

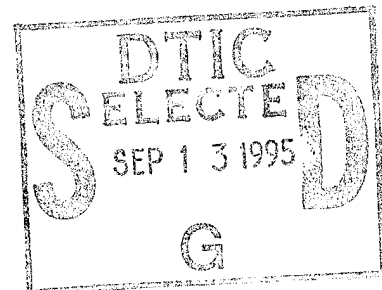
Report No. CG-D-15-95

## Condensed USCG Oil Spill Response Health and Safety Plans

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FINAL REPORT  
JUNE 1995



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Prepared for:

U.S. Coast Guard  
Research and Development Center  
1082 Shennecossett Road  
Groton, CT 06340-6096

and

U.S. Department of Transportation  
United States Coast Guard  
Office of Engineering, Logistics, and Development  
Washington, D.C. 20593-0001

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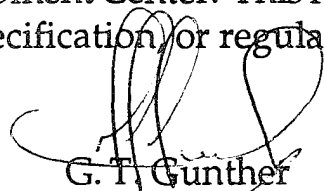
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1. Report No. CG-D-15-95		2. Government Accession No.		3. Recipient's Catalog No.	
4. Title and Subtitle Condensed USCG Oil Spill Response Health and Safety Plans				5. Report Date June 1995	
				6. Performing Organization Code	
7. Authors Kevin J. Beltis				8. Performing Organization Report No. R&DC 02/95	
9. Performing Organization Name and Address Arthur D. Little, Inc. Acorn Park Cambridge, MA 02140				10. Work Unit No. (TRAIS)	
				11. Contract or Grant No. DTRS-57-93-D-00026; TTD: VA-3209	
12. Sponsoring Agency Name and Address  U.S. Coast Guard Research and Development Center 1082 Shennecossett Road Groton, CT 06340-6096				13. Type of Report and Period Covered Final Report September 1993 to December 1994	
				14. Sponsoring Agency Code G-MEP	
15. Supplementary Notes Coast Guard R & D Center technical contact (COTR): Dr. Robert Hiltabrand, Ph.D., 203-441-2701. Contract Administrated by: U.S. Department of Transportation, Volpe National Transportation Service Center, 55 Broadway, Kendall Square, Cambridge, MA 02145					
16. Abstract  This report contains three separate sections under one cover to serve as a ready-to-use set of Safety and Health Plans (SHP) by the US Coast Guard (USCG) in response to a release of oil or other petroleum product. This document is designed to be separable in the field to assist the Site Safety and Health Officer in preparing the necessary documentation in the shortest possible time. This, in turn, should allow spill response personnel to access the site in a more timely fashion to mitigate the release and to help minimize any subsequent environmental damage. Part I of the document describes the USCG's general safety and health plans. Part II helps lead the designated Site Safety and Health Officer through the task of Site Assessment and Characterization. Part III acts as the basis for Site-specific Safety and Health Plans as required by the OSHA standard promulgated under 29 CFR 1910.120. The forms provided in Part II are to be used for Site Assessment and Characterization to supplement the generic plans provided in Part III, which then may be made Incident and Site-specific.					
17. Key Words USCG, Coast Guard, oil, petroleum, spill, release, health, safety, plans, characterization, assessment			18. Distribution Statement Document is available to the U.S. public through the National Technical Information Service, Springfield, Virginia 22161		
19. Security Classification (of this report) Unclassified		20. Security Classification (of this page) Unclassified		21. No. of Pages 103	22. Price

# METRIC CONVERSION FACTORS

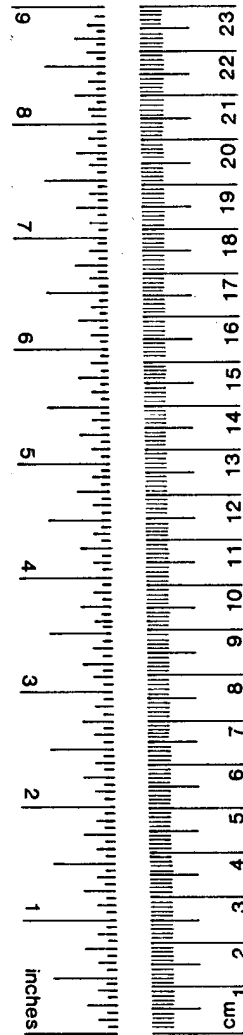
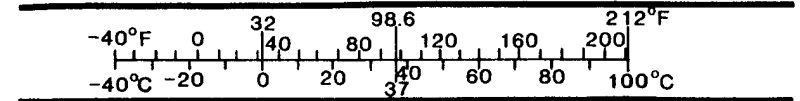
## Approximate Conversions to Metric Measures

Symbol	When You Know	Multiply By	To Find	Symbol
<b>LENGTH</b>				
in	inches	* 2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	miles	1.6	kilometers	km
<b>AREA</b>				
in <sup>2</sup>	square inches	6.5	square centimeters	cm <sup>2</sup>
ft <sup>2</sup>	square feet	0.09	square meters	m <sup>2</sup>
yd <sup>2</sup>	square yards	0.8	square meters	m <sup>2</sup>
mi <sup>2</sup>	square miles	2.6	square kilometers	km <sup>2</sup>
	acres	0.4	hectares	ha
<b>MASS (WEIGHT)</b>				
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons (2000 lb)	0.9	tonnes	t
<b>VOLUME</b>				
tsp	teaspoons	5	milliliters	ml
tbsp	tablespoons	15	milliliters	ml
fl oz	fluid ounces	30	milliliters	ml
c	cups	0.24	liters	l
pt	pints	0.47	liters	l
qt	quarts	0.95	liters	l
gal	gallons	3.8	liters	l
ft <sup>3</sup>	cubic feet	0.03	cubic meters	m <sup>3</sup>
yd <sup>3</sup>	cubic yards	0.76	cubic meters	m <sup>3</sup>
<b>TEMPERATURE (EXACT)</b>				
°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

\*1 in = 2.54 (exactly).

## Approximate Conversions from Metric Measures

Symbol	When You Know	Multiply By	To Find	Symbol
<b>LENGTH</b>				
mm	millimeters	0.04	inches	in
cm	centimeters	0.4	inches	in
m	meters	3.3	feet	ft
m	meters	1.1	yards	yd
km	kilometers	0.6	miles	mi
<b>AREA</b>				
cm <sup>2</sup>	square centimeters	0.16	square inches	in <sup>2</sup>
m <sup>2</sup>	square meters	1.2	square yards	yd <sup>2</sup>
km <sup>2</sup>	square kilometers	0.4	square miles	mi <sup>2</sup>
ha	hectares (10,000 m <sup>2</sup> )	2.5	acres	
<b>MASS (WEIGHT)</b>				
g	grams	0.035	ounces	oz
kg	kilograms	2.2	pounds	lb
t	tonnes (1000 kg)	1.1	short tons	
<b>VOLUME</b>				
ml	milliliters	0.03	fluid ounces	fl oz
l	liters	0.125	cups	c
l	liters	2.1	pints	pt
l	liters	1.06	quarts	qt
l	liters	0.26	gallons	gal
m <sup>3</sup>	cubic meters	35	cubic feet	ft <sup>3</sup>
m <sup>3</sup>	cubic meters	1.3	cubic yards	yd <sup>3</sup>
<b>TEMPERATURE (EXACT)</b>				
°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F



## Acknowledgements

This set of documents was developed for the United States Coast Guard under the Coast Guard Oil Spill Response Health and Safety Study contract through the Department of Transportation Contract No: DTRS-57-93-D-00026 with the Volpe National Transportation Service Center TTD No.: VA-3209.

The author gratefully acknowledges the assistance of the following individuals: Dr. Robert Hiltabrand, technical contact, USCG R&D Center, Groton, CT; and Mr. John Putukian, Technical Task Initiator at the Volpe National Transportation Service Center; Dr. Erich Gundlach of Arthur D. Little for his guidance and extensive experience in oil spill modeling and response technology, Mr. Corey Briggs of Arthur D. Little for providing guidance in OSHA HAZWOPER; Ms. Elizabeth Graham of Arthur D. Little for the toxicological review; and Ms. Michele Noble and Ms. Marie Dellovo of Arthur D. Little for their assistance in reviewing state specific requirements. In addition, we would like to thank the staff of G-ER and G-MEP for their time in reviewing the document and providing insightful comments which have been incorporated into the final document.

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## Preface

This document represents the U.S. Coast Guard's effort to provide a ready-to-use reference for the preparation of Health and Safety Plans for Oil Spill Response anywhere in the coastal waters of the United States including the Great Lakes and the inland waterways of the Mississippi and Missouri Rivers. As currently prepared, this document does not address spill from land based transportation such as tractor-trailer or rail car except as it may impact on waterways. OSHA's Hazardous Waste Operations and Emergency Response (HAZWOPER) Standard 29 CFR 1910.120 requires the U.S. Coast Guard to establish a Comprehensive General Program and Site-specific Safety and Health Plans (SHPs as referenced in Coast Guard documents) to allow for response to oil spills. For the purpose of consistency, this document uses the acronym SHP for Safety and Health Plans but it should be understood that the term and subject document are equivalent to the OSHA/EPA HASP.

The Comprehensive General Safety and Health Program required under 29 CFR 1910.120(b)(1) includes the following components:

### General Requirements:

- Organizational Structure,
  - Health and Safety Training Program,
  - Medical Surveillance Program,
  - Standard Operating Procedures for Safety and Health,
  - Coordination Procedures for Transition between the General Program and Site-specific Activities,
- ... and reference to the site-specific requirements.

### Site-specific Requirements

- Comprehensive Site-specific Work Plans
- Site-specific Safety and Health Plans (SHPs)

**This document is separated into three parts. Part I** details the requirements for the organizational authority's (U.S. Coast Guard) comprehensive general health and safety program. **Part II** assists the On-Scene Coordinator (OSC) and Site Safety and Health Officer (SSHO) in conducting the Site Assessment and Characterization at an oil spill and provides forms to document observations and help determine needs. **Part III** details the OSHA Post-Emergency Response phase requirements for the Coast Guard's Site-specific Safety and Health Plans (SHPs) and, when supplemented with incident specific information on the accompanying forms, may be used as the SHP for OSHA purposes. In addition, Appendix A discusses any state mandated differences from federally promulgated OSHA requirements.

Part III is written in very generic terms for conditions which may be encountered at a typical petroleum product release on the water. The text uses the terms *petroleum product*, *site or location*, *vessel or source*, and *date of release* highlighted in italicized text. These are meant as cues for the SSHO to substitute the generic term with information specific to the particular release to which he/she is responding. In

addition, site assessment and characterization guidance is provided in Part II with forms that may be used to assist in gathering pertinent information. The SSHO may need to provide additional information in the various sections as specific needs arise for a given response. The sections of the Safety and Health Plan in Part III are provided as a starting point and may suffice in many circumstances as the first draft document with site-specific data supplied by substituting the specific released petroleum product, location and date for the generic terms and other italicized text.

OSHA's authority to regulate health and safety standards for the protection of workers engaged in hazardous waste operations and emergency response was granted under section 126 of the Superfund Amendment and Reauthorization Act (SARA) of 1986. The regulations are codified under 29 CFR §1910.120 (effective March 6, 1990). While the standards apply to workers in various circumstances, the application in this protocol is focused on cleanup at uncontrolled hazardous waste sites as either a mandatory or voluntary action.

The SHP, required under 29 CFR §1910.120 (b), implements various components of the comprehensive plan on a site-specific basis. A given spill or release may result in several areas or sites becoming fouled to various degrees. While one site may experience coverage with an oil and water emulsion (i.e., mousse), which would likely contain some volatile organics, another site might be impacted by tar balls which present little hazard. The SHP prepared as a generic document for Part III of this report includes the paragraphs from 29 CFR §1910.120 indicated below. The background for the need of these sections is further discussed in Part I of this document (p. 12-14):

- Key personnel, responsibilities, and communications, ¶(b)(2);
- Health and safety risk analysis, ¶(b)(4);
- Confined space procedures, ¶(b)(9);
- Site control measures, ¶(d);
- Training assignments, ¶(e);
- Medical surveillance, ¶(f);
- Personal protective equipment, ¶(g);
- Area & employee air monitoring; ¶(h);
- Decontamination procedures, ¶(k);
- Emergency response plan, ¶(l);

The SHP also references 29 CFR §1910.120 Safety and Health Programs (per the appropriate paragraph listed below) which the Coast Guard are required to have in place in the event that they are needed. These Programs are not discussed in these documents in detail but are included by reference as USCG Programs. These Programs include the following :

- Information program, ¶(i);
- Spill containment program, ¶(j);
- Illumination program, ¶(m);
- Sanitation program, ¶(n);
- New technology program, ¶(o);

A Site Assessment and Characterization Task [29 CFR §1910.120(c)]; is required for the SHP but is necessarily conducted prior to completion of the SHP. Therefore, it has been included in this set of documents as a separate piece (Part II) with guidance for the Site Safety and Health Officer (SSHO) in collecting site-specific information.



There are three simple one page forms in Part II which the SSHO may fill out to help provide site-specific information used to supplement these generic ready-to-use Safety and Health Plans. The SHP provided may be adapted as necessary for specific sites or situations. The following areas are specifically not addressed in the Oil Spill Response Plan:

- Radioactive Materials as the scope of the spill response is limited to petroleum products, ...
- Biohazards, again, because the scope of the spill response is limited to petroleum products and although spill response may include bioremediation, the technique does not constitute a biohazard, and ...
- Drum Handling to the extent typically involved at HAZWOPER sites which would include unearthing, removal, sampling, and recovery. While there will be some drumming of recovered oil and response debris, these operations will not likely be as involved as at typical hazardous waste site operations.

The Coast Guard SHP is required to fulfill OSHA and EPA requirements for worker safety and health at areas impacted by an oil spill/release which OSHA has generically classified as "uncontrolled hazardous waste sites". The question as to whether petroleum products as generic "oils" are specifically regulated is widely debated. Generally at issue are several common components of "oils" which are specifically regulated such as benzene, toluene, ethyl benzene, xylenes (i.e., BTEX) and hydrogen sulfide among others. While the amount of the components varies from product to product and as a consequence of weathering of spilled product, the potential for exposure to these chemicals must be considered for all response workers and therefore drive the exposure mitigation issues. Other OSHA Standards which may apply under 29 CFR include the following which are further detailed in Appendix B:

- 1910.20 Access to Employee Exposure and Medical Records
- 1910.24 Fixed Industrial Stairs
- 1910.27 Fixed Ladders
- 1910.28 Safety Requirements for Scaffolding
- 1910.38 Employee Emergency Plans and Fire Prevention Plans
- 1910.94 Ventilation
- 1910.95 Occupational Noise Exposure
- 1910.101 Compressed Gases
- 1910.106 Flammables/Combustibles Storage
- 1910.132 Personal Protection Program
- 1910.133 Eye and Face Protection
- 1910.134 Respiratory Protection
- 1910.135 Occupational Head Protection
- 1910.136 Occupational Foot Protection
- 1910.141 Sanitation
- 1910.146 Confined Space Entry
- 1910.151 Medical Services and First Aid
- 1910.157 Fire Extinguishers
- 1910.165 Employee Alarm System
- 1910.181 Derricks

1910.212 General Requirements for all Machines  
1910.252 Welding, Cutting, and Brazing  
1910.307 Hazardous Locations  
1910.401 Subpart T - Commercial Diving Operations

1910.1000 Toxic and Hazardous Substances  
1910.1028 Benzene  
1910.1030 Blood-Borne Pathogens  
1910.1200 Hazard Communication

1926.20 General Safety and Health Provisions  
1926.21 Safety Training and Education  
1926.56 Illumination  
1926.58 Asbestos  
1926.59 Hazard Communication  
1926.151 Fire Prevention  
1926.152 Flammable and Combustible Liquids  
1926.200 Accident Prevention Signs and Tags  
1926.301 Hand Tools  
1926.400 Electrical General Requirements  
1926.401 Grounding and Bonding  
1926.651 Specific Excavation Requirements  
1926.652 Trenching Requirements

Other Standards:

1918.106 Protection Against Drowning (PFD's)  
1915.154 Lifesaving Equipment  
1917.95 Other Protective Measures

An additional regulation regarding any underwater diving operations falls directly under USCG jurisdiction (i.e., 46 CFR Subchapter V - Marine Occupational Safety and Health Standards, Part 197 - General Provisions, Subpart B - Commercial Diving Operations).

## Glossary/Abbreviations

ACGIH -- American Conference of Governmental Industrial Hygienists  
BBP -- Bloodborne Pathogens; refers to 29 CFR 1910.1030 transmittable disease exposure prevention  
BTEX -- refers to aromatic hydrocarbons: benzene, toluene, ethyl benzene, and xylenes  
Ceiling -- exposure limit; re: exposure hazard (e.g., chemical or noise)  
CFR -- Code of Federal Regulations, U.S.  
CHRIS -- Chemical Hazards Response Information System, USCG  
CSEP -- Confined Space Entry Permit, authorized by site safety officer or supervisor  
COTP -- Captain-of-the-Port  
CPC -- Chemical Protective Clothing  
DOE -- Department of Energy, U.S.  
DOD -- Department of Defense, U.S.  
DOI -- Department of Interior, U.S.  
DOL -- Department of Labor, U.S.  
DOT -- Department of Transportation, U.S.  
EPA -- Environmental Protection Agency, U.S.  
ERP -- Emergency Response Plan  
FOSC -- Federal On-Scene Coordinator  
HASP -- Site-specific Health and Safety Plan (EPA/OSHA terminology)  
HAZWOPER -- Hazardous Waste Operations, refers to 29 CFR 1910.120  
HHS -- US Department of Health and Human Services  
IDLH -- Immediately Dangerous to Life and Health, re: chemical exposure hazard  
LEL -- Lower Explosive Limit  
MEP -- Marine Environmental Protection (also G-MEP), a division of the U. S. Coast Guard  
MSDS -- Material Safety Data Sheet  
MSO -- Marine Safety Office, USCG  
NCP -- National Contingency Plan; 40 CFR Part 300  
NOAA -- National Oceanographic and Atmospheric Administration  
NRT -- National Response Team [for oil spills and hazardous materials]  
NFPA -- National Fire Protection Association  
NIOSH -- National Institute of Occupational Safety and Health, U.S. Dept. Health & Human Services  
OSC -- On-Scene Coordinator/Commander  
OSHA -- Occupational Safety and Health Administration, U.S. Dept. of Labor  
PAH -- polycyclic aromatic hydrocarbons or polynuclear aromatic hydrocarbons (PNA - see below)  
PE -- Preliminary Evaluation, refers to site characterization  
PEL -- Permissible Exposure Limits; OSHA, re: exposure hazard (e.g., chemical or noise)  
PFD -- Personal Flotation Device  
PNA -- polynuclear aromatic hydrocarbons, low volatility hazardous chemical (also PAH above)  
PPE -- Personal Protective Equipment  
PPM -- Part Per Million, re: concentration of a given chemical in air  
PTH -- Part Per Thousand, re: concentration of a given chemical in air  
RCRA -- Resource Conservation and Recovery Act (1976)  
REL -- Reasonable Exposure Limit, NIOSH, re: exposure hazard (e.g., chemical or noise)  
RRT -- Regional Response Team  
SARA -- Superfund Amendments and Reauthorization Act  
SCBA -- Self Contained Breathing Apparatus  
SHO -- Safety and Health Officer as designated by OSHA/EPA terminology  
SHP -- Site Safety and Health Plan, same as SSHP or HASP  
SSC -- Scientific Support Coordinator  
SSHO -- Site Safety and Health Officer or simply Site Safety Officer (USCG terminology)  
SSHP -- Site Safety and Health Plan (USCG terminology)  
SSHS -- Site Safety and Health Supervisor (USCG terminology)  
STEL -- Short Term Exposure Limit; OSHA, re: chemical exposure hazard  
TLV -- Threshold Limit Value; ACGIH, re: chemical exposure hazard  
TWA -- Time Weighted Average, re: exposure hazard (e.g., chemical or noise)  
UICS -- Unified Incident Command System  
USCG -- United States Coast Guard

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PART I - Comprehensive H & S Program

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Part I  
Comprehensive USCG Health and Safety Program for Oil Spill Response

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PART I - Comprehensive H & S Program

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## 1.0 GENERAL REQUIREMENTS

### THE GENERAL HAZWOPER PROGRAM

The Federal Government has designated any area impacted by released oil as an uncontrolled hazardous waste site and therefore requires any personnel responding to the release are subject to OSHA regulations under the hazardous waste operations (HAZWOPER) rule 29 CFR 1910.120. Due to the complexity of issues in conducting hazardous waste operations, four separate federal entities worked jointly to prepare a guidance manual to help define the issues. The resulting document prepared in 1985 by OSHA, EPA, NIOSH and the U.S. Coast Guard is titled *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Operations*. In addition, the US EPA has issued a separate document, *Standard Operating Safety Guides (SOGS)*,<sup>1</sup> to assist in understanding the preparation of the required Safety and Health Plans (SHP) and other documents. These documents are the principal sources of information in preparing the Coast Guard's generic health and safety plan.

To ensure worker safety and health at the onset of a post-spill cleanup, certain elements of the SHP (such as presented in Part III of this document) must be prepared in advance of the site entry. A typical outline of the principal elements which should be available are as follows:

- 1.0 Introduction
- 2.0 Key personnel/safety and health personnel
- 3.0 Task/operation safety and health risk analysis
- 4.0 Personnel training requirements
- 5.0 Personal protective equipment to be used
- 6.0 Medical surveillance requirements
- 7.0 Frequency and types of air monitoring
- 8.0 Site control measures
- 9.0 Decontamination plan
- 10.0 Emergency response/contingency plan
- 11.0 Confined space entry procedures
- 12.0 Spill containment and control program
- 13.0 Hazard communication
- 14.0 Animal handling
- 15.0 Illumination
- 16.0 Sanitation
- 17.0 New technology

These comprise the elements of the Site-specific Safety and Health Plan presented in Part III of this report.

## 1.1 Organizational Structures

### 1.1.2 NCP Unified Incident Command System

A national pollution reporting system under the Department of Transportation has generated a generic site safety/emergency response plan to assist in the event of an oil spill. The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) is promulgated under Protection of the Environment 40 CFR Part 300 to provide ready support to a chemical or oil release. The organization under the NCP is shown in Figure I. Responses may be handled through the Unified Incident Command System (Figure II) which makes provision for the logistical issues of responding to chemical and oil spills. The Plan provides for oil spill response implementation by pre-designating a U.S. Coast Guard Officer as the Federal On-scene Coordinator (FOSC or OSC). The principal contact for each Region or District is the USCG Marine Safety Office working through the Captain-of-the-Port (COTP) in coordination with other local response agencies such as local fire departments.

The U.S. Coast Guard uses guidance from the Unified Incident Command System (UICS) to meet its chain of command needs. Although not specifically adopted by the USCG, the UICS specifies the roles at each level of responsibility in responding to a spill including the health and safety program. Waterway spills are monitored by the Coast Guard's National Response Center located at U.S. Coast Guard Headquarters in Washington, D.C. Accessible by telephone 24 hours a day at 800-424-8802, the center provides access to chemical information and relays reports of spilled materials to proper authorities for response action. Upon determination of an oil release which impacts U.S. coastal or inland waters, the U.S. Coast Guard assumes principal government authority over the spill impact area.

The UICS provides for identification of the supervisor for all response activities, the on-scene coordinator; a deputy OSC or incident commander; a safety and health officer; a scientific support coordinator; health and safety supervisors; logistics coordinator; financial coordinator; and describes the responsibilities of all personnel engaged in the emergency response or HAZWOPER activities. The Coast Guard's system of command inherently describes lines of authority, communication, and coordination among personnel and "managers" or officers meeting OSHA's requirement for documentation of organizational structure.

### 1.1.2 USCG Incident Command System using the Unified Command Structure

As of the date of preparation of this document, the Coast Guard has not formally adopted the UICS but relies on its *Chain of Command* and uses the Unified Command Structure within the Incident Command System as indicated in Figure III. The Unified Command Structure provides for a coalition for command decisions to be made by the OSCs from each of three interested parties: the Federal Government, the state(s) impacted by the release, and the responsible party. Leaders will be chosen, as appropriate, from among these organizations to be responsible for various aspects of the response, (i.e., sections) to include: Finance, Logistics, Operations and Planning. The FOSC, in consultation with the other parties, will determine whether

the Coast Guard will direct the response effort or if the responsible party will direct the response given the proper resources.

In situations where the USCG is directing response operations, the Incident Commander will be designated from USCG command staff. The Section Leaders may be designated from the USCG, state or other government sources. Response is delineated as indicated in the Chain-of-Command below.

If the responsible party (RP) is know and taking appropriate action, the USCG has made allowances for the RP to direct the response operations by having it designate the Incident Commander and Section Leaders from its organization. The Unified Command, in this instance, acts to solves any problems identified by and provides strategic direction to the Incident Commander. The USCG may place personnel in the Incident Command's Staff to assist but they may not act as Section Leaders.

### **1.1.3 Chain of Command**

In the event of an oil spill, a Coast Guard Officer , typically the COTP, acts as the FOSC, during an oil spill as stipulated in the NCP 40 CFR part 300.120 paragraph (a)(1). The FOSC is responsible for incident management in accordance with the national contingency plan is the lead individual in spill area activities control. The FOSC's designated deputy serves as the on-site supervisor for USCG personnel.

Assisting the FOSC as the Incident Coordinator is the Deputy On-Scene Coordinator, typically from the District or Port Marine Safety Office. The Deputy OSC acts as the second to the FOSC and chairs the response "Command Staff" as indicated for the NCP in Figure II and detailed in Figure IV. The Command Staff are key personnel with specific responsibilities for site operations.

To assist the FOSC in meeting the HAZWOPER requirements, a Site Safety and Health Officer (referred by OSHA/EPA as the SHO and by the USCG as the SSHO or Site Safety Officer) must be designated to help ensure compliance with established requirements. The Coast Guard's SSHO is the single individual responsible for developing and implementing the Site-specific Safety and Health Plan (SHP). The duties of the SSHO include characterization of the site for specific hazards which may require compliance with various parts of the federal OSHA's regulations. An OSHA field representative is normally assigned to oversee any spill response under that authority. In addition, there may be regulations particular to a state or local government which require specific attention.

NOAA is responsible for assigning a Scientific Support Coordinator (SSC) to each of the Regional Response Teams. The SSC acts as an advisor to the FOSC to access and provide information on spill chemical characteristics and movement modelling. Which is also crucial for hazard assessment and risk analysis for the SSHO.

# National Response Team

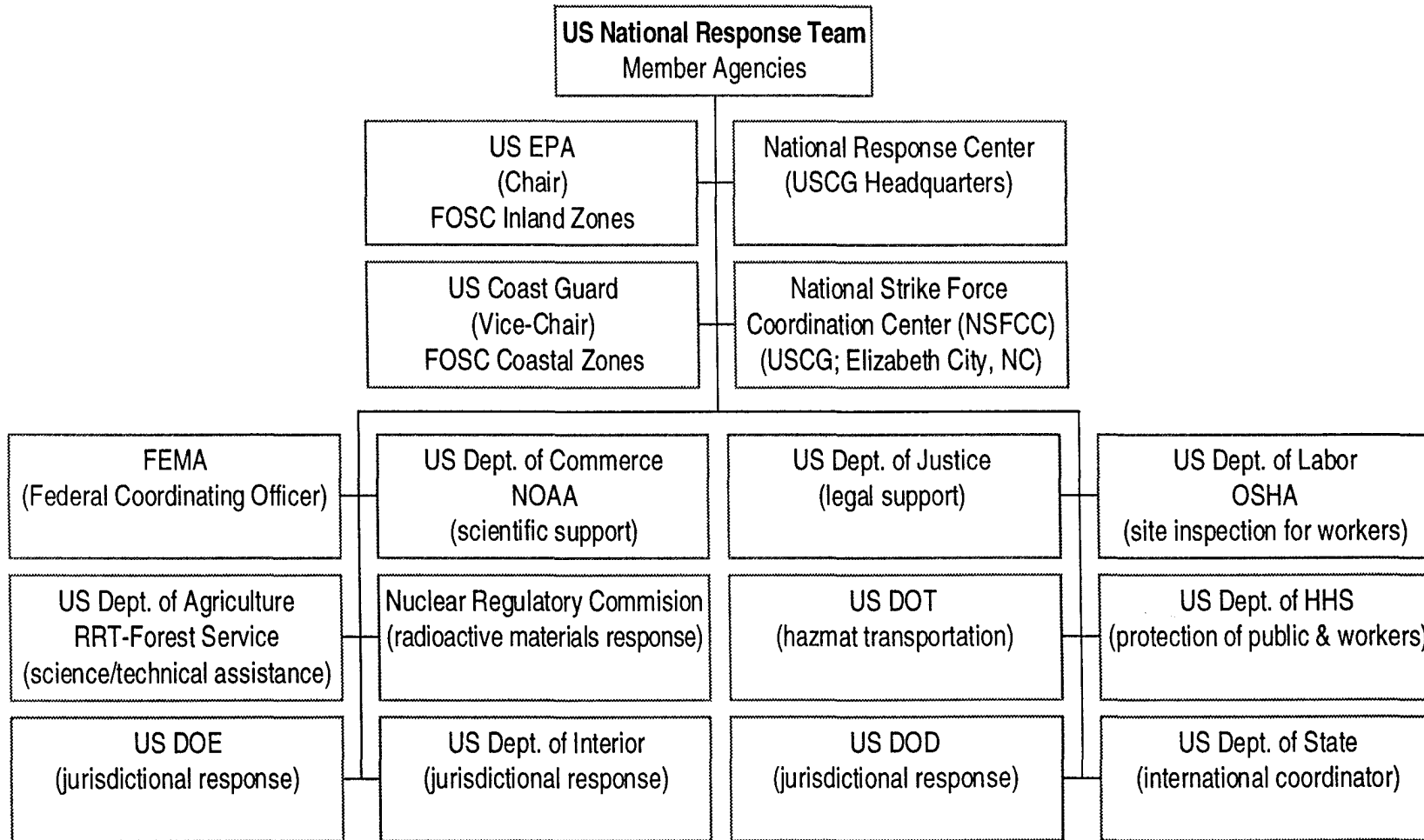


FIGURE I: National Response Team Organization

# Unified Incident Command System (UICS) Organization

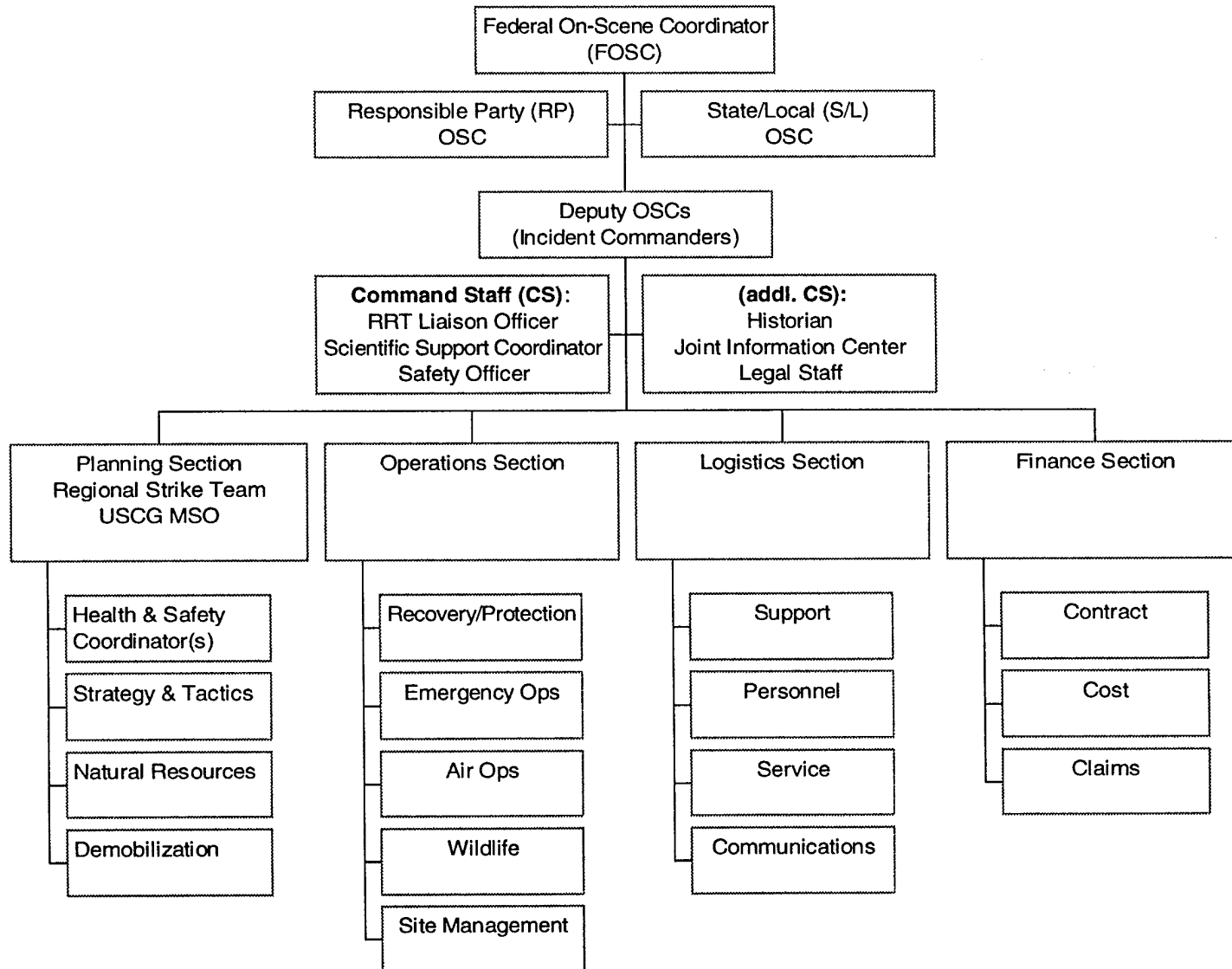


FIGURE II: NCP Unified Incident Command System (UICS) Organization

# Incident Command System Organization

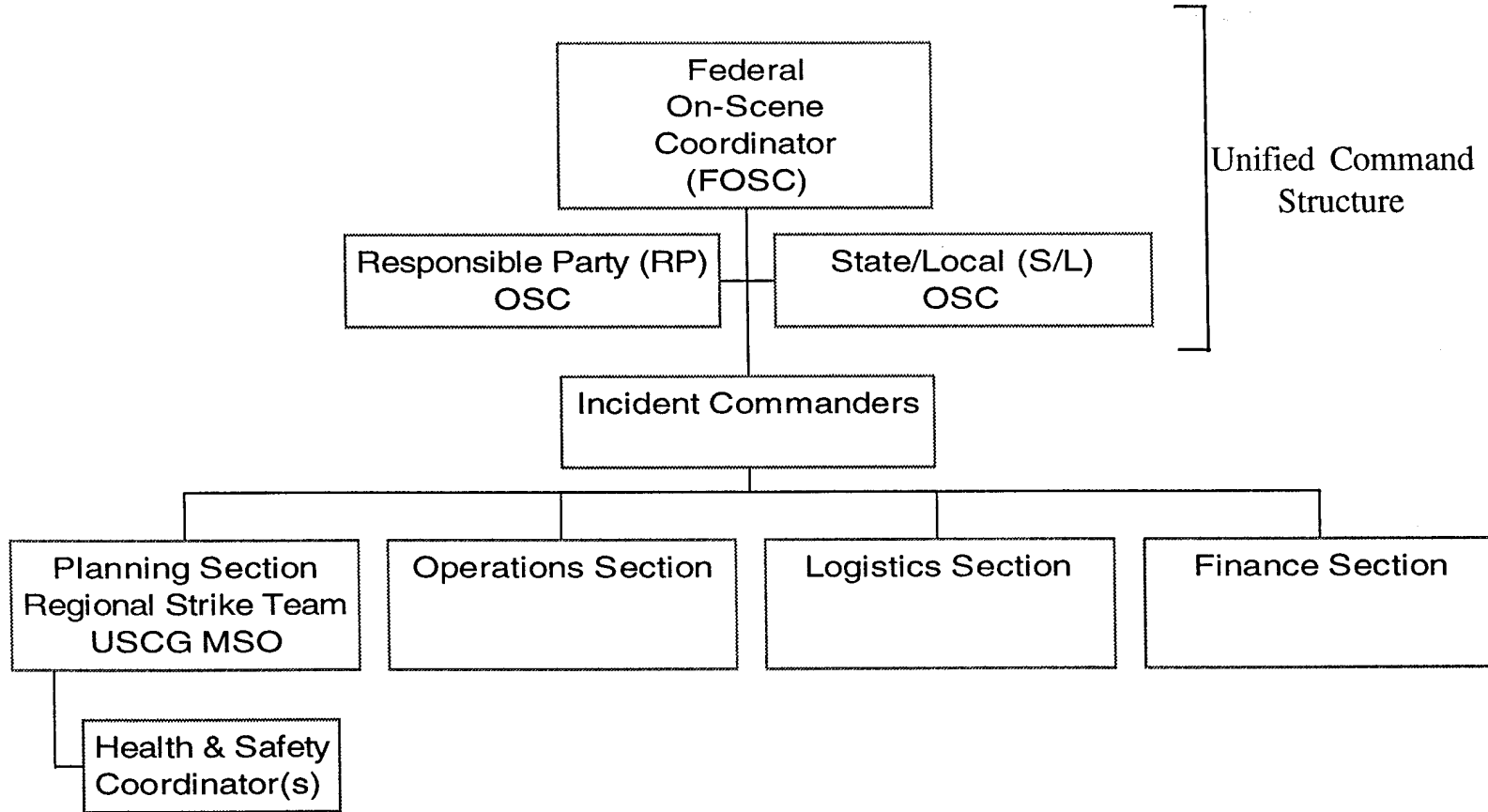
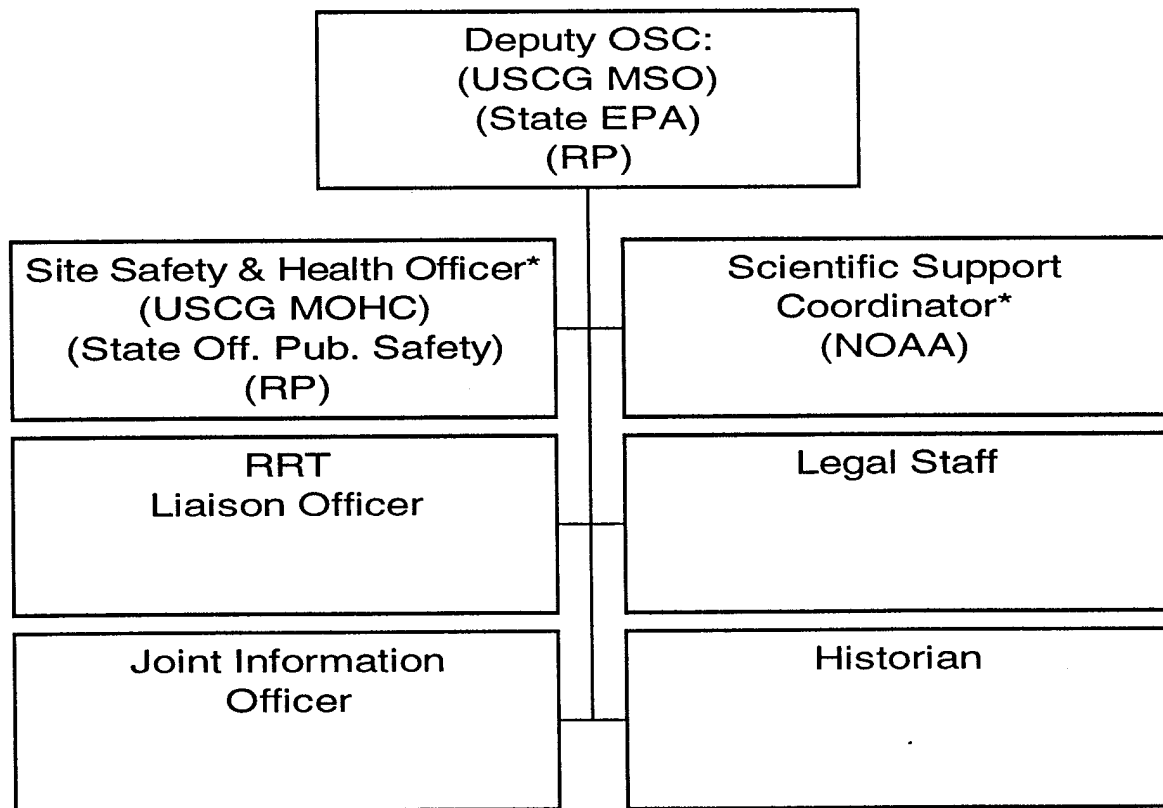


FIGURE III: USCG Incident Command System using a Unified Command Structure



# UICS Command Staff



\* - Direct access to the UCIS authorized.

FIGURE IV: NCP UICS Command Staff

Assisting the SSHO are the Site Safety and Health Supervisors (SSHSs) as required by 29 CFR 1910.120. The Site Safety and Health Supervisor, or simply the Site Safety Supervisor, is the individual in the field responsible for enforcing the SSHO's SHP as his designate. An SSHS is required to be on-site at all times while the SSHO may be with the FOSC or at other locations. Therefore, there are likely several SSHSs reporting to one SSHO. Depending upon the extent of a release, there may be several different areas, each requiring the assignment an SSHS. Further, if operations are conducted in shifts, several SSHS may be assigned to a given area.

In addition to the above roles, the Command Staff includes several other key personnel. A Joint Information Center with a Public Affairs Officer is charged with information dissemination to the public and media as appropriate. A Legal Staff reviews and advises the FOSC both on the Responsible Party's obligations and on the Government's authority. A Historian is designated to record all actions conducted in response to the spill and is responsible for providing updated information to all concerned parties on a daily basis. In addition, the system provides for a liaison with other agencies and interested parties on the Regional Response Team to ensure thorough communication to all concerned.

In addition to these U.S. Coast Guard supported roles, there are state and local representatives that may have similar duties for their jurisdictions and personnel from the Responsible Party's organization.

## **1.2 Health and Safety Training Program**

All individuals responsible for responding to an oil spill are required to meet the health and safety training requirements mandated in regulations [29 CFR §1910.120 (e) & (q)], unless otherwise stated by OSHA agreement. Federal OSHA generally has jurisdiction over Federal employees including the USCG personnel. Military personnel are generally held by the regulations of their Service. State, local, contractor and civilian personnel are held by either State or Federal programs dependant upon an individual State's status as having a Federally mandated State OSHA program as presented in Appendix A of this report. The amount of health and safety training required for each individual to respond to an oil spill will depend upon:

- the role of the individual,
- the degree of exposure expected to be encountered, and
- the type of operation (i.e., emergency vs. post-emergency response/cleanup).

Training of response personnel must be conducted by a qualified instructor and certified in writing upon completion. Proof of proper health and safety training will be required for each individual requesting entrance to the spill site. Proof of training should include:

- name of training class,

- hours of training received,
- dates of class environment instruction,
- signature of the administrator of the employer's health and safety program, and
- description of course material covered in class.

The initial training requirements for workers requiring on-site presence during the cleanup of uncontrolled hazardous waste sites and post-emergency response operations involving potential exposure to hazards is summarized below. There are no specific training requirements for employees with emergency response duties, however, they are required to be trained in accordance with the respective duties to be conducted. Section 4.0 of Part III of this report provides more complete detail.

- a. General Site Workers (e.g., equipment operators, laborers and supervisors) potentially exposed to concentrations greater than the permissible exposure limits (PEL) set by OSHA [Note: reference the table "Monitoring ... for Petroleum Components", p. 30-31] and/or individuals required to wear respirators in the performance of site activities - 40 hours off-site and three days (24 hrs) actual field experience under the supervision of a trained supervisor.
- b. General/Occasional Site Workers (e.g., field monitoring/surveying crews) potentially exposed to concentrations no greater than the PELs and/or individuals not required to wear respirators in the performance of site activities - 24 hours off-site and one day (8 hrs) actual field experience under the supervision of a trained supervisor.
- c. Management and Supervisors of Workers potentially exposed to concentrations greater than the PELs and/or individuals required to wear respirators in the performance of site activities - 40 hours off-site plus 8 hours specialized training and three days (24 hrs) actual field experience under the supervision of a trained supervisor.
- d. Management and Supervisors of Workers potentially exposed to concentrations no greater than the PELs and/or individuals not required to wear respirators in the performance of site activities - 24 hours off-site plus 8 hours specialized training and one day (8 hrs) actual field experience under the supervision of a trained supervisor.
- e. Allowance has been made for a reduced requirement in training for oil spill response under OSHA CPL 2-2.51 Post Emergency Response Operations for clean-up activities. The SSHO is responsible for maintenance of records and determining training requirements or level of duty based on training. Specifically for duties and responsibilities with a determined low magnitude of risk, the minimum training hours may be reduced to 4 hours as appropriate. The decision is made by the OSHA representative to the Regional Response Team (RRT) based upon evaluation of the cleanup operation as follows:

- i. it is the worker's first involvement in post-emergency or cleanup and it is unlikely the worker will be involved in future response activities,
- ii. cleanup is performed in an area that has been monitored and fully characterized by a qualified person indicating that exposures are presently, and can be expected to remain, below PELs and other published exposure limits, and
- iii. health risks from skin absorption are minimal.

The training curriculum for the four hour training course must include:

- emergency response plan/site safety plan,
- hazard communication,
- decontamination procedures,
- water safety,
- hypothermia,
- heat stress,
- safety hazard controls,
- personal protective equipment, and
- other safety training as appropriate.

- f. Employers are able to show, by documentation or certification, that an employee's work experience and/or training has resulted in training equivalent to that required in 29 CFR 1910.120(e) (or the superseding state program). The employer shall not be required to provide the initial training to such employees and shall provide a copy of the certification or documentation to the employee upon request.

#### *Special/Volunteer Cleanup Crews*

As appropriate, special volunteer groups, environmental groups, and vessels of opportunity may participate in the response and/or cleanup. These groups are typically identified in advance, have agreed to a limited participation, and are likely to volunteer assistance either on a solicited or unsolicited basis. As potential site workers, they must receive the training deemed appropriate by OSHA, typically the prerequisite 24 or 40 hours (or 4 hours if allowed) of off-site training unless released by OSHA and Coast Guard agreement. In addition, appropriate supervised field experience may be required to address the potential level of exposure to hazardous substances. The reduced levels of training would prohibit entry to areas in which the PELs may be exceeded or responders may be required to wear respirators during work activities.

#### *Annual Refresher Training*

Eight hours of refresher training is required annually for all site workers, managers, and supervisors under 29 CFR §1910.120(e). Failure to attend a refresher by the anniversary date may be interpreted to require repeating completion of initial training.

### *Recordkeeping*

The SSHO is expected to maintain a file of training records for all individuals involved in the subject response regardless of where the training occurred.

### *MEP Guidance*

The U.S. Coast Guard's MEP Group is currently working with OSHA to develop a set of training recommendations and document which implements the recommendations specifically for oil spill response. MEP, working with a Committee from the American Society of Testing and Materials (ASTM), recently produced the "U.S. Coast Guard Guidance for Health and Safety Training of Oil Spill Responders in the U.S. Coastal Zone" to help address the special circumstance encountered in oil spill response efforts. The "Guidance" document should be referenced for the latest recommendations.

## **1.3 Medical Surveillance Program**

HAZWOPER requires that the general program includes a detailed program for ensuring and monitoring the general health of workers conducting hazardous waste operations (i.e., medical surveillance). The medical surveillance program for USCG personnel is maintained by the Coast Guard's Marine Safety Offices. Specific or unique requirements for a given site are addressed in the Coast Guard SHP. The SSHO is responsible for enforcing the medical surveillance program. However, confidential medical records may only be maintained for review and qualification by trained and board certified medical professionals. The medical staff will be responsible for maintaining the confidentiality of particular information in the records and making recommendations for health qualification for the workers job function to the employer. The employer may be gain access to the confidential records only upon written approval by the employee.

## **1.4 Standard Operating Procedures**

To assist responders in conducting work in a safe and consistent manner, HAZWOPER requires the employer to establish standard operating procedures (SOPs). If approved, the procedures developed may be considered generic to a typical spill and addressed in the general program, specific procedures for a given site are addressed in the site-specific document, as appropriate. The FOSC is responsible for determining the work-site priorities and delegating authority for preparation of the SOPs. Examples of Safety and Health SOPs would be lifting heavy objects, animal recovery handling, and maintaining personal hygiene in contaminated environments. The Chemical Hazards Response Incident System (CHRIS)<sup>2</sup> contains several useful SOPs.

## **1.5 Coordination Procedures**

As all elements of the written safety program are not typically used in a given site-specific safety plan, HAZWOPER requires preparation of procedures to integrate the

elements of the comprehensive plan and a site-specific health and safety plan for which the SSHO is responsible. The SSHO shall review requirements for a specific site and integrate all pertinent sections.

## **2.0 SITE-SPECIFIC REQUIREMENTS**

### **2.1 Site-specific Work Plans**

HAZWOPER requires that the written Health and Safety Program specify that a comprehensive work plan will be developed for each site to evaluate the resources and the logistics needed to achieve the work objectives for site operations. The work plan identifies the anticipated cleanup activities as well as normal operating procedures. It should also establish implementation strategies for coordinating the training, informational, and medical surveillance programs of the general health and safety program.

The OSC's designate should evaluate the following topics in developing the work plan which must be reviewed by the SSHO for safety and health issues:

- Review the available information, including preliminary evaluations, initial entry, site photos and/or video, sampling and monitoring data and other site records;
- Define work objectives (e.g., booming, oil cleanup, animal recovery);
- Determine methods for accomplishing the objectives (e.g., sampling plans, defining alternative technologies);
- Determine personnel requirements;
- Determine the need for additional training;
- Determine equipment requirements.

### **2.2 Site-specific Safety and Health Plans (SHP)**

The SSHO, responsible for preparing the SHP required under 29 CFR §1910.120 (b)(4), implements various components of the comprehensive plan on a site-specific basis including the following as provided by SOGS<sup>1</sup>:

- Key personnel, lines of authority and communication, 29 CFR §1910.120(b)(2); *The SHP should include names of key personnel such as the Project Manager, Field Operations Leader, Site Supervisor, and the Site Health and Safety Officer, as well as their alternates. The SHP should also identify communication procedures and provide for briefings to be held before site activity is initiated. These meetings should be held at any time they appear necessary to ensure that employees are adequately apprised of the health and safety procedures to be followed at the site.*

PART I - Comprehensive H & S Program

- Health and safety risk analysis, 29 CFR §1910.120(b)(4) and (c);  
*Health and safety risk analyses should be established for each task and operation identified in the site-specific work plan. Discussion of these analyses should include identification of chemical contaminants, affected media, concentrations, and potential routes of exposure for use in risk analysis. The plan should also include safety risk analyses to address anticipated on-site operations and safety problems.*
- Confined space procedures, 29 CFR §1910.120 (b)(9);  
*If confined space entry is anticipated on-site, the SHP should describe procedures for entry into the confined spaces. Such procedures ensure the safety of site personnel who must enter areas where ventilation is insufficient to reduce contaminant concentrations or allow sufficient exchange of fresh air to maintain habitable oxygen levels. In addition, OSHA Standard 29 CFR §1910.146 requires the preparation and implementation of a Confined Space Entry Program requiring entry permit procedures. Reference is made to the USCG's Confined Space Entry Program for more complete information.*
- Site control measures, 29 CFR §1910.120(d);  
*The site control program in the SHP specifies the procedures that will be used to minimize employee exposure to hazardous substances before cleanup operations commence and during site operations. The program must be developed during the planning stages of a hazardous waste cleanup operation, and must be modified as any new information becomes available. The site control program should include a site map, designation of work zones, site communications, safety work practices, identification of the nearest medical assistance, and description of the "buddy system" for site operations.*
- Training assignments, 29 CFR §1910.120(e);  
*Training assignments ... address the employee's initial health and safety training, annual health and safety refresher training, on-the-job training, supervisory training, and first-aid and CPR training. Workers [are] prohibited from conducting field activities until they have completed training commensurate with their level of responsibilities.*
- Medical surveillance requirements, 29 CFR §1910.120(f);  
*The medical surveillance program is required for monitoring the health status of personnel who are potentially exposed to hazardous substances in the field and who wear respirators 30 days or more per year. It must include initial and periodic medical examinations, examinations upon termination of employment or transfer, and medical recordkeeping.*
- Personal protective equipment, 29 CFR §1910.120(g);  
*The SHP must describe the different PPE ensembles that will be used to address potential hazards during site activities. The SHP should also include or refer to a comprehensive PPE program that addresses site hazards, duration of site*

*activities, limitations of PPE during temperature extremes, PPE selection, maintenance, storage, and decontamination, and training for PPE use, inspection, and monitoring. PPE is to be worn only when engineering controls and work practices are insufficient to adequately protect against exposure. Reference should be made to the requirement for a respiratory protection program per 29 CFR §1910.134. The SHP's protective equipment information is provided in section 5 of Part III of this report Site-specific Safety and Health Plans. Reference is made to the USCG's Personal Protection Program for more complete details beyond what may be required for oil spill response.*

- Area and employee air monitoring, 29 CFR §1910.120(h);  
*The SHP must describe the employee air monitoring equipment and environmental sampling techniques and instrumentation that will be used on-site for evaluating potential exposure to contaminants that may result from site activities. The monitoring program must include initial (first) entry monitoring, periodic monitoring, and monitoring of high risk employees.*
- Spill containment program, 29 CFR §1910.120 (j);  
*The SHP [must] include any elements of the spill containment program that may be relevant to the site. and should provide procedures to contain and isolate the entire volume of any hazardous substance spilled in the course of a transfer, major spill, or an on-site release.*

Generally, the typical issues of drum handling (i.e., un-characterized wastes, mixed wastes, corrosive wastes, drum excavation, and explosive/shock sensitive wastes) will not be required for the intended use of these response plans for oil spills. Drum handling training to prevent injury to workers in moving drums, standards for storage, types of containers, containment structures and storage should be discussed as typically required per the following regulations: OSHA §1926; EPA regulations 40 CFR §264 and §265; and DOT regulations 49 CFR §171 through §178.

- Decontamination procedures, 29 CFR §1910.120 (k);  
*The SHP [must] include decontamination procedures, both for individuals and equipment on-site and in places where there is a potential for exposure to a hazardous substance. These procedures should explain how to minimize contact with the hazardous substances when [working in and] leaving a contaminated area [and how to safely remove contaminants and contaminated equipment prior to entering non-contaminated areas].*
- Emergency response plan, 29 CFR §1910.120 (l) and (q)(2);  
*The emergency response plan in the SHP must include a description of how anticipated emergencies would be handled at the site and how the risks associated with response would be minimized. The emergency response plan must be developed and implemented prior to beginning site operations.*



THE SHP SHOULD BE CONSIDERED A WORKING DOCUMENT WHICH IS UPGRADED AS MORE INFORMATION IS DETERMINED ABOUT A SITE. THE DOCUMENT SHOULD BE DATED AND GIVEN AN INITIAL DOCUMENT REVISION (e.g., 1.0) THEN UPGRADED AS REVISIONS ARE NECESSARY.

A preliminary site survey is typically conducted at the perimeter or by aircraft depending upon the size of the area to be reviewed. An initial draft of the SHP should be prepared followed by an initial site entry and monitoring (see Part II of this document). Based upon findings of the site entry the SHP may be revised and issued when better defined. The document is thus refined as more information is gathered.

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**PART II**  
**Oil Spill Site**  
**Assessment and Characterization**

PART II - Site Assessment & Characterization

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Part II  
Oil Spill Site Assessment and Characterization

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PART II - Site Assessment & Characterization

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## SITE ASSESSMENT/CHARACTERIZATION

### INTRODUCTION

Prior to preparation of the Site-specific Safety and Health Plans for any oil spill response, the spill location is to be characterized as completely as possible.

Characterization involves gathering as much information as possible and assessment of the anticipated scope of response and the potential hazards associated with the site. Site characterization is generally conducted as three distinct phases:

- A *preliminary evaluation* (PE) is conducted by the SSHO or his designate without actual entry onto the site or into the contaminated zones. Reconnaissance from the site perimeter or by fly-over is used to gather information about the extent of contamination and to determine any potential high hazard areas.
- Upon review of the PE, plans may be made for an *initial site entry* into the contaminated areas to conduct a closer inspection of site conditions and perform preliminary air monitoring to determine site work operability.
- Assessment of the site continues throughout the *spill response and remediation phases*. Monitoring continues to provide updated information for potential worker exposure to allow reduction or increase in personal protection as conditions indicate.

Site characterization is performed to identify specific site hazards and to determine the appropriate personal protective equipment (PPE) required. This characterization should include a preliminary evaluation, hazard identification, monitoring, and risk identification.

The preliminary evaluation (PE) must be performed by a qualified person prior to site entry in order to aid in the selection of PPE. Immediately following initial site entry, a more detailed evaluation is to be performed to identify specific site hazards and to further aid in the selection of PPE. All suspected conditions that are potential inhalation or skin absorption hazards, or any other hazards, that may be immediately dangerous to life and health (IDLH) are to be identified. In addition, the following information, to the extent available, should be obtained prior to site entry:

- Location and approximate size of site contamination,
- Description of the response activity or job task,
- Duration of planned activity,
- Site topography and accessibility,
- Safety and health hazards expected at the site,
- Pathways for dispersion of hazardous substance,
- Current status and capabilities of emergency response (ER) teams,
- Chemical and physical properties of the spilled petroleum product or any health hazards involved or expected at the site.

## 1.0 SPILL MODELING INFORMATION

To provide as much accurate, detailed information as possible to assess the potential hazards to the population resulting from the release of spilled oil, it is an imperative to gather as much information about the release: the chemical/material, the amount of material involved, and the environment into which the spill has occurred. This allows a quick characterization of the release and subsequently an assessment of the potential impact on the environment and hazards to response personnel and the general population. The modelling function is normally performed by the Scientific Support Coordinator (SSC) in preparing modelling information. A checksheet for compiling as much pertinent data regarding the spill as possible is provided in Figure I (Note: the forms may be photocopied as necessary).

The key components to characterizing and/or modelling a release of materials into the environment include the following:

- Material/Oil Type -- Does the material or any of its constituents create an immediate health or safety hazard to response personnel?
- Release Size/Rate -- What degree of response will be required to control the release?
- Release Location -- Is the release in a location that will likely impact the shoreline and/or populated areas?... and
- Weather/Sea Conditions -- What conditions are present that will affect the release, (e.g., bring the material closer to shore, increase evaporation of volatiles)?

### 1.1 Material/Oil Type

Classification of the petroleum product will aid in determining the relative hazard from the volatile components. Particular attention is paid to the aromatic hydrocarbons in particular benzene, toluene, and xylenes commonly referred to as BTX and to the polyaromatic hydrocarbons (PAHs). The classification of released product is typically made based on the specific gravity of the product into one of four groups as follows:

- Group I - Specific gravity < 0.8
- Group II - Specific gravity 0.8 - 0.85
- Group III - Specific gravity 0.85 - 0.95
- Group IV - Specific gravity > 0.95

The specific gravity is generally inversely proportional to the amount of volatile organics in the product and therefore an indication of risk of exposure to those constituents in the early phases of a release. As time passes the volatile components may be solubilized in the surrounding water and/or evaporated into the air. The material evaporated into the air is a potential risk to response personnel by inhalation and must be monitored. The specific gravity of the product should be immediately available from the shipper's manifest. If possible request a material safety data sheet (MSDS) from the shipper or a lot analysis of the product to determine the extent of



hazards present. A listing of typical petroleum products, extracted from the USCG's Chemical Hazards Response Incident System (CHRIS) Manual<sup>2</sup>, their specific gravities, and their Group designation is provided in Table I.

**TABLE I: Oil Type Designations**

Oil Type	Typical Specific Gravity	Group
Coal Tar	0.90 @ 20°C	IV
Crude	0.70-0.98 @ 15°C	I - IV
Diesel	0.841 @ 16°C	II
Fuel 1	0.81-0.85 @ 15°C	II
Fuel 1-D (light diesel)	0.81-0.85 @ 15°C	II
Fuel 2 (home heating)	0.879 @ 20°C	III
Fuel 2-D (medium diesel)	0.87-0.90 @ 20°C	III
Fuel 4	0.904 @ 15°C	III
Fuel 5	0.936 @ 16°C	III
Fuel 6 (bunker C)	~0.95 @ 15°C	IV
Gasolines	0.71-0.75 @ 15°C	I
Lubricating	0.902 @ 20°C	III
Motor	0.84-0.96 @ 15°C	II - IV
Penetrating	0.8961 @ 20°C	III
Road (liquid asphalt)	1.0-1.2 @ 25°C	IV

## 1.2 Release Size/Rate

The amount of material released also has a direct relationship to the potential risk for human exposure and environmental impact. The actual concern for environmental impact is addressed as a separate function from this health and safety document (e.g., Regional Response Team assessment by U.S. EPA). The size of the spill can be estimated by experienced response personnel, or by vessel documents. Methods to determine loss include monitoring the vessel's water displacement to determine weight/material discharge and if outfitted with cargo load/level sensors the loss can be calculated somewhat accurately. The size may be estimated in liters (L), cubic meters (M<sup>3</sup>), gallons (equals ~ 4L/gallon) or barrels (bbls, equal to 42 gallons/bbl) and if possible the rate at which material is being released (e.g., gallons/hr). The size of the spill may be classified in two categories less than (<) approximately 400 M<sup>3</sup> (< ~2500 bbls or ~100,000 gallons) or greater than (>) 400 M<sup>3</sup> (> 2500 bbls). Some private concerns are organized to handle the larger spills of 2500 bbls at sea. A spill of less than (<) 100,000 gallons might be considered a relatively small spill. Smaller spills are typically relegated to the local cooperatives for response.

### 1.3 Release Location

The location of the release will bear on the potential for the spill to impact on shorelines compounding environmental and clean-up issues. On the shore the material may concentrate and increase the potential hazard of exposure to wildlife, response workers, and the general population. Therefore, proximity of the release to the coastline will bear significantly on the potential for fouling of shoreline/population areas. In addition, there is an inverse proportion of concentration of volatile components to time from release and subsequently to the risk of vapor exposure hazard to response workers.

The spill location may be arbitrarily classified into three categories according to the likelihood of shoreline impact. Classification will assist in preparation of the spill model to determine the urgency of spill response and the requirements for response personnel. The following distances have been provided as guidelines but may be determined otherwise by the FOSC according to jurisdictional issues:

- Off-shore > 12 miles (shoreline not immediately threatened);
- Near-shore, 3-12 miles (shoreline impact possible); and
- Shoreline (inland waterways) < 3 miles (shoreline impact probable).

### 1.4 Meteorological / Sea Conditions

The meteorological and sea conditions at the time of the release will greatly influence the potential impact of the release. The key factors of weather and seas, as typically monitored by the SSC, are the following:

- Temperature (surface water and air)
- Solar Radiation (National Weather Service UV index)
- Wind (speed and direction)
- Precipitation
- Surface water conditions (sea height, tide, currents)

#### *Temperature/Solar Radiation*

Temperature and solar radiation directly affect the evaporation of the volatile components from released product. Higher temperatures and solar radiation increase the evaporation of the volatiles. These conditions also have an adverse impact on response workers, enhancing the potential for airborne releases, and an increased potential for heat exposure and sunburn. Inclusion of the National Weather Services UV Index data may aid modelling for evaporation and weathering.

#### *Wind*

Wind influences the evaporation of the volatiles from the released product. Wind acts to decrease the concentration of the volatiles in a localized area by dilution and mixing. This also works in the responders' favor to minimize exposure concentrations and provide a cooling environment in hot weather. Wind conditions could potentially create a problem in low temperatures with wind chills or bring in

higher concentrations of volatiles as might occur with an on-shore wind over an oil spill. With input from the SSC, the SSHO and SSHSs should pay particular attention to wind conditions and chemical monitoring to ensure worker safety.

#### *Precipitation*

Conditions of precipitation (e.g., rain or snow) may affect response operations and/or have an effect on the spilled material. While a light precipitation may have little bearing on the spill, a heavy rain or snow would hamper efforts to respond to a spill effectively. In assessing the site conditions, the SSHO should take into account increased physical hazards from slips, trips, and falls on slippery surfaces and stress these concerns during daily briefings or tailgate meeting.

#### *Surface Conditions*

Surface conditions impact spill response in several ways. Heavy sea conditions will act to help break up a spill slick and enhance removal of many of the product components by mixing action and dilution with the water. However, these conditions make any containment and cleanup response extremely hazardous and all but negate any recovery operations. Heavy seas warrant additional attention to worker safety for individuals working on or near the water. Calm conditions enhance recovery operations but may increase the chance of exposure to the volatiles. Tides and surface currents should be monitored by the SSC to determine shoreline impact. The SSHO and SSHSs should remain aware of the product release's movement to assure adequate protection of responders.

As noted on the Site Characterization/Assessment Checksheet, the thickness of an oil slick may be approximated by its appearance and has been incorporated here for convenience to calculate the volume of oil spilled and help indicate the level of response required. As the thickness of the oil slick tends to thin as it spreads from the source, it is likely that a thickness gradient will be noted with increased distance from the source. With time, volatiles will likely evaporate and the residual oil may amass, congeal, and form mousse or tar. The accounting of noted discrete zones associated with the varied thickness may be combined to provide a comprehensive estimate of the spill size. Noting the location of oiled zones will be useful in attempting collection or mitigation techniques, some of which require a minimum thickness for effective action; for example, the option for in-situ burning would require a minimum oil slick thickness of 2 mm to operate effectively. Exxon's Oil Spill Response Field Manual<sup>3</sup> notes the following correlation of visible characteristics and slick thickness:

- Barely visible under optimum condition      0.00005 mm
- Silvery sheen      0.0001 mm
- Bright rainbow      0.0003 mm
- Dull colors      0.001 mm
- Yellow-brown slick (from aircraft)      0.01 mm
- Light brown or black (from aircraft)      0.1 mm
- Thick dark brown or black (from aircraft)      1 mm
- Near source      10 mm

PART II - Site Assessment & Characterization

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### FIGURE I: Oil Spill/Release Model Information

Site Assessment/Characterization Checksheet for (Location) \_\_\_\_\_

Date: M \_\_\_ / D \_\_\_ / Y \_\_\_ [PHOTOCOPY AS NECESSARY] Compiled by \_\_\_\_\_

<b>A. Oil Types</b>	Cargo Product Type/Name _____			
Petroleum Product Group Designation (Specific Gravity)	Group I (<0.8) <input type="checkbox"/>	Group II (0.8-0.85) <input type="checkbox"/>	Group III (0.85-0.95) <input type="checkbox"/>	Group IV (>0.95) <input type="checkbox"/>

<b>B. Spill Size &amp; Rate</b>				[Check all appropriate sections to provide the best estimate of spill size]
<b>Volume</b>	< -400 M <sup>3</sup> (<2500 bbls) <input type="checkbox"/>		> -400 M <sup>3</sup> (>2500 bbls) <input type="checkbox"/>	
<b>Release Rate</b>	<~1.6 M <sup>3</sup> /hr (< 10 bbls/hr) <input type="checkbox"/>	~1.6~16 M <sup>3</sup> /hr (10 - 100 bbls/hr) <input type="checkbox"/>	>~16 M <sup>3</sup> /hr (> 100 bbls/hr) <input type="checkbox"/>	

<b>Slick Size</b>		<i>Slick Area(s)</i>				
CHECK BEST AREA ESTIMATE FOR EACH		<100 M <sup>2</sup>	100-10,000 M <sup>2</sup>	10,000-1,000,000 M <sup>2</sup> (<1 km <sup>2</sup> )	1-4 km <sup>2</sup> (< 1 sq. mile)	> 4 km <sup>2</sup> (> 1 sq. mile)
Appearance [Thickness]		(Approximate Volumes Represented for Each Thickness-Volume pair are Indicated Below)				
Barely Visible (optimum conditions)	[0.00005 mm]	<input type="checkbox"/> (<5 mL)	<input type="checkbox"/> (5-500 mL)	<input type="checkbox"/> (0.5-50 L)	<input type="checkbox"/> (50-200 L)	<input type="checkbox"/> (>200 L)
Silvery Sheen	[0.0001 mm]	<input type="checkbox"/> (<10 mL)	<input type="checkbox"/> (10-1000 mL)	<input type="checkbox"/> (1-100 L)	<input type="checkbox"/> (100-400 L)	<input type="checkbox"/> (>400 L)
Bright Rainbow	[0.0003 mm]	<input type="checkbox"/> (<30 mL)	<input type="checkbox"/> (30-3000 mL)	<input type="checkbox"/> (3-300 L)	<input type="checkbox"/> (0.3-1.2 M <sup>3</sup> )	<input type="checkbox"/> (>1.2 M <sup>3</sup> )
Dull Colors	[0.001 mm]	<input type="checkbox"/> (<100 mL)	<input type="checkbox"/> (0.1-10 L)	<input type="checkbox"/> (10-1000 L)	<input type="checkbox"/> (1-4 M <sup>3</sup> )	<input type="checkbox"/> (>4 M <sup>3</sup> )
Yellow-Brown Slick (from aircraft)	[0.01 mm]	<input type="checkbox"/> (<1 L)	<input type="checkbox"/> (1-100 L)	<input type="checkbox"/> (0.1-10 M <sup>3</sup> )	<input type="checkbox"/> (10-40 M <sup>3</sup> )	<input type="checkbox"/> (>40 M <sup>3</sup> )
Light Brown or Black Slick (from aircraft)	[0.1 mm]	<input type="checkbox"/> (<10 L)	<input type="checkbox"/> (10-1000 L)	<input type="checkbox"/> (1-100 M <sup>3</sup> )	<input type="checkbox"/> (100-400 M <sup>3</sup> )	<input type="checkbox"/> (>400 M <sup>3</sup> )
Thick Dark Brown or Black (from aircraft)	[1 mm]	<input type="checkbox"/> (<100 L)	<input type="checkbox"/> (0.1-10M <sup>3</sup> )	<input type="checkbox"/> (10-1000 M <sup>3</sup> )	<input type="checkbox"/> (1000-4000 M <sup>3</sup> )	<input type="checkbox"/> (>4000 M <sup>3</sup> )
Near Source	[10 mm]	<input type="checkbox"/> (<1000 L)	<input type="checkbox"/> (1-100 M <sup>3</sup> )	<input type="checkbox"/> (100-10,000 M <sup>3</sup> )	<input type="checkbox"/> (10,000-40,000 M <sup>3</sup> )	<input type="checkbox"/> (>40,000 M <sup>3</sup> )

<b>C. Spill Location</b>	Off-Shore (>12 miles) or Shoreline Impact Unlikely <input type="checkbox"/>	Near-Shore (3-12 miles) or Shoreline Impact Possible (not imminent) <input type="checkbox"/>	Waterways/Shoreline (<3 miles) or Shoreline impact probable (imminent) <input type="checkbox"/>	Inland (no direct connection to waterways) <input type="checkbox"/>		
Latitude _____			Miles of Shoreline Impacted _____	Area Impacted by Oil _____		
Longitude _____						
<b>Spill Movement</b> (Component)	Temperature C°	<b>Current</b>		<b>Tide Time</b>		<b>Wave Height (ft.)</b>
		Direction	Speed	Next High	Height	
Weather Conditions	Air					
Water Conditions	Surface Water					

<b>D. Weather Conditions</b>	Solar Radiation (NWS UV Index or % Cloud Cover) NWS UV Index _____ % Cloud Cover _____	Visibility	Relative Humidity/Precipitation R.H. _____% FOG / RAIN / FR. RAIN / SNOW
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## SPILL RESPONSE INCIDENT DOCUMENTATION

### INITIAL CALL

Call Received by: \_\_\_\_\_; Date: \_\_\_\_\_; Time: \_\_\_\_\_  
(Name/Organization)

Carrier/Responsible Party (RP): \_\_\_\_\_; Material Released: \_\_\_\_\_

Spill/Release Location: \_\_\_\_\_  
(Municipality or other designator)

Impact Location: \_\_\_\_\_  
(Municipality or other designator)

Incident Description: \_\_\_\_\_  
\_\_\_\_\_

### REGIONAL RESPONSE TEAM

Designated Officials from Incident Command System:

Federal On-Scene Coordinator: \_\_\_\_\_; Deputy On-Scene Coord.: \_\_\_\_\_

Safety Officer: \_\_\_\_\_; Scientific Support Coord.: \_\_\_\_\_

RRT Liaison: \_\_\_\_\_; Historian: \_\_\_\_\_

Legal Advisor: \_\_\_\_\_; Information Center Liaison: \_\_\_\_\_

Nat. Pollution Fund Case Officer: \_\_\_\_\_; BOA Contract Supervisor: \_\_\_\_\_

Site Safety & Health Supervisors: \_\_\_\_\_

### KEY ON-SCENE PERSONNEL

#### Public Sector

State/Local OSC: \_\_\_\_\_; Agency: \_\_\_\_\_; Telephone ( ) \_\_\_\_-\_\_\_\_

Fire Dept.: \_\_\_\_\_; Agency/Municipality: \_\_\_\_\_; Telephone ( ) \_\_\_\_-\_\_\_\_

Police: \_\_\_\_\_; Agency/Municipality: \_\_\_\_\_; Telephone ( ) \_\_\_\_-\_\_\_\_

Fed./State OSHA Rep.: \_\_\_\_\_; Telephone ( ) \_\_\_\_-\_\_\_\_; Local EMS Tel. ( ) \_\_\_\_-\_\_\_\_

Nearest Medical Facility: \_\_\_\_\_; 911 Available?:  Yes  No;

#### RP Reps.

OSC: \_\_\_\_\_; Deputy OSC: \_\_\_\_\_; Telephone ( ) \_\_\_\_-\_\_\_\_

Safety Officer/Supervisor(s): \_\_\_\_\_; Telephone ( ) \_\_\_\_-\_\_\_\_

### WORK ACTIVITY/RESPONSE PLAN

SITE DESIGNATION: \_\_\_\_\_ DATE: \_\_\_\_\_

RESPONSE PHASE (Check One):  Emergency  Post-Emergency

#### WORK PLAN

Activity Supervisor(s): \_\_\_\_\_

Safety Supervisor(s): \_\_\_\_\_

Planned Activity Duration: \_\_\_\_\_

Work Designation and Number Required: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Activities Description(s): \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Potential Hazards: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Monitoring Required: \_\_\_\_\_

\_\_\_\_\_

Personal Protective Equipment: \_\_\_ Level C; \_\_\_ Other Level (A, B, D): Describe: \_\_\_\_\_

\_\_\_\_\_



## 2.0 AIR MONITORING

Air monitoring is crucial to identifying potential risk of hazardous atmospheres which may be produced by the components of the spilled petroleum product. Issues of concern are the emanation of toxic atmospheres, combustion of flammable or explosive atmospheres, and or formation of oxygen deficient atmospheres.

When the site evaluation indicates potential hazards such as indicated in Table II (e.g., exposure levels designated as immediately dangerous to life and health - IDLH), conditions of the significant health issues resulting from the presence of oil components (e.g., benzene, toluene, ethyl benzene, xylene or hydrogen sulfide), or when the site information is not sufficient to eliminate these possible conditions, the following monitoring must be conducted as directed by the SSHO or his designate:

- Monitor the air with appropriate direct reading equipment, such as organic vapor analyzers, combustible gas meters, detectors, tubes, etc.,
- Observe for signs of exposure to IDLH or other dangerous conditions, for example, biological indicators such as dead fish, vegetation, or other affected wildlife, and
- Implement an ongoing air monitoring program upon the determination by site characterization that the site is safe for start-up of operations.

Once the specific hazards present and their respective concentrations have been identified, risk assessments are to be performed by the SSHO or his designate to identify the risks associated with these substances. The following risks should be considered:

- Exposures exceeding the OSHA permissible exposure limits (PELs) or American Conference of Governmental Industrial Hygienists (ACGIH) threshold limit values (TLVs) of the hazardous oil components, not necessarily of the oil per se,
- IDLH concentrations of the oil components,
- Potential skin absorption and irritation sources,
- Potential eye irritation sources,
- Explosion sensitivity and flammability ranges, and
- Oxygen deficiency.

Sources of information regarding toxicity and exposure concentration levels include the CHRIS Manual<sup>2</sup> and Chemical Data Guide for Bulk Shipment by Water<sup>4</sup>, the ACGIH Threshold Limit Values Booklet, Mine Safety Appliance, Inc.'s annual catalog of respiratory protection supplies, the NIOSH/OSHA Occupational Health Guidelines for Chemical Hazards and the associated pocket guide.

### *Additional Monitoring*

In addition to the monitoring required for initial site characterization, periodic monitoring of the suspected hazardous components must also be performed when the possibility of an IDLH condition or flammable atmosphere has developed or when

there is indication that exposure may have risen above PELs. The following situations qualify as possibilities of increased exposures and require monitoring:

- When work begins on a different portion of the site,
- When contaminants other than those previously identified are being handled,
- When workers are handling leaking drums or containers, or
- When a different type of operation is initiated.

Finally, during the clean-up phase, when soil, sand, water, or containers are moved or disturbed, those workers who are most likely to have the highest exposures to hazardous substances and health hazards likely to be present above PELs must be monitored. Personal sampling is to be used to characterize worker exposures.

#### *Frequency*

The frequency of monitoring and choice of candidates for personnel monitoring are dependent upon conditions present at any given time and at the discretion of the SSHO to provide a level of confidence to response workers that they are free of significant health risk from exposure to hazardous oil components. Records of area and personal monitoring are maintained by the SSHO to provide evidence of work environment, copy of which will be made available at an employee's request.

## **2.1 Chemical Exposure**

Among the greatest concerns a spill response Safety and Health officer has to face is the potential exposure of response personnel to hazardous concentration of chemical by inhalation (typically the most common and most severe route of exposure), absorption, ingestion, or injection (i.e., exposure to blood stream through cuts or other wounds). As the production of petroleum products are so widespread and therefore typically well documented per regulatory requirements, the list of hazards are easily referenced in general terms. The issues associated with typical commercial petroleum products are summarized in the following sections.

### **2.1.1 Chemical Compounds of Concern**

A candidate list of specific petroleum product components was selected based on the following criteria: abundance in petroleum products, human exposure potential, toxicity to humans, and regulatory impact. Components that are most often present in the highest concentrations in petroleum are considered as potentially posing the greatest exposure potential in terms of inhalation, skin, and eye exposure.

Components that have a high vapor pressure could result in an inhalation exposure, the fastest acting route of exposure. Because chemicals with a high vapor pressure (e.g., benzene, n-hexane) tend to evaporate quickly following a spill and diminish rapidly with weathering, the most significant risk of inhalation exposure to such components would occur during the first hours of a spill.

The candidate list of compounds includes semi-volatile components with relatively low vapor pressures. Although exposure to these components may be minimal from an inhalation standpoint, dermal exposure may be significant. For some of these

components (e.g., the polynuclear aromatic hydrocarbons - PAHs), skin exposure has been associated with carcinogenic effects. The list of the compounds most commonly considered for monitoring in petroleum spills are as follows:

Volatile Aromatic Hydrocarbons: Benzene (UN1114), Trimethyl Benzene (UN2325), Toluene (UN1294), Ethylbenzene (UN1175), Xylenes (o-, m-, p-) (UN1307).

Volatile Aliphatic Hydrocarbons: Butane (UN1011), n-Hexane {isomers} (UN1208), n-Heptane (UN1206), Octane (UN1262), Nonane (UN1920), Cyclohexane (UN1145), Methylcyclohexane (UN2296), Pentane (UN1265), Cyclopentane (UN1146).

Semi Volatile PAHs: Naphthalene (UN1334/2304), Phenanthrene, benzo(a)pyrene, Benz(a)anthracene, Benzo(b)fluoranthene, Chrysene.

Other: Diesel Exhaust, Hydrogen Sulfide (UN1053), Oil Mist, Lead (tetraethyl- (UN1649), tetramethyl-).

The toxic effects associated with components on the candidate list range from irritation to carcinogenicity. Most of the more volatile aromatic and aliphatic hydrocarbons are associated with irritation of the eyes, nose and throat and central nervous system (CNS) effects including giddiness, headache, nausea, and confusion. Some of the components selected, including many of the PAHs, are known or suspected carcinogens. When available, the Environmental Protection Agency (EPA) and the International Agency for Research on Cancer (IARC) carcinogenicity classification has been provided for each component.

All of the components included in the candidate list have Permissible Exposure Limits (PELs) and/or short term exposure limits (STELs) developed by the Occupational Safety and Health Administration (OSHA). Only one component, benzene, is regulated by a substance-specific OSHA standard (29 CFR 1910.1028). This standard outlines specific provisions that include medical surveillance for employees who may be exposed to benzene at or above the PEL for 10 or more days per year, or are exposed to benzene at or over the "action level" of 0.5 ppm (i.e., one half the PEL) for 30 or more days per year and information and training for all employees exposed above the action level.

For each petroleum component, the NIOSH monitoring method reference has also been tabulated. "Real-time" monitoring methods as currently available are also included. Space is provided in Table II for notation of solid sorbents techniques.

### **2.1.2 Worker Protection and NIOSH Methodology**

The Department of Health and Human Services (HHS) is responsible for providing assistance on matters related to assessment of health hazards at a response and protection of both response workers and the public health. The National Institute for Occupational Safety and Health (NIOSH) has been given responsibility under HHS to support R&D programs which further the safety and health needs in the workplace. The Department of Labor (DOL) is responsible for providing assistance on matters related to the protection of workers. Under DOL, the Occupational Safety and Health Administration (OSHA) has authority to conduct safety inspections of hazardous waste sites to ensure that employees are being protected and to determine compliance

with applicable OSHA regulations. For worker exposure issues, NIOSH prepares a list of recommended exposure limits (REL) based upon current research and guidance from the American Conference of Governmental Industrial Hygienists (ACGIH). These recommendations may be adopted by OSHA as federally enforceable permissible exposure limits (PEL). The potential for exposure to hazardous chemical atmospheres may be determined by one of several different types of methods. Limits of exposure may be expressed in several ways as summarized below:

- PEL -- Permissible Exposure Limit, OSHA legally enforceable exposure limit;
- REL -- Recommended Exposure Limit, NIOSH recommended exposure limit;
- TLV -- Threshold Limit Value, ACGIH recommended limit of exposure to which a worker may be repeatedly exposed without adverse effects;
- TWA -- Time Weighted Average, recommended TLV exposure as averaged over a typical work cycle (e.g., eight-hour workday and 40-hour workweek);
- Ceiling -- the TLV concentration not to be exceeded as a single exposure during the workday as determined by real-time monitoring or by 15 minute sampling;
- STEL -- Short Term Exposure Limit, the exposure concentration TLV for 15 minutes four times during an eight hour shift; and
- IDLH -- Immediately Dangerous to Life or Health, concentration indicated to pose an immediate treat.

### 2.1.3 Real-Time Monitors

Field portable instruments are best for providing real-time data for chemical contaminants in the air where spill responders may be working. Portable instruments, vehicle mounted or hand carried, may be used to monitor the air in the immediate area of the response workers. Their use allows workers to immediately determine if contaminants pose a potential threat. Real time monitors are manufactured in sizes ranging from bench mounted instruments to hand held units depending upon requirements for sensitivity and repeatability.

A variety of detectors is available for determination of the various air contaminants being sought. Hydrocarbons are generally detected by flame ionization detectors (FID) to 0.1 ppm as methane. Unsaturated hydrocarbons and aromatics such as benzene, toluene and/or xylenes may be detected by photo ionization detectors (PID) to 0.1 ppm. Infrared (IR) detectors are suitable for determining many other compounds such as ketones or hydrogen sulfide in the ppm range. The more commonly used hand held models are available from HNu Systems<sup>a</sup>, Foxboro Instruments, Inc.<sup>b</sup>, Photovac International Inc.<sup>c</sup> and Mine Safety Appliances (MSA).<sup>d</sup>

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<sup>a</sup>HNu Systems, Inc., Newton, MA.

<sup>b</sup>Foxboro Instruments, Inc, Foxboro, MA.

<sup>c</sup>Photovac International Incorporated, 25-B Jefryn Boulevard West, Deer Park, NY 11729; (516) 254-4199. Instruments include: "IOS plus" portable programmable PID/GC, "MicroTIP™" hand held PID for total VOC, "Snapshot™" hand held PID gas chromatograph, and "ARIES™" stationary multicomponent, multipoint GC/PID system.

<sup>d</sup>MSA - Mine Safety Appliances Co., Baseline Industries Subsidiary, Lyons, CO, manufacturer of Passport® PID monitors and oxygen sensors.

**TABLE II: Monitoring Methods for Petroleum Components**

Key Petroleum Components	OSHA Permissible Exposure (Limit/Regulatory Reference)	Toxicological Hazard	Carcinogenicity Classification	NIOSH Monitoring Method	Real-Time Monitoring Methods	Available Sampling Tubes/Badges
<b>Volatile Aromatic Hydrocarbons</b>						
Benzene	PEL: 1 ppm (3 mg/m <sup>3</sup> ); STEL: 5 ppm (15 mg/m <sup>3</sup> ), 29 CFR 1910.1028*; IDLH: 2000 ppm	Irritant; hematologic and CNS effects; carcinogen	EPA-A; IARC-1	#1500, hydrocarbons (HCs), # 1501, aromatic HC	PID or FID Portable GC/FID or PID	
Trimethyl Benzene	PEL: 25 ppm (125 mg/m <sup>3</sup> ); IDLH: N/A	Irritant; CNS, blood, respiratory effects	Not Classified	Not Available	PID or FID	
Toluene	PEL: 100 ppm (375 mg/m <sup>3</sup> ); STEL: 150 ppm (560 mg/m <sup>3</sup> ); IDLH: 2000 ppm	Irritant; CNS, liver, and kidney effects	EPA-D; IARC-3	#1500, HC; #1501, aromatic HC	PID or FID	
Ethylbenzene	PEL: 100 ppm (435 mg/m <sup>3</sup> ); STEL: 125 ppm (545 mg/m <sup>3</sup> ); IDLH: 2000 ppm	Irritant, CNS effects	EPA-D	#1501, aromatic HC	PID or FID	
Xylenes (o-, m-, p-)	PEL: 100 ppm (435 mg/m <sup>3</sup> ); STEL: 150 ppm (655 mg/m <sup>3</sup> ); IDLH: 10,000 ppm	Irritant; CNS, GI tract, liver, kidney, and blood effects	EPA-D; IARC-3	#1501, aromatic HC	PID or FID	
<b>Volatile Aliphatic Hydrocarbons</b>						
Butane	PEL: 800 ppm (1900 mg/m <sup>3</sup> ); IDLH: N/A	Narcotic	Not Classified	Not Available	FID	
n-Hexane (isomers)	PEL: 50 ppm (180 mg/m <sup>3</sup> ); IDLH: 5000 ppm; {PEL: 500 ppm (1800 mg/m <sup>3</sup> ); STEL: 1000 ppm (3600 mg/m <sup>3</sup> )}	Irritant; narcotic; polyneuritis (muscular weakness, numbness of extremities); respiratory effects	Not Classified	#1500, hydrocarbons	FID	
n-Heptane	PEL: 400 ppm (1600 mg/m <sup>3</sup> ); STEL: 500 ppm (2000 mg/m <sup>3</sup> ); IDLH: 4250 ppm	Irritant, narcotic, and respiratory effects	EPA-D	#1500, hydrocarbons	FID	
Octane	PEL: 300 ppm (1450 mg/m <sup>3</sup> ); STEL: 375 ppm (1800 mg/m <sup>3</sup> ); IDLH: 3750 ppm	Irritant, narcotic	Not Classified	#1500, hydrocarbons	FID	
Nonane	PEL: 200 ppm (1050 mg/m <sup>3</sup> ); IDLH: N/A	Respiratory effects	Not Classified	Not Available	FID	
Cyclohexane	PEL: 300 ppm (1050 mg/m <sup>3</sup> ); IDLH: 10,000 ppm	Irritant, narcotic, liver, kidney effects	Not Classified	#1500, hydrocarbons	FID	

TABLE II: Monitoring Methods for Petroleum Components (cont'd)

Key Petroleum Components	OSHA Permissible Exposure (Limit/Regulatory Reference)	Toxicological Hazard	Carcinogenicity Classification	NIOSH Monitoring Method	Real-Time Monitoring Methods	Available Sampling Tubes/Badges
Methylcyclohexane	PEL: 400 ppm (1600 mg/m <sup>3</sup> ); IDLH: 10,000 ppm	Irritant, narcotic; target: resp.	Not Classified	#1500, hydrocarbons	FID	
Pentane	PEL: 600 ppm (1800 mg/m <sup>3</sup> ); STEL: 750 ppm (2250 mg/m <sup>3</sup> ); IDLH: 5 ppth	Irritant; narcotic; target: kidney	Not Classified	#1500, hydrocarbons	FID	
Cyclopentane	PEL: 600 ppm (1720 mg/m <sup>3</sup> ); IDLH: N/A	Irritant, narcotic	Not Classified	#1500, hydrocarbons	FID	
<b>Semi-Volatile Polynuclear Aromatic Hydrocarbons (PAHs)</b>						
Naphthalene	PEL: 10 ppm (50 mg/m <sup>3</sup> ); STEL: 15 ppm (75 mg/m <sup>3</sup> ); IDLH: 500 ppm	Irritant; targets: CNS, liver, kidney, blood; ? carcinogen	EPA-D	#1501, aromatic hydrocarbons	PID or FID	
Phenanthrene	PEL: 0.2 mg/m <sup>3</sup> {for Coal Tar Pitch Volatiles}; IDLH: N/A	Questionable carcinogen (skin)	IARC-3; EPA-D	#s 5506 or 5515, PAHs	PID or FID	
Benzo(a)pyrene	PEL 0.2 mg/m <sup>3</sup> {for Coal Tar Pitch Volatiles}; IDLH: N/A	Carcinogen (skin and other tissues)	IARC-2A; EPA-B2	#s 5506 or 5515, PAHs	PID or FID	
Benz(a)anthracene	PEL 0.2 mg/m <sup>3</sup> {for Coal Tar Pitch Volatiles}; IDLH: N/A	Carcinogen (skin and other tissues)	IARC-2A; EPA-B2	#s 5506 or 5515, PAHs	PID or FID	
Benzo(b)fluoranthene	PEL 0.2 mg/m <sup>3</sup> {for Coal Tar Pitch Volatiles}; IDLH: N/A	Carcinogen (skin and other tissues)	IARC-2B; EPA-B2	#s 5506 or 5515, PAHs	PID or FID	
Chrysene	PEL 0.2 mg/m <sup>3</sup> {for Coal Tar Pitch Volatiles}; IDLH: N/A	Possible carcinogen (skin and other tissues)	IARC-3; EPA-B2	#s 5506 or 5515, PAHs	PID or FID	
<b>Other</b>						
Diesel Exhaust Fumes	PEL: not established; STEL: 1 ppm (1.8 mg/m <sup>3</sup> , for NO <sub>2</sub> ); IDLH: N/A	Irritant, CNS effects; possible carcinogen	Not Classified	# 6700, Nitrogen Dioxide		
Hydrogen Sulfide	PEL: 10 ppm (14 mg/m <sup>3</sup> ); STEL: 15 ppm (21 mg/m <sup>3</sup> ); IDLH: 300 ppm	Irritant; chemical asphyxiant; CNS effects	Not Classified	#296	Electrochemical	
Oil Mist	PEL: 5 mg/m <sup>3</sup> (extremely refined); IDLH: N/A	Irritant; pulmonary effects	Not Classified	# 5026		
Lead (tetraethyl-, tetramethyl-)	PEL: 0.075 mg/m <sup>3</sup> (as Pb) (skin); IDLH: 40 mg/m <sup>3</sup>	CNS, cardiovascular, liver, kidney effects	IARC-3	#s 2533 (tetraethyl-) and 2534 (tetramethyl-)		

N/A - Data not available

#### 2.1.4 General Air Monitoring Techniques

As indicated earlier in this section, the frequency of monitoring and the choice of candidates compounds is at the discretion of the SSHO. The decisions are dependant upon the condition at the site at any given time and based upon the potential risk of exposure to specific individuals or work functions. The SSHO may choose to conduct simultaneous sampling with other workers performing similar functions or workers in "clean" areas as controls.

##### *Sorbent Tubes*

Gases and vapors may be collected by actively pulling a desired volume of air over a solid sorbent media with a constant flow sampling pump, allowing the compound(s) of interest to be absorbed into or adsorbed onto a solid media (e.g., activated charcoal, silica gel) contained in glass tubes. The technique concentrates the contaminants into a small volume to allow low concentrations in air to be determined. The tube typically has two sections, a front section as the primary collector and a back-up section to determine a potential for analyte breakthrough. The concentration is determined by desorbing the compound(s) of interest for analysis on an appropriate analytical chemical instrument such as a gas or liquid chromatograph. Air monitoring sorbent tubes of this type are readily available from several manufacturers including SKC®, Inc.<sup>e</sup>

##### *Passive Sampler Badges*

Gases and vapors may also be collected passively (i.e., without active collection by a sampling pump) on sorbent systems and analyzed in a manner similar to the sorbent tube or which may chemically react with the air contaminants and produce a visible change proportional to the amount of contaminant in the air. Air monitoring badges of this type are readily available from several manufacturers including 3M® and SKC®, Inc and through suppliers such as BGI, Inc.<sup>f</sup>

##### *Sample Bag*

When contaminant levels are expected to be high enough for direct analysis, a sample of the air itself may be collected into a sample bag. The contents of the bag are then subjected to direct analysis or used for one of the other sampling techniques. Gas sampling methods are available through NIOSH with equipment suppliers such as BGI, Inc., and SKC®, Inc., able to provide equipment.

##### *Impingers*

Occasionally, analytes are not compatible with one of the more convenient techniques such as the sorbent technique. In some cases, the analyte is more effectively trapped in a liquid media rather than a solid sorbent. Impinger methodology is readily available through NIOSH and equipment is available through the sampling equipment suppliers such as Ace®, Kimble®, and SKC®. The impinger methods are not generally necessary for the collection of contaminants at an oil spill site.

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<sup>e</sup>SKC, Inc. Eighty Four, PA.

<sup>f</sup>BGI, Inc., Waltham, MA.

### *Color Detector (length-of-stain) Tubes*

Color tubes work similar to solid sorbent collection tubes in that gases and vapors are passed through sorbent systems with reactive coatings which chemically react with the air contaminants and produce a visible color change proportional to the amount of contaminant in the air. Detector tubes of this type are readily available from several manufacturers including Draeger®, and Sensidyne/Gastec and MSA® through suppliers such as BGI, Inc. and SKC®, Inc.

### *Filters*

Particulate; dust, fumes, mists and aerosols; may be collected by actively pulling the air at a constant rate through a filtering media (e.g., filter cassettes). The media is then analyzed for the contaminant. Filter collection methods are available through NIOSH and equipment and supplies from manufacturers and distributors such as SKC®, Inc and Millipore, Inc.<sup>8</sup>

[Note: The inclusion or mention of any specific product, manufacturer or supplier in this document does NOT imply that the U. S. Coast Guard or EPA approves, recommends, licenses, certifies, or authorizes the use of the product.]

## **2.2 Combustible Atmospheres**

Due to the highly flammable characteristics of petroleum products, a primary concern would be the explosive build-up of vapors. Areas of high concentrations of spilled material or areas where vapors may collect could cause the vapors to reach flammable or explosive levels. The SSHO and SSHSs should be aware of the possibility for flammable vapors to create hazardous concentrations and to monitor closed or stagnant areas using a combustible gas meter.

## **2.3 Oxygen Deficiency**

As with the potential for explosive atmospheres, the SSHO should be aware of the potential for oxygen deficient atmospheres. As chemical vapors build, the oxygen levels will fall without a source of replenishment. Additionally in closed spaces, oxygen levels may become depleted through use by response workers or equipment. The SSHO should have an oxygen deficiency meter as part of the field monitoring instruments to determine areas which may have an oxygen deficiency. Oxygen meters are typically integrated into a single instrument with a combustible gas meter (see above). Concentrations below 19.5% are hazardous and considered as IDLH conditions.

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<sup>8</sup> Millipore, Inc., Bedford, MA.



## **2.4 Confined Space Entry (CSE)**

The SSHO should be aware of areas where responders may enter, become trapped, or be overcome by toxic atmospheres (e.g., carbon monoxide or hydrogen sulfide) or by oxygen deficiency. OSHA standard rules (29 CFR 1910.146) require area posting, the issuance of CSE permits (by the SSHO) and establishing standard and emergency procedures for work in designated confined spaces zones. The USCG Confined Space Entry Program should be referenced for more complete detail.

## **3.0 VESSEL/SOURCE CONTROL ASSESSMENT**

### *Calm Weather Conditions*

The SSHO is responsible for maintaining awareness of relating circumstances of the oil release. In the event of a release from a marine vessel, the vessel should be boomed and attempts made to determine the exact source of the release. If necessary, the vessel's cargo which is the source of the release may need to be off-loaded (lightered) to another vessel or a terminal. The issues which are to be addressed are risk of exposure from vapor or liquid contact hazards; and physical hazards from operating equipment (e.g., booming/skimming operations, burn operations and diving operations). In light of the potential hazards, the mitigation operations should be carefully reviewed against potential immediate hazards.

### *Adverse Weather Conditions*

Loss of control of a vessel's cargo may occur during adverse weather. Attempts to perform any spill response under these conditions may be prohibitive. At the same time, the safety of the vessel's crew may be of primary concern, the OSC and SSHO is referred to the following section "Crew Endangerment Assessment". Once the weather conditions have calmed sufficiently to address the release, the SSHO should reassess the safety and health priorities.

## **4.0 CREW ENDANGERMENT ASSESSMENT**

### *Rescue/Evacuation/Emergency Care*

If a vessel is damaged sufficiently to cause a loss of control of its cargo, there should be a strong concern for the safety of the vessel's crew. There may be a potential for the vessel sinking or running aground in adverse weather. The Coast Guard's primary responsibility under these conditions would be to secure the safety of the crew. Rescue of the crew may involve a number of scenarios. The OSC and SSHO should refer to the Coast Guard's rescue-at-sea operations for guidance.

## **5.0 POPULATION HAZARDS ASSESSMENT**

The FOSC and SSHO should take into account the effect of the spill on any nearby populated areas. The OSC's Information Center representative or Public Affairs

Officer should notify local authorities of the potential hazards such as the possibility that noxious vapors (or smoke, in cases of fire) impacting populated areas. The senior members of the response organization should be prepared to instruct local authorities on proper isolation or evacuation zones. Guidance for isolation is given below.

#### *Isolation Strategy*

In the event of a release into the atmosphere with involvement by fire, the local response contingent should initially evacuate 800 m (1/2 mile) in all directions from the spill. If there is no fire hazard, the isolation zone may be reduced to 150-300 m (500-1000 feet), depending upon the spill size. Further protection of individuals may be required depending upon chemical monitoring. If notable concentrations of noxious vapors are present (e.g., hydrogen sulfide, benzene, or strong petroleum odor), persons downwind must be notified for possible evacuation. Initially the FOSC may opt to further isolate the area downwind. The downwind isolation zone is defined by a distance along the downwind direction and of a width either side of the downwind direction of 1/2 the downwind distance. Further guidance as to isolation zone may be found in the US DOT's [1993] Emergency Response Guidebook (US Govt. Printing Office: ISBN 0-16-042938-2).

## **6.0 SPILL MITIGATION TASK REVIEW**

During the initial phases of spill response, a primary concern of the response team will be mitigation of the spill to reduce loss of material and environmental damage. A principal assumption of the spill response is that a large number of operations will be conducted on or near water and that water safety will be a primary concern. Personal flotation devices (PFDs) use must be adhered to for all operations in which there is a potential water hazard. The SSHO or delegated authority are to be informed and aware of the potential for any of the following techniques to be used in the response operation and cognizant of the hazards associated with conducting these operations. In reviewing each incident, the SSHO should assess such issues as chemical vapor/liquid exposure; increased risk of slips/trips/falls with oil water mixtures on surfaces; and fire hazards.

### **6.1 Booming**

Booming or containment operations may involve placement of booms around the immediate source of the spill or the more complex task of towed booms for collection. Towed boom operations which require coordination of two or more vessels require attention to vessel handling and water safety issues. These operations should only be conducted by crews trained in booming operations. Towed booming operations are typically part of a more complex skimming or even in-situ burning operation.

## **6.2 Skimming**

Skimming of oil from the surface of the water is typically the most desired mitigation operation as it removes the environmental contamination and recovers material for salvage. There are many different types of skimming methods. Skimming may involve the use of oleophilic (oil sorbing) materials, weirs, vacuums, hydrodynamic systems, or other mechanical systems. The SSHO is responsible for maintaining awareness of the safety issues such as operation of mechanical devices, liquid contact from handling oil soaked materials, and PFD use near water.

## **6.3 In-Situ Burning**

In-situ burning requires collection of the oil to a thickness of at least 2 mm which typically requires collection in fireproof booms. Once sufficient oil is collected in the boom for burning, boom operations normally require the boom be towed away from the source and any other response operations. The open end of the boom should be faced up-wind to keep smoke away from the tow operation. Caution should be exercised to keep personnel and other operations away from the downwind direction of the burn. The SSHO is responsible for maintaining awareness of the operational issues which may impact on safety such as vessel speeds required to maintain control of the slick thickness, area, and burn rate and ensure that other operations are cognizant of the reduced maneuverability constraints on the burn operation vessels. Ancillary concerns are the ignition operations using gelled fuels and the technique used to initiate the burn (i.e., boat or air drop). Operations personnel should be aware of the vapors emanating from the boomed material especially as the burn operation progresses.

## **6.4 Dispersants**

Chemical dispersants can be particularly useful in the early stages of a spill before significant weathering occurs. The composition of the dispersant is to be made available to the SSHO, particularly as the MSDS. The MSDS must be reviewed to determine any potential hazards to response workers, and this information made available to the workers in safety training and/or tailgate safety briefings. Information should stress particular hazards of exposure to skin and eyes and the potential for generation of aerosols.

## **7.0 LOGISTICAL SUPPORT**

### **7.1 Personnel**

The SSHO should take into account the extent of the release, whether several individual sites may be designated and the number of Safety Supervisors (SSHs), Trainers, and Medical Staff that may be required to help ensure the health and safety for the number of response workers.

## 7.2 Equipment

Among the health and safety equipment for which the SSHO is responsible are Medical Care Facilities and First Aid Stations, Sanitary Facilities, and personal protective equipment. The amount of supplies required will be dependent upon the size of the release, the season, and the number of responders. The development of a detailed review of equipment needs is beyond the scope of this document.

**PART III**

**[Generic]  
Site-specific**

**Health and Safety Plans  
for  
Oil Spill Response**

PART III - Site-specific H & S Plan

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PART III  
Site-specific Safety and Health Plan (SHP)

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## 1.0 INTRODUCTION

### 1.1 Scope and Applicability of the Site Safety and Health Plan

The purpose of this Site Safety Plan is to provide the necessary documentation for ensuring the health and safety of oil spill response personnel in conducting the tasks of oil spill mitigation and remediation. Applicability is extended to all US Coast Guard (USCG) employees, federal government employees (with the exception of active military personnel) working under USCG control, contractors, volunteers and visitors. Except for those State Governments which have received approval for state-mandated OSHA programs, US Federal OSHA regulations must be followed by commercial sector employees. State and local government employees are governed by the regulations at the state and local level, but are generally held to the same requirements as the Federal OSHA regulations.

### 1.2 Visitors

Site visitors are required to register with the Site Safety/Security Office. Visitors may enter the exclusion (contaminated) zone only under the direct supervision of a qualified HAZWOPER trained individual and with the explicit written authorization of the SSHO or as determined by USCG policy.

## 2.0 KEY PERSONNEL/SAFETY AND HEALTH PERSONNEL

Response to the release of *Material/Cargo* from *Vessel or Source Name* by U.S. Coast Guard personnel and other persons working on behalf of or under the auspices of the U.S. Coast Guard is to be conducted under the normal operating procedures established by the USCG's Marine Safety Office and the National Oil and Hazardous Substances Pollution Contingency Plan.

### 2.1 Key Personnel

#### **Government Representation:**

*Federal On-Scene Coordinator (FOSC):*

*Deputy OSC (Incident Commander):*

*FOSC's On-Site Supervisor(s):*

*NOAA Scientific Support Coordinator (SSC):*

*Site Safety and Health Officer (SSHO):*

*Site Safety and Health Supervisor(s) (SSHs):*

*Information Center Liaison (Public Affairs Officer):*

*National Pollution Fund Center Case Officer:*

*Basic Ordering Agreement (BOA) Contract Supervisor:*

**State/Local Government Representative(s)**

*OSC:*

*Safety Officer:*

*OSHA Representative:*

*Police Dept.:*

*Fire Dept.:*

*Nearest Medical Facility:*

*Poison Control Center:*

**Responsible Party's Representatives**

*On-Site Representative:*

*On-Site Contract Supervisor(s):*

*Site Safety and Health Officer (SSHO):*

*Site Safety and Health Supervisor(s) (SSHSs):*

**2.2 Organizational Responsibility**

**2.2.1 USCG Incident Command System using the Unified Command Structure**

The USCG relies on its *Chain of Command* and uses the Unified Command Structure within the Incident Command System (see Figure III, page 10 in Part I of this document). [Note: a more detailed discussion of the various command systems available to Federal agencies is presented in Part I, page 5 of this document]. The Unified Command Structure provides for a coalition for command decisions to be made by the OSCs from each of three interested parties: the Federal Government, the state(s) impacted by the release, and the responsible party. Leaders will be chosen, as appropriate, from among these organizations to be responsible for various aspects of the response, (i.e., sections) to include: Finance, Logistics, Operations and Planning. The FOSC, in consultation with the other parties, will determine whether the Coast Guard will direct the response effort or if the responsible party will direct the response given the proper resources.

In situations where the USCG is directing response operations, the Incident Commander will be designated from USCG command staff. The Section Leaders may be designated from the USCG, state or other government sources. Response is delineated as indicated in the Chain-of-Command below.

If the responsible party (RP) is know and taking appropriate action, the USCG has made allowances for the RP to direct the response operations by having it designate the Incident Commander and Section Leaders from its organization. The Unified Command, in this instance, acts to solves any problems identified by and provides strategic direction to the Incident Commander. The USCG may place personnel in the Incident Command's Staff to assist but they may not act as Section Leaders.

### 2.2.2 Chain of Command

In the event of an oil spill, a Coast Guard Officer, typically the COTP, acts as the FOSC, during an oil spill as stipulated in the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) 40 CFR part 300.120 paragraph (a)(1). The FOSC is responsible for incident management in accordance with the national contingency plan. The FOSC is the lead individual in spill area activities control. The FOSC's designated deputy serves as the on-site supervisor for USCG personnel.

Assisting the FOSC as the Incident Coordinator is the Deputy On-Scene Coordinator, typically from the District or Port Marine Safety Office. The Deputy OSC acts as the second to the FOSC and chairs the response "Command Staff" as indicated for the NCP. The Command Staff are key personnel with specific responsibilities for site operations.

To assist the FOSC in meeting the HAZWOPER requirements, a Site Safety and Health Officer (referred by OSHA/EPA as the SHO and by the USCG as the SSHO or Site Safety Officer) must be designated to help ensure compliance with established requirements. The Coast Guard's SSHO is the single individual responsible for developing and implementing the Site-specific Safety and Health Plan (SHP). The duties of the SSHO include characterization of the site for specific hazards which may require compliance with various parts of the federal OSHA's regulations. An OSHA field representative is normally assigned to oversee any spill response under that authority. In addition, there may be regulations particular to a state or local government which require specific attention.

NOAA is responsible for assigning a Scientific Support Coordinator (SSC) to each of the Regional Response Teams. The SSC acts as an advisor to the FOSC to access and provide information on spill chemical characteristics and movement modelling. Which is also crucial for hazard assessment and risk analysis for the SSHO.

Assisting the SSHO are the Site Safety and Health Supervisors (SSHSs) as required by 29 CFR 1910.120. The Site Safety and Health Supervisor, or simply the Site Safety Supervisor, is the individual in the field responsible for enforcing the SSHO's SHP as his designate. An SSHS is required to be on-site at all times while the SSHO may be with the FOSC or at other locations. Therefore, there are likely several SSHSs reporting to one SSHO. Depending upon the extent of a release, there may be several different areas, each requiring the assignment an SSHS. Further, if operations are conducted in shifts, several SSHS may be assigned to a given area.

In addition to the above roles, the Command Staff includes several other key personnel. A Joint Information Center with a Public Affairs Officer is charged with information dissemination to the public and media as appropriate. A Legal Staff reviews and advises the FOSC both on the Responsible Party's obligations and on the Government's authority. A Historian is designated to record all actions conducted in response to the spill and is responsible for providing updated information to all concerned parties on a daily basis. In addition, the system provides for a liaison with

other agencies and interested parties on the Regional Response Team to ensure thorough communication to all concerned.

In addition to these U.S. Coast Guard supported roles, there are state and local representatives that may have similar duties for their jurisdictions and personnel from the Responsible Party's organization.

### **3.0 TASK/OPERATION SAFETY AND HEALTH RISK ANALYSIS**

#### **3.1 Historical Overview of Site**

Prior to the release of *Petroleum Product on the date of the occurrence*, the designated hazardous waste site had no history of oil contamination. The response to this release, therefore, will focus solely on the effects of contamination by the recently released material. The tasks will principally involve mitigation of material spread, salvage (as appropriate) and remediation.

#### **3.2 Task-by-Task Risk Analysis**

Upon determination of the methods of mitigation, salvage and remediation, a risk analysis will be conducted. In general terms the compounds to which individuals may be exposed are well known and understood as indicated in the site characterization section. With the use of proper personal protective equipment, work practices, and engineering controls, the risk of exposure will be minimized.

### **4.0 PERSONNEL TRAINING REQUIREMENTS**

All response personnel are subject to the training requirements stipulated below without regard to affiliation and are required to provide proof of completion of training through their affiliated organization: Federal Employees; Public Employees (i.e., State or Local Government); and private employees. Volunteer responders are required to provide current proof of training before performing on-site functions.

As previously indicated, 29 CFR 1910.120 was indented to protect the hazardous waste operations and emergency response worker from the unknown. The generic responder requires training and preparation to deal safely with the most acutely toxic or chronically debilitating chemicals in use today. In contrast, the oil spill response worker is expected to safely mitigate the release of petroleum products accessible to every citizen of the planet on a daily basis. The health and safety issues related to the petroleum compounds have been well established and allow a very well defined, carefully designed, and focused set of procedures to address the issues. Providing the focused training for the circumstance allows the application of a more timely response with sufficient resources to mitigate the potential need for a more extensive response on general terms. The specific procedures are outlined in the oil spill

response training recommendations below in §4.1. Procedures for other potential hazards and special circumstances are provided in sections 4.2 through 4.4.

#### 4.1 U. S. Coast Guard Specific Oil Spill Response Training Recommendations

The *U. S. Coast Guard Guidance for Health and Safety Training of Oil Spill Responders in the U.S. Coastal Zone* has established new recommendations for training based on anticipated work function. The "*Guidance*" defines three categories of responders:

- Type A Workers face the highest risk of exposure from working in proximity to freshly released petroleum product and receive the most extensive training. Training emphasizes monitoring of hazardous atmospheres and proper use of respiratory protection. These are the workers designated to operate in the "Hot Zone" of a response site.
- Type B Workers face moderate risk of exposure from working in support roles to Type A Workers or working with weathered oil such as during shoreline cleanup. Training emphasizes mechanical and physical hazards and dermal exposure. The workers are able to access areas of limited potential contamination designated as "Warm Zones".
- Type C Workers face little to no risk of exposure. These workers may work only in designated "Cold Zones", where no contamination from a release may exist (e.g., logistical support). No specialized health and safety training is required.

The "*Guidance*" document should be referenced for more detailed information.

#### 4.2 Training - Emergency Response Operations

If formal response procedures are required for emergency responses (i.e., exemption to HAZWOPER is not granted), HAZWOPER training requirements will be followed based upon the specific duties and functions of a responder. The established levels of response for the emergency phase are as follows:

**First Responder-  
awareness level:** Trained to understand and recognize hazards, their potential outcomes, and realize the need for additional resources.

*Example:* Personnel discovering a release and reporting the incident.

**First Responder-  
operations level:** Trained to contain the release from a safe distance, keep it from spreading, and prevent exposure by implementing appropriate PPE and basic decontamination procedures. This response is in a defensive manner, generally without being exposed to risk.

*Example:* Personnel providing skimming and boom placement services.

**HAZMAT Technician** Trained to respond to releases for the purpose of stopping the release by performing advance control, containment, and/or confinement operations within the capabilities of the resources and PPE available. This response is in an aggressive manner; personnel are expected to approach the point of release so they must additionally be able to operate field survey equipment and understand basic chemical/toxicology terminology and behavior.

*Example:* Personnel plugging, patching, or other actions deemed essential to stopping or slowing the release.

**HAZMAT Specialist** Trained to respond with and provide support to the technician, but also have duties requiring more directed or specific knowledge of the various substances being contained.

*Example:* Personnel acting as site liaison with other government authorities in regard to site activities.

**On-Scene Incident Commander:** Trained to assume control of the incident scene by implementing incident command system and emergency response plan.

**TABLE 1: TRAINING REQUIREMENTS FOR EMERGENCY RESPONSE**

LEVEL	RESPONDER	TRAINING
1	First Responder Awareness	Sufficient proven training or experience in specific competencies
2	First Responder Operations	Level 1 competency plus at least 8 hours of additional proven training or experience in specific competencies
3	Hazardous Materials Technician	At least 24 hours of Level 2 training and additional proven training or experience in specific competencies
4	Hazardous Materials Specialist	At least 24 hours of Level 3 training and additional proven training or experience in specific competencies
5	On-Scene Incident Commander	At least 24 hours of Level 2 training plus proven experience in additional competencies

#### 4.3 Training - Post-Emergency Response Operations

Any activity to contain the oil on the water in proximity to immediate release location would be considered part of the emergency response. However, beach clean-up crews on shore are typically involved in activities which would be considered post-emergency response. Each new section of the beach contaminated with oil may

not necessarily require an emergency response and may be handled as a post-emergency response. Both emergency response and clean-up activities can be conducted at the same time.

Large volume spills require large numbers of clean-up workers who may not already have the 24 hours of off-site training required by HAZWOPER. Applying this rule to oil spill clean-up workers may delay and hamper efforts to contain oil spills, begin the recovery process, and protect the environment from further harm. Federal OSHA's CPL 2-2.51 addresses the need for reduced training requirements for employees at low risk at an oil spill clean-up operation. CPL 2-2.51 states that less than 24 hours of training may be acceptable, with a minimum of 4 hours, based upon the assessment and decision of the OSHA Regional Response Team representative. The training requirements under these conditions would be conducted as indicated in the "Guidance" document referenced in § 4.1, above. [Note: The SSHO should reference some of the highlighted issues for state mandate training requirements as listed in the appendix and confirm or update any issues with the federal or state OSHA representative.]

If an employer complies with the express intent of the standard, but deviates from its particular requirements with no direct or immediate adverse safety or health effects upon workers, such a violation can be characterized as *de minimis*. Citations are not issued for *de minimis* violations. However, in order to classify violations of the training requirements as *de minimis*, the following criteria must be met:

- Clean-up must be performed in an area that has been monitored and fully characterized by a qualified person. The results must indicate that exposures are currently and can be expected to remain under permissible exposure limits and other recognized exposure limits.
- Health risks from skin absorption are absent or minimal.
- Workers have completed the training requirements of 29 CFR 1910.38 (a) and 1910.1200 (including refresher training if applicable).
- Workers have completed other safety and health training necessary for the tasks they are expected to perform. This may include, but is not limited to, operating procedures, decontamination procedures, water safety, hypothermia, heat stress, and safety hazard controls.
- There must be adequate on-site supervision by employees who meet all training requirements of 29 CFR 1910.120 (e)(4) (*Management and Supervisor training*).

#### 4.4 State-Specific Differences

There are very few significant differences in federally mandated state programs from the federal program which affect oil spills. The SSHO should confer with the designated OSHA representative for any additional requirements that may need to be implemented. Below are those differences found in applicable state programs about which the SSHO should be aware in implementing the SHP in those locations.

The State of Washington requires a minimum of 8 hours of training for workers engaged in low risk tasks. The State of Washington specifies who low risk workers are, and the standard includes a list of what they should be trained to do, gives examples of low risk activities, and supplies mandatory requirements to be covered during training for oil spill clean-up. The State of Washington also requires worst case area air monitoring samples to meet an "allowance criteria". All other allowance criteria are similar or identical to the de minimis criteria listed in Federal OSHA's directive.

The State of California has the following noted exception: 4-hr. training doesn't appear in pre-policy and procedures statement under emergency response as of the date of preparation of this document.

**TABLE 2**  
**TRAINING REQUIREMENTS FOR POST-EMERGENCY RESPONSE**

TRAINING REQUIREMENTS	FEDERAL HAZWOPER	STATE DIFFERENCES
<b>General site workers</b>		
Off-site training	40 hours	Washington state - workers required to wear Level A or B PPE, 80 hours of training req.
Supervised field experience	24 hours	
<b>Workers on-site occasionally for a specific limited task</b>		
Off-site training	24 hours	
Supervised field experience	8 hours	
<b>Workers regularly on-site in areas with exposures under PELs</b>		
Off-site training	24 hours	
Supervised field experience	8 hours	
<b>Management and supervisors</b>		
Initial training	40 hours	
Supervised field experience	24 hours	
Specialized training	8 hours	
<b>Minimum reduced training time (CPL 2-2.51)</b>	4 hour minimum	Washington State - 8 hr. minimum



## 5.0 PERSONAL PROTECTIVE EQUIPMENT (PPE) TO BE USED

Requirements for personal protective equipment as indicated in 29 CFR §1910.120 (g) and (b)(5)(iii) for clothing and ¶ (q)(3)(iv) for SCBA will be followed to prevent illness or injury from exposure to both physical/mechanical and chemical hazards. As indicated in Section 4.0 for training, the hazards associated with the release of a petroleum product are well understood. Similarly, the resources requirements for personal protection from exposure to petroleum products and its components have been researched and procedures established.

Heat stress, a major concern for response workers, may require specific recommendations be made for allowable work assignment duration versus level of protection. In conditions of high heat and solar effects, the anticipated potential for exposure will be reviewed on an "as assigned" basis to determine the appropriate level of chemical protection. Protective equipment requirements will be tempered with appropriate assignment duration (e.g., 30 minutes on/30 minutes off) to balance protection from hazards of the chemical release as well as meteorological hazards.

### 5.1 Levels of Protection

When selecting PPE based upon the results of the preliminary and detailed site evaluations, there are generally four EPA levels of protection that are used. Level A should be worn when the highest level of respiratory, skin, and eye protection is needed. Level B should be worn when the highest level of respiratory protection, but a lesser level of skin protection, is needed. Level C can only be worn if the criteria for using air-purifying respirators are met, and depending upon the chemical may provide a similar level of skin protection as Level B. Level D provides minimal or no protection against chemical hazards. The four main levels of protection and their respective components are summarized in Table 3.

Under the HAZWOPER requirements, if positive-pressure self-contained breathing apparatus is not used as part of the entry ensemble, and if respiratory protection is warranted by the potential hazards identified during the preliminary evaluation, an escape SCBA of at least 5 minutes duration must be carried during initial site entry.

If the preliminary site evaluation does not provide sufficient information to identify the hazards or potential hazards of the site, an ensemble providing protection equivalent to Level B must be worn until the hazards can be more fully evaluated. As indicated in other parts of this document, the issues related to petroleum product releases are relatively well characterized and understood. *Except under the most severe exposure conditions (e.g., at the source of an uncontrolled release), response personnel will likely be sufficiently protected in Level C PPE.*

**TABLE 3**  
**LEVELS OF PERSONAL PROTECTION EQUIPMENT**

LEVEL A	LEVEL B	LEVEL C	LEVEL D
Positive Pressure, Pressure Demand Supplied-air respirator	Positive Pressure, Pressure Demand Supplied-air respirator	Air-purifying respirator (w/ activated carbon)	No respirator required
Full encapsulating chemical-resistant suit	Chemical-resistant clothing	Chemical-resistant clothing	Coveralls
Inner/outer gloves, hydrocarbon-resistant (e.g., Viton® or Nitrile)	Inner/outer gloves, hydrocarbon-resistant (e.g., Viton® or Nitrile)	Inner/outer gloves, hydrocarbon-resistant (e.g., Viton® or Nitrile)	Gloves*
Boots, chemical-resistant, steel toe and shank	Boots, chemical-resistant, steel toe and shank	Boots, chemical-resistant, steel toe and shank	Boots/shoes, chemical-resistant or leather, steel toe and shank
Disposable boot covers*	Disposable boot covers*	Disposable boot covers*	Safety glasses or chemical splash goggles*
Hard hat (face shield)*	Hard hat (face shield)*	Hard hat (face shield)*	Hard hat (face shield)*
2-way radio communications (inherently safe)*	2-way radio communications (inherently safe)*	2-way radio communications (inherently safe)*	2-way radio communications (inherently safe)*

\*Optional

It is expected that Level C Personal Protective equipment will generally provide adequate protection and will typically be required in response to the *Petroleum* spill.

## 5.2 Other Protective Measures

Personal flotation devices (PFDs) must be provided for and worn by those workers who are engaged in work in which they may fall into the water:

- When such workers are working in isolation,
- Where physical limitations or available working space creates a hazard of falling into the water,
- Where the work area is obstructed by cargo or other obstacles which prevent the workers from obtaining safe footing for their work, or
- Except when engaged in loading or discharging ocean going vessels, workers walking or working on the decks of barges on the Mississippi River System and the Gulf Intracoastal Waterway must be protected by PFDs.

Generally, all personnel working in boats, on docks, or normally within 10 feet of water deeper than 3 feet, must wear PFDs or work vests.

The PFDs must be United States Coast Guard approved Type I PFD, Type II PFD Type III PFD, or Type V PFD, or equivalent, in accordance with 46 CFR Part 160 (Coast Guard Lifesaving Equipment Specifications) and 33 CFR 175.23 (Coast Guard table of devices equivalent to personal flotation devices). The PFDs are to be maintained in safe condition and must be considered unserviceable when damaged so as to affect buoyancy or fastening capability. Prior to each use, PFDs will be inspected for dry rot, chemical damage, or other defects which may affect their strength and buoyancy. Defective PFDs will not be used.

Safety belts and lifelines will be inspected, prior to use, for dry rot, chemical damage, or other defects which may affect their strength. Defective belts and lifelines will not be used. When in use, all safety belts must be equipped with lifelines which are secured with a minimum of slack to a fixed structure. Care should be exercised to ensure that the lifeline is not cut, pinched, or led over a sharp edge. In hot work operations or those involving the use of acids, solvents, or caustics, the line is to be kept clear to avoid its being burned or weakened. In order to keep the lifeline continuously attached with a minimum of slack to a fixed structure, the attachment point of the lifeline should be appropriately changed as the work progresses.

At least three 30 inch Coast Guard approved life rings with lines attached must be kept in easily visible and readily accessible locations aboard each vessel afloat on which work is being performed. Life rings must be located one forward, one aft, and one on the gangway, except on vessels under 200 feet in length, in which case one at the gangway is sufficient. At least one life ring with a line attached must be located on each staging float alongside a vessel on which work is being performed. At least 90 feet of line must be attached to each life ring. Life rings and lines must be maintained in good condition.

In the vicinity of each vessel afloat on which work is being performed, there must be at least one portable or permanent ladder of sufficient length to aid workers in reaching safety in the event that they fall into the water.

### **5.3 Reassessment of Protective Program**

Periodically, as the response program progresses, the SSHO will be responsible for reassessing the work environment to determine if protective equipment requirements may need to be upgraded or downgraded. When practical, the protective clothing requirements should be downgraded to reduce stress to response personnel.

### **5.4 Work Task Duration***[Note: Site-specific information is required for this section.]*

*Task duration will be determined by a number of factors including: level of protective clothing required (generally higher levels of protection reduce the time available to conduct on-site activities); ambient temperature and humidity (temperature/humidity extremes decrease effectiveness and decrease on-site time), and complexity of tasks. As tasks are defined, appropriate task duration criteria will be established.*

### **5.5 Chemical Resistance and Integrity of Protective Equipment**

To ensure the proper choice of protective clothing, the following documents have been referenced:

- *Chemical Hazard Response Information System (CHRIS), Hazardous Chemical Data, Commandant Instruction M16465.12A Volume II; US DOT, US Coast Guard, November, 1984; and*
- *Chemical Data Guide for Bulk Shipment by Water, Commandant Instruction M16616.6A; US DOT, US Coast Guard, November, 1990.*

In addition, the third edition of the EPA's *Guidelines for the Selection of Chemical Protective Clothing* is also referenced. The fourth edition of *Guidelines...*, funded jointly by the Department of Energy, the Environmental Protection Agency, and the Federal Emergency Management Agency is in preparation by Arthur D. Little, Inc. for publication the first half of 1995. Reference of these publications on the availability, selection, and use of chemical protective clothing will help ensure response personnel safety. The *Guidelines...* document provides chemical resistance ratings for thousands of combinations of clothing materials and chemicals; chemical permeation data; clothing availability and sources.

### **5.6 SCBA Inspection and Checkout**

Self contained breathing apparatus (SCBA) may be required for initial entry, confined space entry, or in locations where elevated concentration of hazardous chemical vapors exist. Individuals must be medically qualified for use of SCBA including a

pulmonary function test. Personnel must also attend SCBA training to include a field use exercise.

Immediately prior to use, the individual is to inspect the unit and verify the air supply pressure of the air cylinder, that the supply system (demand and/or positive pressure) and bypass systems are operating properly. The unit is to be cleaned after each use with an approved cleaning/sanitizing solution. Before refilling, the cylinder itself should be thoroughly inspected to ensure that the cylinder has been hydrostatically tested and stamped within the past five years (three years for composite cylinders). The face mask and associated hoses should be inspected for wear and degradation of rubber parts. Inlet and exhaust diaphragm valves should be inspected for proper operation. Monthly inspections of SCBA units for emergency use are required under 29 CFR 1910.134 (b)(7). Records of inspection shall be maintained by the SSHO.

### **5.7 Inspection**

The SSHS will be responsible for periodically reviewing Site operations to determine that the appropriate PPE is available and in proper use.

## **6.0 MEDICAL SURVEILLANCE REQUIREMENTS**

The SSHO is responsible for ensuring the components of the medical surveillance requirements are met for each individual. Trained and licensed professionals will administer the program and maintain confidential medical records according to the strict ethical codes of the medical profession.

### **6.1 Baseline or Preassignment Monitoring**

Prior to assignment for on-site duties, response personnel are required to pass a baseline physical and blood chemistry evaluation, within the prior year. The physical should include pulmonary function test and spirometer evaluation for respirator use; liver function evaluation as prior exposure to hydrocarbons or other hazardous materials may indicate decreased functions.

### **6.2 Periodic Monitoring**

Depending upon the expected duration of the response program, response workers may be required to take interim physical evaluations and blood chemistry. In addition, response personnel may be required to undergo periodic controlled substance use evaluation.

### **6.3 Exposure/Injury/Medical Support**

Response workers will be provided full medical support for any exposure or injury received on-site in conducting response related duties.

### **6.4 Exit Physical**

Upon cessation of on-site duties, response personnel potentially exposed to chemical hazards may be required to undergo a closeout physical and blood chemistry evaluation.

## **7.0 FREQUENCY AND TYPES OF AIR MONITORING**

### **7.1 Direct-Reading Monitoring Instruments**

To assist in the definition of potential breathing air hazards, direct-reading instruments may be used to provide real-time data on organic vapors, hydrogen sulfide, oxygen deficiency and/or combustible atmospheres. For the organic vapor components of spilled oil products, two principal types of field portable instruments are common flame ionization and photo ionization detector. For most organic compounds, a flame ionization detection (FID) type analyzer works best as the general analytical tool for concentrations down to 0.1 ppm (measured as methane) with a useful range of 0.1 - 1000 ppm (e.g., Foxboro Instruments OVA). To specifically measure unsaturated hydrocarbons (e.g., benzene, toluene and xylenes) and some inorganics, a photoionization detector (PID) may be better suited (e.g., HNU PI-101). Combination meters (available through safety equipment suppliers such as Hazco, Lab Safety and Fisher Scientific) will be used to determine Oxygen Deficiency, Combustible Atmospheres, Carbon Monoxide and Hydrogen Sulfide (H<sub>2</sub>S) monitor (e.g., Gastech: several models available; MSA: Passport®).

[Note: The inclusion or mention of any specific product, manufacturer or supplier in this document does NOT imply that the U.S. Coast Guard or EPA approves, recommends, licenses, certifies, or authorizes the use of the product.]

### **7.2 Site Air Monitoring and Sampling Program Frequency**

Initially, monitoring will be conducted quarterly during each work period (e.g., at two or three hours periods for a eight or twelve hour day respectively) in the immediate vicinity of workers for each day, using one of the direct reading or color detector tube methods at the discretion of the SSHO or his designate. As a baseline becomes established, indicating consistent results, monitoring requirements may be relaxed. All classes of compounds and specific compounds of concern listed in the Site Characterization section will be included in the monitoring.

### **7.3 Site-specific Monitoring**

At times during the course of on-site duties, response personnel, especially those considered at higher risk, may be asked to participate in industrial hygiene monitoring. This may require personnel to wear an air monitoring device of the active type (i.e., personal sampling pump with sampling tubes) or passive type, (i.e., Badge Sampler). The sampling device will be worn near the breathing zone (e.g., shirt lapel) for a typical work shift. The results will be made available to the worker and be made part of the work records.

### **7.4 Action Levels**

#### **7.4.1 Combustible Gas/Vapors**

Worker areas will be monitored for the presence of levels of combustible vapors from released or pooling petroleum products. The work conditions will continue provided vapor levels remain below 10% of the lower explosive limit (LEL) for any one component in the oil or of a combined total of all combustible components. If levels are found between 10-25% of the LEL, work and monitoring will continue with extreme caution, particularly as higher levels are noted. Any level above 25% of the LEL (10% for confined space entry) constitutes a potential hazard and workers will be evacuated immediately.

#### **7.4.2 Oxygen Level Indicator**

Oxygen levels are considered safe at 19.5-23.5% range. Below 19.5%, workers are to be provided SCBA [Note: combustible gas readings are invalid in atmospheres less than 19.5%], monitoring will continue as long as workers are present. Above 23.5%, work is to be stopped due to the increased fire hazard potential, monitoring is to be discontinued and the area evacuated.

#### **7.4.3 Colorimetric Tubes/Real Time Monitors**

Chemical vapor levels are to be monitored for the key chemical hazardous components of the released material (e.g., Benzene and Hydrogen Sulfide). The most current version of the ACGIH TLV booklet will be referenced for the appropriate action levels. If concentrations approach the indicated action level (1/2 the TLV), the area will be evacuated or personnel will be provided with appropriate protective respiratory protection. [NOTE: Personnel may only be issued respiratory protection after proper medical qualification and training.]

## **8.0 SITE CONTROL MEASURES**

Since oil spills can spread considerable distances, site control will be a relatively difficult task. It is not likely that all areas impacted by oil can be properly and absolutely restricted to prohibit access by un-trained individuals. Routine patrol by USCG personnel over a large area may serve only to deter access. Notification of the hazardous nature of the area should be posted at all access points along the

contaminated area and approximately every *thirty (30) meters (100 feet) (?)* along accessible shoreline regions.

### **8.1 Buddy System**

All site response personnel are required to remain within sight of a at least one other HAZWOPER trained site qualified individual at all times while conducting site response operations. If any member of an assigned team finds it necessary to leave a designated work zone, the buddy or remaining team members should notify the area supervisor who will reassign team members or request the buddy to accompany the individual out of the work zone. Team members should maintain a general cognizance of other team members and monitor for signs of: chemical exposure, sun overexposure, hyperthermia (overheating), hypothermia (cold), or exhaustion.

### **8.2 Site Communications Plan**

Each designated work area on the site will be assigned a work supervisor (not associated with any safety and health function per se), responsible for monitoring personnel for remediation operations other than health and safety. The SSHS will be responsible for health and safety issues. The work supervisor will be responsible for periodically advising base operations of work conditions and progress by radio. Any issues which may be raised originating from either the work area or base operations will be communicated through the area supervisor to the other parties.

### **8.3 Work Zone Definition**

Within the Oil Spill Response Site, several work zones may be designated based upon the type of operation being conducted (e.g., booming/skimming operation) or upon the number of personnel required to perform (e.g., a mile-long shoreline clean-up may be divided into twenty work zones of ten workers each). *Formal designation for site-specific work zones will be made by the operations group upon determination of the required spill response in a given work area using the form provided in Part II of this document.*

### **8.4 Nearest Medical Assistance**

Each work area supervisor will be issued a First Aid kit consisting of a First Aid manual, compress bandages, sterile wrap, plastic bandages, tape, scissors and antiseptic swabs for minimum care. The principal medical care facility for the oil spill response will be located at the base of operations. Emergency medical assistance, response and advanced care facilities will be provided by the local emergency medical system (EMS).



## 8.5 Safe Work Practices

Response personnel will follow prudent work practices in conducting all on site operations. At a minimum, personnel will be required to wear the proper protective clothing designated for their work area as determined by the SSHO based upon the risk of exposure in that area. Personnel will perform work function only to level for which they have received training.

## 8.6 Emergency Alarm Procedures

Emergencies requiring response crews to take more stringent protective measures beyond those in use during normal operations will be notified by a siren/airhorn signal system or by radio through the work area supervisor as designated by the FOSC. *The exact system of notification will be determined by the SSHO upon determination of the site-specific issues.*

## 9.0 DECONTAMINATION PLAN

Prevention of the spread of oil and oil components to clean areas under 29 CFR §1910.120(k) requires the preparation of a formal decontamination plan as incorporated here and amended by the SSHO. As the primary materials of concern are well documented and easily decontaminated by non-toxic means, the procedures presented may be easily implemented to prevent cross-contamination. In most cases Level C or D personal protective equipment will be appropriate. In more extreme conditions Level B may be required. The SSHO will be responsible for determining the proper level of personal protection for the various work assignments.

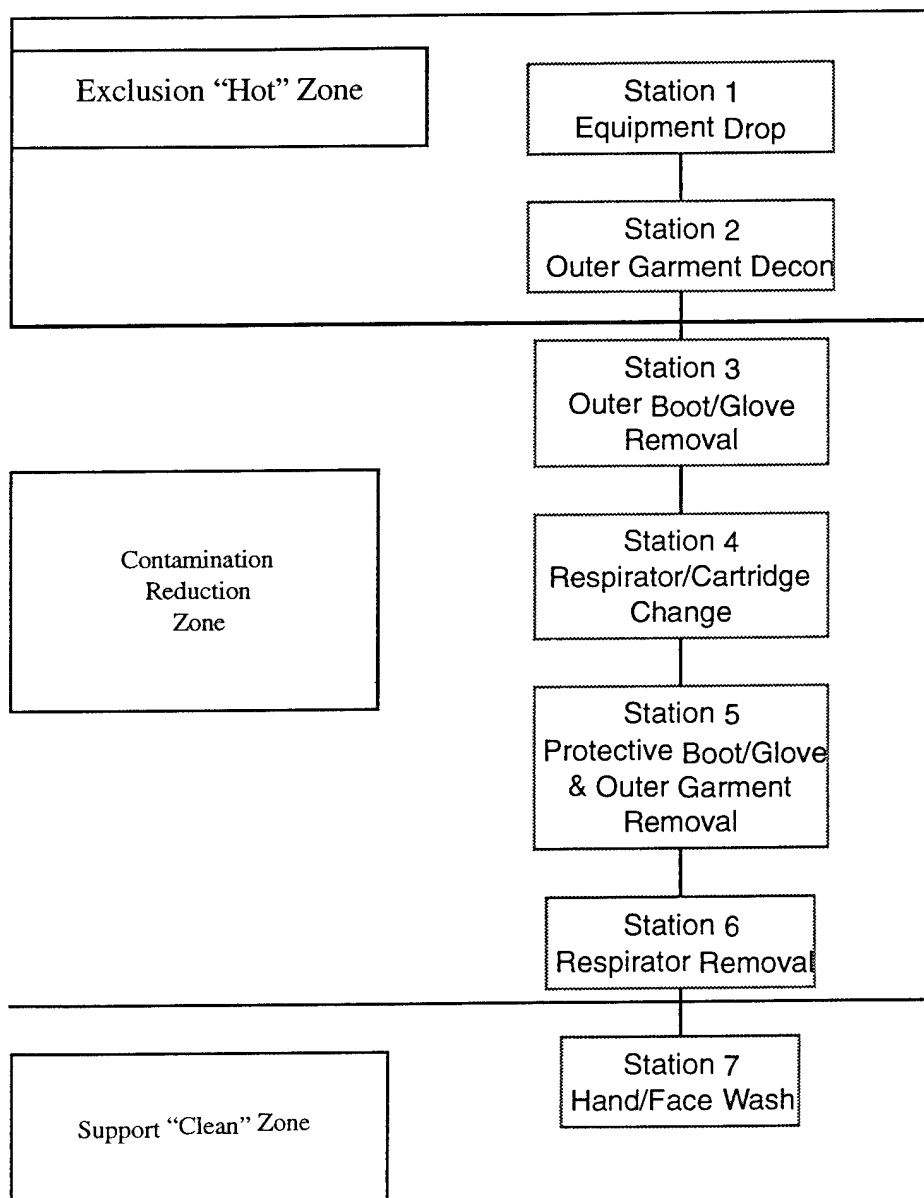
### 9.1 Standard Operating Procedures for Decontamination (Level C)

With the relatively low level hazard associated with spilled oil, the minimum recommended decontamination line required for "Level C" protective clothing will be appropriate for most operations. The typical decontamination line for exiting the contaminated area or "exclusion zone" is as follows (see Figure I of Part III):

- Station 1 (immediately inside exclusion zone): Equipment Drop - Leave equipment used on-site, e.g., air monitoring equipment, radios, sampling equipment, etc. Equipment is later retrieved by support personnel for cleaning and re-use.
- Station 2 (Hotline - at exclusion zone boundary): Outer garment decon - Exiting response personnel's protective clothing (i.e., coveralls, gloves and boots) are washed and rinsed to remove gross contamination.
- Station 3 (immediately adjacent to Station 2): Outer boot/glove removal - Washed PPE is removed as follows: Taped clothing joints are removed and discarded, boot covers are removed and discarded, outer gloves are peeled back (outside- in) to prevent contact with outside contamination.

- Station 4 (inside contamination reduction zone): Mask cartridge/canister change - If air purifying respirators are required on-site, used cartridges would be exchanged here. Personnel leaving the site would keep their respirators in place. Personnel returning on-site would be able to return on-site with fresh boot covers and outer gloves. Clothing joints are re-taped.
- Station 5: Boots, Gloves and Outer Garment Removal - PPE is removed in the following order: remove boots, remove coveralls, remove gloves (outside-in) in separate bag-lined containers. Equipment is later retrieved by support personnel for cleaning and re-use or disposal.
- Station 6: Respirator/ SCBA Face Piece Removal - Without touching the face, the mask is removed and placed in/on plastic container for retrieval and cleaning.
- Station 7: Hand/Face Washing: Hands and face are washed thoroughly.

FIGURE I. Level C Decontamination Line



## **9.2 Levels of Decontamination Protection Required for Personnel**

Personnel working in the decontamination line will be primarily dressed in Level C protection to prevent contamination by splashed material. Any downgrading of PPE for decontamination personnel will be at the discretion of the SSHO. When workers are exposed to hazardous substances which may require emergency bathing, eye washing, or any other facilities, the employer is to provide these facilities and maintain them in good working order.

## **9.3 Equipment Decontamination**

Equipment will be wiped with a cloth wetted with an appropriate detergent solution or "safe-cleaner" such as those indicated below in section 9.5.

## **9.4 Disposition of Decontamination Wastes**

Decontamination wastes will be collected for disposal with the refuse collected on-site to be properly disposed of as contaminated waste.

## **9.5 Common Low Toxicity Degreasers**

Cleaning/decontaminating solutions are easily formulated from supplies found in retail grocery and hardware stores. Common soaps and detergents work extremely well to remove gross oil/grease contamination from most objects. Suggestions of environmentally friendly ("green") and natural product cleaners which are readily available for use in sensitive environments include the following: De-Solv-It®: Orange-Sol, Inc, Chandler, Arizona; Citrasol ®: Chemco International, Inc., Greenville, SC; Simple Green®: Sunshine Makers, Inc., Huntington Harbor, CA; and Safe Solv 378 ®: AMAX, San Carlos, CA.

Before using any product on a large scale, the SSHO should confirm the inclusion of the product as being listed on the NCP Product Schedule by contacting the Emergency Response Division (OS-210), U.S. EPA, 401 M Street, S.W., Washington, D.C. 20460. The items listed above may or may not be listed on the NCP Product Schedule at present. Their inclusion here does NOT imply that the Coast Guard or EPA approves, recommends, licenses, certifies, or authorizes the use of the product on an oil discharge.

## **10.0 EMERGENCY RESPONSE/CONTINGENCY PLAN**

### **10.1 Pre-Emergency Planning**

29 CFR §1910.120 (1)(2) requires the establishment of an Emergency Response Plan. For the indicated site, emergencies may entail endangerment to workers, local or surrounding populations, or harm to the environment. The requirement is based on

the need to notify and respond to the potential release of hazardous substances. As the hazards involved in the release of *petroleum product* are relatively well known and easily managed, the response plan for any site emergency is not expected to differ greatly from routine operating procedures on-site. One condition which may require additional rapid response is uncontrolled fire in an oiled area. Another emergency situation may be due to the sudden onset of adverse weather conditions which may endanger crews at sea.

## **10.2 Personnel Roles, Lines of Authority and Communication**

In the event of an on-site emergency, response personnel will report through the normal chain of authority. The nearest Site Supervisor and SSHS will provide oversight unless superseded by a higher authority. The Site Supervisory Personnel may assign temporary roles for individuals to mitigate the circumstances of the emergency (e.g., fight small fires, assist evacuation, or provide assistance in First Aid). In the event of a fire, the SSHS will be responsible for calling for assistance from local response groups. The RRT Liaison will be initially responsible for notifying local authorities for other possible action. [Note: see UICS Organization Figure.]

## **10.3 Emergency Recognition/Prevention**

Site response personnel will be trained in their initial site orientation and/or in daily safety briefings as to appropriate response for various site issues. Occurrences of minor personal injury may involve activation of medical response through the EMS. The hazard associated with the particular injury should, however, be brought to the attention of the SSHS for notification to other site personnel to help prevent a recurrence. If an unsafe condition is noted by any response personnel, the situation should be brought to the attention of the SSHS who will make an assessment and recommendation to the on-site "Operations" supervisor for modification of procedures as necessary.

## **10.4 Safe Distances and Places of Refuge**

The vast majority of oil spill response operations for this program are expected to be conducted in open air, and the hazards are generally not of an acute nature. As such, site evacuations will not necessarily be required except under very severe conditions of fire, or adverse weather. If required, personnel will be instructed to move to collection points ~150 meters (500 feet) upwind of the hazard (as in the case of a fire or vapor hazard). Should evacuation or a operation shutdown be advised, personnel will be notified by radio or through their supervisor. Water based operations will seek safe harbor, preferable to the port of base operations or the nearest sheltered area. All crews will provide status reports by radio or on a regular basis if remaining at sea during adverse weather conditions.

## **10.5 Evacuation Routes/Procedures**

*The route to be taken off site for land/shore based operations and the personnel collection procedures to be followed will be determined by the SSHS upon designation of specific hazard areas or operations. For water operations, personnel will move upwind of any condition which might pose a potential threat to air quality (e.g., strong chemical vapor or fire hazard). As appropriate, evacuation routes from restricted areas will be posed.*

## **10.6 Site Security and Control**

*USCG personnel will be responsible for security of operations at sea. Depending upon the size of the response, the owner of the release source and hence the potentially responsible party (PRP) may provide additional security for other operations.*

## **10.7 Emergency Notification, Response and Critique Procedures**

### **10.7.1 Site Notification**

Emergencies requiring response crews to take more stringent protective measures beyond those in use during normal operations will be notified by a siren/airhorn signal system or by radio through the work area supervisor. *The exact system of notification will be determined by the SSHO upon designation of the site.*

### **10.7.2 Jurisdictional Notification**

In the event of a fire, the SSHS will be responsible for calling for assistance from local response groups. The Site Supervisor will be initially responsible for notifying local authorities for other possible action(s).

### **10.7.3 Response Critique**

Following the response event, the SSHO and the OSC's representative are responsible for calling a briefing of key individuals to review the effectiveness of the response. Comments from personnel associated with the incident will be documented for maintenance with the incident records.

## **10.8 Emergency Medical Treatment and First Aid Procedures**

Response personnel should maintain current certification in Basic Life Support (i.e., cardiopulmonary resuscitation-CPR) and First Aid and, if required in the performance of their duties, receive Blood-Borne Pathogens (BBP) training as required under 29 CFR 1910.1030 "Occupational Exposure to Bloodborne Pathogens" promulgated as a final rule on December 6, 1991. The Site Work Supervisor and/or the SSHS should be notified of the medical problem who will radio for medical assistance as required. Response personnel with current certification should provide initial support to the individual(s) in need of medical attention while site emergency medical personnel are

advised and enroute. If the medical problem is of a minor nature, the individual(s) may be transported to the nearest medical aid station.

### **10.9 Fire or Explosion**

In the event of a fire, the SSHS will be responsible for calling for assistance from the local fire response groups. Site response personnel will be evacuated to an upwind position and given further direction from the area or site supervisor. Site response personnel will render assistance only as requested from the local fire response organization. Medical assistance will be provided from both on-site support and local response as necessary to assist injured individuals and transport to emergency medical care.

### **10.10 Spills or Leaks**

Spills or leaks from the original source will be covered under the overall oil spill response plan. Secondary leaks or spills from salvaged material will be handled as material from the original source.

### **10.11 Decontamination Procedures (see section 9; pages 67-69)**

### **10.12 Emergency PPE, Other Response Equipment and Facilities**

Emergency equipment supplies will maintained under separate storage from other site necessary supplies to ensure availability in an emergency situation.

### **10.13 Site Topography/Charting**

The NOAA Scientific Support Coordinator (SSC) will be responsible for securing the requisite information for site charts and maps along with meteorological data to provide modeling of wind and sea patterns. Marine charts may be immediately available from the USCG Marine Safety Office.

## **11.0 CONFINED SPACE ENTRY PROCEDURES**

### **11.1 Definitions**

Confined spaces are considered any area in which, by design, has severely limited access or egress, and is enclosed to such an extent as to result in poor natural ventilation or as to not allow the reduction of air contaminants to concentrations below the threshold limit value (TLV). Aside from physical hazards which could result in entrapment, entry could result in injury and/or impairment due to:

- an atmosphere that is flammable or explosive;
- lack of oxygen to support life, especially as may be used by workers or equipment in conducting duties while in the space;

- the presence of toxic materials that upon contact or inhalation could cause injury, illness, or death; or
- general safety hazards such as steam, high pressure materials, or other work area hazards that could result in injury.

Examples of confined spaces include: manholes, stacks, pipes, storage tanks, trailers, tank cars, pits, sumps, hoppers, bins and cargo holds.

## **11.2 General Provisions**

As response efforts may require workers to enter confined spaces, personnel expected to enter designated areas will receive training in confined space entry. Atmospheres in the confined space will be tested prior to entry and continuously during work to ensure safe working conditions for oxygen levels, explosive vapors, and toxic contaminant levels. The USCG confined space entry program address the following elements:

- Hazards information and control,
- Employee training,
- Prevention of unauthorized entry,
- Equipment,
- Emergency rescue,
- Protection from external hazards, and
- training and duties of authorized entrants, attendants, and individuals authorizing or in charge of entry.

## **11.3 Procedure for Confined Space Entry (CSE)**

This SHP uses the U.S. Coast Guard's CSE Program as the default procedures for confined space entry. Before entry into the subject space, the work supervisor will initiate the procedure by securing a confined space entry permit form from the SSHO or his designate. And determining the following items:

- establishing the workers' specific duty to enter the confined space;
- conduct pre-assignment air monitoring to determine potential atmosphere hazards and protective equipment required;
- conduct a pre-assignment physical hazards evaluation to determine protective equipment required and potential requirements for lock-out/tag-out;
- ensure availability of protective equipment to include at a minimum safety belt or harness and lifeline for emergency evacuation;
- provide adequate ventilation and lighting support; and
- provide adequate attendance and emergency response resources.

## **12.0 SPILL CONTAINMENT AND CONTROL PROGRAM**

The discovery of any additional released material for which there had previous accounting will be reported to the SSHS, to allow air monitoring to be conducted. Information should also be relayed to the on-scene coordinators area representative to ensure plans for control and clean-up are conducted. Spills secondary to the original release source should be made known to the area operations supervisor for remediation under the operations planning group procedures. The Program includes requirements such as the placement of containment booms around transfer vessels, use of oil sorbing materials, and drumming procedures.

## **13.0 HAZARD COMMUNICATION**

Following the standards set in the USCG's Hazard Communication Plan and Program, the following information will be provided to response workers in detail during training and/or tailgate site safety briefings as appropriate:

- Health effects and chemistry of oil/petroleum products and their health critical components (i.e., Bunker C, crude oil, diesel fuel, gasoline; benzene, toluene, xylene, hydrogen sulfide, MTBE, etc.);
- Health effects of chemical dispersants;
- Thermal stress;
- Water safety (personal flotation devices);
- Physical hazards (including electrical, heavy equipment, confined spaces, trenches, shoring, excavation, etc.);
- Biological hazards;
- Slips, trips, and falls;
- Ergonomics;
- Hearing conservation;
- Worker's compensation; and
- Accident prevention and reporting.

## **14.0 ANIMAL HANDLING**

Due to the occupational health and safety hazards associated with the capture, transport, cleaning, rehabilitation, and release of oiled marine environment wildlife, workers associated with these functions will receive training and assistance in the following areas:

- Required personal protective equipment;
- Decontamination of personal protective equipment;
- Slips, trips, and falls in transport;
- Safe lifting and handling techniques of large animals;
- Water safety during capture and release of animals;
- Bites, pecks, and scratches; and



- Zoonoses (diseases transmittable from animals to man such as rabies or malaria).

### **15.0 ILLUMINATION PROGRAM**

As required under 29 CFR §1910.120 ¶ (m) and §1926.56, the USCG and any unit operating under this and the general USCG illumination program will ensure that general work areas shall have a minimum illumination intensity of 5 foot-candles. Other specifications for minimum illumination intensities for different work areas and operations will also be ensured as provided in the subject regulations.

### **16.0 SANITATION SERVICES ON-SITE**

As required under 29 CFR §1910.120 ¶ (n) for HAZWOPER and §1926.141 for permanent places, the USCG and any unit operating under this and the general USCG sanitation program will ensure that site workers are provided appropriate housekeeping, waste disposal, vermin control, water supply, toilet and washing facilities, showers, change rooms, waste disposal containers, sanitary storage, and food handling.

### **17.0 NEW TECHNOLOGY PROGRAMS**

This document defers to the USCG's New Technology Program which is referenced in 29 CFR §1910.120 ¶ (o).

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## Appendix A

### State HAZWOPER Regulations vs. Federal

The Federal OSHA Program has jurisdiction over all Local, State, Federal government employees, and private/commercial concerns. Contractors are subject to civilian regulations as covered by the applicable State or Federal regulations. The Federal OSHA Program has mandated several states' to operate their own programs. All state HAZWOPER programs follow the federal requirements for site characterization, monitoring, and personal protective equipment.

The Coast Guard's concern in the development of these plans is the coastal states and those bordering the Great Lakes and Mississippi and Missouri Rivers. The states indicated below are subjects of these plans and have Federally mandated State Programs. The other states which are the subject of these plans follow the Federal OSHA Program. These are: Alabama, Arkansas, Delaware, Florida, Georgia, Illinois, Kansas, Louisiana, Maine, Massachusetts, Missouri, Mississippi, Nebraska, New Hampshire, New Jersey, North Dakota, Ohio, Pennsylvania, Rhode Island, South Dakota, Texas, and Wisconsin.

#### ALASKA

State regulations are equivalent to, or are as restrictive as, the federal. The code numbers and regulations number are different from the federal, but the regulation is essentially the same. Oil spill response may be covered under Alaska's Subchapter 10 "Hazardous Waste Operations and Emergency Response, Occupational Safety and Health Standards" by Alaska Department of Labor, Division of Labor Standards and Safety (DLSS). Section 18.60.010 of the Alaska Statutes (AS). AS 18.60.055 established the DLSS. Subchapter 01, General Safety Code, adopted by reference in Title 8 of Alaska Administrative Code.

#### CALIFORNIA

State regulations are essentially the same as federal, except for numbering. The State program is authorized under the State of California OSHA: Department of Industrial Relations, Division of Occupational Safety and Health (OSH): "Hazardous Waste Operations and Emergency Response", General Industry Safety Orders, Section 5192, Title 8 California Code of Regulations (May 1993). The principal exception to the Federal program is found in the section of training in which the 4-hr. training doesn't appear in pre-policy and procedures statement under emergency response. [Note: see pg. 5 of CAL standard] General site workers require 40 hours of training, workers on site only occasionally require 24 hours as a minimum; workers on site in areas characterized as having no health hazards require 24 hours minimum training; and on-site managers and supervisors require 24 hours additional training.

#### CONNECTICUT

State regulations are identical to the Federal regulations. The regulations are adopted federal regulations per General Statute 31.372 for public sector employees (i.e, the same as other assigned states). State has jurisdiction over all public employees

except Federal. Although the state enforces only public sector, it does run a consultative service for both public and private sectors.

## **HAWAII**

The State mandated program is authorized under Hawaii Code Chapter 99: Hazardous Waste Operations and Emergency Response, Subtitle 8 Division of OSH, Title 12 Dept. of Labor and Industrial Relations. (§ 1-20, are essentially the same as the Federal outline) The State's program includes a definition of hazardous materials response team with a clause stating that they are expected to "use and select chemical protective clothing" and includes a definition for "immediate severe health effects" (see pg. 99-3-2). The Program stipulates the site-specific safety and health plan (part of the overall safety and health program) must address the following which is not covered in the Federal standard:

- Names of key personnel and alternates responsible for site safety and health, including a site safety and health supervisor, and the following exception...
- Paragraph (c) 2 in the Federal OSHA Program, addressing required information for site characterization and analysis part (v) "Safety and health hazards expected at the site", is omitted.

## **INDIANA**

State regulations are identical to Federal regulations. State regulations allow jurisdiction over public and private employees except federal employees who fall under the federal government. By adoption of Indiana Code 22-8-1.1-13.1 Federal OSH standards are adopted and amended.

## **IOWA**

State regulations are identical to Federal regulations. The Code of Iowa (CI) adopted the Federal standards. Several areas directly apply. Chapter 30 of CI "Chemical Emergencies-Emergency Response Commission" and Chapter 88 "Occupational Safety and Health". The State has jurisdiction over all employees, except Federal employees in which case Federal OSHA has jurisdiction.

## **KENTUCKY**

State regulations are identical to federal regulations. Kentucky OSH Standards for General Industry (29 CFR 1910 As adopted by 803 KAR 2:300 - 2:320 with Amendments as of 12/6/91, and as of November 3, 1993) and supplement [KY state differences] to 29 CFR 1910 as adopted by 803 KAR 2:015, 2:018, 2:019, 2:180, 2:200 and 2:300 - 2:320 with amendments as of 4/13/93.

## **MARYLAND**

State regulations are identical to federal regulations. Maryland Occupational Safety and Health Act (1973), accepted 7/18/85. Adopted Federal OSH Standards Title 29 CFR Part 1910 for General Industry, etc. (see above outline) - reprinted from US Dept of Labor, OSHA 1989 (OSHA pub. 3114). New Maryland listing under

COMAR (Code of Maryland Regulations) 09.12.31 and 09.12.20-09.12.22 effective 7/5/93.

### **MICHIGAN**

According to State MIOSHA personnel, the State regulations are essentially the same as Federal and have been rewritten in "Michigan" language.

### **MINNESOTA**

State regulations are identical to federal according to state staff. Chapter 182 of MN statutes, Chapter 5205.0010 states Adoption of Federal Occupational Safety and Health Standards by Reference, to include Federal Register, Volume 54, [item 2 in MN regs] No. 42, dated March 6, 1989; "Hazardous Waste Operations and Emergency Response (1910.120) - Final Rule."

### **NEW YORK**

State regulations identical to federal. NY state regulations are adopted federal regulations 1910 to section 800.3 of Title 12 NYCRR for public employee OSH standards [Labor Law, section 27-a.4(a)], PESH Public Employee Health and Safety Program. NY's Public Employee Safety Health (PESH) has jurisdiction over the entire sector of public entities, i.e., state, city county, village, hamlet, etc. OSHA has jurisdiction over the private sector.

### **NORTH CAROLINA**

State regulations identical to federal. NC OSH Hazardous Waste Operations and Emergency Response Standard (Final Rule): 13 North Carolina Administrative Code 7C.0101 (a)(26) adopted 6-6-89, as amended, effective 7-23-91, which is identical to 29 CFR 1910.120 appearing at 54 FR 9317 3-6-89 and incorporating changes appearing at 55 FR 14073 (4-13-90) and 56 FR 15832 (4-18-91). Effective 2/1/94: change in paragraph Q(6) [regarding training], establishment of another responder level: Operations plus - level between operations and technician, trained for specific offensive functions.

### **OREGON**

State regulations identical to federal. Adopted federal rules, state amendments indicted in italics. OAR 437, Division 2, General Occupational Safety and Health Rules (29 CFR 1910), Subdivision H: Hazardous Materials (1910.101-1910.120), Interim Codebook 8/92.

### **SOUTH CAROLINA**

State regulations identical to federal (29 CFR 1910) per Labor Dept OSH Subarticle 6.

### **TENNESSEE**

State regulations identical to federal. Adopted Federal OSH Standard "Hazardous Waste Operations and Emergency Response". Apparently Z1A table not adopted (needs clarification).

**VIRGINIA**

State regulations identical to federal.

**WASHINGTON**

Chapter 296-62 Part P "Hazardous Waste Operations and Emergency Response", outlined as above, [one difference: level A&B require 80 hrs. training] only other minor difference might be in the content of the training courses (i.e., training covers confined space and their confined space regulation is different than federal).

## Appendix B

### Other Potentially Applicable Federal Regulations

This Appendix presents some common health and safety requirements that are not part of 29 CFR §1910.120 that may need to be addressed prior to initiating hazardous work activities. For sites at which any of these safety requirements are applicable, the information from the regulation should be provided in sufficient detail within the Safety and Health Plan (SHP) to provide adequate protection of employees working on-site. The following are some of the more common OSHA standards that should be considered for site activities, although the list does not reflect all components of the OSHA General Industry (1910) or Construction (1926) standards.

#### **OSHA Act, Section 5(a)(1): General Duty Clause**

Under the "General Duty" clause of the Occupational Safety and Health Act of 1970, section 5(a)(1) states that each employer "shall furnish to each of his employees employment and a place of employment which are free from recognized hazards that are causing or are likely to cause death or serious physical harm to his employees."

#### **29 CFR §1904.2: Log and Summary of Occupational Illnesses and Injuries**

This regulation states the employer must provide exposure and medical records to an employee or designated representative within 15 days after the request for access to records. If the employee requests copies of this information, the employer must make the copies available to the employee at no cost. All employee medical records must be maintained for the duration of employment plus 30 years by the employer.

#### **29 CFR §1910.20: Access to Employee Exposure and Medical Records**

An employer must provide exposure and medical records to an employee or designated representative within 15 days after the request for access to records. If the employee requests copies of this information, the employer must make the copies available to the employee at no cost. All employee medical records must be maintained for the duration of employment plus 30 years by the employer.

#### **29 CFR §1910.24: Fixed Industrial Stairs**

This section contains specifications for the safe design and construction of fixed general industrial stairs. This classification includes interior and exterior stairs around machinery, tanks and other equipment, and stairs leading to or from floors, platforms, or pits. Requirements include stair length, stair width, angle of stairway rise, stairway platforms, railings and handrails, and vertical clearance. The requirements regarding stairs are very specific. For instance, 29 CFR §1910.24(h), Railings and Handrails, references 29 CFR §1910.23, which requires two standard rails (one set on each open side) if the stairway is more than four feet in height from ground level.

#### **29 CFR §1910.27: Fixed Ladders**

This regulation includes information on design requirements, specific features, appropriate clearances, special requirements (e.g., use of cages for ladder heights greater than 20 feet), and appropriate pitch when using a fixed ladder.

**29 CFR §1910.28: Safety Requirements for Scaffolding**

This regulation provides safety requirements for the construction, operation, maintenance, and use of the approximately 20 types of scaffolding.

**29 CFR §1910.38: Employee Emergency Plans and Fire Prevention Plans**

This regulation applies to all emergency action plans and fire prevention plans required by particular OSHA standards. With the exception of employers with 10 or fewer employees, both the emergency action plan and the fire protection plan are required in writing. The required elements of each of these plans are provided in the regulation. If the employer has 10 or fewer employees, the elements of both types of plans must be provided orally to the employees. The employer shall also perform housekeeping and maintenance of equipment and systems as part of the fire prevention plan.

**29 CFR §1910.95: Occupational Noise Exposure**

On many sites, different site activities (e.g., drilling operations, heavy equipment operations) may result in appreciable noise levels. It is important that area and personal noise surveys be conducted to categorize noise levels appropriately. A sound level meter that has the capability to integrate and average sound levels over the course of a work day is required. Currently, the OSHA-Permissible Exposure Limit for an 8-hour work day, 40-hour work week, is 90 decibels as recorded on a sound level meter on the A weighted scale (dBA). An employer shall implement a hearing conservation program if 8-hour time weighted average noise exposures equal or exceed 85 dBA. Continuous intermittent and impulsive sound levels of 80 dBA or greater shall be integrated into the time weighted average.

**29 CFR §1910.96: Ionizing Radiation**

This regulation covers employee protection measures related to the possession, uses, or transfer of ionizing radiation. The regulations set limitations on employee exposure to ionizing radiation and provide methods for establishing precautionary procedures and personnel monitoring, including surveys of radiation hazards, monitoring equipment, marking of radiation areas, emergency evacuation warning signals, and personnel instruction. The regulations require notification of incidents of releases, overexposure, or excessive levels or concentrations of radiation, and specify that employers must keep records of employee exposure and disclose the information upon request from a former employee.

**29 CFR §1910.101: Compressed Gases**

To the extent possible, each employer should determine, through a visual inspection, that compressed gas cylinders under his/her control are in safe condition. Other inspections are prescribed in the DOT Hazardous Materials Regulations. Specific safety requirements for handling compressed gases are found in 29 CFR §252(b).

**29 CFR §1910.133: Eye and Face Protection**

Eye and face protection is required when there is the potential for on-site injury. Particular information on goggles, spectacles and face protection is included in this



regulation. Design, construction, testing, and use of such devices must be in accordance with ANSI Z87.1-1968 specifications.

**29 CFR §1910.134: Respiratory Protection**

Prior to wearing a respirator, an employee should be certified as medically able to wear one. Each employer should have a written respiratory protection plan for selection and use of respirators. All employees must receive training in the proper use of a respirator.

**29 CFR §1910.135: Occupational Head Protection**

On-site situations requiring head protection include: presence of overhead objects on-site operation of heavy equipment, potential for flying objects in the work area, and possible electric shock hazard. In addition to protecting workers from falling or flying objects, head protection affords limited protection from electric shock and burn. Head protection must meet ANSI Z89.1-1969 specifications.

**29 CFR §1.36: Occupational Foot Protection**

Safety toe footwear for employees must meet ANSI Z41.1-1967 specifications for Men's Safety Toe Footwear. In general, workers at hazardous waste sites must wear leather or rubber boots with steel toes and steel shanks.

**29 CFR §1910.141: Sanitation**

Specifications concerning appropriate housekeeping, waste disposal, vermin control, water supply, toilet and washing facilities, showers, change rooms, waste disposal containers, sanitary storage, and food handling for permanent places of employment are provided in this regulation.

**29 CFR §1910.151: Medical Services and First Aid**

If a medical facility is not located in proximity to the workplace, there shall be a person or persons on-site with adequate first-aid training. First-aid supplies approved by a consulting physician shall be available on-site. If there is the potential for corrosive materials on-site, suitable facilities shall be available for drenching of eyes and skin.

**29 CFR §1910.165: Employee Alarm Systems**

The employee alarm system shall be recognizable to all on-site employees. The signal from the employee alarm system shall be audible to employees in the event of a need to warn employees of a need to warn employees of an evacuation from work areas.

**29 CFR §1910.181: Derricks**

Derricks attached to drill rigs must be periodically inspected. This regulation defines nine different types of derricks. Specific information is provided on inspection; frequency of inspection; lead ratings; rope use and inspection; fire extinguisher use; operation near power lines; and operating enclosures.

**29 CFR §1910.252: Welding, Cutting, and Brazing**

Detailed regulations exist for various types of welding, cutting, and brazing operations. These regulations provide specific information on types of gases, gas pressures, operations and maintenance, and safety procedures.

**29 CFR §1910.307: Hazardous Locations**

Electrical equipment used in hazardous locations must be intrinsically safe and suitable for use in the appropriate classified environment. Specified definitions of classifications and further information can be found in §1910.307 and §1910.399.

**29 CFR §1910.1200: Hazard Communication**

The employer will establish a hazard communication (aka, Right-to-Know) program to ensure that hazards associated with chemical usage are communicated to employees. The hazard communication program does not apply to hazardous wastes. There are training, labeling, and material safety data sheet (MSDS) requirements for known chemicals. Employers are required to develop a written hazard communication program that will include:

- List of known chemicals on-site;
- Methods for informing employees of chemical hazards associated with non-routine tasks;
- Methods for informing both employees and subcontractors about chemical hazards (e.g., chemical hazard training, distribution of MSDSs).

**29 CFR §1926.56: Illumination**

General work areas shall have a minimum illumination intensity of 5 foot-candles. Other specification for minimum illumination intensities for different work areas and operations are provided in this regulation.

**29 CFR §1926.57: Ventilation**

Whenever dust, fumes, mists, vapors, or gases exist or are produced in the course of construction work, their concentrations must not exceed limits specified in 29 CFR §1926.55(a). When ventilation is used, the system must be installed and operated according to the requirements of this section.

**29 CFR §1926.59: Hazard Communication**

See 29 CFR §1910.1200: Hazard Communication, above.

**29 CFR §1926.151(a)(3): Fire Prevention**

Electrical equipment and wiring for light, heat, or other power purposes must be installed in accordance with the National Electrical Code requirements, NFPA 70-1971; and ANSI CI-197. Also, smoking is prohibited at or in the vicinity of operations which constitute a fire hazard. "No Smoking" or "Open Flame" signs must be posted. In general, smoking should be limited to a designated area within the "support zone" at a hazardous waste site. This will minimize the fire hazard, as well as the transfer of contaminants to smokers' mouths.

**29 CFR §1910.1000, Subpart Z: Toxic and Hazardous**

There are other applicable OSHA standards that refer to particular air sampling procedures for chemical contaminants, PPE requirements, and recordkeeping for a variety of compounds. These compounds and their accompanying OSHA regulations are as follows:

Compound	OSHA Reference
Asbestos	29 CFR §1910.1001
Coal tar pitch volatiles	29 CFR §1910.1002
4-nitrobiphenyl	29 CFR §1910.1003
Alpha-naphthylamine	29 CFR §1910.1004
Methyl chloromethyl ether	29 CFR §1910.1006
3,3'-Dichlorobenzidine	29 CFR §1910.1007
bis-Chloromethyl ether	29 CFR §1910.1008
beta-Naphthylamine	29 CFR §1910.1009
Benzidine	29 CFR §1910.1010
4-Aminodiphenyl	29 CFR §1910.1011
Ethylenediamine	29 CFR §1910.1012
beta-Propiolactone	29 CFR §1910.1013
2-Acetylaminofluorene	29 CFR §1910.1014
4-Dimethylaminoazobenzene	29 CFR §1910.1015
N-Nitrosodimethylamine	29 CFR §1910.1016
Vinyl chloride	29 CFR §1910.1017
Inorganic arsenic	29 CFR §1910.1018
Lead	29 CFR §1910.1025
Benzene	29 CFR §1910.1028
Coke oven emissions	29 CFR §1910.1029
1,2-Dibromo-3-chloropropane	29 CFR §1910.1044
Acrylonitrile	29 CFR §1910.1045
Ethylene oxide	29 CFR §1910.1047
Formaldehyde	29 CFR §1910.1048

**29 CFR §1926.152: Flammable and Combustible Liquids**

Information on appropriate containers and appropriate storage for flammable and combustible liquids is contained in this reference. Note that no more than 25 gallons of liquid may be stored indoors unless located within an approved storage cabinet.

**29 CFR §1926.200: Accident Prevention Signs and Tags**

This regulation contains specific information on color, size, shape, and placement of danger, caution, exit, safety instruction, directional, accident prevention, and traffic signs.

**29 CFR §1926.301: Hand Tools**

Special attention should be paid to the use of safe hand tools. For example, wooden tool handles must be kept free of splinters or cracks, and impact tools, such as

wedges and chisels, must be kept free of mushroomed heads. Also, wrenches must not be used when jaws are sprung to the point that slippage occurs.

**29 CFR §1926.651: Specific Excavation Requirements**

Specific information on locating underground utilities; using support systems; securing sides, slopes, and faces; using seals, benches, rock bolts, and wire meshes; taking precautions for work adjacent to previously backfilled areas; diverting water flow from excavated areas; using explosives appropriately; using dust control techniques; and using ladders and ramps is provided in this regulation.

**29 CFR §1926.652: Trenching Requirements**

Shoring is needed when the sides of a trench are more than five feet deep and unsuitable ground or soft material is present. In addition, sides of trenches which are located in hard or compact soil must be shored when the trench is more than five feet deep and eight feet long.

**29 CFR Part 1926: Safety and Health Regulations for Construction**

29 CFR Part 1926 is divided into twenty-four specific areas addressing safety and health standards for the construction industry, some of which are described in more detail above:

- Subpart A General
- Subpart B General Interpretations
- Subpart C General Safety and Health Provisions
- Subpart D Occupational Health and Environmental Controls
- Subpart E Personal Protective and Life Saving Equipment
- Subpart F Fire Protection and Prevention
- Subpart G Signs, Signals, and Barricades
- Subpart H Materials Handling, Storage, Use, and Disposal
- Subpart I Tools -- Hand and Power
- Subpart J Welding and Cutting
- Subpart K Electrical
- Subpart L Ladders and Scaffolding
- Subpart M Floors and Wall Openings, and Stairways
- Subpart N Cranes, Derricks, Hoists, Elevators, and Conveyors

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