an end user Earth Tech must maintain hazard documentation for each hazardous substance used on each job site. This documentation will take the form of a listing of all on-site hazardous substances, and copies of manufacturer-developed Materials Safety Data Sheets (MSDSs) for each listed item.

A MSDS shall be available for every hazardous substance used or stored on each job site (this does not include MSDSs for known or suspected environmental contaminants, the hazards of which are addressed on project-specific SH&E documentation). Copies of all MSDSs will be maintained on-site in either a dedicated folder/binder, or as part of the project-specific SH&E documentation. All site personnel will be briefed as to the location of the MSDSs, and will have immediate access to examine any MSDS at any time during their work shift.

MSDSs received for consumer products, articles and other materials not covered by this procedure will be maintained and made available to employees.

For on-going projects, each MSDS associated with a material no longer in use will be marked as obsolete and the date it was obsolete. At the completion of any project the accumulated MSDSs will be maintained as part of the project records. **NO MSDS ASSOCIATED WITH ANY PROJECT WILL BE DESTROYED**.

Employees are required to report any hazardous substance found at the project site that is not on the list of hazardous substances. The report is to be made to the project/site manager.

If no MSDS accompanies a hazardous substance, the manufacturer, distributor, or importer will be immediately notified and requested to provide one as soon as possible. The request will be documented in a letter or telephone log. If this request is not honored, the SH&E Department will be notified.

When purchasing hazardous substances, the verbal or written purchase order will request an MSDS be sent with the shipment. For each facility and/or project, the MSDS will be kept along with the HSI in a location that is readily accessible to all employees at all times during their work periods. Additionally, the MSDSs and HSI will be available to employees for review in such a way so that the assistance of a supervisor is not necessary.

4.3.1 New Information

Whenever a new or revised MSDS is received, such information shall be provided to employees on a timely basis not to exceed 30 days after receipt.

4.4 Training

4.4.1 Hazard Communication Course Content – General Training

Due to the nature of our business, the information and training provided to Earth Tech employees with regard to hazard communication will take two forms: general and specific. General training and information will include the following:

- The elements and requirements of the OSHA Hazard Communication standard (29 CRF 1910.1200).
- Tasks and operations where hazardous substances are present.
- The location and availability of the written Hazard Communication Program, including the list(s) of hazardous substances and MSDSs.
- The methods and observations that may be used to detect the presence or release of a hazardous substance, such as personal and area monitoring, continuous monitoring devices, visual appearance or odor of hazardous substances when being released, etc.
- The physical and health hazards of the substances in the work area, and the measures they can take to protect themselves from these hazards, including specific procedures implemented for the project or shop to protect employees from exposure to hazardous substances, such as appropriate work practices, emergency procedures, and personal protective equipment to be used.
- The project- or shop-specific details of the Hazard Communication Program, including an explanation of the labeling system and the MSDSs, and how employees can obtain and use the appropriate hazard information.
- Information regarding hazardous substances to which employees may be exposed, according to the provisions of the OSHA Hazard Communication standard.
- Information for their physician to receive regarding hazardous substances to which the employee may be exposed according to provisions of this section.
- Freedom from discharge or other discrimination due to the employee's exercise of the rights afforded pursuant to the provisions of the Hazardous Substances Information and Training Act.

4.4.2 Facility-Specific Hazard Communication Training

Specific information regarding safe handling and use of hazardous materials found on the HSI will be presented during site specific training programs. This training may be for specific hazardous materials or for groups of hazardous substances, including flammable/combustible liquids, compressed gases, organic solvents, corrosives, and toxic metals. Additional specific training will be provided to the affected employees any time a new hazardous substance is introduced into the workplace (e.g., project specific substances) and/or when an employee is reassigned. All training conducted will be documented and copies of the documentation included in the permanent project files.

4.4.3 Training Records

The minimum required information required to be maintained at the jobsite or project is as follows:

- Training agenda
- Name of attendees
- Signature of attendees
- Date and duration of training
- List of any audio visual aids used
- Name & Signature of instructor
- Project or facility (specific training only)
- Copies of any tests and/or quizzes

4.5 Labels

4.5.1 General

- All hazardous substances received from outside suppliers will conform to legal requirements and display on each container, as a minimum, the following:

  a. Identification of the hazardous substance(s);
  b. Appropriate hazard warnings such as an HMIS and/or NFPA-type label (see 5.5.2 below).; and
  c. Name and address of the manufacturer, importer, or other responsible party.

  Any failure to have a label on the container at the time of receipt will be cause to refuse delivery of the product.

- Stationary process containers may have signs, placards, process sheets, batch tickets, operating procedures, or other written material in lieu of fixed labels on the containers, as long as the alternative method conveys hazard information. The written materials will be readily accessible to the employees in the work area.
- Although the practice is not recommended, if an employee will use the hazardous substance in a portable container immediately, the portable container need not be labeled when the substance is transferred from the labeled container. The term “immediate use” is intended to mean that the hazardous chemical will be exclusively under the control of and used by the person performing the transfer at all times, and work will be completed within the current work shift.
- Containers of hazardous substances transferred from labeled containers and not intended for the immediate use of the employee performing the transfer must be labeled in accordance with a hazardous materials identification system or an equivalent commercial system.
- Labels on incoming containers will not be removed or defaced.

- Labels or other forms of warning will be legible, in English, and prominently displayed on the containers, or readily available throughout each work shift.
- Container size is not the determining factor in deciding if a label is required; ALL containers of hazardous chemicals must be labeled.

4.5.2 NFPA Labeling System

The National Fire Protection Association (NFPA) and the Hazardous Material Identification System (HMIS) are two examples of a four-part, color-coded label for use with hazardous substances. NFPA labels use a four-section diamond shape while the HMIS uses or a four-line label to address the following conditions:

BLUE Section	~~~	Health Hazard Rating
RED Section	~~~	Fire Hazard Rating
YELLOW Section	~~~	Reactivity Hazard Rating
WHITE Section	~~~	Other specific hazards

Each of the three “rating” sections incorporates a numerical system for identification of the degree of hazard as follows:

0 - Minimal hazard
1 - Slight hazard
2 - Moderate hazard
3 - Serious hazard
4 - Severe hazard

Each of the systems utilize “pictograms” to communicate potential hazards in the WHITE or “OTHER” hazard section.

4.5.3 Pipes / Vessel Labeling

All pipes or piping systems in a treatment system, and all process vessels containing hazardous substances, must be labeled or color coded using facility specific color coding for which all affected employees have been trained. The Project Manager (PM) is responsible for ensuring that this is accomplished at each project site.

4.5.4 User

Each user shall ensure that each container of hazardous substances in the workplace is labeled, tagged, or marked with the following information:

- Identity of the hazardous substance(s) contained therein, and
- Appropriate hazard warnings.

4.5.5 Receiving

Employees receiving shipments of hazardous substances shall not accept the shipment, but return it to the shipper, if the containers are not properly labeled with the following information:

- Identity of the hazardous substance(s);
- Appropriate hazard warnings; and
- Name and address of the manufacturer, importer, or other responsible party.

4.6 Trade Secrets

4.6.1 Non-Emergency Access to Trade Secret Information

Each Responsible Person who obtains an MSDS that claims trade secret information shall forward a copy of that MSDS to the SH&E Director. The SH&E Director will submit a written request to the supplier explaining that the information is needed for one or more of the following reasons, as applicable:

- To assess the hazards of the substances to which employees may be exposed;
- To guide appropriate sampling of the workplace atmosphere to determine employee exposure levels;
- To conduct pre-assignment or periodic medical surveillance of exposed employees;
- To provide medical treatment to exposed employees;
- To guide the selection of appropriate personal protective equipment for exposed employees;
- To guide the development of appropriate engineering controls or other protective measures for exposed employees; and
- To conduct studies to determine the health effects of exposure.

The request includes an agreement to protect the confidentiality of the disclosed information with assurance that the trade secret information will not be used for any purpose other than evaluating health hazards.

The SH&E Director will provide such information as necessary to coordinate an industrial hygiene evaluation of employee exposures. If this involves releasing trade secret information, the SH&E Director will sign a nondisclosure agreement before receiving such information.

Employees working with materials protected by a trade secret have access to the MSDS, which does not have protected information.

4.6.2 Emergency Access to Trade Secret Information

Emergency access to trade secret information is provided through the SH&E Director and Earth Tech's Occupational Physician. Where a physician or nurse determines that a medical emergency exists and the specific chemical identity of a hazardous substance is necessary for emergency or first-aid treatment, the SH&E Director shall request that the manufacturer, importer, or other supplier immediately disclose the specific chemical identity of a trade secret substance, regardless of the existence of a written statement of need or a confidentiality agreement. The manufacturer, importer, or other supplier may require a written statement of need and confidentiality agreement, in accordance with the provisions of OSHA's Hazard Communication standard, as soon as circumstances permit.

4.7 Visitors

4.7.1 Escorted Visitors

Visitors to the work area who have not received a Hazard Communication briefing on the substances present in the work area must be escorted the entire time they are in the work area to ensure that they do not contact and are not harmed by the hazardous substances.

4.7.2 Unescorted Visitors

The supervisor must ensure all visitors who enter the work area unescorted receive a Hazard Communication briefing before encountering any of the hazardous substances in the work area.

4.7.3 Subcontractors

All Earth Tech subcontractors will be required to provide a copy of their written hazard communication program and documentation of training to the Earth Tech project manager. This information will be maintained in the permanent project file. In the event that a subcontractor does not have a written program and/or the employees do not have the appropriate training, the situation must be rectified prior to allowing subcontractor employees to perform work activities in a work area containing a hazardous substance.

4.7.4 Multi-Employer Worksites

In order to inform contractors of the hazardous substances that their employee's may be exposed to which are under the control of Earth Tech, a copy of the HSI and applicable MSDSs will be made available to them. This may be accomplished by providing the contractor with direct access to the existing Earth Tech file or by providing them with copies of the necessary information. Additionally, the Earth Tech project manager will request a list of hazardous substances, with their location, and MSDSs for those items which Earth Tech employees may be exposed. This request will be made from the client, any Earth Tech subcontractors, and any other client contractors which may impact Earth Tech operations. The response to this request shall be covered in the project specific training and maintained along with the Earth Tech HSI and MSDSs.

4.8 Written Program

4.8.1 Hazard Communication in Health and Safety Plans

All Health and Safety Plans or equivalent documents written for projects will contain all the elements of the Hazard Communication Program. MSDSs for hazardous substances at the project site will also be included.

4.8.2 Location-Specific Hazard Communication Programs

Each Earth Tech location where hazardous substances are present shall develop a Hazard Communication Program in accordance with OSHA's Hazard Communication regulation, this procedure, and location-specific work rules. The location-specific Hazard Communication Program must address all elements outlined in Attachment 2 of this procedure and be in writing. In addition, certain state regulatory provisions require additional information to be included in a hazard communication program. These state-specific requirements must be identified by the project/office manager and included in the final program.

Attachment 2 is a template that can be used in developing facility specific Hazard Communication Programs. While the template is not mandatory, all elements addressed in Attachment 2 must be included in all final programs.

5.0 PROCUREMENT

No hazardous substance may be purchased for use on an Earth Tech-managed job site unless it:

- Is accompanied by a copy of the item’s MSDS (unless already on file on the job site)
- Is packaged with proper hazardous commodity hazard warning labels affixed to each container.

All hazardous substances, even those purchased at local stores, must be accompanied with a MSDS. If a vendor cannot provide a MSDS at the time of procurement, the material should not be purchased.

6.0 REFERENCE

SH&E 002 – Corporate SH&E Structure and Responsibilities
SH&E 203 – Accident Prevention Program / Requirements for SH&E Documentation

7.0 ATTACHMENTS

Attachment 1 – Hazardous Material Inventory Template
Attachment 2 – Hazard Communication Program Template

Attachment 1: Hazardous Material Inventory

Product Name	Chemical Name	Manufacturer	Quantity	Location	Usage[1]
OVM/HNu Calibration Gas (Isobutylene in Air)	100 ppm isobutylene in air	Varies (MSA, Scott Specialty Products, others)	$\leq$300 ft^3	Varies (usually stored in site trailer or with other compressed gases)	D, B
LEL/O_2 Calibration Gas (Pentane and Oxygen in Nitrogen)	0.75% pentane and 15% oxygen in balance nitrogen	Varies (MSA, Scott Specialty Products, others)	$\leq$300 ft^3	Varies (usually stored in site trailer or with other compressed gases)	D, B
OVA Calibration Gas (Methane in Air)	100 ppm methane in air	Varies (MSA, Scott Specialty Products, others)	$\leq$300 ft^3	Varies (usually stored in site trailer or with other compressed gases)	D, B
Hydrogen Gas	99.9999% hydrogen gas	Varies (check with Site Manager or HSSO)	$\leq$300 ft^3	Varies (usually stored outside of site trailer with other compressed gas cylinders)	O, B

[1] Usage Legend

D = Daily	F = Field; I = In-House; B= Both; S = Storage
O =Occasionally	

Attachment 2: Hazard Communication Program

Site Name: _____

Location: _____

1. The individual with overall responsibility for the implementation of this Hazard Communication Program at this site is: _____

   Responsibilities of key staff and employees with regards to Hazard Communication program at this will be as follows:

   a. Project Manager is responsible for:

   b. Operations Manager/Area Supervisors are responsible for:

   c. Individual employees are responsible for:

2. Inventory of hazardous substances is attached and also located:
   _____

3. Material Safety Data Sheets (MSDSs) for all hazardous substances are located at:
   _____

4. Employees may review MSDSs and the standard by following this procedure:
   _____
   _____

   MSDSs not on hand, that are requested by employees, will be requested of suppliers within 7 days by letter.

5. The MSDS file is updated with new information and new hazards identified by: _____, every _____weeks.

   Out of date or missing MSDS are obtained and maintained in the files by: _____ within _____ days of the review.

6. Any new hazards will be reported immediately to: _____
   _____ and affected employees notified within 30 days.

7 Containers of hazardous materials entering the site will be checked by _____
   _____ to assure that they are properly labeled with the chemical name of the contents, the appropriate hazard warning, and the name and address of the supplier or manufacturer.

8. Onsite containers of hazardous materials will be labeled with the chemical name and hazard warning. Exceptions must be approved by _____
   _____

   The following exceptions have been approved

   -
   -

9. Non-routine tasks at this location involving hazardous materials may include the following:

   -
   -

   Procedures for complying with the Hazard Communication Standard for these jobs are the following:

   -

Attachment 2: Hazard Communication Program

-
-

10. Employee training is provided initially to all employees and for all new employees. This training covers the following areas:
    a. The basic requirements of the Hazard Communication Standard and their right to information on chemical hazards.
    b. Our company's program to comply with the standards and procedures to follow to see the standard, company program, and MSDSs.
    c. How to interpret and use the labels on containers of hazardous materials.
    d. The potential physical hazards and health effects of the hazardous substances and how to use MSDSs for more information.
    e. How to handle the hazardous substances safely and other protective measures in place.
    f. What to do in an emergency, release, or over-exposure to the chemicals.
    g. How the presence of hazardous chemicals can be detected in the work area.
11. This training is documented in the following manner: _____

    _____

    Records are maintained at the following location: _____

    _____
12. Training concerning new hazards (new chemicals or new information on MSDSs) will be provided within 30 days and documented.
13. Periodic refresher training will be provided and documented as follows:

    -
    -

14. Outside employees (subcontractors and visitors) will be advised of chemical hazards at our site in the following manner: _____

    _____

    Contractors will be required to provide information on any chemicals used at this site as a condition of their contract.
15. An internal review or audit of Hazard Communication program is conducted by _____ every _____ months and results of audit are maintained at _____ for review.

Our company relies on the information contained in MSDSs as permitted by the OSHA Hazard Communication Standard and does not perform independent hazard determinations.

Reviewed and approved:

_____ _____
SH&E Department Date

_____ _____
Project Manager Date

EarthTech A Tyco International Ltd. Company **Safety, Health & Environmental Procedure**	PROCEDURE NO. SH&E 116 DATE March 25, 2005 REVISED January 3, 2007
Driver and Vehicle Safety	PREVIOUSLY EHS 116

This procedure applies to all U.S.-based personnel, projects, offices, business units and activities. Any exceptions to this procedure must be approved, in writing, by the responsible District/Business Unit Manager and Safety Manager.

1.0 PURPOSE

This procedure establishes the minimum requirements for safe operation of a motor vehicle while conducting company business. The procedure is also designed to promote driver and vehicle safety.

2.0 SCOPE

This procedure applies to Earth Tech U.S. operations. The procedure applies to the operation of all motor vehicles on company business including personally owned vehicles (POV) and vehicles that are owned, rented and/or leased by the company or provided to Earth Tech for business use by a client. Additional requirements for the operation of commercial motor vehicles are provided in SH&E 117 - Commercial Vehicle Program.

3.0 PROCEDURE

3.1 Authorized Drivers

1. Section Managers are responsible for authorizing individuals to operate vehicles on company business. In order to be authorized, individuals must be employees and must be at least 18 (non-commercial license) or 21 (commercial license) years of age and have a current driver's license for the class of vehicle that they will be authorized to operate.
2. Only Authorized Drivers are permitted to operate motor vehicles on company business. Authorized drivers will be classified by their Section Managers into two groups based on the frequency of driving a company vehicle and the degree of impact a poor driving record will have on their employment with Earth Tech. The designations are "Casual" (uses a motor vehicle infrequently, e.g., once per week) and "Designated" (uses a vehicle daily, e.g., to meet clients, travel to sites, etc.). The classification of Casual or Designated will influence driver history review and training requirements (see Sections 3.2 – 3.3).
3. Each Section Manager must maintain a current list of Authorized Driver's and submit the list to Human Resources (HR) any time it is updated.
4. Authorized Drivers must review this procedure and complete a Driver's Information Form (Attachment-1). Current Driver's Information Forms must be on file with HR prior to operating a motor vehicle.
5. Authorized Drivers shall report any conviction (work-related or not work-related) for driving under the influence of drugs and/or alcohol to their Section Manager and Human Resource Consultant (HRC) immediately. Additionally, any change in the status of an Authorized Driver's license (i.e. suspension, revocation, limitation, etc.) shall be reported to the HRC immediately. The HRC will report any of the above to the HR Manager immediately.

3.2 Driver's History Review and Insurance Requirements

1. HR, assisted by local Office Administrators, will obtain an updated Driver's Information Form from each Authorized Driver on an annual basis. The Office/Section Manager will audit this process annually.
2. The motor vehicle record[1] (MVR) of Designated Drivers will be reviewed annually and at any other time at the discretion of the company. Casual Drivers will have an MVR check every three years. Continued classification of an Authorized Driver depends on the employee maintaining a safe driving record as defined by the chart in item 5, below.
3. HR will submit an updated Authorized Driver list on an as-needed basis to Wheels, Inc. (or current vendor selected by the company) in order to have newly classified Authorized Driver MVRs pulled for review and added to the annual MVR program. Wheels, Inc. will in turn provide HR with a summary of the employees' driving records. HR will also provide an annual list of Authorized Drivers and driver's license numbers to Wheels, Inc., for review.
4. Under the Fair Credit Reporting Act, a summary of an employee's MVR will be provided confidentially to that employee for review upon request. The employee may dispute any inaccurate information on a driving record. However, it is ultimately the responsibility of each employee to ensure that the information contained in his or her vehicle driving record file is accurate.
5. During an MVR review, based on the number of points assigned to an employee by the Wheels, Inc. "Safety First Scoring System" over the last three-year period, HR and the employee's Section Manager will implement the appropriate corrective actions as outlined in the table below:

3-Year Point Total[2]	Action	Follow-up Action
3-6	Warning letter to driver.	---
7-9	Warning letter to driver. Management/ HR discuss driving performance with employee.	MVR re-checked and evaluated in 6 months.
10-12 (With no single violation greater than 3 points)	Warning letter to driver. Management/ HR discuss driving performance with employee.	Driver completes National Safety Council Defensive Driver Training or other course approved by HR and Supervisor. MVR re-checked and evaluated in 6 months.
10-12 (with at least one violation 5 points or greater)	Warning letter to driver with loss of Authorized Driver status. Management/ HR discuss driving performance with employee.	Loss of "Authorized Driver " status until completion of National Safety Council Defensive Driver Training, or other course approved by HR and Supervisor, and District Manager, Regional Manager, District Safety Manager, and Human resource Consultant concur with reinstatement. MVR re-checked and evaluated in 6 months
13+	Warning letter to driver with immediate loss of Authorized Driver status. Management/ HR discuss driving performance with employee.	District Manager, Regional Manager, District Safety Manager, and Human Resource Consultant review driver's history and determine appropriate remedial action.

[1] The MVR from the state in which the employee is a resident of.

[2] The 3-year point total represents Earth Tech's point scoring system based on the table above and may differ from an individual State's MVR point scoring system. For the purposes of this Standard Operating Procedure, your classification as an Authorized Driver will be dependent upon Earth Tech's scoring system.

Notes: The following represents example violations, with corresponding points assigned to driver.					
1 Point:	■	Using equipment on vehicle prohibited by law	5 Points:	■	Speeding 20 mph+
	■	Violation of gross weight limits		■	Reckless, careless or negligent driving
				■	Driving too fast for conditions – hazardous
				■	Speeding in school zone
2 Points	■	Following too closely	10 Points	■	Accident, preventable
	■	Improper lane usage		■	DUI
	■	Seatbelt violation		■	License suspended
3 Points	■	11-19 mph over posted speed limit		■	Death by motor vehicle
				■	Theft of motor vehicle
	■	Driving wrong direction or down wrong side of street		■	Leaving scene of accident

3.3 Training

1. New employees classified as Designated Drivers must complete a Defensive Driving Training (DDAT) course (i.e., Earth Tech intranet-based DDAT, PureSafety, Earth Tech-approved "brown bag," or other Earth Tech-approved course) and the Earth Tech Employee Safety Orientation Program prior to operating a motor vehicle on company business.
2. Existing employees classified as Designated Drivers must complete a Defensive Driving Awareness course every two years. Existing employees newly classified as Designated Drivers that have not completed the above training must do so within 30 days of designation.
3. Designated Drivers whose primary job duty involves driving a motor vehicle (i.e., vehicle operation is part of the job description or their enrollment in the Earth Tech Commercial Vehicle Program), or Designated Drivers that are permanently assigned a company owned/leased vehicle, shall complete the National Safety Council 4-hour web-based Defensive Driving Course, or equivalent, in place of the Defensive Driving Awareness course described above, every two years.
4. Section Managers may require their Casual Drivers to participate, as warranted, in additional training and classes.
5. Training records and refresher due dates will be maintained by the Earth Tech eTracking system with the Section Environmental, Health and Safety Administrator (EHSA) providing reminders to affected employees.

3.4 General Requirements

1. Company-owned/rented/leased vehicles are for official company business use only. No personal use of any kind is permitted unless approved by the District or Business Unit Manager. Official company use includes normal transportation use for employees on travel status.
2. Authorized Drivers must hold a valid state operator's license appropriate to the type(s) of vehicles they may be driving.
3. Authorized Drivers shall comply with all federal, state and local traffic laws and client regulations concerning vehicle operation.
4. Any vehicle used for company business must have the appropriate registration and automobile liability insurance required by the state in which the vehicle is registered. This includes POVs if the employee is required to drive on company business. Personal vehicle insurance and registration is the responsibility of the employee. Copies of fleet vehicle registration and insurance can be obtained by calling Wheels at (866) 258-8022.

5. All vehicles used on company business must be equipped with seat belts. Drivers and occupants of all vehicles shall use seat belts.
6. No employee shall drive on company business when: under the influence of alcohol or illegal drugs; specifically restricted by a medical provider; injuries or illnesses could prevent safe operation; or a temporary personal condition (i.e. fatigue, emotional state, etc.) could prevent safe operation.
7. Earth Tech employees may work/drive for up to a maximum combined total of 16 continuous hours during a work shift. This period must be followed by at least 8 hours of rest before resuming any work-related driving activity.
8. Unless specific approval is provided in a project safety plan and/or approved Task Hazard Analysis, vehicle motors shall not be left running when the vehicle is unattended.
9. Unless required (such as on a client's property), keys will not be left in an unattended vehicle.
10. No motorcycles or private aircraft shall be operated by employees on company business unless specifically authorized by a Division President. The use of all-terrain vehicles (ATVs) and/or other motorized vehicles not specifically designed for over-the-road use (excluding heavy equipment) must be approved in a project safety plan and/or Task Hazard Analysis.
11. Analytical samples or glass items shall be transported in vehicles in accordance with 49 CFR regulations.
12. No personnel will be allowed to ride in a pickup truck cargo bed unless it has been equipped to transport personnel.
13. Report missing or defective safety equipment to management and obtain replacement equipment before driving the vehicle.
14. Maintain vehicles in clean and orderly condition.
15. Ensure that the vehicle does not exceed its weight capacity.
16. Smoking is not permitted in company vehicles.
17. While operating a motor vehicle on company business, employees are **specifically prohibited from**:
    - Disabling any safety device including seat belts and air bags.
    - Carrying passengers in vehicles unless those passengers are Earth Tech employees, contractors, or customers with legitimate business reasons for being in the vehicle. The Authorized Driver's Section Manager must approve, in writing, any deviation from this requirement.
    - Allowing any unauthorized personnel to drive company vehicles at any time.
    - Overloading and/or overcrowding vehicles.
    - Picking up hitchhikers.
    - Carrying firearms or other weapons in any company vehicles.
    - Transporting placardable quantities of hazardous materials and/or hazardous wastes unless written authorization by the District or Business Unit Manager and District Safety Manager is obtained. Transporting small quantities of hazardous materials must be done in accordance with SH&E 601 – Hazardous Materials Shipping and as applicable SH&E 117 – Commercial Vehicle Program.
    - Operating any vehicle that is in unsafe operating condition.
    - Using portable computers or similar devices such as a Blackberry or Personal Digital Assistant (see also Section 3.7 of this procedure, regarding cellular phones/wireless communication).
    - Being under the influence of alcohol, drugs, or other controlled substances.

- Driving after taking any prescription or over-the-counter medication that may cause drowsiness, dizziness, or other side effects or that could affect the ability to safely and effectively operate a motor vehicle.
- Using a company vehicle for any purpose in violation of federal, state, or local laws.
- Smoking or using a cell phone while refueling.

3.5 Site Vehicles and Equipment

1. Material-handling equipment such as mobile cranes, forklifts, winch trucks, front-end loaders, tractors, etc., are not permitted to transport passengers. The requirement for these types of equipment is covered by other safety procedures and regulations (see the U.S. Operation's SH&E Manual).
2. Passengers shall ride with all portions of their bodies inside the truck body or frame.
3. Passengers shall be in the seated position, with the seat belts in place, before the vehicle is set in motion.
4. Riding on a vehicle's bumper or tailgate is prohibited.
5. Tailgates will be closed before the vehicle is operated unless carrying an extended load that is properly tied down and flagged.
6. Passengers are not permitted to ride in the body of a dump truck or in the bed of a pickup truck.
7. Passengers are not permitted to ride on top of the load or to hold materials to prevent shifting, etc.
8. If a vehicle is not designed to accommodate passenger transportation, it must not be used for that purpose.
9. Drivers transporting passengers will follow the posted or specified speed limit and traffic rules established for the project.
10. Truck operators will use chocks when parking on slopes or grades.

3.6 In Case of Accident

In case of an accident, regardless of who is injured, whose property is damaged, or who owns the vehicle, the Authorized Driver shall:

a) Stop.

b) Call for medical assistance in case of personal injuries.

c) Provide your name, address, driver's license number, and vehicle insurance information.

d) Obtain the following:

   a. Name, address, telephone number, drivers license number and state of issue, and insurance information of the other parties involved,
   b. Name and contact information for any other vehicle occupants,
   c. Year, make, and model of any other vehicles involved,
   d. Name and contact information for any witnesses.

e) Promptly notify your supervisor.

f) Notify Earth Tech Safety Department by utilizing the **1-800-348-5046** telephone support number. The Safety Department will assist in reporting all accidents to our insurance carrier (when necessary), and in requesting support for collision repair from our Fleet Management vendor.

g) Complete section 1 of the Earth Tech Supervisor's Report of Incident and a Vehicle Accident Report (Attachment - 2) and submit to your supervisor as soon as possible in accordance with SH&E 101 - Injury, Illness and Near Miss Reporting.

A laminated card outlining the pertinent reporting procedures listed above will be maintained in the glove box of all company-owned/leased vehicles.

3.7 Cellular Phones/Wireless Communications

While operating a motor vehicle on company business, employees are prohibited from using wireless communication devices where specifically regulated by law or regulation. Additionally, where no specific laws or regulations apply to the use of wireless communication devices while operating a vehicle, Authorized Drivers are prohibited from using these devices while driving unless legally parked or unless the device is in a hands-free mode and/or mounted so that its use does not require the driver to divert their eyes from traffic.

3.8 Safety Inspections

Authorized Drivers are responsible for verifying that any vehicle they operate on company business is in a safe operating condition. In addition to any required state or local vehicle inspection/registration process and routine manufacturer inspections, the following safety items/systems, at a minimum, should be verified to be in working order prior to operation:

- Seat belts
- Doors and door locks
- Headlights and tail-lights
- Rearview mirrors and side mirrors
- Turn signals
- Backup lights
- Horn
- Backup alarms, if applicable
- Parking break
- Speedometer (as soon as possible after operation)
- Steering
- Windows (operate correctly and are clean and free of damage that may interfere with the driver's vision)
    - Windshield wipers and windshield washer fluid
    - Windshield defrosters and rear window defrosters (if any)
    - Defroster/Defogger
    - Tire pressure and tread wear within manufacturer's specified limits

A checklist is provided in Attachment – 3 and can serve as an example to document the vehicle inspection. An inspection of the vehicle should be completed prior to operation to identify problems related to safe operation. Any items identified on the checklist as deficient must be reported to the EHSA or Fleet manager (or other designated individual in your section). If any condition prevents an item from working properly, or if the Authorized Driver deems the vehicle unsafe, the vehicle must be repaired before it is used for company business. Where the condition is such that the Authorized Driver believes the vehicle may be operated safely, the vehicle may be driven to a local service facility for repairs.

4.0 ACCIDENT REVIEW BOARD

4.1 Accident Review Board and Disciplinary Action

In accordance with company requirements, an investigation of vehicle accidents involving company-owned/leased/rented vehicles, and POVs used on company business, may be conducted to determine causal agents and circumstances. If the investigation results in the recommendation that disciplinary action be taken toward the driver, an Accident Review Board will be convened to review the facts and recommend appropriate action. The Board will, at a minimum, consist of the responsible District or Business Unit Manager, District Safety Manager, and HRC. Recommendations developed by the Board will be provided to the responsible Division President for final consideration. Disciplinary action may include, but is not limited to the following (see chart in Section 3.2 of this procedure):

a) Loss of Authorized Driver status
b) Additional driver safety training
c) Suspension without pay
d) Termination of employment

Under the following situations, Authorized Driver status **will automatically be revoked**:

a) Accidents or legal action involving drugs and/or alcohol (i.e., DUI)
b) Driving without a valid license
c) Hit-and-Run driving/leaving the scene of an accident
d) Unauthorized use of a company owned/leased/rented vehicle (i.e., using a company vehicle for personal use)

Under the following situations, Authorized Driver status **may be revoked**:

a) Two or more accidents involving the same driver within a 12-month period
b) Multiple speeding tickets or multiple violations of the Motor Vehicle Code
c) Multiple complaints from a member of the public or fellow employees regarding driving performance
d) Any accident caused by an Authorized Driver where damages exceed $5,000

Once Authorized Driver status is revoked it may only be reinstated by concurrent agreement from the District or Business Unit Manager, District Safety Manager, and HRC.

5.0 SECURITY

Vehicles must be secured in a safe place and locked whenever unattended and the keys removed (unless prohibited by site-specific policy). Never leave company credit cards in an unattended vehicle. Keep sensitive materials and computers out of sight.

6.0 REFERENCES

- SH&E 101 - Injury, Illness, and Near Miss Reporting
- SH&E 102 - Incident Investigation & Review
- SH&E 114 - Safety Training Programs
- SH&E 117 - Commercial Vehicle Program

7.0 ATTACHMENTS

- Attachment 1 - Driver's Information Form for Operation of Vehicle on Company Business
- Attachment 2 - Vehicle Accident Report
- Attachment 3 - Vehicle Inspection Checklist
-

Driver's Information Form

Policy

All employees who operate a vehicle on company business must comply with the Earth Tech Driver and Vehicle Safety Program (SH&E 116). Violation of this policy is subject to disciplinary action up to and including termination of employment.

Personal Certification and Authorization

I certify that I have a valid driver's license and authorize Earth Tech, its agents, and/or insurance carriers to verify my motor vehicle record.

I further certify that I have read and understand the Earth Tech Driver and Vehicle Safety Program (SH&E 116) and agree to comply with its requirements.

If my driver's license is suspended and/or revoked for any reason, I will notify my Earth Tech supervisor as soon as possible and will **NOT OPERATE ANY VEHICLE ON COMPANY BUSINESS**.

Print Legibly

Name: _____ _____ _____ Date of Birth: _____
First Middle Last

License Number: _____ State: _____ Class: _____

Employee Signature: _____ Date: _____

(*Photocopy the employee's driver's license below. All information on the license must be legible. If necessary, copy both sides of the license.*)

Autorized Driver Classification: Designated (*Primary Job*) Designated Casual
(*Circle one of the above)*

Section Manager Approval: _____ Section Manager Name: _____
(*Signature*) (*Print Name*)

Section/Department Number: _____ Office Location: _____

☐ CDL (Gross Weight ≥ 26,001 lbs) ☐ CMV only (Gross Weight ≥ 10,000-26,000 lbs) (*Check as Applicable*)

Vehicle Accident Form

1. Supervisor calls the Earth Tech Incident, Injury and Near Miss Reporting Line **(800) 348-5046**
2. Supervisor completes the Supervisor's Report of Incident first, and then completes this form.
3. Fax both forms to Earth Tech Safety at (804) 515-8313 and submit forms to manager. Call with questions regarding management of any claim (804) 515-8557.

Section 1

Earth Tech Vehicle was:	☐ Earth Tech Owned		☐ Leased	☐ Rented	☐ Employee Personal Vehicle
Check all involved:	☐ Earth Tech Vehicle		☐ Another Vehicle(s)	☐ A pedestrian	☐ Property
Check all that apply:	☐ Accident	☐ Near Miss	☐ No vehicle damage	☐ Vehicle damage	☐ Vandalism/unknown cause of damage

Section 2 – Incident

Date/Time of Incident:	What was Vehicle Being Used For? ☐ Business ☐ Personal
Explain purpose for vehicle use at the time of incident/near miss (travel, client visit, site visit, field work, etc) and indicate travel origin/destination:	
Intersection/Highway of Incident/Near Miss with Closest Cross Street/Exit. If Exact location is known provide address, city, state, zip:	
Description of Incident/Near Miss:	

Section 3 – Earth Tech Driver

Earth Tech Driver Name			☐ Check if the driver is in the Earth Tech DOT program
Drivers License #	State Issued		Expiration Date
Vehicle Year/Make/Model		License Plate # and State	VIN Number

Is the Vehicle Damaged? ☐ Yes ☐ No If yes, list area(s):	Estimated Amount of Damage: ☐$0-$500 ☐$500-$1000 ☐$1000-$5000 ☐ more than $5000 ☐Total Loss
Were Authorities contacted? ☐ Yes ☐ No	If so, who responded?
Any Citations Issued? ☐ Yes ☐ No	What citation and to whom?

Section 4 – Other Driver

Name of Other *Driver*	Address City, State, Zip		
Home Phone:	Work Phone:	Cell Phone:	
Date of Birth	Drivers License #	State Issued	Expiration Date
Vehicle Year/Make/Model	VIN Number	License Plate # and State	
Name of Insurance Carrier	Policy Number		
If *Vehicle Owner* is different from Driver please complete Owner Information:	Owner Name		
	Address, City, State, Zip		
	Home Phone:	Work Phone:	Cell Phone:
Is the Vehicle Damaged? ☐ Yes ☐ No If yes, list area(s):	Estimated Amount of Damage: ☐$0-$500 ☐$500-$1000 ☐$1000-$4000 ☐ more than $5000 ☐Total Loss		

Section 5 - Signatures

Supervisor

Print Name	Signature	Date	Telephone
Comments:			

Manager

Print Name	Signature	Date	Telephone
Comments:			

Safety, Health, & Environmental Professional

Print Name	Signature	Date	Telephone
Comments:			
Administrator:			*AL:* ☐ *Yes* ☐ *No*

Supervisor - Signature by the immediate supervisor of the individual involved in the vehicle accident.

Manager – Signature by the Department / Section Manager

Safety, Health, & Environmental Professional – Signature by the Safety Professional

Vehicle Inspection Checklist

Vehicle _____ **Month** _____

Description	Date	Initials
Windshield (chips, cracks)	1	
	2	
Fluids (oil, fuel, windshield washer, brake, steering, etc.)	3	
	4	
Brakes	5	
	6	
Tires (tread, pressure)	7	
	8	
Appearance (scratches, dents)	9	
	10	
Lights (driving, parking)	11	
	12	
Interior (obstructions)	13	
	14	
Exterior (signage, bed, tie downs)	15	
	16	
Weight of Cargo	17	
	18	
Trailers (connections, lights, weight)	19	
	20	
Safety (locks, door closure, safety belts, windows,	21	
chocks)	22	
	23	
Job Site	24	
	25	
Free Release	26	
	27	
	28	
	29	
	30	
	31	

Discrepancies Noted	Date	Initials	Reported To

EarthTech A tyco International Ltd. Company **Safety, Health & Environmental Procedure**	PROCEDURE NO. SH&E 118 DATE March 25, 2005 REVISED December 1, 2006
Confined Space Entry Program	PREVIOUSLY EHS 511 / ENV 113

This procedure applies to all U.S.-based personnel, projects, offices, business units and activities. Any exceptions to this procedure must be approved, in writing, by the responsible District/Business Unit Manager and Safety Manager.

1.0 PURPOSE

Earth Tech personnel will not enter any confined space until it has been evaluated, classified, and (if necessary) has had a specific entry procedure developed. Personnel performing such entries will meet training requirements specified below.

2.0 DEFINITIONS

Confined Space - is a space which:

- Is large enough and so configured that an employee can physically enter and perform assigned work; and
- Has limited or restricted means for entry or exit; and
- Is not designed for continuous human occupancy.

There are two types of confined spaces:

Permit-Required Confined Space (PRCS) – a confined space that exhibits one or more of the following properties:

- Contains or has a potential to contain a hazardous atmosphere;
- Contains a material that has the potential for engulfing an entrant;
- Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section; or
- Contains any other recognized serious safety or health hazard.

Non-Permit Required Confined Spaces (NPRCS) - Spaces that do not contain or, with respect to atmospheric hazards, have the potential to contain any hazard capable of causing death or serious physical harm. These spaces do not require specific entry procedures.

Non-permit-required confined spaces can be designated only by a Certified Industrial Hygienist, Certified Safety Professional, Earth Tech Safety Manager or Professional Engineer after review of the space(s), historical monitoring data, and other factors (e.g., injuries that have occurred). Therefore, all confined spaces will be considered permit-required unless specifically designated as a non-permit space, in writing, on the approved confined space inventory listing.

Entry – The action by which a person passes through an opening into a confined space. Entry is considered to have occurred as soon as any part of the body breaks the opening of a confined space

3.0 CLASSIFICATION OF CONFINED SPACES

3.1 Identification of Confined Spaces

All confined spaces under the control of Earth Tech that may be entered will be identified, evaluated and classified on a Confined Space Inventory Listing (Attachment 1 or equivalent). The inventory listing shall be updated as required, at a minimum annually.

3.2 Labeling

1. All permit-required confined spaces will be labeled so that employees are adequately warned of the potential for hazardous conditions/atmospheres. Labeling is not required under the following circumstance:

    a. The spaces are easily recognizable, numerous, and widely spaced (e.g., storm sewer manholes). Employees will be instructed that these constitute confined spaces during required training. However, these locations will be included on the inventory.
    b. A complete inventory has been developed, all personnel have been trained in the use of the inventory, and the workers consult the inventory prior to performance of any work that may require entry into a confined space.

2. When non-permit-required confined spaces require the implementation of confined space entry procedures because of specific work operations (e.g., painting, welding), all entry points will be labeled so as to alert all employees of the existence of the hazardous conditions. These signs will be removed only when the hazard no longer exists (e.g., complete curing of the paint).

3.3 Classification of Confined Spaces

For each identified confined space, an evaluation to determine the nature and extent of all possible hazards to entrants must be conducted. Consideration will be given to the following types of hazards:

- The presence of possible airborne contaminants at concentrations exceeding established occupational exposure limits (OELs)
- The presence of any physical hazards (e.g., electrical shock, mechanical injury, etc.)
- The presence of flammable or explosive conditions
- The presence of any potential for rapid flooding or engulfment
- Configurations/positioning that may cause an entrant to become trapped
- Initial classification as either a PRCS or NPRCS

The evaluation will be documented using the *Confined Space Hazard Assessment* form found in Attachment 2.

Wherever the confined space is controlled by a client or third-party, the controlling entity should be contacted to provide the information necessary to complete the evaluation. However, if Earth Tech personnel are required to enter a confined space owned or controlled by others, the final evaluation will remain the responsibility of responsible Earth Tech manager.

4.0 CONFINED SPACE ENTRY DUTIES

4.1 Entry Supervisor

1. Understand the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure;
2. Verify following before signing the permit and allowing entry to begin;
   a. Appropriate entries have been made on the entry permit;
   b. All tests specified by the permit have been conducted;
   c. All procedures and equipment specified by the permit are in place.
   d. Means of communication are available and have been tested.

Terminate the entry and cancel the permit when entry operations are complete or when a prohibited condition arises.

Verify rescue services, when required, are available and the means for summoning them are operable.

Remove unauthorized individuals who enter or who attempt to enter the permit space during entry operations.

Ensure that entry operations remain consistent with terms of the entry permit and that acceptable entry conditions are maintained.

Withdraw the entry permit and stop all entries if unsafe conditions are reported during any confined space entry. He/she will not permit same or any other entry until cause of unsafe conditions is thoroughly investigated and Confined Space program is reviewed to prevent reoccurrence.

4.2 Attendant

1. Understand the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure
2. Be aware of the possible behavioral effects of hazard exposure in the Authorized Entrants;
3. Maintain an accurate count of Authorized Entrants in the permit space and ensure the means used to identify Authorized Entrants accurately tracks who is in the permit space;
4. Remain outside the permit space during entry procedures until relieved by another Authorized Attendant;
5. Communicate with Authorized Entrants as necessary to monitor entrant status and to alert Entrants of the need to evacuate the space
6. Monitor activities inside and outside the space to determine if it is safe for Entrants to remain in the space. Orders the Authorized Entrants to evacuate the permit space under any of the following conditions:
   a. The Attendant detects a problem.
   b. The Attendant detects the behavioral effect of hazard exposure in an Entrant,
   c. The Attendant detects a situation outside the space that could endanger the Entrant, and
   d. If the Attendant cannot effectively and safely perform all of his/her assigned duties.
7. Summon rescue and other emergency services as soon as the Attendant determines that Entrants may need assistance to escape from permit space hazards;

8. Take the following actions when unauthorized persons approach or enter a permit space while entry is underway:
   a. Warn the unauthorized persons they must stay away from the permit space;
   b. Advise unauthorized persons they must exit immediately if they have entered the permit space; and
   c. Inform the Authorized Entrants and the Entry Supervisor if unauthorized entrants have entered the permit space.
9. Perform non-entry rescues as specified within this program; and
10. Perform no other duties that might interfere with the Attendant's primary duty to monitor and protect the Authorized Entrants.

4.3 Authorized Entrant

1. Understand the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure
2. Properly use personal and facility equipment as required by the entry permit;
3. Communicate with the Attendant as necessary to enable the Attendant to monitor Entrant status and to enable the Attendant to alert Entrants of the need to evacuate the space;
4. Alert the Attendant whenever a recognized warning sign or symptom of exposure to a dangerous situation or a prohibited condition exists;
5. Exit from the permit space as quickly as possible whenever:
   a. An order to evacuate is given by the Attendant or the Entry Supervisor; or
   b. When the Entrant recognizes any waning sign or symptom of exposure to a dangerous situation; or
   c. When the Entrant detects a prohibited condition; or
   d. When an evacuation alarm is activated.

4.4 Rescue Service (if designating an outside service)

Prior to authorizing entry into any confined space, Site (Project) Manager should:

1. Evaluate a prospective rescuer's ability to respond to a rescue summons in a timely manner (within 3 minutes for life threatening situations or 15 minutes for non-life threatening injuries), considering the hazard(s) identified;
2. Evaluate a prospective rescue service's ability.
3. Select a rescue team or service from those evaluated that:
   a. Has the capability to reach the victim(s) within a time frame that is appropriate for the permit space hazard(s) identified [as defined in 4.4 (1) above];
   b. Is equipped for and proficient in performing the needed rescue services;
   c. Inform each rescue team or service of the hazards they may confront when called on to perform rescue at the site; and
   d. Provide the rescue team or service selected with access to all permit spaces from which rescue may be necessary so that the rescue service can develop appropriate rescue plans and practice rescue operations.

4.5 Rescue Service (if designating internal rescue team)

Prior to authorizing entry into any confined space, Site (Project) Manager should:

1. Provide affected employees the required personal protective equipment (PPE) and train them in its use;
2. Train affected employees to perform assigned rescue duties;
3. Train affected employees in basic first-aid and cardiopulmonary resuscitation (CPR) (at least one member shall hold a current certification in first aid and CPR); and
4. Ensure that affected employees practice making permit space rescues at least once every 12 months.

4.6 Facilitating Non-Entry Rescue

1. Retrieval systems or methods shall be used whenever an authorized entrant enters a permit space (unless the retrieval equipment would increase the overall risk of entry).
2. Retrieval systems shall meet the following requirements:
    a. Each authorized entrant shall use a chest or full body harness with a retrieval line attached at the center of the entrant's back near shoulder level or other suitable locations as appropriate.
    b. The other end of the retrieval line shall be attached to a mechanical device (mandatory for more than 5 feet deep rescue) or fixed point outside the permit space.

5.0 PRCS-Specific Entry Procedures

To protect employees during PRCS entries, and to meet the requirements of 29 CFR 1910.146, Earth Tech-specific PRCS entry procedures will be developed for each PRCS to be entered. Each entry procedure will detail:

- The identity of the PRCS(s) to which the procedure applies;
- Details concerning the potential hazards associated with the entry operation/PRCS;
- Pre-entry preparation:
    - Required air monitoring equipment;
    - PPE;
    - Required emergency response/extraction equipment;
    - Required ventilation procedures (as applicable);
    - Required isolation procedures (as applicable);
    - Rescue agency notification requirements (as applicable);
- Required pre-entry monitoring procedures and applicable at-entry re-classification criteria
- Air monitoring procedures during entry (if re-classification has not occurred);
- PPE requirements during entry (if re-classification has not occurred);

Specific entry procedures can be documented by following the procedures in sections 5.1 through 5.4 of this procedure and by completing a Task Hazard Analysis (NAC&E) or Work Plan (NACO) in combination with a completed Confined Space Hazard Analysis and Confined Space Permit.

5.1 PRCS Pre-Entry Procedure:

Prior to the start of the entry operation the Entry Supervisor will assign individuals on the entry team to the following jobs:

- Entrant – the person entering the PRCS
- Primary Attendant[1] - the person dedicated only to assisting the entrant, observing the entry operation and maintaining communications with the entrant throughout the entry procedure.
- Secondary Attendant for Rescue Procedures – an employee assigned either to specific support of the entry operation or working nearby who can assist with rescue operations in the event of an accident. This person can perform other duties unrelated to observing the entry.

The Entry Supervisor is responsible for ensuring that the individuals assigned to each job fully understand their duties and responsibilities prior to initiating the entry operation. The Entry Supervisor will review the complete entry procedure with all team members prior to the work. The Entry Supervisor will also verify the availability of rescue services.

Additional requirements for Pre-Entry Planning include the following:

- Select the appropriate equipment to measure the potential hazards. Select a multi-gas meter capable of measuring oxygen, combustible gas (%LEL), and other Hazardous Gases.
- Determine the acceptable values for the hazardous conditions being measured, based on the equipment in use and the field calibration method. The action levels are determined as follows:

▪ Oxygen	19.5% - 23.5%
▪ Lower explosion limit	10%
▪ Hydrogen sulfide	5 ppm
▪ Carbon monoxide	15 ppm
▪ Other toxic chemicals	Contact Health and Safety Department

- Ensure all the equipment selected is calibrated, and calibration is still valid.

Personnel trained in accordance with this procedure shall perform field verification of equipment as follows:

1. Calibrate combustible gas meters using appropriate span gas for the detectors to be used. (This span gas calibration shall be performed each time the instrument is turned on).
2. Check detector tube pumps for leakage using the manufacturer's procedures.
3. Calibrate Photo ionization detectors (PID) using isobutylene, or other material, in accordance with the manufacturer's directions.
4. Calibrate any other instrumentation to be used in accordance with manufacturer's directions.

Set up barricades around the space being entered as required.

[1] Note: The Entry Supervisor can serve as the Primary or Secondary Attendant, but cannot perform work as the PRCS Entrant.

Set up required rescue or retrieval systems.

Institute required lockout/tagout procedures (i.e. electrical, steam, liquid flow-pipe blanking)

Ensure that a second person (trained as entry attendant) is available, and assists in the set up procedures.

Agree upon a means of communication between the entrant and the attendant. (The attendant is not authorized to perform rescue involving entry into the space, unless he/she is trained for rescue and another entry attendant replaces him/her prior to the attempt to rescue).

Attendant must have a means to contact emergency rescue services for further assistance.

Complete Confined Space Entry Permit:

1. Have the attendant verify the completion of the required actions;
2. Entry supervisor shall sign the Permit upon verification of completed actions;
3. Maintain the Permit at all authorized entry sites until completion of the entry;

5.2 PRCS Entry Permits

A PRCS Entry Permit is required to be completed for each individual PRCS entry operation (Exception: Multiple entries of an *individual PRCS* during a single work shift can be covered by a single Permit). The Permit provides the means for documenting:

- The identities and roles of all individuals involved in the entry operation.
- Equipment used for performance of the entry (monitoring instruments, extraction equipment, etc.).
- Pre-entry and operational monitoring results.
- Other relevant workplace conditions or events related to the entry operation (e.g., vault isolation procedures).

The Permit also provides the documented basis for re-classification of any PRCS as non-permit required (for purposes of the particular entry operation) based upon pre-entry monitoring procedures. Each Permit will be signed and authorized by the Entry Supervisor. At the completion of the entry operation, the Permit will be filed as part of the project records.

A copy of Earth Tech's PRCS Entry Permit form is provided in Attachment 3 and an example of Earth Tech's Confined Space Entry Classification Guidance is provided in Attachment 4.

5.3 PRCS Entry Procedure

- Don any required PPE.
- Check the area around the seal to ensure that no flammable situations exist prior to door or cover removal. Note: ***Always check for oxygen levels first if the meter does not measure simultaneously. Low oxygen levels can cause LEL readings to be incorrect.***
- Carefully remove any access doors or covers.
- Upon removal of the access cover/door, check the immediate atmosphere using remote testing procedures to ensure the immediate atmosphere is safe. If any of the parameters being tested are outside the action level, do not enter.

- If necessary, use exhaust ventilation to either remove the contaminant(s) or to correct the oxygen-deficient atmosphere.

- If the initial test(s) are within allowable ranges, slowly enter the space, continually testing the atmosphere in front and to the sides.

- In stratified atmospheres (i.e., vertical entries), testing will be done 4 feet in advance of the direction of travel. Travel speed will allow for adequate instrument response time.

- The entire area where work is to be performed will be tested prior to performance of any work.

- While performing the work, place the direct read instruments in a location that will not interfere with the work, allow for continual monitoring, and allow for noting any alarms that may be activated.

- Upon work completion, pick up all equipment and leave the space.

5.4 PRCS Exit Procedure

- Replace all access covers.

- Ensure all signs are visible and legible.

- Remove all lockout/tagout equipment.

- Note on the Permit any problems encountered while in the space.

- Finish the Permit and turn it in to the Entrant Supervisor.

- The Entrant Supervisor will inspect the Permit for completion and investigate any noted problems. Actions taken to correct noted problems will be discussed with all authorized entrants and attendants for future implementation.

- The completed Permit will be maintained on file as required in this section.

6.0 NON-PERMIT REQUIRED CONFINED SPACE ENTRY PROCEDURE

DEFINITION: ***NON – PERMIT CONFINED SPACE*** (***NPCS***) is a confined space that:

1. Does not contain any hazard capable of causing death or serious physical harm.
2. With respect to atmospheric hazards, does not have the potential to contain any hazard capable of causing death or serious physical harm.

Persons entering this type of space only need to complete a confined space entry permit and remain vigilant about conditions in the space and remember that if any condition changes or if hazards are introduced into the space (e.g. welding/cutting operations), the classification and entry procedures in the space may change.

6.1 NPCS Entry Procedure

1. Check the atmosphere with the gas detector for Oxygen, LEL and other Hazardous gases (e.g. CH_4, H_2S, CO) in the same order prior to entry into the space.

2. Record the measured conditions on the permit and do not allow entry if detected levels are above action levels.

3. When entrance covers are removed, guard the opening to prevent an accidental fall through the opening and to protect each employee working in the space from foreign objects entering the space.

4. Proceed with entry and work with caution.

6.2 NPCS Post Entry Procedures

The following post-entry procedures must be followed after the completion of a non-permit required confined space entry:

1. Replace all access covers.

2. Ensure all signs are visible and legible.

3. Remove all lockout/tagout equipment, if applicable

4. Note any problems encountered while in the space on the Permit.

5. Finish the permit, and turn in to the entrant supervisor.

6. The entrant supervisor shall inspect the Permit for completion, and investigate any noted problems. Actions taken to correct noted problems shall be discussed with all authorized entrants and attendants for future implementation.

7. The completed Permit shall be maintained in record for annual review.

7.0 ALTERNATE ENTRY PROCEDURES

DEFINITION: An Alternate-Procedure Confined Space (APCS) is a confined space where:

1. The only hazard posed by the space is either an actual or potential hazardous atmosphere;
2. Continuous forced air ventilation alone can be used to maintain the space for entry; and
3. Monitoring and inspection data has been obtained to support this assertion.

Alternate entry procedures allow for entry into a confined space without the need for attendant or emergency extraction equipment. In addition, a full Confined Space Permit is not required to be completed; only documentation (e.g., logbook) as to who entered, when entered, and what the atmospheric measurements were prior to entry is required.

In order to use alternate entry procedures for a given space, the confined space will initially be designated as a permit-required confined space, and full entry procedures as required above will be implemented. After collection of sufficient data, a review of the air monitoring data will be performed. If the data shows all air sampling data is within acceptable ranges and/or below the substance action levels, and it is confirmed that there is no other anticipated hazard, then the space can be designated as Alternate-Procedure Confined Space (APCS) entry.

Entry into alternate-procedure confined spaces will still require the entrant to perform initial atmospheric testing prior to entry, as well as periodic measurements while inside the space.

If the measured atmospheric contaminant levels exceed established criteria, the employee will exit the space, and will not re-enter. Subsequent entry into that or similar confined spaces will only be permitted after completing following conditions:

- Thorough review of confined space program and the process of determining APCS to establish root-cause for the contaminant.
- Documentation and reporting of the incident as serious near-miss.
- Complete elimination of the root-cause that resulted into unsafe condition.
- Subsequent entry into the confined space to be done using full permit-required entry procedures until effectiveness of the control is established.

7.1 APCS PRE-ENTRY CERTIFICATION AND ENTRY PROCEDURE (8-STEP PROCESS)

1. Eliminate any conditions making it unsafe to remove an entrance cover.

2. When entrance covers are removed, guard the opening.

3. Before an employee enters the space, test the internal atmosphere with a calibrated direct-reading instrument, for oxygen content, for flammable gases and vapors, and for potential toxic air contaminants, in that order (if meter does not read simultaneously).

4. All employees who enter the space shall be provided an opportunity to observe this pre-entry testing.

5. Confirm there is no hazardous atmosphere within the space whenever any employee is inside the space.

6. Setup and manage the continuous forced air ventilation system as follows:

   a. Do not allow entry into the space until the forced air ventilation has eliminated any hazardous atmosphere;

   b. Direct the forced air ventilation to ventilate the immediate areas where an employee is or will be present within the space.

   c. Continue ventilating the space until all employees have exited from the space; and

   d. Obtain the air supply for the forced air ventilation from a clean source.

7. Periodically test the atmosphere in the space to make sure the continuous forced air ventilation is preventing the accumulation of a hazardous atmosphere.

8. If a hazardous atmosphere is detected during entry:

   a. Instruct each employee to exit the space immediately and withdraw all confined space entry permits.

   b. Evaluate the space to determine how the hazardous atmosphere developed;

   c. Review Confined Space Program to ensure its continued effectiveness and do not authorize any new entries until program is evaluated to be still effective.

   d. Implement measures to protect employees from the hazardous atmosphere before any subsequent entries are permitted.

Verify engulfment hazards are controlled by making sure that all pumps and lines and/or laterals that may reasonable cause water/wastewater to flow into the space have been disconnected, blinded, and locked out, or effectively isolated by other means to prevent the development of engulfment.

Verify all energy is controlled by making sure that all sources of electrical, hydraulic, pneumatic, and the potential for gravitational energy have been effectively identified and locked out or isolated.

Verify Communications have been established via radio, mobile phone, or other device prior to entry. The communications need to be with a central source such as Operations Manager or Supervisor.

Verify the space is safe for entry and the pre-entry measures listed above have been complete.

7.2 APCS Post Entry Procedures

The following post-entry procedures must be followed after the completion of a Alternate confined space entry procedure:

1. Replace all access covers.
2. Ensure all signs are visible and legible.
3. Remove all lockout/tagout equipment.
4. Note any problems encountered while in the space and record on Alternate Procedure Form.
5. The entrant supervisor shall inspect the Alternate Procedure Form for completion, and investigate any noted problems. Actions taken to correct noted problems shall be discussed with all authorized entrants and attendants for future implementation.
6. The completed Alternate Procedure Form shall be maintained for a period of one year or more.

8.0 MULTI-EMPLOYER ENTRY RESPONSIBILITIES

Earth Tech's Requirements - When using another employer to perform work involving confined spaces, Earth Tech must:

1. Inform the contractor that the workplace contains permit spaces and that permit space entry is allowed only through compliance with a permit space program meeting the requirements of CFR 1910.146;
2. Appraise the contractor of the elements, including the hazards identified and all past experiences with the space, that make the space in question a permit space;
3. Appraise the contractor of any precautions or procedures that have been implemented for the protection of employees in or near permit spaces where contractor personnel will be working;
4. Coordinate entry operations with the contractor, when both Town employees and contractor employees will be working in or near permit spaces so that employees of the Town and the contractor do not endanger each other; and
5. Debrief the contractor at the conclusion of the entry operations regarding the permit space program followed and regarding any hazards confronted or created in permit spaces during entry operations.

Contractor Requirements - In addition to complying with the permit space requirements that apply to all employers, each contractor who is retained to perform permit space entry operations must:

1. Obtain any available information regarding permit space hazards and entry operations from the plant superintendent (or Project Manager);
2. Coordinate entry operations with the plant superintendent (or Project Manager) when both Earth Tech personnel and contractor personnel will be jointly working in or near permit spaces; and

3. Inform Plant Superintendent (or Project Manager) of the permit space program that the contractor will be using and of any hazards confronted or created in permit spaces, either through debriefing or during entry operations.

9.0 CONFINED SPACE ENTRY TRAINING

Personnel participating in the entry of any confined space must first complete initial confined space entry training equivalent to their assigned duties. In addition, personnel will receive site-specific training covering confined space entry procedures associated with the work site.

9.1 Initial Training

Personnel will not be permitted to perform entry of any confined space prior to completing this training. The training will be administered or approved by the SH&E Department, and will consist of the following elements:

- Orientation regarding the differences between a confined space and a permit-required confined space (PRCS).
- Review of applicable regulatory requirements (29 CFR 1910.146).
- Review of this procedure
- Air monitoring instrumentation calibration and monitoring methods.
- Use of respiratory protection and PPE during PRCS operations.
- Entrant duties during NPRCS and PRCS entries.
- Attendant duties during PRCS entries:

  Includes all the above plus:

  - Emergency notification requirements
  - Emergency response procedures
  - Maintaining the list of Authorized Entrants
  - Applicable state requirements for Attendants (i.e. Michigan-specific requirements)
- Entry Supervisor duties during PRCS entries:

  Includes all of the above plus:

  - Accident and problem investigation techniques
  - Recordkeeping requirements

Initial training is intended only to qualify personnel to perform the duties of general confined space entry . This training must be supplemented by site/procedure-specific training prior to any new entry operation.

Refresher training is required any time there is a change in the overall program or procedures or when, based on observation or incident, a substantial non-compliance with this procedure is noted.

9.2 Site/Procedure-Specific Training

Because entry procedures will be specifically developed for individual PRCSs, personnel will require training in the specific procedure(s) prior to on site implementation. Training must be conducted by an authorized supervisor, member of the SH&E Department, or an approved alternate and must be documented.

9.3 Annual Program Review

At least annually, (or whenever any incident or serious near miss occurs due to confined space entry an independent authorized employee who is not involved in the procedure being inspected must conduct and document a review and inspection of the confined space entry program specific to the identified facility. The inspection should include a meeting with authorized employees and any other affected employees.

The inspection procedure must include the following elements.

- Discuss the entry supervisors, entry attendant, entrant, and rescuers (where applicable) responsibilities under the confined space entry program.
- Where confined space permit is used, discuss the entry attendant and entrant employee's responsibilities under the confined space entry program and the limitations of the program.
- If deficiencies are noted during the inspection, corrective actions and retraining of employees, as necessary, must be performed immediately.
- Review of all confined space permits filed during last 12 months. Review should be focused on any deficiencies recorded on the permit, with appropriate root-cause analysis and preventive and corrective actions.
- The inspector shall provide a copy of all inspection documentation to the applicable Earth Tech Manager for review and filing.

These inspections shall at least provide for a demonstration of the procedures and may be implemented through random audits and planned visual observations. These inspections are intended to ensure that the confined space program is being properly and consistently implemented.

10 RECORDKEEPING

- Inventories of confined spaces will be maintained until one year past project completion.
- Cancelled and completed Confined Space Entry Permits will be maintained for a minimum of one year.
- Any airborne measurements that represent employee exposure will be maintained in accordance with SH&E 111 Employee Exposure Monitoring Program.
- All Entry Permits will be reviewed annually by a trained entrant supervisor to determine if procedures are being followed and are adequate to protect employees. If necessary, the entry procedures will be modified to ensure personnel are protected when entering locations.

11.0 REFERENCES

SH&E 111 – Employee Exposure Monitoring Program
SH&E 211 – Walking–Working Surfaces Protection
SH&E 204 – Task Hazard Analyses

12.0 ATTACHMENTS

Attachment 1 – Confined Space Identification Log
Attachment 2 – Confined Space Hazard Assessment Form
Attachment 3 – Confined Space Entry Permit Form
Attachment 4 – Confined Space Entry Classification Guidance

ATTACHMENT 1
FACILITY-SPECIFIC
CONFINED SPACE IDENTIFICATION LOG

Name of Space and Location	Permit Required Confined Space		Alternate Procedure Confined Space		Non-Permit Required Confined Space	
	Y	Initial Date Inventoried	Y	Date Reclassified	Y	Date Reclassified

ATTACHMENT 2
Confined Space Hazard Assessment Form

PART 1. CONFINED SPACE IDENTIFICATION
Confined Space Name:
Dimensions:
Description of Space:
Is this space entered on a routine basis? ☐ Yes ☐ No
Described Tasks and Frequency:

PART II. NATURE OF THE HAZARDS – ASSUMPTIONS: Tanks are empty and clean, all energy sources identified and isolated, and no other hazards are introduced into the spaces. A more formal hazard assessment must be done at time of entry.

Potential Atmospheric Hazards

- ☐ O_2 Deficient /Enriched
- ☐ Combustibles/Flammables
- ☐ CO
- ☐ H_2S
- ☐ Other Toxics

Potential Non-Atmospheric Hazards

- ☐ Contains Material Which Could Engulf Entrant?_____
- ☐ Internal Config. Could Trap Entrant?_____
- ☐ Electrical (live circuits)? _____
- ☐ Mechanical (pipes, linkages)?_____
- ☐ Slick/Residue Covered Surfaces?_____
- ☐ Equipment Preventing Safe Exit?_____
- ☐ Low/Inadequate Lighting?_____
- ☐ Hazardous Chemicals Present? _____
- ☐ Fall Potential?_____
- ☐ Potential for Dropped Objects?_____
- ☐ Multiple Work Groups/Nature of Work_____
- ☐ Other _____

Photo of Space Here...

Attachment 3: Earth Tech PRCS Entry Permit Form

1. Permit space to be entered:_____ Project Name & No.:_____
2. Purpose of entry:_____
3. Good on this date only:_____ From:_____ AM/PM To:_____ AM/PM

Authorized Entrants:	Authorized Attendants:	Entry Supervisor:
_____	_____	_____
_____	_____	_____
_____	_____	_____

5. Hazards within the permit space:_____

6. Permit Space Preparation

1.	Work area isolated with signs/barriers?	_____Yes	_____No
2.	All energy sources locked/tagged out?	_____Yes	_____No
3.	All input lines capped/blinded?	_____Yes	_____No
4.	Permit Space contents drained/flushed/neutralized?	_____Yes	_____No
5.	Permit Space cleaned/purged?	_____Yes	_____No
6.	Ventilation provided 30 minutes before entry?	_____Yes	_____No

7. Initial atmospheric testing.

	Reading	Time	Acceptable level
Oxygen%	_____	_____	_____
LEL	_____	_____	_____
Other Contaminants	_____	_____	_____
Other Contaminants	_____	_____	_____
Other Contaminants	_____	_____	_____

8.

Test (s) To Be Taken	Permissible Entry Levels	Test 1	Test 2	Test 3	Test 4
A. Percent of Oxygen	19.5% to 23.5%				
B. Explosivity	<10% LEL				
C.					
D.					
E.					
Name of Tester					
Test Times					

9. Rescue Services (circle one) On Site Off Site

Phone # for Rescue Services or means of summoning:

_____

_____

10. Communication devices and procedures to be used during entry:

_____

_____

11. Safety Equipment required for entry:

PPE	N/A ( ) YES ( )	Specify_____
Testing Equipment	N/A ( ) YES ( )	Specify_____
Alarm System	N/A ( ) YES ( )	Specify_____
Rescue Equipment	N/A ( ) YES ( )	Specify_____
Other	N/A ( ) YES ( )	Specify_____

12. Additional Permits Required:
Hot work: _____ Yes _____ No
Other: _____ Yes _____ No

13. Permit Authorization
I certify that I have inspected the work area for safety and reviewed all safety precautions recorded on this permit.

Permit Authorization by entry Supervisor (Signature): _____ Date/Time_____

14. Permit Conditions Verification:

Physical conditions at confined space checked and verified to be in accordance with the permit Yes No
If no; please record the deviation observed and corrective action taken:

_____
_____

Verified by : _____ _____ _____
(Entry Supervisor) Date Time

15. Review & Close-out:
Please list problems encountered during entry:

_____
_____

Corrective / Preventive Action Taken:

_____
_____

Additional Precautions / Recommendation for Future Entry:

_____
_____

Based on this review, this confined space shall be considered:

- Permit Required Confined Space Yes No
- Non-Permit Required Confined Space Yes No
- Alternate Procedure Confined Space Yes No

Reviewed By: _____ _____ _____
(Entry Supervisor) Date Time

Attachment 4

Confined Space Entry Classification Guidance											
Facility Name Here											
						METER READINGS					
Confined Space Name	Confined Space Location	Task Description	Permit required confined space	Enter By Alternate Procedure	Enter Following Non Permit Procedure	O2	LEL	H2S	CO	Entry rescue	Non entry rescue

EarthTech A tyco International Ltd. Company	PROCEDURE NO. SH&E 124
	DATE March 25, 2005
Safety, Health & Environmental Procedure	REVISED December 1, 2006
Heat Stress Prevention Program	PREVIOUSLY ESH 506

This procedure applies to all U.S.-based personnel, projects, offices, business units and activities. Any exceptions to this procedure must be approved, in writing, by the responsible District/Business Unit Manager and Safety Manager.

1.0 PURPOSE

Field supervisors are responsible for protecting their workers from heat stress conditions by incorporating protective measures into the work routine. The heat stress prevention procedures below will be implemented whenever the temperature exceeds 75 degrees Fahrenheit for workers in normal work clothing, or 65 degrees Fahrenheit for workers in chemically protective clothing.

2.0 SCOPE

This procedure applies to all Earth Tech projects and operations where personnel work in environments that may cause heat stress.

3.0 DEFINITIONS

Acclimated: Workers who have developed physiological adaptation to hot environments characterized by increased sweating efficiency, circulation stability, and tolerance of high temperatures without stress. Acclimatization occurs after 7 to 10 consecutive days of exposure to heat and much of its benefit may be lost if exposure to hot environments is discontinued for a week.

Chemical Protective Clothing (CPC): Apparel that is constructed of relatively impermeable materials intended to act as a barrier to physical contact of the worker with potentially hazardous materials in the workplace. Such materials include: Tyvek coveralls (all types) and polyvinyl chloride (PVC) coveralls and rain suits.

Un-acclimated: Workers who have not been exposed to hot work conditions for one week or more, or who have become heat-intolerant due to illness or other reasons.

Heat Stress: A common hazard to employees working on projects involving exposure to hazardous substances, most particularly when impermeable protective clothing is used. This problem can occur at ambient temperatures below what is normally considered "hot weather." The body normally sheds excess heat primarily through radiation (capillaries in the skin dilate, transferring heat from the body core to the surface), and evaporation of sweat. Heat stress results when the body's regulating mechanisms are inadequate to dispose of internally generated and externally supplied heat.

4.0 PROCEDURES

4.1 General Requirements

Heat stress can be a significant field site hazard, especially for workers wearing chemically protective clothing (CPC). Site personnel must be instructed in the recognition of heat stress symptoms, the first-aid treatment procedures for severe heat stress, and the prevention of heat stress injuries. Workers must be encouraged to immediately report any heat stress that they may experience or observe in fellow workers. Supervisors must use such information to adjust the work-rest schedule to accommodate such problems.

Wherever possible, a designated break area should be established in an air conditioned space, or in shaded areas where air conditioning is impractical. The break area should be equipped to allow workers to loosen or remove protective clothing, and sufficient seating should be available for all personnel. During breaks, workers must be encouraged to drink plenty of water or other liquids, even if not thirsty, to replace lost fluids and to help cool off. Cool water should be available at all times in the break area, and in the work area itself unless hygiene/chemical exposure issues prevent it.

Workers who exhibit ANY signs of significant heat stress (e.g., profuse sweating, confusion and irritability, pale, clammy skin), should be relieved of all duties at once, made to rest in a cool location, and provided with large amounts of cool water. Anyone exhibiting symptoms of heat stroke (red, dry skin, or unconsciousness) must be taken immediately to the nearest medical facility, taking steps to cool the person during transportation (clothing removal, wet the skin, air conditioning, etc.). Severe heat stress (heat stroke) is a life threatening condition that must be treated by competent medical authority.

4.2 Work-Rest Schedule

The prevention of heat stress is best performed through supervisor observation of employees and routine heat stress awareness training activities. However, it is also necessary to implement a work routine that incorporates adequate rest periods to allow workers to remove protective clothing, drink fluids (vital when extreme sweating is occurring), rest and recover. The frequency and length of work breaks must be determined by the work supervisor based upon the ambient temperature, amount of sunshine, humidity, the amount of physical labor being performed, the physical condition of the workers, and protective clothing being used. See Recommended Guidelines below for more details.

Establishing the Work-Rest Schedule

Earth Tech permits the use of either of two techniques to initially determine an appropriate daily work-rest schedule. These methods are:

- Wet Bulb Globe Thermometer (WBGT) Method – this method is preferred, if a WBGT meter is available.
- Adjusted Temperature Method – this method should be used only if WBGT data is not available.

Either procedure will provide the work supervisor with a recommended routine, however adjustments to this routine may be required to accommodate the specific daily conditions at the work site.

4.3 Guidelines

Table 1, the *Non-CPC Activities WBGT Chart*, is intended for use where personnel are not utilizing CPC. Where workers are required to utilize CPC, Table 2, the *CPC Activities WBGT Chart*, will be used.

WBGT readings (in degrees Fahrenheit - ^{O}F) are compared directly with the values the applicable WBGT Chart for the applicable work rate (where light work corresponds to minimal physical activity besides standing/watching, very heavy work corresponds to significant, continuous physical labor) to determine the work-rest frequency.

Table 1. Non-CPC Activities

Work-Rest Frequency	^{O}F–WBGT			
	Light Work	Moderate Work	Heavy Work	Very Heavy Work
Continuous Work	85	81	78	
75% Work – 25% Rest	86	83	81	
50% Work – 50% Rest	88	85	83	81
25% Work – 75% Rest	90	87	86	85

Modified from ACGIH's 2002 Threshold Limit Values for Chemical Substances and Physical Agents, for acclimatized workers

Table 2. CPC Activities

Work-Rest Regimen	^{O}F–WBGT			
	Light Work	Moderate Work	Heavy Work	Very Heavy Work
Continuous Work	74	70	67	
75% Work – 25% Rest	75	72	70	
50% Work – 50% Rest	77	74	72	70
25% Work – 75% Rest	79	76	75	74

Modified from ACGIH's 2002 Threshold Limit Values for Chemical Substances and Physical Agents, for acclimatized workers

4.4 Adjusted Temperature Method

This method can be utilized where WBGT data is not available, and requires only that the ambient temperature (in degrees Fahrenheit - ^{O}F) be known. Adjustment factors are applied to the ambient temperature to account for departures from ideal conditions (sunny conditions, light winds, moderate humidity and a fully acclimated work force). The adjustments should be made by addition or subtraction to the ambient temperature reading, or changes in table position, as indicated in Table 3. Adjustments are independent and cumulative, all applicable adjustments should be applied. The result is the *Adjusted Temperature*, which can be compared with the values in Table 4 for the applicable work rate (where light work corresponds to minimal physical activity besides standing/watching, very heavy work corresponds to significant, continuous physical labor) to determine the work-rest frequency.

Table 3. Temperature Adjustment Factors

Time of Day	
Before daily temperature peak[1]	+2°F
10 am – 2 pm (peak sunshine)	+2°F

Sunshine	
No clouds	+1°F
Partly Cloudy (3/8 – 5/8 cloud cover)	-3°F
Mostly Cloudy (5/8 – 7/8 cloud cover)	-5°F
Cloudy (>7/8 cloud cover)	-7°F
Indoor or nighttime work	-7°F

Wind (ignore if indoors or wearing CPC)	
Gusts greater than 5 miles per hour at least once per minute	-1°F
Gusts greater than 10 miles per hour at least once per minute	-2°F
Sustained greater than 5 miles per hour	-3°F
Sustained greater than 10 miles per hour	-5°F

Humidity (ignore if wearing CPC)	
Relative Humidity greater than 90%	+5°F
Relative humidity greater than 80%	+2°F
Relative Humidity less than 50%	-4°F

Chemical Protective Clothing (CPC)	
Modified Level D (coveralls, no respirator)	+5°F
Level C (coveralls w/o hood, full-face respirator)	+8°F
Level C (coveralls with hood, full-face respirator)	+10°F
Level B with airline system	+9°F
Level B with SCBA	+9°F and right one column[2]
Level A	+14°F and right one column[2]
Other	Specified in the HASP

Miscellaneous	
Unacclimated work force	+5°F
Partially acclimated work force	+2°F
Working in shade	-3°F
Breaks taken in air conditioned space	-3°F

[1] This adjustment accounts for temperature rise during the day. If the temperature has already reached its daytime peak it can be ignored.

[2] Locate the proper column based on work rate, then move one column to the right (next higher work rate) before locating the corresponding adjusted temperature.

Table 4. Work-Rest Schedule Based on Adjusted Temperature

Work-Rest Schedule	Adjusted Temperature (°F)			
	Light Work	**Moderate Work**	**Heavy Work**	**Very Heavy Work**
No specified requirements	< 80	< 75	< 70	< 65
15 minute break every 90 minutes of work	80 – 90	75 - 85	70 - 80	65 – 75
15 minute break every 60 minutes of work	>90 – 100	> 85 - 95	>80 - 85	>75 - 80
15 minute break every 45 minutes of work	>100 – 110	>95 - 100	>85 - 90	>80 - 85
15 minute break every 30 minutes of work	>110 - 115	>100 - 105	>90 - 95	>85 - 90
15 minute break every 15 minutes of work	>115 - 120	>105 - 110	>95 -100	>90 - 95
Stop Work	**>120**	**>110**	**>100**	**>95**

Note: Time spent performing decontamination or donning/doffing CPC should not be included in calculating work or break time lengths.

4.5 Evaluating the Work-Rest Schedule's Effectiveness

Once a work-rest schedule is established, the work supervisor must continually evaluate its effectiveness through observation of workers for signs/symptoms of heart stress. Measurement of each worker's pulse can provide additional information in determining if the schedule is adequate, and is accomplished as follows:

At the start of the workday each worker's baseline pulse rate (in beats per minute – bpm) is determined by taking a pulse count for 15 seconds and multiplying the result by four. Worker pulse rates can then be measured at the beginning and end of each break period to determine if the rest period allows adequate cooling by applying the following criteria:

- Each worker's maximum heart rate at the start of any break should be less than [180 minus workers age] bpm. If this value is exceeded for any worker, the duration of the following work period will be decreased by at least 10 minutes.
- At the end of each work period all workers' heart rates must have returned to within +10% of the baseline pulse rate. If any worker's pulse rate exceeds this value the break period will be extended for at least 5 minutes, at the end of which pulse rates will be re-measured and the end-of-break criteria again applied.

Recommended Guidelines

The guidelines discussed in this section are intended to be used only as a means for initial establishment of a work/rest regimen.

- The on-site health and safety representative, in consultation with the SH&E Department, will evaluate the conditions at a specific operation and make final determinations of the work/rest regimen.

- Intake of fluid will be increased beyond that which satisfies thirst, and it is important to avoid "fluid debt," which will not be made up as long as the individual is sweating.
- Two 8-ounce glasses of water should be taken prior to beginning work, then up to 32 oz per hour during the work shift; fluid replacement at frequent intervals is most effective.
- The best fluid to drink is water; liquids like coffee or soda do not provide efficient hydration, and may increase loss of water.
- If commercial electrolyte drinks (e.g., Gatorade) are used, the drink should be diluted with water, or 8 ounces of water should be taken with each 8 ounces of electrolyte beverage.
- Additional salt is usually not needed and salt tablets should not be taken.
- Replacement fluids should be cool, but not cold.
- Breaks will be taken in a cool, shaded location, and any impermeable clothing should be removed.
- Dry clothing or towels will be available to minimize chills when taking breaks.
- Manual labor will not be performed during breaks, other than paperwork or similar light tasks.
- Other controls that may be used include:
  - Scheduling work at night or during the cooler parts of the day (6 am - 10 am, 3 pm - 7 pm)
  - Erecting a cover or partition to shade the work area
  - Use of cooling garments (this option is expensive and logistically difficult to implement).

- The health and safety representative will determine the potential for heat stress based on planned activities and weather forecasts.
- If the potential for heat stress exists:
  - All site workers will be informed of the potential for heat stress during the daily safety meeting.
  - The health and safety representative will determine if any workers are at particular risk for heat stress due to illness, etc.
  - The health and safety representative will ensure that sufficient quantities of potable water and electrolyte drinks are available in the decon area and that a shaded rest area is available at or immediately outside the decon area.
  - All workers will drink 16 ounces of water prior to beginning work and at least 16 ounces during each rest period.

- The initial work period and monitoring frequency is set according to the level of risk for heat stress.
- Within the first minute of each rest period, each worker's heart rate (pulse) will be measured, and compared to the following:
  - Initial heart rate: 110 beats/minute (28 beats/15 sec).

Each worker's heart rate will be measured again three minutes later, and compared to the following:

- Recovery heart rate: 80 beats/minute (20 beats/15 sec).

- If both heart rate criteria are met, the subsequent work period may be increased by one third, provided the temperature remains constant.
- If the initial heart rate is > 110 beats per minute, or the recovery rate is not less than 80 beats per minute, the subsequent work shift is decreased by one third.
- Additional means of prevention include:
  - Cooling devices such as vortex tubes or cooling vests can be worn beneath protective garments. If cooling devices are worn, only physiological monitoring will be used to determine work activity.
  - Employees will open or remove chemical protective garments during rest periods.
  - All employees will be informed of the importance of adequate rest and proper diet in the prevention of heat stress.
  - Employees will be informed of the harmful effects of excessive alcohol consumption in the prevention of heat stress.

4.6 Training

Those personnel potentially exposed to heat stress will receive training that is documented in accordance with SH&E 114 - Safety Training Programs.

.

Employees will be trained on:

- Sources of heat stress, influence of protective clothing, and importance of acclimatization
- How the body handles heat
- Heat-related illnesses
- Preventative/corrective measures
- First aid procedures for heat stress

Earth Tech health and safety representatives will be trained on measurement methods and calculations of heat stress indices and establishing work schedules.

5.0 REFERENCES

SH&E 114 Safety Training Programs

EarthTech A tyco International Ltd. Company **Safety, Health & Environmental Procedure**	PROCEDURE NO. SH&E 201 DATE March 25, 2005 REVISED June 18, 2007
General Safety Rules	PREVIOUSLY ENV 201

This procedure applies to all U.S.-based personnel, projects, offices, business units and activities. Any exceptions to this procedure must be approved, in writing, by the responsible District/Business Unit Manager and Safety Manager.

1.0 PURPOSE

This procedure will provide general guidelines that are to implement when executing work in the field. Additionally, it provides references to other applicable procedures that are to be implemented.

2.0 SCOPE

This procedure applies in its entirety to all Earth Tech projects and operations and personnel working on these projects and operations.

General Guidelines

- Each office/project site will have the appropriate labor posters (contact you human resource and SH&E representative or professionals for specifics). Ensure local and state posting are included. At a minimum ensure OSHA's Occupational Safety Health and Act Poster (OSHA 3165) is prominently posted. A source for these forms can be found on the SH&E website at: http://etonline.earthtech.com/etonline/healthsafety/index.asp?contentSRC=/etonline/healthsafety/xml/xhtml/links.xhtml&contentXSL=false&config=topClick&pageTitle=Resources%20>%20Links or http://www.osha.gov/.
- Legible and understandable precautionary labels will be prominently affixed to all containers of chemical raw materials, intermediates, products, by-products, mixtures, scrap, waste, debris, and contaminated clothing, per DOT, EPA, OSHA, or other applicable regulations.
- At least one person qualified in the administration of first aid and cardiopulmonary resuscitation (CPR) will be present at all times at each Earth Tech work site unless exempted by the SH&E Department (Safety Manager). ***Recognized agencies providing training and qualification in First Aid/CPR are the American Red Cross and the American Heart Association.***
- Adequate first aid kits will be provided at each project site. Each kit will be stored in a durable water resistant storage case equipped with handles, and have a means for mounting in place.
- As appropriate, equipment on site will be bonded and grounded, spark proof, and explosion resistant. Ground fault interrupters will be utilized for all electrical equipment.
- Hazards from protruding objects, careless movements, or placement of materials on paths or foot traffic areas present a problem with regard to slips, trips, falls, and puncture wounds. Personnel will use a reasonable amount of effort to keep slip, trip and fall hazards to a minimum.

3.0 EMPLOYEE PERFORMANCE RULES

- Each employee, as a condition of employment, is required to comply with the health and safety procedures and the site safety plan governing in each area the employee is required to work. Project Managers are to review records of each employee to ensure that all requirements are in compliance.
- No one will initiate work on a project involving hazardous materials until appropriate training as required by regulation, contract and/or SH&E procedures have been implemented.
- All employees are directed to immediately bring to the attention of the Site Supervisor or Site Safety Officer any unsafe condition, practice or circumstance.
- The following practices are expressly forbidden during operations on work sites:
    - Smoking, eating, or drinking while on site except in designated areas;
    - Ignition of flammable or reactive materials;
    - Entry on site without proper safety equipment;
    - Conduct of operations on site without backup personnel.
- Employees must report every incident/accident to their supervisor immediately, whether or not anyone is injured. Directions regarding first aid, medical treatment, etc. will be provided by the supervisor.
- Employees may not alter or attempt to repair or service safety equipment unless specifically authorized and qualified.
- An employee must not attempt to move (push, tilt etc.) or lift heavy or bulky objects beyond his capacity. No employee will move or lift more than 49 pounds without aid.
- Possession or use of alcohol, intoxicants or drugs on company premises or job sites is prohibited. Employees may not report for work or perform duties while under the influence of alcohol, intoxicants or drugs. Use of prescription drugs are to be reported to the Site Supervisor and shall not impair the ability of the worker to work safely.
- Walking under or working under a suspended load is not permitted.
- Personnel on site will use the "buddy" system (pairs), working alone on any job site is forbidden unless emergency procedures and communication with the client, PM, and/or Earth Tech office are established prior to initiating site operations. Communication or visual contact will be maintained between crew members at all times.

3.1 General Safe Work Practices

- Anyone known to be under the influence of alcohol, intoxicants, or drugs will not be allowed on the job while in that condition. Additionally, this event will be reported to the individual's supervisor and district human resource representative. The employee is not to return to work until they directed to do so by their supervisor and human resource representative.
- Horseplay, scuffling, and other acts that tend to have an adverse influence on the safety or well-being of the employees are prohibited.
- Work will be pre-planned planned and supervised to prevent injuries while handling materials and working with equipment.
- No one will knowingly be permitted or required to work while the employee's ability or alertness is so impaired by fatigue, illness, or other causes that it might unnecessarily expose the employee or others to injury.

- Employees will not enter confined spaces unless in full compliance with the provisions of SH&E 118 – Confined Space Entry Program.

- No equipment will be operated unless all appropriate guards and safety devices are in place and properly adjusted.

- Crowding, pushing, or shoving when boarding or leaving any vehicle is prohibited.

- A lock or tag installed in accordance with SH&E 119 - Lock Out & Tag Out Program will not be violated.

- To the extent practical, mechanical or powered equipment will be used to handle, lift, or move heavy objects. Manual handling of heavy objects will be kept to a minimum. When muscle power is used to handle heavy objects, the lifts will be planned and assistance obtained to minimize the risk of injury.

- Footwear worn onsite must comply with ANSI Z41 PT91 (must be stamped in or on footwear). Footwear is to be 100% leather, Safety toe, with a minimum ankle cuff of 6 inches.

- Materials, tools, or other objects will not be thrown from buildings or structures until proper precautions (such as materials chutes) are taken to protect others from the falling objects.

- Employees will wash (soap and water) thoroughly before eating, drinking, smoking, or leaving the jobsite. When hazardous materials or hazardous waste are involved, employees will go through appropriate decontamination.

- Workers will observe all safety precautions when using ladders in accordance with SH&E 501 – Ladders.

- Gasoline will not be used for cleaning purposes.

- All sources of ignition will be eliminated from the work area when using flammable solvents.

- No burning, welding, or other hot processes or source of ignition will be applied to any enclosed tank or vessel, even if there are some openings, until it has first been determined that no possibility of explosion exists, and authority for the work is obtained from the foreman or supervisor.

- Any damage to scaffolds, falsework, or other supporting structures will be immediately reported to the foreman or supervisor and repaired before use.

- Wear appropriate gloves when handling materials. Leather work gloves are usually sufficient when handling wood. Special gloves are available for handling broken glass and other especially sharp objects. If the materials are contaminated, wear gloves to protect against the contamination under the work gloves. The chemical-protective gloves must be protected against puncture just as your skin must be protected.

3.2 Use of Tools and Equipment

- All tools and equipment will be maintained in good condition

- Damaged tools or equipment will be removed from service and tagged "DEFECTIVE."

- Pipe or Stillson wrenches will not be used as substitutes for other wrenches.

- Files will be equipped with handles and not used to punch or pry.
- Screwdrivers will not be used as a chisel.
- Wheelbarrows will not be pushed with the handles in an upright position.
- Portable electric tools will not be lifted or lowered by means of the power cord. Ropes will be used.
- Electric cords will not be exposed to damage from vehicles.
- In locations where the use of a portable power tool is difficult, the tool will be supported by means of a rope or similar support of adequate strength.

3.3 Machinery and Vehicles

- Only authorized persons will operate machinery or equipment.
- Loose or frayed clothing, long hair, dangling ties, finger rings, etc., will not be worn around moving machinery or other sources of entanglement.
- Machinery will not be serviced, repaired, or adjusted while in operation, nor will oiling of moving parts be attempted, except on equipment that is designed or fitted with safeguards to protect the person performing the work. Machinery will be locked out and tagged out in accordance with SH&E 119 – Lock Out & Tag Out Program.
- Persons will not work under vehicles supported by jacks or chain hoists, without protective blocking that will prevent injury if the jacks or hoist should fail.
- Air hoses will not be disconnected until the pressure has been bled off the line.
- All excavations will be visually inspected before backfilling to ensure that it is safe to backfill.
- Prior to entry all excavations shall be inspected by a competent person
- Excavating equipment will not be operated near tops of cuts, banks, and cliffs if workers are at risk below.
- Tractors, bulldozers, scrapers, and carryalls will not operate where there is the possibility of overturning in dangerous areas such as edges of deep fills, cut banks, and steep slopes.
- When loading excavated soil/debris, the wheels or treads of loading equipment should be turned in the direction that will facilitate escape in case of dangerous slides or movement of material.

4.0 EMERGENCY PLANNING

- A sufficient number of fire extinguishers, with a minimum rating of 2A:10B:C, will be strategically located throughout the areas where active work is progressing so that travel distance to an extinguisher from any location is less than 75 linear feet. In high hazard areas, this distance may be reduced to ensure a timely response.
- Where work operations involve the on-site handling or use of corrosive materials (strong acids/bases, etc.) or materials which can cause significant eye irritation/damage, a fixed or portable eye wash unit will be located within 10 seconds of the work area. The eyewash unit will

meet the latest requirements of American National Standards Institute (ANSI) Standard Z358.1, and be capable of supplying hands-free irrigation of both eyes for at least 15 minutes at a flow rate of at least 0.4-gallon per minute. At the discretion of the SH&E Department (Safety Manager), and emergency drench shower, meeting the requirements of ANSI Z358.1, will also be provided.

5.0 ADMINISTRATIVE REQUIREMENTS

5.1 OSHA POSTER

Each office and project site has the appropriate OSHA poster (state or federal) posted prominently. A link to an online poster vendor (www.gneil.com) has been provided on the safety homepage at http://etonline.earthtech.com/etonline/healthsafety/index.asp?contentSRC=/etonline/healthsafety/xml/xhtml/links.xhtml&contentXSL=false&config=topClick&pageTitle=Resources%20>%20Links.

5.2 Medical and Training Certificates

Project Managers will review records of each employee to be assigned work on projects involving hazardous substances and ensure that all requirements pertaining to health and safety (such as medical clearance certificates and training certificates) are in compliance.

6.0 BIOLOGICAL

6.1 Dangerous Animals

Snakes and venomous arthropods (e.g., insects, spiders, ticks, scorpions, centipedes, millipedes, and others) create a hazard when their habitats are disturbed. The best defense is to understand where these creatures may be found and either avoid them or kill them before they can cause harm. Should a bite or sting occur, immediately notify your supervisor. First aid should be applied immediately and medical treatment sought as indicated below. Also, personnel allergic to stinging insects are to notify their supervisor and ensure an on-site treatment kit is in place prior to starting work.

6.2 Ticks

Ticks are external parasites of reptiles, birds, and mammals. The bites of some soft-bodied ticks may cause mild paralysis in humans. Ticks transmit many diseases, including Rocky Mountain spotted fever and Lyme disease. Ticks attach themselves to the host only with their mouthparts, and feed on blood. In removing a tick, take care not to leave mouthparts behind. Ticks are best removed by pulling them off with steady, gentle pressure. The pull must be light enough to keep the tick intact. It may take more than 10 minutes of pulling to remove the tick. After the tick is removed, wash the area thoroughly with soap and water, gently scrubbing the area of the tick bite. Check for district specific procedure requirements.

6.3 Ants, Bees, Wasps, Hornets, and Yellow Jackets

Ants, bees, wasps, hornets, and yellow jackets occasionally cause death due to acute allergic reaction. In some cases, the stinging apparatus and venom sac remain at the site of the sting and must be removed. Some relief from the pain can be obtained by applying ice. Soothing lotions, such as calamine, may reduce itching.

If the victim has a history of allergic reactions to insect bites or is subject to attacks of hay fever or asthma, or if he is not promptly relieved of symptoms, call a physician or take the victim immediately to

the nearest location where medical treatment is available. In a highly sensitive person, transport for medical treatment immediately, do not wait for symptoms to appear, a delay can be fatal.

6.4 Dangerous Plants

The most common adverse reactions to plants from occupational exposures are skin irritation/inflammation. The best prevention is avoiding contact with the plants and being aware of dangerous plants native to the area. However, if the skin does contact the plant, the dermatitis may be avoided by prompt removal of the allergen. About 10 minutes are required for the cutaneous penetration of the allergen. Washing with running water is recommended, but avoid the use of soap. Soap removes protective skin oils and may cause or hasten penetration of the allergen. Avoid non-polar solvents, such as alcohol, which may spread the allergen over a wider area. Early application of topical steroids minimizes the severity of the dermatitis. If the face or genitalia are involved, seek professional medical help immediately, within 6 hours of the exposure. Other objects, such as tools or clothing, may carry the allergen. Avoid touching the face or genitalia with unwashed hands. Protective clothing that prevents skin contact should be used when there is unavoidable contact or when working in areas where there is a high likelihood of contact.

7.0 REFERENCES

- SH&E 203 – Accident Prevention Program – Requirements for SH&E Documentation

EarthTech A tyco International Ltd. Company	PROCEDURE NO. SH&E 202
	DATE March 25, 2005
Safety, Health & Environmental Procedure	REVISED June 18, 2007
Safety Meetings	PREVIOUSLY ENV 202

This procedure applies to all U.S.-based personnel, projects, offices, business units and activities. Any exceptions to this procedure must be approved, in writing, by the responsible District/Business Unit Manager and Safety Manager.

1.0 PURPOSE/SCOPE

This procedure will provide general guidelines that are to implement when executing work in the field. Additionally, it provides references to other applicable procedures that are to be implemented.

2.0 PROJECT INITIATION/KICK-OFF

Where specified in the project-specific SH&E documentation (see SH&E 203 - Accident Prevention Program Requirements for SH&E Documentation), a kick-off safety meeting will be conducted prior to the start of field operations, and will involve representatives of all organizations working on the job site. Topics for this meeting will include:

- Communication of all on site SH&E responsibilities and authority.
- Communication of organizational SH&E performance expectations.
- Identification of significant project SH&E issues/hazards and solutions.
- Coordination of organizational SH&E conflicts and interactions.

Refer to SH&E 204 – Task Hazard Analysis for additional information regarding implementation of Task Hazard Analysis (THA) and associated training requirements.

3.0 ON-SITE MEETINGS

Safety meetings will be conducted at all job sites for the following operational milestones:

1. Project Start-up: On the first day of field operations for a new project or a new phase of work.
2. Periodic: On a regular, recurring frequency of not less than once per week (daily meetings are required for HAZWOPER activities).
3. Significant Personnel Turn-over: The start of any workday where a new organization begins work on site or more than 25 percent of the day's work force is new to the site.
4. Accident Recovery: The start of the work day following any accident which results in more than $1000 dollars in property damage or where an injury to one or more personnel requires medical treatment (discuss the accident, its causes and preventive measures).

The meetings will be documented on the *Tailgate Safety Briefing Form Sign-In Log* (Attachment 2).

4.0 SUPPLEMENTAL SAFETY TRAINING

The Project Manager (PM), Site Supervisor (SS) or Site Safety Officer (SSO) will implement worker training on general safety topics as part of routine on-site training activities. Where such training is conducted it will be documented on the *Safety Training Log* (Attachment 3).

5.0 SITE ORIENTATIONS

1. All project employees will receive a safety orientation and training prior to the start of any project and/or task.

2. The PM, SS or SSO will perform the orientation and training. The level of training and method for providing orientation and training will consist of the mandatory items listed in SH&E 114 – Safety Training Programs, and a site specific orientation that will be based on the project specifics, location of the project, and client requirements. The SH&E Department can provide examples of previous orientation material for reference.

3. The depth/level of training will be commensurate with the job function(s) to be performed. Site visitors will receive general orientation and task-specific training.

4. At a minimum, initial employee orientation and training will consist of the items listed below:
   - Identification of hazards associated with the individual's job function and responsibilities.
   - Specific safety procedural instruction needed to perform his or her required job function or task.
   - Content of the HASP and THAs.
   - Other ongoing safety training for specific job functions will be conducted on an "as-needed" basis and required by the Training Needs Assessment program
   - NOTE: In addition to the Project Safety Orientation all Earth Tech employees will receive the Earth Tech safety orientation as found on the Intranet.
   - http://uslgbwll03.earthtech.com/EHandSOrientation/ehs_employee_orientation.html

6.0 SAFETY MEETINGS

Safety meetings will occur on a daily basis prior to the start of field activities. Safety meetings will be conducted by the PM or SS and supplemented by the supervisors of various crafts (labor, equipment operation, foreman, safety).

1. The purpose of these meetings is to allow the project employees an opportunity to maintain a high degree of safety awareness through timely safety education. This training will be used to discuss specific safety topics and obtain employee feedback.
2. The PM and SSO will monitor safety meetings to ensure that subject matter is properly presented.
3. Topics to be discussed will include safety hazards noted during the week and explanation of job safety procedures unique to the project.

4. Other items open for discussion may include, but are not limited to:

   Use of employee personal protective equipment

   Project safety rules

   Employee accidents and incident reviews

   Review of applicable SOPs to job specific activities

   Review of any Safety or Injury Alerts deemed necessary by the District Safety Manager

5. Safety Briefings will be developed by the PM, SS, or SSO. Meetings will be conducted by the PM, SS, or foreman with support from the SH&E Department. Subjects may be obtained from the SH&E Dept.

6. Records of attendance at all employee safety orientation and training provided as part of this procedure will be documented on the Tailgate Safety Briefing Form (attached).

7.0 ATTACHMENTS

Attachment 1 – Tailgate Safety Briefing Sign-In Log

Attachment 2 – Safety Training Log

8.0 REFERENCES

- SH&E 114 – Safety Training Programs
- SH&E 203 – Accident Prevention Program – Requirements for SH&E Documentation
- SH&E 204 – Task Hazard Analysis

Earth Tech
Tailgate Safety Briefing Sign-In Log

Briefing Conducted By:	Signature:	Date:	Time:

Project name:	Project Number:

This sign-in log documents the topics of the tailgate safety briefing and individual attendance at the briefing. Personnel who perform work operations onsite are required to attend each safety briefing and acknowledge receipt of such briefings daily. **Please provide a brief narrative of the following topics as applicable to the Project**

Scope of Work	
HASP / THA review	
SOP Review	
PPE Requirements	
Incident Review Safety Alerts	
Other:	

Personnel Sign-in List

Printed Name and Company	Signature	Printed Name and Company	Signature
1.		7.	
2.		8.	
3.		9.	
4.		10.	
5.		11.	
6.		12.	

Earth Tech
Safety Training Log

Training Conducted By:	Signature:	Date:
Project name:	**Project Number:**	**Time:**

This sign-in log documents the safety training conducted in accordance with various Parts of 29 CFR 1910 and 29 CFR 1926 as well as other applicable regulatory requirements. Earth Tech personnel who perform work activities in field/facility environments are required to attend each safety training session and acknowledge receipt of such training prior to a change in site/facility-specific operations or conditions. Additional training topics and/or regulations can be added to address ongoing site/facility operations. The assigned Manager (i.e., project, construction, response, facility, etc.) is instructed to maintain the completed documents at the facility for review for the duration of the project.

Describe the elements of the training topic below. Use a separate for separate training. This form should be used for specific training (PPE training, Respiratory Protection training, HAZCOM, etc.)

Personnel Sign-in List

Printed Name	Signature	Printed Name	Signature
1.		7.	
2.		8.	
3.		9.	
4.		10.	
5.		11.	
6.		12.	

EarthTech A Tyco International Ltd. Company **Safety, Health & Environmental Procedure**	PROCEDURE NO. SH&E 204 DATE March 25, 2005 REVISED June 18, 2007
Task Hazard Analyses	PREVIOUSLY CP 104

This procedure applies to all U.S.-based personnel, projects, offices, business units and activities. Any exceptions to this procedure must be approved, in writing, by the responsible District/Business Unit Manager and Safety Manager.

1.0 PURPOSE

This procedure establishes the minimum requirements and process for personnel and organizations assigned to Earth Tech-controlled project sites to perform a Task Hazard Analysis (THA) for each identified task that may present a significant risk to worker health and safety.

2.0 SCOPE

This procedure applies in its entirety to all Earth Tech projects and operations unless a variance from its requirements is granted by the SH&E Department.

3.0 DEFINITIONS

THA: Evaluation of the component parts of any method or procedure for the following purposes:

1. To determine the hazards connected therewith and the requirements or qualifications of those who are to perform the work.
2. To identify hazard control methods that may feasibly be applied.
3. To implement solutions to eliminate, nullify, or reduce to a minimum the consequences of such hazards.
4. Evaluate established means and methods and controls to ensure effectiveness – make modifications as needed.

4.0 PROCEDURE

4.1 General Requirements

4.1.1 THA

THAs will be prepared by the supervision directly responsible for the work and reviewed by the Project Manager (PM) prior to commencing work activities. The Earth Tech subcontractors will prepare their own THA's and submit to the Earth Tech SSO and / or PM for review and accept prior to starting their activity. These reviews do not relieve the subcontractor of their safety responsibilities.

4.1.2 Signatures

All affected personnel are responsible for signing the THA Sign-off Form (attached) indicating that they understand and will comply with the provisions of the THA. The THA Log will be maintained in a conspicuous location at the workplace by supervision (HASP, wall posting, etc.).

4.2 THA Applicability

THAs are required when the Earth Tech PM, Site Supervision, the SSO, or Safety Professional through pre-job planning, determine that the process, equipment, or procedure indicates potential for injury and/or property damage for any type of field work unless a variance is given by the District Safety Manager. Field work activities include but not limited to:

- Land Surveying
- Contractor oversight
- Bid reviews and job site walks
- Confined Space entries
- Non-Hazwoper Site Walkthroughs
- Field Assessments
- Facility Auditing

Activities that require a separate written control plan (e.g., confined space entry, hot work, etc.) may satisfy the requirement for a THA through correct application of those alternate control plans and respective procedures.

4.3 Completion of THA

- The THA Form (Determined by the District Safety Manager) will:
    - Identify the THA author
    - List the key activities in the sequence in which they occur.
    - Determine the hazard(s) and/or hazardous materials involved for each step.
    - Be specific in designation of required protective devices, equipment, or clothing.
    - Apply specific effective safety measures to eliminate or control the hazard(s).
- All THAs will be developed in sufficient detail to preclude confusion and misunderstanding.
- Consideration will be given to movement, work area, specific hazards, safety rules, and recognition of abnormal or unexpected problems.
- Each THA final draft will be submitted to the Project Manager / SSO for review and acceptance/signature.

4.4 Posting and Filing THA

A completed copy of the THA will be available for review by the employees at the work location prior to the start of work. A copy of the THA will be retained as part of the project files. Copies will be forwarded to the project SH&E Professional for review.

4.5 THA Training

In accordance with SH&E 203 – Accident Prevention Program – Requirements for SH&E Documentation, the PM will ensure that all personnel and subcontractors responsible for the performance of THAs have been trained in the proper procedures to accomplish them. The SH&E Professional will assist the District Safety Manager in performing the training as necessary.

5.0 ATTACHMENT

None

6.0 REFERENCES

SH&E 203 – Accident Prevention Program

EarthTech A tyco International Ltd. Company **Safety, Health & Environmental Procedure**	PROCEDURE NO. SH&E 205 DATE March 25, 2005 REVISED June 18, 2007
Emergency Action Planning and Prevention	PREVIOUSLY ENV 102

This procedure applies to all U.S.-based personnel, projects, offices, business units and activities. Any exceptions to this procedure must be approved, in writing, by the responsible District/Business Unit Manager and Safety Manager.

1.0 PURPOSE

This procedure provides minimum guidelines for the development of Emergency Action Plan (EAP) for each Earth Tech office. This assigns responsibilities, accountability, and procedures to be followed by all employees in the event of fire or other emergencies.

2.0 SCOPE

This procedure applies to all Earth Tech offices. The EAP describes the potential emergencies at offices and details what procedures will be followed to minimize risk. The FPP identifies potential fire sources and the plans to control them. For development of EAP/FPP at project sites, please refer to your respective Health and Safety Plan (HASP). Emergencies are defined as uncontrolled circumstances that can result in damage to personnel or property.

3.0 RESPONSIBILITIES

3.1 Section/Office Manager

- Responsible for the implementation and enforcement of the EAP
- Coordinates the development of the EAP for their office with review by the SH&E Department.
- Identifies specific municipality or other local regulations/requirements for the EAP and ensures those requirements are incorporated into the EAP
- Establishes the working relationships with regulatory and local agencies that may respond to an emergency.
- Designates an Emergency Coordinator or Supervisor to implement the EAP

3.2 Emergency Coordinator/Supervisor

- Responsible for directing all actions in emergency situations, until relieved by outside emergency response units (i.e., Fire Department).
- Responsible for ensuring all Earth Tech employees on site are trained in the provisions of this plan, and the required actions.
- Designates specific communication procedures to ensure that all personnel are alerted to potential emergency conditions, and what actions are required.

- Identifies a common muster point outside of the facility where Earth Tech personnel will gather in the event of an emergency or implementation of the EAP.
- Continually reviews the EAP to ensure that identified hazards and actions are adequate for the office and/or facility.
- Designates personnel to perform specific duties during emergencies, such as taking muster, and directing emergency responders to the site(s).
- Responsible for ensuring other contractors at the office are notified as to the potential emergencies associated with Earth Tech work, and that the contractors provide information as to potential emergencies associated with their work processes. Also, ensures that the contractor's hazards and emergency warning systems are communicated to Earth Tech employees.
- Ensures that all hazard signs (e.g., exit signs) and floor plans are posted as required.
- Ensures that emergency exit doors are not blocked, are labeled, and are not locked at any time.
- Establishes criteria and scheduling of emergency drills for Earth Tech employees.
- Critiques the drill results, and works with the supervisors to correct any observed deficiencies.
- Ensures that new employees are trained on the provisions of the EAP prior to entering the work site.
- Ensures that visitors are either trained on the provisions of the EAP, or are continually escorted by a trained employee.

3.3 Earth Tech Employees:

- Ensure compliance with all provisions of this EAP.
- Alert the Emergency Coordinator/Supervisor to any observed conditions that can create an emergency situation.
- Notify the Emergency Coordinator/Supervisor of any change in work conditions that may impact the identified hazards in this plan.
- Do not block emergency exits or accesses.
- Participate in drills that are conducted to ensure the adequacy of the plan.

4.0 PROCEDURE

4.1 EAP

Emergencies are uncontrolled circumstances that can result in damage to personnel or property. Emergencies can be a result from severe weather, fire, bomb threat, medical attention, environmental spill, etc. In addition, the emergency response procedures change with each location (e.g., different hospitals).

In developing an EAP, the potential emergencies must be identified. Potential emergencies common to all offices include:

- Severe weather (hurricanes, tornadoes, earthquakes, flooding)
- Medical emergencies
- Fire/explosion

- Hazardous material spills/releases
- Structural collapse
- Bomb threats
- Civil disturbance/criminal action

The EAP describes specific responsibilities and actions to either mitigate the emergency, or to ensure the protection of site personnel. In multi-employer office sites, each employer is responsible for the development and enforcement of their own EAP in accordance with health and safety regulations. However, Earth Tech shall ensure that a description of the potential emergencies in our office environment, and specific alarm systems, is provided to other on-site employers, and that other employers provide similar information. Employers should exchange copies of the respective plans.

Finally, the EAP provides a description of training required and any drills. The training includes new employee and visitor orientation procedures.

Attachment 1 is a fill-in-the-blank template example for EAP. Each section/office manager is responsible to ensure completion for each section/office site. If all potential emergencies are identified, one plan can be developed for each building.

Any time the Emergency Action Plan is implemented, the Emergency Coordinator will develop a detailed report of the entire incident. Specifically, careful documentation during and after an emergency will be needed for insurance issues, legal issues, accident investigations and analysis to prevent re-occurrence. Good record keeping and a critique of an incident after the fact can provide an excellent method of preventing another incident. All records will be maintained in project or applicable office operation files.

5.0 FIELD / PROJECT LOCATIONS

PMs will coordinate with the respective Safety Professionals to develop a site-specific EAP to be included in the HASP. Elements of the EAP as noted above will apply (designating EC's, drilling, etc.).

In the event of any emergency incident, the following general requirements apply:

- Work activities will cease and all personnel will be evacuated from the work location. The evacuation will proceed in a direction opposite the critically affected area, with all personnel assembling in a pre-designated location outside of the site proper.
- A headcount will be taken of the assembled employees and any injured individuals shall be administered first aid.
- If not present at the work location, the Site Safety Officer (SSO) and Emergency Coordinator will be contacted immediately.
- In the event of a chemical spill, send someone to meet the responders outside the area to direct them to the scene and provide information about the conditions that may exist, including appropriate Material Safety Data Sheets (MSDSs) for hazardous material. The Fire Department may have spill containment dikes, absorbents, neutralizing chemicals and other means of mitigating spills or leaks. Once the spill is contained, contact the District Safety Manager or call the Incident Reporting Hotline at 1-800-343-5046 to meet all company, local, state and federal reporting requirements
- Without endangering personnel, make a quick assessment of the situation. Call the emergency services agency (Fire Department, etc.) immediately and, if there are injuries, ask for medical

assistance. Next, contact an Emergency Coordinator. When calling in the emergency, give your location, describe the nature of the emergency, and provide your name.

Any alterations mandated by changing conditions shall be determined by the Emergency Coordinator and communicated to workers during the tailgate safety briefing.

6.0 PROGRAM REVIEW

The EAP Program will be reviewed on an annual basis or when changes occur that affect the EAP (e.g., office location change, personnel change, new work practice or process, etc.).

7.0 ATTACHMENTS

Attachment 1: EAP Template

8.0 REFERENCES

SH&E – 203 – Accident Prevention Program - Requirements for SH&E Documentation
SH&E – 302 – Office Safety
SH&E – 508 – Fire Extinguishers
SH&E – 606 – Flammable and Combustible Materials

OSHA SPECIFIC

29 CFR 1910.38 – Employee Emergency Plans and Fire Prevention Plans

29 CFR 1910.35-.37 – Means of Egress

29 CFR 1910.151 – Medical and First Aid

29 CFR 1910.155 – Fire Protection

29 CFR 1910.157 – Fire Extinguishers

29 CFR 1910.165 – Employee Alarm System

Attachment 1

EMERGENCY ACTION PLAN
FOR
[insert office or project name/location]

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1. **Emergency Coordinator**:_____

2. **Emergency Numbers**:

	Name	Number
Fire Department		
Police Department		
Ambulance		
Hospital		
Poison Control Center		(800) 222-1222
HAZMAT Spill Response		

3. **Numbers for Key Personnel:**

		Number
Office Manager	Work	
	Home	
	Pager	
		Number
Emergency Coordinator/ Supervisor	Work	
	Home	
	Pager	
		Number
Alternate	Work	
	Home	
	Pager	

4. **Specific Muster Locations in Case of Evacuation:**

Primary Muster Point: _____
_____
_____

Secondary Muster Point: _____
_____
_____

5. Potential Emergencies

A. ***Severe Weather -*** Severe weather includes hurricanes, tornadoes, lightning and flooding. Some of these conditions, such as tornadoes, can come upon the office site suddenly, with little to no warning. The following actions shall be implemented for each situation:

a) Tornadoes - Radio stations will provide continual updates when conditions are right for potential tornado formation. The Office Manager/Emergency Coordinator/Supervisor will listen to the continual updates, and if conditions worsen, personnel will either be sent to their primary residence (if time and conditions allow), or to pre-designated shelters. In the event of being outside when a tornado forms, personnel shall lie flat in the nearest low point in the ground (unless time permits evacuation to the designated shelter). Designated shelters will be identified in the EAP.

b) Lightning - In the event of lightning, all equipment shall be shut off, and personnel shall enter the nearest structure. UNDER NO CIRCUMSTANCES stand under a solitary tree. If a structure is not nearby, either remain in an enclosed vehicle, or lie flat at a low point on the ground.

c) Flooding - When flooding is expected, proceed to the highest available point (i.e., multi-story building).

B. ***Fire/Explosion -*** In the event of a fire or explosion, the procedures found in the Fire Prevention Plan shall be implemented. In the event an evacuation is necessary, all personnel shall proceed to the primary muster location, unless the primary location is downwind from the emergency, in which case the secondary muster location shall be used. Contact the local Fire Department, either through use of emergency pull stations if available, or using the phone.

C. ***Medical Emergencies -*** Medical emergencies can be the result of work-related accidents (e.g., broken bones, serious cuts) or occurrences. In the event of a medical emergency:

1. Ensure the injured worker is in no immediate danger (e.g., lying face down in water).
2. Touch or move the injured employee ONLY if an immediate danger exists, and then only to alleviate the life-threatening situation.
3. After alleviating the life-threatening situation, send someone to contact the ambulance and notify the Office Manager/Supervisor.
4. The person initially finding the emergency should stay at the scene, unless no one else is available to call the ambulance.
5. Once the ambulance is contacted, the Office Manager/Supervisor shall designate someone to meet the ambulance at the entrance to the office site to direct the responders to the emergency.

D. ***Hazardous Chemical Spills/Releases:***

1. ***Small Spills -*** Spills or releases of hazardous chemicals in quantities that do not present an immediate risk to personnel can be corrected and cleaned up by the employee.

2. ***Large Spills -*** If the spill or release presents a hazard to either personnel or the environment, the immediate area shall be evacuated, and the Office Manager/Supervisor contacted. Do not attempt to remediate the spill/release unless you have received specific Spill Response Training. The Office Manager/Supervisor will contact the appropriate HAZMAT response team for stopping the leak and performing the cleanup. Once the spill is contained, contact the District Safety Manager or call the Incident Reporting Hotline at 1-800-343-5046 to meet all company, local, state and federal reporting requirements.

E. ***Structural Collapse -*** In the event of the collapse of a structure, all personnel shall muster at the primary muster location to ensure no one is trapped in the collapsed building. If everyone is not accounted for, the Fire Department and ambulance service shall be contacted. The Office Manager/Supervisor shall designate someone to remain at the site entrance to direct emergency responders to the emergency site.

F. ***Bomb Threat:***

1. The receipt of a bomb threat at the office/project requires a quick assessment as to whether the threat is an actual warning, harassment, or a hoax, and to determine the appropriate call to action.
2. An advance provision will be made for the immediate communication of any bomb threat to the office.
3. Upon reaching a decision after consideration and assessment, the prearranged procedure is to be placed into action.
4. Clear-cut levels of authority will be established to minimize risk to persons and property. Particular characteristics and conditions existing at each location will require that each area develop specific emergency procedures.

6. Communications

Emergency alarm methods must be communicated to ensure all office employees are knowledgeable of protocol. When developing the alarm methods, consideration must also be given as to how the employees who hear/see the alarm respond. *For example, some offices sound a long, steady whistle to signify a fire, whereas two short alarm bursts, followed by a pause, followed by two short bursts, can signify that equipment shall be shut down and all personnel shall immediately proceed to the designated shelter(s).*

In addition, personnel must be able to contact outside emergency units as needed. Therefore, communications must be available at the storm shelters and muster points to allow for contact. Emergency numbers are posted at all phone systems.

The following communication systems are implemented at this location:

Tornado: _____

Lightning: _____

Flood: _____

Medical emergency: _____

Fire/Explosion/Bomb Threat: _____

Hazardous Material Spill/Release: _____

Structural Collapse: _____

Note: The emergency communications selected for the above situations can be the same for similar expected actions (i.e., tornado and lightning can have the same signal, since all require proceeding to the designated shelter, or seeking low points on the ground). Also, if the emergency is localized, and does not impact the entire office, verbal warnings are appropriate. Phones are found at the following locations:

_____

_____

_____

_____

In addition to the above communications associated with notifying personnel of an emergency, means of communicating during emergencies shall also be developed. *For example, if the primary evacuation route cannot be used, a means to notify employees to use secondary routes must be developed.* To accomplish this, specific people are designated on each floor to receive additional information on the nature of the emergency, and what evacuation routes can be used. These people will verbally communicate the information as necessary to ensure safe evacuation. If applicable, the following people are designated:

First Floor: _____

Second Floor: _____

Third Floor: _____

Fourth Floor: _____

Other (specify): _____

_____

EarthTech A tyco International Ltd. Company	PROCEDURE NO. SH&E 207
	DATE March 25, 2005
Safety, Health & Environmental Procedure	REVISED June 18, 2007
Contractor and Subcontractor SH&E Requirements	PREVIOUSLY ENV 104

This procedure applies to all U.S.-based personnel, projects, offices, business units and activities. Any exceptions to this procedure must be approved, in writing, by the responsible District/Business Unit Manager and Safety Manager.

1.0 PURPOSE

This procedure has been developed to assist the Earth Tech Project Manager (PM) and the Procurement Department with the evaluation of potential subcontractors' SH&E performance and commitment. Prior to entering into a contractual arrangement with an organization, it is Earth Tech's intent to ensure the organization meets the Safety, Health and Environmental standards established by Earth Tech. Only safe and qualified subcontractors will be contracted for work on Earth Tech projects.

2.0 RESPONSIBILITIES

2.1 Procurement Department

The Procurement Department is responsible for:

- Maintaining the database where all subcontractor SH&E performance data is maintained
- Entering subcontractor's SH&E performance data into the database
- Communicating changes in the operation or function of the database to the SH&E Department

2.2 Safety, Health, & Environmental Department

The SH&E Department is responsible for:

- Updating the *Subcontractor Safety Criteria Questionnaire*, *Subcontractor Safety Criteria Questionnaire Scoring Key*, and communicating those changes to Earth Tech
- Evaluating the Subcontractor Safety Criteria Questionnaire, as required
- Supporting operations in the completion of client/potential-client safety questionnaires

2.3 Project Managers

Project Managers are responsible for that all subcontractor organizations scoped to perform field-activities either for or in support of Earth Tech operations has been properly qualified for SH&E. This includes:

- Ensuring that the requirements identified in Section 3.0 are completed for all organizations subcontracted to perform field-based activities for Earth Tech

- Providing a copy of the completed *Subcontractor Safety Criteria Questionnaire* to the Procurement Department for upload into their database (Attachment 1)
- Verifying a contract company's minimum level of insurance coverage as stipulated by Earth Tech's Legal and Procurement Departments (Workers' Compensation, Auto Insurance, General Liability, etc.).

3.0 SUBCONTRACTOR SELECTION REQUIREMENTS

For all subcontractor organizations used to provide non-administrative activities at Earth Tech work sites, the selection process will include consideration of the candidate firms' SH&E management and performance indicators. This will be accomplished using a subcontractor instruction and evaluation process that includes the following requirements:

- All *Purchase Requisition* forms (or similar purchasing documents) related to the procurement of subcontractors for performance of field-based activities must be approved by the SH&E Department before execution. Any associated solicitation documents provided to bidders (e.g., scope of work, specification, Master Service Agreement, teaming agreement, etc.) will include an SH&E Department-approved section stating the SH&E information and performance requirements applicable to the subcontractor's work, including:

    - Subcontract specifications must state that the subcontractor is solely responsible for all non-operational costs associated with SH&E compliance (e.g., employee medical monitoring procedures, personal protective equipment, etc.), and
    - that any cost or schedule impacts resulting from a subcontractors' non-compliance with applicable Safety and Health regulations or Earth Tech operational procedures are the responsibility of that subcontractor.

- Except where waived by the SH&E Department, subcontractor bids/submittals must include a completed *Subcontractor Safety Criteria Questionnaire* form (available on the Earth Tech Intranet at http://corp/healthsafety/hsforms.htm). Each questionnaire will be evaluated by the PM or Procurement Department Subcontract's Administrator, and the SH&E Department as necessary, during the subcontractor selection process to identify any organizations whose past SH&E performance may disqualify them from selection.
- Selected subcontractor firms are required to provide copies of any SH&E documentation (e.g., operational safety procedures, employee training/medical monitoring certifications) to the Project Manager prior to the start of their on-site operations.
- The evaluation of a subcontractor's SH&E performance will be measured against the *Subcontractor Safety Criteria Questionnaire Scoring Key* (See Attachment 2).The criteria used to evaluate a contractor is based on federal OSHA, United States Bureau of Labor Statistics (BLS), and United States insurance data. Offshore locations should replace benchmark data with comparable meaningful data used in that country.

- Although the questionnaire is to be used as a guideline to determine whether a bidder's safety and health record is acceptable, there are no simple pass/fail criteria. The guidance outlines the standards Earth Tech's SH&E Department has established to reflect performance acceptability. Marginal performance (e.g., Score is determined to be Weak (2)) will require evaluation for final approval of a subcontractor by the SH&E Department.

4.0 SUBCONTRACTOR SH&E REQUIREMENTS

Subcontractor organizations are responsible for safely performing their assigned work activities in accordance with all applicable federal and state occupational safety and health regulations. Subcontractors will also be provided with Earth Tech's project-specific SH&E documentation for the specification of minimum acceptable on-site SH&E performance. If at any time the subcontractor obtains the services of a subcontractor, consultant, or second tier subcontractor for any portion of the work to be performed, a copy of the Statement of Work and the approved project-specific SH&E documentation shall be provided as part of the package submitted to each respective subcontractor, consultant, or second tier subcontractor. The subcontractor shall submit in writing, prior to the start of work, the names of any second-tier subcontractors that may be used in the project for approval by Earth Tech. Subcontractors are responsible for ensuring that their employees are provided the appropriate equipment, training, and medical surveillance to perform the work safely.

Prior to starting fieldwork, each subcontractor organization shall provide Earth Tech with at least one of the following for review and acceptance:

- Site-specific SH&E documentation addressing specific performance requirements for the subcontractor's on-site work activities; or
- A written statement of adoption of the provisions in Earth Tech's project SH&E documentation as the subcontractor's own procedures while working on the job site. This documentation must be in letter format (company letterhead), and must include the following information:
    - Site location.
    - Anticipated scope of work activities to be performed by the subcontractor.
    - Name of the subcontractor's Site Safety Officer, with contact phone numbers.
    - Name of the subcontractor's Health and Safety Manager (HSM), with contact phone numbers.
    - Statement adopting the Earth Tech project SH&E documentation as the subcontractor's own requirements for the project.
    - Statement requiring that only qualified and trained personnel (to the level of assigned responsibilities) will perform assigned work activities on the site.
    - Designation of required personal protective equipment (PPE) anticipated for the subcontractor's assigned work activities.
    - Copies of supplemental or additional subcontractor-specific provisions, policies, procedures and/or protocols that will be implemented by the subcontractor during site activities.

5.0 ATTACHMENTS

Attachment 1 – Subcontractor Safety Criteria Questionnaire
Attachment 2 – Subcontractor Safety Criteria Questionnaire Scoring Key

Instructions to Contractor/Subcontractor/Organization Completing the Earth Tech Subcontractor Safety Criteria Questionnaire

1. Complete the administrative information related to your organization (*Company name, address, etc.*)
2. List the service(s) to be performed for Earth Tech by your organization. Examples include (*but are not limited to*):
    a. Subsurface drilling
    b. Excavation operations
    c. Surveying
    d. Construction/renovation/clean-construction operations
    e. Demolition
    f. Well abandonment
    g. Electrical system installation
3. List the Experience Modification Rate (EMR) for your organization (entire company, not a local office, division, subsidiary, or joint venture) from the past three years. This information can be obtained from your organization's Worker's Compensation Insurance Carrier. If your organization's EMR is greater than **1.10**, an explanation must be provided in the appropriate space provided. NOTE: *EMR is separate from the Experience Modification Factor (EMF) also provided by your Worker's Compensation Insurance Carrier. EMR is a whole number, while EMF is a percentage.*
4. Provide the applicable injury and illness data for your organization from the past three years in the table provided. Using the formulas included in the table, calculate the requested Recordable Case Frequency Rate (e.g., Recordable Incident Rate or RIR). If your company has less than 10 employees, you are not required to maintain this information according to Title 29 of the Code of Federal Regulations (CFR) Part 1904, Section 1, Subsection (a)(1) [29 CFR 1904.1(a)(1)]; however, if your organization does have less than 10 employees, Earth Tech still requires that you provide the information for rows d) *Total Recordable Cases* and e) *Total Corporate Hours Worked*.
5. List any fatalities your organization has incurred during the past three years and for each occurrence please provide the following information (*Supplemental material may be attached to this questionnaire*):
    a. Location where the fatality occurred
    b. Cause of the fatality
    c. What corrective action(s) your organization has taken as a result of the fatality
6. List and describe any REPEAT, WILLFUL, or CRIMINAL citations issued to your organization by the U.S. Occupational Safety and Health Administration (OSHA) or a State with a federally-approved OSHA Plan (*Supplemental information related to the specific citation(s) may be attached to the questionnaire*). The list of States with a federally approved OSHA Plan is available at http://www.osha.gov/fso/osp/index.html.
7. After reading the Compliance Statement on page 3, list the name and phone number of the representative from your organization who completed the questionnaire, sign the questionnaire, and write in the date the questionnaire was completed. By signing the questionnaire, the representative states that they have truthfully answered all questions, that all of the information provided is accurate, and that if selected by Earth Tech, your organization shall adhere to the requirements identified in the Compliance Statement.

Should your organization have any questions regarding this questionnaire, please contact your Earth Tech Point-of-Contact or one of the following:

Tom Atwood	(719) 473-5252	Bob Poll, CIH, CSP	(518) 951-2242
Patrick Timbes	(303) 804-2359	Ron Partilla, CSP	(843) 572-5600
James Overly	(562) 951-2106	Dale Prokopchak, CIH, CSP	(804) 515-8556
Lisa Stone	(864) 234-3298	Bart Dawson, CIH	(210) 271-0925
Deanna Jew	(562) 951-2017	Chad Ross, ASP	(859) 442-2300
Amy Harrington	(713) 706-0532	Joe Bermudez, CSP	(562) 951-2242

Company Name:	Date:
Address:	
City:	State:
List Service(s) to be provided:	

1. Experience Modification Rates

   a) List your firm's Experience Modification Rate (EMR) for the three (3) most recent years. (*Information is available from your Workers' Compensation Insurance Carrier*)

Year	Interstate

   b) If your organization does not have an EMR or your EMR is greater than 1.10, please explain why.

_____

_____

2. Please consolidate your firm's OSHA Form 300 injury and illness data for the last three (3) years and complete the following:

	Data	Year	Year	Year
a)	Number of Lost Workday Cases (not days lost)			
b)	Number of Restricted Workday Cases (not restricted days)			
c)	Number of Medical Treatment Cases* (not including first aid)			
d)	Total Recordable Cases (a + b + c)			
e)	Total Corporate Hours Worked (hourly and salaried employees)			
f)	Recordable Case Frequency Rate (RCFR) ([d x 200,000] / e)			

***Medical Treatment Case** is a case in which an on-the-job injury requires *other* than first aid treatment (and is not considered a restricted or lost workday) as defined by the U.S. Bureau of Labor Statistics recordability criteria (i.e., prescribed medication, physical therapy - more than one visit, fractures, imbedded foreign body, etc.). First aid injury treatment cases are *not* required to be added to the OSHA Form 300 log.

   a) Does your organization have fewer than 10 employees? ☐ Yes ☐ No

   Note: If you check Yes, you are required to only complete rows d) and e) in the above table.

3. List any fatalities your firm has had in the last three (3) years. Include location, cause, and corrective actions. (*Attach supplemental information as required*)

_____

_____

4. List any OSHA *REPEAT*, *WILLFUL*, or *CRIMINAL* citations your firm has had in the last three (3) years. Please describe. (*Attach supplemental information as required*)

_____

_____

Compliance Statement:
As a Contractor/Subcontractor to Earth Tech, it is understood that your organization understands and maintains the highest standards possible for compliance with all state, federal, and other regulatory agency/client requirements, as they apply to your organization. Additionally, it is also understood that any subcontractors that your organization may employ, acquire, obtain, or use during the course of your contractual agreement(s) with Earth Tech are selected using the same methods and policies which you enforce upon your own organization, employees, and other affiliated organizations and subcontractors.

I certify that my organization, its personnel, and subcontractors will not compromise the integrity of safety systems or devices at any time without proper authorization from Earth Tech. At no time will employees or subcontractor personnel willfully violate any state or federally mandated regulatory requirements.

Completed by (Print):	Completed by (Signature):
Phone Number:	Date Completed:

Procurement/Safety/Management Use Only

Evaluated by:	Evaluated by (Signature):	Employee No.:	Date:

EMR Rating	Incident Rating	OSHA Comp. Rating	OVERALL RATING*

*The lowest of the three individual criteria ratings.

Evaluator Note: If the organization checked YES to 2.a), they only need to provide the applicable data for rows d) and e) in the table in Section 2, and the evaluator will calculate the RCFRs by applying the formula found in row f). If the organization checked NO, then they must provide **all** requested data to be considered compliant.

Revision 1
November 2005

Subcontractor Safety Criteria Questionnaire Scoring Key

EMR[1]	Incident Rate (RCFR)[2]	OSHA Compliance	Scores and Ratings	
< 1.1	< 5.0	No *REPEAT*, *WILLFUL*, or *CRIMINAL* citations	**3**	***Acceptable*** - Meets Earth Tech requirements.
1.1 - 1.5	5.0 – 7.5	1 *REPEAT*, *WILLFUL*, or *CRIMINAL* citation	**2**	***Weak*** - Acceptable only with concurrence from the Safety Dept.
> 1.5	> 7.5	2 or more *REPEAT*, *WILLFUL*, or *CRIMINAL* citations	**1**	***Not Recommended*** - Not recommended that the company receive subcontracts at this time.
No data	No Data[3]	No Data	**0**	***Non-responsive*** - Cannot receive subcontracts at this time.

[1] – Use the greater of: (a) The most current year, or (b) The 3-year average value.
[2] – If there are any job-related fatalities in the last 3 years then the highest possible score is 2, regardless of reported RCFR.
[3] – If Question 2.a) is checked **YES** then the RCFR must be calculated by the evaluator using the formula found in row f) and the information reported in rows d) and e). If this data is not supplied to Earth Tech, then the score is 0.

Revision 2
November 2005

EarthTech A tyco International Ltd. Company	PROCEDURE NO. SH&E 208
	DATE March 25, 2005
Safety, Health & Environmental Procedure	REVISED June 18, 2007
General Housekeeping/Accountability	PREVIOUSLY NEW

This procedure applies to all U.S.-based personnel, projects, offices, business units and activities. Any exceptions to this procedure must be approved, in writing, by the responsible District/Business Unit Manager and Safety Manager.

1.0 PURPOSE

This procedure outlines the personal hygiene, work site sanitation, and work site housekeeping requirements for Earth Tech's operations and projects.

2.0 SCOPE

This procedure applies in its entirety to all Earth Tech projects and operations unless a variance from its requirements is granted by the SH&E Department.

3.0 PROCEDURE

3.1 Personal Hygiene

3.1.1 Smoking, Eating and Drinking

Eating and drinking will be permitted only in designated areas at Earth Tech project sites. Smoking will be permitted only in areas designated by Field Supervision and situated in locations that are not in the immediate vicinity of activities associated with work site activities. Additionally, Field Supervision will designate each smoking area giving primary consideration to those personnel who do not smoke.

Personnel actively involved in the performance of certain activities will not be permitted to smoke, eat, drink, or use smokeless tobacco, except during breaks (e.g., HAZWOPER Controlled work areas).

Site personnel will first wash hands and face after completing work activities and prior to eating or drinking.

3.1.2 Water Supply

Water supplies will be available for use on site and will comply with the following requirements:

Potable Water

An adequate supply of drinking water will be available for site personnel consumption. Potable water can be provided in the form of approved well or city water, bottled, or drinking fountains. Where drinking fountains are not available, individual use cups will be provided as well as adequate disposal containers. Potable water containers will be properly identified in order to distinguish them from non-potable water sources.

Non-Potable Water

Non-potable water may be used for hand washing and cleaning activities. Non-potable water will not be used for drinking purposes. All containers/supplies of non-potable water used will be properly identified/labeled as such.

3.1.3 Toilet Facilities

Toilet facilities will be available for site personnel and visitors. Should subcontractor personnel be located on-site for extended periods, it may become necessary to obtain temporary toilet facilities. Exceptions to this requirement will apply to mobile crews where work activities and locations permit transportation to nearby toilet facilities.

A minimum of one toilet will be provided for every 20 site personnel, with separate toilets maintained for each sex, except where there are less than five total personnel on site. For mobile crews where work activities and locations permit transportation to nearby toilet facilities (e.g., gas station, or rest stop), on site facilities are not required

3.1.4 Washing Facilities

Hand and Face

Site personnel will wash hands and face after completing work activities and prior to breaks, lunch, or completion of workday.

Personal Cleaning Supplies

Cleaning supplies at Earth Tech project sites will consist of soap, water, and disposable paper towels or items of equal use/application (e.g., anti-bacterial gels, wipes, etc.).

3.1.5 Clothing and Personal Protective Equipment

All personal protective equipment will be kept clean at all times and maintained in accordance with the manufacturer's requirements.

3.2 Sanitation

3.2.1 General Work Areas

At all times work areas will be kept free of dirt and debris that may impact the safety of site personnel and visitors. All trash receptacles will be routinely regularly emptied.

3.2.2 Break Areas and Lunchrooms

Site personnel will observe the following requirements when using break areas and lunchrooms at Earth Tech project sites:

- All food and drink items will be properly stored when not in use.
- Food items will not be stored in personal lockers for extended periods in order to prevent the potential for vermin infestation.
- Perishable foods will be refrigerated whenever possible.
- All waste food containers will be discarded in trash receptacles.

- All tables, chairs, counters, sinks, and similar surfaces will be kept clean and free of dirt, waste food, and food containers at all times.
- Refrigerators used to store food items will be maintained at 45 degrees Fahrenheit and emptied of all unclaimed food items weekly.
- Routine cleaning of refrigerators will also be performed on a regular basis.

3.3 Housekeeping

- All work areas shall be kept clean to the extent that the nature of the work allows.
- Every work area shall be maintained, so far as practicable, in a dry condition. Where wet processes are used, drainage shall be maintained and platforms, mats, or other dry standing places shall be provided, where practicable, or appropriate waterproof footgear shall be provided.
- Hazards from protruding objects or placement of materials on paths or foot traffic areas present a problem with regard to slips, trips, falls, and puncture wounds. Personnel will use a reasonable amount of effort to keep slip, trip and fall hazards to a minimum.
- Excess debris and trash will be collected and stored in an appropriate container (e.g., plastic trash bags, garbage can, roll-off bin) prior to disposal.
- At no time will debris or trash be intermingled with waste PPE or contaminated materials.

3.4 Additional Requirements

The PM will ensure that weekly evaluations of work area cleanliness and sanitation are performed and documented as part of their weekly self-inspections in accordance with the Earth Tech Weekly Housekeeping Checklist. Based on project-specific activities associated with the asset removal process, additional safety precautions may be required.

4.0 ATTACHMENTS

Attachment 1 - Weekly Housekeeping Checklist

5.0 REFERENCES

- SH&E 201 –General Safety Rules

EARTH TECH WEEKLY HOUSEKEEPING, HYGIENE & SANITATION CHECKLIST

Inspector Name (please print): _____ Date: _____
Inspector signature: _____
Company name: _____
Area Inspected: _____
Supervisor signature:

Item	Inspection Question	Yes	No	NA	Correct By:
1.	Are there adequate toilet and washing facilities?				
2.	Is potable water provided for all employees?				
3.	Are non-potable water sources labeled?				
4.	Is smoking/eating/drinking permitted only in designated areas?				
5.	Is designated PPE worn while handling impacted materials?				
6.	Are decontamination washes and rinses changed out daily?				
7.	Is trash/PPE placed into appropriate receptacles				
8.	Are trash receptacles routinely emptied?				
9.	Is smoking prohibited in flammable storage areas?				
10.	Are proper receptacles available for storage of flammables?				
11.	Are flammables and combustibles stored in non-smoking areas?				
12.	Are oxygen and fuel gas cylinders stored upright and secured?				
13.	Are oxygen and fuel gas cylinders stored a minimum of 20 feet apart?				
14.	Are materials stacked and stored as to prevent sliding or collapsing?				
15.	Are materials and supplies stored outside of designated paths of travel?				
16.	Are areas of foot and vehicle traffic clear of debris?				
17.	Are tripping hazards labeled or marked?				
18.	Are electrical / extension cords kept out of wet areas?				
19.	Is trash picked up and placed into appropriate receptacles at the end of each shift?				
20.	Are area personnel using designated paths of travel?				
21.	Are aisles and walkways marked as appropriate?				
22.	Are holes in the floor, sidewalks, or other walking surface repaired properly, covered or otherwise made safe?				
23.	Are aisles or walkways that pass near moving or operating machinery, welding operations or similar operations arranged so employees will not be subjected to potential hazards?				
24.	Are work surfaces kept dry or is appropriate means taken to assure the surfaces are slip-resistant?				
25.	Are all spilled hazardous materials or liquids, including blood and other potentially infectious materials, cleaned up immediately and according to proper procedures?				

Additional Comments:

EarthTech A Tyco International Ltd. Company **Safety, Health & Environmental Procedure**	PROCEDURE NO. SH&E 301 DATE March 11, 2005 REVISED
Hazardous Waste Operations (HAZWOPER)	PREVIOUSLY ENV 301

This procedure applies to all U.S.-based personnel, projects, offices, business units and activities. Any exceptions to this procedure must be approved, in writing, by the responsible District/Business Unit Manager and Safety Manager.

1.0 PURPOSE

Earth Tech operations will meet or exceed all applicable federal, state, and local safety and health regulations pertaining to hazardous waste operations and emergency response (HAZWOPER). All HAZWOPER work performed or managed by Earth Tech will be performed in accordance with the following requirements, which are intended to ensure compliance with 29 CFR 1910.120 (and equivalent state regulations).

2.0 PERSONNEL QUALIFICATIONS

All personnel working at HAZWOPER sites must meet the training and medical monitoring requirements specified in 29 CFR 1910.120 (e) and (f). Also, additional training may be required based on site activities (e.g., confined space, lead in construction, OSHA 10-hour construction). These additional training requirements will be outlined in the project- or site-specific health and safety plan.

2.1 Earth Tech Personnel

Earth Tech's HAZWOPER-qualified employees will participate in the following training and medical monitoring procedures.

2.1.1 Medical Monitoring

Specific HAZWOPER medical examination protocols have been developed by Earth Tech's Corporate Medical Provider (CMP) to meet the requirements of 29 CFR 1910.120 (f). To be medically qualified to perform HAZWOPER work personnel receive the following medical examinations:

- Initial (Baseline) Examination - The initial examination is a part of pre-employment requirements, and must be completed (with results received) prior to the employee's start of work date.

- Annual Examination - HAZWOPER-qualified employees will complete a medical examination once each year[1].

[1] Medical qualification expires on the anniversary date of the last examination completed, and there will be no "grace period" exemptions beyond this date without the express approval of an Safety Manager (SM). At the recommendation of the SH&E Department, the CMP may approve an alternate examination frequency, at periods of up to two years, in cases where the worker's exposures to environmental contaminants are infrequent and typically well below any occupational exposure limits (e.g., senior management personnel).

- Termination Examination - At the conclusion of employment at Earth Tech, or when re-assigned to non-HAZWOPER duties, personnel will be provided with the opportunity to receive a termination medical examination.

- Special Examinations - The SH&E Department and the CMP will jointly determine the need for special examinations due to:
    - Unusual exposure conditions.
    - In response to possible overexposures.

The CMP will determine the medical protocol elements for each of these examinations based on exposure information provided by the SH&E Department. The CMP will evaluate the results of each employee's examination, and will provide a medical clearance clearly stating medical compliance with the HAZWOPER regulatory standard (29 CFR 1910.120 (f)), and approval of the employee to perform unrestricted HAZWOPER activities. For Initial and Annual examinations the CMP will also evaluate the employee for the use of air purifying and supplied air respiratory protection, and the written evaluation from these examinations will indicate the physician's approval/limitations on the employee's use of respiratory protection.

2.1.2 Training

All personnel assigned to work at a hazardous waste site must participate in training meeting the requirements of 29 CFR 1910.120 (e).

1. Initial 40-Hour Training - Before being assigned to a HAZWOPER site all Earth Tech personnel must complete 40 hours of training meeting the requirements of 29 CFR 1910.120 (e)(3)(i). At the conclusion of training personnel will receive a written certification of course completion, signed by the instructor, which indicates the course of instruction (40-hour HAZWOPER) and training dates. A copy of this certification must be provided to the employee's Environmental Health and Safety Administrator (EHSA). The employee is responsible for maintaining their own copy of this certificate, and bringing it when working on any HAZWOPER site.

   Available Training Sources:

   - On-site training provided by the SH&E Department
   - Outsourced training providers approved by the SH&E Department

2. Refresher 8-Hour Training - To remain qualified to perform on-site work activities each Earth Tech employee will complete 8-hours of HAZWOPER refresher training meeting the requirements of 29 CFR 1910.120 (e)(8) at yearly intervals[2] following completion of Initial 40-hour training. At the conclusion of training personnel will receive a written certification of course completion, signed by the instructor, which indicates the course of instruction (8-hour HAZWOPER Refresher) and the training date. A copy of this certification must be provided to the employee's EHSA. The employee is responsible for maintaining their own copy of this certificate, and bringing it when working on any HAZWOPER site.

   Available Training Sources:

   - Internet-based training approved by SH&E Department
   - On-site training provided by the SH&E Department
   - Outsourced training providers approved by the SH&E Department
   - Earth Tech's Take-home Refresher Training course (with SM approval only)

[2] Training expires on the anniversary date of the last class completed. The worker's HAZWOPER-qualification expires at this time, and there will be no "grace period" exemptions beyond this date without the express approval of an SM.

3. Supervisor 8-Hour Training - Any Earth Tech employee acting in a management capacity for HAZWOPER activities (e.g., project management personnel, field managers, site safety officers, etc.) must complete an additional 8 hours of HAZWOPER Supervisor training meeting the requirements of 29 CFR 1910.120 (e)(4). This training is required only once, no supervisor refresher training is specified (however supervisors must still maintain their overall HAZWOPER-qualification through annual completion of Refresher training). At the conclusion of training personnel will receive a written certification of course completion, signed by the instructor, which indicates the course of instruction (HAZWOPER Supervisor) and the training date. A copy of this certification must be provided to the employee's EHSA. The employee is responsible for maintaining their own copy of this certificate, and bringing it when working on any HAZWOPER site.

   Available Training Sources:

   - On-site training provided by the SH&E Department
   - Outsourced training providers approved by the SH&E Department

4. 24-Hour HAZWOPER Training - Some site support contractors and site visitors may qualify to substitute 24-hour HAZWOPER training in place of 40-hour training, as specified in 29 CFR 1910.120 (e)(3)(ii). Personnel potentially qualifying for this alternative training include:

   - Site support personnel who will not work in any Exclusion Zone areas.
   - Subcontractors and site visitors who's duties will not entail significant exposure to site contaminants[3].

   An SM must approve the substitution of 24-hour training for Initial 40-hour training. Persons qualifying for 24-hour training must provide written certification of course completion prior to beginning work on site. Persons completing 24-hour training must complete 8 hours of annual refresher training at the required interval to maintain eligibility for on-site work, and must provide proof of this training (as necessary to demonstrate re-training) prior to beginning work on site.

2.2 Subcontractor Personnel

Any subcontractor organization whose employees will support Earth Tech operations at a HAZWOPER site will:

- Provide the Earth Tech Project Manager with a copy of their written HAZWOPER medical monitoring and training program requirements. The elements of the program must be similar to those for Earth Tech's own program, as detailed above.
- Provide the Project Manager with written certification of a physician's approved medical clearance for each employee who will work on the site. Certification can be demonstrated by:
  - A copy of the physician's signed medical clearance for each employee (preferred), or
  - A letter identifying the medical status and clearance expiration date of every employee, signed by the company's safety director or an officer of the company.
- A copy of the each employee's training certifications, which must include:

[3] Defined as not working in any areas where airborne contaminant concentrations exceed one-half of any applicable occupational exposure limit, and no contact or exposure to materials with site contaminant concentrations exceeding natural background levels.

- The Initial 40-hour training certificate (24-hour training may be substituted with SH&E Department approval).
- The most current Refresher training certificate (must be current within the previous 1-year period).
- A copy of the Supervisor training certificate for each person serving in a management capacity (e.g., foreman personnel).

3.0 PROJECT SH&E DOCUMENTATION – HEALTH AND SAFETY PLANS

The project SH&E documentation prepared for HAZWOPER activities is referred to as a Health and Safety Plan (HASP), and must meet the requirements presented in 29 CFR 1910.120 (b)(4). The required plan elements include:

1. A description of the work location, the site history, and a summary of any information available concerning site hazards (including both physical hazards and contamination conditions).
2. A summary of the work activities to be performed under Earth Tech's scope of activities.
3. A safety and health risk or hazard analysis for each on-site task, which will be performed. Identified risks must include both chemical and physical hazards to which personnel may be exposed during the conduct of the work task.
4. Protective measures for each work task to prevent or mitigate the potential hazards identified in the hazard analyses.
5. Personal protective equipment (PPE) requirements for each work task.
6. Frequency and types of air monitoring, personal monitoring, and environmental sampling techniques and instrumentation to be used.
7. Site control measures.
8. Decontamination procedures.
9. An emergency response plan addressing actions to be taken in the event of each type of credible incident which might result during the performance of planned work activities, including minor and major injuries, and chemical release and fire. Response plans must address the means for coordinating the evacuation of all on-site personnel in the event of a catastrophic incident.

Responsibility for development of each HASP will be coordinated between the Project Manager and the SH&E Department as part of project initiation. Regardless of where the HASP is developed, it will be reviewed and approved by the SH&E Department prior to submission to any agency outside of Earth Tech.

4.0 HAZWOPER PROTECTIVE EQUIPMENT ENSEMBLES

Defined HAZWOPER PPE ensembles are specified for general use on all HAZWOPER operations. The project HASP may specify modifications to these requirements to meet specific on-site conditions.

4.1 Level D Ensemble

The Level D ensemble provides a minimal level of skin protection (primarily against physical rather than chemical hazards) and no respiratory protection. Level D PPE is the minimum work

uniform which will be used on HAZWOPER sites. Its use is appropriate when there is no significant potential for encountering chemical materials while working in controlled work areas.

Level D Equipment List

- Hard hat
- Eye protection
- Safety-toe work boots
- Shirts with sleeves and long pants (shorts are unacceptable for use)
- Hearing protection (as required).

4.2 Modified Level D Ensemble

The Modified Level D ensemble provides moderate skin protection against chemical contact, but no respiratory protection. Its use is appropriate where there is a moderate to low potential for skin contact with chemical materials, but no significant inhalation hazard is anticipated. The Modified Level D ensemble will consist of the Level D ensemble, supplemented by the addition of one or more of the following items:

- Chemical-resistant disposable outer coveralls
- Chemical-resistant outer gloves (taped to outer coveralls)[4]
- Chemical-resistant inner gloves[4]
- Chemical-resistant safety-toe boots (taped to outer coveralls)

4.3 Level C Ensemble

The Level C ensemble provides moderate skin protection against chemical contact and moderate respiratory protection. Its use is appropriate where there is the potential for skin contact with chemical materials, together with a limited and well defined potential for exposure via inhalation.

Level C Equipment List

- Full-face air-purifying respirator equipped with HASP-designated cartridges[5]
- Chemical-resistant disposable outer coveralls
- Chemical-resistant outer gloves (taped to outer coveralls)[4]
- Chemical-resistant inner gloves[4]
- Hard hat
- Safety-toe boots (taped to coveralls) the use of boot covers (e.g., booties) or chemical-resistant boots may be specified
- Hearing protection (as required).

4.4 Level B Ensemble

The Level B ensemble provides both the highest level of inhalation exposure protection, and considerable skin contact protection. Its use is appropriate where there are significant chemical hazards involving both skin and inhalation exposure (up to and including Immediately Dangerous to Life or Health [IDLH] conditions), or where adverse atmospheric conditions cannot be mitigated by use of air purifying respirators (e.g., oxygen deficient atmospheres or chemicals with poor warning properties).

[4] Selection of specific glove types/materials will be provided in the project HASP based on consideration of the contaminants and the physical conditions of the work.

[5] Selection of specific cartridges will be made by the SH&E Department based on contaminants present. A cartridge change-out frequency will also be specified in the HASP based on the manufacturer's cartridge performance data.

Level B Equipment List

- Supplied air respirator (either SCBA or air line system w/Grade D or better breathing air)
- Chemical-resistant disposable outer coveralls
- Chemical-resistant outer glove (taped to outer coveralls)[4]
- Chemical-resistant inner gloves[4]
- Hard hat
- Chemical resistant safety-toe boots (taped to coveralls)
- Hearing protection (as required).

4.5 Level A Ensemble

The Level A ensemble provides the highest level of both respiratory and skin protection, up to and including protection against skin contact with vapor-phase contaminants. The use of Level A PPE requires approval by the SM.

Specific Level A ensemble components will be determined on a case-by-case basis by the SH&E Department.

5.0 EXPOSURE MONITORING

Air monitoring at HAZWOPER sites will be conducted to monitor and control employee exposures to chemical contaminants, and to regulate controlled work area boundaries for the protection of non-HAZWOPER workers and the general public.

5.1 Direct Reading Air Monitoring Requirements

Airborne contaminants present potential hazards to HAZWOPER personnel working within controlled work areas, and to non-HAZWOPER workers and the general public present outside the controlled areas. On site monitoring will be utilized to asses the magnitude of these hazards, and provide indications of any necessary control procedures to mitigate unacceptable hazards.

Specific air monitoring requirements will be established in individual HASPs subject to the following requirements:

- Direct reading instrumentation will be used when available. Instruments include:
    - Flame Ionization Detectors (FIDs – e.g., OVA) – select organic vapors
    - Photoionization detectors (PID – e.g., miniRAE or Micro-TIP) – select organic vapors
    - Explosimeters – explosivity (as a percent of the Lower Explosive Limit [LEL])
    - Oxygen monitors – oxygen concentration (in percent)
    - Single gas meters (mono-tox) – selected contaminants (in parts per million)
        - Hydrogen sulfide
        - Carbon monoxide
        - Oxides of Nitrogen
        - Cyanide
    - Colorimeteric Detector Tubes (e.g., Draegar) – selected contaminants (in parts per million)
    - Aerosol monitors (e.g., mini-RAM) – airborne particulate concentration (in milligrams per cubic meter)
    - Portable gas chromatographs (e.g., OVA) – selected organic vapors

Selected instruments will be capable of discriminating contaminant concentrations to concentrations of at least one-half of the HASP-specified exposure limit. All direct reading instrumentation will be calibrated daily as directed by the manufacturer.

5.1.1 Work Area Monitoring

- Work area monitoring will include breathing zone readings for the maximally exposed worker(s).
- Results will be used to determine adequacy of PPE (especially respiratory protection). Specific criteria for upgrade/downgrade will be established in the HASP.

5.1.2 Perimeter Air Monitoring

- Perimeter air samples will be collected when the potential exists for airborne contaminants to migrate off-site.
- Perimeter monitoring will be conducted at locations downwind from the project activities at a minimum (also upwind if the potential exists for offsite contamination to migrate onto the site).
- Results will be used to determine if the existing controlled work area boundaries are adequate, and/or if work operations present unwarranted hazards to off-site personnel.

5.2 Personal Exposure Monitoring

Personal exposure monitoring will be conducted to determine individual exposures, as specified in the HASP or directed by the SH&E Department.

- Sample results will be recorded in a log book or on the sample log form provided in Attachment 2.
- Records will indicate individual name, SSN (last 4 digits is acceptable), and job/operation at the time of sample collection.
- Samples sent out for independent laboratory analysis will follow chain of custody requirements.
- Exposure results will be posted on site and explained in a safety briefing.
- Employees will receive a written statement of results within 5 days of receipt from the laboratory.

Results of all personal exposure monitoring will be provided to the SH&E Department for inclusion in the employee medical records.

6.0 REFERENCES

SH&E 108 – Medical Monitoring and Surveillance
SH&E 111– Employee Exposure Monitoring Program
SH&E 112 – Respiratory Protection Program
SH&E 113 – Personal Protective Equipment (PPE)
SH&E 114 – Safety Training Programs
SH&E 203 – Accident Prevention Program - Requirements for SH&E Documentation
SH&E 303 – OE and UXO Operations
SH&E 604 – Decontamination

7.0 ATTACHMENTS

Attachment 1 – *Direct Reading Instrument Monitoring Log*
Attachment 2 - *Personal Sampling Data Sheet*
Attachment 3 - *Instrument Calibration Log*

Direct Read Instrument Monitoring Log

Project: _____ Job No.: _____

Date: _____ Operator: _____

Instrument: _____ Calibration: _____
(Amt, Component, Date)

Sampling Technique: _____

_____

Sample Interval: _____

Background Reading: _____

Action Level/Response: _____

Time	Location	Reading (units)	Detection Limits (Scale)

Personal Sampling Data Sheet

EarthTech
A Tyco International Ltd. Company

Client: _____ Method: _____

Site Location: _____ Job No.: _____ Sampling Media: _____

Sample ID.	Pump No.	Air Flow Calibration (L/min)			Start Time	Stop Time	Total Time	Volume (Liters)	Sampler's Initials	Date	Results		Remarks
		Pre	Post	Average			Minutes				Amount (mg)	Conc. ppm, mg/m^3	(Location of sampling, Employee name, SSN)

Instrument Calibration Log

Instrument Information	
Instrument Name:	Manufacturer:
Serial Number:	Last Service Date:
Parameter(s):	Calibration Gas:
Calibration Procedure:	

Daily Calibration Results

Date: _____ Calibration Result: _____

Name: _____ Signature: _____

Notes:

Date: _____ Calibration Result: _____

Name: _____ Signature: _____

Notes:

Date: _____ Calibration Result: _____

Name: _____ Signature: _____

Notes:

Date: _____ Calibration Result: _____

Name: _____ Signature: _____

Notes:

Date: _____ Calibration Result: _____

Name: _____ Signature: _____

Notes:

Date: _____ Calibration Result: _____

Name: _____ Signature: _____

Notes:

Project: _____ Job No.: _____

Date: _____ Operator: _____

Instrument: _____ Calibration: _____
(Amt, Component, Date)

EarthTech A Tyco International Ltd. Company **Safety, Health & Environmental Procedure**	PROCEDURE NO. SH&E 310 DATE March 11, 2005 REVISED
Overhead Electrical Lines	PREVIOUSLY ENV 524

This procedure applies to all U.S.-based personnel, projects, offices, business units and activities. Any exceptions to this procedure must be approved, in writing, by the responsible District/Business Unit Manager and Safety Manager.

1.0 PURPOSE

This procedure provides the safe work requirements to be observed where overhead power lines are present on a job site.

2.0 INTRODUCTION

Operation of heavy equipment and cranes in areas with overhead power lines represents a significant hazard to all personnel on the job site. Accidental contact with an energized line or arcing between a high power line and grounded equipment can cause electrocution of equipment operators or nearby ground personnel, and damage to power transmission and operating equipment. While maintaining a safe distance from all energized lines is the preferred means for control of this hazard, site conditions may not always accommodate this. If work will (or may) occur within 50 feet of any energized line, the procedures outlined below will be observed.

3.0 HAZARD IDENTIFICATION

Overhead power lines will be identified on each job site before the work commences. For each identified line, the Project Manager must determine whether it is energized (and the operating voltage for energized lines), and whether work operations will require that activities with heavy equipment (excavators, loaders, cranes, etc.) will occur within 50 feet of the line. Unless verified, it will be assumed that all lines are energized.

4.0 HAZARD PREVENTION

Safe working distance is the minimum distance which must be maintained between any energized electrical line and any part of the operating equipment to maintain adequate safety margins, and is based on the line voltage of the power line. The following safe working distance criteria will be applied for all Earth Tech operations:

Line Voltage (Kilovolts)	Minimum Safe Working Distance
0 – 50	10 feet
>50 – 200	15 feet
>200 – 350	20 feet
>350 – 500	25 feet
>500 – 750	35 feet
>750 – 1000	45 feet

Source: American National Standards Institute, Publication B30.5

4.1 Acceptable Safety Procedures

Where any work task will not allow the minimum safe working distance to be maintained at all times, an alternate means of protection must be identified and approved by the SH&E Department. In order of preference, acceptable procedures are:

1. De-energize the power line(s).
2. Install insulated sleeves on power lines.
3. Assign line spotters to assist the equipment operator.

4.1.1 De-Energize Power Lines

Elimination of electrical power provides the most acceptable means of ensuring safety of personnel. While temporary site power lines are under the control of the site manager (and can be de-energized locally), electrical distribution and transmission lines can be de-energized only by the owner of the line (generally the local electrical utility). Therefore, de-energizing of a line requires advance coordination with the line owner – generally at least one week advance notice should be provided.

4.1.2 Install Insulating Sleeves

Insulating sleeves can be placed over power lines to provide a contact and arcing barrier if work must occur closer to the power lines than the accepted safe work distance. Although not as desirable as line de-energizing, the use of these sleeves can provide an acceptable alternative where electrical lines are required to remain in service.

As with de-energizing of distribution and transmission lines, placement of insulating sleeves can be performed only by the line owner. This requires advance coordination with the line owner – generally at least one week advance notice should be provided. To install the sleeves, representatives of the line owner will require access to the job site.

4.1.3 Assign Line Spotters

A line spotter is a person located at ground level who is assigned to observe equipment operations, with the specific duty of assisting the equipment operator to ensure that no part of the equipment gets too close to an energized, unprotected electrical line.

Persons assigned to act as line spotters must meet the following requirements:

1. While acting as a line spotter, no other duties may be performed (e.g., the line spotter cannot also act as the load spotter during a lifting operations).

2. The spotter will have a radio or other direct means of communicating with the equipment operator at all times.

3. The spotter will be positioned at a right angle to the equipment operator's line of sight to maximize the sight angles between the personnel.

Under no circumstances will any portion of a piece of equipment pass closer than 10 feet to any energized, un-insulated electrical line.

4.2 Additional Safety Measures

The following additional safety measures can be implemented as needed when working around energized power lines:

1. Provide equipment with proximity warning devices – these provide an audible alarm if any part of the equipment gets too close to a line.

2. Install ground safety stops – these prevent vehicles from accidentally entering hazardous areas.

3. Equip cranes with a boom-cage guard – this prevents the boom from becoming energized if an electrical line is contacted.

4. Utilize insulated links and polypropylene tag lines - these prevent transmission of electricity to loads or tag line handlers if an electrical line is contacted.

NOTE: These additional safeguards are intended as supplemental protection. Use of these measures is not permissible as a substitute for maintaining the safe working distance or implementation of the procedures in Section 4.1.

5.0 ACCIDENT RESPONSE

If an electrical power line is hit or an electrical arc occurs:

1. All ground personnel must evacuate IMMEDIATELY to a distance of at least 50 feet. DO NOT attempt to rescue any injured person until the line can be de-energized.

2. The operator should remain in the cab until the line can be de-energized, and carefully try to extricate the equipment from the power line. This may not be possible where melting of insulator material or metal has occurred.

3. Contact the line owner to report the line contact and request that the line be de-energized immediately.

4. Once the line has been confirmed to be de-energized, the operator can safely evacuate the cab and rescue can commence for any injured personnel.

5. Contact the SH&E Department to report the incident and implement any instructions provided.

If the operator must evacuate while the line is still energized (due to fire or other life-threatening condition) he/she should jump clear of the equipment (making SURE to avoid touching the equipment and the ground simultaneously), and land upright and with feet together. Once on the ground, proceed in a direct line away from the equipment, using a short, shuffling gait (feet touching, sliding each foot no more than 1 foot forward at a time) to minimize shock hazard from electrical energy being transmitted through the ground.

6.0 REFERENCES

SH&E 515 - Cranes, Lifting Devices and Rigging Requirements

EarthTech A Tyco International Ltd. Company **Safety, Health & Environmental Procedure**	PROCEDURE NO. SH&E 402 DATE March 11, 2005 REVISED June 30, 2006
Excavation and Trenching	PREVIOUSLY ENV 515

This procedure applies to all U.S.-based personnel, projects, offices, business units and activities. Any exceptions to this procedure must be approved, in writing, by the responsible District/Business Unit Manager and Safety Manager.

1.0 PURPOSE

Earth Tech will evaluate all excavation operations to provide for proper protective systems and ensure employee protection from excavation collapse. In addition, Earth Tech will comply with the guidelines found in 29 CFR Subpart P, 1926.650 through 1926.652, as well as any state or local regulations.

2.0 GENERAL REQUIREMENTS

The following factors are to be evaluated by a competent person and discussed before commencing excavation operations:

Soil Structure: Excavations in wet soil, sandy soil, or areas that have been backfilled are relatively unstable and must be supported or sloped if employees are to enter the excavation.

Weather Conditions: Changing weather conditions greatly affect the safety of working in and around excavations. Excess water from rain or snow loosens the soil, increasing the chance of the soil caving in. Excavation should be diked, pumped, or covered, to prevent an excessive amount of water from accumulating.

Superimposed Loads: Superimposed loads in the vicinity of excavation walls increase the probability of a cave-in. Heavy equipment and materials should be kept back as far as possible. Heavy equipment should be placed on wooden mats or planking to spread the weight more evenly. Considerations must also be taken when buildings, curbs, trees, utility poles, and other structures are around the excavation. Excavated soil must be stored away from the edge of the excavation.

3.0 SPECIFIC REQUIREMENTS

The following safe operating guidelines will apply to excavations exceeding 4 feet in depth.

- Prior to opening an excavation, all efforts shall be made to locate all underground utilities. The utilities shall be marked.
- Trees, boulders, and other surface encumbrances that create a hazard will be removed or made safe before excavation is begun.
- Excavated materials will be stored and retained at least 3 feet from the edge of the excavation. Walkways and sidewalks shall be kept clear of excavated materials.
- Special precautions will be taken in sloping or shoring the sides of excavations adjacent to a previously backfilled excavation.

- Except in hard rock, excavations below the level of the base of the footing of any foundation or retaining wall will not be permitted unless the wall is underpinned and all other precautions have been taken to ensure the stability of the adjacent walls.
- Diversion ditches, dikes or other suitable means will be used to prevent water from entering an excavation and for drainage of the excavation.
- When mobile equipment is used or allowed adjacent to excavations, stop logs or barricades will be installed. The grade will always be away from the excavation.
- Dust conditions during excavation will be kept to a minimum. Wetting agents shall be used upon the direction of the SSO.
- Employees subjected to vehicle traffic in excavating operations shall don reflective clothing.
- Excavations shall be inspected by a competent person prior to employees entering the space (see Section 6.0).
- When employees are required to work in an excavation 4 feet or deeper, one or more ladders shall be provided for access/egress. Within the trench, the maximum horizontal travel distance to a ladder shall be no more than 25 feet. The ladder shall extend a minimum of 3 feet above the excavation and be secured. This ladder shall not be removed until all employees have exited the excavation. All ladders will meet the requirements of 29 CFR 1926.1053.
- Excavations deeper than 5 feet which are entered by employees shall be sloped, shored, or supported by some other protective system prior to entering the space.
- Guardrail or fences shall be placed at all excavations which are close to sidewalks, drives, or other thoroughfares. Adequate protection shall also exist at remote excavations where workers are not present.
- Employees working around an excavation deeper than 4 feet will be protected from the fall hazard by an appropriate fall protection measure (e.g., warning line, barricade, fencing, etc.).

4.0 PROTECTIVE SYSTEMS

OSHA requires that all excavations more than 5 feet deep which will be entered by employees shall be shored, sheeted, braced, or supported.

- The preferred method is to slope the sides of the excavation to the angle of repose, or the angle of control at which the soil will remain at rest. The angle of repose varies with different kinds of soil; this angle must be determined on each individual excavation, using the following guidelines:

Maximum Allowable Slopes

Soil or Rock Type	Horizontal to Vertical Ratio (Slope)
Stable Rock	Vertical (90 degrees)
Type A	¾:1 (53 degrees)
Type B	1:1 (45 degrees)
Type C	1½:1 (34 degrees)

Note: No soil classification is required if a 1½:1 slope (34-degree slope) is used. If a 1½:1 slope is not used, a soil classification must be made by a competent person. The excavation must then comply with the above minimum slope requirements.

- The second method of support is shoring, sheeting, tightly placed timber shores, bracing, trench jacks, piles, or other materials installed in a manner strong enough to resist the pressures surrounding the excavations.
- The third method is to use a trench box, which is a prefabricated movable trench shield made of steel plates, welded to a steel frame.

5.0 HAZARDOUS ATMOSPHERES

When Earth Tech performs excavation operations in areas where a hazardous atmosphere could reasonably exist (e.g., landfill, hazardous storage areas, underground/aboveground storage tanks, etc.) personnel will, at a minimum, apply these guidelines:

- Perform atmospheric testing in the anticipated breathing zone of the work area to determine oxygen content, combustible gas, and toxic gases and vapors, if applicable.
- Employees will not perform work in areas with less than 19.5% oxygen without the appropriate respiratory protection or adequate ventilation.
- Employees will not perform work in an area with more than a 10% lower explosive level (LEL).
- Toxic gases will be evaluated on a per-site basis using direct-reading equipment.

6.0 COMPETENT PERSON

A Safety Manager-approved individual will serve as the site's "competent person" for excavation operations. The designated competent person must meet the qualifications identified in Section 5.2.3 of SH&E 132.

The responsibilities of the designated competent person are identified in Section 5.2.2 of SH&E 132.

When required, the responsible project manager must designate an approved individual to serve as the competent person and must also authorize the individual to take prompt, corrective actions regarding excavation safety.

8.0 ATTACHMENTS

Attachment 1 – *Excavation Daily Inspection Checklist*

9.0 REFERENCES

SH&E 111 – Employee Exposure Monitoring Program

SH&E 132 – Competent Persons

EARTH TECH
EXCAVATION DAILY INSPECTION CHECKLIST

Project Name:	
Project/Contract Number:	Project Manager:
Site Safety Coordinator:	Competent Person:

TRENCHING/EXCAVATION INSPECTION REQUIREMENTS

Visual Test: ☐ Cohesive ☐ Granular ☐ Fissured	**Manual Test:** ☐ Cohesive ☐ Granular
Soil Classification: ☐ Stable Rock ☐ Class A	☐ Class B ☐ Class C
Protective Measures/Equipment: ☐ Slope 1 ½H:1V Type C ☐ Slope 1H:1V Type B ☐ Slope ¾ H:1V Type A ☐ Special Engineered Design **(submit copy to SH&E Department)** ☐ Horizontal ☐ Vertical	☐ Trench Shoring Box ☐ Manufacturer's Tabulated Data ☐ Correct Shore/Shield ☐ Slope Used_____
Encumbrances Identified: ☐ Above Ground (explain): _____ ☐ Below Ground (explain): _____ ☐ Surcharge Loads (explain):	
General Considerations: ☐ Ladder/Ramps ☐ Hazardous Atmosphere ☐ Spoil Material Placement ☐ Water Accumulation	☐ Utility Locations ☐ Other: _____ ☐ Notes: _____

1.	Has the daily inspection of the excavation site been made by the competent person?	☐ **yes** ☐ **no** ☐ **n/a**
2.	Are employees who are exposed to vehicular traffic wearing warning vests?	☐ **yes** ☐ **no** ☐ **n/a**
3.	Are employees being kept out from under suspended loads?	☐ **yes** ☐ **no** ☐ **n/a**
4.	Before opening any excavation, have efforts been made to determine if there are underground utility installation in the area?	☐ **yes** ☐ **no** ☐ **n/a**
5.	If there are underground utility installations, have utility companies been contacted before excavation was started?	☐ **yes** ☐ **no** ☐ **n/a**
6.	If underground utility installations are located, have they been protected, braced or removed to safeguard employees?	☐ **yes** ☐ **no** ☐ **n/a**
7.	Have all surface encumbrances been removed?	☐ **yes** ☐ **no** ☐ **n/a**
8.	Have excavated or other materials been effectively stored and retained at least 2 feet from the edge of the excavation?	☐ **yes** ☐ **no** ☐ **n/a**
9.	Do trenches >4 feet deep or more have adequate means of exit: ladders or steps? (no more than 25 feet of travel is required)	☐ **yes** ☐ **no** ☐ **n/a**
10.	Have steps been taken to protect employees from loose rock and hazards of falling rock?	☐ **yes** ☐ **no** ☐ **n/a**
11.	Do the walls and faces of trenches 5 feet or deeper and *all excavations* in which employees are exposed to danger from moving ground or a cave-in have a protection system, i.e. Shoring, sloping or some other equivalent means?	☐ **yes** ☐ **no** ☐ **n/a**
12.	Is there any evidence of a possible cave-in or slide? **If yes,** all work in the excavation must cease until the necessary precautions have been taken to safeguard the employees.	☐ **yes** ☐ **no** ☐ **n/a**
13.	Have guardrails been provided when employees are required to cross a walkway at an excavation site?	☐ **yes** ☐ **no** ☐ **n/a**
14.	If excavation is remote, such as a well, pit or shaft, have physical barriers been provided?	☐ **yes** ☐ **no** ☐ **n/a**
15.	Have structural ramps used solely be employees been designed by a competent person?	☐ **yes** ☐ **no** ☐ **n/a**
16.	Do the structural ramps have appropriate means provided to prevent slipping and are the runways uniform in thickness?	☐ **yes** ☐ **no** ☐ **n/a**
17.	Has a barricade, stop log or hand signal been provided when equipment is required close to the excavation?	☐ **yes** ☐ **no** ☐ **n/a**
18.	Are sidewalks, pavements, etc. Protected from undercuts?	☐ **yes** ☐ **no** ☐ **n/a**
19.	Have adjoining buildings, walls, etc. been braced or otherwise supported?	☐ **yes** ☐ **no** ☐ **n/a**
20.	Has the air around the excavation site been tested to make sure an oxygen deficiency or hazardous atmosphere does not exist?	☐ **yes** ☐ **no** ☐ **n/a**
21.	If hazardous atmosphere does exist, has proper personal protective equipment been provided?	☐ **yes** ☐ **no** ☐ **n/a**
22.	Is water accumulation a problem? ☐ **yes** ☐ **no** ☐ **n/a** if yes, are employees in the excavation site protected and equipment monitored by a competent person?	☐ **yes** ☐ **no** ☐ **n/a**

Completed By:

Print Name	Signature	Organization	Date

EarthTech A Tyco International Ltd. Company **Safety, Health & Environmental Procedure**	PROCEDURE NO. SH&E 403 DATE March 11, 2005 REVISED June 30, 2006
Drilling	PREVIOUSLY ENV 521

This procedure applies to all U.S.-based personnel, projects, offices, business units and activities. Any exceptions to this procedure must be approved, in writing, by the responsible District/Business Unit Manager and Safety Manager.

1.0 PURPOSE

All drilling operations must conform to the procedures outlined below. Drilling operations include, but are not limited to, rotary, hollow-stem, and direct-push drilling.

2.0 GENERAL SAFETY GUIDELINES

- Use common sense, while maintaining a “safety-first” attitude at all times.
- Know the location of underground and overhead utilities.
- Use required personal protective equipment (PPE); do not wear loose-fitting clothing or jewelry. Keep hair tied back and tucked into hardhat.
- Do not touch or go near moving parts.
- Be aware of the location of "Emergency Shut Off" switches.
- Be aware of potential contaminants. Always wear required PPE and follow appropriate decontamination procedures.
- In the event of an accident, allow properly equipped and protected personnel to respond. Immediately leave the area.
- Do not smoke or use spark-producing equipment around drilling operations.
- No food will be consumed or stored in the work area.
- Do not work around a drill rig during a thunderstorm or rain.
- Maintain orderly housekeeping on and around the drill rig. Store tools, materials, and supplies to allow safe handling by drill crewmembers. Proper storage on racks or sills will prevent spreading, rolling, or sliding. Avoid storage or transportation of tools, materials, or supplies within or on the drill rig derrick.
- Maintain working surfaces free of obstructions or potentially hazardous substances.
- Store gasoline only in containers specifically designed or approved for such use.
- Fire fighting equipment should not be tampered with and should not be removed for other than the intended fire fighting purposes or for servicing.
- The departing driller should inform the oncoming driller of any special hazards or ongoing work that may affect the safety of the crew.

- Rigging material equipment for material handling should be checked prior to use on each shift and as often as necessary to ensure it is safe. Defective rigging should be removed from service.
- Work areas and walkways should not be obstructed. The area around the derrick ladder should be kept clear to provide unimpeded access to the ladder. The rotary table of the rig floor shall be kept free of obstructions and free of undue accumulation of oil, water, ice, or circulating fluids.
- Passengers shall only be allowed in vehicles designed for passenger use. Do not ride on the outside of drill rigs, trailers, or other equipment.

3.0 PRE-OPERATIONAL PROCEDURES

The following procedures shall be take place prior to performing drilling operations.

3.1 Utility Clearance

Earth Tech and/or its subcontractors will determine the location of all underground/overhead utilities before drilling operations take place. Project management shall contact the One-Call Center for the state in which drilling is to be performed to obtain written clearance. For drilling operations outside of the United States, contact the local utility companies for clearance. For areas that are not covered by One-Call Centers or local utility companies (i.e., client specific utilities), clearance must be obtained from the client. In addition to obtaining utility clearances, the appropriate party will make a utility survey of each drilling point. The utility survey shall include both magnetometer and ground-penetrating radar survey. Documentation that nearby utilities have been marked on the ground and that the drill site has been cleared shall be kept in the project trailer/support vehicle and communicated to the drilling subcontractor. All utilities shall be identified on a job hazard analysis and communicated to all drilling and drill support personnel.

3.2 Drill Rig Inspection

Prior to the start of site work each day, the drilling subcontractor will inspect all drilling equipment. The inspection will be documented in the field records, and the records will be maintained at the site. If the drill rig owner or operator does not have a company-specific inspection form, use or reference the attached “Drill Rig Safety Inspection Checklist” form. The drilling equipment inspection must be repeated on a daily basis. Defective equipment shall be repaired prior to use.

3.3 Maintenance

The following are minimum specifications for performing maintenance on drilling equipment:

- Safety glasses shall be worn, at a minimum, when performing maintenance on a drill rig or on the drilling tools.
- Follow all manufacturers’ recommendations for maintenance on drilling equipment.
- The drill rig engine shall be shut down before making repairs or adjustments to a drill rig or lubricating fittings (except repairs or adjustments that can only be made with the engine running). The operator shall remove keys and tag out the ignition. All systems (i.e., drill rotor, engine, pressurized lines, etc.) shall be at a “zero energy state” before performing maintenance.
- The leveling jacks shall be lowered, the wheels chocked, and the hand/parking brakes set before working under a drill rig.

4.0 OPERATING PROCEDURES

The following procedures shall be recognized during the operation of drilling equipment.

4.1 Moving Drilling Equipment

- Lower drilling mast before moving rig.
- Secure all loads to rig prior to off-road mobilization.
- Inspect the route of travel prior to moving the drill rig off-road. Be aware of holes, rocks, trees, erosion, and uneven surfaces.
- Remove all passengers from the cab before moving drill rig onto rough or sloped terrain.
- Engage multiple drive power trains (when available) on rig vehicle when mobilizing off-road.
- Travel directly up or down grade on slopes when feasible. Avoid off-camber traverse approaches to drill sites.
- Approach changes in grade squarely to avoid shifting loads or unexpected unweighting.
- Use a spotter (person at grade) to provide guidance when vertical and lateral clearance is questionable.
- Use parking brake and chock wheels when grades are steep.

4.2 Raising The Derrick (Mast)

- Locate visually, overhead utilities prior to raising the mast.
- Treat overhead electrical lines as if they were energized and maintain at least a 40-foot clearance.
- Earth Tech will contact appropriate utilities agency to manipulate and deactivate overhead service in areas that interfere with drilling operations. Do not attempt to handle utilities.
- Stabilize and level each work site prior to drill rig setup. Do not drill on slopes near powerlines, including drainage ditches, trenches, excavations, and other holes. Drill rig could tip over, resulting in contact with power lines.
- The derrick must not be raised until the rig has been blocked, leveled (leveling jacks down), and chocked.
- Secure and lock mast according to manufacturer's recommendations prior to drilling.
- If required to perform work on the mast at heights above six feet, a full body safety harness and lanyard shall be worn accordingly.
- Note wind speed and direction to prevent overhead utility lines from contacting rig derrick. Allow at least a 40-foot clearance between rig mast and utility lines, unless authorized by the SH&E department to operate at a shorter clearance distance.

4.3 Drilling

- If Earth Tech personnel perform drilling (i.e., direct push, Geoprobe®), follow the manufacturer's operational or field manual's safety guidelines/specifications.
- Only authorized and trained drill rig operators shall operate a drill rig. Drill rigs shall be setup and operated according to manufacturer's specifications.
- Set up and delineate appropriate work zones. This may include an exclusion zone, contamination-reduction zone, and a support zone. When feasible, work zones shall be cleared of obstructions and leveled to provide a safe working area.

- Establish a communication system between driller, helpers, and other field support personnel for responsibilities during drilling operations.
- All personnel shall be instructed to “stand clear” prior to and during startup. Personnel shall stay as far away as possible from operating equipment, especially if rig is located on unstable terrain (drilling operations shall not proceed on unstable ground).
- Begin auger borings slowly with the drive engine operating at low speed.
- Keep hands and feet clear of rotating augers and direct push equipment.
- Prevent placing hands or feet under auger sections during hoisting over hard surfaces.
- Avoid the removal of spoil cuttings with hands or feet.
- Assure drill rig is in neutral and the augers are not rotating before cleaning augers.
- Wear hearing protection as required.

4.4 Subcontractor Guidelines

Subcontractors shall discuss company-specific standard operating procedures (SOPs) for health and safety with Earth Tech field supervisors prior to the start of drilling operations. Subcontractor SOPs may include procedures for hoisting operations, cat line operations, pipe handling, derrick operations, making and breaking joints, etc.

5.0 ATTACHMENT

Attachment 1 - Drill Rig Safety Inspection Checklist

6.0 REFERENCES

SH&E 112 – Respiratory Protection Program

SH&E 113 – Personal Protective Equipment

SH&E 301 – Hazardous Waste Operations (HAZWOPER)

SH&E 310 – Overhead Electrical Lines

SH&E 604 – Decontamination

Drill Rig Inspection Checklist

Date	Equipment Model/Type:
Project Name:	Serial or License #
Project #	Location Owner/Operator:
Project Manger:	Inspector:

Place a (✓) in the "Yes" column if the requirement has been met. If a "No" is encountered, equipment must be removed from operation until the deficiency has been corrected. Describe deficiencies on page two of this form. Use the Comment column to note any additional information needed to certify the equipment. If a checklist item is found to be "Not Applicable," check "NA" and provide a comment in the appropriate box.

Item Name	Requirement	Yes	No	NA	Comment
Hydraulic systems controls and levers	No leak fittings or connections. Levers are in good operating condition. Fluid levels are full.				
Fuel, oil, water, and coolant lines	No leaks.				
Hoses	No leaks in hoses or connections. No signs of excessive wear, kinked or bent hoses.				
Gauges	Operational and visible to operator.				
Emergency kill switch and life line	Operational and accessible to operator.				
Shear pins	In place.				
Drive chains	No signs of excessive wear, broken or defective links.				
Parking brakes	Set and operational.				
Outriggers	No leaks. Set on pads (as necessary to avoid damage).				
Windshield Wipers	Operational.				
Lights (head, tail and running lights)	Operational and without cracked lenses.				
Back-up alarm	Operational, spotter used.				
Cables and ropes	No fraying, birdnesting, flattening, stretching. Must be braided or properly clamped at connections.				
Pulleys, drums and spools	No excessive wear or cracking.				
Derrick/Mast	Locked in position. Frame is not cracked or bent.				
Hoists	Properly spooled cable, rated to lift loads.				

Item Name	Requirement	Yes	No	NA	Comment
Safety equipment	Safety harness, fire extinguisher, flares, safety reflectors, first aid kit, grounding wire for fueling, and spill response equipment (for fueling and repairs).				
Guards	Power take-offs (PTOs) and all rotating parts designed with guards. Guards must have warning labels.				
Miscellaneous (as applicable)	Diverter systems; auger and head seals; cyclones; grout plant guards; etc. (list): • • •				

DEFICIENCIES (Explain all negative response and list corrective actions; all deficiencies must be corrected before the rig is entered into service):

1.
2.
3.
4.
5.

Other Repairs, Routine Maintenance and/or Comments:

Inspection Conducted and Certified by:

	Print Name:	Signature	Date:
Owner / Operator			

Checklist Reviewed by:

	Print Name:	Signature	Date:
Earth Tech PM or SSO			

EarthTech A Tyco International Ltd. Company **Safety, Health & Environmental Procedure**	PROCEDURE NO. SH&E 404 DATE March 11, 2005 REVISED June 30, 2006
Manual Lifting	PREVIOUSLY ENV 501

This procedure applies to all U.S.-based personnel, projects, offices, business units and activities. Any exceptions to this procedure must be approved, in writing, by the responsible District/Business Unit Manager and Safety Manager.

1.0 PURPOSE

Earth Tech personnel will observe the procedures below when performing manual handling in excess of 10 pounds. No person shall lift more than 49 pounds without the use of mechanical aid or assistance from other personnel.

2.0 INTRODUCTION

Manual materials handling (MMH) means moving or handling things by lifting, lowering, pushing, pulling, carrying, holding, or restraining. Improper MMH can result in cuts, pinches, crushing, and serious back, abdomen, arm, and leg muscle and joint injury. Even “light” objects, lifted improperly, can contribute to injury, causing cuts and muscle injuries.

The level of hazard associated with MMH work depends on what is being handled, what the task is, and what the conditions are at the workplace. Specific considerations include:

- Is the load too heavy for the task that you are doing?
- Is the load located too high or low for a safe lift?
- Is the load too big or may have a shape that makes it difficult to handle?
- Is the load wet, slippery, or have sharp edges that make it difficult to grasp?
- Is the load unstable or can shift its center of gravity because contains items that can move or flow (e.g., a partially filled drum or concrete in a wheelbarrow)?
- Is the load too big to let you see where you are putting your feet?

The task can make MMH hazardous if a worker:

- Uses poor lifting techniques (lifting too fast, too often or too long; lifting with back bent or while twisting or reaching too far; lifting while sitting or kneeling, etc.),
- Has to move material over long distances,
- Will not take appropriate rest breaks; insufficient recovery time, and
- Performs a combination of different handling tasks together (e.g. lifting, carrying and lowering).

The site conditions can also contribute to hazards of MMH if:

- Walking surfaces are uneven, sloping, wet, icy, slippery, unsteady, etc.
- There are differences in floor levels or walking surfaces.
- There is poor housekeeping that causes slip, trip and fall hazards.
- There is inadequate lighting.
- Work is performed at a fast pace.
- Movement is restricted because of clothing or personal protective equipment, or because the space is small or posture is constrained.

3.0 GENERAL REQUIREMENTS

Mechanical equipment or assistance such as dollies, carts, come-alongs, or rollers are to be used whenever possible. Mechanical assistance must be of proper size, have wheels sized for the terrain, and be designed to prevent pinching or undue stress on wrists. Objects to be moved must be secured to prevent falling and properly balanced to prevent tipping.

The following guidance will be observed:

- Before performing the lift:
    - Check to see if mechanical aids such as hoists, lift trucks dollies or wheelbarrows are available.
    - Be sure that you can lift the load without over-exertion, and get help with heavy or awkward loads. All loads in excess of 49 pounds require use of mechanical aids or assistance from other personnel.
    - Be sure that the load is "free" to move.
    - Check that the planned location of the load is free of obstacles and debris.
    - Be sure that the path to the planned location of the load is clear. Grease, oil, water, litter and debris can cause slips and falls.
    - Particular handling and lifting techniques are needed for different kinds of loads or materials being handled (for example, compact loads, small bags, large sacks, drums, barrels, cylinders, sheet materials like metal or glass). See Section 2.0 for additional guidance.
    - Do not lift if you are not sure that you can handle the load safely.
- General tips for lifting:
    - Prepare for the lift by warming up the muscles.
    - Stand close to the load and face the way you intend to move.
    - Use a wide stance to gain balance.
    - Be sure you have a good grip on the load.
    - Keep arms straight.
    - Tighten abdominal muscles.
    - Tuck chin into the chest.
    - Initiate the lift with body weight.
    - Lift the load as close to the body as possible.
    - Lift smoothly without jerking.

    - Avoid twisting and side bending while lifting.
- Engineering Controls:
    - Material handling tasks should be designed to minimize the weight, range of motion, and frequency of the activity.
    - Alter the task to eliminate the hazardous motion and/or change the position of the object in relation to the employee's body -- such as adjusting the height of a pallet or shelf.
    - Work methods and stations should be designed to minimize the distance between the person and the object being handled.
    - High-strength push-pull requirements are undesirable, but pushing is better than pulling. Material handling equipment should be easy to move, with handles that can be easily grasped in an upright posture.
    - Workbench or workstation configurations can force people to bend over. Corrections should emphasize adjustments necessary for the employee to remain in a relaxed upright stance or fully supported, seated posture. Bending the upper body and spine to reach into a bin or container is highly undesirable. The bins should be elevated, tilted or equipped with collapsible sides to improve access.
    - Repetitive or sustained twisting, stretching, or leaning to one side are undesirable. Corrections could include repositioning bins and moving employees closer to parts and conveyors.
    - Store heavy objects at waist level.
- Whenever possible, utilize hand holds or other lifting attachments on objects being handled:
    - Use the "hook grip" on loads with cut-out handholds.
    - Curl your fingers around the edge.
    - Do not hold the load with fingertips.
    - Use containers with handles located more than halfway up the side of the container.
    - Use the "ledge grip" to handle regularly shaped objects without handles.
    - Use vacuum lifters to handle sheet materials or plates.
    - Hold the object with hands placed diagonally.
    - Wear gloves where practical.
- When significant, sustained lifting work is required it is desirable to rotate employees to spread the work load among several people and avoid fatigue. Rotation is not simply performing a different job, but must be a job that utilizes a completely different muscle group from the ones that have been over-exerted.

4.0 SPECIFIC HANDLING TECHNIQUES

The following guidance will be used when performing MMH for various types of materials.

4.1 Square or Rectangular Objects

To lift square or rectangular objects:

- Place one foot slightly in front of the other.
- Squat as close to the object as possible.
- Grasp one of the top corners away from the body and the opposite bottom corner closest to the body.
- Tilt the object slightly away from the body, tilt forward at the hips, keep the back straight, and tuck in the chin.
- Test to be sure the object is loose from floor and shall lift without snagging.
- Straighten the legs, keeping the backbone straight, pull the object into the body, and stand up slowly and evenly without jerking or twisting.
- If turning or change of direction is required, turn with feet without twisting the torso and step in the direction to travel.
- To set an object down, reverse the sequence, being sure not to trap the bottom hand between the object and the surface on which the object is set.

4.2 Cylindrical Objects

When lifting/moving round or cylindrical objects, the objects should be rolled wherever possible. Rolling must be controlled by chute, tagline, or other means of limiting acceleration. Workers must not be positioned downhill from rolled objects. Use of the legs for pushing and tagline control of rolled objects must be stressed.

Cylindrical objects, such as drums that must remain upright, are to be handled manually by slightly tilting the object, using the legs for control, and balancing the object on the bottom edge. The handler then walks besides the object, with the object tilted toward the body, positioning the hands on the top edge away from the body and moving so they do not cross, thus, maintaining the balance and a steady controlled forward motion. Motion must be controlled so that stopping walking and moving the hands shall stop forward motion.

Use carts or tracks to transport cylinders. Make sure that two people transport a cylinder if carts cannot be used, use lifting straps to improve grip.

Technique for one person lifting a cylinder onto a platform:

- Roll the cylinder to within 3 feet of the platform.
- Position the forward foot around the cylinder, the back foot about 1 foot behind the cylinder.
- Bend knees slightly.
- Place one hand on the valve protective cap, the other hand underneath the cylinder about 1 foot from the ground.
- Tilt the cylinder onto the thigh of the back leg.
- Balance the cylinder on the thigh by pressing down with the back hand while lifting the cylinder with the forward hand.
- Extend both knees to initiate and forward movement of the cylinder and continue by pushing up and forward with the arms until the cylinder is located on the platform.
- Climb on the platform.
- Straddle the cylinder at the valve end.

- Grasp the valve protective cap of the cylinder with both hands between the thighs.
- Lean forward and straighten the knees to set the cylinder upright.

4.3 Bags and Sacks

The best way to handle a bag depends on its size, weight and how far it is to be carried. When lifting, remember to:

- Straddle the end of the bag.
- Bend the hips and knees.
- Keep the back straight.
- Grasp the bag with both hands under the closer end. Keep elbows inside the thighs.
- Lean forward, straightening the knees to set the bag upright.
- Readjust the straddle position moving feet closer to the bag.
- Readjust the grasp, with one hand clasping the bag against the body and the other under it.
- Stand up by thrusting off with the back leg and continuing in an upward and forward direction.
- Thrust the bag up with the knee while straightening the body.
- Put the bag on the shoulder opposite the knee used to thrust the bag up.
- Stabilize the bag on the shoulder.
- Move off without bending sideways.

Avoid unloading a bag from the shoulder directly to floor level. Use an intermediate platform or get help from a coworker.

1. Stand close to the platform.
2. Place one foot in front of the platform.
3. Bend hips and knees.
4. Keep the back straight.
5. Ease the bag off the shoulder and put it upright on the platform.
6. Pull the bag slightly over the edge of the platform.
7. Stand close to the platform with the bag touching the chest.
8. Clasp the bag against the body with one hand, the other hand holding bottom of the bag.
9. Step back.
10. Bend hips and knees, keeping back straight.
11. Ease the bag on the floor.

Bulkier sacks are easier to carry on your back. Lift the sack onto your back from a platform:

1. Move the sack to the edge of the platform.
2. Put your back against the sack.

3. Grasp with both hands on the upper corners of the sack.
4. Ease the sack onto the back, bending hips and knees before taking the weight.
5. Keep the back straight.
6. Stand up and straighten the hips and knees.
7. Stabilize the sack.
8. Move away without bending sideways.

Two-person handling of a sack:

1. Position one person on either side of the sack.
2. Squat with one foot balancing behind the sack.
3. Keep back straight.
4. Grasp with the outer and on the upper corner, the other holding the bottom of the sack.
5. On one person's command:
    a. Stand up and straighten the hips and knees.
    b. Move towards the stack.
    c. Put the sack on the stack.

4.4 Sheet Materials

When lifting sheet materials:

1. Stand close to the pile of sheets in a walking stance.
2. Grasp sheet firmly at the mid-point of its long side with the closer hand.
3. Pull sheet up and toward the body.
4. Change grip using your other hand and put your fingers on top of the sheet.
5. Pull sheet up to the vertical position and to the side until one half is off the pile.
6. Grasp the lower edge of the sheet with the free hand and support the hand by placing it on your knee.
7. Stand up without bending and twisting body.

To carry sheets:

- Use drywall carts to carry sheet materials.
- Get help from another person where carts are not available.
- Apply carrying handles for manual carrying.
- Always use gloves and carrying handle for glass and other materials with sharp edges.

Team Handling - Team handling occurs when more than one person is involved during the lift.

Use team lifting and carrying where other solutions are inappropriate.

- Remember that the combined strength of the team is less than the sum of individual strength.
- Select team members of similar height and strength.
- Assign a leader to the team.
- Determine a set of commands to be used such as "lift", "walk", "stop", "down". Make sure that everyone knows what to do when they hear the command.
- Follow the commands given by the team leader.
- Practice team lifting and carrying together before attempting the task.

5.0 MATERIALS STORAGE

When storing materials on site

- Store materials at a convenient height.
- Leave the lowest shelf unused if necessary.
- Use vertically mobile shelves to avoid bending and overhead reaching.
- Use bin racks for storing small items.
- Store heavy and frequently used materials at waist height.
- Do not store materials at floor level.
- Use hand trucks with elevating devices in storage and loading areas.
- Use trucks with a tilting device to avoid bending.
- Use elevating platforms to avoid overhead reaching.

6.0 REFERENCES

SH&E 211 – Walking - Working Surfaces Protection

SH&E 405 – Handling Drums and Large Containers

EarthTech A Tyco International Ltd. Company **Safety, Health & Environmental Procedure**	PROCEDURE NO. SH&E 506 DATE March 11, 2005 REVISED October 2005
Manual Hand Tools	PREVIOUSLY ENV 505

This procedure applies to all U.S.-based personnel, projects, offices, business units and activities. Any exceptions to this procedure must be approved, in writing, by the responsible District/Business Unit Manager and Safety Manager.

1.0 PURPOSE

All manually operated hand tools and equipment shall be used, handled, and stored in accordance with the following requirements.

2.0 GENERAL REQUIREMENTS

- Use each tool only for the job it was designed to do.
- Discard damaged or abused tools promptly.
- Buy several versions or sizes of the same tool.
- Inspect for distortion, cracks, chips, wear or mushrooming.
- Keep all tools clean and in working order.
- Be sure handles are fixed firmly to a tool's working end.
- Be sure tools and work mate properly to avoid slippage.
- Handles are made for the tool; never use extensions.
- Confine impact forces to striking and struck tools.
- Hold work in a clamp or vise, not in your hand.
- Start off slowly when engaging the tool and the work.
- Shut current off before using a tool near electricity.
- Make sure the handle sits securely in your hand.
- Keep moving parts lightly lubed; avoid lube leakage.
- Wear approved safety goggles when using hand tools.
- Keep hands away from sharp edges.
- Pull, don't push, a wrench handle for more leverage.
- Position your body securely while working with the tool.
- Keep jaw teeth, cutters and blades sharp for better results.
- Keep tool's moving parts properly cleaned and tightened

- Use steady pressure on jaws and cutters; don't rock the tool.
- Support long, overhanging work in a vise at the far end.
- Use pads in the jaws to protect soft or crushable work.
- Use a tool close to the vise or clamp.
- Hold work in a clamp or vise with sufficient pressure.
- Keep clamped assemblies away from vibration and bumping.
- Discard a tool instead of repairing it by welding or brazing.
- Keep tools from excessive heat.
- For continuous work, use comfort grips or gloves.
- Follow instructions on the tool and/or package.

3.0 TOOL-SPECIFIC REQUIREMENTS

3.1 Cutting Tools

- Wear safety glasses and protective gloves when using cutters.
- Choose the proper cutter for the job. Cutters are designed for a specific type, hardness, and size of material.
- Cut materials straight across - keep the material being cut at right angles to the cutting edges of jaws.
- Prevent injury from flying metal by wrapping a burlap bag, cloth or rag around the cutting jaws. Metal can fly when cut. The harder the metal, the farther it will fly.
- Warn those in the area to take precautionary measures to avoid possible injury from flying metal pieces.
- Keep cutting tools in good repair.
- Adjust and lubricate cutter and moving parts daily if heavily used.
- Sharpen jaws according to manufacturers' instructions.
- Do not use a cutting tool until you are trained in its proper and safe use.
- Do not use cushion grip handles for jobs requiring electrically-insulated handles. Cushion grips are for comfort primarily and do not protect against electric shock.
- Do not use cutters which are cracked, broken or loose.
- Do not exceed the recommended capacity of a tool.
- Do not cut diagonally.
- Do not rock cutters from side to side when cutting wire.
- Do not pry or twist with tool when cutting.
- Do not hammer on cutting tools or extend the handle length to achieve greater cutting power.
- Do not expose cutters to excessive heat.

3.2 Hammers

- Hammers are designed according to the intended purpose. Select a hammer that is comfortable for you and that is the proper size and weight for the job. Misuse can cause the striking face to chip, possibly causing a serious injury.
- Choose a hammer with a striking face diameter approximately ½ inch larger than the face of the tool being struck (e.g., chisels, punches, wedges, etc.).
- Ensure that the head of the hammer is firmly attached to the handle.
- Replace loose, cracked or splintered handles.
- Discard any hammer with mushroomed or chipped face or with cracks in the claw or eye sections.
- Strike a hammer blow squarely with the striking face parallel to the surface being struck. Always avoid glancing blows and over and under strikes. (Hammers with bevelled faces are less likely to chip or spall).
- Look behind and above you before swinging the hammer.
- Watch the object you are hitting.
- Hold the hammer with your wrist straight and your hand firmly wrapped around the handle.
- Do not use a hammer with a loose or damaged handle.
- Do not use handles that are rough, cracked, broken, splintered, sharp-edged or loosely attached to the head.
- Do not use any hammer head with dents, cracks, chips, mushrooming, or excessive wear.
- Do not use a hammer for any purpose for which it was not designed or intended.
- Do not use one hammer to strike another hammer, other hard metal objects, stones or concrete.
- Do not redress, grind, weld or reheat-treat a hammer head.
- Do not strike with the side or cheek of the hammer.

3.3 Saws

- Saws are made in various shapes and sizes and for many uses. Use the correct saw for the job.
- Wear safety glasses.
- Select a saw of proper shape and size for stock being used.
- Choose a saw handle that keeps your wrist in a natural position in the horizontal plane.
- Choose a saw with a handle opening of at least 5 inches long and 2.5 inches wide and slanted at a 15° angle.
- Check the stock being cut for nails, knots, and other objects that may damage or buckle the saw.
- Start the cut by placing your hand beside the cut mark with your thumb upright and pressing against blade. Start the cut carefully and slowly to prevent blade from jumping. Pull upward until blade bites. Start with a partial cut, then set the saw at the proper angle.

- Apply pressure on downstroke only.
- Hold stock being cut firmly in place.
- Use a helper, a supporting bench or vise to support long stock if required.
- Keep teeth and blades properly set.
- Protect teeth of saw when not in use.
- Keep saw blades clean.
- Hacksaws:
    - Select correct blade for material being cut.
    - Secure blade with the teeth pointing forward.
    - Keep blade rigid, and frame properly aligned.
    - Cut using strong, steady strokes, directed away from yourself.
    - Use entire length of blade in each cutting stroke.
    - Use light machine oil on the blade to keep it from overheating and breaking.
    - Cut harder materials more slowly than soft materials.
    - Clamp thin, flat pieces requiring edge cutting.

3.4 Pipe Tools (Wrenches, Cutters, Reamers, and Threaders)

- Pipe tools are made in various shapes and sizes and for many uses. Always use the correct tool for the job.
- Select a pipe wrench with sufficient capacity and leverage to do the job.
- Use a pipe wrench to turn or hold a pipe. Never use a pipe wrench to bend, raise or lift a pipe.
- Adjust the pipe wrench grip to maintain a gap between the back of the hook jaw and the pipe. This concentrates the pressure at the jaw teeth, producing the maximum gripping force. It also aids the ratcheting action.
- Inspect pipe wrenches periodically for worn or unsafe parts and replace them (e.g., check for worn threads on the adjustment ring and movable jaw).
- Keep pipe wrench teeth clean and sharp.
- Face a pipe wrench forward. Turn wrench so pressure is against heel jaw.
- Pull, rather than push on the pipe wrench handle. Maintain a proper stance with feet firmly placed to hold your balance.
- Do not use a pipe wrench as a hammer, or strike a pipe wrench with a hammer.
- Do not use pipe wrenches on nuts and bolts.
- Do not use a pipe extender for extra leverage. Get a larger pipe wrench.
- Replace pipe cutter wheels which are nicked or otherwise damaged.
- Use a 3- or 4-wheeled cutter, if there is not enough space to swing the single wheel pipe cutter completely around the pipe.
- Choose a cutting wheel suitable for cutting the type of pipe material required:
    - Thin wheel for cutting ordinary steel pipe.
    - Stout wheel for cutting cast iron.

- Other wheels for cutting stainless steel, plastic and other materials.

- Select the proper hole diameter and correct tap size to tap a hole. The hole should be sized so that the thread cut by the tap will be about 75% as deep as the thread on the tap.
- Use a proper tap wrench (with a "T" handle) for turning a tap.
- Use lubricant or machine cutting fluid with metals other than cast iron.
- Do not permit chips to clog flutes (groves in the tap that allow metal chips to escape from the hole). The chips may prevent the tap from turning - this may result in the tap breaking if you continue to apply pressure.
- Do not use a conventional adjustable wrench for turning a tap - it will cause uneven pressure on the tap that may cause it to break.
- Do not attempt to thread hardened steel. This can chip or damage the die.
- Do not thread any rod or other cylindrical object that is larger in diameter than the major diameter of the die thread.
- Do not use a spiral reamer on a rotating pipe. The reamer may snag and cause serious injury.

3.5 Pliers and Wire Cutters

- Pliers are made in various shapes and sizes and for many uses. Use the correct pliers or wire cutters for the job.
- Choose pliers or wire cutters that have a grip span of 2½ - 3½ inches to prevent your palm or fingers from being pinched when the tools are closed.
- Use adjustable pliers that allow you to grip the workpiece firmly while maintaining a comfortable handgrip (i.e., hand grasp is not too wide).
- Use tools only if they are in good condition.
- Make sure that the cutting edges are sharp. Dull and worn-down cutting edges require many times more force for cutting.
- Make sure that the toothed jaws are clean and sharp. Greasy or worn-down jaws can result in compromised safety. Such tools also require increased force to hold the workpiece which, in turn, increases the risk of muscular fatigue and repetitive strain injuries.
- Oil pliers and wire cutters regularly. A drop of oil on the hinge will make the tools easier to use.
- Pull on the pliers; do not push away from you when applying pressure. If the tool slips unexpectedly, you may lose your balance or injure your hand.
- Cut at right angles. Never rock the cutting tool from side to side or bend wire back and forth against the cutting edges.
- Do not cut hardened wire unless the pliers or wire cutters are specifically manufactured for this purpose.
- Do not expose pliers or wire cutters to excessive heat.
- Do not bend stiff wire with light pliers. Needle-nose pliers can be damaged by using the tips to bend large wire. Use a sturdier tool.
- Do not use pliers as a hammer.

- Do not hammer on pliers or wire cutters to cut wires or bolts.
- Do not extend the length of handles to gain greater leverage. Use a larger pair of pliers for gripping or a bolt cutter for cutting.
- Do not use cushion grip handles for jobs requiring tools with electrically insulated handles. Cushion grips are for comfort primarily and do not protect against electric shock.
- Do not use pliers on nuts and bolts; use a wrench.

3.6 Screwdrivers

- Screwdrivers are made in various shapes and sizes and for many uses. Use the correct screwdriver for the job.
- Choose contoured handles that fit the shank tightly, with a flange to keep the hand from slipping off the tool.
- Use a slot screwdriver with a blade tip width that is the same as the width of the slotted screw head.
- For cross-head screws, use the correct size and type of screwdriver: a Phillips screwdriver may slip out of a screw head designed for use with the slightly flatter-tipped Pozi-driv screwdriver.
- Use a vise or clamp to hold the stock if the piece is small or moves easily.
- Keep the screwdriver handle clean. A greasy handle could cause an injury or damage from unexpected slippage.
- If work must be carried out on "live" electrical equipment, use screwdrivers that have insulated handles designed for electrical work and a non-conducting shaft. Remember, most plastic handles are designed for grip and comfort.
- Use non-magnetic tools when working near strong magnets (e.g., in some laboratories).
- Use a screw-holding screwdriver (with screw-holding clips or magnetic blades) to get screws started in awkward, hard-to-reach areas. Square-tipped screwdrivers (e.g., Robertson) that hold screws with recessed square holes are also useful in such situations.
- Use an offset screwdriver in close quarters where a conventional screwdriver cannot be used.
- Use a screwdriver that incorporates the following features when continuous work is needed:
    - A pistol grip to provide for a straighter wrist and better leverage.
    - A "Yankee drill" mechanism (spiral ratchet screwdriver or push screwdriver) which rotates the blade when the tool is pushed forward.
    - A ratchet device to drive hard-to-move screws efficiently, or use a powered screwdriver.
- File a rounded tip square making sure the edges are straight. A dull or rounded tip can slip out of the slot and cause hand injury or damage to materials.
- Store screwdrivers in a rack or partitioned pouch so that the proper screwdriver can be selected quickly.
- Do not lean or push on a screwdriver with any more force than necessary to keep contact with the screw. A screw properly piloted and fitted will draw itself into the right position when turned. Keep the shank directly over the screw being driven.

- Do not hold the stock in one hand while using the screwdriver with the other. If the screwdriver slips out of the slot you may cut your hand.
- Do not hammer screws that cannot be turned.
- Do not grind the tip to fit another size screw head.
- Do not try to use screwdrivers on screw heads for which they are not designed (e.g., straight blade screwdrivers on Phillips, clutch head, Torx or multi-flutted spline screw heads).
- Do not use defective screwdrivers (e.g., ones with rounded or damaged edges or tips; split or broken handles; or bent shafts).
- Do not use a screwdriver for prying, punching, chiseling, scoring, scraping or stirring paint.
- Do not use pliers on the handle of a screwdriver for extra turning power. A wrench should be used only on the square screwdriver shank designed for that purpose.
- Do not expose a screwdriver blade to excessive heat. Heat can affect the temper of the metal and weaken the tool.
- Do not use a screwdriver to check if an electrical circuit is live. Use a suitable meter or other circuit testing device.
- Do not carry screwdrivers in your pockets.

3.7 Snips

- Wear safety glasses and protective gloves when working with snips. Small pieces of metal may go flying in the air and cut edges of metal are sharp.
- Snips are made in various shapes and sizes for various tasks. The handle can be like those on scissors with finger and thumb holes or like plier handles. Models are available for cutting in straight lines and in curves to the left or right.
- Universal snips can cut in both straight and wide curves.
- Straight snips and duckbill snips (flat blade, "perpendicular" to the handle, with pointed tips) are generally designed to cut in straight lines; some duckbill snips are designed for cutting curved lines.
- Hawk's bill snips (with crescent-shaped jaws) are used for cutting tight circles.
- Aviation snips have compound leverage that reduces the effort required for cutting.
- Offset snips have jaws that are set at an angle from the handle.
- Select the right size and type of snips for the job; check the manufacturer's specifications about the intended use of the snips (e.g., type of cut - straight, wide curve, tight curve, right or left, and maximum thickness and kind of metal or other material that can be cut).
- Use only snips that are sharp and in good condition.
- Use snips for cutting soft metal only. Hard or hardened metal should be cut with tools designed for that purpose.
- Use ordinary hand pressure for cutting. If extra force is needed, use a larger tool.
- Cut so that the waste is on the right if you are right-handed or on the left if you are left-handed.
- Avoid springing the blades. This results from trying to cut metal that is too thick or heavy for the snips you are using.

- Keep the nut and the pivot bolt properly adjusted at all times.
- Oil the pivot bolt on the snips occasionally.
- Do not try to cut sharp curves with straight cut snips.
- Do not cut sheet metal thicker than the manufacturer's recommended upper limit (e.g., cuts up to 16-gauge cold, rolled steel or 18-gauge stainless steel). Do not extend the length of handles to gain greater leverage.
- Do not hammer or use your foot to exert extra pressure on the cutting edges.
- Do not use cushion grip handles for tasks requiring insulated handles. They are for comfort primarily and not for protection against electric shocks.
- Do not attempt to resharpen snips in a sharpening device designed for scissors, garden tools, or cutlery.

3.8 Wood Chisels

- Wear safety glasses.
- Wood chisels are made in various shapes and sizes and for many uses. Use the correct chisel for the job.
- Use the right size of chisel for the job.
- Choose smooth, rectangular handles that have no sharp edges and are attached firmly to the chisel.
- Ensure that the cutting edge is sharp. Dull chisels can be difficult to control and require more effort to do the job.
- Check stock thoroughly for knots, staples, nails, screws, or other foreign objects before chiseling.
- Clamp stock so it cannot move.
- Adjust your stance so that you do not lose your balance if the tool slips.
- Chip or cut away from yourself.
- Keep your hands and body behind the cutting edge.
- Use a wooden or plastic mallet with a large striking face on all chisels. Only heavy-duty or framing chisels are made of a solid or molded handle that can be struck with a steel hammer.
- Make finishing or paring cuts with hand pressure alone.
- Place chisels safely within the plastic protective caps to cover cutting edges when not in use.
- Replace any chisel that is bent or shows dents, cracks, chips, or excessive wear.
- Store chisels in a "storage roll," a cloth or plastic bag with slots for each chisel, and keep them in a drawer or tray.
- Replace broken or splintered handles.
- Sharpen cutting edges as often as necessary.
- Do not use a wood chisel as a pry or a wedge.
- Do not use a wood chisel on metal.

- Do not use an all-steel chisel with a mushroomed face or a chipped edge. Redress with a file or whetstone.
- Do not use a grinder to redress heat-treated tools. Use a whetstone.
- Do not use a dull chisel.

3.9 Wrenches

- Use the correct wrench for the job - pipe wrenches for pipes and plumbing fittings, and general-use wrenches for nuts and bolts.
- Discard any damaged wrenches (e.g., open-ended wrenches with spread jaws or box wrenches with broken or damaged points).
- Select the correct jaw size to avoid slippage.
- Position your body in a way that will prevent you from losing balance and hurting yourself if the wrench slips or something (e.g., a bolt) suddenly breaks.
- Use a box or socket wrench with a straight handle, rather than an off-set handle, when possible.
- Ensure that the jaw of an open-ended wrench is in full contact (fully seated, "flat," not tilted) with the nut or bolt before applying pressure.
- Face an adjustable wrench "forward," adjust tightly, and turn the wrench so pressure is against the permanent or fixed jaw.
- Ensure that the teeth of a pipe wrench are sharp and free of oil and debris and that the pipe or fitting is clean to prevent unexpected slippage and possible injuries.
- Apply a small amount of pressure to a ratchet wrench initially to ensure that the ratchet wheel (or gear) is engaged with the pawl (a catch fitting in the gear) for the direction you are applying pressure.
- Support the head of the ratchet wrench when socket extensions are used.
- Pull on a wrench using a slow, steady pull; do not use fast, jerky movements.
- Stand aside when work is done with wrenches overhead.
- Make sure adjustable wrenches do not "slide" open during use.
- Keep tools well maintained (cleaned and oiled).
- Clean and place tools and wrenches in a tool box, rack or tool belt after use.
- Do not push on a wrench - losing your balance is more likely if the wrench slips.
- Do not use a wrench that is bent or damaged.
- Do not use worn adjustable wrenches. Inspect the knurl, jaw and pin for wear.
- Do not pull on an adjustable wrench that is loosely adjusted.
- Do not use pipe wrenches on nuts or bolts.
- Do not use pipe wrenches for lifting or bending pipes.
- Do not use a wrench on moving machinery.
- Do not use the wrong tools for the job. For example, never use pliers instead of a wrench or a wrench as a hammer.
- Do not use a makeshift wrench.

- Do not insert a shim in a wrench for better fit.
- Do not strike a wrench (except a "strike face" wrench) with a hammer or similar object to gain more force.
- Do not increase the leverage by adding sleeved additions (e.g., a pipe) to increase tool handle length.
- Do not expose a wrench to excessive heat (like from a blow torch) that could affect the temper of the metal and ruin the tool.
- Files/Rasps
- Personnel will not use a file as a pry bar, hammer, screwdriver, or chisel.
- When using a file or a rasp, grasp the handle in one hand and the toe of the file in the other.
- Personnel will not hammer on a file.

3.10 Chisels

- Personnel will not use a chisel that has a dull cutting edge.
- Personnel will not use chisels that have "mushroomed" striking heads.
- Hold a chisel by using a tool holder if possible.
- Clamp small workpieces in the vise and chip towards the stationary jaw when working with a chisel.

3.11 Vises

- When clamping a long workpiece in a vise, support the far end of the workpiece by using an adjustable pipe stand, saw horse or box.
- Position the workpiece in the vise so that the entire face of the jaw supports the workpiece.
- Personnel will not use a vise that has worn or broken jaw inserts, or has cracks or fractures in the body of the vise.
- Personnel will not slip a pipe over the handle of a vise to gain extra leverage.

3.12 Clamps

- Personnel will not use the C-clamp for hoisting materials.
- Personnel will not use the C-clamp as a permanent fastening device.

3.13 Jacks

- Personnel will not exceed the jack's rated lifting capacity as noted on the label of the jack.
- Clear all tools, equipment and any other obstructions from under the vehicle before lowering the jack.

3.14 Tool Boxes/Chests/Cabinets

- Use the handle when opening and closing a drawer or door of a tool box, chest, or cabinet.
- Tape over or file off sharp edges on toolboxes, chests or cabinets.
- Personnel will not stand on toolboxes, chests or cabinets to gain extra height.
- Lock the wheels on large toolboxes, chests or cabinets to prevent them from rolling.
- Push large chests, cabinets and toolboxes rather that pulling them.
- Personnel will not open more than one drawer of a toolbox at a time.
- Close and lock all drawers and doors before moving the tool chest to a new location.
- Personnel will not move a toolbox, chest or cabinet if it has loose tools or parts on the top.

4.0 REFERENCES

None

EarthTech A Tyco International Ltd. Company **Safety, Health & Environmental Procedure**	PROCEDURE NO. SH&E 604 DATE March 11, 2005 REVISED
Decontamination	PREVIOUSLY ENV 535

This procedure applies to all U.S.-based personnel, projects, offices, business units and activities. Any exceptions to this procedure must be approved, in writing, by the responsible District/Business Unit Manager and Safety Manager.

1.0 PURPOSE

Decontamination of contaminated personnel and equipment will comply with the requirements specified below, as well as any additional site-specific procedures that may be required by the Health and Safety Plan (HASP).

2.0 DEFINITIONS

Contamination Reduction Zone (CRZ) - the transition area between the contaminated area and the clean area where decontamination activities occur.

Decontamination – the process of removing or neutralizing contaminants that have accumulated on personnel or equipment.

Exclusion Zone (EZ) – the area where primary activities occur, such as sampling, remediation operations, installation of wells, cleanup work, etc.

LOP – Level of Protection (Personal Protective Equipment or PPE).

Support Zone (SZ) - an uncontaminated zone where administrative and other support functions, such as first aid, equipment supply, emergency information, etc., are located.

3.0 GENERAL REQUIREMENTS

When possible, all necessary steps shall be taken to reduce or minimize contact with chemicals and impacted materials while performing field activities (e.g., avoid sitting or leaning on, walking through, dragging equipment over, tracking, or splashing potential or known impacted materials).

All personal decontamination activities shall be performed with an attendant (buddy) to provide assistance to personnel that are performing decontamination activities. Depending on specific site hazards, attendants may be required to wear a level of protection that is equal to the required level in the exclusion zone.

All persons and equipment entering the EZ shall be considered contaminated, and thus, must be properly decontaminated prior to entering the SZ.

Decontamination procedures may vary based on site conditions and nature of the contaminant. If chemicals or decontamination solutions are used, care should be taken to minimize reactions between the solutions and contaminated materials. In addition, personnel must assess the potential exposures created by the decontamination chemical(s) or solutions. The Material Safety Data Sheet (MSDS) must be reviewed, implemented, and filed by personnel contacting the chemicals/solutions.

All contaminated personal protective equipment (PPE) and decontamination materials shall be stored and disposed of in accordance with site-specific requirements determined by site management.

4.0 DECONTAMINATION EQUIPMENT

The equipment required to perform decontamination may vary based on site-specific conditions and nature of the contaminant(s). The following equipment is commonly used for decontamination purposes:

- Soft-bristle scrub brushes or long-handled brushes to remove contaminants;
- Hoses, buckets of water or garden sprayers for rinsing;
- Large plastic/galvanized wash tubs or children's wading pools for washing and rinsing solutions;
- Large plastic garbage cans or similar containers lined with plastic bags for the storage of contaminated clothing and equipment;
- Metal or plastic cans or drums for the temporary storage of contaminated liquids; and
- Paper or cloth towels for drying protective clothing and equipment.

5.0 PERSONAL DECONTAMINATION STEPS

Modified Level D

In the Exclusion Zone:

1. Equipment drop on plastic sheet
2. Remove the majority of gross contamination
3. Wash boot covers and outer gloves
4. Rinse boot covers and outer gloves
5. Remove tape
6. Remove boot covers and outer gloves

In the Contamination Reduction Zone (keep the most contaminated equipment near the EZ boundary):

1. Wash protective suits and safety boots
2. Rinse protective suits and safety boots
3. Safety boot removal
4. Remove protective suit
5. Wash inner gloves
6. Rinse inner gloves
7. Remove inner gloves.

8. Remove inner clothing (if necessary)

In the Support Zone:

1. Finish with personal decon/hygiene wash procedures
2. Redress (if necessary).

Level C

In Exclusion Zone (near boundary of CRZ):

1. Equipment drop on plastic sheet
2. Remove the majority of gross contamination
3. Wash boot covers and outer gloves
4. Rinse boot covers and outer gloves
5. Remove tape
6. Remove boot covers and outer gloves

In the Contamination Reduction Zone (keep the most contaminated equipment near the EZ boundary):

1. Wash protective suits and safety boots
2. Rinse protective suits and safety boots
3. Change out (if required): Filter/mask change and redress (boot covers and outer gloves)
4. Safety boot removal
5. Remove protective suit
6. Wash inner gloves
7. Rinse inner gloves
8. Remove respirator/mask and decontaminate
9. Remove inner gloves
10. Remove inner clothing (if necessary)

In the Support Zone:

1. Finish with personal decon/hygiene wash procedures
2. Redress (if necessary)

Level B

In the Exclusion Zone (near boundary of CRZ):

1. Equipment drop on plastic sheet
2. Remove the majority of gross contamination
3. Wash boot covers and outer gloves
4. Rinse boot covers and outer gloves
5. Remove tape
6. Remove boot covers and outer gloves

In the Contamination Reduction Zone (keep the most contaminated equipment near the EZ boundary):

1. Wash SCBA/airline equipment, protective suits and safety boots
2. Rinse SCBA/airline equipment, protective suits and safety boots
3. Change out (if required): Tank change and redress (boot covers and outer gloves)

4. Safety boot removal
5. SCBA backpack or airline equipment removal
6. Remove protective suit and/or splash suit
7. Wash inner gloves
8. Rinse inner gloves
9. Remove face piece/mask
10. Remove inner gloves
11. Remove inner clothing (if necessary)

In the Support Zone:

1. Finish with personal decon/hygiene wash procedures
2. Redress (if necessary)

Level A

In the Exclusion Zone (near boundary of CRZ):

1. Equipment drop on plastic sheet
2. Remove the majority of gross contamination
3. Wash boot covers and outer gloves (if applicable to ensemble)
4. Rinse boot covers and outer gloves (if applicable to ensemble)
5. Remove tape (if applicable to ensemble)
6. Remove boot covers and outer gloves (if applicable to ensemble)

In the Contamination Reduction Zone (keep the most contaminated equipment near the EZ boundary):

1. Wash protective suite and safety boots
2. Rinse protective suits and safety boots
3. Change out (if required): Tank change and redress (boot covers and outer gloves)
4. Safety boot removal
5. Remove fully encapsulating suit and hard hat
6. Remove SCBA backpack
7. Wash inner gloves
8. Rinse inner gloves
9. Remove face piece/mask and decontaminate
10. Remove inner gloves
11. Remove inner clothing (if necessary)

In the Support Zone:

1. Finish with personal decon/hygiene wash procedures
2. Redress (if necessary)

6.0 Equipment Decontamination

All equipment leaving the EZ shall be considered contaminated and must be properly decontaminated to minimize the potential for exposure and off-site migration of impacted

materials. Such equipment may include, but is not limited to: sampling tools, heavy equipment, vehicles, PPE (hoses, cylinders, etc.), and various handheld tools.

All employees performing equipment decontamination shall wear the appropriate PPE to protect against exposure to contaminated materials. The level of PPE may be equivalent to the LOP required in the EZ. Other PPE may include splash protection, such as face-shields and splash suits, and knee protectors. Following equipment decontamination, employees may be required to follow the proper personal decontamination procedures above.

For larger equipment, a high-pressure washer may need to be used. Some contaminants require the use of a detergent or chemical solution and scrub brushes to ensure proper decontamination.

For smaller equipment, use the following steps for decontamination:

1. Remove majority of visible gross contamination in EZ.
2. Wash equipment in decontamination solution with a scrub brush and/or power wash heavy equipment.
3. Rinse equipment.
4. Visually inspect for remaining contamination.
5. Follow appropriate personal decontamination steps outlined above.

All decontaminated equipment shall be visually inspected for contamination prior to leaving the CRZ . Signs of visible contamination may include an oily sheen, residue or contaminated soils left on the equipment. All equipment with visible signs of contamination shall be discarded or re-decontaminated until clean. Depending on the nature of the contaminant, equipment may have to be analyzed using a wipe method or other means.

5.0 REFERENCES

SH&E 301 - HAZWOPER

EarthTech A Tyco International Ltd. Company **Safety, Health & Environmental Procedure**	PROCEDURE NO. SH&E 607 DATE March 11, 2005 REVISED
Biohazards	PREVIOUSLY ESH 504

This procedure applies to all U.S.-based personnel, projects, offices, business units and activities. Any exceptions to this procedure must be approved, in writing, by the responsible District/Business Unit Manager and Safety Manager.

1.0 PURPOSE

Bio-hazardous material potentially exposes workers to physiologically active substances and has a high potential to contain pathological organisms and allergens. This procedure identifies some of the hazards inherent in such materials and provides guidance to protect health and safety on projects involving them.

2.0 SCOPE

Concern for the accidental transmission of infectious agents to persons handling infectious materials in the workplace extends beyond "other potentially infectious materials" as defined in SH&E 608 – Blood-borne Pathogens. The bloodborne pathogens procedure is directed toward transmission of disease between humans. This procedure applies to pathogens, parasites, spores, and allergens of animal origin.

3.0 DEFINITIONS

Allergen: A substance that causes an allergic state or reaction.

Anthrax: *Bacillus anthracis* is a rod-shaped, gram-positive, sporulating organism, the spores constituting the usual infective form. Anthrax is a zoonotic disease with cattle, sheep, and horses being the chief domesticated animal hosts, but other animals may be infected. The disease may be contracted by handling of contaminated hair, wool, hides, flesh, blood, and excreta of infected animals and from manufactured products such as bone meal, as well as by purposeful dissemination of spores. Transmission is made through scratches or abrasions of the skin, wounds, inhalation of spores, eating insufficiently cooked infected meat, or by flies. All human populations are susceptible. Recovery from an attack of the disease may be followed by immunity. The spores are very stable and may remain viable for many years in soil and water. They will resist sunlight for varying periods.

Ectoparasite: A parasite that lives on the outer surfaces of an animal (e.g., mite, flea, tick).

Endoparasite: A parasite that inhabits the internal organs of an animal (e.g., hookworm, tapeworm, liver fluke, endoamoeba).

Etiological Agent: A disease-causing agent or pathogen (e.g., virus, bacteria).

Occupational Exposure: Reasonably anticipated skin, eye, mucous membrane, respiratory, or parenteral contact with an infectious waste or potentially infectious materials that may result from the performance of an employee's duties.

Pathogen: Any microorganism or virus that can cause disease.

PPE: Personal protective equipment.

Work Practice Controls: Methods that reduce the likelihood of exposure by altering the manner in which a task is performed.

4.0 RESPONSIBILITIES

4.1 Managers

Managers are responsible for identifying work activities that involve bio-hazardous materials and for coordinating a project-specific exposure control plan.

4.2 Employees

Employees are responsible for complying with the exposure control plan and informing their immediate supervisor of potential exposure situations not addressed in the project-specific exposure control plan.

4.3 Health and Safety

The SH&E Department will develop and approve exposure control plans and employees' enrollment in medical surveillance programs during work activities involving potential exposure to anthrax spores and/or other bio-hazardous materials (e.g., ticks, Lyme disease).

5.0 PROCEDURE

5.1 Hazards

The bio-hazardous substances left behind by animal or spore activity may harbor disease-causing organisms or parasites, induce allergic reactions, or release noxious volatile compounds, and in severe cases can be fatal.

5.1.1 Anthrax

Scope of Work – Earth Tech potentially will be involved with the following activities in the case of purposeful dissemination of spores:

- Confirmation (sampling) of the accuracy of the Bio-Detection System (BDS) for the United States Postal Service (USPS).
- Decontamination of equipment and personnel after positive confirmation for anthrax spores.

Training – In addition to the OSHA 40-hour HAZWOPER training:

- Earth Tech team leaders will receive BDS sample collection and decontamination training at the USPS William Bolger training facility in Potomac, Maryland. Each team leader will subsequently provide training to all team members.

- Prior to initiation of decontamination activities after positive confirmation of anthrax spores, all site personnel will receive training on the construction/function of "hot," "warm," and cold chambers, personal protective equipment (PPE) requirements, hazard communication training for chemical(s) used in the process (e.g., ethylene oxide, hypochlorite) and medical surveillance provisions.

Medical Surveillance – During collection of samples to verify the accuracy of the BDS, if Earth Tech personnel are wearing respiratory protection and PPE, antibiotic prophylactic treatment is not required. If future activities will increase to include actual remediation in response to positive identification of anthrax samples, Earth Tech personnel will be enrolled in a medical surveillance program consistent with the guidance offered by the Centers for Disease Control (CDC).

Health and Safety Plan – A detailed, site-specific health and safety plan (HASP) following the guidelines summarized in SH&E 203 – Accident Prevention Program – Requirements for documentation will be developed prior to site activities, reviewed, and approved by an Earth Tech Certified Industrial Hygienist.

5.1.2 Bird Droppings

Bird dropping material (avian fecal material) is rich in nitrogen compounds and is often used as plant fertilizer. However, along with the nitrogen compounds, the birds also shed ectoparasites and disease organisms. Mites and disease-causing microorganisms are often present in accumulations of bird droppings. Accumulations of droppings may also provide a medium for fungal growth. Some of these fungi are pathogenic, such as Aspergillis sp., Histoplasma capsulatum, and Coccidioides immitis. Guidelines for the cleanup of bird droppings are included in SH&E 419 – Cleanup of Bird Excrement and Amplified Fungal Growth

5.1.3 Rodent Droppings

Accumulations of rodent droppings are rarely sufficient to cause hazardous concentrations of volatile compounds. Pathogens and ectoparasites are the chief concerns when dealing with rodents. Typhus, scrub typhus, and bubonic plague are among the diseases that can be passed by rodents and their fleas.

5.1.4 Animal Habitats

Mites, fleas, and ticks can be passed to the unprotected worker working near an established animal habitat. Dander from the animals may cause allergic reactions. Many diseases can be passed from animals to humans by ectoparasite vectors such as fleas and ticks, or by contact with infected urine or feces.

5.1.5 Insect Infestations

The fecal material and discarded exoskeletons of insects are capable of causing allergic reactions in many people. Silverfish and firebrats are prolific even under dry conditions. Very little food and water can sustain large populations of cockroaches. The greater the population of insects, the more likely the allergic response. Insects are also potential carriers of human disease organisms, including arbovirus (arthropod-borne virus), bacteria, rickettsia, spirochetes, etc.

5.2 Protective Measures

Protective measures are important to prevent disease when dealing with bio-hazardous substances. When the intended work involves potential contact with bio-hazardous materials, an exposure control plan shall be written summarizing how the following measures will be used to prevent occupational illnesses.

5.2.1 Exposure Avoidance

When possible, avoid situations of close contact with bio-hazardous materials. Unless required by the project scope, do not disturb rodent burrows, wild animal nesting places, or insect and spider habitats.

5.2.2 Personal Protective Equipment

When the scope of work requires the removal or disturbance of bio-hazardous materials, or disturbance of rodent burrows, wild animal nesting places, or insect and spider habitats, workers must be protected. Chemical-protective clothing, boots, and gloves are effective for bio-hazardous materials. Procedures that disturb infectious materials may cause infectious agents to become airborne. In these cases, respiratory protection must also be provided.

5.2.3 Personal Hygiene

Personal hygiene is very important to prevent disease from occupational exposure to bio-hazardous materials. When working with biohazards, carefully wash hands and face when leaving the work zone and before eating, drinking, chewing gum, smoking, or applying cosmetics.

6.0 REFERENCES

SH&E 112 – Respiratory Protection Program
SH&E 113 – Personal Protective Equipment
SH&E 203 – Accident Prevention Program – Documentation Requirements
SH&E 419 – Cleanup of Bird Excrement and Amplified Fungal Growth
SH&E 608 – Blood-borne Pathogens

EarthTech A Tyco International Ltd. Company **Safety, Health & Environmental Procedure**	PROCEDURE NO. SH&E 608 DATE March 11, 2005 REVISED October 2005
Bloodborne Pathogens	PREVIOUSLY ESH 503

This procedure applies to all U.S.-based personnel, projects, offices, business units and activities. Any exceptions to this procedure must be approved, in writing, by the responsible District/Business Unit Manager and Safety Manager.

1.0 PURPOSE

Concern for the accidental transmission of infectious agents to persons handling infectious materials in the workplace led OSHA to adopt regulations to protect health care workers. These regulations now apply to all Earth Tech personnel who may encounter bloodborne pathogens.

2.0 Scope

This procedure covers only personnel with potential exposure to bloodborne pathogens during administration of basic first aid ("Good Samaritans"). For projects that involve extensive contact/handling/removal of likely infectious agents, the site-specific health and safety plan (HASP) will establish training, medical surveillance, and personal protective equipment requirements per 29 CFR 1910.1030.

3.0 DEFINITIONS

Blood-borne Pathogens – pathogenic microorganisms that are present in human blood and other body fluids and can cause disease in humans. These pathogens include, but are not limited to, hepatitis B virus (HBV) and human immunodeficiency virus (HIV).

Good Samaritan – Person who provides first aid and assistance to others at a site or facility.

Occupational Exposure – Occupational exposure means reasonably anticipated skin, eye, mucous membrane, or parenteral contact with blood or other potentially infectious materials that may result from the performance of an employee's duties.

4.0 RESPONSIBILITIES

4.1 SH&E Department

Evaluate with project managers the potential for Earth Tech site personnel to become occupationally exposed to blood or other potentially infectious materials.

4.2 EHSA

Coordinate necessary medical surveillance (e.g., hepatitis B vaccination) protocol with the company's occupational physician and the affected employee.

4.3 Project Managers

Ensure awareness training requirements for first aid personnel are complied with at their projects.

4.4 All Earth Tech Employees

Employees who provide first aid/CPR services as an additional duty and who are not otherwise at risk of contacting potentially infectious materials will meet the requirements under Section 5.1 First Aid/CPR-Trained Personnel.

5.0 PROCEDURE

5.1 First Aid/CPR-Trained Personnel

Employees who provide first aid/CPR services as an additional duty and who are not otherwise at risk to contact potentially infectious materials need only meet the requirements outlined in the following subsections.

5.1.1 First Aid Training Course Content

Training on prevention of blood-borne infections must be provided to first aid/CPR providers as in 5.2.

5.1.2 Notification Requirements

First aid and CPR providers must notify the Project Manager and SH&E Professional immediately (that is, before the end of the work shift) if involved in an exposure incident.

5.1.3 Immunization Sequence

The immunization sequence as stated in 5.3 is not required before an exposure incident, but gamma globulin and hepatitis B vaccination (HBV) must be offered within 24 hours after an exposure incident.

5.1.4 Recording

Documentation, treatment, and reporting of an exposure incident shall be accomplished as in 5.3.

5.1.5 Self-Applied First Aid

To reduce the potential for exposure incidents, employees with minor injuries should be encouraged to apply first aid procedures to themselves when it can be done without compromising the quality of treatment.

5.1.6 Use of Universal Precautions

First aid and CPR providers should use all applicable universal precautions, engineering controls, approved work practices, and personal protective equipment when providing first aid and CPR.

5.2 Training

All employees assigned to first aid/CPR service with occupational exposure to potentially infectious materials shall receive specialized training prior to commencement of work and at least annually thereafter, covering the following elements:

- A copy of 29 CFR 1910.1030 and an explanation of its contents;
- A general explanation of the epidemiology and symptoms of blood-borne diseases;
- An explanation of the modes of transmission of blood-borne pathogens;
- An explanation of the appropriate methods for recognizing tasks and other activities that may involve exposure to blood and other potentially infectious materials;
- An explanation of the use and limitations of practices that will prevent or reduce exposure including appropriate engineering controls, work practices, and personal protective equipment;
- Information about the types, proper use, location, removal, handling, decontamination and/or disposal of personal protective equipment;
- An explanation of the basis for selection of personal protective equipment;
- Information on the HBV, including information on its efficacy, safety, and the benefits of being vaccinated;
- Information on the appropriate actions to take and persons to contact in an emergency;
- An explanation of the procedure to follow if an exposure incident occurs, including the method of reporting the incident and the medical follow-up that will be made available, as well as information on the medical counseling that is provided for exposed individuals; and
- An explanation of required signs and labels.

5.2.1 Training Records

Training records shall include the following information and be maintained for five years:

- The date of the training sessions;
- The contents or a summary of the training sessions;
- The names of persons conducting the training; and
- The names of all persons attending the training sessions.

5.3 Medical Requirements

- All employees with potential occupational exposure to bloodborne pathogens will receive medical evaluations supplemental to any company-designated or required medical examination.
- All employees with occupational exposure shall be offered the opportunity to receive the HBV vaccination and tetanus vaccination prior to workplace exposure at no cost to the employee.
- Hepatitis B vaccination/Recombivax or accelerated Recombivax vaccines shall be used. If the employee has received the HBV previously and/or antibody testing reveals that the employee is immune, a new vaccination is not required.

- Employees may be subjected to occupational exposure after receiving the first shot in the HBV series. Antibody testing shall be performed 30 days after completing the HBV series. Employees unable to develop immunity shall be precluded from further occupational exposure.
- Should a booster dose be recommended by a physician, it shall be provided according to standard recommendations for medical practice.
- Tetanus Vaccination - “Current status” for tetanus vaccination is within 10 years. Documentation of current status shall be maintained for all employees subject to this procedure.
- Post-Exposure Evaluation and Follow-up - All exposure incidents shall be reported as an injury. The company’s occupational physician shall be advised immediately via the Corporate SH&E. Following a report of an exposure incident, the employer shall make available to each employee a confidential medical evaluation and follow-up including at least the following elements: Documentation of the route(s) of exposure, HBV and HIV antibody status of the source patient(s) (if known), and how the exposure occurred. The medical confidentiality rights of the source patient shall be preserved at all times.
- If the source patient can be determined and permission is obtained, collection of and testing of the source patient's blood to determine the presence of HIV or HBV infection shall be conducted under the direction of the attending physician.
- With the exposed employee's consent, blood may be collected from the exposed employee as soon as possible after the exposure incident for the determination of HIV and/or HBV status. Actual core antibody and surface antigen testing of the blood or serum sample may be done at that time or at a later date if the employee so requests. If the test is deferred, arrangements shall be made through the attending physician to properly archive the specimen.
- Follow-up of the exposed employee will include antibody and antigen testing, counseling, illness reporting, and safe and effective post-exposure prophylaxis, according to standard recommendations for medical practice as defined by the company’s occupational physician.
- Any employee who declines the HBV immunization shall sign a statement such as the attached waiver form acknowledging receipt of information and the offer of immunization at no cost.
- The employer shall provide the following information to the evaluating physician:
    - A copy of 29 CFR 1910.1030 and its appendices, and
    - A description of the affected employee's duties as they relate to the employee's occupational exposure.
- For each evaluation, a copy of the evaluating physician's written opinion will be provided to the employee within 15 working days of the completion of the evaluation. The written opinion shall be limited to the following information:
    - The physician's recommended limitations upon the employee's ability to receive hepatitis B vaccination.
    - A statement that the employee has been informed of the results of the medical evaluation and that the employee has been told about any medical conditions resulting from exposure to blood or other potentially infectious materials which require further evaluation or treatment.
    - Specific findings or diagnoses related to the employee's ability to receive HBV vaccination. Any other findings and diagnoses shall remain confidential.

6.0 ATTACHMENTS

- Waiver of Immunizations Form

7.0 REFERENCE

- SH&E 114 - Safety Training Programs

WAIVER OF IMMUNIZATIONS

I understand that due to my occupational exposure to blood or other potentially infectious materials I may be at risk of acquiring hepatitis B virus (HBV) infection. I have been given the opportunity to be vaccinated with hepatitis B vaccine, at no charge to myself. However, I decline hepatitis B vaccination at this time. I understand that by declining this vaccine, I continue to be at risk of acquiring hepatitis B, a serious disease. If in the future I continue to have occupational exposure to blood or other potentially infectious materials and I want to be vaccinated with hepatitis B vaccine, I can receive the vaccination series at no charge to me.

Printed Name	Signature	Date

Employee Number	Section Number

Appendix 2

Task Hazard Analysis

EarthTech
A Tyco International Ltd. Company

TASK HAZARD ANALYSIS (THA)
ANCHOR LITH KEM KO
500 WEST JOHN STREET, HICKSVILLE, NY

Prepared by: Sabyasachi Chatterjee **Date**: September 2006

TASK NAME

MOBILIZATION/DEMOBILIZATION

TASK DESCRIPTION

Mobilization/Demobilization activities typically present limited hazards as compared to the majority of site tasks. However, the potential still exists for exposure to a variety of hazards typically physical in nature.

CHEMICAL EXPOSURE HAZARDS

- None anticipated

PPE

Level D

- High-visibility reflective safety vest.
- ANSI approved hardhat.
- ANSI approved steel toe safety shoes/boots.
- ANSI approved safety glasses

OTHER SAFETY EQUIPMENT

- First Aid Kit.
- Leather gloves while handling sharp edges or operating powered tools/machinery.
- Ear plugs/muffs if necessary.

PHYSICAL HAZARDS

- Hammer Drill Operation
- Manual lifting
- Slip, trip, and falls
- Heat/cold stress
- Severe weather/sunburn
- Biological
- Noise

APPLICABLE OPERATIONAL SAFETY PROCEDURES

- ENV 201, General Safety Rules
- ENV 501, Manual Materials Handling
- ENV 505, Manual Hand Tools
- ENV 535, Decontamination

ADDITIONAL SAFETY CONSIDERATIONS

1. Evaluate surrounding work area for additional hazards that may be present.
2. All loads in excess of 49 pounds require use of mechanical aids or assistance from other personnel.
3. Clear utilities (underground and overhead) in the immediate work area or travel route prior to positioning.
4. Probe areas with standing water before walking into puddles during site-walk.

EarthTech
A Tyco International Ltd. Company

TASK HAZARD ANALYSIS (THA)
ANCHOR LITH KEM KO
500 WEST JOHN STREET, HICKSVILLE, NY

Prepared by: Mihir Chokshi **Date**: May 2007

TASK NAME

MONITORING WELLS

TASK DESCRIPTION	EXPOSURE ROUTE	CHEMICAL EXPOSURE HAZARDS
TAMS will assess on-site and off-site groundwater at the site to evaluate the areas of concern identify during the preliminary assessment. Geoprobe® direct-push technology (DPT) or Hollow Stem Auger (HAS) will be used to advance the monitoring wells.	• Skin contact • Inhalation	• BTEX • TCE

PPE	OTHER SAFETY EQUIPMENT	PHYSICAL HAZARDS
Level D • Protective chemical gloves • High-visibility reflective safety vest • ANSI approved hardhat • ANSI approved safety glasses • ANSI approved steel toe safety boots	• Face shield/chemical goggles if splash is anticipated • Tyvek® and rubber boots/booties if potential exists for contact with impacted materials • Leather gloves while handling sharp edges or operating powered tools/machinery • SPF 15 sunblock when working outdoors • Equipment decontamination supplies • First aid kit (located in vehicle) • Fire extinguisher (located in vehicle) • Ear plugs/muffs if necessary	• Drilling rig operations • Manual lifting, overexertion • Rotating/moving equipment • Flying debris • Dust • Slip, trip, and falls • Heat stress • Severe weather/sunburn • Biological • Hazardous noise • Overhead hazards • Pinch points • Push/pull

APPLICABLE OPERATIONAL SAFETY PROCEDURES	ADDITIONAL SAFETY CONSIDERATIONS
• SH&E 201, General Safety Rules • SH&E 404, Manual Lifting • SH&E 403, Drilling	• Evaluate surrounding work area for additional hazards that may be present. • All loads in excess of 49 pounds require use of mechanical aids or assistance from other personnel. • Clear utilities (underground and overhead) in the immediate work area or travel route prior to positioning. • Always ensure the driver of excavation equipment can see you at all time times. Never assume he can see you. Always yield to heavy equipment. • Establish safe distances from drill rig (refer to HASP).

MONITORING PROCEDURES

PARAMETER	LOCATION AND INTERVAL	RESPONSE LEVEL (Meter units/ppm above background)	RESPONSE
Hydrocarbons (Total by PID, see "RESPONSE" for chemical-specific monitoring using detector tubes when meter units are 1-5)	Activities/locations that require air monitoring: • Excavation of test pits • Excavation/removal USTs • Install monitoring wells • Soil sampling Prior to initial entry in to impacted areas and then at least every 30 minutes afterwards in the worker's breathing zone or in the immediate work area. Confined spaces will require initial and continuous monitoring.	< 1	Continue Level D or Modified Level D work and continue monitoring.
		≥ 1 (If no detector tubes drawn)	If no detector tubes are drawn, upgrade to Level C PPE (minimum GMA/P100 cartridges or equivalent chemical cartridge combined with P100). Monitor for specific chemical(s) listed below and continue monitoring.
		PID ≥ 1 - 5 and; benzene < 0.5 ppm	Periodically monitor with chemical-specific detector tubes. Contact the SSO or SH&E Professional, implement mitigation measures, and continue work in Level D/modified Level D. **See chemical-specific monitoring information below** and continue monitoring.
		≥ 5 - < 10	Upgrade to Level C PPE (minimum GMA/P100 cartridges or equivalent chemical cartridge combined with P100). Continue environmental monitoring.
		≥ 10	Cease work, exit the area, contact the SSO or SH&E Professional and upgrade to Level B.

Work Area Benzene Detector tubes (e.g., Drager 6728561, Benzene 0.5/a or equivalent)	Breathing zone, every 30 minutes where indicted by PID readings (see PID response levels above).	≥ 0.5 - < 10 ppm	Cease work, exit the area, contact the SSO/SH&E Manager and upgrade to Level C PPE (minimum GMA/P100 cartridges or equivalent chemical cartridge combined with P100). Continue to monitor for benzene.
		≥ 10 ppm	Cease work, exit the area, contact the SSO/SH&E Manager and upgrade to Level B.

TASK HAZARD ANALYSIS (THA)
ANCHOR LITH KEM KO
500 WEST JOHN STREET, HICKSVILLE, NY

Prepared by: Mihir Chokshi **Date**: April 2007

TASK NAME

GROUNDWATER SAMPLING

TASK DESCRIPTION	EXPOSURE ROUTE	CHEMICAL EXPOSURE HAZARDS
At each monitoring well location, groundwater samples will be collected to further analyze for VOCs.	• Skin contact • Inhalation	• BTEX • TCE

PPE	OTHER SAFETY EQUIPMENT	PHYSICAL HAZARDS
Level D • Protective chemical gloves • High-visibility reflective safety vest • ANSI approved hardhat • ANSI approved safety glasses • ANSI approved steel toe safety boots	• Face shield/chemical goggles if splash is anticipated • Tyvek® and rubber boots/booties if potential exists for contact with impacted materials • Leather gloves while handling sharp edges or operating powered tools/machinery • SPF 15 sunblock when working outdoors • Equipment decontamination supplies • First aid kit (located in vehicle) • Fire extinguisher (located in vehicle) • Ear plugs/muffs if necessary	• Manual lifting, overexertion • Dust • Slip, trip, and falls • Heat stress • Severe weather/sunburn • Biological

APPLICABLE OPERATIONAL SAFETY PROCEDURES	ADDITIONAL SAFETY CONSIDERATIONS
• SH&E 201, General Safety Rules • SH&E 404, Manual Lifting	• Evaluate surrounding work area for additional hazards that may be present. • All loads in excess of 49 pounds require use of mechanical aids or assistance from other personnel. • Clear utilities (underground and overhead) in the immediate work area or travel route prior to positioning. • Always ensure the driver of excavation equipment can see you at all time times. Never assume he can see you. Always yield to heavy equipment. • Establish safe distances from drill rig (refer to HASP).

MONITORING PROCEDURES

EarthTech
A Tyco International Ltd. Company

TASK HAZARD ANALYSIS (THA)
ANCHOR LITH KEM KO
500 WEST JOHN STREET, HICKSVILLE, NY Prepared

by: Sabyasachi Chatterjee **Date**: September 2006

TASK NAME

INVESTIGATIVE-DERIVED WASTE

TASK DESCRIPTION

This task involves characterization, management and disposal of waste such as decontamination liquid produced during investigation. Investigative-derived waste is also known as "legacy waste".

CHEMICAL EXPOSURE HAZARDS

- VOCs

PPE

Level D

- Protective chemical gloves
- High-visibility reflective safety vest
- ANSI approved hardhat
- ANSI approved safety glasses
- ANSI approved steel toe safety boots

OTHER SAFETY EQUIPMENT

- Leather gloves while handling sharp edges or operating powered tools/machinery
- SPF 15 sunblock when working outdoors
- First aid kit (located in vehicle)
- Fire extinguisher (located in vehicle)
- Ear plugs/muffs if necessary

PHYSICAL HAZARDS

- Slips, trips, falls, and protruding objects
- Manual lifting, overexertion
- Vehicle/equipment traffic
- Hazardous noise
- Heat stress

APPLICABLE OPERATIONAL SAFETY PROCEDURES

- SH&E 201, General Safety Rules
- SH&E 404, Manual Lifting

ADDITIONAL SAFETY CONSIDERATIONS

- Evaluate surrounding work area for additional hazards that may be present.
- All loads in excess of 49 pounds require use of mechanical aids or assistance from other personnel.
- Always ensure the hammer drill operator can see you at all time times. Never assume he can see you. Always yield to heavy equipment.

Air monitoring not required

Appendix 3

Material Safety Data Sheet

LIQUINOX MSDS

Section 1 : MANUFACTURER INFORMATION

Supplier: Same as manufacturer.

Manufacturer: Alconox, Inc.
30 Glenn St.
Suite 309
White Plains, NY 10603.

Manufacturer emergency phone number: 800-255-3924.
813-248-0585 (outside of the United States).

Manufacturer: Alconox, Inc.
30 Glenn St.
Suite 309
White Plains, NY 10603.

Supplier MSDS date: 2005/02/24

D.O.T. Classification: Not regulated.

Section 2 : HAZARDOUS INGREDIENTS

C.A.S.	CONCENTRATION %	Ingredient Name	T.L.V.	LD/50	LC/50
25155-30-0	10-30	SODIUM DODECYLBENZENESULFONATE	NOT AVAILABLE	438 MG/KG RAT ORAL 1330 MG/KG MOUSE ORAL	NOT AVAILABLE

Section 3 : PHYSICAL / CHEMICAL CHARACTERISTICS

Physical state: Liquid.

Appearance & odor: Odourless.
Pale yellow.

Odor threshold (ppm): Not available.

Vapour pressure (mmHg): @ 20°C (68°F).
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Vapour density (air=1): >1

Volatiles (%)

By volume: Not available.

Evaporation rate (butyl acetate = 1): < 1.

Boiling point (°C):	100 (212F)
Freezing point (°C):	Not available.
pH:	8.5
Specific gravity @ 20 °C:	(water = 1). 1.083
Solubility in water (%):	Complete.
Coefficient of water\oil dist.:	Not available.
VOC:	None

Section 4 : FIRE AND EXPLOSION HAZARD DATA

Flammability:	Not flammable.
Conditions of flammability:	Surrounding fire.
Extinguishing media:	Carbon dioxide, dry chemical, foam. Water Water fog.
Special procedures:	Self-contained breathing apparatus required. Firefighters should wear the usual protective gear. Use water spray to cool fire exposed containers.
Auto-ignition temperature:	Not available.
Flash point (°C), method:	None
Lower flammability limit (% vol):	Not applicable.
Upper flammability limit (% vol):	Not applicable.

Not available.

Sensitivity to mechanical impact:	Not available.
Hazardous combustion products:	Oxides of carbon (COx). Hydrocarbons.
Rate of burning:	Not available.
Explosive power:	Containers may rupture if exposed to heat or fire.

Section 5 : REACTIVITY DATA

Chemical stability:	Product is stable under normal handling and storage conditions.
Conditions of instability:	Extreme temperatures.
Hazardous polymerization:	Will not occur.
Incompatible substances:	Strong acids. Strong oxidizing agents.
Hazardous decomposition products:	See hazardous combustion products.

Section 6 : HEALTH HAZARD DATA

Route of entry:	Skin contact, eye contact, inhalation and ingestion.
Effects of Acute Exposure	
Eye contact:	May cause irritation.
Skin contact:	Prolonged and repeated contact may cause irritation.
Inhalation:	May cause headache and nausea.
Ingestion:	May cause vomiting and diarrhea. May cause gastric distress.
Effects of chronic exposure:	See effects of acute exposure.
LD50 of product, species & route:	> 5000 mg/kg rat oral.
LC50 of product, species & route:	Not available.
Exposure limit of material:	Not available.
Sensitization to product:	Not available.
Carcinogenic effects:	Not listed as a carcinogen.
Reproductive effects:	Not available.
Teratogenicity:	Not available.
Mutagenicity:	Not available.
Synergistic materials:	Not available.
Medical conditions aggravated by exposure:	Not available.
First Aid	
Skin contact:	Remove contaminated clothing. Wash thoroughly with soap and water. Seek medical attention if irritation persists.
Eye contact:	Check for and remove contact lenses. Flush eyes with clear, running water for 15 minutes while holding eyelids open: if irritation persists, consult a physician.
Inhalation:	Remove victim to fresh air. If irritation persists, seek medical attention.
Ingestion:	Do not induce vomiting, seek medical attention. Dilute with two glasses of water. Never give anything by mouth to an unconscious person.

Section 7 : PRECAUTIONS FOR SAFE HANDLING AND USE

Leak / Spill:	Contain the spill. Prevent entry into drains, sewers, and other waterways. Wear appropriate protective equipment. Small amounts may be flushed to sewer with water. Soak up with an absorbent material. Place in appropriate container for disposal. Notify the appropriate authorities as required.
Waste disposal:	In accordance with local and federal regulations.
Handling procedures and equipment:	Protect against physical damage. Avoid breathing vapors/mists. Wear personal protective equipment appropriate to task.

Wash thoroughly after handling.
Keep out of reach of children.
Avoid contact with skin, eyes and clothing.
Avoid extreme temperatures.
Launder contaminated clothing prior to reuse.

Storage requirements: Store away from incompatible materials.
Keep containers closed when not in use.

Section 8 : CONTROL MEASURES

Precautionary Measures

Gloves / Type:

Wear appropriate gloves.

Respiratory / Type: None required under normal use.

Eye / Type:

Safety glasses recommended.

Footwear / Type: Safety shoes per local regulations.

Clothing / Type: As required to prevent skin contact.

Other / Type: Eye wash facility should be in close proximity.
Emergency shower should be in close proximity.

Ventilation requirements: Local exhaust at points of emission.

Appendix 4

Community Air Monitoring Plan

APPENDIX 4

COMMUNITY AIR MONITORING PLAN

GROUNDWATER EVALUATION
ANCHOR LITH KEM KO SITE
Site Number: 1-30-021

Work Assignment No.
D004436-08

Prepared for:

SUPERFUND STANDBY PROGRAM
New York State
Department of Environmental Conservation
625 Broadway
Albany, New York 12233

November 2007

Prepared by:

Earth Tech Northeast, Inc.
300 Broadacres Drive
Bloomfield, NJ 07003-3153

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Chapter **Page**

1.0 INTRODUCTION

A Community Air Monitoring Plan (CAMP) is used to provide a measure of protection for the downwind community (i.e., off-site receptors including residences and businesses and on-site workers not directly involved with the subject work activities) from potential airborne contaminant releases as a direct result of investigative and remedial work activities.

A CAMP requires real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) at the downwind perimeter of each designated work area when certain activities are in progress at contaminated sites. The CAMP is not intended for use in establishing action levels for worker respiratory protection. The action levels specified herein require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP helps to confirm that work activities did not spread contamination off-site through the air.

2.0 MONITORING

No significant airborne concentration of contaminants is expected at the site. Real-time air monitoring for volatile organic compounds (VOCs) in the work area will be limited to periodic instantaneous measurements.

2.1 PERIODIC MONITORING

Periodic monitoring for VOCs will be required during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. "Periodic" monitoring during sample collection might reasonably consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or overturning soil, monitoring during well baling/purging, and taking a reading prior to leaving a sample location.

VOCs will be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) periodically. Upwind concentrations will be measured at the start of each workday to establish background conditions. The monitoring work will be performed using a photo-ionization detector (PID).

- If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for a 15-minute average calculated based on instantaneous measurements, work activities will be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.
- If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities will be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average (calculated based on instantaneous measurements).
- If the organic vapor level is above 25 ppm at the perimeter of the work area, activities will be shutdown.
- Instantaneous readings used for decision purposes will be recorded.