

World Trade Center Emergency Project

Environmental, Safety, and Health Plan

DRAFT

Revision A
30 September 2001

World Trade Center Emergency Project

Environmental, Safety, and Health Plan

Agency Participants

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NYC Port Authority
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Signature

Date

Final Approval

WTC Emergency Project ES&H Director
Name/Title

Signature

Date

Mayor's Office of Emergency Management
Name/Title

Signature

Date

Reviews

NOTICE

All agency, contractor and subcontractor personnel working at the World Trade Center (WTC) site must comply with the requirements specified in this document. Copies shall be made available to all personnel upon request.

Personnel unable to read this document must have their supervision explain the contents of the document prior to working on the site. Individuals who have questions should discuss their questions with their supervision for clarification.

If the questions cannot be answered to the satisfaction of the individual, contact a Department of Design and Construction (DDC) Safety Representative for assistance.

Any addendum to this Environmental, Safety, and Health Plan (ES&H Plan) shall be approved by all individuals (or their designee) who approved this plan.

In the event of an emergency (injury or illness, skin or clothing contamination, fatality, vehicle accident, serious property damage, spill, etc.) notify the personnel listed in Section 6.0 on this Plan (Emergency Preparedness and Response).

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APPENDICES

- A. Emergency Response Plan (ERP)**
- B. Dust Protection and Suppression Plan (Attached)**
- C. Site Logistics (Under development by Bovis)**
- D. Site Demolition Plan (Under development by Bovis)**
- E. Site Asbestos Removal Plan (Under development by Bechtel)**
- F. Spill Prevention and Response Plan (Under development by Bechtel)**
- G. Storm Water Pollution Prevention Plan (Under development by Bechtel)**
- H. Owner Controlled Insurance Program (Later)**
- I. Visitor Orientation (Attached)**
- J. Personal Safety & Health Protection Recommendations (Attached)**

LIST OF ACRONYMS AND ABBREVIATIONS

ACGIH	American Conference of Governmental Industrial Hygienists
ACM	Asbestos-Containing Material
ANSI	American National Standards Institute
BZA	Breathing Zone Air
°C	Degrees Celsius (or Centigrade)
CA	Contamination Area
CC	Command Center
CEC	Construction Environmental Coordinator
CFR	Code of Federal Regulations
CPR	Cardiopulmonary Resuscitation
dBa	Decibels, A-weighted
DDC	Department of Design and Construction (NYC)
DEC	Department of Environmental Conservation (NY-State)
DOE	Department of Energy (U.S.)
DOT	Department of Transportation (U.S.)
ES&H	Environmental Safety and Health
EPA	Environmental Protection Agency (U.S.)
ERP	Emergency Response Plan
°F	Degrees Fahrenheit
FEMA	Federal Emergency Management Administration
FDNY	Fire Department New York
ft	Foot (or feet)
GFCI	Ground Fault Circuit Interrupter
HEPA	High Efficiency Particulate Air
IDLH	Immediately Dangerous to Life and Health
IH	Industrial Hygiene (or Industrial Hygienist)
JHA	Job Hazard Analysis
kg	Kilogram
KW	Kilowatt
LEL	Lower Explosive Limit
Mg/m ³	Milligram per meter cubed
mg/kg	Milligram per Kilogram
MSDS	Material Safety Data Sheet
NEC	National Electrical Code® (NFPA 70)
NFPA	National Fire Protection Association
NIOSH	National Institute for Occupational Safety and Health
NYC	New York City
NYPD	New York Police Department
NYSDEC	New York State Department of Environmental Conservation
OSHA	Occupational Safety and Health Administration
OVAG	Organic Vapor/Acid Gas
PAPD	Port Authority Police Department (NYC)
PAPR	Powered Air Purifying Respirator

PCB	Polychlorinated Biphenyl
PEL	Permissible Exposure Limit (regulatory, OSHA-required)
PENVL	Project Environmental Lead
PFE	Project Field Engineer
PID	Photoionization Detector
PPE	Personal Protective Equipment
ppm	Parts per million
RCRA	Resource Conservation and Recovery Act
REL	Recommended Exposure Limit (non-regulatory, NIOSH recommendation only)
RF	Radio Frequency
SM	Site Manager
SOW	Scope of Work (also "Statement of Work")
SPRP	Spill Prevention and Response Plan
SWPPP	Storm Water Pollution Prevention Plan
STEL	Short-Term Exposure Limit
TLV	Threshold Limit Value (non-regulatory, ACGIH recommendation only)
TWA	Time-Weighted Average
UEL	Upper Explosive Limit
USCG	United States Coast Guard
yd ³	Cubic Yard
ug/kg	Microgram per kilogram
WBGT	Wet Bulb Globe Temperature
WEMR	Weekly Environmental Monitoring Report
WFC	World Financial Center
WTC	World Trade Center

SECTION 1.0: GENERAL INFORMATION

1.1 PURPOSE AND SCOPE

1.1.1 Purpose

This Environmental, Safety, and Health Plan (ES&H Plan) provides the minimum acceptable requirements for ensuring worker safety and health at the World Trade Center (WTC) Emergency Project located in Lower Manhattan, New York City, New York. It also addresses the necessary minimum requirements to ensure the preservation of the environment and environmental resources.

1.1.2 Scope

This ES&H Plan is directly applicable to all work conducted by Agency and Contractor personnel engaged in any activity associated with the cleanup and recovery efforts on the WTC Emergency Project.

1.2 REFERENCES

OSHA 29 CFR 1904	Recording and Reporting of Occupational Injuries and Illnesses
OSHA 29 CFR 1910	Occupational Safety and Health Standards – General Industry
OSHA 29 CFR 1918	Safety and Health Regulations for Longshoring
OSHA 29 CFR 1925	Safety and Health Standards for Federal Service Contracts
OSHA 29 CFR 1926	Safety and Health Regulations for Construction
OSHA 29 CFR 1960	Basic Program Elements for Federal Employee Occupational Safety and Health Programs and Related Matters
49 CFR	Department of Transportation

Other environmental, health and safety-related codes, standards, regulations and requirements as directed by the DDC.

1.3 SITE CHARACTERIZATION

1.3.1 Description of Site

Site Background and Location:

The World Trade Center (WTC) consisted of seven individual buildings located on and around a sixteen acre complex known as the WTC Plaza. This area is now referred to as “Ground Zero.” The Plaza area lies within the boundaries of the following streets (see Figure 1.1):

- Vesey and West Streets to the north and west
- West and Liberty Streets to the west and south

- Liberty and Church Streets to the south and east
- Vesey and Church Streets to the east and north

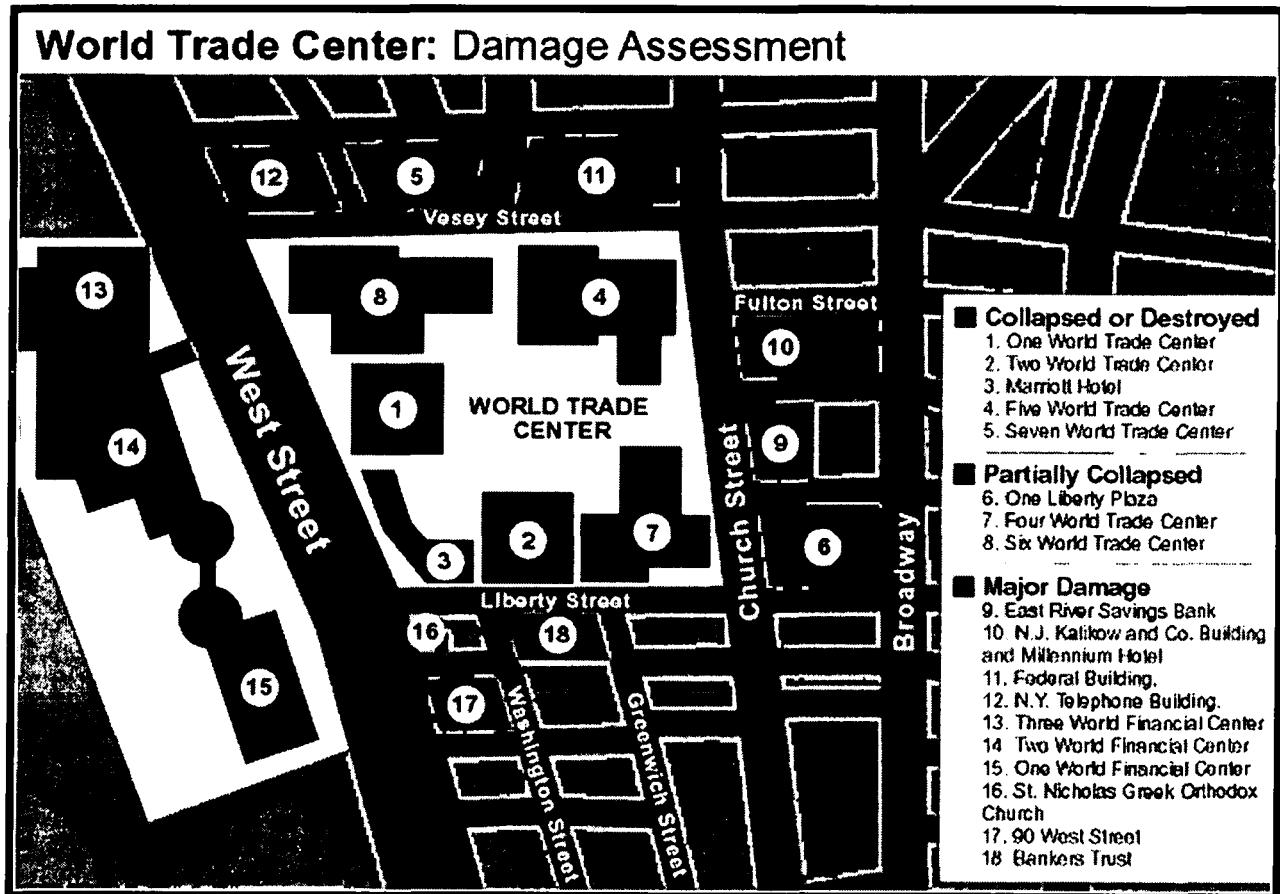


Figure 1.1: General Layout of "Ground Zero" and surrounding areas

The World Financial Center (WFC) is also located adjacent to and across the street from the WTC Plaza area, to the west of West Street. There are a number of buildings located in the WFC that sustained considerable collateral damage as a result of the collapse of WTC Buildings.

Other buildings located on the perimeter of the WTC Plaza area also sustained considerable damage or were destroyed as a result of projectile debris during the collapse of the WTC Buildings. Of primary concern are the following:

- Millennium Hilton – Church Street, east of WTC-5
- East River Savings Bank – ("Century 21 Building") – Church Street, east of WTC-4
- 1 Liberty Plaza ("Brooks Brothers Building") – Church Street, east of WTC-4
- 130 Liberty Street ("Bankers Trust") – Liberty and Greenwich Streets, south of WTC-2
- St. Nicolas Greek Orthodox Church – Liberty and West Street, south of WTC-3
- 90 West Street – West Street, south of WTC 3

- WFC-1 (“Dow Jones Building”) – West Street, west of WTC-3
- WFC-2 – West Street, west of WTC-1
- WFC-3 (“American Express Building”) – West Street, west of WTC-1
- 140 West Street (“NY Telephone”) – Corner of Vesey and West, north of WTC-6
- Federal Building – Vesey Street, north of WTC-5 and east (behind) WTC-7

Description of WTC 1 & 2:

The larger of the buildings and by far the most well-known were WTC-1 and WTC-2, more commonly referred to as the “Twin Towers.” The Towers were opened for tenancy in 1970. The following data pertains to WTC-1 and WTC-2:

Height of Towers:	1350 feet
Floor Size of Towers:	1 acre
Total Floor Space:	10 million square feet
Elevators:	104 in each Tower
Parking Garage Capacity:	2000 cars (below ground)
Shopping Mall:	More than 60 stores on concourse level (street level) and Observation Deck on 107 floor of WTC-2
Construction Materials:	200,000 tons of steel 425,000 cubic yards of concrete 43,600 windows in two Towers

FIGURE 1.2
3-D DRAWING TO BE PROVIDED HERE

WTC Work Zone Description:

The WTC Ground Zero area has been divided into four separate work zones. The boundaries of these zones has been determined based upon the four contractors who have been retained by the City of New York to clear and remove debris from the Ground Zero areas. The work zone contractors are as follows:

- Zone 1 – Tully
- Zone 2 – Bovis
- Zone 3 – Amec
- Zone 4 – Turner

Figure 1.3 shows an outline of the Ground Zero area, the four work zones, and the respective contractor agencies for each zone.

FIGURE 1.3
DRAWING SHOWING ZONES TO BE PROVIDED HERE

Contractor ES&H Programs:

Each contractor is required to complete and submit their own Environmental, Safety, and Health (ES&H) Plan. The ES&H Plan shall be submitted to the NYC Department of Design and Construction (DDC) ES&H Manager and the WTC Emergency Project ES&H Director for review and approval. The contractor ES&H plans shall describe how each respective contractor organization intends to ensure the safety and health of employees as well as the preservation of the environment. At a minimum, the contractor ES&H plans shall address this document and all federal, state and local regulations.

Each contractor is responsible for designating at minimum, a full-time ES&H manager to implement their ES&H plan requirements and to act as liaison with the DDC regarding health and safety matters. The designated ES&H manager shall be knowledgeable in appropriate safety and health practices and regulations and experienced in fulfilling health and safety functions relating to demolition, hazardous waste and site support operations as required.

1.4 POTENTIAL SAFETY, HEALTH AND ENVIRONMENTAL HAZARDS

1.4.1 Chemical Hazards

Chemicals Brought to Site:

Chemicals brought to site will meet the requirements of 29 CFR 1910.1200. A material safety data sheet (MSDS) for all chemicals used during WTC work activities will be available in the Zone where the chemical is used or stored. The potential hazards associated with these products will be mitigated through training, administrative controls, and proper use of prescribed personal protective equipment (PPE).

Table 1 is a list of the chemical substances that may be brought to the Site for use during cleanup and recovery operations at this Site and provides exposure guidelines for these chemicals. These include various petroleum-based fuels, lubricants, and oils that may be used during maintenance and repair of equipment (e.g., generators, compressors, heavy equipment, etc.). Whenever new chemicals (i.e., those not listed on Table 1) are brought onto the Site, notification to the contractor ES&H manager and/or the DDC/Site ES&H officer is required prior to initial use.

Table 1: Exposure Symptoms and Treatment – Chemicals Brought on Site

Substance	Route of Entry	Exposure Symptoms	Treatment	8-Hour TWA	STEL & IDLH	Source
Diesel Fuel	Skin Contact Eye Contact Inhalation Ingestion	Harmful if in contact with or absorbed through the skin. Contact may cause skin and eye irritation. Prolonged or repeated exposure may cause liver or blood forming organ damage. May cause skin irritation or dermatitis.	<u>Eyes</u> : Irrigate immediately. <u>Skin</u> : Flush with soap and water. <u>Inhalation</u> : Remove victim to fresh air and give respiratory support if needed. <u>Ingestion</u> : Seek medical attention.	100 mg/m ³	N/A	MSDS
Acetylene	Eye Contact Inhalation Ingestion	Headaches, dizziness leading to asphyxiation. Skin and eye contact causes frostbite.	<u>Eyes</u> : Irrigate immediately. <u>Skin</u> : Flush with plenty of water. <u>Inhalation</u> : Remove victim to fresh air.	N/A	2500 ppm (Ceiling)	NIOSH
Grease, Oils, Hydraulic Fluids	Skin Contact Eye Contact Inhalation Ingestion	May be slightly irritating to skin and eyes; inhalation may cause headache; ingestion could result in nausea and vomiting	<u>Eyes</u> : Irrigate immediately. <u>Skin</u> : Flush with plenty of soap and water. <u>Inhalation</u> : Remove victim to fresh air, provide respiratory support if needed. <u>Ingestion</u> : Seek medical.	N/A	N/A	MSDS
Gasoline <i>Petroleum distillates</i>	Skin Contact Eye Contact Inhalation Ingestion	Acute – Central nervous system effects. Chemical pneumonitis if aspirated into lungs. Chronic- Benzene is a confirmed carcinogen. Long term exposure has caused kidney and liver cancer in rats/mice	<u>Eyes</u> : Irrigate immediately. <u>Skin</u> : Flush with soap and water. <u>Inhalation</u> : Remove victim to fresh air and give respiratory support if needed. <u>Ingestion</u> : Seek medical attention.	350 mg/m ³	N/A	REL & MSDS

Other Chemicals Substances:

A number of different chemical substances and compounds were used or stored in the WTC Complex at the time of the collapse. These substances and compounds were required for various reasons, including building infrastructure and support, original construction materials, etc. Table 2 provides Chemical Exposure and Treatment information for the chemical substances and compounds that are known to have been in the WTC Complex at the time of the collapse.

It is noted that the information provided here refers to the pure form of the subject chemical. The heating of some of these materials can result in hazardous decomposition products, many of which may not be known under the extreme conditions at this Site.

Table 2. Exposure Symptoms and Treatment – Chemicals Existing at WTC Site

Substance	Route of Entry	Exposure Symptoms	Treatment	8-Hour TWA	STEL & IDLH	Source
Diesel Fuel (used for back-up generator system)	Skin Contact Eye Contact Inhalation Ingestion	Harmful if in contact with or absorbed through the skin. Contact may cause skin and eye irritation. Prolonged or repeated exposure may cause liver or blood forming organ damage. May cause skin irritation or dermatitis.	<u>Eyes</u> : Irrigate immediately. <u>Skin</u> : Flush with soap and water. <u>Inhalation</u> : Remove victim to fresh air and give respiratory support if needed. <u>Ingestion</u> : Seek medical attention.	100 mg/m ³	N/A	MSDS
Asbestos (fire resistant coating used on a variety of structural components)	Inhalation Ingestion	Acute – Not applicable. Chronic – Prolonged exposure over a period of many years has been shown to cause cancer in humans. Asbestosis and mesothelioma are most likely to occur following many years of exposure to asbestos.	<u>Inhalation</u> : Remove victim to fresh air and seek medical attention. Exposure requires medical surveillance. <u>Ingestion</u> : Seek medical attention immediately.	All forms: 0.1 fiber/cc	N/A	ACGIH
PCB (chlorodiphenyl) (constituent of some oils used in electrical transformers)	Skin Contact Eye Contact Inhalation Ingestion	Acute – May produce irritation of the nose, throat and lungs; may cause irritation of the skin and, in sensitive individuals, rash; irritating to the eyes, especially at exposure levels above 10 mg/m ³ ; ingestion leads to absorption through digestive tract, contributing to effects of long term exposure. Chronic – Burning sensation in the eyes, nose and face, and dry throat that may persist for weeks; chemical acne, black heads, dark patches on skin; possible liver damage and digestive disturbances; may impair the immune system; high doses may cause cancer.	<u>Eyes</u> : Irrigate immediately with copious amounts of water for a minimum of 15 minutes. See medical attention. <u>Skin</u> : Wash affected area with soap and water, remove contaminated clothing and wash before reuse. <u>Inhalation</u> : Remove victim to fresh air and restore breathing. Seek medical attention. <u>Ingestion</u> : Give large quantities of salt water and induce vomiting. Keep person warm and quiet. Seek medical attention immediately. (Never make an unconscious person vomit)	0.5 mg/m ³	IDLH: 5.0 mg/m ³	ACGIH
Crystalline Silica (as respirable dust)	Eye Contact Inhalation	Acute – Eye irritation Acute – Cough, wheeze, difficult breathing Chronic – Progressive respiratory symptoms, silicosis/carcinogen	<u>Eyes</u> : Irrigate immediately <u>Inhalation</u> : Remove exposed person to fresh air	0.05 mg/m ³	IDLH: 25 mg/m ³	NIOSH
Carbon Monoxide	Inhalation	Acute – Headache, nausea, rapid breathing, weakness, dizziness, confusion, hallucinations Chronic – Angina, heart dysrhythmia	<u>Inhalation</u> : provide respiratory support	50 ppm	IDLH: 1200 ppm	NIOSH
Formaldehyde	Eye contact Inhalation	Acute – eye irritant Acute – nose and throat irritation Chronic – coughing and bronchial spasms, carcinogen	<u>Eyes</u> : Irrigate immediately <u>Inhalation</u> : provide respiratory support	0.75 ppm	2 ppm (STEL)	NIOSH
PAH (Coal Tar Pitch volatiles)	Skin Contact Eye Contact Inhalation	Acute – skin and eye irritation, dermatitis Acute – Bronchitis Chronic – Skin, lung and kidney cancer	<u>Eyes</u> : Irrigate immediately <u>Skin</u> : Soap and water immediately <u>Inhalation</u> : provide respiratory support	0.2 mg/m ³	80 mg/m ³	NIOSH

Zinc Oxide	Inhalation	Acute - Metal Fume Fever, chills, muscle aches, nausea, metallic taste Chronic - Low back pain, tight chest, decreased pulmonary function	<u>Inhalation:</u> provide respiratory support	5 mg/ m ³ fume 15mg/ m ³ total dust 5 mg/ m ³ resp. dust	IDLH: 500 mg/ m ³	NIOSH
Mercury Compounds	Skin Contact Eye Contact Inhalation	Acute - skin and eye irritation, chest pain, headache Chronic - Pneumonitis, tremor, gastrointestinal distress	<u>Eyes:</u> Irrigate immediately <u>Skin:</u> Soap and water immediately <u>Inhalation:</u> provide respiratory support	0.1 mg/ m ³ ceiling	IDLH: 10 mg/ m ³	NIOSH
Arsenic	Skin Contact Eye Contact Inhalation	Acute - Respiratory irritation, dermatitis Chronic - Ulceration of nasal septum, gastrointestinal distress, carcinogen	<u>Eyes:</u> Irrigate immediately <u>Skin:</u> Soap and water immediately <u>Inhalation:</u> provide respiratory support	0.01mg/ m ³	IDLH: 5mg/ m ³	NIOSH
Nickel	Skin Contact Eye Contact Inhalation	Acute - Allergic asthma, dermatitis Chronic - Pneumonia, carcinogen	<u>Eyes:</u> Irrigate immediately <u>Skin:</u> Soap and water immediately <u>Inhalation:</u> provide respiratory support	1 mg/ m ³	IDLH: 10 mg/ m ³	NIOSH
Lead (metallic and inorganic) <i>(possibly in some paint coatings on surface structures. Also, lead acid batteries used for back-up power)</i>	Skin Contact Eye Contact Inhalation Ingestion	Acute - Lead is a cumulative poison, increasing amounts can build up in the body reaching a point where symptoms and disability occur. Note: Inhalation of large amounts may cause seizures, coma, and death. Effects of inhalation of fumes and dusts and ingestion of dusts can include decreased physical fitness, fatigue, sleep disturbances, headache, aching bones and muscles, constipation, abdominal pains, and decreased appetite; prolonged skin and eye contact may cause irritation. Chronic - Accumulation in body tissues and bones over time. Symptoms include anemia, pale skin, a blue line at the gum margin, decreased gripping strength, abdominal pain, severe constipation, nausea, vomiting, and paralysis of the wrist joint. Kidney damage is also possible; potential nervous system disorders.	<u>Eyes:</u> Irrigate immediately with copious amounts of water for a minimum of 15 minutes. <u>Skin:</u> Wash affected area with soap and water, remove contaminated clothing and wash before reuse. <u>Inhalation:</u> Remove victim to fresh air and restore breathing. Seek medical attention. <u>Ingestion:</u> Give large quantities of water and induce vomiting. Keep person warm and quiet. Seek medical attention immediately. (Never make an unconscious person vomit)	0.05 mg/m ³	IDLH: 100 mg/m ³	OSHA NIOSH

Table 2. Exposure Symptoms and Treatment – Chemicals Existing at WTC Site (continued)

Substance	Route of Entry	Exposure Symptoms	Treatment	8-Hour TWA	STEL & IDLH	Source
Cadmium Fume	Inhalation	Acute – Pulmonary edema, tight chest, headache, chills, nausea Chronic – Emphysema, anemia, carcinogen	<u>Inhalation</u> : Provide respiratory support	0.005 mg/m ³	9 mg/m ³ IDLH	NIOSH
Chromates	Inhalation Skin Contact Eye Contact	Acute – Eye, skin and respiratory system irritation Chronic – Nasal septum perforation, liver and kidney damage, carcinogen	<u>Eyes</u> : Irrigate immediately. <u>Skin</u> : Flush with soap and water. <u>Inhalation</u> : Remove victim to fresh air and give respiratory support if needed.	0.1 mg/m ³ ceiling	N/A	NIOSH
Benzene	Inhalation Skin Contact Eye Contact	Acute – Irritation of eyes, skin, nose and respiratory system, headache, nausea Chronic – Central nervous system depression, leukemia	<u>Eyes</u> : Irrigate immediately. <u>Skin</u> : Flush with soap and water. <u>Inhalation</u> : Remove victim to fresh air and give respiratory support if needed.	1 ppm 5 ppm ceiling	IDLH 500 ppm	NIOSH
Hydrogen chloride	Inhalation Skin Contact Eye Contact	Acute – Nose and throat irritation, cough, choking, dermatitis Chronic – Throat spasm, pulmonary edema	<u>Eyes</u> : Irrigate immediately. <u>Skin</u> : Flush with soap and water. <u>Inhalation</u> : Remove victim to fresh air and give respiratory support if needed.	5 ppm ceiling	IDLH 50 ppm	NIOSH
Hydrogen fluoride	Skin Contact Eye Contact Inhalation	Acute – Eye, skin, nose and throat irritation. Chronic – Pulmonary edema, skin burns, bone changes	<u>Eyes</u> : Irrigate immediately. <u>Skin</u> : Flush with soap and water. <u>Inhalation</u> : Remove victim to fresh air and give respiratory support if needed.	3 ppm	IDLH 30 ppm	NIOSH
Hydrogen sulfide	Inhalation Skin Contact Eye Contact	Acute – Eye, respiratory system irritation. Apnea Chronic – Coma, headache, dizzy, insomnia, gastrointestinal problems	<u>Eyes</u> : Irrigate immediately. <u>Skin</u> : Flush with soap and water. <u>Inhalation</u> : Remove victim to fresh air and give respiratory support if needed.	50 ppm (10 min peak) 20 ppm ceiling	IDLH 100 ppm	NIOSH
Gasoline (100 gallons in 5 gallon cans)	Skin Contact Eye Contact Inhalation Ingestion	Acute – Central nervous system effects. Chemical pneumonitis if aspirated into lungs. Chronic- Benzene is a confirmed carcinogen. Long term exposure has caused kidney and liver cancer in rats/mice	<u>Eyes</u> : Irrigate immediately. <u>Skin</u> : Flush with soap and water. <u>Inhalation</u> : Remove victim to fresh air and give respiratory support if needed. <u>Ingestion</u> : Seek medical attention.	350 mg/m ³	N/A	REL & MSDS
Freon (R-22) (used for HVAC systems)	Skin Contact Eye Contact Inhalation	Acute – Frostbite Acute – Cardiac arrhythmia, cardiac arrest and asphyxiation	<u>Eyes</u> : Irrigate immediately <u>Skin</u> : Seek medical attention <u>Inhalation</u> : Provide respiratory support	1000 ppm	5000 ppm	NIOSH
Spray Paints and Thinners	Skin Contact Eye Contact Inhalation Ingestion	Acute – Contact can cause eye/skin irritation which can lead to dermatitis; ingestion can cause gastrointestinal irritation, nausea, vomiting, diarrhea; inhalation may cause fatal chemical pneumonitis,	<u>Eyes</u> : Irrigate immediately with copious amounts of water for a minimum of 15 minutes. See medical attention. <u>Skin</u> : Wash affected area with soap and water, remove contaminated clothing and	50 ppm	500 ppm based on toluene content	MSDS

		nose and throat irritation. Chronic- Prolonged or repeated exposure may cause permanent brain/nervous system damage; xylol and toluene may cause liver and heart abnormalities in humans. Hexane may cause irreversible polyneuropathy.	wash before reuse. <u>Inhalation:</u> Remove victim to fresh air and restore breathing. Seek medical attention. <u>Ingestion:</u> DO NOT induce vomiting. Keep person warm and quiet. Seek medical attention immediately. (Never make an unconscious person vomit)			
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Solvents and Cleaners:

A broad spectrum of chemical solvents and degreasers were used by cleaning and maintenance staff. Many of these were stored in janitorial closets throughout the various levels of each WTC Building. These included but were not limited to mild detergents, bleach, solvents, paints and a variety of liquid and powder products.

1.4.2 Physical Hazards

The WTC Emergency Project is a long-term project with varied work schedules.

1.4.2.1 Cold Stress:

Cold stress and hypothermia are concerns, especially in wet weather. Other adverse weather conditions such as wind (wind chill factors – see Table 3 for guidelines) and blowing dust, rain/snow can cause workers to be distracted, preoccupied, and irritable. Other factors, such as wet clothing and pre-existing personal illnesses, can compound the effects of cold stress. Personnel will be briefed on how to recognize and identify the symptoms of cold stress during the Daily Safety Meetings, when appropriate. Personnel will be required to wear proper clothing to mitigate the effects of cold stress. Work breaks will be provided and required so that personnel may take shelter. The Zone Contractor Superintendent (or designee) and/or DDC/Site ES&H officer will observe site conditions and monitor weather forecasts to determine if work activities are to be altered or suspended.

Table 3: Wind Chill Factors

		OUTDOOR TEMPERATURE °F														
		50	47	44	41	38	35	32	29	26	23	20	17	14	11	8
WIND SPEED	0	50	47	44	41	38	35	32	29	26	23	20	17	14	11	8
	5	48	45	42	38	35	32	29	26	23	20	17	14	10	7	3
	10	41	37	33	29	26	22	18	15	11	7	3	0	-4	-9	-12
	15	37	33	28	23	20	16	12	9	5	1	-5	-10	-12	-18	-22
	20	32	29	26	20	15	12	6	3	-1	-5	-10	-16	-19	-23	-26
	25	28	25	21	17	12	8	2	0	-4	-10	-15	-20	-23	-28	-35
	30	26	23	19	13	10	6	0	-3	-9	-13	-18	-21	-26	-31	-36
	35	23	20	18	12	9	4	-2	-5	-12	-14	-20	-23	-28	-34	-40
	40	22	19	17	10	7	3	-3	-6	-13	-15	-21	-24	-29	-35	-42
	45	21	18	16	9	6	2	-4	-7	-14	-16	-22	-25	-30	-36	-43
Mph	50	20	17	15	8	5	1	-5	-8	-15	-17	-23	-26	-31	-37	-44

1.4.2.2 Heat Stress:

Heat stress is a serious concern. Heat stress monitoring should be conducted by the Zone Contractor ES&H manager, or designee, if warranted by hot weather conditions. Monitoring will be based upon approved modified Wet Bulb Globe Temperature (WBGT) values (see Tables 4a and 4b). The WBGT monitoring will be used as a guide for determining work/rest regimes in hot weather. Personnel will be briefed on how to identify the various stages of heat-induced illness (heat stress, heat exhaustion, and heat stroke) during the Daily Safety Meetings, when appropriate. Note that the use of personal protective equipment (PPE) can accelerate the effects of heat stress and workers who may already be ill can also feel the effects quicker than others. Work breaks will be taken as needed and plenty of fluids will be available on site. The Zone Superintendent (or designee) and/or the DDC/Site ES&H officer will observe site conditions and monitor weather forecasts to determine if work activities are to be altered or suspended.

Table 4a: Modified Wet Bulb Globe Temperature Values – Light Work Load
Reflects Heat Exposure Threshold Limit Values in °C and °F (WBGT)

Light Work Load*	Summer Work Uniform	Coveralls or Rain Suit No Respirators	Coveralls or Rain Suit w/PAPR or Half Mask	Coveralls or Rain Suit w/Full Face Respirator	Tyvek® No Respirator	Tyvek® w/any Respirator
Clothing Correction (°C)	0	-2	-4	-6	-6	-10
Continuous Work, (15 mn. Rest every 2 hrs)	<30.0°C <86.0°F	<28.0°C <82.4°F	<26.0°C <78.8°F	<24.0°C <75.2°F	<24.0°C <75.2°F	<20.0°C <68.0°F
75% Work/25% Rest, (Each Hour)	30.1-30.6°C 87.1-89.0°F	28.1-28.6°C 82.5-83.5°F	26.1-26.6°C 78.9-79.9°F	24.1-24.6°C 75.3-76.3°F	24.1-24.6°C 75.3-76.3°F	20.1-20.6°C 68.1-69.1°F
50% Work/50% Rest, (Each Hour)	30.7-31.4°C 87.1-89.0°F	28.7-29.4°C 83.6-84.9°F	26.7-27.4°C 80.0-81.3°F	24.7-25.4°C 76.4-77.7°F	24.7-25.4°C 76.4-77.7°F	20.7-21.4°C 69.2-70.5°F
25% Work/75% Rest, (Each Hour)	31.5-32.2°C 89.1-90.0°F	29.7-30.2°C 85.0-86.4°F	27.5-28.2°C 81.4-82.8°F	25.5-26.2°C 77.8-79.2°F	25.5-26.2°C 77.8-79.2°F	21.5-22.2°C 70.6-72.0°F

*Light Work Load: Sitting or standing to control machines, performing light hand or arm work (up to 200 kcal/hr)

Table 4b: Modified Wet Bulb Globe Temperature Values – Moderate Work Load
Reflects Heat Exposure Threshold Limit Values in °C and °F (WBGT)

Moderate Work Load*	Summer Work Uniform	Coveralls or Rain Suit No Respirators	Coveralls or Rain Suit w/PAPR or Half Mask	Coveralls or Rain Suit w/Full Face Respirator	Tyvek® No Respirator	Tyvek® w/any Respirator
Clothing Correction (°C)	0	-2	-4	-6	-6	-10
Continuous Work, (15 mn. rest every 2 hrs)	<26.7°C <80.0°F	<24.7°C <76.5°F	<22.7°C <72.9°F	<20.7°C <69.3°F	<20.7°C <69.3°F	<16.7°C <62.1°F
75% Work/25% Rest, (Each Hour)	26.8-28.0°C 80.1-82.0°F	24.8-26.0°C 76.6-78.2°F	22.8-24.0°C 73.0-75.2°F	20.8-22.0°C 69.4-71.6°F	20.8-22.0°C 69.4-71.6°F	16.8-18.0°C 62.2-64.4°F
50% Work/50% Rest, (Each Hour)	28.1-29.4°C 82.1-85.0°F	26.1-27.4°C 78.2-81.3°F	24.1-25.4°C 75.3-77.7°F	22.1-23.4°C 71.7-74.1°F	22.1-23.4°C 71.7-74.1°F	18.1-19.4°C 64.5-66.9°F
25% Work/75% Rest, (Each Hour)	29.5-31.1°C 85.1-88.0°F	27.5-29.1°C 81.4-84.4°F	25.5-27.1°C 77.8-80.8°F	23.5-25.1°C 74.2-77.2°F	23.5-25.1°C 74.2-77.2°F	19.5-21.1°C 67.0-70.0°F

*Moderate Work Load: Walking about with moderate lifting and pushing, carrying materials (200-350 kcal/hr)

1.4.2.3 Noise:

Exposure to high noise levels is a potential hazard associated with the operation of heavy equipment, power tools, generators, compressors, pumps and similar activities that may be performed by the contractors. Exposure to intermittent high noise levels exceeding accepted standards may result in hearing loss.

Whenever noise levels are measured or anticipated to exceed a time-weighted average (TWA) of 85 decibels as measured on the A scale (dBA), worker protection against the effects of noise exposure shall be provided in accordance with 29 CFR 1910.95 or 29 CFR 1926.52 as appropriate. Administrative or engineering controls shall be provided where feasible. If such controls fail to reduce exposure to below 85 dBA TWA, appropriate hearing protection shall be provided and the work area or equipment shall be posted with warning signs to alert workers to the requirement for hearing protection use.

For high noise activities (greater than a TWA of 85 dBA), a written hearing conservation program meeting the requirements of 29 CFR 1910.95 is required and shall be implemented for affected personnel.

1.4.2.4 Manual Lifting:

There will be numerous opportunities for personnel working at the WTC Emergency Project to handle/lift and move objects and structures of varying weights and sizes. Proper lifting techniques shall always be used when manual lifting is required. Personnel shall always seek assistance and/or use material handling equipment/devices when a load is determined to be too heavy or large to be safely lifted alone. Proper lifting techniques will be provided in the JHA for the task.

1.4.3 Biological Hazards

1.4.3.1 Bloodborne Pathogens:

It is known that a great number of persons perished when the various buildings located in the WTC Complex collapsed. During the course of project activities, it is possible that human remains in any variety of form and condition may be encountered. Only designated personnel are authorized to touch or handle human remains (typically, Fire Department and/or Emergency Medical Services personnel). It is also known that a Blood Bank was located in WTC-1. Subsequently, there is a potential for personnel picking up or handling debris to unknowingly contact blood or blood products that may be contaminated. Each contractor will need to ensure that appropriate gloves and an infectious disease program is established.

1.4.3.2 Bites and Stings:

A majority of the WTC work will be conducted in outdoor areas and the potential for encountering venomous animals and insects (bees, spiders) as well as other biting, non-venomous animals (birds, rats) and insects (spiders, flies), does exist. Also, due to the West Nile Virus potential in the New York area, personnel are advised to use mosquito repellent (during appropriate season). Personnel will be advised to avoid crevices, shrubs, and other areas where these creatures may inhabit. Poor lighting in many indoor areas increases exposure potential. Individuals with allergies to wasps or bees must notify the appropriate contractor ES&H manager of their condition prior to working at the WTC Site.

1.4.3.3 Bird Droppings:

Some structures at or around the WTC contain a significant amount of bird droppings. Inhalation or ingestion of bird droppings may result in several types of diseases, including psittacosis (a communicable disease, with symptoms including headache, nausea, chill and fever, and occasionally, respiratory illness) and histoplasmosis (a fungal disease caused by inhaling spores found in contaminated soils) with symptoms that include respiratory distress fever, chest pains, and a dry nonproductive cough. Work in structures containing a significant amounts of bird droppings may require the use of air-purifying respirator and disposable protective clothing.

1.4.4 Air Quality Hazards

Dust Control

There is a constant potential for dust hazards at the WTC Project. Dust generated from equipment operations or wind-borne dust will be kept to a minimum and control measures outlined in the Dust Protection and Suppression Plan (Appendix B) for the WTC Project shall be followed.

1.4.5 Radiation Hazards

General

Radiological contamination or hazards due to past activities at the site are not anticipated at any of the remedial action sites. Background monitoring has been conducted and will continue to ensure no radiation hazards are present.

1.5 WORKER ORIENTATION AND TRAINING

1.5.1 Site Orientation

The Contractor will ensure that all employees on the project attend site orientation training prior to beginning field work assignments.

1.5.2 General Training

Contractors shall provide their employees with the ES&H training required to comply with their ES&H plan, achieve compliance with regulatory standards, and other training and qualification necessary for an employee to complete the assigned job duties safely and in an environmentally sound manner.

Documentation of all required training (e.g., training certificates or attendance rosters) shall be maintained by the employer and made available for inspection. Training documentation shall be maintained in an organized manner that is readily retrievable and shows that individual workers have the required training.

All personnel have the right and responsibility to stop work anytime unsafe conditions (i.e., those that have not been previously addressed) arise, or the Scope of Work changes from that which was originally briefed or understood.

1.5.3 Site-Specific Training

Prior to commencement of field activities all personnel assigned to the project will have completed site-specific training that includes hazardous activities, procedures, monitoring, and equipment used in the site operations. Site-specific training will also include site layout, potential hazards, risks associated with identified hazardous substances at the site, hazard communication as necessary, PPE, incident reporting, emergency response actions, and available emergency services. This training allows field workers to clarify anything they do not understand and to reinforce their responsibilities regarding safety and work operations for their particular activity.

1.5.4 Substance Abuse

All Contractors shall maintain and implement a Drug Free Workplace program for site work activities performed on the project. Use, or working under the influence of alcohol or controlled substances (other than prescribed or over-the-counter medication) is strictly prohibited. Site workers are subject to substance abuse testing at any time "for cause" or following a safety or property damage incident.

1.5.5 Other Required Training and Qualifications

Other training and qualification may be required depending on the task work scope and assigned duties of an individual employee. This may include training for waste handling, hazardous materials transportation, respiratory protection, hazardous communication, noise exposure or hearing conservation, and various qualified person requirements (e.g., operation of heavy equipment, forklifts, confined space entry, excavation). Specific additional training and/or qualified person requirements will be identified through the Job Hazard Analysis (JHA) process. The employer is responsible for ensuring that identified training and/or qualified person requirements are met for site workers.

1.6 INCIDENT REPORTING AND INVESTIGATION

1.6.1 Owner Controlled Insurance Program

The WTC Emergency Project will be covered by an Owner Controlled Insurance Program (OCIP). Provisions of the plan will be provided as an appendix at a later date.

1.6.2 Incident Definition

For all Contractor activities, an incident is defined as follows:

- A work-related injury or illness
- An exposure to a hazardous substance above the allowable exposure limit
- Property/vehicle/equipment damage
- An uncontrolled fire or explosion
- An unplanned spill or release (including air releases) to the environment
- A permit or permit equivalent exceedance
- Any unexpected contact or damage to aboveground or below ground utilities
- Discovery of potential ordnance or projectiles
- A "near miss" or an unplanned event that has a reasonable probability of resulting in one of the outcomes described above had the circumstances been different, and for which modifications to management programs will reduce the probability of occurrence or the severity of the outcome.

1.6.3 Employee Responsibility

All contractor personnel have the responsibility to immediately report any incident to their supervisor. Supervisors shall take appropriate corrective action and immediately report the incident to the contractor ES&H manager and the DDC/Site ES&H officer.

1.6.4 Verbal (Oral) Notifications

In addition to immediate verbal (oral) reporting of all incidents to the DDC/Site ES&H officer, for serious incidents, the Contractor shall immediately notify the WTC Emergency Project ES&H Director.

A "serious" incident includes the following:

- Imminent danger safety violations
- Any incident involving the general public or visitors
- Discovery of potential ordnance or projectiles
- Exposure to a hazardous substance above the allowable exposure limit
- Work-related injury requiring more than First Aid
- Work-related illness
- Spills of hazardous material in excess of 1 gallon or the Reportable Quantity, including unknown or potentially hazardous soils, debris, and containers discovered on roadways. The reportable quantity for petroleum products is 25 gallons.
- Potential environmental violation
- Any cylinder discovered with unknown contents must be reported to the EPA (646-756-3136)
- Any unexpected contact or damage to aboveground or below ground utilities
- Other unusual incidents of a serious nature

1.6.5 Incident Reports

Contractors will prepare a written incident report for all incidents as described in Section 1.6.1 during the work shift when the incident occurred. The report is to be prepared by the supervisor responsible for the Contractor activity/area where the incident occurred.

1.6.6 Incident Investigations

An incident investigation shall be performed for all incidents for which a report is required. The contractor supervisor and the ES&H manager shall perform the investigation and shall include participation by others as necessary. The investigation is to be initiated as soon as possible after the incident.

1.6.7 Investigation Follow-Up

Contractors shall establish a follow-up system for all investigation findings under their control. The system shall identify the corrective action(s) to be taken, the individual responsible for each corrective action, and the date the corrective action was implemented or verified.

1.6.8 Lessons Learned

The WTC Emergency Project will develop lessons learned reports for incidents for site wide distribution as appropriate.

1.6.8 Case Management of Potential Injuries or Illnesses

Each contractor is responsible for implementing and maintaining an effective case management program for their employees that addresses potential injuries or illnesses related to work on the project. The goal of the case management program is to ensure that workers receive the appropriate level of care; that injured or ill workers return to normal work duties as soon as possible; that injury or illness records are consistently and accurately maintained; that unnecessary or fraudulent injury or illness cases are avoided; and that the contractor actively seeks to minimize the impact of any incident with respect to recordability, restricted duty, and lost time aspects.

1.7 ENVIRONMENTAL, SAFETY & HEALTH MEETINGS

1.7.1 Daily ES&H Meetings

Contractors shall conduct daily "tailgate" ES&H meetings with each work crew member prior to the start of each work shift or when the individual arrives at work. The meeting shall include a discussion of the planned work activities and periodic special ES&H topics of interest to site personnel. In addition, the following items shall also be discussed as appropriate:

- Necessary training requirements and site work rules
- Changes in work practices or environmental conditions
- Precautions or safe work practices related to the day's site activities
- New or modified site-wide procedures or requirements
- Incident alerts provided by the Project

Documentation of daily ES&H meetings shall be maintained by each contractor and made available for inspection by the Project.

1.7.2 Shift ES&H Turnover

As long as multiple shift operations are being conducted ES&H personnel schedules will allow for a shift turnover to ensure critical issues are effectively communicated at each shift change.

1.7.3 Twice-Weekly (Minimum) Contractor ES&H Meeting

Each on-site Contractor is required to attend the Project Contractor ES&H Meeting to be held a minimum of two times per week. The purpose of this meeting is to provide a forum for the exchange of ES&H-related information on a site-wide basis. It is expected that the contractor will be represented by their Site Manager, Site Superintendent, or equivalent operations management representative in addition to the ES&H supervisor.

1.7.4 Environmental Coordination Meeting

The contractor will attend frequent coordination meeting with project representatives and all other participatory federal, state, and local agencies and authorities in order to identify problems and develop/implement resolutions in a timely manner.

Environmental Monitoring/Coordination Meetings will be held between appropriate project personnel, including the SM, the CEC, Project Superintendent, and the lead subcontractor representatives. The purpose of the meetings is to discuss current and future construction activities as they relate to observation of environmental requirements. Typically, these meetings will occur as part of the Weekly Contractor Progress Review Meetings, but may be held more frequently as construction activities warrant.

Pertinent environmental data will be quickly communicated to project ES&H representatives to ensure protectiveness of workers and the surrounding residential and business areas.

1.8 RECORDKEEPING

1.8.1 Weekly Safety Report

Each contractor will submit a weekly Safety Report to the DDC/ES&H director with the following safety data:

- Name Contractor and any Subcontractors covered by the report
- Total jobhours worked during the week covered by the report for all employees
- Total number of OSHA Recordable Cases
- Number of Recordable Injuries
- Number of Recordable Illnesses
- Number of Lost-time Cases
- Number of Restricted Work Cases
- Number of Incidents as defined in Section 1.6.1
- Copy of the site first aid log if there are new entries for the week
- Weekly Sampling Reports if applicable

1.8.2 Medical Qualification and Training Records

Maintenance of employee medical and training records is the responsibility of each contractor.

1.8.3 Exposure Records

Each contractor is required to maintain employee exposure records in accordance with 29 CFR 1910.20. Personal monitoring results, related laboratory reports and calculations, and sampling data sheets may be considered part of an employee exposure record. Copies of any site work-related exposure record generated will be kept at the site by the contractor.

1.8.4 Incident Reports

Incident reports and investigation reports will be maintained at the site in accordance with Section 1.6.

1.8.5 First Aid Log

The contractor shall maintain a First Aid Log for any work-related First Aid provided at the Project. The log shall identify the company, project/task, date, employee and short description of the First Aid provided. New entries on the First Aid Log will be reported to the DDC/Site ES&H director in the Weekly Safety Report.

1.8.6 OSHA Form 200/300

The contractor shall maintain a current OSHA Form 200/300 (Log of Occupational Injuries and Illnesses) at the site covering project work. Each recordable injury or illness shall be recorded on this form within 5 workdays. A supplemental record (Incident Report and Investigation Report) is required for each entry and shall be kept with the OSHA Form 200/300.

1.8.7 Environmental Reports

The contractor shall prepare a Weekly Environmental Monitoring Report (WEMR) to summarize the environmental issues and/or incidents that have occurred during the week.

The contractor is also responsible for maintaining adequate records and documentation of compliance with environmental requirements as listed in Section 4 and appendices

1.8.8 Material Safety Data Sheets

MSDS shall be available on-site in the work zones prior to and during work activities for ready access and review by site workers.

SECTION 2.0: HAZARD INFORMATION & RISK ASSESSMENT

2.1 HAZARD IDENTIFICATION SUMMARY

Based upon the known work activities required for the WTC Emergency Project, there may be a potential for exposure to a number of hazardous conditions during the performance of the specific work. These conditions, and their potential causes, are summarized in Table 5 below.

Since these hazards are identified and addressed through the JHA process for each task, personnel involved in WTC work activities shall review and understand the applicable JHA(s) before beginning work on any WTC Activities.

Table 5: Potential Hazard/Injury Categories for WTC Emergency Project

Hazard/Hazardous Condition	Potential Cause(s)
Struck by	Moving vehicles, equipment, falling parts/debris/materials
Caught in, on, or between	Pinch points, sharp points; moving equipment, use of tools, trench
Contact with hazardous debris, materials or substances	Physical (eyes, skin, etc.); Biological (pathogens, bites, stings, etc.)
Contact with hazardous energy	Electrical, thermal, noise (equipment operations), vibration (jack hammer)
Fall to same level	Slip/trip on uneven/slippery surfaces; poor lighting (in damaged buildings)
Fall to different level	Working at heights from elevated structures (ladders, lifts, roofs, etc.)
Inhalation/Absorption	Smoke, chemical (PCB, lead, mercury, asbestos)
Strains and Sprains	Over-reaching, over-exertion, manual lifting
Psychological Stress	Disaster casualties

2.2 JOB HAZARD ANALYSIS (JHA)

2.2.1 General

The primary tool used to identify and mitigate hazards associated with individual field activities for WTC work are the Job Hazard Analyses (JHAs). These documents specifically describe the hazards associated with the work, and the mitigation measures required to either eliminate or control personnel exposure to these hazards. Therefore, while this ES&H Plan provides the general and programmatic safety information required for the WTC Emergency Project, information regarding job/task specific hazards will be found in the JHA(s).

2.2.2 JHA Preparation:

Each contractor shall prepare JHAs in accordance with the requirements outlined in their individual ES&H Plans for their organization. The JHA is typically developed and prepared by a Team of personnel.

The JHA will focus on only those job steps of any task that present a hazard to personnel health and safety. A properly completed JHA for a particular work task will provide mitigation measures for each listed hazard or hazardous condition. The JHA is typically written as a stand-alone document that provides the user (i.e., the worker) with the necessary information to properly understand each potential hazard and the measures required to control exposure to those hazards. In this regard, the hazard control measures in the JHA must be specific, clear, and concise.

Appendixes to the JHA will include any permits or documents necessary to control the hazards specified within the JHA (for example, Confined Space Entry Permit, when required).

2.3 RISK ASSESSMENT

2.3.1 Risk Control Measures

Hazard exposure risk reduction at the WTC project shall be achieved using proven administrative/management controls and, where appropriate and feasible, engineering controls. These include, but are not necessarily limited to, the following:

2.3.1.1 Administrative Controls:

1. The use of Job Hazard Analyses to identify, discuss, and resolve specific hazard exposure potential.
2. Implementation and enforcement of approved contractor operating procedures and directives for specific work activities.
3. The use of personal protective equipment (PPE), when required.
4. Employee safety training requirements (prior to work assignment).
5. The use of barriers, warning devices (signs/lights), and other measures to control employee access to hazardous locations.
6. Employee rotation.

2.3.1.2 Engineering Controls:

1. Removal/elimination (where possible) of hazards and hazardous conditions.
2. Personnel exposure monitoring (chemical, noise, temperature, etc.).
3. Substituting, wherever possible, the use of hazardous materials and/or processes with those that pose less hazards to personnel.
4. Ventilation.
5. Substitution of specialty tools where appropriate.

2.4 EXPOSURE MONITORING

General

Site monitoring shall be performed as necessary for site demolition and construction work. This section covers general site monitoring for physical and chemical hazards including air

contaminants (dust, metals, volatile organic compounds, and other specific compounds) heat stress, cold stress and noise.

Federal, EPA, NIOSH, and New York City DDC may determine minimum site monitoring requirements. Contractors are expected to conduct exposure monitoring for all employees as required by OSHA or local requirements. All exposure data must be provided to the DDC ES&H Department.

2.4.1 Required Site Monitoring

Site monitoring is required under the following conditions.

- When required by specific OSHA standards (e.g., asbestos, benzene, , lead, formaldehyde, Carbon Monoxide)
- When worker exposure is reasonably anticipated to be greater than 50% of the OSHA Permissible Exposure Limit (PELs), ACGIH TLV, or other recognized occupational exposure limit
- When necessary to verify the adequacy of hazard control measures and/or personal protective equipment, including respiratory protection
- When necessary to assess and evaluate worker exposure, or to resolve worker complaints or concerns

With the approval of the DDC/Site ES&H Director, site monitoring may be discontinued after representative initial monitoring is conducted and worker exposures are shown to be adequately controlled through the use of engineering, work practice, or personal protective equipment control measures. If work activities change so that the initial monitoring is no longer representative of worker exposure, monitoring must be reinitiated.

2.4.2 Monitoring Strategy

The construction/demolition contractor is expected to submit to the DDC/Site ES&H Director an employee-monitoring plan that reflects the anticipated task specific hazards. Where monitoring is required, the DDC IH contractor shall develop and implement a monitoring program that considers the factors that may affect worker exposure and the following elements:

- Monitoring requirements, contaminants, and monitoring equipment limitations
- Contractor-specific work locations, work activities, work practices, personnel, and equipment to be used on site
- Any additional site-specific hazard information gathered by the contractor during development of the task-specific JHA.

The monitoring strategy shall be documented in the task-specific JHA and include the type of monitoring (direct reading, personal, perimeter or area monitoring), activities or locations to be monitored, contaminants, monitoring instrumentation, monitoring methods, and frequency of monitoring as appropriate.

2.4.3 Typical Site Monitoring

2.4.3.1 Direct Reading Exposure Monitoring

Direct reading instruments for exposure monitoring are extremely useful on demolition and construction sites. The primary advantages include ease of use, ability to monitor constantly changing conditions, and the rapid detection of flammable atmospheres, oxygen deficiency, certain gasses and vapors, and physical hazards including noise and radiation.

The following are some of the instruments that may be used by the DDC contractors for exposure monitoring at the WTC site:

- Photo-ionization detector, (PID)
- Flame-ionization detector (FID)
- Combustible gas indicator (CGI)
- Specific gas monitors (e.g. oxygen, carbon monoxide, hydrogen sulfide)
- Real-time aerosol monitor (RAM)
- Radiation detection instruments
- Colorimetric indicating tubes (e.g. Draeger tubes)
- Mercury vapor analyzer
- Specialized air monitors
- Noise dosimeter
- Sound level meter (SLM)

Routine direct reading monitoring results (date/time, calibration information, results, and activities monitored) shall be recorded in the site health and safety logbook, monitoring logbook, or appropriate data sheet. Monitoring results shall be recorded initially and periodically throughout the monitoring period (e.g., every 15 minutes, when results are above background levels, when site operations or locations change, or when unexpected site conditions arise). Results of routine direct reading monitoring should be summarized and documented on the Direct Reading Monitoring Report (or equivalent) shown in Figure 2.4-1. These reports shall be submitted to the DDC/Site ES&H director as part of the weekly safety report.

2.4.3.2 Integrated Personal Air Monitoring

Integrated personal air monitoring refers to the continuous collection of a sample over a period of time for subsequent analysis, usually by a laboratory. This monitoring typically involves the use of portable sampling pumps and an appropriate collection media such as filters, or adsorption tubes. Integrated monitoring can also be performed using organic vapor monitors and other passive sampling devices.

Personal sampling and analysis will be performed in accordance with the OSHA Industrial Hygiene Technical Manual, the National Institute for Occupational Safety and Health (NIOSH) Manual of Analytical Methods, or other acceptable industrial hygiene practices. Only analytical laboratories accredited by the American Industrial Hygiene Association shall perform sample analysis. The laboratory analysis will include field blanks, as required by the individual method or laboratory. The laboratory shall also be successful participants in the NIOSH Proficiency Analytical Testing program for the appropriate analytical category. Prior to sampling, the specific sampling and analytical method should be discussed with the receiving laboratory to

determine any special requirements or variations to established methods necessary to collect an acceptable sample.

Sampling and analytical information for personal sampling shall be recorded on the Air Monitoring Data Sheet (or equivalent) shown in Figure 2.4-2. Data sheets and the corresponding laboratory analytical reports shall be submitted to the DCC/Site ES&H director as part of the weekly safety report.

2.4.3.3 Noise Monitoring

Noise monitoring shall be conducted for operations, which may exceed an 8-hour time weighted average sound level of 85 dBA (Refer also to Section). Noise monitoring shall be performed in accordance with 29 CFR 1910.95 using a SLM or noise dosimeter as appropriate.

2.4.3.4 Heat Stress Monitoring

Heat stress monitoring shall be conducted as necessary to assist in determining and maintaining appropriate work/rest regimens. Periodic physiological monitoring (e.g., pulse rate and oral temperature) may be used to verify effectiveness and modify work/rest regimens as needed.

2.4.4 Other Site Monitoring

Other site monitoring may be necessary depending on the job task or site location of the work. The contractor performing work at the WTC is responsible for identifying and implementing any additional site monitoring necessary to adequately assess and control worker exposure.

2.4.5 Data Quality Assurance

2.4.5.1 Training

Persons conducting site monitoring shall have adequate training and/or experience commensurate with the type and complexity of the monitoring program. They should be able to understand the limitations of the equipment they use proper methods of calibration, proper methods of sealing and shipping samples and the importance of chain-of-custody.

2.4.5.2 Calibration

All instruments shall be calibrated (or checked for proper function if appropriate) before use for each shift. Instrument calibration shall be documented on sample data sheets or in logbooks. Calibration checks may be necessary during the day and at the end of use to confirm instrument accuracy. Duplicate readings may be taken to confirm individual instrument response. Air sampling pumps will be calibrated with primary standards (e.g., dry calibrator or bubble-tube method).

2.4.5.3 Operation and Maintenance

All instruments shall be operated and maintained in accordance with the manufacturer's specifications. The manufacturer's operation and maintenance manual will be kept at the site work location for each type of instrument that is being used.

2.4.5.4 Sample Shipment

Samples sent to a laboratory for analysis shall be packaged to prevent damage, spillage, or leaks. An air or bulk sample data sheet with chain-of-custody information must accompany any sample shipped.

- Filter Cassettes – Filter cassettes should be mailed in a cardboard box and packed with paper. Avoid using packaging peanuts or other static producing material because the static charge will draw material away and off the filter surface. This is especially true for asbestos fiber samples. Filter cassettes shall be taped over the top and bottom to keep the plugs on the end of the cassette and to prevent sample tampering prior to analysis.
- Charcoal Tubes – Charcoal tubes should be mailed in a cardboard box and adequately packaged to prevent breakage during shipment. Bulk solutions must never be shipped in the same package as charcoal tubes.
- Bulk Samples – Bulk samples shall be packaged in labeled containers compatible with the sample and tightly sealed to prevent leaks and spills. Keep in mind that some bulk samples may be considered as hazardous materials by the Department of Transportation and have special requirements for packaging, labeling, and method of shipment.

2.4.5.5 Data Review

The designated IH Contractor Safety Representative or other qualified person will assess and interpret monitoring data and results based on standard industry practices and his/her professional judgment. All calculations performed on raw data (e.g. time-weighted-average calculations) shall be documented and reviewed by another qualified person.

2.4.5.6 Recordkeeping and Posting

The contractor performing work is responsible for maintaining adequate records of site monitoring activities, communicating or posting exposure information, and informing employees of monitoring results as may be required. All integrated personal air sampling results shall be communicated in writing to affected employees within 5 days of receiving laboratory results. All exposure monitoring and sampling results shall be maintained at the site and made available for inspection and review by the DDC designated industrial hygienist. All employee exposure records are to be kept by the employer and made available in accordance with 29 CFR 1910.1020.

2.4.6 Additional Site Monitoring Considerations

2.4.6.1 Monitoring Frequency

Monitoring or sampling frequency will be influenced by a number of factors including the following:

- frequency of contaminant release (i.e., continuously, intermittently, one time release)
- frequency of operation
- number of samples required
- number of different work groups requiring assessment
 - number of work shifts requiring monitoring.

Each of these factors should be considered to determine the monitoring frequency.

2.4.6.2 Monitoring Duration

When monitoring a worker's exposure for comparison to a published exposure limit value such as the OSHA PEL's or ACGIH TLV's, monitoring may need to be conducted over a full eight hour (or longer) work shift or a 10 to 15 minute period of time. For extended work shifts, samples should be for the shift duration and adjusted to reflect extended work duration. For asbestos, samples will be collected for maximum 8 hours during the highest expected fiber exposure, for a period of time in order to avoid overloading filters.

In some cases, monitoring may need to be continuous if there is the potential for build-up of a dangerous atmosphere. Monitoring duration can also be affected by the duration of the operation being monitored (i.e., it may only operate one hour a day) or by the length of time a worker performs an operation. Duration can also be affected by the contaminant concentration in air. Often times, higher concentrations of air contaminants will require the collection of shorter-term samples so as to avoid overloading the sample collection device being used.

2.4.6.2 Participation with DDC Sampling Program

The Contractor shall participate with the DDC sampling program by allowing sampling of personnel for a variety of potential airborne contaminants. Sampling will typically occur during both shifts and require wearing sampling pumps, media and coordinate with the sampling coordinator.

2.4.6.3 Observation of Monitoring

Observation of monitoring refers to two different aspects. First, all air monitoring needs to be checked throughout the day by the person performing the monitoring. When an air monitoring device, such as an air-sampling pump, is set-up and turned on, it needs to be checked for proper operation at least every 20 to 30 minutes throughout the day. All air-monitoring devices are subject to breakdown and tampering and thus they need to be periodically checked.

Figure 2.4-1 Direct Reading Monitoring Report Form

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Figure 2.4-2 Air Monitoring Data Sheet

World Trade Center Disaster Project				AIR MONITORING DATA SHEET			
				(Personnel Sampling) Page 1			
Employee _____				Date _____			
SSN _____				Project _____			
Company _____				Task _____			
Job Title _____				Site _____			

Pump No.							Blank
Sample No.							
Media							
Time On							
Time Off							
Total Time							
Flow Rate							
Volume							
STP Corr Volume							

Laboratory Analysis	Laboratory Used: _____			Report Nos. (attach copies) _____		
Contaminant	Result	Result	Result	Result	Result	Result

Description of Job Duties and Activities Conducted _____

Continue on separate sheet if necessary

Control Measures _____

Continue on separate sheet if

PPF Utilized _____

Continue on separate sheet if

Calibration Data					Page 2				
Pre-Calibration					Post-Calibration				
Pump	1 st	2 nd	3 rd	Average	Pump	1 st	2 nd	3 rd	Average

Chain of Custody

Relinquished by	Received by	Date & Time
Relinquished by	Received by	Date & Time
Relinquished by	Received by	Date & Time
Relinquished by	Received by	Date & Time

Additional Information

(Diagrams, calculations, other employees represented by the sample)

Sampler*:	Signature	Date:
DCC Reviewer:	Signature	Date:

*Form and calculations completed by sampler unless otherwise indicated.

2.5 ASBESTOS

Asbestos has been found in bulk and air samples taken within and outside of the rubble pile.

2.5.1 Within 25 Feet of the Rubble Pile:

Until an assessment is made, contractors shall assume workers located within 25 feet of the rubble pile are exposed to asbestos in excess of the OSHA permissible exposure limit (PEL) of 0.1 fibers per cubic centimeter as an eight hour time weighted average (TWA) and Excursion Limit of 1 fiber per cc for 30 minute sample. As a minimum, the following shall be included in the contractor's ES&H program:

- Designate area within 25 feet of rubble pile as a regulated area
- Engineering and work practice controls designed to control asbestos exposure
- Air monitoring
- Respiratory protection (including written respiratory protection program)
- Hygiene facilities and practices (including shower facilities, clean change rooms, etc.)
- Training
- Housekeeping
- Medical surveillance

In the event a contractor makes a negative exposure assessment, the DDC safety office shall be notified within 24 hours of such a determination. After a negative exposure assessment has been made, whenever there is a change of equipment, process, control, personnel or a new task has been initiated that may result in an increased exposure to asbestos, the employer shall conduct additional monitoring to reevaluate asbestos exposure.

2.5.2 Greater than 25 Feet from the Rubble Pile:

A significant percentage of bulk dust samples taken from locations throughout the financial district have been found to be positive for asbestos. All settled dust located outside the 25 foot radius of the rubble pile shall be treated as asbestos containing until bulk sampling indicates dust being cleaned is not asbestos containing ($> 1\%$ asbestos). Clean up operations involving asbestos containing dust shall be considered Class IV asbestos work and shall be conducted by workers using proper protective equipment and work practices (i.e., wet methods, dry sweeping prohibition, use of hepa vacuums, etc.). Contractor employees destined for such asbestos clean up shall be trained in asbestos hazards and proper clean up procedures.

Contractors shall comply with OSHA asbestos standard 1926.1101.

2.5.3 Other Standing Structures Requiring Asbestos Removal

All standing structures requiring demolition shall be assessed for the presence of asbestos prior to demolition. All asbestos removal conducted in standing structures shall be done in accordance with 29 CFR 1926.1101.

2.5.4 Landfill Operations

Section 2.5.1 also applies to potential ACM at the disposal site. Dust protection measure outlined in the Dust Protection Plan should also be used.

2.6 LEAD

Steel and other building substrates have been determined to either contain lead, or be covered with lead containing protective coatings. Contractors performing operations such as, but not limited to, welding, torch cutting, torch burning, etc., may expose workers to lead in excess of the OSHA permissible exposure limit. Contractors performing such operations shall comply with the OSHA lead standard 1926.62. Until a negative exposure assessment is made, at a minimum, contractors shall provide the following:

- Designation of the area within 25 feet of the rubble pile as a regulated area
- Engineering and work practice controls
- Written Lead Compliance Program
- Respiratory protection (including a respiratory protection program)
- Protective work clothing and equipment
- Proper housekeeping practices
- Hygiene facilities and practices (including shower facilities, change rooms, etc.)
- Medical surveillance
- Employee training

In the event a negative exposure assessment is made by any contractor, the DDC safety office shall be notified within 24 hours of such an assessment. Whenever there is a change of equipment, process, control, personnel or a new task has been initiated that may result in employees being exposed to lead above the action level or PEL, the employer shall conduct additional monitoring as required by 29 CFR 1926.62.

2.7 MEDICAL SURVEILLANCE

All personnel working at the WTC Emergency project are expected to be medically qualified to participate in the task. Medical qualification will be determined by the responsible medical officer for the employer. Employees participating in lead or asbestos work will follow OSHA requirements. Personnel using respirators shall be medically evaluated by a Licensed Health Care Professional on an annual basis.

In the event of a chemical exposure or injury involving hazardous or contaminated materials, the injured worker will require evaluation by a Health Care Professional. Additional monitoring will be at the discretion of the Medical Officer for the employer.

SECTION 3.0 GENERAL HEALTH & SAFETY REQUIREMENTS

3.1 PERSONAL PROTECTIVE EQUIPMENT (PPE)

PPE shall be selected, used, maintained, and stored in accordance with 29 CFR 1910 Subpart I, 29 CFR 1926 Subpart E, and the manufacturer's recommendations. Engineering, administrative, and/or work practice controls shall be implemented where feasible, rather than relying exclusively on PPE. At a minimum, the following PPE shall be worn in the following Work Zones.

3.1.1 WTC Work Zones 1 - 4

Minimum PPE:

During all work associated with the demolition, cleanup, and recovery effort in all WTC Zones, personnel entering the Zone(s) will be required to wear the following minimum PPE:

- Safety shoes that provide adequate protection from the hazards present in Zones 1-4.
- Safety glasses, goggles, or other suitable eye protection
- Hard hat
- Long sleeve shirts and full-length trousers or coveralls
- Protective gloves appropriate for the task being performed
- High visibility vests
- Half mask respirator with Organic Vapor/Acid (OVAG) Gas Cartridges and P-100 Pre-filter

Hearing protection may also be required when exposure to noise levels exceeds that established under Section 1.0 (Physical Hazards), Paragraph 1.4.2 (Noise), of this ES&H Plan.

Personnel sitting within the cab of equipment or vehicles that are equipped with overhead protection are not required to wear hard hats.

3.1.2 Non-Zone Work Activities – Within 25 foot Perimeter

Minimum PPE:

For work not involving access into the specific WTC Zones, but within 25 feet of a Zone boundary, the following minimum PPE is required:

- Safety shoes that provide adequate protection from the hazards present within 25 feet of a Zone boundary
- Safety glasses, goggles, or other suitable eye protection
- Hard hat
- Long sleeve shirts and full-length trousers or coveralls
- High visibility vests
- Half mask respirator with P-100 filter

Hearing protection is required when exposure to noise levels exceeds that established under Section 1.0 (Physical Hazards), Paragraph 1.4.3 (Noise) of this ES&H Plan.

Personnel sitting within the cab of equipment or vehicles that are equipped with overhead protection are not required to wear hard hats.

3.1.3 Non-Zone Work Activities – Beyond 25 foot Perimeter

Minimum PPE:

For work not involving access into the specific WTC Zones, and beyond 25 feet of a Zone boundary, the following minimum PPE is required:

- Safety shoes that provide adequate protection from the hazards present beyond 25 feet of a Zone boundary
- Safety glasses
- Hard hat
- Long sleeve shirts and full-length trousers or coveralls
- High visibility vests
- Dust mask (personal preference)

3.1.4 Selection and Use of PPE

Selection and use of PPE shall be based on the performance characteristics of the PPE and task or site-specific hazards. PPE selection and use shall be documented in the contractor's JHA. Documentation in the JHA shall meet certification requirements of 29 CFR 1910.132 regarding hazard assessment, activities evaluated, person certifying the evaluation, and the date of the assessment.

The minimum PPE initially identified for each Zone and area may be changed based on field reconnaissance, results of site monitoring, or additional hazard analysis.

3.1.5 Maintenance and Storage

Assigned PPE shall be maintained and stored in a clean and sanitary manner. Contractors shall ensure that adequate facilities and supplies for cleaning, maintenance, storage, and issue of PPE (including respiratory protection) are made available for these activities at the work location or in a centralized area.

3.1.6 Training

Appropriate training shall be provided to PPE users and training shall be documented as required by Section 1.5. All respirator users shall be adequately trained in proper use of assigned respirators and the applicable respiratory protection program procedures. Personnel responsible for respirator cleaning, storage, maintenance and issue shall be provided additional training as necessary to ensure that respirator program requirements are met. All respiratory protection training shall meet the requirements of 29 CFR 1910.134.

3.1.7 Respiratory Protection

A written respiratory protection program meeting the requirements of 29 CFR 1910.134 is required for each contractor using respiratory protection at the site. Contractors shall submit a copy of their written respiratory protection program for review by the DDC/Site ES&H director or designee prior to respirator use.

3.2 CONFINED SPACE ENTRY

All confined space entries shall be controlled through the use of a permit system (Note: this includes spaces that meet the OSHA definition of nonpermit-required confined spaces). Contractors shall comply with the Confined Space Entry requirements specified in 29 CFR 1910.146. Contractors shall comply with their own confined space entry program, the use of which requires review and approval by the WTC Emergency Site ES&H director or his designee.

3.3 EXCAVATION, TRENCHING AND PENETRATION

Intrusive soil activities are defined as "any man-made disturbance of the ground such as a cut, cavity, excavation, trench, or depression in the earth's surface formed by earth removal, regardless of dimensions, which produces unsupported soil conditions." All intrusive soil activities shall be conducted in accordance with 29 CFR 1926, Subpart P.

Contractors shall ensure that all personnel performing work in an excavation have awareness training which includes a discussion of the hazards and control measures associated with underground utilities, cave-ins, access and egress, use of protective systems (benching, shoring, sloping, trench boxes), potential atmospheric hazards, equipment operations hazards, water accumulation hazards, stability of adjacent structures, and the contractors excavation inspection program.

Contractors shall assign a competent person to each excavation where a hazard to personnel, equipment or facilities may exist. The competent person shall be available on-site (at the excavation area as necessary) and involved in all important aspects of planning and executing excavation work including soil classification, identification and use of protective systems and permit approval.

Contractors shall ensure that all employees in an excavation are protected from cave-ins by an adequate protective system for all excavations which are at least 5 feet or deeper, and for excavations less than 5 feet where examination by a competent person indicates a potential for cave-ins. A JHA shall be developed for personnel who are working in and around an excavation that is 4 feet or deeper or where the potential for cave-in is present. Excavated materials (spoils) shall be placed a minimum distance of 2 feet from the edge of the excavation.

A means of egress shall be provided, every 25 feet of lateral distance, from all excavations 4 feet or greater.

3.4 DEMOLITION SAFETY

All demolition operations (including use of explosives) shall at a minimum meet the requirements of 29 CFR 1926 Subpart T.

Contractors shall develop a demolition plan, for review and approval by the WTC Emergency site ES&H director or designee, that addresses the specific hazards and work steps of specific demolition projects. The plan shall be reviewed and approved prior to the start of the demolition of any existing structures.

3.5 CRANE AND HOISTING OPERATIONS

Crane operations shall be conducted in accordance with 29 CFR 1926.550, Cranes and Derricks. Rigging of loads being lifted by cranes shall comply with the requirements of 29 CFR 1926.251, Rigging Equipment for Material Handling. Contractors shall develop a lift plan for each lift that meets any of the following conditions:

- The weight of the lift exceeds 75 percent of the crane's rated capacity in the configuration that will be used during the lift
- Lifts for which the path of travel is out of the operator's view
- Lifts made with more than one piece of lifting equipment
- Lifts involving non-routine or difficult rigging arrangements
- Hoisting of personnel with a crane or derrick shall be done in accordance with 29 CFR 1926.550 (g)
- Lifts involving high value items where damage would result in an unacceptable financial or production loss
- Any lift which the lifting equipment operator believes should be considered critical

If adverse weather conditions affect the safe operations of cranes, all hoisting and rigging operations shall cease.

3.6 CONSTRUCTION EQUIPMENT SAFETY

Use and operation of construction equipment such as motorized vehicles, heavy equipment, water trucks, and haul trucks (excluding passenger vehicles and pickup trucks) shall meet the following requirements:

- On-site equipment shall meet the requirements of all relevant OSHA standards.
- Equipment will be inspected by the Contractor designee upon arrival and prior to use. Deficiencies found shall be corrected before use.
- Operators shall complete inspections on all construction equipment prior to use each day to ensure that parts, accessories, and equipment are in safe operating condition and free of apparent damage.

- Operators of over-the-road vehicles such as haul trucks and water trucks must possess a valid commercial driver's license (CDL) if a CDL is normally required when operating such vehicles on public roads.
- Eating, drinking, smoking and use of personal cellular telephones and radios are prohibited when operating construction equipment in active work areas.
- Construction equipment operators shall have the experience, skills and knowledge to safely operate the equipment to be used.
- Construction equipment used for demolition or materials handling shall be equipped with demolition cage, wire screen, or equivalent structures to prevent materials or debris from breaking cab windows where the potential for window breakage hazards exists. Construction equipment shall be equipped with operable audible backup indicators.
- Personnel in areas in which heavy equipment is being operated shall wear high visibility (e.g., orange) traffic safety vests and make eye contact with the operator before approaching.
- Employees shall only be transported in vehicles meeting the requirements of 49 CFR 571. Vehicles used to transport personnel shall have seats firmly secured and adequate for the number of employees to be carried. Seat belts and anchorages meeting the requirements of 49 CFR 571 shall be installed in all motor vehicles.

3.7 WORKING FROM ELEVATED SURFACES/STRUCTURES

On hundred percent (100%) fall protection in accordance with 29 CFR 1926 Subpart M is required. Personnel may be required to work on elevated structures to access Ground Zero areas and peripheral locations to inspect and/or conduct analyses of damaged structures. Others may be required to work at elevated heights during demolition of certain areas within a work Zone. These elevated structures may include ladders, scaffolding, scissors lifts, elevating/rotating boom lifts (aerial work platforms), man baskets, etc. Also, cleanup work may require personnel to access and survey roof areas and other elevated structures of buildings adjacent to the WTC Complex. These areas may not offer tested tie-off locations for fall protection. There are also a number of obstacles located on the various roof levels (e.g., air handlers, compressors, piping, vent stacks, etc.).

Aerial lifts shall be operated in accordance with the requirements of 29 CFR 1926.453 and manufacturers recommendations. All aerial lifts shall be inspected prior to use. Documentation of inspections shall be available upon request.

3.8 ELECTRICAL SAFETY

All electrical equipment including extension cords, generators, electrical power tools, light plants, temporary lighting, etc. shall be used, maintained, and inspected in accordance with 29 CFR 1926 Subpart K.

In addition, all construction zone 110 volt outlets shall be equipped with GFCI protection.

3.9 HAND TOOLS

Use of hand and power tools presents the potential for user abrasions, cuts, amputations, electric shock, burns, crushing, vibration, and puncture wounds. Portable hand-held and/or electrical tools shall be inspected before each use for defects such as, but not limited to, cracked handles/housing, damaged cutting edges, splitting or cracking parts, and broken adjustment components. Damaged or defective tools are to be reported to the Zone Superintendent and taken out of service. All electrical powered tools shall be double insulated or grounded in accordance with the National Electrical Code® (NFPA-70). Tools shall be used only for their intended use and any tool with a cut or frayed electrical cord, and/or missing guards will be removed from service. Only properly trained personnel will use and operate power tools. Ground fault circuit interrupters (GFCI) will be used for portable generators in excess of single-phase 5 KW. The GFCI will be trip-tested daily.

3.10 LOCKOUT/TAGOUT

Lockout/Tagout of hazardous energy sources shall be controlled using permit systems and applicable requirements as described in the following OSHA standards:

- 29 CFR 1910.147 – The Control of Hazardous Energy (Lockout/Tagout)
- 29 CFR 1926.417 – Lockout and Tagging of Circuits
- 29 CFR 1910, Subpart S – Electrical
- 29 CFR 1926, Subpart K – Electrical
- 29 CFR 1910.331 – Safety – Related Work Practices
- 29 CFR 1926, Subpart G – Signs, Signals and Barricades

The contractors shall maintain and implement as part of their Lockout/Tagout program:

- A current written Lockout/Tagout program which covers the work to be performed
- A Lockout/Tagout training program that includes annual training and updated training whenever there is a change in the work environment
- A written procedure or JHA for each unique machine or piece of equipment that requires Lockout/Tagout

3.11 ILLUMINATION

Lighting for all demolition activities shall at a minimum meet the requirements of 29 CFR 1926 Subpart C. Contractors shall provide documentation of illumination testing and results upon request.

3.12 MATERIAL HANDLING

Material handling shall be performed in accordance with 29 CFR 1926.250. Stacking and storing of materials shall not pose hazards to site personnel or impede truck or equipment routes.

3.13 FIRE PROTECTION AND PREVENTION

At a minimum, the following fire and protection measures shall be implemented:

- Smoking is allowed in designated smoking areas only.
- All work operations shall comply with the requirements of 29 CFR 1926, Subpart F, Fire Protection.
- A minimum 10 lb. type ABC fire extinguisher shall be provided within 75 feet of storage areas at which more than 5 gallons of flammable or combustible liquids or more than 5 pounds of flammable gas are being stored.
- Fire extinguishers shall be installed in all occupied job trailers and equipment.
- Fire extinguishers shall be inspected and maintained monthly and equipped with inspection tags.
- Flammable and combustible liquid and gas storage and dispensing areas shall be posted "No Smoking or Open Flame."

3.14 FLAMMABLE AND COMBUSTIBLE LIQUIDS

Dispensing of flammable and combustible liquids shall comply with 29 CFR 1926, Project Spill Prevention Containment Control Plan and the following:

- Refueling areas shall be located at least 25 feet from other operations and storm water drains.
- Spill containment, collection and cleanup materials shall be readily available in refueling areas.
- Transfer containers shall be electrically bonded together.
- All spark-producing equipment in the immediate vicinity of flammable liquid dispensing operations shall be shut down. Adequate cool-down time for generators, pumps, and other portable equipment shall be provided prior to refueling.
- Pressure buildup in portable fuel cans shall be relieved away from hot surfaces and spark-producing equipment.
- Dispensing nozzles shall have an automatic shutoff and no "latch open" devices.
- Disconnect switches for refueling equipment shall be located away from refueling operations.
- Smoking and spark-producing equipment or tools are prohibited in the fueling area.
- A fire extinguisher rated no less than 20 lb, type ABC, shall be securely placed between 25 and 75 feet from each refueling operation.
- Only properly labeled and approved safety containers shall be used for handling and storage. Flammable storage cans shall not be stored in direct sunlight.

- For indoor storage of flammable liquids, no more than 25 gallons of flammable liquids may be stored outside of a flammable cabinet, so long as the material is stored in 5-gallon safety cans, and with a minimum 10 lb type ABC fire extinguisher within 25 feet.
- A fire extinguisher rated no less than 20 lb, type ABC, shall be securely placed between 25 and 75 feet from outside storage of flammable materials (e.g., 5-gallon safety cans of gasoline).
- Exits and other means of egress shall not be used for storage.
- All non-bulk materials shall be stored in a flammable cabinet. Stored quantities shall not exceed 60 gallons per cabinet. No more than three cabinets shall be placed in a single area.
- Outdoor portable tanks shall be separated by a 5-foot clear area.
- A 12-foot-wide access shall be maintained for fire equipment to reach outdoor storage areas.
- Outdoor storage areas shall be maintained free of weeds, rubbish, and other fuel sources.
- Outdoor storage tanks shall have adequate venting capacity.

3.15 CUTTING AND WELDING

All cutting and welding operations shall be performed in accordance with 29 CFR 1926 Subpart J. PPE worn during cutting and welding operations shall follow the requirements of Section 3.1.4.

3.16 WORKING OVER OR NEAR WATER

All employees working over or near water, where the danger of drowning exists, shall be protected in accordance with 29 CFR 1926.106. At a minimum, personnel working over or near water shall be provided:

- U.S. Coast Guard approved life jacket or buoyant vest.
- Ring buoy with at least 90 feet of line
- Manned life saving skiff

3.17 MARINE OPERATIONS

Removal of materials from the WTC Project that involves marine operations will, at a minimum, meet the requirements of 29 CFR 1926.605. A JHA shall be developed by the contractor for specific tasks associated with marine operations.

3.18 ORDINANCE AND EXPLOSIVES

In the event that a suspected ordnance or explosive device is encountered, site personnel shall stop work mark the area and immediately vacate to a safe location. At this time employees shall notify their direct supervisor or any ES&H team member. Once the proper authorities are notified, a JHA will be written. Only qualified ordnance or explosive specialists shall be allowed to proceed into the area and address the item(s). Ordnance specialists will determine when work can resume in the area.

3.19 PERSONAL HYGIENE AND CLEANLINESS

3.19.1 Prevention Practices

Contractors shall consider the cleanliness of personnel, tools and equipment in planning work activities at all field locations. Implementation of good personal hygiene and cleanliness practices will assist in preventing worker exposure and spread on dusty material. Procedures shall include the following:

- Do not walk through areas of obvious dust.
- Do not directly handle or touch dusty materials.
- Make sure there are no cuts or tears in PPE.
- Fasten all closures in suits and cover them with duct tape, if appropriate.
- Take particular care to protect any skin injuries.
- Stay upwind of airborne dust, where possible.
- Do not eat or drink in dusty work areas.
- Do not carry food, beverages, tobacco, or flame-producing equipment into dusty work areas.
- Minimize the number of personnel and amount of equipment in dusty areas to that necessary for accomplishing the work.
- Choose tools and equipment with nonporous exterior surfaces that can be easily cleaned.
- Cover monitoring and sampling equipment with clear plastic, leaving openings for the sampling ports, as necessary.
- Minimize the amount of tools and equipment necessary in dusty areas.

3.19.2 Cleaning of Personnel /Personnel Equipment

All personnel exiting zones in dusty areas shall move through a personnel cleaning station. The station will be set up in designated zones and will have adequate equipment and facilities to clean personnel, reusable protective clothing, respirators, small equipment, and tools or will properly containerize contaminated materials (disposable PPE, gross debris, and liquids). At a minimum, face and hand washing facilities are required when site-located shower facilities are not specified.

3.19.3 Cleaning of Personnel During Medical Emergencies

Standard personnel cleanliness practices will be followed whenever possible. For emergency life saving first aid and/or medical treatment, normal cleaning procedures may need to be abbreviated or omitted. In this situation, site personnel shall accompany victims to advise emergency response personnel on potential issues present and proper cleaning procedures.

Outer garments may be removed if they do not cause delays, interfere with treatment, or aggravate the problem. Protective clothing can be cut away. If the outer garments cannot be safely removed, a plastic barrier between the individual and clean surfaces should be used to help

keep the inside of ambulances clean. Outer garments can then be removed at the medical facility.

3.20 SLIP/TRIPS/FALL HAZARDS

Most of the work areas within each Zone have walking surfaces that are uneven or otherwise present a tripping hazard to personnel. This is one of the most prevalent hazards associated with work at the WTC Emergency Project. Slip, trip, and fall hazards will be properly discussed during Daily ES&H Meetings.

3.21 HOUSEKEEPING

Good housekeeping practices are the responsibility of every person assigned to the project. Since the WTC effort is a long-term demolition and recovery activity, the potential for housekeeping safety issues will increase as the project progresses. Awareness of such hazards is a major factor in the prevention of housekeeping-related accidents and decreasing fire hazard concerns. Construction materials shall be stored or placed in an orderly manner and work areas shall be checked at the end of each shift to ensure adherence to this requirement. Because this is an active Crime Scene and the debris may be screened and analyzed, it will be important to dispose of all garbage in the trash containers so new materials do not get mixed into the rubble.

SECTION 4.0: ENVIRONMENTAL CONTROL MEASURES

4.1 GENERAL REQUIREMENTS

Cleanup and recovery activities will be performed in a manner protective of the environment. Activities will also be conducted in accordance with applicable environmental laws and regulations, and will implement generally-accepted practices. Environmental awareness training to instruct project personnel on specific environmental issues will be part of general worker training previously discussed in Section 1.5. Adherence to the environmental control measures will be assured by periodic compliance monitoring.

4.1.1 Environmental Issues and Mitigation Measures

Potential environmental impacts on the WTC project include, or may relate to, dust, vehicle/equipment emissions, noise, unanticipated discoveries, hazardous materials management, hazardous and non-hazardous solid waste management, spills, and stormwater management and sediment control. These potential impacts are discussed further below, along with associated mitigative controls.

4.1.1.1 Dust Control

Dust control is a major concern at the site. Field activities have the potential to generate and spread significant amounts of fugitive airborne dust into the surrounding residential communities and business districts. If left uncontrolled, dust may be further spread along transportation corridors to disposal sites. To control and minimize the generation and spread of dust during debris/dust removal, loading, and transport to disposal sites, contractors will follow the conditions in the World Trade Center Emergency Project Dust Protection and Suppression Plan for Post Disaster Search/Rescue, Demolition, and Cleanup (Appendix B). If asbestos is determined to be above the OSHA action level, the plan may be superseded by requirements described in Section 2.5.

4.1.1.2 Vehicle/Equipment Emissions

Vehicle and equipment emissions pose a potential threat to workers and the environment. Contractors are responsible for performing regular visual vehicle and equipment inspections to ensure original equipment manufacturer's air pollution control equipment is installed, functioning properly, and maintained.

4.1.1.3 Noise

The contractors will implement noise control strategies to minimize the impact from noise for atypical events (e.g., blasting). Prior to conducting blasting or atypical noise activity, the contractor will notify DDC/Site ES&H Officer in order to provide adequate notice to local residents and businesses.

4.1.1.4 Unanticipated Discoveries

If structures, containers, or discolored/odiferous soil are identified, the contractor will immediately stop work, barricade or flag the area, and then notify the EPA Emergency Response Team at (646) 756-3136 and field ES&H representative. The ES&H representative will notify DDC/DEC of the discovery. Work will resume only after the DDC/DEC investigates, takes

corrective action, performs the necessary agency notification and reporting, and provides a written authorization to the contractor that the site is cleaned so that field activities can proceed.

4.1.1.5 Hazardous Materials Management

Contractors will manage all petroleum products and chemical materials (referred to as "hazardous materials") in such a manner, as to minimize the potential threat to human health and the environment. Handling and storage of hazardous materials will adhere to the manufacturer's product specific requirements. This will include secondary containment when appropriate and maintaining a safe distance from a sensitive area (e.g., storm drains and drain paths). At a minimum, hazardous materials may not be stored within 25 feet of sensitive areas. All stationary fuel tanks will have secondary containment and will be managed to prevent spills. All hazardous material containers shall have the proper labeling, as provided by the manufacturer. Contractors will adhere to World Trade Center Emergency Project Spill Prevention And Response Plan (SPRP) (Appendix F). Each contractor must submit (and update as necessary) a list of hazardous materials to the ES&H Director for all materials on site during the course of their work. In addition, contractors will maintain copies of Material Safety Data Sheets (MSDS) for all chemical compounds used on site.

4.1.1.6 Solid Waste Management (Non-Hazardous Wastes/Hazardous)

Contractors will not mix World Trade Center debris with contractor-generated wastes. Further, contractors will segregate WTC rubble and light metal from structural steel prior to transporting to the approved disposal sites. Contractors are responsible for the proper management and disposal of all contractor-generated non-hazardous and hazardous wastes. Contractors may dispose of non-hazardous wastes at New York City Department of Sanitation collection points (if available) or utilize private waste management subcontractor(s). Hazardous waste will be managed in accordance with all applicable federal, state, and local regulations. Each contractor is responsible for the proper identification, containerization, labeling, storage, manifesting, transport, and disposal of all hazardous materials used and regulated wastes (e.g., hazardous waste, used oil, spills to the ground) generated in the course of their activities at the WTC project.

Contractors should implement waste reduction measures to minimize the generation of wastes (e.g., recycling, replacing container lids to prevent spills).

4.1.1.7 Spill Prevention and Response

The World Trade Center Emergency Spill Prevention And Response Plan is provided in Appendix F. This plan discusses the proper practices for preventing a release and the appropriate response in case of a release.

4.1.1.8 Storm Water Management and Sediment Control

The Storm Water Management and Sediment Control Plan is provided in Appendix G. The plan describes how storm water will be managed and sediment controlled during cleanup and recovery activities. All storm water/sediment control measures will be installed and maintained by the contractors. The storm water/sediment controls described are designed to protect surrounding waterways from sedimentation and contaminants. The contractor will inspect the sediment control measures at least every seven (7) days and within twenty-four (24) hours after

every rain event of greater than 0.5 inch. When cleanup and recovery activities damage the controls, the contractor responsible for that area will make the necessary repairs.

4.2 ENVIRONMENTAL MONITORING

Each contractor will perform and document periodic environmental monitoring to verify environmental requirements specified in this ES&H plan are being implemented and followed during cleanup and recovery activities. In addition, a Weekly Environmental Monitoring Report will be prepared by the contractor and submitted to the Site ES&H Director. The report will summarize the environmental issues and/or incidents that occurred during the week.

Monitoring schedules will be dictated by the type of work performed during cleanup and recovery activities and environmental requirements relevant to those activities. The contractor and field ES&H representatives will discuss work practices on a daily basis and direct immediate changes where a significant potential for an adverse environmental impact exists.

If necessary, "stop work" orders will be issued if cleanup and recovery activities are not in accordance with the applicable environmental requirements, are having significant adverse impacts on the environment, or will result in a significant adverse impact to the environment if the activity continues. If such activities occur, the field ES&H representative will take appropriate action to halt work, provide guidance to correct the problem, and immediately notify the contractor ES&H Manager, as appropriate. The cleanup and recovery activity in question will not resume until all required corrective actions have been implemented.

SECTION 5.0: SITE CONTROL MEASURES

5.1 GENERAL REQUIREMENTS

5.1.1 Medical Facilities

For non-emergency medical needs, contractors to identify specific medical facilities they will use and establish required protocols directly with the facility

5.1.2 First-Aid Stations

Contractors shall ensure all employees are aware of the availability and location of First Aid Stations as part of initial site orientation and training. Current locations of First Aid Stations shall be clearly shown on site maps to be posted on informational bulletin boards on site.

5.1.3 Emergency Eyewash Stations

Portable eyewash stations will be provided and maintained around the WTC Work Zones. These stations shall have the capability of providing a continuous flow of eyewash water for a minimum of 15-minutes and be properly winterized to ensure they are functional during freezing weather. Eyewash stations will be maintained and include documented inspections in accordance with the manufacturer's recommendations.

5.1.4 Site Communication Methods

All contractors shall ensure employees are aware of the current warning/notification system for both emergency and non-emergency situations as part of initial site orientation and training. Current warning signals shall be posted on informational bulletin boards on site.

A roster of key personnel contact names and numbers shall be established and maintained for emergency and non-emergency situations. All contractors shall, as a minimum, have a two-way communication system with their field supervision and safety and health personnel.

5.2 PRE-ENTRY BRIEFING

All contractor personnel are to attend a comprehensive orientation training program conducted by contractor ES&H personnel in accordance with Section 1 prior to being allowed site access. Contractors will maintain records of employees who have attended the orientation. Employees will be provided with documentation that they have attended the orientation.

5.3 SITE CONTROL AND ENTRY

All employees must have proper entry identification in accordance with Office of Emergency Management, NYC Mayor's Office.

5.4 PEDESTRIAN AND MOTORIZED TRAFFIC CONTROL

5.4.1 Pedestrian Traffic

Where dedicated pedestrian walkways to the WTC Complex are provided, the paths shall be readily identifiable and contractors shall ensure employee usage.

5.4.2 Motorized Traffic

A traffic control program shall be established and implemented for travel throughout the entire work area of the WTC Complex and surrounding areas. Contractors shall ensure that employees comply with all posted signage and designated traffic routes. The project speed limit is 5 mph.

5.4.3 Visitor and Viewing Control

All contractor visitors must be escorted full-time by a contractor employee trained in site ES&H requirements. At a minimum, visitors shall wear a hard hat, eye protection and a dust mask. Visitor badges will be issued and retrieved to ensure all visitors are properly accounted for. Specific viewing areas for visitors shall be established and identified on site maps. Appendix I (attached) is visit safety and health orientation requirements.

SECTION 6.0: EMERGENCY PREPAREDNESS AND RESPONSE

6.1 EMERGENCY RESPONSE PLAN

Contractors shall establish an evacuation plan to include a designated rally point(s) and a means for accountability of all direct contract and subcontract personnel. This plan shall be developed for the purpose of worker protection in the event of a catastrophic event/incident. The plan shall comply with 29 CFR 1926.35 and shall be submitted as an Appendix to their respective Safety and Health Plans.

Attached to this ES&H Plan is the Emergency Response Plan (ERP) and Contingency Plan for the WTC Project (Appendix A). The ERP provides specific instructions and response requirements for all types of emergency situations that could arise during the performance of WTC work.

Zone management shall ensure that the ERP is on-site and readily available to all personnel during working hours. All personnel assigned to support scheduled work at the WTC Project shall be briefed on the existence of the ERP. Personnel shall be made familiar with the emergency response requirements for all work at WTC, prior to work start.

6.2 EMERGENCY INCIDENT CONTINGENCY PLAN

6.2.1 SITE – WIDE EMERGENCY RESPONSE ACTION PLAN

In general, if any emergency event arises, the DDC ES&H Manager or designee shall be notified immediately to direct and provide emergency services.

The Project has the capability to provide or obtain fire, emergency medical, environmental spill response, or natural disaster assistance anywhere within a short time frame. Additional information is provided below concerning events that may occur during on-site work. All emergency situations require completion of the incident reporting and investigation forms.

6.2.2 SEVERE WEATHER RESPONSE

Upon notification of a weather emergency, all personnel shall proceed to their designated rally point, assemble for head count, and await further instructions. If there is not enough time to reach the designated rally point, personnel shall move to lower levels of buildings or to similar areas with solid structural protection, including closets and bathrooms.

In the event of severe lightning hazards during field operations, activities must be suspended, personnel evacuated to a safe area, and weather conditions monitored to determine when it is safe to resume field operations. Lightning safety protocols established in the appropriate task-JHA must be followed. The supervisor may suspend all activities on-site if necessary due to severe weather. Safe areas include fully enclosed metal vehicles with windows rolled up and substantial or permanent buildings. Unsafe areas include small structures (huts and rain shelters)

and areas near metallic objects (fences, gates, electrical equipment, wires and power poles). Always avoid trees, water, and open fields. If you are isolated from shelter during close-in lightning, adopt a low crouching position on your toes with feet together and hands on ears.

6.2.3 SITE EVACUATION

Site-located sirens indicate site evacuation notification. Appendix J (attached) Personal Safety and Protection Recommendations includes current siren emergency signal. Office personnel will receive instructions via voice mail and/or computer message and field personnel via radio.

6.2.4 FIRE OR EXPLOSION

If personnel observe a fire or explosion, a DDC/Site ES&H officer shall be notified immediately. All personnel shall leave the immediate area of the fire, move to an upwind location and await the arrival of emergency help. The radio should be monitored for further instructions. Personnel shall not fight fires unless properly trained to do so and only do so for fires in the incipient (beginning) stage.

6.2.5 TASK-SPECIFIC EMERGENCY RESPONSE ACTION PLAN

A task-specific emergency response action plan shall be developed as part of each task-specific JHA. The task-specific emergency response action plan shall address foreseeable emergency situations and response actions associated with the individual work site and tasks. Emergency response actions shall be compatible with the Site Wide Emergency Response Plan. Emergency response situations and actions contained in the task-specific plan shall be reviewed with each on-site worker during site-specific briefings. Workers shall be provided updated information whenever there is a significant change to the plan. The plan shall include the following:

- Emergency coordinator and alternate
- Evacuation and accountability
- Notifications
- Weather
- Material release and spill containment
- Injury
- Fire/explosion

The DDC/Site ES&H director will ensure that a copy of the task-specific emergency response action plan is provided to the each contractor.

Table 6: Emergency Notification Contact Personnel

CALL ORDER	DDC ES&H MANAGEMENT PERSONNEL CONTACT INFORMATION
1	Name:
	Title:
	Office Phone: Cellular Phone:
	Pager:
	Responsibilities:
2	Name:
	Title:
	Office Phone: Cellular Phone:
	Pager:
	Responsibilities:
3	Name:
	Title:
	Office Phone: Cellular Phone:
	Pager:
	Responsibilities:

Appendix B

World Trade Center Disaster

**New York City Department of Design and
Construction, New York State Department of
Environmental Conservation, and New York City
Department of Health**

FINAL

**DUST PROTECTION AND SUPPRESSION PLAN
FOR
POST DISASTER SEARCH/RESCUE, DEMOLITION, AND CLEANUP**

September 27, 2001

DUST PROTECTION AND SUPPRESSION PLAN

1. INTRODUCTION

The World Trade Center disaster generated a tremendous amount of debris and dust in the "ground zero" area that may contain contaminants (e.g., asbestos). During search/rescue, demolition, and cleanup activities currently underway, the potential exists to contaminate search/rescue personnel and cleanup workers and spread contaminated materials into other areas. The purpose of this plan is to provide guidance and recommendations for protecting all personnel working in the "ground zero" area and minimizing the spread of dust during debris/dust removal, loading, and transport to disposal sites.

2. PERSONAL PROTECTION

Search/rescue, demolition, and cleanup personnel working on rubble piles at "ground zero" and in adjacent areas with large amounts of debris and dust (hereinafter termed "work areas") should follow the personal protective measures identified below.

2.1 While in the Work Area

Personnel in work areas should use the following personal protective measures to help protect themselves from potential dust hazards:

- Respiratory protection
 - Everyone who will perform work on/in, suspended above, or within 25 ft of the rubble pile must use a half-face re-usable respirator with combination P100 (or equivalent)/ organic vapor acid gas (OVAG) cartridges.
 - All others within the "green line" and not categorized above must use P100 (or equivalent) cartridges. In areas with odors, combination P100/organic vapor (OV) cartridges may be used.
 - Persons outside of the "green line" are encouraged to wear disposable N95 (or equivalent) dust masks if dusty or smoky conditions exist.
- Head covering (hard hat)
- Safety glasses (Z87) with side shields or mono-goggles
- Work gloves (with latex or nitrile glove liners if handling remains)
- Long pants, long sleeve work shirts, or coveralls
- Steel-toed work boots
- If available, disposable outer protective clothing when working on the rubble pile
- Exit the work area if any of the above personal protective measures are damaged or do not function properly and make necessary repairs before re-entering work area.
- Avoid eating in work area.

2.2 Leaving the Work Area:

When personnel leave the work area, they should do the following to prevent spreading dust outside the work area:

- Exit work area through designated routes.
- Clean or scrape off shoes, preferably with water.
- If wearing disposable outer protective clothing, dispose of clothing in designated container.
- Thoroughly dust off clothing. If available, use HEPA vacuum.
- Clean personal protective equipment (e.g., respirator, goggles).
- At end of shift, replace respirator cartridges.
- Wash face and hands with soapy water.

DUST PROTECTION AND SUPPRESSION PLAN

2.3 Returning Home

When workers return "home" with clothing that has been soiled with dust, they should do the following to prevent bringing dust into their residence:

- Immediately remove clothing soiled with dust.
- Place dust soiled clothing in plastic bag(s) until washing. Do not shake dust from clothing.
- Launder dust soiled clothes twice and separate from other clothing.
- Run machine empty through one (1) complete cycle to rinse any debris that may have been deposited before washing next load.
- Dispose of plastic bag(s); do not reuse.
- Wash hands with soapy water.

3. DEBRIS/DUST REMOVAL AND LOADING

Search/rescue, demolition, and cleanup activities will require the removal of vast quantities of debris that could potentially spread dust within and outside the work area(s). The following dust suppression measures should be used to control the generation and spread of dust:

- Minimize handling of debris/dust by avoiding, where possible, multiple handling.
- Minimize the drop height of debris from equipment when dumping into haul trucks or onto ground surface.
- At locations in rubble piles where debris is separated by dropping, the rubble should be periodically wet down.
- Where practical, aerial mist sprayers could be used to help control dust when material is double handled or dumped (e.g., rest areas, areas where debris is sorted).
- In areas with thick dust accumulation (including streets and sidewalks), use a truck-mounted, high efficiency particulate air (HEPA) vacuum or, if not available, use standard large volume vacuum trucks.
- In areas where vacuum trucks are not used, lightly wet down areas prior to initiating debris/dust removal activities with shovels or other tools/equipment.
- Either wet down, or cover and secure debris/dust loads in haul trucks. Haul trucks should not be allowed to leave the work area unless these measures have been completed.
- Assign haul trucks designated routes to and from disposal site(s).
- Haul truck speed in work areas should not exceed 10 mph.
- Haul routes to disposal sites should be periodically wet down and/or cleaned with "street sweepers" to control dust.

DUST PROTECTION AND SUPPRESSION PLAN

4. WASH DOWN AND DECONTAMINATION STATIONS

At a minimum, all haul trucks leaving the work area should be washed as described in Section 4.2 below. If agency sampling (e.g., ambient air or bulk sample) results from areas within or in close proximity to the work area exceed the prescribed "action level" for asbestos, the measures described in Section 4.3 below should be implemented to minimize the spread of dust into adjacent residential/commercial areas and along haul routes.

4.1 Siting Considerations

The siting criteria for wash/decontamination stations listed below should be followed to enhance protection of personnel within work areas and the general public, and to prevent spreading dust outside the work areas:

- Locate along designated routes to disposal site(s) and in close proximity to work areas.
- Avoid locating in public traffic areas and pedestrian zones. If this is not possible, construct barriers to keep out unauthorized personnel.
- Keep away from overhead utilities.
- Select a site with sufficient space to construct a contained wash area with an adjacent area for stockpiling saturated sediment/debris.
- Locate near a clean water source (e.g., fire hydrant) or where a water tank can be placed.
- Locate near an acceptable wash water disposal receptor (e.g., sanitary sewer, not a storm water drain or outfall).

4.2 Wash Area Actions

To prevent/minimize the spread of dust outside work areas, the following actions should be performed at wash areas:

- Wash the truck's sides, tailgate, tires, and undercarriage.
- Verify haul truck loads are wet down or covered and the cover is securely attached. Haul trucks should not be allowed to leave wash/decontamination stations unless these measures have been completed.
- Properly manage wash water and sediment/debris resulting from wash area activities.

4.3 Operation and Maintenance of Decontamination Wash Stations

If agency prescribed "action levels" are exceeded, decontamination wash stations should be operated and maintained to ensure haul trucks are affectively decontaminated and resulting wash water and sediment/debris contained. The following measures are provided as examples of options available for managing contained wash water and sediment/debris:

DUST PROTECTION AND SUPPRESSION PLAN

- If possible, pump accumulated wash water from wash containment area into a settling tank(s) with baffle(s) to promote separation of oils, sediment/debris, and water.
 - As needed for reuse or discharge, pump water from discharge side of settling tank through a five (5) micron, in-line, filter.
 - If possible, use electric pumps.
 - If generators or gas pumps are used, they should be placed in secondary containment with oil absorbent material and fire extinguisher readily available.
 - Removal of sediment from tank can be accomplished with the use of sludge vacuum pump (e.g., vacuum truck).
- If a settling tank is not used, accumulated wash water should be pumped through a non-woven filter bag that is placed in a contained area adjacent to the wash/decontamination station.
 - Filtered water should then be checked for hydrocarbon contamination (e.g., sheen or odor). If fuel/oil contamination is identified, oil absorbent material/boom should be used to remove contamination and these materials disposed of properly.
 - As needed for reuse or discharge, pump water through a five (5) micron, in-line, filter.
 - Filter bag should be taken to disposal site once sediment capacity has been reached.
- If wash water is not filtered, it should only be discharged into a sanitary sewer or water tankers for transport to an approved disposal site.
- If possible, debris/sediment from wash/decontamination station should be stockpiled in an adjacent contained area to allow saturated sediment/debris to drain prior to being loaded into haul trucks and transported to disposal site(s). If draining of saturated sediment/debris is not possible, trucks transporting saturated material should have dump bed liners to contain liquids during transport to disposal site(s).

4.4 Personal Protective Measures

Personnel involved in wash/decontamination station activities will be responsible for removing accumulated dust from vehicles leaving the work area and ensuring loads are properly wet down or covered. Consequently, they will be exposed to dust, wet conditions, and debris/sediments and should use the following measures to help protect themselves against possible hazards:

- Head covering
- Approved dust mask
- Face shield
- Rubber gloves
- Water repellent outer clothing
- Rubber boots

When returning home, wash/decontamination station workers should follow the recommended protection measures described above in Section 2.3, Returning Home.

APPENDIX I

WTC DISASTER EMERGENCY

VISITOR SAFETY AND HEALTH ORIENTATION

We are providing the following personal protective equipment (PPE) for your safety and health while you are visiting the WTC Disaster Emergency area. Please wear this PPE at all times during your visit.

Your PPE consists of a hard hat, safety glasses, and a dust mask.

Dust, smoke and nuisance level airborne particulate may be present in the impacted areas. Be aware that these exposures can cause problems and should be minimized or prevented for some "sensitive" populations including:

- Infants and children
- The elderly
- Those who are immune-compromised (people undergoing chemotherapy or with HIV infections or liver disease, etc.)
- Pregnant women
- People with allergies and asthma

We have laid out a safe route for your visit. Please keep together as a group and follow the designated route. Do not stray off into areas that heavy equipment and haul trucks are working. Watch out for overhead loads.

If a FDNY Fireman, NYPD Police Officer, or a National Guardsman approaches you, please comply with any and all instructions.

The emergency signals on this controlled site are:

- Three (3) repeated short blasts from an air horn or siren means immediately stop and evacuate the area as instructed.
- One (1) long and two (2) short blasts from an air horn or siren means return to work or the area.
- One long blast from an air horn or siren means immediate stop and remain silent.

If any one of these three occur during your visit, please follow all instructions from FDNY, NYPD, National Guard or a Site ES&H Professional wearing a yellow vest and red hard hat.

Hand washing is required after touring debris-covered areas and before eating, drinking, and smoking or touching facial areas.

By following all of the above instructions, your visit to the site will be a safe one.