The electronic version of this file/report should have the file name:

Type of document . Site Number . Year-Month . File *Year-Year* or Report name . pdf

_____ . _____ . _____ . _____ .pdf

example: *letter . Year-Month . File Year-Year . pdf*

report . HW . 932011 . 1993 - 07 - 21 . Soil - Invest - Plan .pdf

example: *report . Site Number . Year-Month . Report Name . pdf*

Project Site numbers will be proceeded by the following:

Municipal Brownfields - B
Superfund - HW
Spills - SP
ERP - E
VCP - V
BCP - C

diversified manufacturing incorporated
410 Ohio Street • Lockport, N.Y. 14094 (716) 434-5585

July 21, 1993

New York State Department of Environmental Conservation
270 Michigan Avenue
Buffalo, NY 14203-2999

ATT: Mr. Abul Barkat, P.E.
Project Manager

Dear Mr. Barkat:

RE: Diversified Manufacturing Site #932011
Soil Investigation Plan

In the absence of Mr. Charles Husvar, I am forwarding one (1) copy of the Health and Safety Plan prepared by our consultant GZA for your review. Please advise if this plan is acceptable.

Work is scheduled to start the week of July 26, 1993.

Very truly yours,

Michael Carpenter
Treasurer

tam
Enclosure

HEALTH AND SAFETY PLAN

PREPARED FOR:
Diversified Manufacturing Site
Lockport, New York

PREPARED BY:
GZA GeoEnvironmental of New York
Buffalo, New York

July 1993
File: 9-93-688

GZA SITE HEALTH & SAFETY HANDBOOK

DOCUMENT NO. 921106
(Replaces Doc. No. 920224)

DATE: November 6, 1992
REVISION NO: 2
ISSUED BY: GZA Corporate Health & Safety Department

CONTENTS

1. PURPOSE

The purpose of this document is to establish standardized health and safety procedures for employees engaged in a broad range of field operations. These procedures are intended to comply with applicable regulations established by the United States Occupational Safety and Health Administration (OSHA), and to protect GZA GeoEnvironmental Technologies, Inc. (GZA) employees engaged in various field operations from recognized hazards associated with these operations.

2. DISCUSSION

Depending upon the scope, GZA field operations may be subject to the General Industry Standards established by OSHA (29 CFR 1900 through 1910), the Construction Industry Standards established by OSHA (29 CFR 1926), or a combination thereof. This document is intended to address a fundamental job-site requirement as defined by OSHA 1926.20. That is, the need for employer to establish and implement an accident prevention program.

> It is estimated that *88% of all accidents are preventable!* Accident prevention is the responsibility of *everyone* on the job. Therefore, all applicable safety precautions must be observed at all times.

Where OSHA requires detailed written procedures to comply with specific regulations, GZA will develop these written procedures as part of the *GZA Health & Safety Program Manual.* The procedures established by this document are intended to supplement other portions of the GZA Health & Safety Program Manual.

3. APPLICATION

The requirements of this document apply to all GZA employees who are involved directly or indirectly with routine field operations, including but not limited to geotechnical oversight, site instrumentation, site assessments, site investigations, facility audits, sampling activities, monitoring activities, etc., Routine field operations can be further defined as those operations where the hazards are clearly understood by the on-site GZA personnel. And, where these hazards can be minimized or controlled with routine equipment and/or procedures.

Operations requiring Level-B protection, or where the hazards may not be clearly understood or controllable with routine equipment and/or procedures, require the development and implementation of a detailed site-specific Health and Safety Plan (HASP).

4. PROGRAM

This program has been developed as an employee handbook. The handbook consists of three basic components. First is the basic program text which outlines how, when, where and by whom the program is to be implemented. Second is the site specific information form which identifies applicable site hazards and control measures as well as site specific emergency response information. Third are the various appendices which contain detailed information for the broad range of hazards and control measures identified on the checklist portion of the site specific form.

4.1 General Requirements

Implementation of this program requires a careful reading of the basic text, completion of the site specific form, review the of form and the applicable portions of the program and its appendices as part of a pre-startup site safety briefing, and ready availability of both the completed form and the program handbook during on-site activities.

4.1.1 GZA Employee Responsibilities GZA field employees are expected to:

a) *obtain a copy of the applicable GZA Site Specific Information and Checklist form and carefully review it prior to engaging in field activities*, and

b) *keep a copy of the program handbook and the completed site specific form readily accessible any time they are engaged in field operations.*

4.2 Site Specific Forms

A Site Specific Information and Checklist form (Appendix I) must be completed and approved prior to initiation of field activities. However, this form is not intended to be a stand alone document. Most procedural details and supporting information are included as part of this document/employee handbook and its appendices. Procedural details and/or supporting information which is not included, must be developed and attached to the form on an as needed basis.

4.2.1 Project Description This information must be included at the top of the form. The required information should be self explanatory. The details may be limited to the identification of the basic *what*, *why* and *where* associated with the overall project scope. However, it must include a listing of all tasks within the project scope.

4.2.2 Emergency Coordination Identification of emergency response personnel and services is critically important prior to field activities. The identification of an appropriate hospital in the area which can provide emergency first aid and medical services is required by OSHA regulation 1910.151. In addition to listing the phone number and address of the hospital on the form, a street map and/or detailed directions from the site must be attached. Additional information regarding emergency response procedures can be found in the *Emergency Response and Site Evacuation Program* contained in the *GZA H&S Program Manual.* A copy of GZA's incident investigation form is included in Appendix II of this document.

4.2.3 Air Monitoring and Action Levels Action Levels refer to the air monitoring instrument readings which will indicate the need to upgrade from one level of personal protective equipment to the next. This document is intended to cover Level D projects having upgrade contingencies for Level C only. All Level B projects or projects with Level B upgrade contingencies must be accompanied by a detailed Health and Safety Plan (HASP). Examples of some frequently cited Action Levels, associated instruments and the required actions are indicated in the attached table. Additional guidance regarding the selection of action levels and the required instruments and instrument limitations are included in Appendix III.

4.2.4 Hazard Assessment The results of the hazard assessment enable the establishment of site specific *action levels* and determine the level of *personal protective equipment* necessary to complete field activities. It is therefore critically important to gather as much information as possible ahead of time so the hazard assessment can be made with a reasonable degree of certainty. Although it is impossible to foresee all the potential hazards, the safety of the field team depends on the ability to make an educated and somewhat reasonable "*best guess.*"

The hazard assessment must consider the probable physical, chemical, and biological hazards. The checklist includes several frequently (and not so frequently) encountered physical, chemical and biological hazards. Once the site specific hazards have been noted on the checklist, each member of the field team should review the hazard assessment information on each of the hazards listed contained in the following appendices:

a) *Physical Hazards*, see appendix IV,

b) *Chemical Hazards*, see appendix V,

c) *Biological Hazards*, see appendix VI,

d) *Other Hazards*, Any physical, chemical, or biological hazard which is not specifically listed in either of the above appendices must be evaluated independently. If the hazards are determined to be easily controllable within the scope of this program, separate hazard information should be attached to the completed form. If the hazard is not easily controllable or is subject to specific regulations such as *radiation*, a detailed Health and Safety Plan (HASP) must be prepared.

4.2.5 OSHA Hazard Communication The OSHA Hazard Communication Standard is a regulation intended to assure employees' *right-to-know* about the hazards associated with all workplace chemicals and the methods necessary to protect them from those hazards. The basic requirements include the need to *label* all containers with the chemical name and chemical hazards associated with its contents. Basic requirements also include the need to prepare a list of chemicals in each work area and provide access to a *material safety data sheet* for each chemical.

Chemicals associated with typical field operations may include decon solutions, calibration standards and borehole grouting materials. It should be emphasized that all containers, regardless of size (particularly *plastic squeeze bottles*!) must be labeled with both the chemical name and chemical hazards. Additional information regarding employee right-to-know can be found in the *Hazard Communication Program* contained in the *GZA H&S Program Manual.*

4.2.6 Personal Protective Equipment As indicated above, field activities within the scope of this document will be conducted in Level D with upgrade contingencies for Level C. The simplest definitions apply in this case, where *Level D* refers to normal work clothes and *Level C* refers to the additional use of a full or half face air purifying respirator. Additional details regarding personal protective equipment, including the recommended use of coveralls, gloves, boots etc., can be found in appendix VII

4.2.7 Site Control and Decontamination The minimum site control required on all sites where construction hazards exist (drilling, excavating, test pitting, etc.) is the establishment of a simple exclusion zone using colored tape, stanchions, cones or some other equally effective method. Depending on the nature of the site, the establishment of separate zones for decontamination and support services may be appropriate. Additional guidance on site control and decontamination procedures are contained in appendix VIII.

4.2.8 Project Personnel Identification and Approvals The Site Specific Information and Checklist form must identify the Site Safety Officer (SSO), Project Manager (PM), Associate or Principal-in-charge (AIC/PIC), and Regional Health & Safety Coordinator (RHSC) or designee and should be signed by these individuals. Approval/acknowledgement signatures apply as follows:

Approval or Acknowledgement	SSO	PM	AIC/PIC	RHSC
Probable hazards identified on form.		X		X
Project scope accurately reflected on form.		X		
Appropriate emergency response info identified on form.		X		X
Appropriate control measures identified on form.		X		X
Hazards and control measures to be implemented on-site acknowledged.	X			
Overall project scope and health & safety requirements acknowledged.	X			

4.3 Medical Monitoring

All personnel engaged in routine field activities must comply with the requirement of GZA's Medical Monitoring Program. This generally includes (Category II) entrance exams and annual exams. These exams are required to comply with OSHA regulations regarding respiratory protection and hearing conservation. Participation is not optional. Regulations also require that employees be given the opportunity to have an exit exam upon termination. Employee acceptance of the exit exam is optional. However, the requirement for GZA to offer it is not optional if employees have been required to wear respiratory protection or have been exposed to excessive noise (as defined by OSHA) within the last 12 months prior to termination.

4.4 Training

4.4.1 General Requirements OSHA regulations require that all employees receive some training prior to initial field activities and annually thereafter. This training must include:

a) the contents of this document which are intended to address basic OSHA requirements regarding accident prevention and emergency response,

b) training in accordance with the OSHA Hazard Communication Standard,

c) training in accordance with the OSHA Hearing Conservation Standard, and

d) respirator fit testing and training in accordance with the OSHA Respiratory Protection Standard.

Items a, b, c and d are included in the annual 8 hour refresher training classes conducted by the GZA Corporate Health & Safety Department (see section 4.4.2).

4.4.2 Environmental Requirements As specified above, this program is intended to cover field activities which are outside the scope of OSHA 1910.120 (HAZWOPER). Although participation in the HAZWOPER training is not required by OSHA, HAZWOPER initial 40 hour and annually 8 hour refresher training has been adopted as a basic standard for GZA employees engaged in environmental projects as well as non-environmental projects where environmental hazards may be encountered.

5. REFERENCES

5.1 29 CFR 1900-1910 General Industry Standards
5.2 29 CFR 1929 Construction Industry Standards
5.3 1990-91 ACGIH Threshold Limit Values
5.4 NIOSH Pocket Guide to Chemical Hazards
5.5 NIOSH/OSHA/USCG/EPA Hazardous Waste Site Guidance Manual

Appendix I

Site Specific Form

GZA Site Specific Information and Checklist Form

Important! This is not a stand alone document. Form must be accompanied on-site by the GZA Site H&S Handbook!!

Site Name and Address: Diversified Manufacturing, Inc. Job #: 9-93-688

Estimated Start Date: 7/26/93 Completion/Expiration Date: 7/30/93

Site Description: Manufacturing facility where metal is machined into various products.

Nature of Field Work (List all tasks): Advance test holes through gravel/soil parking lot/driveway to a depth of 2 feet using hand tools (power auger, slide hammer, hand auger etc.). Place samples in jars for testing. Survey locations.

Emergency Response Information and Phone Numbers

Hospital #: 911 Ambulance #: 911 Fire #: 911 Police #: 911

Hospital Name & Address: Lockport Memorial Hospital, 521 East Avenue

Directions, Diagram, or Map of Route to Nearest Hospital Attached: [x] Yes [ ] No (if no, do not proceed) (see Figure 1)

Other Emergency Contact: None Phone #:

Location of Nearest Phone: At facility office.

Air Monitoring Instruments and Action Levels:

Organic Vapor Detector (hnu, OVM, OVA) - Breathing Zone Readings:

0 to 1 units: Remain in Level D. Use colorimetric tubes or other chemical specific device to verify low PEL contaminant levels (Benzene, Vinyl Chloride, etc.) where applicable.

>1 _____ units: Withdraw from work area, discontinue operation, contact GZA project manager discontinue work at that location until contaminants can be evaluated, and H & S plan revised. (Set new action level based on contaminants present.)

Combustible Gas Indicator CGI/LEL Meter (if required) - Readings Near Vapor Source:

- < 10% LEL: Continue to monitor with caution. Eliminate all ignition sources.
- >10%: Withdraw from work area and contact GZA project manager.

Have Necessary Utility Notifications for Subsurface Work Been Made? [ ] Yes [x] Not Applicable

If yes, specify clearance dates, clearance I.D. #, and other relevant information: Main utilities (gas, water etc) are typically located deeper than 2 feet. However, GZA will contact appropriate facility personnel to check for near surface ($\leq$2 feet) utilities that may be in the area (TV cable, telephone, electric lines for lighting, alarm cables etc.)

Subcontractor Identification Company Name:	Type:(driller,etc.)	Contractor notified of H&S responsibilities in writing:
1. _____	_____	[ ] Yes [ ] No (if no, do not proceed)
2. _____	_____	[ ] Yes [ ] No (if no, do not proceed)

(x = Applies, or required item(s) available. NA = Not Applicable.)

PHYSICAL HAZARDS
[ ]Confined Space Entry (prohibited without permit)
[ ]Construction Hazards, Drill Rigs, Backhoes, etc.
[ ]Drums and Buried Drums
[ ]Fire and Explosion
[x]Heat and/or Cold Stress
[x]Moving Vehicles, Traffic Safety
[ ]Noise
[ ]Overhead Utilities and Hazards
[ ]Pedestrian Traffic
[ ]Test Pit Excavations
[x]Underground Utilities and Hazards
[ ]Water Hazards and Boat Sampling
[x]Others: Power augers, hand augers

CHEMICAL HAZARDS
[ ]Asbestos
[ ]BTEX Compounds
[ ]Chlorinated Organic Compounds
[ ]Chromium Compounds
[x]Cutting Oils
[ ]Fuel Oil
[ ]Gasoline
[ ]Herbicides
[ ]Hydrogen Sulfide
[ ]Lead Paint
[x]Metal Compounds
[ ]Methane
[ ]Pesticides
[ ]Petroleum Hydrocarbons (PHC)
[x]Polychlorinated Biphenyl (PCB)
[ ]Polycyclic Aromatic Hydrocarbons (PAH)
[ ]Tetraethyl & Tetramethyl Lead
[ ]Volatile Organic Compounds (VOC)
[x]Waste Oil
[ ]Others: Dust that may contain PCBs or metals(3)

BIOLOGICAL HAZARDS
[ ]Insects
[ ]Lyme Disease
[ ]Medical Wastes and Bloodborne Diseases
[ ]Poisonous Plants
[ ]Rats, Snakes and Other Vermin
[ ]Wastewater and Sewage
[ ]Others:

HAZARD COMMUNICATION (1)
[x]All containers properly labeled
[x]MSDS/workplace notebook available

ACCIDENTS
[x]First aid kits and/or facilities available (2)
[x]GZA Incident Investigation Forms available

PERSONAL PROTECTIVE EQUIPMENT
[ ]Respirator Type:
[ ]Resp-Cartridge Type:
[x]Hearing Protection (if needed)
[x]Hardhat
[x]Outer Gloves Type: chemical resistant
[x]Inner Gloves Type: latex or vinyl surgical type
[x]Work Boots
[x]Coveralls Type: if needed (at discretion of SSO) tyvek suit
[x]Outer Boots Type: rubber
[x]Eye Protection
[ ]Others:

MONITORING EQUIPMENT
[x]PID Type: Hnu Model PI 101 or similar
Lamp Energy: eV
[ ]FID Type:
[ ]Cal gas and equipment type:
[x]LEL
[ ]Others:

OTHER EQUIPMENT & GEAR
[ ]Caution Tape
[x]Traffic Cones or Stanchions
[ ]Warning Signs or Placards
[x]Decon Buckets, Brushes, Detergent, Towels and Plastic Bags
[ ]Others:

Project Personnel and Sign-off (Refer to section 4.2.8 of the GZA Site H&S Handbook):

Site Safety Officer: G. Klawinski or S. Blair (Required on all sites)

Project Manager: T. Heins

AIC or PIC: R. Kampff

RHSC (or designee):

Attach additional sheets for comments: (Revised 11/6/92)

1. Ten percent nitric acid in water, hexane and isopropanol alcohol will be used at the site for cleaning sampling tools.
2. GZA will bring a first aid kit to site.
3. If dust is observed during augering, it will be controlled by spraying potable water over the dust source. If visible dust cannot be controlled using this method, GZA will stop work.

Appendix II

Emergency Response and Incident Investigation

GZA INCIDENT INVESTIGATION FORM

Employee's Name:_____GZA Company Name:_____

Employee's SS Number:_____ GZA Office location:_____

Project Name:_____ Project Location:_____

Project Number:_____ _____

Building:_____ Room:_____ Other:_____

Time Incident Occurred_____Date_____

Supervisor's Name_____

Type of Case:
First Aid_____Medical Treatment_____
Lost Time_____Fatality_____Property Damage_____
Occupational Illness_____

Describe the incident (what happened):

Describe the type of first aid or medical treatment provided:

Describe employee activity at time of incident:

Describe any tools or machinery involved:

Describe condition of work atmosphere at time of incident:

GZA INCIDENT INVESTIGATION FORM (con't)

Describe any personal protective equipment used by employee:

In your opinion, what the probable causes of the incident are:

In your opinion, how this incident could have been prevented:

Changes in process, procedure, or equipment that you would recommend:

How you would classify the apparent causes of this incident:
Human error_____Equipment_____
Material_____Personal protective equipment_____
Environmental_____Other_____

Name and signature of person preparing this form_____

Distribution:

Branch/Regional Office Manager:
Regional Health and Safety Coordinator:
Corporate Director of Health and Safety:
Other:

Note: If the space provided on this form is insufficient, provide additional information on separate paper and attach. The completed investigation report must be submitted to the Corporate Director of Health and Safety in Newton within five days.

Appendix III

Action Levels

Example Table 1 - BTEX Compounds

Contaminants of Concern

Monitoring and Response

Contaminant Name or Type	Vapor Pressure	Ionization Potential	OSHA PEL (ACGIH TLV)	Instrument (Relative Response)	Instrument Reading	Required Action
Total VOC (as Benzene)	75 mm	9.24 eV	1 ppm TWA 5 ppm STEL (10 ppm TWA)	hnu/10.2 eV lamp/Benzene Reference Standard (1:1) ~~ Colorimetric Tube (± 25%)	Any reading above background ~~ ≥ 1 ppm ≥ 10 ppm ≥ 25 ppm	Verify w/ Colorimetric Tube ~~ **Level C** (1/2 or Full Face) (Full Face Only) Backoff:Write HASP to address **Level B** or appropriate mitigation controls.
Total VOC as: **Xylene** as: **Ethyl Benzene** as: **Toluene**	9 mm 10 mm 20 mm	8.56 eV 8.76 eV 8.82 eV	100 ppm TWA (100 ppm TWA) 100 ppm TWA (100 ppm TWA) 100 ppm TWA (100 ppm TWA)	hnu/10.2 eV lamp/Benzene Ref. Standard (1:1.1) (1:1) (1:1)	≥ 25 ppm ≥ 250 ppm	**Level C** Backoff:Write HASP to address **Level B** or appropriate mitigation controls.

Example Table 2 - Chlorinated Compounds

Contaminants of Concern

Monitoring and Response

Contaminant Name or Type	Vapor Pressure	Ionization Potential	OSHA PEL (ACGIH TLV)	Instrument (Relative Response)	Instrument Reading	Required Action
Total VOC (as Vinyl Chloride)	>760 mm	9.99 eV	1 ppm TWA (5 ppm TWA)	hnu/10.2 eV lamp/Benzene Reference Standard (1:1) ~~ Colorimetric Tube (± 25%)	Any reading above background ~~ ≥ 1 ppm	Verify w/ Colorimetric Tube. ~~ Backoff:Write HASP to address **Level B** or appropriate mitigation controls (Refer to OSHA 1910.1017).
Total VOC as: DCA as: TCA as: TCE	 230 mm 100 mm 58 mm	 11.06 eV 11.00 eV 9.45 eV	 100 ppm TWA (200 ppm TWA) 350 ppm TWA (350 ppm TWA) 50 ppm TWA (50 ppm TWA)	hnu/11.7 eV lamp/Benzene Ref. Standard (1:1.1) (1:0.7) (1:0.9)	≥ 15 ppm ≥ 150 ppm	**Level C** (1/2 or Full Face) Backoff:Write HASP to address **Level B** or appropriate mitigation controls.

Table 3 - Supplemental Monitoring and Response Data

Contaminant of Concern	Instrument Response (10 ppm actual) hnu 9.5eV	hnu 10.2eV	hnu 11.7eV	OVM ~10eV	OVA	OSHA PEL (ppm)	Recommended Action Levels Level C	Level B
ACETIC ACID		0.1			8	10	2	20
ACETIC ANHYDRIDE		1				5	*	*
ACETONE	0.7	6.3	4.7	5.9	6	750	25	250
ACETONITRILE			0.1		7	40	1	10
ACROLEIN		3.1	2.8	4	2.7	0.1	*	*
ACRYLONITRILE			5.8		7	2	*	*
ALLYL ALCOHOL		4.2		1.9	3	2	0.5	5
ALLYL CHLORIDE		1.5		0.7	5	1	*	*
AMMONIA		0.3		0.4		35	*	*
BENZENE	10	10		14.3	15	1	1	10
BUTANE			7.1		6.3	800	25	250
BUTANONE, 2-	2.9	5.7	5.2	6.3	8	200	20	200
CARBON DISULFIDE		7.1	27.7	4.3		4	1	10
CARBON TETRACHLORIDE			7.4	0.1	1	2	*	*
CHLOROFORM			4.9		6.5	2	*	*
CHLOROPROPENE, 3-		1.5		0.7	5	1	*	*
CROTONALDEHYDE		3.1				2	0.5	5
CYCLOHEXANONE		5.1			11	25	5	50
DIBROMO-CHLOROPROPANE		0.7				0.001	*	*
DICHLOROETHANE			10.6	0.2	8	100	25	250
DIETHYLAMINE	9.9			6.7	7.5	10	2.5	25
EPICHLOROHYDRIN		0.7			6	2	*	*
ETHYLENE DIBROMIDE		2.7			5	20	2	20
ETHYLENE OXIDE		1		0.3	7	1	*	*
HEPTANE	0.2	1.7	18.1		7.5	400	25	250
HEXANE		2.2	15.5	0.8	7.5	50	10	100
HEXONE		5.7	8.7	6.7	10	50	5	50
HYDROGEN SULFIDE		2.3		1.4		10	None	1

Table 3 - Supplemental Monitoring and Response Data

Contaminant of Concern	Instrument Response (10 ppm actual) hnu 9.5eV	hnu 10.2eV	hnu 11.7eV	OVM ~10eV	OVA	OSHA PEL (ppm)	Recommended Action Levels Level C	Level B
ISOBUTYLENE		7	8.2	10	7.4			
ISOPROPYL ALCOHOL		1	3.7	0.5	6.5	400	25	250
ISOPRPANOL		1	3.7	0.5	6.5	400	25	250
METHANOL			0.8		1.2	200	None	10
METHYL ALCOHOL			0.8		1.2	200	10	100
METHYL CHLORIDE			8		7.5	50	None	15
METHYL ETHYL KETONE	2.9	5.7	5.2	6.3	8	200	20	200
METHYL ISOCYANATE		4.5		0.8		0.02	*	*
METHYL METHACRYLATE	0.6	3		2.3	5	100	5	50
METHYLENE CHLORIDE			7.7		8	500	None	25
METHYLISOBUTYL-KETONE		5.7	8.7	6.7	10	50	5	50
METYL MERCAPTAIN		4.3				0.5	*	*
MINERAL SPIRITS		4				100	15	150
NAPTHA		5				100	15	150
NITRIC OXIDE		0.6		0.2		25	None	*
NITROGEN DIOXIDE		0.02				1	None	*
OCTANE, n-		2.5			8	300	25	250
PENTANE			11.6		6.5	600	25	250
PHENOL	7.7			3.4	5.4	5	1	10
PROPANE			4.5		7	1000	25	250
PYRIDINE	2.2	3		16.6	12.8	5	1	10
STODDARD SOLVENT		4				100	15	150
STYRENE	10	9.7		3	8	50	15	150
TETRACHLORO-ETHANE			4.9		10	1	*	*
TETRAHYDROFURAN		6	6.5	2.7	4	200	20	200
TOLUENE	10	10	8.2	20	11	100	25	250

Table 3 - Supplemental Monitoring and Response Data

Contaminant of Concern	Instrument Response (10 ppm actual) hnu 9.5eV	hnu 10.2eV	hnu 11.7eV	OVM ~10eV	OVA	OSHA PEL (ppm)	Recommended Action Levels Level C	Level B
TRICHLORO-ETHANE,1,1,1- (TCA)			7.4		10.5	350	25	250
TRICHLORO-ETHYLENE (TCE)		8.9		7.7	7	50	15	150
VINYL CHLORIDE		5			3.5	1	None	*
XYLENE, m	11.2	11.2		12.5	11.1	100	25	250
XYLENE, p	11.2	11.4		14.3	11.2	100	25	250

NOTES:

1. SHADED AREAS WITH NUMBERS DISPLAYED INDICATE INADEQUATE INSTRUMENT RESPONSE RELATIVE THE PEL. INSTRUMENT NOT RECOMMENDED FOR IDENTIFICATION OF THE CONTAMINANT.

2. OTHER SHADED AREAS INDICATE THAT INSTRUMENT RESPONSE INFORMATION IS UNAVAILABLE.

3. hnu INSTRUMENT RESPONSE DATA ARE BASED ON THE INSTRUMENT CALIBRATED WITH ISOBUTYLENE AND ADJUSTED TO RESPOND RELATIVE TO BENZENE.

4. OVM INSTRUMENT RESPONSE DATA ARE BASED ON THE INSTRUMENT CALIBRATED WITH ISOBUTYLENE AND ADJUSTED TO RESPOND RELATIVE TO ISOBUTYLENE. (IF THE INSTRUMENT IS ADJUSTED TO RESPOND RELATIVE TO BENZENE, READINGS WILL BE ~ 30% LOWER.)

5. OVA INSTRUMENT RESPONSE DATA ARE BASED ON THE INSTRUMENT CALIBRATED AND ADJUSTED TO RESPOND RELATIVE TO METHANE.

6. "NONE" IN THE LEVEL-C COLUMN INDICATES THAT CHEMICAL CARTRIDGE RESPIRATORS ARE NOT APPROVED FOR CONTAMINANT.

7. ALL ACTION LEVELS BELOW 5 SHOULD BE VERIFIED WITH A COLORIMETRIC TUBE OR OTHER METHOD OF VERIFICATION.

8. "*" IN THE LEVEL-C OR LEVEL-B COLUMN INDICATES THAT ACTIONS LEVELS SHOULD NOT BE BASED ON INSTRUMENTS LISTED.

Appendix IV

Physical Hazards

1 **Confined Space Entry (CFE)** Confined space entry means the *potentially hazardous* entry into any space which, by design, has limited openings for entry and exit, unfavorable natural ventilation which could contain or produce dangerous air contaminants, and which is not intended for continuous employee occupancy. Confined spaces include but are not limited to storage tanks, compartments of ships, process vessels, pits, silos, vats, degreasers, reaction vessels, boilers, ventilation and exhaust ducts, sewers, tunnels, underground utility vaults, and pipelines. Other environments which must be treated as confined spaces include *test pits, and basements, garages, warehouses and other indoor areas where mechanical (i.e. diesel, propane, gasoline or similarly powered) equipment must be operated for drilling or test pitting purposes*. Confined space entry should be allowed only when absolutely necessary, and then only when all requirements of **GZA's Confined Space Entry Control Program**, contained in the Health & Safety Program Manual, have been satisfied.

2 **Construction Hazards, Drill Rigs, Backhoes, etc.** The use of drill rigs, backhoes and other heavy equipment represent potentially serious construction hazards. Whenever such equipment is used, personnel in the vicinity should be limited to those who must be there to complete their assigned duties. All personnel must avoid standing within the turning radius of the equipment or below any suspended load. Job sites must be kept as clean, orderly and sanitary as possible. When water is used, care must be taken avoid creating muddy or slippery conditions. If slippery conditions are unavoidable, barriers and warning signs must be used to warn of these dangers. Additionally, the following basic personal protective measures must be observed:

Hard Hats must be worn to protect against bumps or falling objects.

Safety glasses must be worn by all workers in the vicinity of drill rigs or other sources of flying objects. Goggles, face shields or other forms of eye protection must be worn when necessary to protect against chemicals or other hazards.

Steel toed safety shoes or boots are also required. The shoes must be chemically resistant or protected with appropriately selected boots/coverings where necessary.

Unless otherwise specified, normal work clothes must be worn. Long sleeves and gloves are also required whenever necessary to protect against hazardous contact, cuts, abrasions or other possible skin hazards.

3 **Drums and Buried Drums** As a precautionary measure, personnel must assume that *labelled* and *unlabelled drums* encountered during field activities contain hazardous materials until their contents can be confirmed and characterized. Personnel should recognize that drums are frequently mislabeled, particularly drums that are reused.

Only trained and authorized personnel should be allowed to perform drum handling. Prior to any handling, drums must be visually inspected to gain as much information as possible about their contents. Trained field personnel must look for signs of deterioration such as corrosion, rust or leaks, and for signs that the drum is under pressure such as swelling or bulging. Drum type and drumhead configuration may provide the observer with information about the type of material inside, (i.e., a removable lid is designed to contain solids, while the presence of a bung indicates liquid storage).

Although not usually anticipated, buried drums can be encountered when digging test pits. Therefore, the following provisions must be observed if drums are encountered. Machine excavation (i. e. backhoe) should cease immediately anytime a drum is encountered. The appropriate management personnel should be notified immediately. All GZA personnel should be instructed to immediately leave the work area.

Even authorized personnel must not enter an excavation where drums have been uncovered, even for monitoring purposes, unless all provisions of OSHA's trenching and excavation standard have been met and the appropriate level of personal protective equipment is utilized. Sampling of unknown drums usually requires Level B protection. Buried drums must not be moved unless it can be accomplished in a safe manner and overpack drums are available.

4 **Fire and Explosion** The possibility of flammable materials being encountered during field activities must be recognized. And, the appropriate steps necessary to minimize fire and explosion must be observed. This includes situations where *excessive organic vapors or free product* are encountered. When this occurs, monitoring with a combustible gas indicator (CGI), is required.

Excessive organic vapors, for the purposes of initiating the use of a combustible gas indicator, are defined as sustained readings (i.e., continuous for at least five minutes) at or above 250 units or as an instantaneous reading at or above 1,000 units on the PID or FID, in close proximity (within one foot or less) of the borehole, test pit, sampling location or other area of potential exposure.

In situations where hexane, methanol are needed for field activities, the following precautions must be observed: *Keep flammable and combustible materials away from heat, sparks and open flames. Do not smoke around flammable or combustible materials. Keep all flammable and combustible liquids in approved and properly labelled safety containers.*

5 **Heat and Cold Stress** Overexposure to temperature extremes can represent significant risks to personnel if simple precautions are not observed. Typical control measures designed to prevent **heat stress** include dressing properly, drinking plenty of the right fluids, and establishing an appropriate work/break regimen. Typical control measures designed to prevent **cold stress** also include dressing properly, and establishing an appropriate work/break regimen. The project manager must assure that the appropriate provisions of **GZA's Heat and Cold Stress Control Program** contained in the Health & Safety Program Manual are observed.

6 **Moving Vehicles, Traffic Safety** All vehicular traffic routes which could impact worker safety must be identified and communicated. Whenever necessary, barriers or other methods must be established to prevent injury from moving vehicles. This is particularly important when field activities are conducted in parking lots, driveways. ramps or roadways. OSHA 1926.201 specifies that when signs, signals or barricades do not provide adequate protection from highway or street traffic, flagmen must be utilized. *Flagmen must wear red or orange garments. Garments worn at night must be reflective.*

7 **Noise** Noise exposure can be affected by many factors including the number and types of noise sources (continuous vs.intermittent or impact), and the proximity to noise intensifying structures such walls or building which cause noise to bounce back or echo. The single most important factor effecting total noise exposure is distance from the source. The closer one is to the source the louder the noise. The operation of a drill rig, backhoe or other mechanical equipment can be sources of significant noise exposure. In order to reduce the exposure to this noise, personnel working in areas of excessive noise must use hearing protectors (ear plugs or ear muffs) in accordance with the **GZA Hearing Conservation Program** contained in the Health and Safety Program Manual.

Rule-of-Thumb: Wherever actual data from sound level meters or noise dosimeters is unavailable and it is necessary to raise one's voice above a normal conversational level to communicate with others within 3 to 5 feet away, hearing protection should be worn.

8 **Overhead Utilities and Hazards** Overhead hazards can include low hanging structures which can cause injury due to bumping into them. Other overhead hazards include *falling objects, suspended loads, swinging loads and rotating equipment.* Hardhats must be worn by personnel in areas were these types of physical hazards may be encountered. Barriers or other methods must also be used to exclude personnel from these areas were appropriate. Electrical wires are another significant overhead hazard. According to OSHA (29 CFR 1926.550), *the minimum clearance which must be maintained from overhead electrical wires is 10 feet* from an electrical source rated $\leq$ 50 kV. Sources rated > 50 kV require a minimum clearance of 10 feet plus 0.4 inches per kV above 50 kV.

9 **Pedestrian Traffic** The uncontrolled presence of pedestrians on a drilling or excavation site can be hazardous to both pedestrians and site workers. Prior to the initiation of site activities, the site should be surveyed to determine if, when and where pedestrian may gain access. This includes walkways, parking lots, gates and doorways. Barriers or caution tape should be used to exclude all pedestrian traffic. *Exclusion of pedestrian traffic is intended to prevent injury to the pedestrians and eliminate distractions which could cause injury to GZA personnel or other site workers.*

10 **Test Pit Excavations** All provisions of the OSHA trenching and excavation standard (29 CFR 1926.650-652) must be followed during excavation activities. This includes *all test pit excavation and sampling activities.* It is the responsibility of the GZA Project Manager to ensure that GZA and GZA subcontractor personnel are in compliance with this standard. The estimated location of utility installations, such as sewer, telephone, electric, water lines and other underground installations that may reasonably be expected to be encountered during excavation work, must be determined prior to opening an excavation.

Excavations are considered to be confined spaces. Excavations should not be entered if other means are available to perform the task requiring entry. If entry into an excavation is required, the atmosphere within the space must be monitored by a trained person to assure that oxygen concentrations are at $\geq$ 19.5%, that combustible gas levels are less than 10%, and that vapor levels are within applicable safe exposure (PEL and TLV) limits.

A ladder or similar means of egress must be located in excavations greater than 4 feet in depth so as to require no more than 25 feet of lateral travel for employees. *No person should be allowed to enter an excavation greater than five feet in depth unless the walls of the excavation have been sloped back to an angle of 34 degrees, the excavation is free of accumulated water, and the excavation has been tested for*

hazardous atmospheres as noted previously. If personnel enter an excavation, all materials must be placed at least two feet from the edge of the excavation to prevent the materials from rolling into the excavation. *Personnel must remain at least two feet away from the edge of the excavation at all times.* Upon completion of a test pit exploration, the excavation should be backfilled and graded. Excavation should never be left open unless absolutely necessary, and then only with proper barricading and controls to prevent accidental injury.

11 **Underground Utilities and Hazards** The identification of underground storage tanks, pipes, utilities and other underground hazards is critically important prior to all drilling, excavating and other intrusive activities. In accordance with OSHA 29 CFR 1926.650, *the estimated location of utility installations, such as sewer, telephone, electric, water lines and other underground installations that may reasonably be expected to be encountered* during excavation work, *must be determined* prior to opening an excavation. The same requirements apply to drilling operations and the use of soil gas probes. Where public utilities may exist, the utility agencies or operators must be contacted directly or through *Digsafe*. Where other underground hazards may exist, reasonable attempts must be made to identify their locations as well. *Failure to identify underground hazards can lead to fire, explosion, flooding, electrocution or other life threatening accidents.*

12 **Water Hazards and Boat Sampling** The collection of water or sediment samples on or immediately adjacent to a body of water can pose significant hazards. In addition to the slip, trip and fall hazards associated with wet surfaces, the potential for drowning accidents must be recognized. These hazards can be intensified by the use of some personnel protective equipment, particularly if respiratory protection is worn. OSHA 29 CFR 1926.106 requires that all employees working over or near water, where the danger of drowning exists, *must wear a U.S. Coast Guard-approved life jacket or buoyant work vest*. Ring buoys and emergency *standby personnel* must also be in-place.

Appendix V

Chemical Hazards

1 **Asbestos** The inspection and/or removal of asbestos-based or asbestos-containing building materials is regulated by some major cities and several states. Regulations may require individuals who conduct building inspections for the presence of asbestos or collect samples of asbestos containing materials to be licensed or certified. GZA employees must determine the applicability of these regulations prior to any activities involving asbestos.

The primary health effects of asbestos exposure include asbestosis (a scarring of the lungs), lung cancer, mesothelioma and other forms of cancer. Exposure to asbestos is regulated by a comprehensive OSHA standard (29 CFR 1910.1001).

2 **BTEX Compounds** Exposure to the vapors of **benzene, ethylbenzene, toluene** and **xylenes** above their respective permissible exposure limits (PELs), as defined by the Occupational Safety and Health Administration (OSHA), may produce irritation of the mucous membranes of the upper respiratory tract, nose and mouth. Overexposure may also result in the depression of the central nervous system. Symptoms of such exposure include drowsiness, headache, fatigue and drunken-like behavior. Benzene has been determined to be carcinogenic, targeting blood-forming organs and bone marrow.

The vapor pressures of these compounds are high enough to generate significant quantities of airborne vapor. On sites where high concentrations of these compounds are present, this can result in a potential inhalation hazard to the field team during subsurface investigations. However, if the site is open and the anticipated quantities of BTEX contamination are small (i.e. part per million concentrations in the soil or groundwater), overexposure potential will also be small.

3 **Carbon Monoxide** Carbon monoxide (CO) is gas usually formed by the incomplete combustion of various fuels. Welding, cutting and the operation internal combustion engines can produce significant quantities of CO. Amounts of CO can quickly rise to hazardous levels in poorly ventilated areas. CO is odorless and colorless. It cannot be detected without appropriate monitoring equipment. LEL/O_2 meters and hnu/photoionizing detectors are <u>not</u> appropriate for the detection of CO. A direct reading instrument, calibrated for CO, should used. Common symptoms of overexposure include pounding of the heart, a dull headache, flashes before the eyes, dizziness, ringing in the ears and nausea. These symptoms must not be relied upon in place of an appropriately calibrated monitoring instrument. Exposures should not exceed 15ppm. Exposures above 15ppm require the use of supplied air respirators. Air purifying respirators are not approved for protection against CO.

4 **Chemicals Subject to OSHA Hazard Communication** All chemicals used in field activities such as solvents, reagents, decontamination solutions, or any other hazardous chemical must be accompanied by the required labels, Material Safety Data Sheets (MSDS), and employee training documentation (OSHA 1910.1200). For additional information refer to **GZA's Hazard Communication Program** contained in the Health and Safety Program manual.

5 **Chlorinated Organic Compounds** Exposure to the vapors of many chlorinated organic compounds such as vinyl chloride, tetrachloroethylene, 1,1,1-trichloroethane, trichloroethylene and 1,2-dichloroethylene above their respective PELs will result in similar symptoms. The actual permissible exposure limits (PEL) as set by the Occupational Safety and Health Administration (OSHA), vary depending on the specific compound.

Over exposure to the vapor of these compounds can cause irritation of the eyes, nose and throat. The liquid if splashed in the eyes, may cause burning irritation and damage. Repeated or prolonged skin contact with the liquid may cause dermatitis. Acute overexposure to chlorinated hydrocarbons depresses the central nervous system exhibiting such symptoms as, drowsiness, dizziness, headache, blurred vision, incoordination, mental confusion, flushed skin, tremors, nausea, vomiting, fatigue and cardiac arrhythmia. Alcohol may make symptoms of overexposure worse. If alcohol has been consumed, the overexposed worker may become flushed. Some of these compounds are considered to be potential human carcinogens. Exposure to *vinyl chloride* is regulated by a comprehensive OSHA standard (29 CFR 1910.1017).

6 **Chromium Compounds** Hexavalent chromium compounds, upon contact with the skin can cause ulceration and possibly an allergic reaction. Inhalation of hexavalent chromium dusts is irritating and corrosive to the mucous membranes of the upper respiratory tract. Chrome ulcers and chrome dermatitis are common occupational health effects from prolonged and repeated exposure to hexavalent chromium compounds. Acute exposures to hexavalent chromium dusts may cause coughing or wheezing, pain on deep inspiration, tearing, inflammation of the conjunctiva, nasal itch and soreness or ulceration of the nasal septum. Certain forms of hexavalent chromium have been found to cause increased respiratory cancer among workers.

Trivalent chromium compounds (chromic oxide) are generally considered to be of lower toxicity, although dermatitis may occur as a result of direct handling.

7 **Cutting Oils** Cutting oils may produce a condition known as "cutting oil acne," a specific dermatosis associated with prolonged and repeated direct contact. Other

problems associated with continued occupational exposure to cutting fluids include allergic skin sensitization, folliculitis and squamous cell carcinoma, due to the presence of nitrosamines.

8 **Fuel Oil** See Petroleum Hydrocarbons (PHC)

9 **Gasoline** See BTEX Compounds, and Tetraethyl and Tetramethyl Lead.

10 **Herbicides** Some of the commonly used herbicides present a low toxicity to man. However, other herbicides pose more serious problems. Organophosphorus and carbamate herbicides, if inhaled or ingested can interfere with the functioning of the central nervous system. Many herbicides can be readily absorbed through the skin to cause systemic effects. In addition to being absorbed through the skin, many herbicides, upon contact with the skin, may cause discoloring, skin irritation or dermatitis. Contaminants of commercial preparations of chlorinated phenoxy herbicides such as 2,4,5-T include 2,3,7,8-tetrachlorodibenzo-p-dioxin (dioxin). Dioxin is a known mutagen and a suspect carcinogen.

11 **Hydrogen Sulfide (H_2S)** Hydrogen sulfide, characterized by its "rotten egg" odor, is produced by the decomposition of sulfur-containing organic matter. It is found in many of the same areas where methane is found such as landfills, swamps, sewers and sewer treatment facilities. An important characteristic of H_2S is its ability to cause a decrease in ones ability to detect its presence by smell. So although one may no longer be able to smell it, it could still be present in harmful concentrations.

The symptoms of over exposure include headache, dizziness, staggering and nausea. Severe over exposure can cause respiratory failure, coma, and death. The current OSHA PEL is 10 ppm as an 8-hour TWA. The ACGIH TLV is the same.

12 **Lead Paint** The inspection and/or removal of lead-based or lead-containing paints is now regulated by an increasing number of states. States may require individuals who conduct lead paint inspections or collect samples of lead paint to be licensed or certified. GZA employees must determine the applicability of these regulations prior to any activities involving lead paint. For health information, see Metal Compounds.

13 **Metal Compounds** Overexposure to metal compounds has been associated with a variety of local and systemic health hazards, both acute and chronic in nature, with chronic effects being most significant. Direct contact with the dusts of some metal compounds can result in contact or allergic dermatitis. Repeated contact with arsenic compounds may result in hyperpigmentation. Cases of skin cancer due to the trivalent

inorganic arsenic compounds have been documented. The moist mucous membranes, particularly the conjunctivae, are most sensitive to the irritating effects of arsenic. Copper particles embedded in the eye result in a pronounced foreign body reaction with a characteristic discoloration of eye tissue.

Inhalation of copper and zinc dusts above their established PEL's may result in flu-like symptoms known as "metal fume fever." Prolonged and repeated inhalation of the dusts of inorganic arsenic compounds above the established PEL may result in weakness, loss of appetite, a sense of heaviness in the stomach and vomiting. Respiratory problems such as cough, hoarseness and chest pain usually precede the gastrointestinal problems. Chronic overexposure to the dusts of inorganic arsenic may result in lung cancer.

The early symptoms of lead poisoning are usually nonspecific. Symptoms include sleep disturbances, decreased physical fitness headache, decreased appetite and abdominal pains. Chronic overexposure may result in severe colic and severe abdominal cramping. The central nervous system (CNS) may also be adversely effected when lead is either inhaled or ingested in large quantities for extended periods of time. The peripheral nerve is usually affected. "Wrist drop" is peculiar to such CNS damage. Lead has also been characterized as a male and female reproductive toxin as well as a fetotoxin. Exposure to lead (Pb) is regulated by a comprehensive OSHA standard (29 CFR 1910.1025).

14 **Methane** Methane is an odorless, colorless, tasteless, gas that when present in high concentrations in air acts primarily as a simple asphyxiant without other significant physiologic effects. Simple asphyxiants dilute or displace oxygen below that required to maintain blood levels sufficient for normal tissue respiration.

Methane has a lower explosive limit (LEL) of 5% and an upper explosive limit (UEL) of 15%. The LEL of a substance is the minimum concentration of gas or vapor in air below which the substance will not burn when exposed to a source of ignition. This concentration is expressed in percent by volume. Below this concentration, the mixture is "too lean" to burn or explode. The UEL of a substance is the maximum concentration of gas or vapor in air above which the substance will not burn when exposed to a source of ignition. Above this concentration, the mixture is "too rich" to burn or explode. The explosive range is the range of concentrations between the LEL and UEL where the gas-air mixture will support combustion. For methane this range is 5% to 15%.

15 **Pesticides** Pesticides can be grouped into three major categories; organophosphates, carbamate and chlorinated hydrocarbons. The actual permissible exposure limits (PEL) as set by the Occupational Safety and Health Administration (OSHA), vary depending on the specific compound. Organophosphates, including Diazinon, Malathion and Parathion, are quickly absorbed into the body by inhalation, ingestion and direct skin contact. The symptoms of exposure include headache, fatigue, dizziness, blurred vision, sweating, cramps, nausea and vomiting. More severe symptoms can include tightness of the chest, muscle spasms, seizures and unconsciousness. It should also be noted that the Malathion and Parathion PELs both carry the *Skin* notation, indicating that these compounds adversely effect or penetrate the skin. OSHA specifies that skin exposure to substances carrying this designation be prevent or reduced through the use of the appropriate personal protective equipment (PPE).

Chlorinated Hydrocarbons such as Chlordane, DDT and Heptachlor can cause dizziness, nausea, abdominal pain and vomiting. The more severe symptoms include epileptic like seizures, rapid heart beat, coma and death. These compounds also carry the OSHA *Skin* notation.

The symptoms of exposure to carbamate such Carbaryl (also known as Sevin) are similar to those described for the organophosphates. However, the OSHA exposure limit for Carbaryl *does not* carry the Skin notation.

16 **Petroleum Hydrocarbons (PHC)** Petroleum Hydrocarbons such as fuel oil are generally considered to be of low toxicity. Recommended airborne exposure limits have not been established for these vapors. However, inhalation of low concentrations of the vapor may cause mucous membrane irritation. Inhalation of high concentrations of the vapor may cause pulmonary edema. Repeated or prolonged direct skin contact with the oil may produce skin irritation as a result of defatting. Protective measures, such as the wearing of chemically resistant gloves, to minimize contact are addressed elsewhere in this plan. Because of the relatively low vapor pressures associated with PHC's, an inhalation hazard in the outdoor environment is not likely.

17 **Polychlorinated Biphenyls (PCB)** Prolonged skin contact with PCB's may cause the formation of comedomes, sebaceous cysts, and/or pustules (a condition known as chloracne). PCBs are considered to be suspect carcinogens and may also cause reproductive damage.

The OSHA permissible exposure limits (PEL) for PCBs are as follows:

Compound	*PEL (8-hour time weighted average)*
Chlorodiphenyl (42% Chlorine)	1 mg/m^3-Skin
Chlorodiphenyl (54% Chlorine)	0.5 mg/m^3 -Skin

It should be noted that PCBs have extremely low vapor pressures (0.001 mm Hg @ 42% Chlorine and 0.00006 mm Hg @ 54% Chlorine). This makes it unlikely that any significant vapor concentration (i.e exposures above the OSHA PEL) will be created in the ambient environment. This minimizes the potential for any health hazards to arise due to inhalation unless the source is heated or generates an airborne mist. If generated, vapor or mists above the PEL may cause irritation of the eyes, nose, and throat. The exposure limits noted above are considered low enough to prevent systemic effects but it is not known if these levels will prevent local effects. It should also be noted that both PELs carry the *Skin* notation, indicating that these compounds adversely effect or penetrate the skin. OSHA specifies that skin exposure to substances carrying this designation be prevent or reduced through the use of the appropriate personal protective equipment (PPE).

18 **Polycyclic Aromatic Hydrocarbons (PAH)** Due to the relatively low vapor pressure of PAH compounds, vapor hazards at ambient temperatures are not expected to occur. However, if site conditions are dry, the generation of contaminated dusts may pose a potential inhalation hazard. Therefore dust levels should be controlled with wetting if necessary. Repeated contact with certain PAH compounds has been associated with the development of skin cancer. Contact of PAH compounds with the skin may cause photosensitization of the skin, producing skin burns after subsequent exposure to ultraviolet radiation. Protective measures, such as the wearing of chemically resistant gloves, are appropriate when handling PAH contaminated materials.

19 **Tetraethyl and Tetramethyl Lead** Both compounds are used as anti-knock ingredients in gasoline. The inhalation of tetraethyl lead dusts may result in irritation of the respiratory tract. This dust, when in contact with moist skin or eye membranes, may cause itching, burning and transient redness.

The direct absorption of a sufficient quantity of tetraethyl lead, whether briefly at a high rate, or for prolonged periods at a low rate, may cause acute intoxication of the central nervous system. Mild degrees of intoxication may cause headache, anxiety, insomnia, nervous excitation and minor gastrointestinal disturbances.

20 **Volatile Organic Compounds (VOC)** See BTEX compounds and Chlorinated Organic Compounds.

21 **Waste Oil** See Petroleum Hydrocarbons (PHC) and Cutting Oil.

Appendix VI

Biological Hazards

BIOLOGICAL HAZARD INFORMATION

1 **Insects** Insects represent significant sources (vectors) of disease transmission. Therefore, precautions to avoid or minimize potential contact should be considered prior to all field activities. Disease or harmful effects can be transmitted through bites, stings or through direct contact with insects or through ingestion of foods contaminated by certain insects. Examples of disease transmitted by insect bites include encephalitis and malaria from contaminated mosquitoes, lyme disease and spotted fever from contaminated ticks. Stinging insects, such as bees and wasps, are prevalent throughout the country, particularly during the warmer months. The stings of these insects can be painful, and cause serious allergic reactions to some individuals.

2 **Lyme Disease** Lyme disease is an infection caused by the bite of certain ticks, primarily deer, dog and wood ticks. The symptoms of Lyme disease usually start out as a skin rash then progress to more serious symptoms. The more serious symptoms can include lesions, headaches, arthritis and permanent damage to the neurological system. If detected early the disease can be treated successfully with antibiotics. The following steps are recommended for prevention of lyme disease and other diseases transmitted by ticks: a) *Beware of tall grass, bushes, woods and other areas where ticks may live.* b) *Wear good shoes, long pants tucked into socks, a shirt with a snug collar, good cuffs around the wrists and tails tucked into the pants. Insect/tick repellents may also be useful.* c) *Carefully monitor for the presence of ticks. Carefully inspect clothes and skin when undressing. If a tick is attached to the skin it should be removed with fine tipped tweezers. You should be alert for early symptoms over the next month or so. If you suspect that you have been bitten by a tick you should contact a physician for medical advice.*

3 **Medical Wastes and Bloodborne Diseases** Any field activity where exposure to medical wastes or other sources of bloodborne pathogens can be reasonably anticipated must be conducted in accordance with the OSHA (29 CFR 1910.1030) *Bloodborne Pathogens* standard. According to the OSHA definition, Bloodborne Pathogens means pathogenic microorganisms that are present in human blood and can cause disease in humans. These pathogens include but are not limited to *hepatitis B virus (HBV) and human immunodeficiency virus (HIV)*. Wherever there is a potential for employee skin, eye, mucous membrane, or parenteral (skin or membrane piercing) contact with blood or other potentially infectious sources, *employers must develop a Written Exposure Control Plan.*

4 **Poisonous Plants** The possible presence of poisonous plants should be anticipated for field activities in wooded or heavily vegetated areas. *Poison ivy* is a climbing plant with alternate green to red leaves (arranged in threes) and white berries. *Poison oak*

is similar to poison ivy and *sumac* but its leaves are oak-like in form. The leaves of these poisonous plants produce an irritating oil which causes an intensely itching skin rash and characteristic blister-like lesions. Contact with these plants should be avoided.

5 **Rats, Snakes and other vermin** Certain animals, particularly those that feed on garbage and other wastes, can represent significant sources (vectors) of disease transmission. Therefore, precautions to avoid or minimize potential contact with (biting) animals (such as rats) or animal waste (such as pigeon droppings) should be considered prior to all field activities. Rats, snakes and other wild animals can inflict painful bites. The bites can poisonous (as in the case of some snakes), or disease causing (as in the case of rabid animals). Avoidance of these animals is the best protection.

6 **Waste Water and Sewage** Sewage and waste water contaminated with raw, untreated sewage can represent significant sources of bacterial, viral or fungal contamination. Adverse effects, due to contact, can range from mild skin reactions or rashes to life threatening diseases. Diseases are easily transmitted by accidental ingestion or through skin contact, particularly if the skin is broken. Avoidance of direct contact and good personal hygiene are the best protection from these hazards.

Appendix VII

Personal Protective Equipment

PERSONAL PROTECTIVE EQUIPMENT

1. **General Site Work** General site work, outside the areas where exposure to chemical or biological contamination is anticipated, will typically require Level D protective equipment. This equipment is defined as:

   - Hard hat (in areas where overhead or construction hazards exist)
   - Chemically resistant, steel-toed work shoes or boots
   - Work clothes
   - Hearing protection (if applicable)
   - Eye protection

2 **Site Work in Contaminated Areas** The following personal protective equipment are typically required during all intrusive and sampling activities where exposure to chemical and/or biological contamination is anticipated:

   - Tyvek coveralls
   - Hard hat (in areas where overhead or construction hazards exist)
   - Chemically resistant, steel-toed shoes or boots
   - Nitrile or similar gloves (with disposable latex or vinyl inner gloves)
   - Eye protection (if full-face respiratory protection is not worn)
   - Hearing Protection (if applicable)

   If required (based on air monitoring results), Level C respiratory protection will be worn, typically consisting of an MSA full-face air purifying respirator with combination dust and organic vapor GMC-H cartridges or equivalent.

All personnel who will be required to don air purifying respirators must have been qualitatively or quantitatively fit-tested for the particular brand and size respirator he/she will be wearing on-site within the last year. Normal eyeglasses cannot be worn under full-face respirators because the temple bars interfere with the face seal. For workers requiring corrective face piece lenses, special spectacles designed for use with respirators must be available.

Appendix VIII

Site Control and Decontamination

1 **Designation of Zones** Where appropriate, GZA designates work areas or zones as suggested in the "Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities," NIOSH/OSHA/USCG/EPA, November, 1985. They recommend the area surrounding each of the work areas of potential chemical or biological hazard exposure to be divided into three zones; the exclusion or "Hot" zone, contamination reduction zone (CRZ), and the support zone.

1.1 **Exclusion Zone** Due to the scattered locations of the activities covered within the scope of most routine field activities, the actual zones are expected to change frequently in accordance with daily activities. Therefore, all exclusion zones are expected to be temporary or dynamic. Site personnel should be advised of the locations of temporary work zones as part of the routine site safety meetings.

Exclusion zones will typically consist of the active work areas where site investigations are taking place. A 15-foot (minimum) radius should be established as the perimeter of the zone, however, this may be increased as necessary in order to protect unprotected personnel from contact with potential exposure hazards that may arise from these operations. The perimeter of the zone should be marked with brightly colored hazard tape. All personnel entering these areas must wear the prescribed level of protective equipment.

1.2 **Contamination Reduction Zone** Contamination reduction zones are typically inside or immediately adjacent to the exclusion zone. The CRZ is where personnel begin the sequential decontamination process when exiting the exclusion zone. To prevent cross contamination and for accountability purposes, all personnel must enter and leave the exclusion zone through the CRZ.

1.3 **Support Zone** The support zone will typically be the area outside the exclusion zone and CRZ. Eating, drinking and smoking should be allowed only in this area.

2.0 **Decontamination** Proper decontamination is required of all personnel and equipment before leaving a contaminated area. All materials and equipment used for decontamination must be disposed of properly. Clothing, tools, buckets, brushes, and all other equipment that is contaminated must be secured in drums or other containers and labeled. Clothing not completely decontaminated on-site should be secured in plastic bags before being removed from the site.

2.1 **Personnel Decontamination** Personnel decontamination is typically accomplished by following a systematic procedure of cleaning and removal personal protective clothing (PPE). Contaminated PPE such as boots and face shields should be rinsed free of gross contamination, scrubbed clean in a detergent solution and then rinsed clean. To facilitate this, a three-basin wash system should be set up on site.

Respirators must be cleaned after each use with respirator wipe pads and will be stored in plastic bags after cleaning.

2.1.1 **Decontamination Sequence** Steps required will depend on the actual level of protection worn:

1. Remove and wipe clean hard hat

2a. Rinse boots and gloves of gross contamination

2b. Scrub boots and gloves clean

2c. Rinse boots and gloves

3. Remove outer "nuke" boots

4. Remove outer gloves

5. Remove tyvek coveralls

6. Remove respirator, wipe clean and store

7. Remove inner gloves

Boots that have been decontaminated can be worn into the support zone.

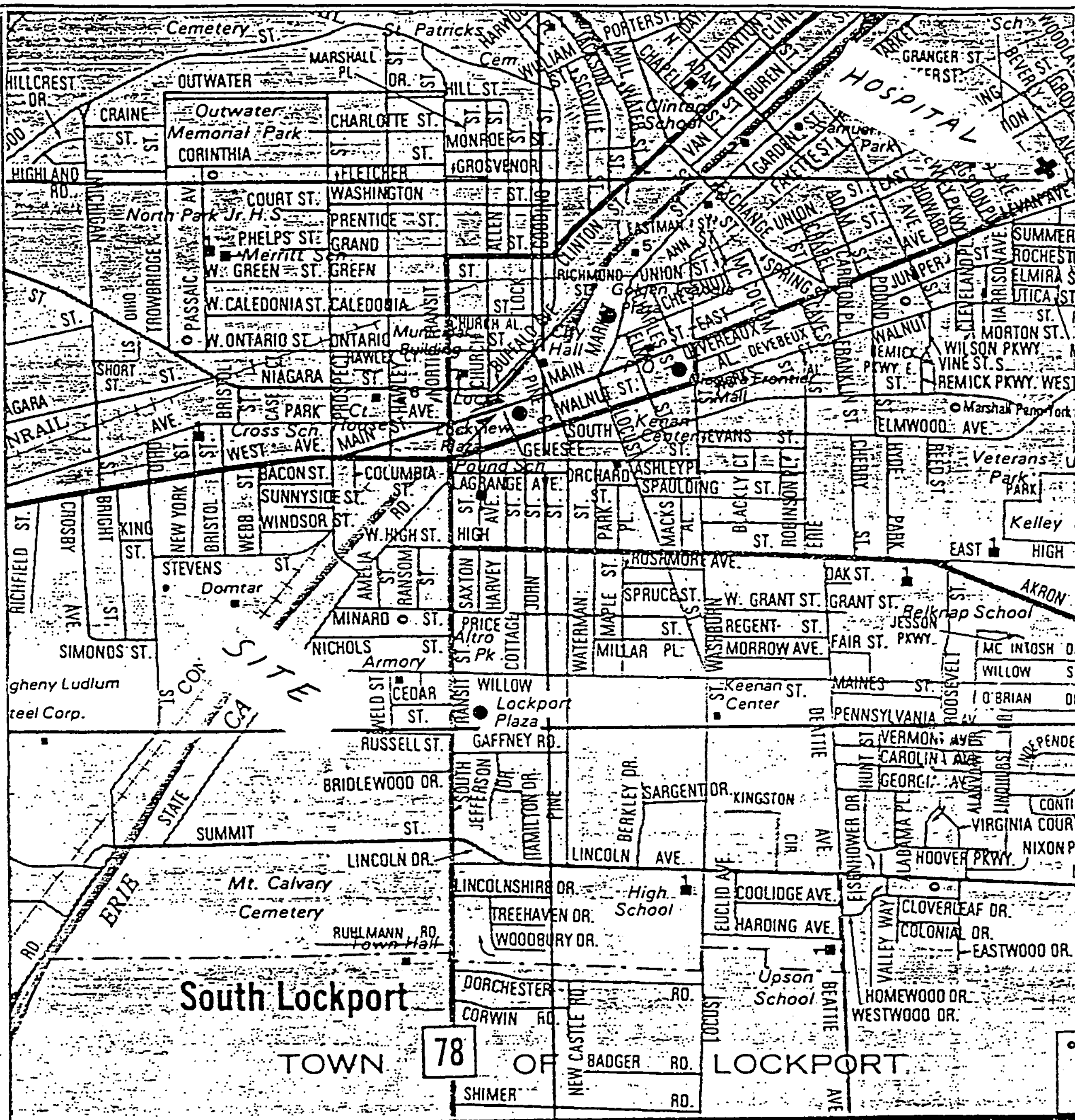
2.2 **Equipment Decontamination** Insofar as possible, measures should be taken to prevent contamination of sampling and monitoring equipment. Sampling devices become contaminated through normal usage, but monitoring instruments, unless they are splashed, usually do not. Once contaminated, instruments are difficult to clean without damaging them. Any delicate instrument which cannot be easily decontaminated should be protected while it is being used. It should be placed in a clear plastic bag, and the bag taped and secured around the instrument. Openings are made in the bag for sample intake and exhaust.

If solvents are used for decontamination of equipment all safety precautions specified on the manufacturer's warning label and MSDS must be observed. Solvents or rinsate generated during the decontamination process must be disposed of properly. *The use of solvent to clean skin is prohibited*!

Wooden tools are difficult to decontaminate because they absorb chemicals. At the end of the field activities, contaminated wooden tools should be discarded.

Drill rigs, trucks, backhoes, and other heavy equipment are difficult to decontaminate. The method generally used is to wash them with water under high pressure or to scrub accessible parts with detergent/water solution under pressure. Wash water from decontamination of augers and soil sampling equipment must be disposed of properly.

In some cases, shovels, scoops and augers may require steam cleaning. Particular care must be given to those components in direct contact with contaminants. Personnel doing the decontamination must be adequately protected for the methods used since these can generate contaminated mists and aerosols. *Appropriate respiratory protection and other PPE, must be worn during equipment decontamination procedures.*



Hospital: Lockport Memorial Hospital
521 East Ave
Lockport, NY

Phone: 911 or

Site: Diversified Manufacturing Inc
410 Ohio Street
Lockport, NY

GZA GeoEnvironmental of New York

DRAWN BY:

DATE: 7/20/93

SCALE IN FEET

Not to scale.

MAP to Hospital

PROJECT No.

FIGURE No. 1