ACKNOWLEDGMENT OF COMPLETION REPORT

FOR

GERDAU AMERISTEEL FIRE
300 WARD ROAD
MIDLOTHIAN, ELLIS COUNTY, TEXAS

Prepared for

U.S. Environmental Protection Agency
Will LaBombard, Project Officer
1445 Ross Avenue
Dallas, Texas 75202

Contract No. EP-W-06-042
Technical Direction Document No. 1/WESTON-042-15-007
TDD No. 0001-42-15-07
WESTON W.O. No. 20406.012.001.0932.01
NRC No. N/A
FPN ID: N/A
CERCLIS ID: TXN000606881
EPA OSC: John Martin
START-3 PTL: Sean Gavlas

Submitted by

Weston Solutions, Inc.
Cecilia H. Shappee, P.E., Program Manager
5599 San Felipe, Suite 700
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(713) 985-6600

13 March 2015

1176750

ACKNOWLEDGMENT OF COMPLETION REPORT

1. INTRODUCTION

On 29 January 2015 at approximately 0530 hours, a fire started in a stockpile of tire wire following a possible explosion while transporting hot slag within the Gerdau Ameristeel Steel Mill (Gerdau) facility located at 300 Ward Road, Midlothian, Ellis County, Texas. Gerdau is the incident potentially responsible party (PRP). The geographic coordinates of the incident are Latitude 32.456868° North and Longitude 97.041946° West and were determined using a handheld Global Positioning System (GPS) based on the World Geodetic System – 1984 (WGS-84) with accuracy estimated at less than 50-feet circular probable error. A Site Location Map and Site Area Map are included as Attachments A and B, respectively.

The fire occurred approximately 0.15 mile southeast of U.S. Highway 67 with smoke emitting downwind toward a business park located approximately 1 mile southwest of the fire and toward a nearby residence approximately 0.75 mile south of the facility. A Site Sketch Map is included as Attachment C. Throughout the incident, winds were predominately out of the north-northwest.

At approximately 0630 hours, the U.S. Environmental Protection Agency (EPA) Region 6 Prevention and Response Branch (PRB) Phone Duty Officer became aware of the incident via a local television news report. The PRB Phone Duty Officer contacted the Texas Commission on Environmental Quality (TCEQ), and the agencies (EPA and TCEQ) agreed to coordinate response efforts to assess the impact to air quality for facility workers and the surrounding public. At approximately 0730 hours, EPA On-Scene Coordinator (OSC) John Martin was notified of the incident and activated Weston Solutions, Inc. (WESTON®), the EPA Region 6 Superfund Technical Assessment and Response Team (START-3) contractor, to assist TCEQ by conducting a Tier 2 incident response. As directed by OSC Martin and as outlined in Technical Direction Document (TDD) No. 1/WESTON-042-15-007 (Attachment H), START-3 was tasked to document response activities and to provide technical support to EPA.

2. BACKGROUND

On 29 January 2015 at approximately 0530 hours, a fire started in a stockpile of tire wire following a possible explosion while transporting hot slag within the Gerdau Ameristeel Steel Mill facility. The fuel for the fire consisted of approximately 2.5 to 5% rubber remaining on steel wire that had been stockpiled for use in the production of concrete reinforcing steel, angles, channels, rounds, flats, squares, coiled wire rod, wide flange beams, I-beams, bantam® beams, microalloy bars, sheet piling, and H piling (http://www.gerdauameristeel.com/company/aboutga/wwd.cfm).

3. SUMMARY OF ACTIONS

On 29 January 2015 at approximately 0530 hours, an employee at the Gerdau Ameristeel Steel Mill facility observed a fire in a stockpile of tire wire following a reported possible explosion while transporting hot slag nearby. The Midlothian Fire Department was notified and arrived on scene at approximately 0545 hours to begin firefighting activities.

At approximately 0730 hours, EPA OSC John Martin was deployed to the incident and EPA START-3 was activated to support the emergency response, to conduct an assessment of the incident, to monitor air quality downwind of the incident, and to document fire suppression activities.

The EPA Team arrived on-site at 1000 hours and met with TCEQ, Gerdau, and Midlothian Fire Department representatives to discuss the status of the fire. Following the response briefing, the EPA Team and TCEQ mobilized to conduct particulate matter (PM) air monitoring using a Thermo Scientific DataRam 4 Particulate Monitor at potentially sensitive downwind receptors including Mt. Peak Elementary School, the Toys R Us and QuikTrip Distribution centers, and the closest downwind residence. The Mt. Peak Elementary School was located approximately 3.1 miles to the east southeast, the distribution center was approximately 1.0 mile to the south, and the nearest residence was approximately 0.75 mile south of the incident.

Particulate readings observed on the DataRam 4 unit at Mt. Peak Elementary School were 5.8 to 9.4 micrograms per cubic meter ($\mu g/m^3$) and between 31.4 and 220.0 $\mu g/m^3$near the distribution centers and the nearby residence as wind direction shifted frequently. The Occupational Safety and Health Administration (OSHA) permissible exposure limit (PEL) of 5 milligrams per cubic meter (mg/m^3)

(i.e., 5,000 µg/m^3) was applied as an action level for respirable dust during the response in accordance with the *EPA Emergency Response Air Monitoring Guidance Tables, Edition 3* (Attachment G). Air monitoring locations are shown in Attachment C, Site Sketch Map. A summary of the PM air monitoring results is provided in the tables below.

Table 1: Particulate Matter Air Monitoring Results at Mt. Peak Elementary School

Location	Time (hr)	Result (µg/m^3)
ML-1	1059	5.8
ML-2	1102	7.0
ML-3	1108	9.4
ML-4	1114	7.4
ML-5	1118	5.8

Table 2: Particulate Matter Air Monitoring Results at Closest Downwind Receptors

Location	Time (hr)	Result (µg/m3)
ML-6	1059	31.4
ML-7	1102	220.0
ML-8	1108	183.5

Throughout the incident, facility front end loaders, equipped with steel tires and heat shields to protect machinery systems, worked to segregate smoldering tire wire, as Midlothian Fire Department personnel and facility personnel doused the fire and smoldering rubber with water. Firewater flowed downgradient to a retention pond southwest of the incident and was recirculated using pumps and hoses to extinguish the fire. TCEQ monitored the containment of firewater on-site. By 1400 hours, the majority of the fire had been extinguished and the EPA Team demobilized from site.

At approximately 1430 hours, TCEQ demobilized from the site after all flames had been extinguished, and segregation and dousing of the remaining smoldering rubber continued. The

facility notified TCEQ at 2100 hours that the remaining smoldering rubber had been completely extinguished.

This final report was prepared as part of the requirements of Technical Direction Document (TDD) No. 1/WESTON-042-15-007 and serves as documentation of work completed to date.

4. LIST OF ATTACHMENTS

A. Site Location Map

B. Site Area Map

C. Site Sketch

D. Site Logbook

E. Digital Photographs

F. Pollution Report

G. EPA Emergency Response Air Monitoring Guidance Tables - Edition 3

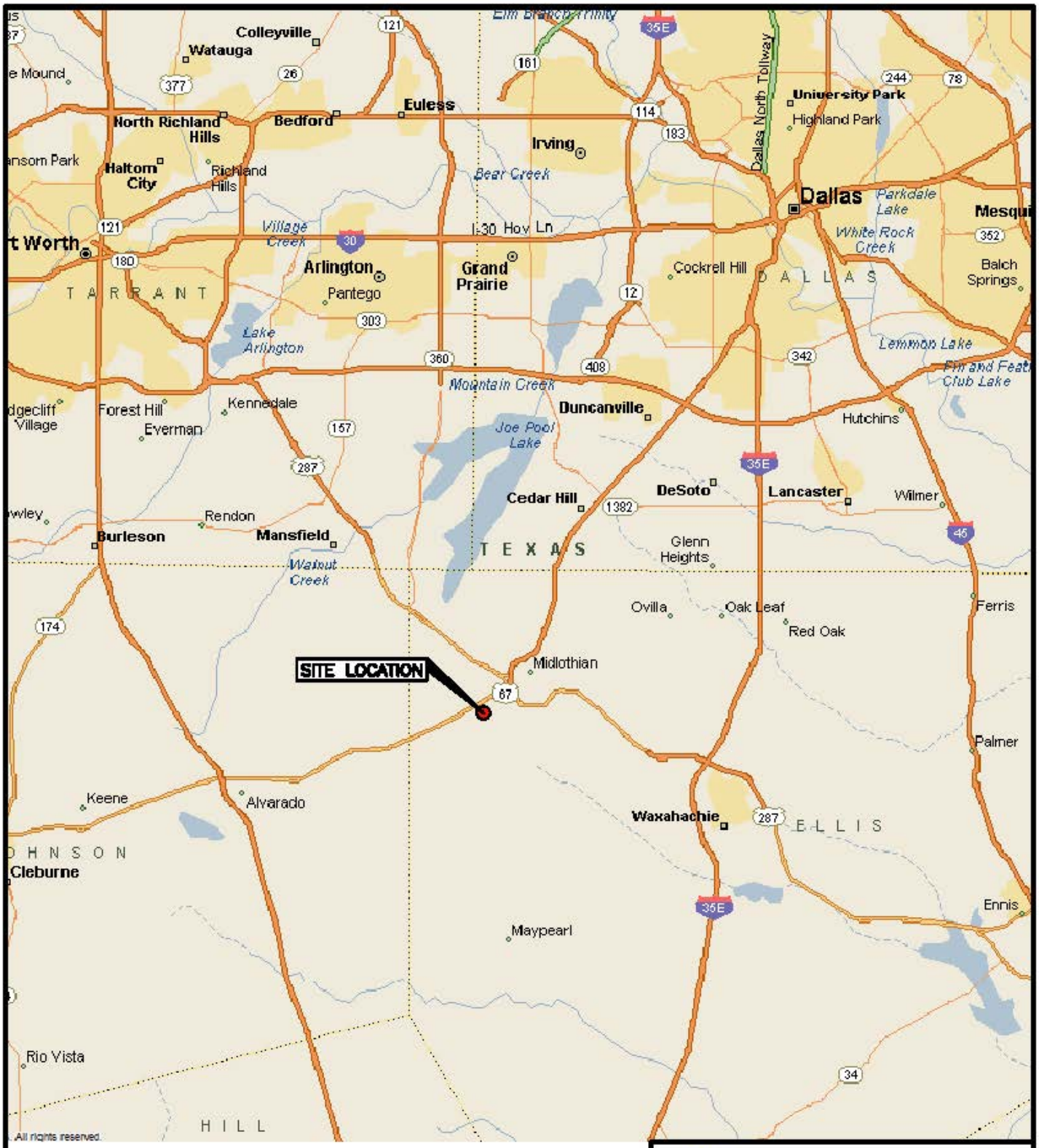
H. TDD No. 1/WESTON-042-15-007

☐ The EPA Task Monitor did not provide final approval of this report prior to the completion date of the work assignment. Therefore, Weston Solutions, Inc. has submitted this report absent the Task Monitor's approval.

☒ The EPA Task Monitor has provided final approval of this report. Therefore, Weston Solutions, Inc. has submitted this report with the Task Monitor's approval.

Attachment A

Site Location Map



N

US EPA REGION 6

ATTACHMENT A
SITE LOCATION MAP

GERDAU AMERISTEEL FIRE
300 WARD ROAD
MIDLOTHIAN, ELLIS COUNTY, TEXAS

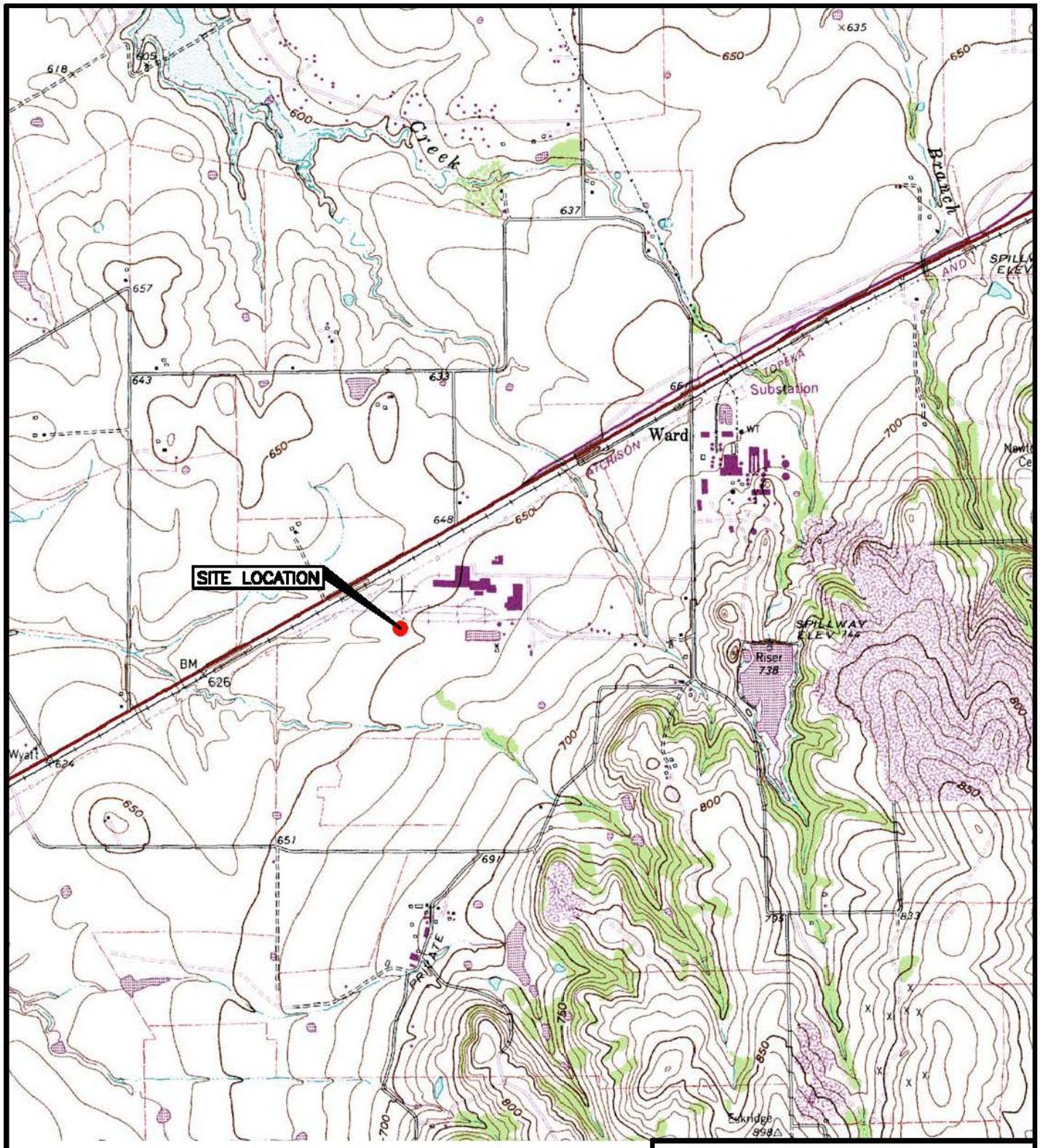
DATE:	W.O. #	SCALE:
FEB 2015	20408.012.001.0932.01	NOT TO SCALE

SOURCE: MICROSOFT STREETS 2010.
CERCLIS No.: TXN000606881
TDD No.: 1/WESTON-042-15-007

H:\START III EPA\0932_Gerdau Ameristeel Fire\0226151451.dwg Mar 13, 2015 - 11:51am

Attachment B

Site Area Map



N

0 1000 2000

SCALE IN FEET

US EPA REGION 6

ATTACHMENT B

SITE AREA MAP

GERDAU AMERISTEEL FIRE
300 WARD ROAD
MIDLOTHIAN, ELLIS COUNTY, TEXAS

DATE:	W.O. #	SCALE:
FEB 2015	20406.012.001.0932.01	AS SHOWN

SOURCE: USGS 7.5 MINUTE SERIES TOPOGRAPHIC, VENUS, TEXAS (1978).
CERCLIS No.: TXN000606881
TDD No.: 1/WESTON-042-15-007

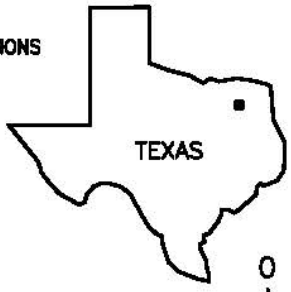
H:\START III EPA\0932_Gerdau Ameristeel Fire\0226151458.dwg Mar 13, 2015 – 11:50am

Attachment C

Site Sketch

LEGEND:

■ AIR MONITORING LOCATIONS



N

0 1500 3000

SCALE IN FEET

SOURCE: GOOGLE EARTH PRO AERIAL 2014.
CERCLIS No.: TXN000606881
TDD No.: 1/WESTON-042-15-007

US EPA REGION 6

ATTACHMENT C

SITE SKETCH

GERDAU AMERISTEEL FIRE
300 WARD ROAD
MIDLOTHIAN, ELLIS COUNTY, TEXAS

DATE:	W.O. #	SCALE:
FEB 2015	20406.012.001.0932.01	AS SHOWN

H:\START III EPA\0932_Gerdau Ameristeel Fire\0227150845.dwg Mar 13, 2015 - 11:50am

Attachment D

Site Logbook

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~~20406.012.001.0929.01~~ SC
TDD#: 1/WESTON-042-15-007

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1 of 1

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Name Sean Gavlas

Address 3900 Dallas Parkway, Suite 175
Plano, TX 75093

Phone 609-433-8434

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CONTENTS

PAGE	REFERENCE	DATE
	Sean Gavlas - PTL - 609-433-8434	
	José Ojeda - FSO - 619-417-3298	

1/29/2015

20406.012.001.0932.01

1/29/2015 1/WESTON-042-15-007 Sean Gowlas

0730 hrs. - OSC John Morton notified START Gowlas of a tire water fire at the Gerdau Ameristeel Facility on Midlothian, TX.

0910 hrs - START departed Coop after gathering and loading response equipment.

1000hrs. - START Team on-site, Slag being transported was hot and assumed to have come in contact with water, exploded, and ignited tires, chips used to fuel furnace. Fire is at tire pile of approximately 60 yds x 20 yds x 15 ft. Water being flushed to west retention pond. Facility environmental manager stated that tires are contain 2-5% rubber. Dale McCastill 214-532-9526 Midlothian Fire Department. Mt. Peak Elementary located at Tower and 1663. Will conduct air monitoring.

Note: START and OSC meeting with TCEQ, Midlothian FD Gerdau, to discuss current status of fire.

20406.012.001.0932.01

1/29/2015 1/WESTON-042-15-007 Sean Gowlas

1026 - START depart command post to conduct airmonitoring at Mt. Peak Elementary.

1045hrs - START completed calibration check of VRAE, MultiRae, and DataRam 4 after checking in with Mt. Peak Elementary Administration.

Monitoring results @ school:

1059 hr	ML1	VOC = 0, SO_2 = 0	PM = 5.8 mg/m³	32.427506 -97.000547
1102 hr	ML2	VOC = 0, SO_2 = 0	PM = 7.0 mg/m³	32.426807 -97.000077
1105 hr	ML3	VOC = 0, SO_2 = 0	PM = 9.4 mg/m³	32.426792 -97.000509
1114 hr	ML4	VOC = 0, SO_2 = 0	PM = 7.4 mg/m³	32.427792 -97.002609
1118 hr	ML5	VOC = 0, SO_2 = 0	PM = 5.8 mg/m³	32.428717 -97.002592

1134 hrs. - START completed air monitoring at Mt. Peak Elementary and departs.

Note: Wind out of NNE.

1145 hrs. - START on-site North of Tony "A" US distribution center conducting air monitoring for particulates and volatiles.

Monitoring Results @ Distribution Center and Near Residence (Farmhouse):

1145 hr	ML6	VOC = 0.0, SO_2 = 0.0	PM = 31.4 µg/m³	32.447028 -97.045850
1156 hr	ML7	VOC = 0.0, SO_2 = 0.0	PM = 0.20 mg/m³	32.446766 -97.043994
1202 hr	ML8	VOC = 0.0, SO_2 = 0.0	PM = 183.5 µg/m³	32.438982 -97.044921

Rite in the Rain

20406.012.001.0932.01

1/29/2015 1/WESTON-042-15-007 Sean Gowlas

Weather: Fair; 67°F; Humidity 38%
Wind Speed N 14 mph w/ 20 mph gusts
Visibility 10.0 miles

Air Guidance for Tire Fire:
PEL = 15 mg/m³ (total); 5 mg/m³ (respirable)
TLVs 10 mg/m³ (total); 3 mg/m³ (respirable)
1300 hrs. - START Completed air monitoring SSW of Fire near Tang R Lk and QuickTrip distribution center.
1300 hrs. - Randy Spencer meets with TCEQ and the EPA Team. R. Spencer with Gerdau. Kenneth Schappert (Gerdau HR Manager) also meets. Greg Bell (Plant Manager (VP)) meets with TCEQ and EPA.
Note: Fire First observed at 0530 hrs. Fire Department on site at ~0545 hrs.
1330 hrs. - START took photos of current Fire Fighting activities. Midlothian FD conducting oversight as Gerdau Supresses Fire with water trucks.
1400 hrs. - START Ojeda and START Gowlas off-site.

End of Logbook

1/29/2015

Rite in the Rain

EPA Response Manager Photo Report

SEARCH

Enter Photo # DISPLAY

Incident Name:	Gerdau Ameristeel Fire
Event Name:	Gerdau Ameristeel Fire
Photo Type:	Overview
Direction:	W
Photo Name:	IMG_1090.JPG
Date and Time:	Jan 29 2015 12:00AM
Latitude:	32.457061
Longitude:	-97.041266
Photographer:	Sean Gavlas
Witness:	
Caption:	Tire wire firefighting activities.

EPA Response Manager Photo Report

SEARCH

Enter Photo # DISPLAY

Incident Name:	Gerdau Ameristeel Fire
Event Name:	Gerdau Ameristeel Fire
Photo Type:	Overview
Direction:	W
Photo Name:	IMG_1089.JPG
Date and Time:	Jan 29 2015 12:00AM
Latitude:	32.457058
Longitude:	-97.041261
Photographer:	Sean Gavlas
Witness:	

Caption:
Tire wire segregated from stockpile fire and doused with water.

Attachment F

Pollution Report

U.S. ENVIRONMENTAL PROTECTION AGENCY
POLLUTION/SITUATION REPORT
Gerdau Ameristeel - Removal Polrep
Initial Removal Polrep

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region VI

Subject: **POLREP #1**
INITIAL and FINAL
Gerdau Ameristeel

Midlothian, TX
Latitude: 32.4568680 Longitude: -97.0419460

To: Sean Gavlas, Weston Solutions
Jose Ojeda, Weston Solutions

From: John Martin, EPA FOSC
Date: 1/29/2015
Reporting Period:

1. Introduction

1.1 Background

Site Number:	A6G9	**Contract Number:**	
D.O. Number:		**Action Memo Date:**	
Response Authority:		**Response Type:**	Emergency
Response Lead:		**Incident Category:**	
NPL Status:		**Operable Unit:**	
Mobilization Date:		**Start Date:**	1/29/2015
Demob Date:		**Completion Date:**	1/29/2015
CERCLIS ID:	TXN000606881	**RCRIS ID:**	
ERNS No.:		**State Notification:**	TCEQ
FPN#:		**Reimbursable Account #:**	

Incident Category: Fixed Facility

Location: 300 Ward Road, Midlothian, Ellis County, Texas. The geographic coordinate of the fire was Latitude: 32.456868 degrees North, Longitude: 97.041946 degrees West.

Description of Threat: A tire wire fire started due to an unknown cause at the Gerdau Ameristeel steel mill and steel recycling facility, emitting smoke downwind towards a business park located approximately 1 mile SW of the fire and a nearby residence approximately 0.75 miles S of the facility. The fire occurred approximately 0.15 miles SE of U.S. Highway 67. Throughout the incident, winds were predominately out of the NNW.

At approximately 0530 hr. on 29 January 2015, the fire was first observed by facility employees following a reported possible explosion that may have occurred while transporting hot slag. The Midlothian Fire Department was notified and arrived on scene at approximately 0545 hr. to begin fire suppression activities. The fuel for the fire consisted of approximately 2.5 to 5 percent rubber remaining on steel tire wire which had been stockpiled for use in the production of concrete reinforcing steel, angles, channels, rounds, flats, squares, coiled wire rod, wide flange beams, I beams, bantam® beams, microalloy bars, sheet piling and H piling.

Preliminary Removal Assessment/Removal Site Inspection Results: At approximately 0530 hr. on 29 January 2015, the fire was first observed by facility employees following a reported possible explosion that may have occurred while transporting hot slag. The Midlothian Fire Department was notified and arrived on scene at approximately 0545 hr. to begin fire suppression activities.

At approximately 0630 hr., the EPA Phone Duty Officer observed the fire on a local news station and contacted the responding agency, the Texas Commission on Environmental Quality (TCEQ). EPA and TCEQ made the decision to coordinate response efforts.

At approximately 0730 hr., EPA On Scene Coordinator (EPA OSC) John Martin was deployed to the incident and EPA START 3 was activated to support the emergency response, conduct an assessment of the incident, monitor air quality downwind of the incident, and to monitor fire suppression activities at the site.

The EPA Team arrived on scene at 1000 hr. and met with TCEQ, Gerdau, and Midlothian Fire Department representatives to discuss the status of the fire. The EPA Team and TCEQ then mobilized to conduct particulate air monitoring at the Mt. Peak Elementary School approximately 3.1 miles ESE, the Toys R Us and QuickTrip distribution center approximately 1 mile S of the incident, and the nearby residence approximately 0.75 mile S of the incident. Particulate readings observed on the DataRam 4 unit at Mt. Peak Elementary School were 6-9 µg/m^3 and between 30 and 220 µg/m^3 near the distribution centers and nearby residence as wind direction shifted frequently. A calibrated MultiRae unit and a VRae were also used to monitor VOCs and sulfur dioxide of which no readings above background were observed. The OSHA PEL of 5 mg/m^3 (5000 µg/m^3) for respirable dust was applied for use as an action level during the response in accordance with the EPA Emergency Response Air Monitoring Guidance Tables, Edition 3 (2012).

2. Current Activities

2.1 Operations Section

Throughout the incident, facility front end loaders specially equipped with steel tires and heat shields to protect machinery systems, worked to segregate smoldering tire wire as Midlothian Fire Trucks and facility water trucks doused the fire and smoldering rubber. Firewater flowed down gradient to a retention pond SW of the incident and was reused to fight the fire. By 1400 hr. the majority of the fire had been extinguished and the EPA Team demobilized from Site.

At approximately 1430 hr., all flames had been extinguished as segregation and dousing of the remaining smoldering rubber continued. TCEQ demobilized from Site at 1430 hr. and requested notification from the facility once the fire had been completely extinguished. The facility notified TCEQ at 2100 hr. that the fire had been completely extinguished by 1730 hr.

2.2 Planning Section

Next Steps: TCEQ will continue to monitor the final disposition of the firewater to ensure compliance with disposal regulations.

2.3 Logistics Section

N/A

2.4 Finance Section

N/A

2.5 Other Command Staff

N/A

3. Participating Entities

Gerdau Ameristeel
Midlothian Fire Department and assisting Fire Departments
TCEQ
EPA

4. Personnel On Site

EPA: 1
START: 2
TCEQ: 2

5. Definition of Terms

No information available at this time.

6. Additional sources of information

No information available at this time.

7. Situational Reference Materials

No information available at this time.

Attachment G

EPA Emergency Response Air Monitoring Guidance Tables - Edition 3

EPA Emergency Response Air Monitoring Guidance Tables

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
EPA
EMERGENCY RESPONSE TECHNICAL GROUP

12P-0003

2012 Edition 3

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Executive Summary

Response Tables

Table Number	Response Type	
1	Acid	Spill or Release
2	Ammonia	Spill or Release
3	Chemical Plant	Fire
4	Chlorine	Spill or Release
5	Electroplating Facility	Spill, Release, or Fire
6	General Industrial	Fire
7	Landfill	Release or Fire
8	Magnesium	Fire
9	Mercury	Spill or Release
10	Oil	Spill, Release, or Fire
11	Pesticide or Fertilizer	Fire
12	Phosphorus	Spill, Release, or Fire
13	Tire Fire	Fire
14	Wood-Treating Facility	Spill or Release
15	Volcano	Natural Disaster
16	Chemical Warfare Agents	Terrorism
17	Ethanol	Spill, Release, or Fire
18	Spacecraft Debris	Natural Disaster
19	Special Event	Riot
20	Clandestine Lab	Fire

Auto Fluff (Auto Recycling Waste)…….....……...see Tire Fire Table

Fireworks……....….see General Industrial Fire Table

Glossary

Attachment A – Hazard Evaluation Flow Chart for Unknowns

Executive Summary

Background

The United States Environmental Protection Agency (EPA) assembled the following 20 tables for use by field responders. The tables cover an array of response types and should be used as guidance only.

These tables are a quick-reference guide to assist field responders during an emergency response or a time-critical site clean-up. Additional guidance and resources may need to be consulted for further information.

For radiological responses, refer to the site-specific health and safety plan (SSHASP), *Radiation Playbook*, and the EPA memorandum *Turnback Guidance for EPA Personnel Responding to Radiological Emergencies*. Consult with a health physicist for guidance in determining an action level.

User Responsibilities

To verify the data in these tables, refer to the Agency for Toxic Substances and Disease Registry (ATSDR), EPA toxicologists, the National Institute of Occupational Safety and Health (NIOSH), the Occupational Safety and Health Administration (OSHA), device manufacturer handbooks (most are available online), equipment operating guides, and other authoritative regulatory guidance. More current data from any source used to compile these tables supersedes the information in these tables. This document does not supersede the SSHASP for any response.

During responses to unknown situations, use the most conservative criterion, approach, and personal protective equipment (PPE) as outlined in the SSHASP. For responses involving metals in a particulate form, a particulate air monitoring instrument (*e.g.*, Personal DataRAM or DataRAM) will be the instrument that can provide real-time data. The instrumentation reading will be in total milligram per cubic meter (mg/m^3) of particulate and not the metal of interest. Consult with a toxicologist or industrial hygienist for guidance in determining an action level. When monitoring for combustible atmosphere, a combustible gas indicator (*e.g.*, MultiRAE) will need to be used. The action level for a combustible atmosphere is a lower explosive level (LEL) greater than 10%. A normal oxygen level in the ambient air should be between 19.5%-23.5% oxygen (normal 20.8%). An oxygen level below 19.5% or above 23.5% will require a reassessment of the situation. Teflon tubing is to be used for calibration instead of tygon tubing for volatile organic compounds.

If you have any changes or revisions please email:
zintak.leonard@epa.gov or ben.maradkel@westonsolutions.com

Glossary

~	approximately
>	greater than
<	less than
%	percent
∞	infinity
$\mu g/m^3$	microgram per cubic meter
A1	carcinogenic effects
A4	concern that the compound may be carcinogenic, but supporting data are lacking
A-TWA	ATSDR time-weighted average
ACGIH	American Conference of Governmental Industrial Hygienists
AEGL	Acute Exposure Guideline Levels
ATSDR	Agency for Toxic Substances and Disease Registry
C	ceiling (concentrations that should not be exceeded during any part of work exposure)
C-STEL	CDC short-term exposure limit
CDC	Centers for Disease Control
CF	correction factor
Cl	chlorine
CO	carbon monoxide
cpm	counts per minute
EPA	United States Environmental Protection Agency
eV	electron volt
FID	flame ionization detector
GPL	general public limit
H_2S	hydrogen sulfide
HCN	hydrocyanic acid
HGV	Health Guidance Value
IDLH	Immediately Dangerous to Life and Health
IP	ionization potential
ISO	isobutylene
LEL	lower explosive level
m^3	cubic meter
mg/kg	milligram per kilogram
mg/m^3	milligram per cubic meter
µR/hr	micro-Roentgens per hour
NA	not available/applicable
ND	non-detect
ng/m^3	nanogram per cubic meter
NH_3	ammonia
NIOSH	National Institute for Occupational Safety and Health
NL	not listed
NR	no response
O_2	oxygen

Glossary (continued)

OSHA	Occupational Safety and Health Administration
pCi/L	picocuries per liter
PAH	polyaromatic hydrocarbon
PID	photoionization detector
ppb	parts per billion
PDR	personal dataRAM
PEL	Permissible Exposure Limit (OSHA)
PPE	personal protective equipment
ppm	parts per million
R/hr	Roentgen per hour
REL	Recommended Exposure Limit (NIOSH)
SO_2	sulfur dioxide
SPM	Single-Point Monitor
SSHASP	site-specific health and safety plan
ST	short-term
STEL	Short-Term Exposure Limit
TLV	Time-Limited Value (ACGIH)
TWA	Time-Weighted Average
U-STEL	USA CHPPM short-term exposure limit
U-WPL	USA CHPPM worker protection limit
USA CHPPM	U.S. Army Center for Health Promotion and Preventive Medicine
VOC	volatile organic compound
Vol.	volume
WPL	worker protection limit
Y w/option	Yes with option; see manufacturer's instrument manual for information

Table 1 -- Acid (Spill or Release)

Target Compound[1]	Instrument (Instrument Guidance)	Detection Level	Intrinsically Safe (Y/N)	IP	Conversion	Occupational Action Levels: TWA	Occupational Action Levels: IDLH	AEGL-1: 1-hr	AEGL-1: 4-hr	AEGL-1: 8-hr	TEEL-0: 15-min TWA	ERPG-1: 1-hr	Air Sampling (Reference): Media	Air Sampling (Reference): Method	Air Sampling (Reference): Flow Rate/ Total Volume
Acids															
Hydrochloric Acid (Hydrogen Chloride)	AreaRAE HCl Sensor	2-15 ppm	Y	12.74 eV	1 ppm = 1.49 mg/m^3	PEL = C 5 ppm REL = C 5 ppm TLV = C 5 ppm	50 ppm	1.8 ppm	1.8 ppm	1.8 ppm	0.5 ppm	NA	Silica Gel Tube, 226-10-03	NIOSH 7903	0.2-0.5 L/min; 48 L
	MultiRAE Pro HCl Sensor	0-15 ppm	Y												
	Dräger Tube	≥1-10 ppm	Y												
	Dräger Chip	≥1-25 ppm	N (Y w/option)												
	pH Paper	NA	Y												
	SPM	0.5-15 ppm	N (Y w/option)												
	Dräger Pac III	0-30 ppm	Y												
	GFG Inc. Micro IV	0-30 ppm	Y												
Nitric Acid	Dräger Tube	≥1-50 ppm	Y	11.95 eV	1 ppm = 2.58 mg/m^3	PEL = 2 ppm REL = 2 ppm, ST 4 ppm TLV = 2 ppm, ST 4 ppm	25 ppm	0.53 ppm	0.53 ppm	0.53 ppm	0.53 ppm	1 ppm	Silica Gel Tube, 226-10-03	NIOSH 7903	0.2-0.5 L/min; 48 L
	pH Paper	NA	Y												
	SPM	0.2-6 ppm	N (Y w/option)												
Sulfuric Acid	Dräger Tube	1-5 mg/m^3	Y	12.4 eV	NA	PEL = 1 mg/m^3 REL = 1 mg/m^3 TLV = 1 mg/m^3, ST 3 mg/m^3	15 mg/m^3	0.2 mg/m^3	0.2 mg/m^3	0.2 mg/m^3	0.2 mg/m^3	2 mg/m^3	Silica Gel Tube, 226-10-03	NIOSH 7903	0.2-0.5 L/min; 48 L
	pH Paper	NA	Y												
	SPM	26-750 ppb	N (Y w/option)												
Hydrocyanic Acid (Hydrogen Cyanide)	MultiRAE/AreaRAE HCN Sensor	0-100 ppm	Y	13.6 eV	1 ppm = 1.1 mg/m^3	PEL = 10 ppm S REL = ST 4.7 ppm S TLV = C 10 ppm S	50 ppm	2.0 ppm	1.3 ppm	1 ppm	1.9 ppm	NA	Soda Lime Tube, 226-28	NIOSH 6010	0.05-0.2 L/min; 2-90 L
	MultiRAE Pro HCN Sensor	0-50 ppm	Y												
	Dräger Tube	2-30 ppm	Y												
	Dräger Chip	2-50 ppm	N (Y w/option)												
	pH Paper	NA	Y												
	ToxiRAE II HCN	0-100 ppm	Y												
	SPM	1.1-30 ppm	N (Y w/option)												
	Dräger Pac III	0-50 ppm	Y												
	GFG Inc. Micro IV	0-50 ppm	Y												
Hydrofluoric Acid (Hydrogen Fluoride)	AreaRAE HF Sensor	2-10 ppm	Y	15.98 eV	1 ppm = 0.82 mg/m^3	PEL = 3 ppm REL = C 3 ppm, ST 6 ppm TLV = C 3 ppm	30 ppm	1 ppm	1 ppm	1 ppm	0.527 ppm	NA	Silica Gel Tube, 226-10-03	NIOSH 7903	0.2-0.5 L/min; 48 L
	MultiRAE Pro HF Sensor	0-10 ppm	Y												
	Dräger Tube	0.5-90 ppm	Y												
	pH Paper	NA	Y												
	SPM	0.6-9 ppm	N (Y w/option)												
	Dräger Pac III	0-30 ppm	Y												
	GFG Inc. Micro IV	0-10 ppm	Y												
Hydrobromic Acid	pH Paper	NA	Y	11.62 eV	1 ppm = 3.31 mg/m^3	PEL = 3 ppm REL = C 3 ppm TLV = C 3 ppm	30 ppm	1 ppm	1 ppm	1 ppm	0.527 ppm	NA	Silica Gel Tube, 226-10-03	NIOSH 7903	0.2-0.5 L/min; 48 L
	SPM	0.3-9 ppm	N (Y w/option)												
Acetic Acid	Dräger Tube	5-80 ppm	Y	10.66 eV	1 ppm = 2.46 mg/m^3	PEL = 10 ppm REL = 10 ppm TLV = 10 ppm, ST 15 ppm	50 ppm	NA	NA	NA	5 ppm	5 ppm	Anasorb CSC Tube, 226-01	NIOSH 1603	0.01-1 L/min; 24 L
	Dräger Chip	2-50 ppm	N (Y w/option)												
	pH Paper	NA	Y												
	MIRAN SapphIRe	0-100 ppm	Y												

Table 1 -- Acid (Spill or Release)

Instrument Guidance						Regulatory Guidance							Reference		
						Occupational Action Levels		AEGL-1			TEEL-0	ERPG-1	Air Sampling		
Target Compound[1]	Instrument	Detection Level	Intrinsically Safe (Y/N)	IP	Conversion	TWA	IDLH	1-hr	4-hr	8-hr	15-min TWA	1-hr	Media	Method	Flow Rate/ Total Volume
Gases Produced from Acid Reactions															
Oxygen	MultiRAE/AreaRAE O_2 Sensor	0-30% Vol.	Y	12.35 eV	NA	<19.5% O_2 (simple asphyxiant)	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Dräger Tube	5-23% Vol.	Y												
	Dräger Chip	1-25% Vol.	N (Y w/option)												
	Dräger Pac III	0-100% Vol.	Y												
	GFG Inc. Micro IV	0-25%	Y												
Hydrogen	Dräger Tube	0.2-2% Vol.	Y	15.42 eV	NA	<19.5% O_2 (simple asphyxiant)	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Dräger Pac III	0-2000 ppm	Y												
	GFG Inc. Micro IV	0-4% Vol.	Y												
Radiation[2]															
Radiation	Ludlum Model 192	0-5,000 µR/hr	N	NA	NA	60-100 µR/hr*	NA	NA	NA	NA	NA	NA	RADeCO Filter Paper (2")	RSSOP 209/501	α = 2500 ft^3 β/γ = 1250 ft^3
	Ludlum Model 2241-2 w/Pancake Probe	0-100,000 cpm or 0-200 mR/hr	N			300 cpm*									
	Ludlum Model 2241-3 w/Pancake Probe	0-100,000 cpm or 0-200 mR/hr	N			300 cpm*									
	*These are not TWA(s). Normal gamma radiation background is from 5-20 µR/hr; however, higher backgrounds may exist. If readings are 3 times background or greater than 60-100 µR/hr or greater than 300 cpm, then stop work and consult with a Health Physicist. Refer to Hazardous Evaluation Flow Chart for Unknowns in Attachment A.														

Table 1 -- Acid (Spill or Release)

Notes:
For guidance only. These tables do not supersede a SSHASP at any time or on any response.

[1] Does not include all pollutants associated with this type of event, only the most common pollutants with the lowest action levels.

[2] Standard EPA Emergency Response Protocol is to screen for radiation with a Micro-R at all emergency responses. If readings are three times background, responders consult with a Health Physicist. Additional radiation equipment is available to monitor for Alpha, Beta and Gamma, but is not included in this table.

AEGL-1 is the airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience notable discomfort, irritation, or certain asymptomatic non-sensory effects; however, the effects are not disabling and are transient and reversible upon cessation of exposure.
TEEL-0 is the temporary level of concern derived according to a tiered, formula-like methodology; representing concentrations associated with no effects.
ERPG-1 is the acute exposure concentration of the general population for up to 1 hour associated with effects expected to be mild or transient.

Data on tables are from the following sources:

http://www.epa.gov/oppt/aegl/pubs/chemlist.htm	EPA's website used to research AEGLs using the chemical's name or chemical abstracts service registry numbers.
http://www.cdc.gov/niosh/npg/npgsyn-a.html	CDC NIOSH Pocket Guide to Chemical Hazards website
http://wiser.nlm.nih.gov/	WISER website
http://www.skcinc.com/	SKC, Inc. website (Air Sampling Media Part No. is specific to SKC)

Acronyms:

≥ -- greater than or equal to
< -- less than
% -- percent
ACGIH -- American Conference of Governmental Industrial Hygienists
AEGL -- acute exposure guideline levels
C -- ceiling (concentrations that should not be exceeded during any part of work exposure)
CDC -- Centers for Disease Control and Prevention
cpm -- counts per minute
EPA -- U.S. Environmental Protection Agency
ERPG -- emergency response planning guideline
eV -- electron volt
IDLH -- immediately dangerous to life and health
IP -- ionization potential
L/min -- liter per minute
mg/m^3 -- milligrams per cubic meter
µR/hr -- micro Roentgens per hour
NA -- not available/applicable
NIOSH -- National Institute for Occupational Safety and Health
OSHA -- Occupational Safety and Health Administration
PEL -- permissible exposure limit (OSHA)
ppm -- parts per million
R/hr -- Roentgens per hour
REL -- recommended exposure limit (NIOSH)
S -- skin notation (compound may be absorbed through the skin)
SPM -- single-point monitor
SSHASP -- site-specific health and safety plan
ST -- short term
TEEL -- temporary emergency exposure limit
TLV -- time-limited value (ACGIH)
TWA -- time-weighted average
Vol. -- volume
WISER -- Wireless Information System for Emergency Responders
Y w/option - yes with option; see manufacturer's instrument manual for information

Table 2 -- Ammonia (Spill or Release)

Target Compound	Instrument	Detection Level	Intrinsically Safe (Y/N)	IP	PID CF (ISO)	Conversion	Occupational Action Levels		AEGL-1			TEEL-0	ERPG-1	Air Sampling		
							TWA	IDLH	1-hr	4-hr	8-hr	15-min TWA	1-hr	Media	Method	Flow Rate/ Total Volume
Gas																
Ammonia	MultiRAE/AreaRAE NH_3 Sensor	0-50 ppm	Y	10.18 eV	NA	1 ppm = 0.7 mg/m^3	PEL = 50 ppm REL = 25 ppm, ST 35 ppm TLV = 25 ppm, ST 35 ppm	300 ppm	30 ppm	30 ppm	30 ppm	30 ppm	25 ppm	Silica Gel Tube, 226-10-06	NIOSH 6015	0.1-0.2 L/min; 72 L
	MultiRAE Pro NH_3 Sensor	0-100 ppm	Y													
	Dräger Tube	≥0.25-3 ppm	Y													
	Dräger Chip	≥0.2-5 ppm	N (Y w/option)													
	Dräger Pac III	0-300 ppm	Y													
	SPM	2.6-75 ppm	N (Y w/option)													
	ToxiRAE II NH_3	0-50 ppm	Y													
	MIRAN SapphIRe*	0-500 ppm	Y													
	MultiRAE/AreaRAE PID**	0-2000 ppm	Y		9.7 (10.6 lamp)											
	TVA 1000B**	0.5-2,000 ppm (PID) 1-50,000 ppm (FID)	Y		10.6 lamp 21.666 (10 ppm) - 22.980 (2000 ppm)											
Radiation[1]																
Radiation	Ludlum Model 192	0-5,000 µR/hr	N	NA	NA	NA	60-100 µR/hr*	NA	NA	NA	NA	NA	NA	RADeCO Filter Paper (2")	RSSOP 209/501	α = 2500 ft^3 β/γ = 1250 ft^3
	Ludlum Model 2241-2 w/Pancake Probe	0-100,000 cpm or 0-200 mR/hr	N				300 cpm*									
	Ludlum Model 2241-3 w/Pancake Probe	0-100,000 cpm or 0-200 mR/hr	N				300 cpm*									
	*These are not TWA(s). Normal gamma radiation background is from 5-20 µR/hr; however, higher backgrounds may exist. If readings are 3 times background or greater than 60-100 µR/hr or greater than 300 cpm, then stop work and consult with a Health Physicist. Refer to Hazardous Evaluation Flow Chart for Unknowns in Attachment A.															

Table 2 -- Ammonia (Spill or Release)

Notes:
For guidance only. These tables do not supersede a SSHASP at any time or on any response.

[1] Standard EPA Emergency Response Protocol is to screen for radiation with a Micro-R at all emergency responses. If readings are three times background, responders consult with a Health Physicist. Additional radiation equipment is available to monitor for Alpha, Beta and Gamma, but is not included in this table.

AEGL-1 is the airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience notable discomfort, irritation, or certain asymptomatic non-sensory effects; however, the effects are not disabling and are transient and reversible upon cessation of exposure.
TEEL-0 is the temporary level of concern derived according to a tiered, formula-like methodology; representing concentrations associated with no effects.
ERPG-1 is the acute exposure concentration of the general population for up to 1 hour associated with effects expected to be mild or transient.

Data on tables are from the following sources:

http://www.epa.gov/oppt/aegl/pubs/chemlist.htm	EPA's website used to research AEGLs using the chemical's name or chemical abstracts service registry numbers.
http://www.cdc.gov/niosh/npg/npgsyn-a.html	CDC NIOSH Pocket Guide to Chemical Hazards website
http://wiser.nlm.nih.gov/	Wireless Information System for Emergency Responders (WISER) website
http://www.skcinc.com/	SKC, Inc. website (Air Sampling Media Part No. is specific to SKC)

*MIRAN SapphlRe has problems with complex mixtures (*e.g.;* distinguishing benzene from gasoline vapor)
**PIDs/FIDs are non-specific detectors and cannot differentiate between VOCs, even with CFs applied. See RAE PID CF Guidance Document TN-106 for information and TVA Response Factor document P/N 50039 THERMO.

Acronyms:

≥ -- greater than or equal to
ACGIH -- American Conference of Governmental Industrial Hygienists
AEGL -- acute exposure guideline levels
CDC -- Centers for Disease Control and Prevention
CF -- conversion factor
cpm -- counts per minute
EPA -- U.S. Environmental Protection Agency
ERPG -- emergency response planning guideline
eV -- electron volt
IDLH -- immediately dangerous to life and health
IP -- ionization potential
ISO -- isobutylene
L/min -- liter per minute
mg/m^3 -- milligrams per cubic meter
µR/hr -- micro Roentgens per hour
NA -- not available/applicable
NIOSH -- National Institute for Occupational Safety and Health
OSHA -- Occupational Safety and Health Administration
PEL -- permissible exposure limit (OSHA)
PID -- photoionization detector
ppm -- parts per million
R/hr -- Roentgens per hour
REL -- recommended exposure limit (NIOSH)
SPM -- single-point monitor
SSHASP -- site-specific health and safety plan
ST -- short term
TEEL -- temporary emergency exposure limit
TLV -- time-limited value (ACGIH)
TWA -- time-weighted average
WISER -- Wireless Information System for Emergency Responders
Y w/option - yes with option; see manufacturer's instrument manual for information

Table 3 -- Chemical Plant (Fire)

Target Compound[1]	Instrument	Detection Level	Intrinsically Safe (Y/N)	IP	PID CF (ISO)	Conversion	Health Guidance Values[2]		Occupational Action Levels		AEGL-1			TEEL-0	ERPG-1	Air Sampling		
							Residential	Commercial	TWA	IDLH	1-hr	4-hr	8-hr	15-min TWA	1-hr	Media	Method	Flow Rate/ Total Volume
VOCs and Gases																		
Benzene	UltraRAE-PID***	0.1-2000 ppm	Y	9.24 eV	NA	1 ppm = 3.19 mg/m^3	NA	NA	PEL = 1 ppm REL = 0.1 ppm, ST 1 ppm TLV = 10 ppm	500 ppm	52 ppm	18 ppm	9 ppm	1 ppm	50 ppm	Anasorb CSC Tube, 226-01	NIOSH 1501	≤0.2 L/min; 6 L
	Dräger Tube	≥0.5-10 ppm	Y															
	Dräger Chip	≥0.2-10	N (Y w/option)															
	MIRAN SapphIRe**	10-200 ppm	Y															
	ppbRAE-PID***	1ppb-200ppm	Y		0.53 (10.6 lamp)													
	MultiRAE/AreaRAE PID***	0-2000 ppm	Y															
	TVA 1000B***	0.5-2,000 ppm (PID) 1-50,000 ppm (FID)	Y		10.6 lamp 0.702 (10 ppm) - 1.781 (2000 ppm)													
Carbon Monoxide	MultiRAE/AreaRAE CO Sensor	0-500 ppm	Y	14.01 eV	NA	1 ppm = 1.15 mg/m3	NA	NA	PEL = 50 ppm REL = 35 ppm, C 200 ppm TLV = 25 ppm	1200 ppm	83 ppm*	33 ppm*	27 ppm*	50 ppm	200 ppm	Sample Bag, 245-05	OSHA ID 210	NA
	MultiRAE Pro CO Sensor	0-2000 ppm ext. range	Y															
	Dräger Tube	≥2-300 ppm	Y															
	Dräger Chip	5-150 ppm	N (Y w/option)															
	ToxiRAE II CO	≥0-500 ppm	Y															
	GFG Inc. Micro IV	0-2000 ppm	Y															
	MIRAN SapphIRe**	4.5-250 ppm	Y															
Hydrogen Sulfide	MultiRAE/AreaRAE H_2S Sensor	0-100 ppm	Y	10.46 eV	NA	1 ppm = 1.4 mg/m^3	NA	NA	PEL = C 20 ppm, 50 ppm (10 mins) REL = C 10 ppm (10 mins) TLV = 10 ppm, ST 15 ppm	100 ppm	0.51 ppm	0.36 ppm	0.33 ppm	0.51 ppm	0.1 ppm	Silica Gel Tube, 266-177	OSHA 1008	0.05 L/min; 12 L
	MultiRAE Pro H_2S Sensor	0-1000 ppm ext. range	Y															
	Dräger Tube	≥0.2-6 ppm	Y															
	Dräger Chip	≥0.2-5 ppm	N (Y w/option)															
	SPM	1.1-30 ppm	N (Y w/option)															
	MultiRAE/AreaRAE PID***	0-2000 ppm	Y		3.3 (10.6 lamp)													
	GFG Inc. Micro IV	0-500 ppm	Y		NA													
	TVA 1000B***	0.5-2,000 ppm (PID)	Y															
Sulfur Dioxide	MultiRAE/AreaRAE SO_2 Sensor	0-20 ppm	Y	12.3 eV	NA	1 ppm = 2.62 mg/m^3	NA	NA	PEL = 5 ppm REL = 2 ppm, ST 5 ppm TLV = 2 ppm, ST 5 ppm	100 ppm	0.2 ppm	0.2 ppm	0.2 ppm	0.2 ppm	0.3 ppm	MCE Cassette, 225-9005	NIOSH 6004	0.5-1.5 L/min; 180 L
	Dräger Pac III	0-100 ppm	Y															
	Dräger Tube	≥0.1-3 ppm	Y															
	Dräger Chip	≥0.4-10 ppm	N (Y w/option)															
	MIRAN SapphIRe**	6-30 ppm	Y															
	GFG Inc. Micro IV	1-10 ppm	Y															
	SPM	0.2-6 ppm	N (Y w/option)															
Nitric Oxide	MultiRAE/AreaRAE NO Sensor	0-250 ppm	Y	11.95 eV	NA	1 ppm = 1.23 mg/m^3	NA	NA	PEL = 25 ppm REL = 25 ppm TLV = 25 ppm	100 ppm	NA	NA	NA	0.5 ppm	NA	Molecular Sieve Tube, 226-40	NIOSH 6014	0.025 L/min; 1.5-6 L
	ToxiRAE II NO	0-250 ppm	Y															
	Dräger Pac III	0-100 ppm	Y															
	GFG Inc. Micro IV	0-100 ppm	Y															

Table 3 -- Chemical Plant (Fire)

Target Compound[1]	Instrument	Detection Level	Intrinsically Safe (Y/N)	IP	PID CF (ISO)	Conversion	Health Guidance Values[2]		Occupational Action Levels		AEGL-1			TEEL-0	ERPG-1	Air Sampling		
							Residential	Commercial	TWA	IDLH	1-hr	4-hr	8-hr	15-min TWA	1-hr	Media	Method	Flow Rate/ Total Volume
VOCs and Gases (continued)																		
Vinyl Chloride	MultiRAE/AreaRAE PID***	0-2000 ppm	Y	9.99 eV	2 (10.6 lamp)	1 ppm = 2.56 mg/m^3	NA	NA	PEL = 1 ppm, C 5 ppm (15 mins) REL = Ca TLV = 5 ppm	NA	250 ppm	140 ppm	70 ppm	1 ppm	500 ppm	Anasorb CSC Tube, 226-01	NIOSH 1007	0.05 L/min; 5 L
	Dräger Tube	≥0.5-30 ppm	Y		NA													
	Dräger Chip	≥0.3-10 ppm	N (Y w/option)															
	MIRAN SapphIRe**	2-20 ppm	Y															
	Dräger Pac III	0-100 ppm	Y															
	TVA 1000B***	0.5-2,000 ppm (PID) 1-50,000 ppm (FID)	Y		10.6 lamp 2.334 (10 ppm) - 4.397 (2000 ppm)													
Nitrogen Dioxide	MultiRAE/AreaRAE NO_2 Sensor	0-20 ppm	Y	9.75 eV	NA	1 ppm = 1.88 mg/m^3	NA	NA	PEL = C 5 ppm REL = ST 1 ppm TLV = 3 ppm, ST 5 ppm	20 ppm	0.5 ppm	0.5 ppm	0.5 ppm	0.5 ppm	1 ppm	Molecular Sieve Tube, 226-40-02	NIOSH 6014	0.025-0.2 L/min; 1.5-6 L
	Dräger Tube	≥0.5-25 ppm	Y															
	Dräger Chip	0.5-25 ppm	N (Y w/option)															
	SPM	0.3-9 ppm	N (Y w/option)															
	ToxiRAE II NO_2	0-20 ppm	Y															
	Dräger Pac III	0-50 ppm	Y															
	GFG Inc. Micro IV	0-30 ppm	Y															
	MultiRAE/AreaRAE PID***	0-2000 ppm	Y		16 (10.6 lamp)													
	TVA 1000B***	0.5-2,000 ppm (PID) 1-50,000 ppm (FID)	Y		NA													
TCE	Dräger Tube	≥2-250 ppm	Y	9.47 eV	NA	1 ppm = 5.37 mg/m^3	NA	NA	PEL = 100 ppm, C 200 ppm, 300 ppm (5 mins) REL = Ca TLV = 50 ppm, ST 200 ppm	1000 ppm Ca	130 ppm	84 ppm	77 ppm	10ppm	100 ppm	Anasorb CSC Tube, 226-01	NIOSH 1022	0.01-0.2 L/min; 10 L
	Dräger Chip	≥5-100 ppm	N (Y w/option)															
	MultiRAE/AreaRAE PID***	0-2000 ppm	Y		0.54 (10.6 lamp)													
	TVA 1000B***	0.5-2000 ppm (PID)	Y		10.6 lamp 0.605 (10 ppm) - 2.129 (2000 ppm)													
Phosgene	Dräger Tube	0.02-15 ppm	Y	11.2 eV	NA	1 ppm = 4.05 mg/m^3	NA	NA	PEL = 0.1 ppm REL = 0.1 ppm, C 0.2 ppm (15 mins) TLV = 0.1 ppm	2 ppm	0.3 ppm*	0.08 ppm*	0.04ppm*	0.1 ppm	NA	XAD-2 Tube, 226-117	OSHA 61	1 L/min; 240 L
	Dräger Chip	0.05-2 ppm	N (Y w/option)															
	MIRAN SapphIRe**	0.05 ppm	Y															
	TVA 1000B***	0.5-2000 ppm	Y															
	MultiRAE Pro $COCl_2$ Sensor	0-1 ppm	Y															
	MultiRAE/AreaRAE PID***	0-200 ppm	Y		8.5 (11.7 lamp)													
	TVA 1000B***	0.5-2000 ppm (PID)	Y		NA													
Nitric Acid	Dräger Tube	≥1-50 ppm	Y	11.95 eV	NA	1 ppm = 2.58 mg/m^3	NA	NA	PEL = 2 ppm REL = 2 ppm, ST 4 ppm TLV = 2 ppm, ST 4 ppm	25 ppm	0.53 ppm	0.53 ppm	0.53 ppm	0.53 ppm	1 ppm	Silica Gel Tube, 226-10-03	NIOSH 7903	0.2-0.5 L/min; 48 L
	pH Paper	NA	Y															
	SPM	0.2-6 ppm	N (Y w/option)															

Table 3 -- Chemical Plant (Fire)

Target Compound[1]	Instrument (Instrument Guidance)	Detection Level (Instrument Guidance)	Intrinsically Safe (Y/N) (Instrument Guidance)	IP (Instrument Guidance)	PID CF (ISO) (Instrument Guidance)	Conversion (Instrument Guidance)	Health Guidance Values[2] (Regulatory Guidance): Residential	Health Guidance Values[2] (Regulatory Guidance): Commercial	Occupational Action Levels (Regulatory Guidance): TWA	Occupational Action Levels (Regulatory Guidance): IDLH	AEGL-1 (Regulatory Guidance): 1-hr	AEGL-1 (Regulatory Guidance): 4-hr	AEGL-1 (Regulatory Guidance): 8-hr	TEEL-0 (Regulatory Guidance): 15-min TWA	ERPG-1 (Regulatory Guidance): 1-hr	Air Sampling (Reference): Media	Air Sampling (Reference): Method	Air Sampling (Reference): Flow Rate/ Total Volume
VOCs and Gases (continued)																		
Sulfuric Acid	Dräger Tube	1-5 mg/m^3	Y	12.4 eV	NA	NA	NA	NA	PEL = 1 mg/m^3 REL = 1 mg/m^3 TLV = 1 mg/m^3, ST 3 mg/m^3	15 mg/m^3	0.2 mg/m^3	0.2 mg/m^3	0.2 mg/m^3	0.2 mg/m^3	2 mg/m^3	Silica Gel Tube, 226-10-03	NIOSH 7903	0.2-0.5 L/min; 48 L
	pH Paper	NA	Y															
	SPM	26-750 ppb	N (Y w/option)															
Hydrochloric Acid (Hydrogen Chloride)	AreaRAE HCl Sensor	2-15 ppm	Y	12.74 eV	NA	1 ppm = 1.49 mg/m^3	NA	NA	PEL = C 5 ppm REL = C 5 ppm TLV = C 5 ppm	50 ppm	1.8 ppm	1.8 ppm	1.8 ppm	0.5 ppm	NA	Silica Gel Tube, 226-10-03	NIOSH 7903	0.2-0.5 L/min; 48 L
	MultiRAE Pro HCl Sensor	0-15 ppm	Y															
	Dräger Tube	≥1-10 ppm	Y															
	Dräger Chip	≥1-25 ppm	N (Y w/option)															
	pH Paper	NA	Y															
	SPM	0.5-15 ppm	N (Y w/option)															
	Dräger Pac III	0-30 ppm	Y															
	GFG Inc. Micro IV	0-30 ppm	Y															
Acetic Acid	Dräger Tube	5-80 ppm	Y	10.66 eV	NA	1 ppm = 2.46 mg/m^3	NA	NA	PEL = 10 ppm REL = 10 ppm TLV = 10 ppm, ST 15 ppm	50 ppm	NA	NA	NA	5 ppm	5 ppm	Anasorb CSC Tube, 226-01	NIOSH 1603	0.01-1 L/min; 24 L
	Dräger Chip	2-50 ppm	N (Y w/option)															
	pH Paper	NA	Y															
	MIRAN SapphIRe	0-100 ppm	Y															
Hydrobromic Acid	pH Paper	NA	Y	11.62 eV	NA	1 ppm = 3.31 mg/m^3	NA	NA	PEL = 3 ppm REL = C 3 ppm TLV = C 3 ppm	30 ppm	1 ppm	1 ppm	1 ppm	0.527 ppm	NA	Silica Gel Tube, 226-10-03	NIOSH 7903	0.2-0.5 L/min; 48 L
	SPM	0.3-9 ppm	N (Y w/option)															
Hydrocyanic Acid (Hydrogen Cyanide)	MultiRAE/AreaRAE HCN Sensor	0-100 ppm	Y	13.6 eV	NA	1 ppm = 1.1 mg/m^3	NA	NA	PEL = 10 ppm S REL = ST 4.7 ppm S TLV = C 10 ppm S	50 ppm	2.0 ppm	1.3 ppm	1 ppm	1.9 ppm	NA	Soda Lime Tube, 226-28	NIOSH 6010	0.05-0.2 L/min; 2-90 L
	MultiRAE Pro HCN Sensor	0-50 ppm	Y															
	Dräger Tube	2-30 ppm	Y															
	Dräger Chip	2-50 ppm	N (Y w/option)															
	pH Paper	NA	Y															
	ToxiRAE II HCN	0-100 ppm	Y															
	SPM	1.1-30 ppm	N (Y w/option)															
	Dräger Pac III	0-50 ppm	Y															
	GFG Inc. Micro IV	0-50 ppm	Y															
Hydrofluoric Acid (Hydrogen Fluoride)	AreaRAE HF Sensor	2-10 ppm	Y	15.98 eV	NA	1 ppm = 0.82 mg/m^3	NA	NA	PEL = 3 ppm REL = C 3 ppm, ST 6 ppm TLV = C 3 ppm	30 ppm	1 ppm	1 ppm	1 ppm	0.527 ppm	NA	Silica Gel Tube, 226-10-03	NIOSH 7903	0.2-0.5 L/min; 48 L
	MultiRAE Pro HF Sensor	0-10 ppm	Y															
	Dräger Tube	0.5-90 ppm	Y															
	pH Paper	NA	Y															
	SPM	0.6-9 ppm	N (Y w/option)															
	Dräger Pac III	0-30 ppm	Y															
	GFG Inc. Micro IV	0-10 ppm	Y															
Metals - as particulates																		
Arsenic (inorganic compounds)	Personal DataRAM****	0.001-400 mg/m^3	N	9.81 eV	NA	NA	NA	NA	PEL = 0.01 mg/m^3 REL = C 0.002 mg/m^3 (15 mins) TLV = 0.01 mg/m^3	5 mg/m^3 Ca	NA	NA	NA	0.025 mg/m^3	NA	MCE Cassette, 225-3-01	NIOSH 7900	1-3 L/min; 30 L
	DataRAM 4****	0.001-400 mg/m^3	N															
Arsenic (organic compounds)	Dräger Tube	0-3 mg organic arsenic/m^3	Y	NA	NA	NA	NA	NA	PEL = 0.5 mg/m^3 TLV = 0.2 mg/m^3	NA	NA	NA	NA	0.025 mg/m^3	NA	PTFE Filter, 225-17-01	NIOSH 5022	1-3 L/min; 960 L
Chromium	Personal DataRAM****	0.001-400 mg/m^3	N	NA	NA	NA	NA	NA	PEL = 1 mg/m^3 REL = 0.5 mg/m^3 TLV = 0.5 mg/m^3	250 mg/m^3	NA	NA	NA	NA	NA	MCE Cassette, 225-3-01	NIOSH 7024	1-3 L/min; 10-1000 L
	DataRAM 4****	0.001-400 mg/m^3	N															

Table 3 -- Chemical Plant (Fire)

Target Compound[1]	Instrument	Detection Level	Intrinsically Safe (Y/N)	IP	PID CF (ISO)	Conversion	Health Guidance Values[2]		Occupational Action Levels		AEGL-1			TEEL-0	ERPG-1	Air Sampling		
							Residential	Commercial	TWA	IDLH	1-hr	4-hr	8-hr	15-min TWA	1-hr	Media	Method	Flow Rate/ Total Volume
				Instrument Guidance			Regulatory Guidance									Reference		
Metals - as particulates (continued)																		
Chromium (II)	Personal DataRAM****	0.001-400 mg/m^3	N	NA	NA	NA	NA	NA	PEL = 0.5 mg/m^3 REL = 0.5 mg/m^3 TLV = 0.5 mg/m^3	250 mg/m^3	NA	NA	NA	NA	NA	MCE Cassette, 225-3-01	NIOSH 7024	1-3 L/min; 10-1000 L
	DataRAM 4****	0.001-400 mg/m^3	N															
Chromium (III)	Personal DataRAM****	0.001-400 mg/m^3	N	NA	NA	NA	NA	NA	PEL = 0.5 mg/m^3 REL = 0.5 mg/m^3 TLV = 0.5 mg/m^3	25 mg/m^3	NA	NA	NA	NA	NA	MCE Cassette, 225-3-01	NIOSH 7024	1-3 L/min; 10-1000 L
	DataRAM 4****	0.001-400 mg/m^3	N															
Chromium (VI)	Personal DataRAM****	0.001-400 mg/m^3	N	NA	NA	NA	NA	NA	PEL = 0.005 mg/m^3 REL = 0.001 mg/m^3 TLV = 0.05 mg/m^3	15 mg/m^3	NA	NA	NA	NA	NA	PVC Cassette, 225-802	NIOSH 7600	1-4 L/min; 240 L
	DataRAM 4****	0.001-400 mg/m^3	N															
Lead	Personal DataRAM****	0.001-400 mg/m^3	N	NA	NA	NA	NA	NA	PEL = 0.05 mg/m^3 REL = 0.05 mg/m^3 TLV = 0.05 mg/m^3	100 mg/m^3	NA	NA	NA	0.05 mg/m^3	NA	MCE Cassette, 225-3-01	NIOSH 7300	1-4 L/min; 50-2000 L
	DataRAM 4****	0.001-400 mg/m^3	N															
Mercury	Lumex RA-915	0.000002-0.05 mg/m^3	N	NA	NA	NA	1000 ng/m^3	3000 ng/m^3	PEL = C 0.1 mg/m^3 S REL = 0.05 mg/m^3 S (vapor), C 0.1 mg/m^3 (other) TLV = 0.025 mg/m^3 S	10 mg/m^3	1.7 mg/m^3*	0.67 mg/m^3*	0.33 mg/m^3*	0.025 mg/m^3*	NA	Anasorb C300 Tube, 226-17-1A	NIOSH 6009	0.15-0.25 L/min; 48 L
	Lumex RA-915 Light	0.0001-0.1 mg/m^3	N															
	Jerome 431X	0.003 to 0.999 mg/m^3	N															
	Jerome J405	0.0005-0.999 mg/m^3	N															
	Jerome 471	0.00003-0.25 mg/m^3	N															
	Dräger Tube	0.00000005-0.000002 mg/m^3	Y															
Particulate																		
Particulate	Personal DataRAM****	0.001-400 mg/m^3	N	NA	NA	NA	NA	NA	PEL = 15 mg/m^3 (total), 5 mg/m^3 (respirable) TLV = 10 mg/m^3 (total), 3 mg/m^3 (respirable)	NA	NA	NA	NA	10 mg/m^3	NA	Filter (total) Cyclone + Filter (resp)	NIOSH 0500 (total) NIOSH 0600 (resp)	1-2 L/min (total) 1.7-2.5 L/min (resp)
	DataRAM 4****	0.001-400 mg/m^3	N															
	eBAM	0-100 mg/m^3	N															
Radiation[3]																		
Radiation	Ludlum Model 192	0-5,000 µR/hr	N	NA	NA	NA	NA	NA	60-100 µR/hr*	NA	NA	NA	NA	NA	NA	RADeCO Filter Paper (2")	RSSOP 209/501	α = 2500 ft^3 β/γ = 1250 ft^3
	Ludlum Model 2241-2 w/Pancake Probe	0-100,000 cpm or 0-200 mR/hr	N						300 cpm*									
	Ludlum Model 2241-3 w/Pancake Probe	0-100,000 cpm or 0-200 mR/hr	N						300 cpm*									
	*These are not TWA(s). Normal gamma radiation background is from 5-20 µR/hr; however, higher backgrounds may exist. If readings are 3 times background or greater than 60-100 µR/hr or greater than 300 cpm, then stop work and consult with a Health Physicist. Refer to Hazardous Evaluation Flow Chart for Unknowns in Attachment A.																	

Table 3 -- Chemical Plant (Fire)

Notes:
For guidance only. These tables do not supersede a SSHASP at any time or on any response.

[1] Does not include all pollutants associated with this type of event, only the most common pollutants with the lowest action levels. Depending on the chemical of concern, certain Dräger tubes and chips can be used. In addition, single-gas instruments and sensors and/or a gas chromatography-mass spectrometry instrument may be used.

[2] EPA and ATSDR Health Guidance Values

[3] Standard EPA Emergency Response Protocol is to screen for radiation with a Micro-R at all emergency responses. If readings are three times background, responders consult with a Health Physicist. Additional radiation equipment is available to monitor for Alpha, Beta and Gamma, but is not included in this table.

AEGL-1 is the airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience notable discomfort, irritation, or certain asymptomatic non-sensory effects; however, the effects are not disabling and are transient and reversible upon cessation of exposure.
AEGL-2 is the airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience irreversible or other serious, long-lasting adverse health effects or an impaired ability to escape.
TEEL-0 is the temporary level of concern derived according to a tiered, formula-like methodology; representing concentrations associated with no effects.
ERPG-1 is the acute exposure concentration of the general population for up to 1 hour associated with effects expected to be mild or transient.

Data on tables are from the following sources:

http://www.epa.gov/oppt/aegl/pubs/chemlist.htm	EPA's website used to research AEGLs using the chemical's name or chemical abstracts service registry numbers.
http://www.cdc.gov/niosh/npg/npgsyn-a.html	CDC NIOSH Pocket Guide to Chemical Hazards website
http://wiser.nlm.nih.gov/	WISER website
http://www.skcinc.com/	SKC, Inc. website (Air Sampling Media Part No. is specific to SKC)

*AEGL-2--There are no AEGL-1 for this compound
**MIRAN SapphIRe has problems with complex mixtures (*e.g.;* distinguishing benzene from gasoline vapor)
***PIDs/FIDs are non-specific detectors and cannot differentiate between VOCs, even with CFs applied. See RAE PID CF Guidance Document TN-106 for information and TVA Response Factor document P/N 50039 THERMO.
****Personal DataRAMs/DataRAMs are non-specific detectors and cannot differentiate between particulates

Acronyms:

≥ -- greater than or equal to
ACGIH -- American Conference of Governmental Industrial Hygienists
AEGL -- acute exposure guideline levels
C -- ceiling (concentrations that should not be exceeded during any part of work exposure)
Ca -- carcinogenic
CDC -- Centers for Disease Control and Prevention
CF -- conversion factor
cpm -- counts per minute
EPA -- U.S. Environmental Protection Agency
ERPG -- emergency response planning guideline
eV -- electron volt
FID -- flame ionization detector
IDLH -- immediately dangerous to life and health
IP -- ionization potential
ISO -- isobutylene
L/min -- liter per minute
m^3 -- cubic meter
mg/m^3 -- milligrams per cubic meter
µR/hr -- micro Roentgens per hour
NA -- not available/applicable
NL -- not listed
ng/m^3 -- nanograms per cubic meter
NIOSH -- National Institute for Occupational Safety and Health
OSHA -- Occupational Safety and Health Administration
PEL -- permissible exposure limit (OSHA)
PID -- photoionization detector
ppm -- parts per million
R/hr -- Roentgens per hour
rec. -- recommended
REL -- recommended exposure limit (NIOSH)
SPM -- single-point monitor
SSHASP -- site-specific health and safety plan
ST -- short term
TCE -- trichloroethylene
TEEL -- temporary emergency exposure limit
TLV -- time-limited value (ACGIH)
TWA -- time-weighted average
VOC -- volatile organic compound
WISER -- Wireless Information System for Emergency Responders
Y w/option - yes with option; see manufacturer's instrument manual for information

Table 4 -- Chlorine (Spill or Release)

Target Compound	Instrument	Detection Level	Intrinsically Safe (Y/N)	IP	Conversion	Occupational Action Levels		AEGL-1			TEEL-0	ERPG-1	Air Sampling		
						TWA	IDLH	1-hr	4-hr	8-hr	15-min TWA	1-hr	Media	Method	Flow Rate/ Total Volume
Gas															
Chlorine	MultiRAE/AreaRAE Cl_2 Sensor	0-10 ppm	Y	11.48 eV	1 ppm = 2.9 mg/m^3	PEL = C 1 ppm REL = C 0.5 ppm (15 mins), ST 1 ppm TLV = 0.5 ppm, ST 1 ppm	10 ppm	0.5 ppm	0.5 ppm	0.5 ppm	0.5 ppm	1 ppm	PTFE Cassette, 225-9006	NIOSH 6011	0.3-1 L/min; 90 L
	MultiRAE Pro Cl_2 Sensor	0-50 ppm	Y												
	Dräger Pac III Cl Sensor	0.1-20 ppm	Y												
	Dräger Tube	≥0.2-30 ppm	Y												
	Dräger Chip	≥0.2-10 ppm	N (Y w/option)												
	SPM	0.05-1.5 ppm	N (Y w/option)												
Radiation[1]															
Radiation	Ludlum Model 192	0-5,000 µR/hr	N	NA	NA	60-100 µR/hr*	NA	NA	NA	NA	NA	NA	RADeCO Filter Paper (2")	RSSOP 209/501	α = 2500 ft^3 β/γ = 1250 ft^3
	Ludlum Model 2241-2 w/Pancake Probe	0-100,000 cpm or 0-200 mR/hr	N			300 cpm*									
	Ludlum Model 2241-3 w/Pancake Probe	0-100,000 cpm or 0-200 mR/hr	N			300 cpm*									
	*These are not TWA(s). Normal gamma radiation background is from 5-20 µR/hr; however, higher backgrounds may exist. If readings are 3 times background or greater than 60-100 µR/hr or greater than 300 cpm, then stop work and consult with a Health Physicist. Refer to Hazardous Evaluation Flow Chart for Unknowns in Attachment A.														

Instrument Guidance | Regulatory Guidance | Reference

Table 4 -- Chlorine (Spill or Release)

Notes:
For guidance only. These tables do not supersede a SSHASP at any time or on any response.
Use teflon tubing for calibration instead of tygon tubing.

[1] Standard EPA Emergency Response Protocol is to screen for radiation with a Micro-R at all emergency responses. If readings are three times background, responders consult with a Health Physicist. Additional radiation equipment is available to monitor for Alpha, Beta and Gamma, but is not included in this table.

AEGL-1 is the airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience notable discomfort, irritation, or certain asymptomatic non-sensory effects; however, the effects are not disabling and are transient and reversible upon cessation of exposure.
TEEL-0 is the temporary level of concern derived according to a tiered, formula-like methodology; representing concentrations associated with no effects.
ERPG-1 is the acute exposure concentration of the general population for up to 1 hour associated with effects expected to be mild or transient.

Data on tables are from the following sources:

http://www.epa.gov/oppt/aegl/pubs/chemlist.htm	EPA's website used to research AEGLs using the chemical's name or chemical abstracts service registry numbers.
http://www.cdc.gov/niosh/npg/npgsyn-a.html	CDC NIOSH Pocket Guide to Chemical Hazards website
http://wiser.nlm.nih.gov/	WISER website
http://www.skcinc.com/	SKC, Inc. website (Air Sampling Media Part No. is specific to SKC)

Acronyms:

≥ -- greater than or equal to
ACGIH -- American Conference of Governmental Industrial Hygienists
AEGL -- acute exposure guideline levels
C -- ceiling (concentrations that should not be exceeded during any part of work exposure)
CDC -- Centers for Disease Control and Prevention
cpm -- counts per minute
EPA -- U.S. Environmental Protection Agency
ERPG -- emergency response planning guideline
eV -- electron volt
IDLH -- immediately dangerous to life and health
IP -- ionization potential
L/min -- liter per minute
mg/m^3 -- milligrams per cubic meter
µR/hr -- micro Roentgens per hour
NA -- not available/applicable
NIOSH -- National Institute for Occupational Safety and Health
OSHA -- Occupational Safety and Health Administration
PEL -- permissible exposure limit (OSHA)
ppm -- parts per million
R/hr -- Roentgens per hour
REL -- recommended exposure limit (NIOSH)
SPM -- single-point monitor
SSHASP -- site-specific health and safety plan
ST -- short term
TEEL -- temporary emergency exposure limit
TLV -- time-limited value (ACGIH)
TWA -- time-weighted average
WISER -- Wireless Information System for Emergency Responders
Y w/option - yes with option; see manufacturer's instrument manual for information

Table 5 -- Electroplating Facility (Spill, Release, or Fire)

Target Compound[1]	Instrument (Instrument Guidance)	Detection Level (Instrument Guidance)	Intrinsically Safe (Y/N) (Instrument Guidance)	IP (Instrument Guidance)	PID CF (ISO) (Instrument Guidance)	Conversion (Instrument Guidance)	Occupational Action Levels (Regulatory Guidance): TWA	Occupational Action Levels (Regulatory Guidance): IDLH	AEGL-1 (Regulatory Guidance): 1-hr	AEGL-1 (Regulatory Guidance): 4-hr	AEGL-1 (Regulatory Guidance): 8-hr	TEEL-0 (Regulatory Guidance): 15-min TWA	ERPG-1 (Regulatory Guidance): 1-hr	Air Sampling (Reference): Media	Air Sampling (Reference): Method	Air Sampling (Reference): Flow Rate/ Total Volume
VOCs and Gases																
Carbon Monoxide	MultiRAE/AreaRAE CO Sensor	0-500 ppm	Y	14.01 eV	NA	1 ppm = 1.15 mg/m3	PEL = 50 ppm REL = 35 ppm, C 200 ppm TLV = 25 ppm	1200 ppm	83 ppm*	33 ppm*	27 ppm*	50 ppm	200 ppm	Sample Bag, 245-05	OSHA ID 209	NA
	MultiRAE Pro CO Sensor	0-2000 ppm ext. range	Y													
	Dräger Tube	≥2-300 ppm	Y													
	Dräger Chip	5-150 ppm	N (Y w/option)													
	ToxiRAE II CO	≥0-500 ppm	Y													
	GFG Inc. Micro IV	0-2000 ppm	Y													
	MIRAN SapphIRe**	4.5-250 ppm	Y													
Hydrogen Sulfide	MultiRAE/AreaRAE H_2S Sensor	0-100 ppm	Y	10.46 eV	NA	1 ppm = 1.4 mg/m^3	PEL = C 20 ppm, 50 ppm (10 mins) REL = C 10 ppm (10 mins) TLV = 10 ppm, ST 15 ppm	100 ppm	0.51 ppm	0.36 ppm	0.33 ppm	0.51 ppm	0.1 ppm	Silica Gel Tube, 266-177	OSHA 1008	0.05 L/min; 12 L
	MultiRAE Pro H_2S Sensor	0-1000 ppm ext. range	Y													
	Dräger Tube	≥0.2-6 ppm	Y													
	Dräger Chip	≥0.2-5 ppm	N (Y w/option)													
	SPM	1.1-30 ppm	N (Y w/option)													
	MultiRAE/AreaRAE PID***	0-2000 ppm	Y		3.3 (10.6 lamp)											
	GFG Inc. Micro IV	0-500 ppm	Y		NA											
	TVA 1000B***	0.5-2,000 ppm (PID)	Y													
Nitric Oxide	MultiRAE/AreaRAE NO Sensor	0-250 ppm	Y	11.95 eV	NA	1 ppm = 1.23 mg/m^3	PEL = 25 ppm REL = 25 ppm TLV = 25 ppm	100 ppm	NA	NA	NA	0.5 ppm	NA	Molecular Sieve Tube, 226-40	NIOSH 6014	0.025 L/min; 1.5-6 L
	ToxiRAE II NO	0-250 ppm	Y													
	Dräger Pac III	0-100 ppm	Y													
	GFG Inc. Micro IV	0-100 ppm	Y													
Nitrogen Dioxide	MultiRAE/AreaRAE NO_2 Sensor	0-20 ppm	Y	9.75 eV	NA	1 ppm = 1.88 mg/m^3	PEL = C 5 ppm REL = ST 1 ppm TLV = 3 ppm, ST 5 ppm	20 ppm	0.5 ppm	0.5 ppm	0.5 ppm	0.5 ppm	1 ppm	Molecular Sieve Tube, 226-40-02	NIOSH 6014	0.025-0.2 L/min; 1.5-6 L
	Dräger Tube	≥0.5-25 ppm	Y													
	Dräger Chip	0.5-25 ppm	N (Y w/option)													
	SPM	0.3-9 ppm	N (Y w/option)													
	ToxiRAE II NO_2	0-20 ppm	Y													
	Dräger Pac III	0-50 ppm	Y													
	GFG Inc. Micro IV	0-30 ppm	Y													
	MultiRAE/AreaRAE PID***	0-2000 ppm	Y		16 (10.6 lamp)											
	TVA 1000B***	0.5-2,000 ppm (PID)	Y		NA											

Table 5 -- Electroplating Facility (Spill, Release, or Fire)

Target Compound[1]	Instrument (Instrument Guidance)	Detection Level	Intrinsically Safe (Y/N)	IP	PID CF (ISO)	Conversion	Occupational Action Levels: TWA	Occupational Action Levels: IDLH	AEGL-1: 1-hr	AEGL-1: 4-hr	AEGL-1: 8-hr	TEEL-0: 15-min TWA	ERPG-1: 1-hr	Air Sampling (Reference): Media	Air Sampling: Method	Air Sampling: Flow Rate/ Total Volume
VOCs and Gases (continued)																
Sulfur Dioxide	MultiRAE/AreaRAE SO_2 Sensor	0-20 ppm	Y	12.3 eV	NA	1 ppm = 2.62 mg/m^3	PEL = 5 ppm REL = 2 ppm, ST 5 ppm TLV = 2 ppm, ST 5 ppm	100 ppm	0.2 ppm	0.2 ppm	0.2 ppm	0.2 ppm	0.3 ppm	MCE Cassette, 225-9005	NIOSH 6004	0.5-1.5 L/min; 180 L
	Dräger Pac III	0-100 ppm	Y													
	Dräger Tube	≥0.1-3 ppm	Y													
	Dräger Chip	≥0.4-10 ppm	N (Y w/option)													
	MIRAN SapphIRe**	6-30 ppm	Y													
	GFG Inc. Micro IV	1-10 ppm	Y													
	SPM	0.2-6 ppm	N (Y w/option)													
TCE	Dräger Tube	≥2-50 ppm	Y	9.47 eV	NA	1 ppm = 5.37 mg/m^3	PEL = 100 ppm, C 200 ppm, 300 ppm (5 mins) REL = Ca TLV = 50 ppm, ST 200 ppm	1000 ppm Ca	130 ppm	84 ppm	77 ppm	10ppm	100 ppm	Anasorb CSC Tube, 226-01	NIOSH 1022	0.01-0.2 L/min; 10 L
	Dräger Chip	≥5-100 ppm	N (Y w/option)													
	MultiRAE/AreaRAE PID***	0-2000 ppm	Y		0.54 (10.6 lamp)											
	TVA 1000B***	0.5-2000 ppm	Y		10.6 lamp 0.605 (10 ppm) - 2.129 (2000 ppm)											
PCE	MultiRAE/AreaRAE PID***	0-2000 ppm	Y	9.47 eV	0.54 (10.6 lamp)	1 ppm = 6.78 mg/m^3	PEL = 100 ppm, C 200 ppm, 300 ppm REL = Ca 100 ppm TLV = 25, ST 100 ppm	150 ppm Ca	35 ppm	35 ppm	35 ppm	25 ppm	100 ppm	Anasorb CSC Tube, 226-01	NIOSH 1003	0.01-0.2 L/min; 3 L
	TVA 1000B***	0.5-2000 ppm	Y		10.6 lamp 0.738 (10 ppm) - 1.99 (2000 ppm)											
Vinyl Chloride	MultiRAE/AreaRAE PID***	0-2000 ppm	Y	9.99 eV	2 (10.6 lamp)	1 ppm = 2.56 mg/m^3	PEL = 1 ppm, C 5 ppm (15 mins) REL = Ca TLV = 5 ppm	NA	250 ppm	140 ppm	70 ppm	1 ppm	500 ppm	Anasorb CSC Tube, 226-01	NIOSH 1007	0.05 L/min; 5 L
	Dräger Tube	≥0.5-30 ppm	Y		NA											
	Dräger Chip	≥0.3-10 ppm	N (Y w/option)													
	MIRAN SapphIRe**	2-20 ppm	Y													
	Dräger Pac III	0-100 ppm	Y													
	TVA 1000B***	0.5-2000 ppm	Y		10.6 lamp 2.334 (10 ppm) - 4.397 (2000 ppm)											
Phosgene	Dräger Tube	0.02-15 ppm	Y	11.2 eV	NA	1 ppm = 4.05 mg/m^3	PEL = 0.1 ppm REL = 0.1 ppm, C 0.2 ppm (15 mins) TLV = 0.1 ppm	2 ppm	0.3 ppm*	0.08 ppm*	0.04ppm*	0.1 ppm	NA	XAD-2 Tube, 226-117	OSHA 61	1 L/min; 240 L
	Dräger Chip	0.05-2 ppm	N (Y w/option)													
	MIRAN SapphIRe**	0.05 ppm	Y													
	TVA 1000B***	0.5-2000 ppm (PID)	Y													
	MultiRAE Pro $COCl_2$ Sensor	0-1 ppm	Y													
	MultiRAE/AreaRAE PID***	0-200 ppm	Y		8.5 (11.7 lamp)											

Table 5 -- Electroplating Facility (Spill, Release, or Fire)

Target Compound[1]	Instrument (Instrument Guidance)	Detection Level (Instrument Guidance)	Intrinsically Safe (Y/N) (Instrument Guidance)	IP (Instrument Guidance)	PID CF (ISO) (Instrument Guidance)	Conversion (Instrument Guidance)	Occupational Action Levels (Regulatory Guidance): TWA	Occupational Action Levels (Regulatory Guidance): IDLH	AEGL-1 (Regulatory Guidance): 1-hr	AEGL-1 (Regulatory Guidance): 4-hr	AEGL-1 (Regulatory Guidance): 8-hr	TEEL-0 (Regulatory Guidance): 15-min TWA	ERPG-1 (Regulatory Guidance): 1-hr	Air Sampling (Reference): Media	Air Sampling (Reference): Method	Air Sampling (Reference): Flow Rate/ Total Volume
VOCs and Gases (continued)																
Sulfuric Acid	Dräger Tube	1-5 mg/m^3 (min)	Y	12.4 eV	NA	NA	PEL = 1 mg/m^3 REL = 1 mg/m^3 TLV = 1 mg/m^3, ST 3 mg/m^3	15 mg/m^3	0.2 mg/m^3	0.2 mg/m^3	0.2 mg/m^3	0.2 mg/m^3	2 mg/m^3	Silica Gel Tube, 226-10-03	NIOSH 7903	0.2-0.5 L/min; 48 L
	pH Paper	NA	Y													
	SPM	26-750 ppb	N (Y w/option)													
Hydrochloric Acid (Hydrogen Chloride)	AreaRAE HCl Sensor	2-15 ppm	Y	12.74 eV	NA	1 ppm = 1.49 mg/m^3	PEL = C 5 ppm REL = C 5 ppm TLV = C 5 ppm	50 ppm	1.8 ppm	1.8 ppm	1.8 ppm	0.5 ppm	NA	Silica Gel Tube, 226-10-03	NIOSH 7903	0.2-0.5 L/min; 48 L
	MultiRAE Pro HCl Sensor	0-15 ppm	Y													
	Dräger Tube	≥1-10 ppm	Y													
	Dräger Chip	≥1-25 ppm	N (Y w/option)													
	pH Paper	NA	Y													
	SPM	0.5-15 ppm	N (Y w/option)													
	Dräger Pac III	0-30 ppm	Y													
	GFG Inc. Micro IV	0-30 ppm	Y													
Nitric Acid	Dräger Tube	≥1-50 ppm	Y	11.95 eV	NA	1 ppm = 2.58 mg/m^3	PEL = 2 ppm REL = 2 ppm, ST 4 ppm TLV = 2 ppm, ST 4 ppm	25 ppm	0.53 ppm	0.53 ppm	0.53 ppm	0.53 ppm	1 ppm	Silica Gel Tube, 226-10-03	NIOSH 7903	0.2-0.5 L/min; 48 L
	pH Paper	NA	Y													
	SPM	0.2-6 ppm	N (Y w/option)													
Hydrocyanic Acid (Hydrogen Cyanide)	MultiRAE/AreaRAE HCN Sensor	0-100 ppm	Y	13.6 eV	NA	1 ppm = 1.1 mg/m^3	PEL = 10 ppm S REL = ST 4.7 ppm S TLV = C 10 ppm S	50 ppm	2.0 ppm	1.3 ppm	1 ppm	1.9 ppm	NA	Soda Lime Tube, 226-28	NIOSH 6010	0.05-0.2 L/min; 2-90 L
	MultiRAE Pro HCN Sensor	0-50 ppm	Y													
	Dräger Tube	2-30 ppm	Y													
	Dräger Chip	2-50 ppm	N (Y w/option)													
	pH Paper	NA	Y													
	ToxiRAE II HCN	0-100 ppm	Y													
	SPM	1.1-30 ppm	N (Y w/option)													
	Dräger Pac III	0-50 ppm	Y													
	GFG Inc. Micro IV	0-50 ppm	Y													
Metals - as particulates																
Cadmium	Personal DataRAM****	0.001-400 mg/m^3	N	NA	NA	NA	PEL = 0.005 mg/m^3 REL = Ca TLV = 0.01 mg/m^3 (dust), 0.002 mg/m^3 (respirable)	9 mg/m^3 Ca	0.10 mg/m^3	0.063 mg/m^3	0.041 mg/m^3	0.005 mg/m^3	NA	MCE Cassette, 225-3-01	NIOSH 7048	1-3 L/min; 480 L
	DataRAM 4****	0.001-400 mg/m^3	N													
Copper	Personal DataRAM****	0.001-400 mg/m^3	N	NA	NA	NA	PEL = 0.1 mg/m^3 (fume), 1 mg/m^3 (dust) REL = 0.1 mg/m^3 (fume), 1 mg/m^3 (dust)	100 mg/m^3	NA	NA	NA	1 mg/m^3	NA	MCE Cassette, 225-3-01	NIOSH 7029	1-3 L/min; 480 L
	DataRAM 4****	0.001-400 mg/m^3	N													
Chromium (VI)	Personal DataRAM****	0.001-400 mg/m^3	N	NA	NA	NA	PEL = 0.005 mg/m^3 REL = 0.001 mg/m^3 TLV = 0.05 mg/m^3	15 mg/m^3	NA	NA	NA	NA	NA	PVC Cassette, 225-802	NIOSH 7600	1-4 L/min; 240 L
	DataRAM 4****	0.001-400 mg/m^3	N													

Table 5 -- Electroplating Facility (Spill, Release, or Fire)

Target Compound[1]	Instrument (Instrument Guidance)	Detection Level (Instrument Guidance)	Intrinsically Safe (Y/N) (Instrument Guidance)	IP (Instrument Guidance)	PID CF (ISO) (Instrument Guidance)	Conversion (Instrument Guidance)	Occupational Action Levels (Regulatory Guidance): TWA	Occupational Action Levels (Regulatory Guidance): IDLH	AEGL-1 (Regulatory Guidance): 1-hr	AEGL-1 (Regulatory Guidance): 4-hr	AEGL-1 (Regulatory Guidance): 8-hr	TEEL-0 (Regulatory Guidance): 15-min TWA	ERPG-1 (Regulatory Guidance): 1-hr	Air Sampling (Reference): Media	Air Sampling (Reference): Method	Air Sampling (Reference): Flow Rate/ Total Volume
Metals - as particulates (continued)																
Lead	Personal DataRAM****	0.001-400 mg/m^3	N	NA	NA	NA	PEL = 0.05 mg/m^3 REL = 0.05 mg/m^3 TLV = 0.05 mg/m^3	100 mg/m^3	NA	NA	NA	0.05 mg/m^3	NA	MCE Cassette, 225-3-01	NIOSH 7300	1-4 L/min; 50-2000 L
	DataRAM 4****	0.001-400 mg/m^3	N													
Nickel	Personal DataRAM****	0.001-400 mg/m^3	N	NA	NA	NA	PEL = 1 mg/m^3 REL = 0.015 mg/m^3 TLV = 0.1 mg/m^3 (soluble), 1 mg/m^3 (insoluble)	10 mg/m^3	NA	NA	NA	4.5 mg/m^3	NA	MCE Cassette, 225-3-01	NIOSH 7300	1-4 L/min; 5-1000 L
	DataRAM 4****	0.001-400 mg/m^3	N													
Particulate																
Particulate	Personal DataRAM****	0.001-400 mg/m^3	N	NA	NA	NA	PEL = 15 mg/m^3 (total), 5 mg/m^3 (respirable) TLV = 10 mg/m^3 (total), 3 mg/m^3 (respirable)	NA	NA	NA	NA	10 mg/m^3	NA	Filter (total) Cyclone + Filter (resp)	NIOSH 0500 (total) NIOSH 0600 (resp)	1-2 L/min (total) 1.7-2.5 L/min (resp)
	DataRAM 4****	0.001-400 mg/m^3	N													
	eBAM	0-100 mg/m^3	N													
Radiation[2]																
Radiation	Ludlum Model 192	0-5,000 µR/hr	N	NA	NA	NA	60-100 µR/hr*	NA	NA	NA	NA	NA	NA	RADeCO Filter Paper (2")	RSSOP 209/501	α = 2500 ft^3 β/γ = 1250 ft^3
	Ludlum Model 2241-2 w/Pancake Probe	0-100,000 cpm or 0-200 mR/hr	N				300 cpm*									
	Ludlum Model 2241-3 w/Pancake Probe	0-100,000 cpm or 0-200 mR/hr	N				300 cpm*									
	*These are not TWA(s). Normal gamma radiation background is from 5-20 µR/hr; however, higher backgrounds may exist. If readings are 3 times background or greater than 60-100 µR/hr or greater than 300 cpm, then stop work and consult with a Health Physicist. Refer to Hazardous Evaluation Flow Chart for Unknowns in Attachment A.															

Table 5 -- Electroplating Facility (Spill, Release, or Fire)

Notes:

For guidance only. These tables do not supersede a SSHASP at any time or on any response.

[1] Does not include all pollutants associated with this type of event, only the most common pollutants with the lowest action levels. Depending on the chemical of concern, certain Dräger tubes and chips can be used. In addition, single-gas instruments and sensors and/or a gas chromatography-mass spectrometry instrument may be used.

[2] Standard EPA Emergency Response Protocol is to screen for radiation with a Micro-R at all emergency responses. If readings are three times background, responders consult with a Health Physicist. Additional radiation equipment is available to monitor for Alpha, Beta and Gamma, but is not included in this table.

AEGL-1 is the airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience notable discomfort, irritation, or certain asymptomatic non-sensory effects; however, the effects are not disabling and are transient and reversible upon cessation of exposure.

AEGL-2 is the airborne concentration (expressed as ppm or mg/m^3) of a substance above which it is predicted that the general population, including susceptible individuals, could experience irreversible or other serious, long-lasting adverse health effects or an impaired ability to escape.

TEEL-0 is the temporary level of concern derived according to a tiered, formula-like methodology; representing concentrations associated with no effects.

ERPG-1 is the acute exposure concentration of the general population for up to 1 hour associated with effects expected to be mild or transient.

Data on tables are from the following sources:

http://www.epa.gov/oppt/aegl/pubs/chemlist.htm	EPA's website used to research AEGLs using the chemical's name or chemical abstracts service registry numbers.
http://www.cdc.gov/niosh/npg/npgsyn-a.html	CDC NIOSH Pocket Guide to Chemical Hazards website
http://wiser.nlm.nih.gov/	WISER website
http://www.skcinc.com/	SKC, Inc. website (Air Sampling Media Part No. is specific to SKC)

*AEGL-2--There are no AEGL-1 for this compound

**MIRAN SapphIRe has problems with complex mixtures (*e.g.;* distinguishing benzene from gasoline vapor)

***PIDs/FIDs are non-specific detectors and cannot differentiate between VOCs, even with CFs applied. See RAE PID CF Guidance Document TN-106 for information and TVA Response Factor document P/N 50039 THERMO.

****Personal DataRAMs/DataRAMs are non-specific detectors and cannot differentiate between particulates

Acronyms:

≥ -- greater than or equal to
ACGIH -- American Conference of Governmental Industrial Hygienists
AEGL -- acute exposure guideline levels
C -- ceiling (concentrations that should not be exceeded during any part of work exposure)
CDC -- Centers for Disease Control and Prevention
CF -- conversion factor
CO -- carbon monoxide
cpm -- counts per minute
EPA -- U.S. Environmental Protection Agency
ERPG -- emergency response planning guideline
eV -- electron volt
FID -- flame ionization detector
IDLH -- immediately dangerous to life and health
IP -- ionization potential
ISO -- isobutylene
L/min -- liter per minute
mg/m^3 -- milligrams per cubic meter
$\mu g/m^3$ -- micrograms per cubic meter
µR/hr -- micro Roentgens per hour
NA -- not available/applicable
NIOSH -- National Institute for Occupational Safety and Health
OSHA -- Occupational Safety and Health Administration
PEL -- permissible exposure limit (OSHA)
PID -- photoionization detector
ppb -- parts per billion
ppm -- parts per million
R/hr -- Roentgens per hour
rec. -- recommended
REL -- recommended exposure limit (NIOSH)
SPM -- single-point monitor
SSHASP -- site-specific health and safety plan
ST -- short-term
TCE -- trichloroethylene
TEEL -- temporary emergency exposure limit
TLV -- time-limited value (ACGIH)
TWA -- time-weighted average
VOC -- volatile organic compound
WISER -- Wireless Information System for Emergency Responders
Y w/option - yes with option; see manufacturer's instrument manual for information

Table 6 -- General Industrial (Fire/Fireworks)

(Also refer to Table 3)

Target Compound[1]	Instrument	Detection Level	Intrinsically Safe (Y/N)	IP	PID CF (ISO)	Conversion	Health Guidance Values[2]		Occupational Action Levels		AEGL-1			TEEL-0	ERPG-1	Air Sampling		
							Residential	Commercial	TWA	IDLH	1-hr	4-hr	8-hr	15-min TWA	1-hr	Media	Method	Flow Rate/ Total Volume
VOCs and Gases																		
Benzene	UltraRAE-PID***	0.1-2000 ppm	Y	9.24 eV	NA	1 ppm = 3.19 mg/m^3	NA	NA	PEL = 1 ppm REL = 0.1 ppm, ST 1 ppm TLV = 10 ppm	500 ppm	52 ppm	18 ppm	9 ppm	1 ppm	50 ppm	Anasorb CSC Tube, 226-01	NIOSH 1501	≤0.2 L/min; 6 L
	Dräger Tube	≥0.5-10 ppm	Y															
	Dräger Chip	≥0.2-10 ppm	N (Y w/option)															
	MIRAN SapphIRe**	10-200 ppm	Y															
	ppbRAE-PID***	1ppb-200ppm	Y		0.53 (10.6 lamp)													
	MultiRAE/AreaRAE PID***	0-2000 ppm	Y															
	TVA 1000B***	0.5-2,000 ppm (PID) 1-50,000 ppm (FID)	Y		10.6 lamp 0.702 (10 ppm) - 1.781 (2000 ppm)													
Carbon Monoxide	MultiRAE/AreaRAE CO Sensor	0-500 ppm	Y	14.01 eV	NA	1 ppm = 1.15 mg/m3	NA	NA	PEL = 50 ppm REL = 35 ppm, C 200 ppm TLV = 25 ppm	1200 ppm	83 ppm*	33 ppm*	27 ppm*	50 ppm	200 ppm	Sample Bag, 245-05	OSHA ID 209	NA
	MultiRAE Pro CO Sensor	0-2000 ppm ext. range	Y															
	Dräger Tube	≥2-300 ppm	Y															
	Dräger Chip	5-150 ppm	N (Y w/option)															
	ToxiRAE II CO	≥0-500 ppm	Y															
	GFG Inc. Micro IV	0-2000 ppm	Y															
	MIRAN SapphIRe**	4.5-250 ppm	Y															
Hydrochloric Acid (Hydrogen Chloride)	AreaRAE HCl Sensor	2-15 ppm	Y	12.74 eV	NA	1 ppm = 1.49 mg/m^3	NA	NA	PEL = C 5 ppm REL = C 5 ppm TLV = C 5 ppm	50 ppm	1.8 ppm	1.8 ppm	1.8 ppm	0.5 ppm	NA	Silica Gel Tube, 226-10-03	NIOSH 7903	0.2-0.5 L/min; 48 L
	MultiRAE Pro HCl Sensor	0-15 ppm	Y															
	Dräger Tube	≥1-10 ppm	Y															
	Dräger Chip	≥1-25 ppm	N (Y w/option)															
	pH Paper	NA	Y															
	SPM	0.5-15 ppm	N (Y w/option)															
	Dräger Pac III	0-30 ppm	Y															
	GFG Inc. Micro IV	0-30 ppm	Y															
Hydrocyanic Acid (Hydrogen Cyanide)	MultiRAE/AreaRAE HCN Sensor	0-100 ppm	Y	13.6 eV	NA	1 ppm = 1.1 mg/m^3	NA	NA	PEL = 10 ppm S REL = ST 4.7 ppm S TLV = C 10 ppm S	50 ppm	2.0 ppm	1.3 ppm	1 ppm	1.9 ppm	NA	Soda Lime Tube, 226-28	NIOSH 6010	0.05-0.2 L/min; 2-90 L
	MultiRAE Pro HCN Sensor	0-50 ppm	Y															
	Dräger Tube	2-30 ppm	Y															
	Dräger Chip	2-50 ppm	N (Y w/option)															
	pH Paper	NA	Y															
	ToxiRAE II HCN	0-100 ppm	Y															
	SPM	1.1-30 ppm	N (Y w/option)															
	Dräger Pac III	0-50 ppm	Y															
	GFG Inc. Micro IV	0-50 ppm	Y															
Phosgene	Dräger Tube	0.02-15 ppm	Y	11.2 eV	NA	1 ppm = 4.05 mg/m^3	NA	NA	PEL = 0.1 ppm REL = 0.1 ppm, C 0.2 ppm (15 mins) TLV = 0.1 ppm	2 ppm	0.3 ppm*	0.08 ppm*	0.04ppm*	0.1 ppm	NA	XAD-2 Tube, 226-117	OSHA 61	1 L/min; 240 L
	Dräger Chip	0.05-2 ppm	N (Y w/option)															
	MIRAN SapphIRe**	0.05 ppm	Y															
	TVA 1000B***	0.5-2000 ppm (PID)	Y															
	MultiRAE Pro $COCl_2$ Sensor	0-1 ppm	Y															
	MultiRAE/AreaRAE PID***	0-200 ppm	Y		8.5 (11.7 lamp)													

Table 6 -- General Industrial (Fire/Fireworks)

(Also refer to Table 3)

Target Compound[1]	Instrument	Detection Level	Intrinsically Safe (Y/N)	IP	PID CF (ISO)	Conversion	Health Guidance Values[2]		Occupational Action Levels		AEGL-1			TEEL-0	ERPG-1	Air Sampling		
							Residential	Commercial	TWA	IDLH	1-hr	4-hr	8-hr	15-min TWA	1-hr	Media	Method	Flow Rate/ Total Volume
VOCs and Gases (continued)																		
Hydrogen Sulfide	MultiRAE/AreaRAE H_2S Sensor	0-100 ppm	Y	10.46 eV	NA	1 ppm = 1.4 mg/m^3	NA	NA	PEL = C 20 ppm, 50 ppm (10 mins) REL = C 10 ppm (10 mins) TLV = 10 ppm, ST 15 ppm	100 ppm	0.51 ppm	0.36 ppm	0.33 ppm	0.51 ppm	0.1 ppm	Silica Gel Tube, 266-177	OSHA 1008	0.05 L/min; 12 L
	MultiRAE Pro H_2S Sensor	0-1000 ppm ext. range	Y															
	Dräger Tube	≥0.2-6 ppm	Y															
	Dräger Chip	≥0.2-5 ppm	N (Y w/option)															
	SPM	1.1-30 ppm	N (Y w/option)															
	MultiRAE/AreaRAE PID***	0-2000 ppm	Y		3.3 (10.6 lamp)													
	GFG Inc. Micro IV	0-500 ppm	Y		NA													
	TVA 1000B***	0.5-2,000 ppm (PID)	Y															
Vinyl Chloride	MultiRAE/AreaRAE PID***	0-2000 ppm	Y	9.99 eV	2 (10.6 lamp)	1 ppm = 2.56 mg/m^3	NA	NA	PEL = 1 ppm, C 5 ppm (15 mins) REL = Ca TLV = 5 ppm	NA	250 ppm	140 ppm	70 ppm	1 ppm	500 ppm	Anasorb CSC Tube, 226-01	NIOSH 1007	0.05 L/min; 5 L
	Dräger Tube	≥0.5-30 ppm	Y		NA													
	Dräger Chip	≥0.3-10 ppm	N (Y w/option)															
	MIRAN SapphIRe**	2-20 ppm	Y															
	Dräger Pac III	0-100 ppm	Y															
	TVA 1000B***	0.5-2,000 ppm (PID)	Y		10.6 lamp 2.334 (10 ppm) - 4.397 (2000 ppm)													
Sulfur Dioxide	MultiRAE/AreaRAE SO_2 Sensor	0-20 ppm	Y	12.3 eV	NA	1 ppm = 2.62 mg/m^3	NA	NA	PEL = 5 ppm REL = 2 ppm, ST 5 ppm TLV = 2 ppm, ST 5 ppm	100 ppm	0.2 ppm	0.2 ppm	0.2 ppm	0.2 ppm	0.3 ppm	MCE Cassette, 225-9005	NIOSH 6004	0.5-1.5 L/min; 180 L
	Dräger Pac III	0-100 ppm	Y															
	Dräger Tube	≥0.1-3 ppm	Y															
	Dräger Chip	≥0.4-10 ppm	N (Y w/option)															
	MIRAN SapphIRe**	6-30 ppm	Y															
	GFG Inc. Micro IV	1-10 ppm	Y															
	SPM	0.2-6 ppm	N (Y w/option)															
Metals - as particulates																		
Lead	Personal DataRAM****	0.001-400 mg/m^3	N	NA	NA	NA	NA	NA	PEL = 0.05 mg/m^3 REL = 0.05 mg/m^3 TLV = 0.05 mg/m^3	100 mg/m^3	NA	NA	NA	0.05 mg/m^3	NA	MCE Cassette, 225-3-01	NIOSH 7300	1-4 L/min; 50-2000 L
	DataRAM 4****	0.001-400 mg/m^3	N															
Mercury	Lumex RA-915	0.000002-0.05 mg/m^3	N	NA	NA	NA	1000 ng/m^3	3000 ng/m^3	PEL = C 0.1 mg/m^3 S REL = 0.05 mg/m^3 S (vapor), C 0.1 mg/m^3 (other) TLV = 0.025 mg/m^3 S	10 mg/m^3	1.7 mg/m^3*	0.67 mg/m^3*	0.33 mg/m^3*	0.025 mg/m^3*	NA	Anasorb C300 Tube, 226-17-1A	NIOSH 6009	0.15-0.25 L/min; 48 L
	Lumex RA-915 Light	0.0001-0.1 mg/m^3	N															
	Jerome 431X	0.003 to 0.999 mg/m^3	N															
	Jerome J405	0.0005-0.999 mg/m^3	N															
	Jerome 471	0.00003-0.25 mg/m^3	N															
	Dräger Tube	0.00000005-0.000002 mg/m^3	Y															

Table 6 -- General Industrial (Fire/Fireworks)

(Also refer to Table 3)

Target Compound[1]	Instrument	Detection Level	Intrinsically Safe (Y/N)	IP	PID CF (ISO)	Conversion	Health Guidance Values[2]		Occupational Action Levels		AEGL-1			TEEL-0	ERPG-1	Air Sampling		
							Residential	Commercial	TWA	IDLH	1-hr	4-hr	8-hr	15-min TWA	1-hr	Media	Method	Flow Rate/ Total Volume
Particulate																		
Particulate	Personal DataRAM****	0.001-400 mg/m^3	N	NA	NA	NA	NA	NA	PEL = 15 mg/m^3 (total), 5 mg/m^3 (respirable) TLV = 10 mg/m^3 (total), 3 mg/m^3 (respirable)	NA	NA	NA	NA	10 mg/m^3	NA	Filter (total) Cyclone + Filter (resp)	NIOSH 0500 (total) NIOSH 0600 (resp)	1-2 L/min (total) 1.7-2.5 L/min (resp)
	DataRAM 4****	0.001-400 mg/m^3	N															
	eBAM	0-100 mg/m^3	N															
Radiation[3]																		
Radiation	Ludlum Model 192	0-5,000 µR/hr	N	NA	NA	NA	NA	NA	60-100 µR/hr*	NA	NA	NA	NA	NA	NA	RADeCO Filter Paper (2")	RSSOP 209/501	α = 2500 ft^3 β/γ = 1250 ft^3
	Ludlum Model 2241-2 w/Pancake Probe	0-100,000 cpm or 0-200 mR/hr	N						300 cpm*									
	Ludlum Model 2241-3 w/Pancake Probe	0-100,000 cpm or 0-200 mR/hr	N						300 cpm*									
	*These are not TWA(s). Normal gamma radiation background is from 5-20 µR/hr; however, higher backgrounds may exist. If readings are 3 times background or greater than 60-100 µR/hr or greater than 300 cpm, then stop work and consult with a Health Physicist. Refer to Hazardous Evaluation Flow Chart for Unknowns in Attachment A.																	

EMERGENCY RESPONSE TECHNICAL GROUP

Table 6 -- General Industrial (Fire/Fireworks)

(Also refer to Table 3)

Notes:
For guidance only. These tables do not supersede a SSHASP at any time or on any response.

[1] Does not include all pollutants associated with this type of event, only the most common pollutants with the lowest action levels. Depending on the chemical of concern, certain Dräger tubes and chips can be used. In addition, single-gas instruments and sensors and/or a gas chromatography-mass spectrometry instrument may be used.

[2] EPA and ATSDR Health Guidance Values

[3] Standard EPA Emergency Response Protocol is to screen for radiation with a Micro-R at all emergency responses. If readings are three times background, responders consult with a Health Physicist. Additional radiation equipment is available to monitor for Alpha, Beta and Gamma, but is not included in this table.

AEGL-1 is the airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience notable discomfort, irritation, or certain asymptomatic non-sensory effects; however, the effects are not disabling and are transient and reversible upon cessation of exposure.

AEGL-2 is the airborne concentration (expressed as ppm or mg/m^3) of a substance above which it is predicted that the general population, including susceptible individuals, could experience irreversible or other serious, long-lasting adverse health effects or an impaired ability to escape.
TEEL-0 is the temporary level of concern derived according to a tiered, formula-like methodology; representing concentrations associated with no effects.
ERPG-1 is the acute exposure concentration of the general population for up to 1 hour associated with effects expected to be mild or transient.

Data on tables are from the following sources:

http://www.epa.gov/oppt/aegl/pubs/chemlist.htm	EPA's website used to research AEGLs using the chemical's name or chemical abstracts service registry numbers.
http://www.cdc.gov/niosh/npg/npgsyn-a.html	CDC NIOSH Pocket Guide to Chemical Hazards website
http://wiser.nlm.nih.gov/	WISER website
http://www.skcinc.com/	SKC, Inc. website (Air Sampling Media Part No. is specific to SKC)

*AEGL-2--There are no AEGL-1 for this compound
**MIRAN SapphIRe has problems with complex mixtures (*e.g.;* distinguishing benzene from gasoline vapor)
***PIDs/FIDs are non-specific detectors and cannot differentiate between VOCs, even with CFs applied. See RAE PID CF Guidance Document TN-106 for information and TVA Response Factor document P/N 50039 THERMO.
****Personal DataRAMs/DataRAMs are non-specific detectors and cannot differentiate between particulates

Acronyms:

≥ -- greater than or equal to
ACGIH -- American Conference of Governmental Industrial Hygienists
AEGL -- acute exposure guideline levels
C -- ceiling (concentrations that should not be exceeded during any part of work exposure)
CDC -- Centers for Disease Control and Prevention
CF -- conversion factor
cpm -- counts per minute
EPA -- U.S. Environmental Protection Agency
ERPG -- emergency response planning guideline
eV -- electron volt
FID -- flame ionization detector
IDLH -- immediately dangerous to life and health
IP -- ionization potential
ISO -- isobutylene
L/min -- liter per minute
mg/m^3 -- milligrams per cubic meter
µR/hr -- micro Roentgens per hour
NA -- not available/applicable
NIOSH -- National Institute for Occupational Safety and Health
OSHA -- Occupational Safety and Health Administration
PEL -- permissible exposure limit (OSHA)
PID -- photoionization detector
ppm -- parts per million
R/hr -- Roentgens per hour
rec. -- recommended
REL -- recommended exposure limit (NIOSH)
S -- skin notation (compound may be absorbed through the skin)
SPM -- single-point monitor
SSHASP -- site-specific health and safety plan
ST -- short term
TEEL -- temporary emergency exposure limit
TLV -- time-limited value (ACGIH)
TWA -- time-weighted average
VOC -- volatile organic compound
WISER -- Wireless Information System for Emergency Responders
Y w/option - yes with option; see manufacturer's instrument manual for information

Table 7 -- Landfill (Release or Fire)

(If the Landfill is on fire, also refer to Table 3)

Target Compound[1]	Instrument	Detection Level	Intrinsically Safe (Y/N)	IP	PID CF (ISO)	Conversion	Occupational Action Levels		AEGL-1			TEEL-0	ERPG-1	Air Sampling		
							TWA	IDLH	1-hr	4-hr	8-hr	15-min TWA	1-hr	Media	Method	Flow Rate/ Total Volume
Gases																
Methane	TVA 1000B***	1-50,000 ppm (FID) no response (PID)	Y	12.98 eV	NA	NA	<19.5% O_2 (simple asphyxiant[3])	NA	30 ppm	30 ppm	30 ppm	NA	NA	NA	NA	NA
	MIRAN SapphIRe**	7.5-100 ppm	Y													
	MultiRAE/AreaRAE	0-100% LEL, 0-30% O_2	Y													
	Landtec GEM 500	0-70% to specification 0-100% reading	Y													
Carbon Monoxide	MultiRAE/AreaRAE CO Sensor	0-500 ppm	Y	14.01 eV	NA	1 ppm = 1.15 mg/m3	PEL = 50 ppm REL = 35 ppm, C 200 ppm TLV = 25 ppm	1200 ppm	83 ppm*	33 ppm*	27 ppm*	50 ppm	200 ppm	Sample Bag, 245-05	OSHA ID 209	NA
	MultiRAE Pro CO Sensor	0-2000 ppm ext. range	Y													
	Dräger Tube	≥2-300 ppm	Y													
	Dräger Chip	5-150 ppm	N (Y w/option)													
	ToxiRAE II CO	≥0-500 ppm	Y													
	GFG Inc. Micro IV	0-2000 ppm	Y													
	MIRAN SapphIRe**	4.5-250 ppm	Y													
Hydrogen Sulfide	MultiRAE/AreaRAE H_2S Sensor	0-100 ppm	Y	10.46 eV	NA	1 ppm = 1.4 mg/m^3	PEL = C 20 ppm, 50 ppm (10 mins) REL = C 10 ppm (10 mins) TLV = 10 ppm, ST 15 ppm	100 ppm	0.51 ppm	0.36 ppm	0.33 ppm	0.51 ppm	0.1 ppm	Silica Gel Tube, 266-177	OSHA 1008	0.05 L/min; 12 L
	MultiRAE Pro H_2S Sensor	0-1000 ppm ext. range	Y													
	Dräger Tube	≥0.2-6 ppm	Y													
	Dräger Chip	≥0.2-5 ppm	N (Y w/option)													
	SPM	1.1-30 ppm	N (Y w/option)													
	MultiRAE/AreaRAE PID***	0-2000 ppm	Y		3.3 (10.6 lamp)											
	GFG Inc. Micro IV	0-500 ppm	Y													
	TVA 1000B***	0.5-2,000 ppm (PID)	Y		NA											
Sulfur Dioxide	MultiRAE/AreaRAE SO_2 Sensor	0-20 ppm	Y	12.3 eV	NA	1 ppm = 2.62 mg/m^3	PEL = 5 ppm REL = 2 ppm, ST 5 ppm TLV = 2 ppm, ST 5 ppm	100 ppm	0.2 ppm	0.2 ppm	0.2 ppm	0.2 ppm	0.3 ppm	MCE Cassette, 225-9005	NIOSH 6004	0.5-1.5 L/min; 180 L
	Dräger Pac III	0-100 ppm	Y													
	Dräger Tube	≥0.1-3 ppm	Y													
	Dräger Chip	≥0.4-10 ppm	N (Y w/option)													
	MIRAN SapphIRe**	6-30 ppm	Y													
	GFG Inc. Micro IV	1-10 ppm	Y													
	SPM	0.2-6 ppm	N (Y w/option)													

Table 7 -- Landfill (Release or Fire)

(If the Landfill is on fire, also refer to Table 3)

Target Compound[1]	Instrument	Detection Level	Intrinsically Safe (Y/N)	IP	PID CF (ISO)	Conversion	Occupational Action Levels		AEGL-1			TEEL-0	ERPG-1	Air Sampling		
	Instrument Guidance						Regulatory Guidance							Reference		
							TWA	IDLH	1-hr	4-hr	8-hr	15-min TWA	1-hr	Media	Method	Flow Rate/ Total Volume
Gases (continued)																
Radon****	Radalink	0.5-2,500 pCi/L	N	NA	NA	NA	OSHA MPC = 100pCi/l	NA	NA	NA	NA	NA	NA	Alpha Track Detector, Activated Carbon Cannister, Lucas Cell or Tedlar Bag (grab sample)	Lab read-out	Passive, min. 7-day exposure period; Instant grab, or time integrated for variable periods
	Pylon AB6	0.76 - ∞ pCi/L (110A) 1.36 - ∞ pCi/L (300A) 0.85 - ∞ pCi/L (200A)	N													
	Bladewerx SabreAlert2	*****	Y													
	Durridge RAD7	0.01 - 20,000 pCi/L	Y													
TCE	Dräger Tube	≥2-50 ppm	Y	9.47 eV	NA	1 ppm = 5.37 mg/m^3	PEL = 100 ppm, C 200 ppm, 300 ppm (5 mins) REL = Ca TLV = 50 ppm, ST 200 ppm	1000 ppm Ca	130 ppm	84 ppm	77 ppm	10ppm	100 ppm	Anasorb CSC Tube, 226-01	NIOSH 1022	0.01-0.2 L/min; 10 L
	Dräger Chip	≥5-100 ppm	N (Y w/option)													
	MultiRAE/AreaRAE PID***	0-2000 ppm	Y		0.54 (10.6 lamp)											
	TVA 1000B***	0.5-2000 ppm	Y		10.6 lamp 0.605 (10 ppm) - 2.129 (2000 ppm)											
PCE	MultiRAE/AreaRAE PID***	0-2000 ppm	Y	9.47 eV	0.54 (10.6 lamp)	1 ppm = 6.78 mg/m^3	PEL = 100 ppm, C 200 ppm, 300 ppm REL = Ca 100 ppm TLV = 25, ST 100 ppm	150 ppm Ca	35 ppm	35 ppm	35 ppm	25 ppm	100 ppm	Anasorb CSC Tube, 226-01	NIOSH 1003	0.01-0.2 L/min; 3 L
	TVA 1000B***	0.5-2000 ppm	Y		10.6 lamp 0.738 (10 ppm) - 1.99 (2000 ppm)											
Vinyl Chloride	MultiRAE/AreaRAE PID***	0-2000 ppm	Y	9.99 eV	2 (10.6 lamp)	1 ppm = 2.56 mg/m^3	PEL = 1 ppm, C 5 ppm (15 mins) REL = Ca TLV = 5 ppm	NA	250 ppm	140 ppm	70 ppm	1 ppm	500 ppm	Anasorb CSC Tube, 226-01	NIOSH 1007	0.05 L/min; 5 L
	Dräger Tube	≥0.5-30 ppm	Y		10.6 lamp 2.334 (10 ppm) - 4.397 (2000 ppm)											
	Dräger Chip	≥0.3-10 ppm	N (Y w/option)													
	MIRAN SapphIRe**	2-20 ppm	Y													
	Dräger Pac III	0-100 ppm	Y													
	TVA 1000B***	0.5-2,000 ppm (PID)	Y													
Particulate																
Particulate	Personal DataRAM****	0.001-400 mg/m^3	N	NA	NA	NA	PEL = 15 mg/m^3 (total), 5 mg/m^3 (respirable) TLV = 10 mg/m^3 (total), 3 mg/m^3 (respirable)	NA	NA	NA	NA	10 mg/m^3	NA	Filter (total) Cyclone + Filter (resp)	NIOSH 0500 (total) NIOSH 0600 (resp)	1-2 L/min (total) 1.7-2.5 L/min (resp)
	DataRAM 4****	0.001-400 mg/m^3	N													
	eBAM	0-100 mg/m^3	N													

Table 7 -- Landfill (Release or Fire)

(If the Landfill is on fire, also refer to Table 3)

Target Compound[1]	Instrument	Detection Level	Intrinsically Safe (Y/N)	IP	PID CF (ISO)	Conversion	Occupational Action Levels		AEGL-1			TEEL-0	ERPG-1	Air Sampling		
							TWA	IDLH	1-hr	4-hr	8-hr	15-min TWA	1-hr	Media	Method	Flow Rate/ Total Volume
Radiation[2]																
Radiation	Ludlum Model 192	0-5,000 µR/hr	N	NA	NA	NA	60-100 µR/hr*	NA	NA	NA	NA	NA	NA	RADeCO Filter Paper (2")	RSSOP 209/501	α = 2500 ft^3 β/γ = 1250 ft^3
	Ludlum Model 2241-2 w/Pancake Probe	0-100,000 cpm or 0-200 mR/hr	N				300 cpm*									
	Ludlum Model 2241-3 w/Pancake Probe	0-100,000 cpm or 0-200 mR/hr	N				300 cpm*									
	*These are not TWA(s). Normal gamma radiation background is from 5-20 µR/hr; however, higher backgrounds may exist. If readings are 3 times background or greater than 60-100 µR/hr or greater than 300 cpm, then stop work and consult with a Health Physicist. Refer to Hazardous Evaluation Flow Chart for Unknowns in Attachment A.															

Instrument Guidance | Regulatory Guidance | Reference

Table 7 -- Landfill (Release or Fire)

(If the Landfill is on fire, also refer to Table 3)

Notes:

For guidance only. These tables do not supersede a SSHASP at any time or on any response.

[1] Does not include all pollutants associated with this type of event, only the most common pollutants with the lowest action levels.

[2] Standard EPA Emergency Response Protocol is to screen for radiation with a Micro-R at all emergency responses. If readings are three times background, responders consult with a Health Physicist. Additional radiation equipment is available to monitor for Alpha, Beta and Gamma, but is not included in this table.

[3] ACGIH TLV = 1000 ppm

AEGL-1 is the airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience notable discomfort, irritation, or certain asymptomatic non-sensory effects; however, the effects are not disabling and are transient and reversible upon cessation of exposure.

AEGL-2 is the airborne concentration (expressed as ppm or mg/m^3) of a substance above which it is predicted that the general population, including susceptible individuals, could experience irreversible or other serious, long-lasting adverse health effects or an impaired ability to escape.

TEEL-0 is the temporary level of concern derived according to a tiered, formula-like methodology; representing concentrations associated with no effects.

ERPG-1 is the acute exposure concentration of the general population for up to 1 hour associated with effects expected to be mild or transient.

Data on tables are from the following sources:

http://www.epa.gov/oppt/aegl/pubs/chemlist.htm	EPA's website used to research AEGLs using the chemical's name or chemical abstracts service registry numbers.
http://www.cdc.gov/niosh/npg/npgsyn-a.html	CDC NIOSH Pocket Guide to Chemical Hazards website
http://wiser.nlm.nih.gov/	WISER website
http://www.skcinc.com/	SKC, Inc. website (Air Sampling Media Part No. is specific to SKC)

*AEGL-2--There are no AEGL-1 for this compound

**MIRAN SapphIRe has problems with complex mixtures (*e.g.;* distinguishing benzene from gasoline vapor)

***PIDs/FIDs are non-specific detectors and cannot differentiate between VOCs, even with CFs applied. See RAE PID CF Guidance Document TN-106 for information and TVA Response Factor document P/N 50039 THERMO.

**** Radon is unlike any other gas and does not follow the typical guidelines. Consult with a Health Physicist.

*****The sensitivity of the SabreAlert is dependent on several factors including, radon background, filter type, flow rate, acute and chronic window settings, and, of course, the energy of the radioactive isotope of interest.

Acronyms:

≥ -- greater than or equal to
< -- less than
% -- percent
∞ -- infinity
ACGIH -- American Conference of Governmental Industrial Hygienists
AEGL -- acute exposure guideline levels
C -- ceiling (concentrations that should not be exceeded during any part of work exposure)
CDC -- Centers for Disease Control and Prevention
cpm -- counts per minute
EPA -- U.S. Environmental Protection Agency
ERPG -- emergency response planning guideline
eV -- electron volt
FID -- flame ionization detector
IDLH -- immediately dangerous to life and health
IP -- ionization potential
ISO -- isobutylene
L/min -- liter per minute
LEL -- lower explosive limit
mg/m^3 -- milligrams per cubic meter
µR/hr -- micro Roentgens per hour
NA -- not available/applicable
NIOSH -- National Institute for Occupational Safety and Health
OSHA -- Occupational Safety and Health Administration
pCi/L -- picocuries per liter
PEL -- permissible exposure limit (OSHA)
PID -- photoionization detector
ppm -- parts per million
R/hr -- Roentgens per hour
rec. -- recommended
REL -- recommended exposure limit (NIOSH)
SPM -- single-point monitor
SSHASP -- site-specific health and safety plan
TEEL -- temporary emergency exposure limit
TLV -- time-limited value (ACGIH)
TWA -- time-weighted average
VOC -- volatile organic compound
WISER -- Wireless Information System for Emergency Responders
Y w/option - yes with option; see manufacturer's instrument manual for information

Table 8 -- Magnesium (Fire)

Target Compound[1]	Instrument (Instrument Guidance)	Detection Level (Instrument Guidance)	Intrinsically Safe (Y/N) (Instrument Guidance)	IP (Instrument Guidance)	PID CF (ISO) (Instrument Guidance)	Conversion (Instrument Guidance)	Occupational Action Levels (Regulatory Guidance): TWA	Occupational Action Levels (Regulatory Guidance): IDLH	AEGL-1 (Regulatory Guidance): 1-hr	AEGL-1 (Regulatory Guidance): 4-hr	AEGL-1 (Regulatory Guidance): 8-hr	TEEL-0 (Regulatory Guidance): 15-min TWA	ERPG-1 (Regulatory Guidance): 1-hr	Air Sampling (Reference): Media	Air Sampling (Reference): Method	Air Sampling (Reference): Flow Rate/ Total Volume
VOCs and Gases																
Benzene	UltraRAE-PID***	0.1-2000 ppm	Y	9.24 eV	NA	1 ppm = 3.19 mg/m^3	PEL = 1 ppm REL = 0.1 ppm, ST 1 ppm TLV = 10 ppm	500 ppm	52 ppm	18 ppm	9 ppm	1 ppm	50 ppm	Anasorb CSC Tube, 226-01	NIOSH 1501	≤0.2 L/min; 6 L
	Dräger Tube	≥0.5-10 ppm	Y													
	Dräger Chip	≥0.2-10 ppm	N (Y w/option)													
	MIRAN SapphIRe**	10-200 ppm	Y													
	ppbRAE-PID***	1ppb-200ppm	Y		0.53 (10.6 lamp)											
	MultiRAE/AreaRAE PID***	0-2000 ppm	Y													
	TVA 1000B***	0.5-2,000 ppm (PID) 1-50,000 ppm (FID)	Y		10.6 lamp 0.702 (10 ppm) - 1.781 (2000 ppm)											
Carbon Monoxide	MultiRAE/AreaRAE CO Sensor	0-500 ppm	Y	14.01 eV	NA	1 ppm = 1.15 mg/m3	PEL = 50 ppm REL = 35 ppm, C 200 ppm TLV = 25 ppm	1200 ppm	83 ppm*	33 ppm*	27 ppm*	50 ppm	200 ppm	Sample Bag, 245-05	OSHA ID 209	NA
	MultiRAE Pro CO Sensor	0-2000 ppm ext. range	Y													
	Dräger Tube	≥2-300 ppm	Y													
	Dräger Chip	5-150 ppm	N (Y w/option)													
	ToxiRAE II CO	≥0-500 ppm	Y													
	GFG Inc. Micro IV	0-2000 ppm	Y													
	MIRAN SapphIRe**	4.5-250 ppm	Y													
Hydrogen Sulfide	MultiRAE/AreaRAE H_2S Sensor	0-100 ppm	Y	10.46 eV	NA	1 ppm = 1.4 mg/m^3	PEL = C 20 ppm, 50 ppm (10 mins) REL = C 10 ppm (10 mins) TLV = 10 ppm, ST 15 ppm	100 ppm	0.51 ppm	0.36 ppm	0.33 ppm	0.51 ppm	0.1 ppm	Silica Gel Tube, 266-177	OSHA 1008	0.05 L/min; 12 L
	MultiRAE Pro H_2S Sensor	0-1000 ppm ext. range	Y													
	Dräger Tube	≥0.2-6 ppm	Y													
	Dräger Chip	≥0.2-5 ppm	N (Y w/option)													
	SPM	1.1-30 ppm	N (Y w/option)													
	MultiRAE/AreaRAE PID***	0-2000 ppm	Y		3.3 (10.6 lamp)											
	GFG Inc. Micro IV	0-500 ppm	Y		NA											
	TVA 1000B***	0.5-2,000 ppm (PID)	Y													
Sulfur Dioxide	MultiRAE/AreaRAE SO_2 Sensor	0-20 ppm	Y	12.3 eV	NA	1 ppm = 2.62 mg/m^3	PEL = 5 ppm REL = 2 ppm, ST 5 ppm TLV = 2 ppm, ST 5 ppm	100 ppm	0.2 ppm	0.2 ppm	0.2 ppm	0.2 ppm	0.3 ppm	MCE Cassette, 225-9005	NIOSH 6004	0.5-1.5 L/min; 180 L
	Dräger Pac III	0-100 ppm	Y													
	Dräger Tube	≥0.1-3 ppm	Y													
	Dräger Chip	≥0.4-10 ppm	N (Y w/option)													
	MIRAN SapphIRe**	6-30 ppm	Y													
	GFG Inc. Micro IV	1-10 ppm	Y													
	SPM	0.2-6 ppm	N (Y w/option)													
Hydrogen	MultiRAE/AreaRAE	0-100% LEL, 0-30% O_2	Y	15.43 eV	NA	1 ppm = 0.82 mg/m^3	PEL = 3 ppm REL = 3 ppm TLV = 5 ppm	30 ppm	1 ppm	1 ppm	1 ppm	0.35 ppm	NA	Hydrogen Tube, 810-30	OSHA CSI	NA

Table 8 -- Magnesium (Fire)

Target Compound[1]	Instrument	Detection Level	Intrinsically Safe (Y/N)	IP	PID CF (ISO)	Conversion	Occupational Action Levels		AEGL-1			TEEL-0	ERPG-1	Air Sampling		
							TWA	IDLH	1-hr	4-hr	8-hr	15-min TWA	1-hr	Media	Method	Flow Rate/ Total Volume
Metals - as particulates																
Magnesium	Personal DataRAM****	0.001-400 mg/m^3	N	NA	NA	NA	PEL = 15 mg/m^3 TLV = 10 mg/m^3	750 mg/m^3	NA	NA	NA	1.25 mg/m^3	NA	MCE Cassette, 225-3-01	NIOSH 7301	1-4 L/min; 5-67 L
	DataRAM 4****	0.001-400 mg/m^3	N													
Particulate																
Particulate	Personal DataRAM****	0.001-400 mg/m^3	N	NA	NA	NA	PEL = 15 mg/m^3 (total), 5 mg/m^3 (respirable) TLV = 10 mg/m^3 (total), 3 mg/m^3 (respirable)	NA	NA	NA	NA	10 mg/m^3	NA	Filter (total) Cyclone + Filter (resp)	NIOSH 0500 (total) NIOSH 0600 (resp)	1-2 L/min (total) 1.7-2.5 L/min (resp)
	DataRAM 4****	0.001-400 mg/m^3	N													
	eBAM	0-100 mg/m^3	N													
Radiation[2]																
Radiation	Ludlum Model 192	0-5,000 µR/hr	N	NA	NA	NA	60-100 µR/hr*	NA	NA	NA	NA	NA	NA	RADeCO Filter Paper (2")	RSSOP 209/501	α = 2500 ft^3 β/γ = 1250 ft^3
	Ludlum Model 2241-2 w/Pancake Probe	0-100,000 cpm or 0-200 mR/hr	N				300 cpm*									
	Ludlum Model 2241-3 w/Pancake Probe	0-100,000 cpm or 0-200 mR/hr	N				300 cpm*									

*These are not TWA(s). Normal gamma radiation background is from 5-20 µR/hr; however, higher backgrounds may exist. If readings are 3 times background or greater than 60-100 µR/hr or greater than 300 cpm, then stop work and consult with a Health Physicist. Refer to Hazardous Evaluation Flow Chart for Unknowns in Attachment A.

EMERGENCY RESPONSE TECHNICAL GROUP

Table 8 -- Magnesium (Fire)

Notes:

For guidance only. These tables do not supersede a SSHASP at any time or on any response.

[1] Does not include all pollutants associated with this type of event, only the most common pollutants with the lowest action levels. Depending on the chemical of concern, certain Dräger tubes and chips can be used. In addition, single-gas instruments and sensors and/or a gas chromatography-mass spectrometry instrument may be used.

[2] Standard EPA Emergency Response Protocol is to screen for radiation with a Micro-R at all emergency responses. If readings are three times background, responders consult with a Health Physicist. Additional radiation equipment is available to monitor for Alpha, Beta and Gamma, but is not included in this table.

AEGL-1 is the airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience notable discomfort, irritation, or certain asymptomatic non-sensory effects; however, the effects are not disabling and are transient and reversible upon cessation of exposure.

AEGL-2 is the airborne concentration (expressed as ppm or mg/m^3) of a substance above which it is predicted that the general population, including susceptible individuals, could experience irreversible or other serious, long-lasting adverse health effects or an impaired ability to escape.

TEEL-0 is the temporary level of concern derived according to a tiered, formula-like methodology; representing concentrations associated with no effects.

ERPG-1 is the acute exposure concentration of the general population for up to 1 hour associated with effects expected to be mild or transient.

Data on tables are from the following sources:

http://www.epa.gov/oppt/aegl/pubs/chemlist.htm	EPA's website used to research AEGLs using the chemical's name or chemical abstracts service registry numbers.
http://www.cdc.gov/niosh/npg/npgsyn-a.html	CDC NIOSH Pocket Guide to Chemical Hazards website
http://wiser.nlm.nih.gov/	WISER website
http://www.skcinc.com/	SKC, Inc. website (Air Sampling Media Part No. is specific to SKC)

*AEGL-2--There are no AEGL-1 for this compound

**MIRAN SapphIRe has problems with complex mixtures (*e.g.;* distinguishing benzene from gasoline vapor)

***PIDs/FIDs are non-specific detectors and cannot differentiate between VOCs, even with CFs applied. See RAE PID CF Guidance Document TN-106 for information and TVA Response Factor document P/N 50039 THERMO.

****Personal DataRAMs/DataRAMs are non-specific detectors and cannot differentiate between particulates

Acronyms:

≥ -- greater than or equal to
ACGIH -- American Conference of Governmental Industrial Hygienists
AEGL -- acute exposure guideline levels
C -- ceiling (concentrations that should not be exceeded during any part of work exposure)
CDC -- Centers for Disease Control and Prevention
CF -- conversion factor
CO -- carbon monoxide
cpm -- counts per minute
EPA -- U.S. Environmental Protection Agency
ERPG -- emergency response planning guideline
eV -- electron volt
FID -- flame ionization detector
IDLH -- immediately dangerous to life and health
IP -- ionization potential
ISO -- isobutylene
L/min -- liter per minute
mg/m^3 -- milligrams per cubic meter
µR/hr -- micro Roentgens per hour
NA -- not available/applicable
NIOSH -- National Institute for Occupational Safety and Health
OSHA -- Occupational Safety and Health Administration
PEL -- permissible exposure limit (OSHA)
PID -- photoionization detector
ppm -- parts per million
R/hr -- Roentgens per hour
REL -- recommended exposure limit (NIOSH)
SPM -- single-point monitor
SSHASP -- site-specific health and safety plan
TEEL -- temporary emergency exposure limit
TLV -- time-limited value (ACGIH)
TWA -- time-weighted average
VOC -- volatile organic compound
WISER -- Wireless Information System for Emergency Responders
Y w/option - yes with option; see manufacturer's instrument manual for information

Table 9 -- Mercury (Spill or Release)

Target Compound	Instrument	Detection Level	Intrinsically Safe (Y/N)	IP	Conversion	Health Guidance Values[1]		Occupational Action Levels		AEGL-1			TEEL-0	ERPG-1	Air Sampling		
						Residential	Commercial	TWA	IDLH	1-hr	4-hr	8-hr	15-min TWA	1-hr	Media	Method	Flow Rate/ Total Volume
Mercury																	
Mercury	Lumex RA-915	0.000002-0.05 mg/m^3	N	NA	NA	0.001 mg/m^3 (1000 ng/m^3)	0.003 mg/m^3 (3000 ng/m^3)	PEL = C 0.1 mg/m^3 S REL = 0.05 mg/m^3 S (vapor), C 0.1 mg/m^3 (other) TLV = 0.025 mg/m^3 S	10 mg/m^3	1.7 mg/m^3*	0.67 mg/m^3*	0.33 mg/m^3*	0.025 mg/m^3*	NA	Anasorb C300 Tube, 226-17-1A	NIOSH 6009	0.15-0.25 L/min; 48 L
	Lumex RA-915 Light	0.0001-0.1 mg/m^3	N														
	Jerome 431X	0.003 to 0.999 mg/m^3	N														
	Jerome J405	0.0005-0.999 mg/m^3	N														
	Jerome 471	0.00003-0.25 mg/m^3	N														
	Dräger Tube	0.00000005-0.000002 mg/m^3	Y														
Radiation[2]																	
Radiation	Ludlum Model 192	0-5,000 µR/hr	N	NA	NA	NA	NA	60-100 µR/hr*	NA	NA	NA	NA	NA	NA	RADeCO Filter Paper (2")	RSSOP 209/501	α = 2500 ft^3 β/γ = 1250 ft^3
	Ludlum Model 2241-2 w/Pancake Probe	0-100,000 cpm or 0-200 mR/hr	N					300 cpm*									
	Ludlum Model 2241-3 w/Pancake Probe	0-100,000 cpm or 0-200 mR/hr	N					300 cpm*									
	*These are not TWA(s). Normal gamma radiation background is from 5-20 µR/hr; however, higher backgrounds may exist. If readings are 3 times background or greater than 60-100 µR/hr or greater than 300 cpm, then stop work and consult with a Health Physicist. Refer to Hazardous Evaluation Flow Chart for Unknowns in Attachment A.																

Instrument Guidance | Regulatory Guidance | Reference

Table 9 -- Mercury (Spill or Release)

Notes:
For guidance only. These tables do not supersede a SSHASP at any time or on any response.

[1] EPA and ATSDR Health Guidance Values

[2] Standard EPA Emergency Response Protocol is to screen for radiation with a Micro-R at all emergency responses. If readings are three times background, responders consult with a Health Physicist. Additional radiation equipment is available to monitor for Alpha, Beta and Gamma, but is not included in this table.

AEGL-1 is the airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience notable discomfort, irritation, or certain asymptomatic non-sensory effects; however, the effects are not disabling and are transient and reversible upon cessation of exposure.

AEGL-2 is the airborne concentration (expressed as ppm or mg/m^3) of a substance above which it is predicted that the general population, including susceptible individuals, could experience irreversible or other serious, long-lasting adverse health effects or an impaired ability to escape.

TEEL-0 is the temporary level of concern derived according to a tiered, formula-like methodology; representing concentrations associated with no effects.

ERPG-1 is the acute exposure concentration of the general population for up to 1 hour associated with effects expected to be mild or transient.

Data on tables are from the following sources:

http://www.epa.gov/oppt/aegl/pubs/chemlist.htm	EPA's website used to research AEGLs using the chemical's name or chemical abstracts service registry numbers.
http://www.cdc.gov/niosh/npg/npgsyn-a.html	CDC NIOSH Pocket Guide to Chemical Hazards website
http://wiser.nlm.nih.gov/	WISER website
http://www.skcinc.com/	SKC, Inc. website (Air Sampling Media Part No. is specific to SKC)

*AEGL-2--There are no AEGL-1 for this compound

Acronyms:

≥ -- greater than or equal to
AEGL -- acute exposure guideline levels
ATSDR -- Agency for Toxic Substances and Disease Registry
CDC -- Centers for Disease Control and Prevention
cpm -- counts per minute
EPA -- U.S. Environmental Protection Agency
ERPG -- emergency response planning guideline
IDLH -- immediately dangerous to life and health
IP -- ionization potential
L/min -- liter per minute
mg/m^3 -- milligrams per cubic meter
µR/hr -- micro Roentgens per hour
NA -- not available/applicable
NIOSH -- National Institute for Occupational Safety and Health
OSHA -- Occupational Safety and Health Administration
R/hr -- Roentgens per hour
REL -- recommended exposure limit (NIOSH)
S -- skin notation (compound may be absorbed through the skin)
SSHASP -- site-specific health and safety plan
TEEL -- temporary emergency exposure limit
TWA -- time-weighted average
WISER -- Wireless Information System for Emergency Responders
Y w/option - yes with option; see manufacturer's instrument manual for information

Table 10 -- Oil (Spill, Release, or Fire)

Target Compound[1]	Instrument (Instrument Guidance)	Detection Level (Instrument Guidance)	Intrinsically Safe (Y/N) (Instrument Guidance)	IP (Instrument Guidance)	PID CF (ISO) (Instrument Guidance)	Conversion (Instrument Guidance)	Occupational Action Levels (Regulatory Guidance): TWA	Occupational Action Levels (Regulatory Guidance): IDLH	AEGL-1 (Regulatory Guidance): 1-hr	AEGL-1 (Regulatory Guidance): 4-hr	AEGL-1 (Regulatory Guidance): 8-hr	TEEL-0 (Regulatory Guidance): 15-min TWA	ERPG-1 (Regulatory Guidance): 1-hr	Air Sampling (Reference): Media	Air Sampling (Reference): Method	Air Sampling (Reference): Flow Rate/ Total Volume
VOCs and Gases																
Benzene	UltraRAE-PID***	0.1-2000 ppm	Y	9.24 eV	NA	1 ppm = 3.19 mg/m^3	PEL = 1 ppm REL = 0.1 ppm, ST 1 ppm TLV = 10 ppm	500 ppm	52 ppm	18 ppm	9 ppm	1 ppm	50 ppm	Anasorb CSC Tube, 226-01	NIOSH 1501	≤0.2 L/min; 6 L
	Dräger Tube	≥0.5-10 ppm	Y													
	Dräger Chip	≥0.2-10 ppm	N (Y w/option)													
	MIRAN SapphIRe**	10-200 ppm	Y													
	ppbRAE-PID***	1ppb-200ppm	Y		0.53 (10.6 lamp)											
	MultiRAE/AreaRAE PID***	0-2000 ppm	Y													
	TVA 1000B***	0.5-2,000 ppm (PID) 1-50,000 ppm (FID)	Y		10.6 lamp 0.702 (10 ppm) - 1.781 (2000 ppm)											
Carbon Monoxide	MultiRAE/AreaRAE CO Sensor	0-500 ppm	Y	14.01 eV	NA	1 ppm = 1.15 mg/m3	PEL = 50 ppm REL = 35 ppm, C 200 ppm TLV = 25 ppm	1200 ppm	83 ppm*	33 ppm*	27 ppm*	50 ppm	200 ppm	Sample Bag, 245-05	OSHA ID 209	NA
	MultiRAE Pro CO Sensor	0-2000 ppm ext. range	Y													
	Dräger Tube	≥2-300 ppm	Y													
	Dräger Chip	5-150 ppm	N (Y w/option)													
	ToxiRAE II CO	≥0-500 ppm	Y													
	GFG Inc. Micro IV	0-2000 ppm	Y													
	MIRAN SapphIRe**	4.5-250 ppm	Y													
Hydrogen Sulfide	MultiRAE/AreaRAE H_2S Sensor	0-100 ppm	Y	10.46 eV	NA	1 ppm = 1.4 mg/m^3	PEL = C 20 ppm, 50 ppm (10 mins) REL = C 10 ppm (10 mins) TLV = 10 ppm, ST 15 ppm	100 ppm	0.51 ppm	0.36 ppm	0.33 ppm	0.51 ppm	0.1 ppm	Silica Gel Tube, 266-177	OSHA 1008	0.05 L/min; 12 L
	MultiRAE Pro H_2S Sensor	0-1000 ppm ext. range	Y													
	Dräger Tube	≥0.2-6 ppm	Y													
	Dräger Chip	≥0.2-5 ppm	N (Y w/option)													
	SPM	1.1-30 ppm	N (Y w/option)													
	MultiRAE/AreaRAE PID***	0-2000 ppm	Y		3.3 (10.6 lamp)											
	GFG Inc. Micro IV	0-500 ppm	Y		NA											
	TVA 1000B***	0.5-2,000 ppm (PID)	Y													
Sulfur Dioxide	MultiRAE/AreaRAE SO_2 Sensor	0-20 ppm	Y	12.3 eV	NA	1 ppm = 2.62 mg/m^3	PEL = 5 ppm REL = 2 ppm, ST 5 ppm TLV = 2 ppm, ST 5 ppm	100 ppm	0.2 ppm	0.2 ppm	0.2 ppm	0.2 ppm	0.3 ppm	MCE Cassette, 225-9005	NIOSH 6004	0.5-1.5 L/min; 180 L
	Dräger Pac III	0-100 ppm	Y													
	Dräger Tube	≥0.1-3 ppm	Y													
	Dräger Chip	≥0.4-10 ppm	N (Y w/option)													
	MIRAN SapphIRe**	6-30 ppm	Y													
	GFG Inc. Micro IV	1-10 ppm	Y													
	SPM	0.2-6 ppm	N (Y w/option)													
PAHs - as particulates																
PAHs*****	Personal DataRAM****	0.001-400 mg/m^3	N	NA	NA	NA	PEL = 0.2 mg/m^3 REL = 0.1 mg/m^3	80 mg/m^3	NA	NA	NA	0.075 mg/m^3	0.25 mg/m^3	PTFE Cassette, 226-30-04	NIOSH 5506	2 L/min; 480 L
	DataRAM 4****	0.001-400 mg/m^3	N													

Table 10 -- Oil (Spill, Release, or Fire)

Target Compound[1]	Instrument	Detection Level	Intrinsically Safe (Y/N)	IP	PID CF (ISO)	Conversion	Occupational Action Levels		AEGL-1			TEEL-0	ERPG-1	Air Sampling		
							TWA	IDLH	1-hr	4-hr	8-hr	15-min TWA	1-hr	Media	Method	Flow Rate/ Total Volume
Radiation[2]																
Radiation	Ludlum Model 192	0-5,000 µR/hr	N	NA	NA	NA	60-100 µR/hr*	NA	NA	NA	NA	NA	NA	RADeCO Filter Paper (2")	RSSOP 209/501	α = 2500 ft^3 β/γ = 1250 ft^3
	Ludlum Model 2241-2 w/Pancake Probe	0-100,000 cpm or 0-200 mR/hr	N				300 cpm*									
	Ludlum Model 2241-3 w/Pancake Probe	0-100,000 cpm or 0-200 mR/hr	N				300 cpm*									
	*These are not TWA(s). Normal gamma radiation background is from 5-20 µR/hr; however, higher backgrounds may exist. If readings are 3 times background or greater than 60-100 µR/hr or greater than 300 cpm, then stop work and consult with a Health Physicist. Refer to Hazardous Evaluation Flow Chart for Unknowns in Attachment A.															

Instrument Guidance | Regulatory Guidance | Reference

Table 10 -- Oil (Spill, Release, or Fire)

Notes:

For guidance only. These tables do not supersede a SSHASP at any time or on any response.

Consult ATSDR for site-specific action levels

[1] Does not include all pollutants associated with this type of event, only the most common pollutants with the lowest action levels.

[2] Standard EPA Emergency Response Protocol is to screen for radiation with a Micro-R at all emergency responses. If readings are three times background, responders consult with a Health Physicist. Additional radiation equipment is available to monitor for Alpha, Beta and Gamma, but is not included in this table.

AEGL-1 is the airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience notable discomfort, irritation, or certain asymptomatic non-sensory effects; however, the effects are not disabling and are transient and reversible upon cessation of exposure.

AEGL-2 is the airborne concentration (expressed as ppm or mg/m^3) of a substance above which it is predicted that the general population, including susceptible individuals, could experience irreversible or other serious, long-lasting adverse health effects or an impaired ability to escape.

TEEL-0 is the temporary level of concern derived according to a tiered, formula-like methodology; representing concentrations associated with no effects.

ERPG-1 is the acute exposure concentration of the general population for up to 1 hour associated with effects expected to be mild or transient.

Data on tables are from the following sources:

http://www.epa.gov/oppt/aegl/pubs/chemlist.htm	EPA's website used to research AEGLs using the chemical's name or chemical abstracts service registry numbers.
http://www.cdc.gov/niosh/npg/npgsyn-a.html	CDC NIOSH Pocket Guide to Chemical Hazards website
http://wiser.nlm.nih.gov/	WISER website
http://www.skcinc.com/	SKC, Inc. website (Air Sampling Media Part No. is specific to SKC)

*AEGL-2--There are no AEGL-1 for this compound

**MIRAN SapphIRe has problems with complex mixtures (*e.g.;* distinguishing benzene from gasoline vapor)

***PIDs/FIDs are non-specific detectors and cannot differentiate between VOCs, even with CFs applied. See RAE PID CF Guidance Document TN-106 for information and TVA Response Factor document P/N 50039 THERMO.

****Personal DataRAMs/DataRAMs are non-specific detectors and cannot differentiate between particulates

*****PAHs are most conservative value (anthracene, benzo(a)pyrene, chrysene, naphthalene, phenanthrene, pyrene)

Acronyms:

≥ -- greater than or equal to
ACGIH -- American Conference of Governmental Industrial Hygienists
AEGL -- acute exposure guideline levels
C -- ceiling (concentrations that should not be exceeded during any part of work exposure)
CDC -- Centers for Disease Control and Prevention
CF -- conversion factor
cpm -- counts per minute
EPA -- U.S. Environmental Protection Agency
ERPG -- emergency response planning guideline
eV -- electron volt
FID -- flame ionization detector
IDLH -- immediately dangerous to life and health
IP -- ionization potential
ISO -- isobutylene
L/min -- liter per minute
mg/m^3 -- milligrams per cubic meter
µR/hr -- micro Roentgens per hour
NA -- not available/applicable
NIOSH -- National Institute for Occupational Safety and Health
OSHA -- Occupational Safety and Health Administration
PAH -- polyaromatic hydrocarbon
PEL -- permissible exposure limit (OSHA)
PID -- photoionization detector
ppb -- parts per billion
ppm -- parts per million
R/hr -- Roentgens per hour
rec. -- recommended
REL -- recommended exposure limit (NIOSH)
SPM -- single-point monitor
SSHASP -- site-specific health and safety plan
ST -- short-term
TEEL -- temporary emergency exposure limit
TLV -- time-limited value (ACGIH)
TWA -- time-weighted average
VOC -- volatile organic compound
WISER -- Wireless Information System for Emergency Responders
Y w/option - yes with option; see manufacturer's instrument manual for information

Table 11 -- Pesticide or Fertilizer (Fire)

Target Compound[1]	Instrument	Detection Level	Intrinsically Safe (Y/N)	IP	PID CF (ISO)	Conversion	Health Guidance Values[2]		Occupational Action Levels		AEGL-1			TEEL-0	ERPG-1	Air Sampling		
							Residential	Commercial	TWA	IDLH	1-hr	4-hr	8-hr	15-min TWA	1-hr	Media	Method	Flow Rate/ Total Volume
VOCs and Gases																		
Benzene	UltraRAE-PID***	0.1-2000 ppm	Y	9.24 eV	NA	1 ppm = 3.19 mg/m^3	NA	NA	PEL = 1 ppm REL = 0.1 ppm, ST 1 ppm TLV = 10 ppm	500 ppm	52 ppm	18 ppm	9 ppm	1 ppm	50 ppm	Anasorb CSC Tube, 226-01	NIOSH 1501	≤0.2 L/min; 6 L
	Dräger Tube	≥0.5-10 ppm	Y															
	Dräger Chip	≥0.2-10 ppm	N (Y w/option)															
	MIRAN SapphIRe**	10-200 ppm	Y															
	ppbRAE-PID***	1ppb-200ppm	Y		0.53 (10.6 lamp)													
	MultiRAE/AreaRAE PID***	0-2000 ppm	Y															
	TVA 1000B***	0.5-2,000 ppm (PID) 1-50,000 ppm (FID)	Y		10.6 lamp 0.702 (10 ppm) - 1.781 (2000 ppm)													
Carbon Monoxide	MultiRAE/AreaRAE CO Sensor	0-500 ppm	Y	14.01 eV	NA	1 ppm = 1.15 mg/m3	NA	NA	PEL = 50 ppm REL = 35 ppm, C 200 ppm TLV = 25 ppm	1200 ppm	83 ppm*	33 ppm*	27 ppm*	50 ppm	200 ppm	Sample Bag, 245-05	OSHA ID 209	NA
	MultiRAE Pro CO Sensor	0-2000 ppm ext. range	Y															
	Dräger Tube	≥2-300 ppm	Y															
	Dräger Chip	5-150 ppm	N (Y w/option)															
	ToxiRAE II CO	≥0-500 ppm	Y															
	GFG Inc. Micro IV	0-2000 ppm	Y															
	MIRAN SapphIRe**	4.5-250 ppm	Y															
Hydrogen Sulfide	MultiRAE/AreaRAE H_2S Sensor	0-100 ppm	Y	10.46 eV	NA	1 ppm = 1.4 mg/m^3	NA	NA	PEL = C 20 ppm, 50 ppm (10 mins) REL = C 10 ppm (10 mins) TLV = 10 ppm, ST 15 ppm	100 ppm	0.51 ppm	0.36 ppm	0.33 ppm	0.51 ppm	0.1 ppm	Silica Gel Tube, 266-177	OSHA 1008	0.05 L/min; 12 L
	MultiRAE Pro H_2S Sensor	0-1000 ppm ext. range	Y															
	Dräger Tube	≥0.2-6 ppm	Y															
	Dräger Chip	≥0.2-5 ppm	N (Y w/option)															
	SPM	1.1-30 ppm	N (Y w/option)															
	MultiRAE/AreaRAE PID***	0-2000 ppm	Y		3.3 (10.6 lamp)													
	GFG Inc. Micro IV	0-500 ppm	Y		NA													
	TVA 1000B***	0.5-2,000 ppm (PID)	Y															
Sulfur Dioxide	MultiRAE/AreaRAE SO_2 Sensor	0-20 ppm	Y	12.3 eV	NA	1 ppm = 2.62 mg/m^3	NA	NA	PEL = 5 ppm REL = 2 ppm, ST 5 ppm TLV = 2 ppm, ST 5 ppm	100 ppm	0.2 ppm	0.2 ppm	0.2 ppm	0.2 ppm	0.3 ppm	MCE Cassette, 225-9005	NIOSH 6004	0.5-1.5 L/min; 180 L
	Dräger Pac III	0-100 ppm	Y															
	Dräger Tube	≥0.1-3 ppm	Y															
	Dräger Chip	≥0.4-10 ppm	N (Y w/option)															
	MIRAN SapphIRe**	6-30 ppm	Y															
	GFG Inc. Micro IV	1-10 ppm	Y															
	SPM	0.2-6 ppm	N (Y w/option)															
Phosgene	Dräger Tube	0.02-15 ppm	Y	11.2 eV	NA	1 ppm = 4.05 mg/m^3	NA	NA	PEL = 0.1 ppm REL = 0.1 ppm, C 0.2 ppm (15 mins) TLV = 0.1 ppm	2 ppm	0.3 ppm*	0.08 ppm*	0.04ppm*	0.1 ppm	NA	XAD-2 Tube, 226-117	OSHA 61	1 L/min; 240 L
	Dräger Chip	0.05-2 ppm	N (Y w/option)															
	MIRAN SapphIRe**	0.05 ppm	Y															
	TVA 1000B***	0.5-2000 ppm (PID)	Y															
	MultiRAE Pro $COCl_2$ Sensor	0-1 ppm	Y															
	MultiRAE/AreaRAE PID***	0-200 ppm	Y		8.5 (11.7 lamp)													

Table 11 -- Pesticide or Fertilizer (Fire)

Target Compound[1]	Instrument	Detection Level	Intrinsically Safe (Y/N)	IP	PID CF (ISO)	Conversion	Health Guidance Values[2]		Occupational Action Levels		AEGL-1			TEEL-0	ERPG-1	Air Sampling		
							Residential	Commercial	TWA	IDLH	1-hr	4-hr	8-hr	15-min TWA	1-hr	Media	Method	Flow Rate/ Total Volume
VOCs and Gases (continued)																		
Methyl Bromide	Dräger Tube	≥0.5-30 ppm	Y	10.54 eV	NA	1 ppm = 3.89 mg/m^3	NA	NA	PEL = C 20 ppm S REL = Ca TLV = 5 ppm S	250 ppm Ca	210 ppm*	67 ppm*	67 ppm*	1 ppm	NA	Anasorb 747 Tube, 226-83	OSHA PV2040	0.01-0.1 L/min; 3 L
	TVA 1000B***	0.5-2000 ppm (PID)	Y															
	MultiRAE/AreaRAE PID***	0-200 ppm	Y		8.5 (11.7 lamp)													
Phosphorus (elemental[3])	Personal DataRAM****	0.001-400 mg/m^3	N	NA	NA	NA	NA	NA	PEL = 0.1 mg/m^3 REL = 0.1 mg/m^3 TLV = 0.1 mg/m^3	5 mg/m^3	3.7 ppm	0.93 ppm	0.47 ppm	0.1 mg/m^3	NA	Tenax Tube, 226-35-03	NIOSH 7905	0.01-0.2 L/min; 12 L
	DataRAM 4****	≥0.5-15 ppm	N															
Phosphorus Pentoxide	Personal DataRAM****	0.001-400 mg/m^3	N	NA	NA	NA	NA	NA	PEL = 1 mg/m^3 REL = 3 mg/m^3 ACGIH TLV = 1 mg/m^3	250 mg/m^3	NA	NA	NA	1 mg/m^3	1 mg/m^3	MCE Cassette, 225-3-01	OSHA ID 111	1 L/min; 480 L
	DataRAM 4****	0.001-400 mg/m^3	N															
Phosphine	MultiRAE/AreaRAE PH_3 Sensor	0-5 ppm	Y	9.96 eV	NA	1 ppm = 1.39 mg/m^3	NA	NA	PEL = 0.3 mg/m^3 REL = 0.3 mg/m^3, ST 1 ppm TLV = 0.3 mg/m^3	50 ppm	2 ppm*	0.5 ppm*	0.25 ppm*	0.3 ppm	NA	Silica Gel Tube, 226-165A	NIOSH 6002	0.01-0.2 L/min; 12 L
	MultiRAE Pro PH_3 Sensor	0-1000 ppm ext. range	Y															
	ToxiRAE	0-5 ppm	Y															
	Dräger Pac III	0-10 ppm	Y															
	Dräger Tube	≥0.1-1 ppm	Y															
	Dräger Chip	0.1-2.5 ppm or	N (Y w/option)															
	GFG Inc. Micro IV	0-10 ppm	Y															
	SPM	32-900 ppb	N (Y w/option)															
	MultiRAE/AreaRAE PID***	0-200 ppm	Y		3.9 (10.6 lamp)													
	TVA 1000B***	0.5-2000 ppm (PID)	Y		NA													
Nitrogen Dioxide	MultiRAE/AreaRAE NO_2 Sensor	0-20 ppm	Y	9.75 eV	NA	1 ppm = 1.88 mg/m^3	NA	NA	PEL = C 5 ppm REL = ST 1 ppm TLV = 3 ppm, ST 5 ppm	20 ppm	0.5 ppm	0.5 ppm	0.5 ppm	0.5 ppm	1 ppm	Molecular Sieve Tube, 226-40-02	NIOSH 6014	0.025-0.2 L/min; 1.5-6 L
	Dräger Tube	≥0.5-25 ppm	Y															
	Dräger Chip	0.5-25 ppm	N (Y w/option)															
	SPM	0.3-9 ppm	N (Y w/option)															
	ToxiRAE II NO_2	0-20 ppm	Y															
	Dräger Pac III	0-50 ppm	Y															
	GFG Inc. Micro IV	0-30 ppm	Y															
	TVA 1000B***	0.5-2000 ppm (PID)	Y															
	MultiRAE/AreaRAE PID***	0-2000 ppm	Y		16 (10.6 lamp)													
Nitric Oxide	MultiRAE/AreaRAE NO Sensor	0-250 ppm	Y	11.95 eV	NA	1 ppm = 1.23 mg/m^3	NA	NA	PEL = 25 ppm REL = 25 ppm TLV = 25 ppm	100 ppm	NA	NA	NA	0.5 ppm	NA	Molecular Sieve Tube, 226-40	NIOSH 6014	0.025 L/min; 1.5-6 L
	ToxiRAE II NO	0-250 ppm	Y															
	Dräger Pac III	0-100 ppm	Y															
	GFG Inc. Micro IV	0-100 ppm	Y															
Metals - as particulates																		
Lead	Personal DataRAM****	0.001-400 mg/m^3	N	NA	NA	NA	NA	NA	PEL = 0.05 mg/m^3 REL = 0.05 mg/m^3 TLV = 0.05 mg/m^3	100 mg/m^3	NA	NA	NA	0.05 mg/m^3	NA	MCE Cassette, 225-3-01	NIOSH 7300	1-4 L/min; 50-2000 L
	DataRAM 4****	0.001-400 mg/m^3	N															
Cadmium	Personal DataRAM****	0.001-400 mg/m^3	N	NA	NA	NA	NA	NA	PEL = 0.005 mg/m^3 REL = Ca TLV = 0.01 mg/m^3 (dust), 0.002 mg/m^3 (respirable)	9 mg/m^3 Ca	0.10 mg/m^3	0.063 mg/m^3	0.041 mg/m^3	0.005 mg/m^3	NA	MCE Cassette, 225-3-01	NIOSH 7048	1-3 L/min; 480 L
	DataRAM 4****	0.001-400 mg/m^3	N															

Table 11 -- Pesticide or Fertilizer (Fire)

Target Compound[1]	Instrument	Detection Level	Intrinsically Safe (Y/N)	IP	PID CF (ISO)	Conversion	Health Guidance Values[2]		Occupational Action Levels		AEGL-1			TEEL-0	ERPG-1	Air Sampling		
							Residential	Commercial	TWA	IDLH	1-hr	4-hr	8-hr	15-min TWA	1-hr	Media	Method	Flow Rate/ Total Volume
Metals - as particulates (continued)																		
Arsenic (inorganic compounds)	Personal DataRAM****	0.001-400 mg/m^3	N	9.81 eV	NA	NA	NA	NA	PEL = 0.01 mg/m^3 REL = C 0.002 mg/m^3 (15 mins) TLV = 0.01 mg/m^3	5 mg/m^3 Ca	NA	NA	NA	0.025 mg/m^3	NA	MCE Cassette, 225-3-01	NIOSH 7900	1-3 L/min; 30 L
	DataRAM 4****	0.001-400 mg/m^3	N															
	TVA 1000B***	0.5-2000 ppm (PID)	Y															
	MultiRAE/AreaRAE PID***	0-200 ppm	Y		8.5 (11.7 lamp)													
Arsenic (organic compounds)	Dräger Tube	0-3 mg organic arsenic/m^3	Y	NA	NA	NA	NA	NA	PEL = 0.5 mg/m^3 TLV = 0.2 mg/m^3	NA	NA	NA	NA	0.025 mg/m^3	NA	PTFE Filter, 225-17-01	NIOSH 5022	1-3 L/min; 960 L
Mercury	Lumex RA-915	0.000002-0.05 mg/m^3	N	NA	NA	NA	1000 ng/m^3	3000 ng/m^3	PEL = C 0.1 mg/m^3 S REL = 0.05 mg/m^3 S (vapor), C 0.1 mg/m^3 (other) TLV = 0.025 mg/m^3 S	10 mg/m^3	1.7 mg/m^3*	0.67 mg/m^3*	0.33 mg/m^3*	0.025 mg/m^3*	NA	Anasorb C300 Tube, 226-17-1A	NIOSH 6009	0.15-0.25 L/min; 48 L
	Lumex RA-915 Light	0.0001-0.1 mg/m^3	N															
	Jerome 431X	0.003 to 0.999 mg/m^3	N															
	Jerome J405	0.0005-0.999 mg/m^3	N															
	Jerome 471	0.00003-0.25 mg/m^3	N															
	Dräger Tube	0.00000005-0.000002 mg/m^3	Y															
Particulate																		
Particulate	Personal DataRAM****	0.001-400 mg/m^3	N	NA	NA	NA	NA	NA	PEL = 15 mg/m^3 (total), 5 mg/m^3 (respirable) TLV = 10 mg/m^3 (total), 3 mg/m^3 (respirable)	NA	NA	NA	NA	10 mg/m^3	NA	Filter (total) Cyclone + Filter (resp)	NIOSH 0500 (total) NIOSH 0600 (resp)	1-2 L/min (total) 1.7-2.5 L/min (resp)
	DataRAM 4****	0.001-400 mg/m^3	N															
	eBAM	0-100 mg/m^3	N															
Radiation[4]																		
Radiation	Ludlum Model 192	0-5,000 µR/hr	N	NA	NA	NA	NA	NA	60-100 µR/hr*	NA	NA	NA	NA	NA	NA	RADeCO Filter Paper (2")	RSSOP 209/501	α = 2500 ft^3 β/γ = 1250 ft^3
	Ludlum Model 2241-2 w/Pancake Probe	0-100,000 cpm or 0-200 mR/hr	N						300 cpm*									
	Ludlum Model 2241-3 w/Pancake Probe	0-100,000 cpm or 0-200 mR/hr	N						300 cpm*									
	*These are not TWA(s). Normal gamma radiation background is from 5-20 µR/hr; however, higher backgrounds may exist. If readings are 3 times background or greater than 60-100 µR/hr or greater than 300 cpm, then stop work and consult with a Health Physicist. Refer to Hazardous Evaluation Flow Chart for Unknowns in Attachment A.																	

Instrument Guidance | Regulatory Guidance | Reference

Table 11 -- Pesticide or Fertilizer (Fire)

Notes:
For guidance only. These tables do not supersede a SSHASP at any time or on any response.

[1] Does not include all pollutants associated with this type of event, only the most common pollutants with the lowest action levels. Depending on the chemical of concern, certain Dräger tubes and chips can be used. In addition, single-gas instruments and sensors and/or a gas chromatography-mass spectrometry instrument may be used.
[2] EPA and ATSDR Health Guidance Values
[3] Emits irritating oxides of phosphorus, may re-ignite upon exposure to air
[4] Standard EPA Emergency Response Protocol is to screen for radiation with a Micro-R at all emergency responses. If readings are three times background, responders consult with a Health Physicist. Additional radiation equipment is available to monitor for Alpha, Beta and Gamma, but is not included in this table.

AEGL-1 is the airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience notable discomfort, irritation, or certain asymptomatic non-sensory effects; however, the effects are not disabling and are transient and reversible upon cessation of exposure.

AEGL-2 is the airborne concentration (expressed as ppm or mg/m^3) of a substance above which it is predicted that the general population, including susceptible individuals, could experience irreversible or other serious, long-lasting adverse health effects or an impaired ability to escape.
TEEL-0 is the temporary level of concern derived according to a tiered, formula-like methodology; representing concentrations associated with no effects.
ERPG-1 is the acute exposure concentration of the general population for up to 1 hour associated with effects expected to be mild or transient.

Data on tables are from the following sources:

http://www.epa.gov/oppt/aegl/pubs/chemlist.htm	EPA's website used to research AEGLs using the chemical's name or chemical abstracts service registry numbers.
http://www.cdc.gov/niosh/npg/npgsyn-a.html	CDC NIOSH Pocket Guide to Chemical Hazards website
http://wiser.nlm.nih.gov/	WISER website
http://www.skcinc.com/	SKC, Inc. website (Air Sampling Media Part No. is specific to SKC)

*AEGL-2--There are no AEGL-1 for this compound
**MIRAN SapphIRe has problems with complex mixtures (*e.g.;* distinguishing benzene from gasoline vapor)
***PIDs/FIDs are non-specific detectors and cannot differentiate between VOCs, even with CFs applied. See RAE PID CF Guidance Document TN-106 for information and TVA Response Factor document P/N 50039 THERMO.
****Personal DataRAMs/DataRAMs are non-specific detectors and cannot differentiate between particulates

Acronyms:
≥ -- greater than or equal to
ACGIH -- American Conference of Governmental Industrial Hygienists
AEGL -- acute exposure guideline levels
C -- ceiling (concentrations that should not be exceeded during any part of work exposure)
CDC -- Centers for Disease Control and Prevention
CF -- conversion factor
cpm -- counts per minute
EPA -- U.S. Environmental Protection Agency
ERPG -- emergency response planning guideline
eV -- electron volt
FID -- flame ionization detector
IDLH -- immediately dangerous to life and health
IP -- ionization potential
ISO -- isobutylene
L/min -- liter per minute
m^3 -- cubic meter
mg/m^3 -- milligrams per cubic meter
µR/hr -- micro Roentgens per hour
NA -- not available/applicable
NIOSH -- National Institute for Occupational Safety and Health
OSHA -- Occupational Safety and Health Administration
PEL -- permissible exposure limit (OSHA)
PID -- photoionization detector
ppb -- parts per billion
ppm -- parts per million
R/hr -- Roentgens per hour
rec. -- recommended
REL -- recommended exposure limit (NIOSH)
SPM -- single-point monitor
SSHASP -- site-specific health and safety plan
ST -- short term
TEEL -- temporary emergency exposure limit
TLV -- time-limited value (ACGIH)
TWA -- time-weighted average
VOC -- volatile organic compound
WISER -- Wireless Information System for Emergency Responders
Y w/option - yes with option; see manufacturer's instrument manual for information

Table 12 -- Phosphorus (Spill, Release, or Fire)

Target Compound[1]	Instrument (Instrument Guidance)	Detection Level (Instrument Guidance)	Intrinsically Safe (Y/N) (Instrument Guidance)	IP (Instrument Guidance)	PID CF (ISO) (Instrument Guidance)	Conversion (Instrument Guidance)	Occupational Action Levels (Regulatory Guidance): TWA	Occupational Action Levels (Regulatory Guidance): IDLH	AEGL-1 (Regulatory Guidance): 1-hr	AEGL-1 (Regulatory Guidance): 4-hr	AEGL-1 (Regulatory Guidance): 8-hr	TEEL-0 (Regulatory Guidance): 15-min TWA	ERPG-1 (Regulatory Guidance): 1-hr	Air Sampling (Reference): Media	Air Sampling (Reference): Method	Air Sampling (Reference): Flow Rate/ Total Volume
Phosphorus Compounds and Gases																
Phosphorus (elemental[3])	Personal DataRAM****	0.001-400 mg/m^3	N	NA	NA	NA	PEL = 0.1 mg/m^3 REL = 0.1 mg/m^3 TLV = 0.1 mg/m^3	5 mg/m^3	3.7 ppm	0.93 ppm	0.47 ppm	0.1 mg/m^3	NA	Tenax Tube, 226-35-03	NIOSH 7905	0.01-0.2 L/min; 12 L
	DataRAM 4****	≥0.5-15 ppm	N													
Red Phosphorus	MultiRAE/AreaRAE PID**	0-2000 ppm	Y	10.49 eV	NA	NA	NA	NA	3.7 ppm	0.93 ppm	0.47 ppm	0.05 mg/m^3	0.4 mg/m^3*	Tenax Tube, 226-35-03	NIOSH 7905	0.2 L/min; 12 L
	TVA 1000B***	0.5-2,000 ppm (PID) 1-50,000 ppm (FID)	Y													
Phosphorus Pentoxide	Personal DataRAM****	0.001-400 mg/m^3	N	NA	NA	NA	PEL = 1 mg/m^3 REL = 3 mg/m^3 ACGIH TLV = 1 mg/m^3	250 mg/m^3	NA	NA	NA	1 mg/m^3	1 mg/m^3	MCE Cassette, 225-3-01	OSHA ID 111	1 L/min; 480 L
	DataRAM 4****	0.001-400 mg/m^3	N													
Benzene	UltraRAE-PID***	0.1-2000 ppm	Y	9.24 eV	NA	1 ppm = 3.19 mg/m^3	PEL = 1 ppm REL = 0.1 ppm, ST 1 ppm TLV = 10 ppm	500 ppm	52 ppm	18 ppm	9 ppm	1 ppm	50 ppm	Anasorb CSC Tube, 226-01	NIOSH 1501	≤0.2 L/min; 6 L
	Dräger Tube	≥0.5-10 ppm	Y													
	Dräger Chip	≥0.2-10 ppm	N (Y w/option)													
	MIRAN SapphIRe**	10-200 ppm	Y													
	ppbRAE-PID***	1ppb-200ppm	Y		0.53 (10.6 lamp)											
	MultiRAE/AreaRAE PID***	0-2000 ppm	Y													
	TVA 1000B***	0.5-2,000 ppm (PID) 1-50,000 ppm (FID)	Y		10.6 lamp 0.702 (10 ppm) - 1.781 (2000 ppm)											
Carbon Monoxide	MultiRAE/AreaRAE CO Sensor	0-500 ppm	Y	14.01 eV	NA	1 ppm = 1.15 mg/m3	PEL = 50 ppm REL = 35 ppm, C 200 ppm TLV = 25 ppm	1200 ppm	83 ppm*	33 ppm*	27 ppm*	50 ppm	200 ppm	Sample Bag, 245-05	OSHA ID 209	NA
	MultiRAE Pro CO Sensor	0-2000 ppm ext. range	Y													
	Dräger Tube	≥2-300 ppm	Y													
	Dräger Chip	5-150 ppm	N (Y w/option)													
	ToxiRAE II CO	≥0-500 ppm	Y													
	GFG Inc. Micro IV	0-2000 ppm	Y													
	MIRAN SapphIRe**	4.5-250 ppm	Y													
Hydrogen Sulfide	MultiRAE/AreaRAE H_2S Sensor	0-100 ppm	Y	10.46 eV	NA	1 ppm = 1.4 mg/m^3	PEL = C 20 ppm, 50 ppm (10 mins) REL = C 10 ppm (10 mins) TLV = 10 ppm, ST 15 ppm	100 ppm	0.51 ppm	0.36 ppm	0.33 ppm	0.51 ppm	0.1 ppm	Silica Gel Tube, 266-177	OSHA 1008	0.05 L/min; 12 L
	MultiRAE Pro H_2S Sensor	0-1000 ppm ext. range	Y													
	Dräger Tube	≥0.2-6 ppm	Y													
	Dräger Chip	≥0.2-5 ppm	N (Y w/option)													
	SPM	1.1-30 ppm	N (Y w/option)													
	MultiRAE/AreaRAE PID***	0-2000 ppm	Y		3.3 (10.6 lamp)											
	GFG Inc. Micro IV	0-500 ppm	Y		NA											
	TVA 1000B***	0.5-2,000 ppm (PID)	Y													

Table 12 -- Phosphorus (Spill, Release, or Fire)

Target Compound[1]	Instrument	Detection Level	Intrinsically Safe (Y/N)	IP	PID CF (ISO)	Conversion	Occupational Action Levels: TWA	Occupational Action Levels: IDLH	AEGL-1: 1-hr	AEGL-1: 4-hr	AEGL-1: 8-hr	TEEL-0: 15-min TWA	ERPG-1: 1-hr	Air Sampling: Media	Air Sampling: Method	Air Sampling: Flow Rate/ Total Volume
Phosphorus Compounds and Gases (continued)																
Sulfur Dioxide	MultiRAE/AreaRAE SO_2 Sensor	0-20 ppm	Y	12.3 eV	NA	1 ppm = 2.62 mg/m^3	PEL = 5 ppm REL = 2 ppm, ST 5 ppm TLV = 2 ppm, ST 5 ppm	100 ppm	0.2 ppm	0.2 ppm	0.2 ppm	0.2 ppm	0.3 ppm	MCE Cassette, 225-9005	NIOSH 6004	0.5-1.5 L/min; 180 L
	Dräger Pac III	0-100 ppm	Y													
	Dräger Tube	≥0.1-3 ppm	Y													
	Dräger Chip	≥0.4-10 ppm	N (Y w/option)													
	MIRAN SapphIRe**	6-30 ppm	Y													
	GFG Inc. Micro IV	1-10 ppm	Y													
	SPM	0.2-6 ppm	N (Y w/option)													
Particulate																
Particulate	Personal DataRAM****	0.001-400 mg/m^3	N	NA	NA	NA	PEL = 15 mg/m^3 (total), 5 mg/m^3 (respirable) TLV = 10 mg/m^3 (total), 3 mg/m^3 (respirable)	NA	NA	NA	NA	10 mg/m^3	NA	Filter (total) Cyclone + Filter (resp)	NIOSH 0500 (total) NIOSH 0600 (resp)	1-2 L/min (total) 1.7-2.5 L/min (resp)
	DataRAM 4****	0.001-400 mg/m^3	N													
	eBAM	0-100 mg/m^3	N													
Radiation[2]																
Radiation	Ludlum Model 192	0-5,000 µR/hr	N	NA	NA	NA	60-100 µR/hr*	NA	NA	NA	NA	NA	NA	RADeCO Filter Paper (2")	RSSOP 209/501	α = 2500 ft^3 β/γ = 1250 ft^3
	Ludlum Model 2241-2 w/Pancake Probe	0-100,000 cpm or 0-200 mR/hr	N				300 cpm*									
	Ludlum Model 2241-3 w/Pancake Probe	0-100,000 cpm or 0-200 mR/hr	N				300 cpm*									
	*These are not TWA(s). Normal gamma radiation background is from 5-20 µR/hr; however, higher backgrounds may exist. If readings are 3 times background or greater than 60-100 µR/hr or greater than 300 cpm, then stop work and consult with a Health Physicist. Refer to Hazardous Evaluation Flow Chart for Unknowns in Attachment A.															

Instrument Guidance | Regulatory Guidance | Reference

Table 12 -- Phosphorus (Spill, Release, or Fire)

Notes:

For guidance only. These tables do not supersede a SSHASP at any time or on any response.

[1] Does not include all pollutants associated with this type of event, only the most common pollutants with the lowest action levels. Depending on the chemical of concern, certain Dräger tubes and chips can be used. In addition, single-gas instruments and sensors and/or a gas chromatography-mass spectrometry instrument may be used.

[2] Standard EPA Emergency Response Protocol is to screen for radiation with a Micro-R at all emergency responses. If readings are three times background, responders consult with a Health Physicist. Additional radiation equipment is available to monitor for Alpha, Beta and Gamma, but is not included in this table.

[3] Emits irritating oxides of phosphorus, may re-ignite upon exposure to air

AEGL-1 is the airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience notable discomfort, irritation, or certain asymptomatic non-sensory effects; however, the effects are not disabling and are transient and reversible upon cessation of exposure.

AEGL-2 is the airborne concentration (expressed as ppm or mg/m^3) of a substance above which it is predicted that the general population, including susceptible individuals, could experience irreversible or other serious, long-lasting adverse health effects or an impaired ability to escape.

TEEL-0 is the temporary level of concern derived according to a tiered, formula-like methodology; representing concentrations associated with no effects.

ERPG-1 is the acute exposure concentration of the general population for up to 1 hour associated with effects expected to be mild or transient.

Data on tables are from the following sources:

http://www.epa.gov/oppt/aegl/pubs/chemlist.htm	EPA's website used to research AEGLs using the chemical's name or chemical abstracts service registry numbers.
http://www.cdc.gov/niosh/npg/npgsyn-a.html	CDC NIOSH Pocket Guide to Chemical Hazards website
http://wiser.nlm.nih.gov/	WISER website
http://www.skcinc.com/	SKC, Inc. website (Air Sampling Media Part No. is specific to SKC)

*AEGL-2--There are no AEGL-1 for this compound

**MIRAN SapphIRe has problems with complex mixtures (*e.g.;* distinguishing benzene from gasoline vapor)

***PIDs/FIDs are non-specific detectors and cannot differentiate between VOCs, even with CFs applied. See RAE PID CF Guidance Document TN-106 for information and TVA Response Factor document P/N 50039 THERMO.

****Personal DataRAMs/DataRAMs are non-specific detectors and cannot differentiate between particulates

Acronyms:

≥ -- greater than or equal to
ACGIH -- American Conference of Governmental Industrial Hygienists
AEGL -- acute exposure guideline levels
C -- ceiling (concentrations that should not be exceeded during any part of work exposure)
CDC -- Centers for Disease Control and Prevention
CF -- conversion factor
cpm -- counts per minute
EPA -- U.S. Environmental Protection Agency
ERPG -- emergency response planning guideline
eV -- electron volt
FID -- flame ionization detector
IC -- ion chromatography
IDLH -- immediately dangerous to life and health
IP -- ionization potential
ISO -- isobutylene
L/min -- liter per minute
mg/m^3 -- milligrams per cubic meter
$\mu g/cm^2$ -- micrograms per square centimeter
µR/hr -- micro Roentgens per hour
NA -- not available/applicable
NIOSH -- National Institute for Occupational Safety and Health
OSHA -- Occupational Safety and Health Administration
PEL -- permissible exposure limit (OSHA)
PID -- photoionization detector
ppb -- parts per billion
ppm -- parts per million
R/hr -- Roentgens per hour
rec. -- recommended
REL -- recommended exposure limit (NIOSH)
SPM -- single-point monitor
SSHASP -- site-specific health and safety plan
TEEL -- temporary emergency exposure limit
TLV -- time-limited value (ACGIH)
TWA -- time-weighted average
WISER -- Wireless Information System for Emergency Responders
Y w/option - yes with option; see manufacturer's instrument manual for information

Table 13 -- Tire Fire

(Also can be used for Auto Fluff Fire)

Target Compound[1]	Instrument (Instrument Guidance)	Detection Level (Instrument Guidance)	Intrinsically Safe (Y/N) (Instrument Guidance)	IP (Instrument Guidance)	PID CF (ISO) (Instrument Guidance)	Conversion (Instrument Guidance)	Occupational Action Levels (Regulatory Guidance): TWA	Occupational Action Levels (Regulatory Guidance): IDLH	AEGL-1 (Regulatory Guidance): 1-hr	AEGL-1 (Regulatory Guidance): 4-hr	AEGL-1 (Regulatory Guidance): 8-hr	TEEL-0 (Regulatory Guidance): 15-min TWA	ERPG-1 (Regulatory Guidance): 1-hr	Air Sampling (Reference): Media	Air Sampling (Reference): Method	Air Sampling (Reference): Flow Rate/ Total Volume
VOCs and Gases																
Benzene	UltraRAE-PID***	0.1-2000 ppm	Y	9.24 eV	NA	1 ppm = 3.19 mg/m^3	PEL = 1 ppm REL = 0.1 ppm, ST 1 ppm TLV = 10 ppm	500 ppm	52 ppm	18 ppm	9 ppm	1 ppm	50 ppm	Anasorb CSC Tube, 226-01	NIOSH 1501	≤0.2 L/min; 6 L
	Dräger Tube	≥0.5-10 ppm	Y													
	Dräger Chip	≥0.2-10 ppm	N (Y w/option)													
	MIRAN SapphIRe**	10-200 ppm	Y													
	ppbRAE-PID***	1ppb-200ppm	Y		0.53 (10.6 lamp)											
	MultiRAE/AreaRAE PID***	0-2000 ppm	Y													
	TVA 1000B***	0.5-2,000 ppm (PID) 1-50,000 ppm (FID)	Y		10.6 lamp 0.702 (10 ppm) - 1.781 (2000 ppm)											
Carbon Monoxide	MultiRAE/AreaRAE CO Sensor	0-500 ppm	Y	14.01 eV	NA	1 ppm = 1.15 mg/m3	PEL = 50 ppm REL = 35 ppm, C 200 ppm TLV = 25 ppm	1200 ppm	83 ppm*	33 ppm*	27 ppm*	50 ppm	200 ppm	Sample Bag, 245-05	OSHA ID 209	NA
	MultiRAE Pro CO Sensor	0-2000 ppm ext. range	Y													
	Dräger Tube	≥2-300 ppm	Y													
	Dräger Chip	5-150 ppm	N (Y w/option)													
	ToxiRAE II CO	≥0-500 ppm	Y													
	GFG Inc. Micro IV	0-2000 ppm	Y													
	MIRAN SapphIRe**	4.5-250 ppm	Y													
Hydrogen Sulfide	MultiRAE/AreaRAE H_2S Sensor	0-100 ppm	Y	10.46 eV	NA	1 ppm = 1.4 mg/m^3	PEL = C 20 ppm, 50 ppm (10 mins) REL = C 10 ppm (10 mins) TLV = 10 ppm, ST 15 ppm	100 ppm	0.51 ppm	0.36 ppm	0.33 ppm	0.51 ppm	0.1 ppm	Silica Gel Tube, 266-177	OSHA 1008	0.05 L/min; 12 L
	MultiRAE Pro H_2S Sensor	0-1000 ppm ext. range	Y													
	Dräger Tube	≥0.2-6 ppm	Y													
	Dräger Chip	≥0.2-5 ppm	N (Y w/option)													
	SPM	1.1-30 ppm	N (Y w/option)													
	MultiRAE/AreaRAE PID***	0-2000 ppm	Y		3.3 (10.6 lamp)											
	GFG Inc. Micro IV	0-500 ppm	Y		NA											
	TVA 1000B***	0.5-2,000 ppm (PID)	Y													
Sulfur Dioxide	MultiRAE/AreaRAE SO_2 Sensor	0-20 ppm	Y	12.3 eV	NA	1 ppm = 2.62 mg/m^3	PEL = 5 ppm REL = 2 ppm, ST 5 ppm TLV = 2 ppm, ST 5 ppm	100 ppm	0.2 ppm	0.2 ppm	0.2 ppm	0.2 ppm	0.3 ppm	MCE Cassette, 225-9005	NIOSH 6004	0.5-1.5 L/min; 180 L
	Dräger Pac III	0-100 ppm	Y													
	Dräger Tube	≥0.1-3 ppm	Y													
	Dräger Chip	≥0.4-10 ppm	N (Y w/option)													
	MIRAN SapphIRe**	6-30 ppm	Y													
	GFG Inc. Micro IV	1-10 ppm	Y													
	SPM	0.2-6 ppm	N (Y w/option)													
PAHs - as particulates																
PAHs*****	Personal DataRAM****	0.001-400 mg/m^3	N	NA	NA	NA	PEL = 0.2 mg/m^3 REL = 0.1 mg/m^3	80 mg/m^3	NA	NA	NA	0.075 mg/m^3	0.25 mg/m^3	PTFE Cassette, 226-30-04	NIOSH 5506	2 L/min; 480 L
	DataRAM 4****	0.001-400 mg/m^3	N													

Table 13 -- Tire Fire

(Also can be used for Auto Fluff Fire)

Instrument Guidance							Regulatory Guidance							Reference		
Target Compound[1]	Instrument	Detection Level	Intrinsically Safe (Y/N)	IP	PID CF (ISO)	Conversion	Occupational Action Levels		AEGL-1			TEEL-0	ERPG-1	Air Sampling		
							TWA	IDLH	1-hr	4-hr	8-hr	15-min TWA	1-hr	Media	Method	Flow Rate/ Total Volume
Metals - as particulates																
Lead	Personal DataRAM****	0.001-400 mg/m^3	N	NA	NA	NA	PEL = 0.05 mg/m^3 REL = 0.05 mg/m^3 TLV = 0.05 mg/m^3	100 mg/m^3	NA	NA	NA	0.05 mg/m^3	NA	MCE Cassette, 225-3-01	NIOSH 7300	1-4 L/min; 50-2000 L
	DataRAM 4****	0.001-400 mg/m^3	N													
Particulate																
Particulate	Personal DataRAM****	0.001-400 mg/m^3	N	NA	NA	NA	PEL = 15 mg/m^3 (total), 5 mg/m^3 (respirable) TLV = 10 mg/m^3 (total), 3 mg/m^3 (respirable)	NA	NA	NA	NA	10 mg/m^3	NA	Filter (total) Cyclone + Filter (resp)	NIOSH 0500 (total) NIOSH 0600 (resp)	1-2 L/min (total) 1.7-2.5 L/min (resp)
	DataRAM 4****	0.001-400 mg/m^3	N													
	eBAM	0-100 mg/m^3	N													
Radiation[2]																
Radiation	Ludlum Model 192	0-5,000 µR/hr	N	NA	NA	NA	60-100 µR/hr*	NA	NA	NA	NA	NA	NA	RADeCO Filter Paper (2")	RSSOP 209/501	α = 2500 ft^3 β/γ = 1250 ft^3
	Ludlum Model 2241-2 w/Pancake Probe	0-100,000 cpm or 0-200 mR/hr	N				300 cpm*									
	Ludlum Model 2241-3 w/Pancake Probe	0-100,000 cpm or 0-200 mR/hr	N				300 cpm*									
	*These are not TWA(s). Normal gamma radiation background is from 5-20 µR/hr; however, higher backgrounds may exist. If readings are 3 times background or greater than 60-100 µR/hr or greater than 300 cpm, then stop work and consult with a Health Physicist. Refer to Hazardous Evaluation Flow Chart for Unknowns in Attachment A.															

EMERGENCY RESPONSE TECHNICAL GROUP

Table 13 -- Tire Fire

(Also can be used for Auto Fluff Fire)

Notes:

For guidance only. These tables do not supersede a SSHASP at any time or on any response.

[1] Does not include all pollutants associated with this type of event, only the most common pollutants with the lowest action levels. Depending on the chemical of concern, certain Dräger tubes and chips can be used. In addition, single-gas instruments and sensors and/or a gas chromatography-mass spectrometry instrument may be used.

[2] Standard EPA Emergency Response Protocol is to screen for radiation with a Micro-R at all emergency responses. If readings are three times background, responders consult with a Health Physicist. Additional radiation equipment is available to monitor for Alpha, Beta and Gamma, but is not included in this table.

AEGL-1 is the airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience notable discomfort, irritation, or certain asymptomatic non-sensory effects; however, the effects are not disabling and are transient and reversible upon cessation of exposure.

AEGL-2 is the airborne concentration (expressed as ppm or mg/m^3) of a substance above which it is predicted that the general population, including susceptible individuals, could experience irreversible or other serious, long-lasting adverse health effects or an impaired ability to escape.

TEEL-0 is the temporary level of concern derived according to a tiered, formula-like methodology; representing concentrations associated with no effects.

ERPG-1 is the acute exposure concentration of the general population for up to 1 hour associated with effects expected to be mild or transient.

Data on tables are from the following sources:

http://www.epa.gov/oppt/aegl/pubs/chemlist.htm	EPA's website used to research AEGLs using the chemical's name or chemical abstracts service registry numbers.
http://www.cdc.gov/niosh/npg/npgsyn-a.html	CDC NIOSH Pocket Guide to Chemical Hazards website
http://wiser.nlm.nih.gov/	WISER website
http://www.skcinc.com/	SKC, Inc. website (Air Sampling Media Part No. is specific to SKC)

*AEGL-2--There are no AEGL-1 for this compound

**MIRAN SapphIRe has problems with complex mixtures (*e.g.;* distinguishing benzene from gasoline vapor)

***PIDs/FIDs are non-specific detectors and cannot differentiate between VOCs, even with CFs applied. See RAE PID CF Guidance Document TN-106 for information and TVA Response Factor document P/N 50039 THERMO.

****Personal DataRAMs/DataRAMs are non-specific detectors and cannot differentiate between particulates

*****PAHs are most conservative value (anthracene, benzo(a)pyrene, chrysene, naphthalene, phenanthrene, pyrene)

Acronyms:

≥ -- greater than or equal to
ACGIH -- American Conference of Governmental Industrial Hygienists
AEGL -- acute exposure guideline levels
CDC -- Centers for Disease Control and Prevention
CF -- conversion factor
cpm -- counts per minute
EPA -- U.S. Environmental Protection Agency
ERPG -- emergency response planning guideline
eV -- electron volt
FID -- flame ionization detector
IDLH -- immediately dangerous to life and health
IP -- ionization potential
ISO -- isobutylene
L/min -- liter per minute
mg/m^3 -- milligrams per cubic meter
µR/hr -- micro Roentgens per hour
NA -- not available/applicable
NIOSH -- National Institute for Occupational Safety and Health
OSHA -- Occupational Safety and Health Administration
PAH -- polyaromatic hydrocarbon
PEL -- permissible exposure limit (OSHA)
PID -- photoionization detector
ppm -- parts per million
R/hr -- Roentgens per hour
rec. -- recommended
REL -- recommended exposure limit (NIOSH)
SPM -- single-point monitor
SSHASP -- site-specific health and safety plan
TEEL -- temporary emergency exposure limit
TLV -- time-limited value (ACGIH)
TWA -- time-weighted average
VOC -- volatile organic compound
WISER -- Wireless Information System for Emergency Responders
Y w/option - yes with option; see manufacturer's instrument manual for information

Table 14 -- Wood-Treating Facility (Spill or Release)

Instrument Guidance							Regulatory Guidance							Reference		
Target Compound[1]	Instrument	Detection Level	Intrinsically Safe (Y/N)	IP	PID CF (ISO)	Conversion	Occupational Action Levels		AEGL-1			TEEL-0	ERPG-1	Air Sampling		
							TWA	IDLH	1-hr	4-hr	8-hr	15-min TWA	1-hr	Media	Method	Flow Rate/ Total Volume
VOCs and Gases																
Hydrochloric Acid (Hydrogen Chloride)	AreaRAE HCl Sensor	2-15 ppm	Y	12.74 eV	NA	1 ppm = 1.49 mg/m^3	PEL = C 5 ppm REL = C 5 ppm TLV = C 5 ppm	50 ppm	1.8 ppm	1.8 ppm	1.8 ppm	0.5 ppm	NA	Silica Gel Tube, 226-10-03	NIOSH 7903	0.2-0.5 L/min; 48 L
	MultiRAE Pro HCl Sensor	0-15 ppm	Y													
	Dräger Tube	≥1-10 ppm	Y													
	Dräger Chip	≥1-25 ppm	N (Y w/option)													
	pH Paper	NA	Y													
	SPM	0.5-15 ppm	N (Y w/option)													
	Dräger Pac III	0-30 ppm	Y													
	GFG Inc. Micro IV	0-30 ppm	Y													
Nitric Acid	Dräger Tube	≥1-50 ppm	Y	11.95 eV	NA	1 ppm = 2.58 mg/m^3	PEL = 2 ppm REL = 2 ppm, ST 4 ppm TLV = 2 ppm, ST 4 ppm	25 ppm	0.53 ppm	0.53 ppm	0.53 ppm	0.53 ppm	1 ppm	Silica Gel Tube, 226-10-03	NIOSH 7903	0.2-0.5 L/min; 48 L
	pH Paper	NA	Y													
	SPM	0.2-6 ppm	N (Y w/option)													
Sulfuric Acid	Dräger Tube	1-5 mg/m^3	Y	12.4 eV	NA	NA	PEL = 1 mg/m^3 REL = 1 mg/m^3 TLV = 1 mg/m^3, ST 3 mg/m^3	15 mg/m^3	0.2 mg/m^3	0.2 mg/m^3	0.2 mg/m^3	0.2 mg/m^3	2 mg/m^3	Silica Gel Tube, 226-10-03	NIOSH 7903	0.2-0.5 L/min; 48 L
	pH Paper	NA	Y													
	SPM	26-750 ppb	N (Y w/option)													
Hydrocyanic Acid (Hydrogen Cyanide)	MultiRAE/AreaRAE HCN Sensor	0-100 ppm	Y	13.6 eV	NA	1 ppm = 1.1 mg/m^3	PEL = 10 ppm S REL = ST 4.7 ppm S TLV = C 10 ppm S	50 ppm	2.0 ppm	1.3 ppm	1 ppm	1.9 ppm	NA	Soda Lime Tube, 226-28	NIOSH 6010	0.05-0.2 L/min; 2-90 L
	MultiRAE Pro HCN Sensor	0-50 ppm	Y													
	Dräger Tube	2-30 ppm	Y													
	Dräger Chip	2-50 ppm	N (Y w/option)													
	pH Paper	NA	Y													
	ToxiRAE II HCN	0-100 ppm	Y													
	SPM	1.1-30 ppm	N (Y w/option)													
	Dräger Pac III	0-50 ppm	Y													
	GFG Inc. Micro IV	0-50 ppm	Y													
Naphthalene	MultiRAE/AreaRAE PID***	0-2000 ppm	Y	8.12 eV	0.42 (10.6 lamp)	1 ppm = 5.24 mg/m^3	REL = 10 ppm ST, 15 ppm PEL = 10 ppm	250 ppm	NA	NA	NA	10 ppm	15 ppm*	Sorbent Tube, 226-110	NIOSH 1501	0.02 L.min; 10 L
	TVA 1000B***	0.5-2,000 ppm (PID) 1-50,000 ppm (FID)	Y		NA											
PAHs - as particulates																
PAHs*****	Personal DataRAM****	0.001-400 mg/m^3	N	NA	NA	NA	PEL = 0.2 mg/m^3 REL = 0.1 mg/m^3	80 mg/m^3	NA	NA	NA	0.075 mg/m^3	0.25 mg/m^3*	PTFE Cassette, 226-30-04	NIOSH 5506	2 L/min; 480 L
	DataRAM 4****	0.001-400 mg/m^3	N													
Pentachlorophenol and Dioxin-Furans - as particulates																
Pentachloro phenol	Personal DataRAM****	0.001-400 mg/m^3	N	NA	NA	NA	PEL = 0.5 mg/m^3 REL = 0.5 mg/m^3 S	2.5 mg/m^3	NA	NA	NA	0.5 mg/m^3	2 mg/m^3*	Styrene Cassette, 225-3LF	NIOSH 5512	0.5-1 L/min; 480 L
	DataRAM 4****	0.001-400 mg/m^3	N													

Table 14 -- Wood-Treating Facility (Spill or Release)

Target Compound[1]	Instrument (Instrument Guidance)	Detection Level (Instrument Guidance)	Intrinsically Safe (Y/N) (Instrument Guidance)	IP (Instrument Guidance)	PID CF (ISO) (Instrument Guidance)	Conversion (Instrument Guidance)	Occupational Action Levels (Regulatory Guidance): TWA	Occupational Action Levels (Regulatory Guidance): IDLH	AEGL-1 (Regulatory Guidance): 1-hr	AEGL-1 (Regulatory Guidance): 4-hr	AEGL-1 (Regulatory Guidance): 8-hr	TEEL-0 (Regulatory Guidance): 15-min TWA	ERPG-1 (Regulatory Guidance): 1-hr	Air Sampling (Reference): Media	Air Sampling (Reference): Method	Air Sampling (Reference): Flow Rate/ Total Volume
Pentachlorophenol and Dioxin-Furans - as particulates (continued)																
Dioxin-Furan	Personal DataRAM****	0.001-400 mg/m^3	N	NA	NA	NA	NA	NA	NA	NA	NA	1E-8 mg/m^3	0.0015 mg/m^3*	PUF Tube Filter	EPA TO-9A	225-280 L/min; NA
	DataRAM 4****	0.001-400 mg/m^3	N													
Metals - as particulates																
Arsenic (inorganic compounds)	Personal DataRAM****	0.001-400 mg/m^3	N	9.81 eV	NA	NA	PEL = 0.01 mg/m^3 REL = C 0.002 mg/m^3 (15 mins) TLV = 0.01 mg/m^3	5 mg/m^3 Ca	NA	NA	NA	0.025 mg/m^3	NA	MCE Cassette, 225-3-01	NIOSH 7900	1-3 L/min; 30 L
	DataRAM 4****	0.001-400 mg/m^3	N													
	MultiRAE/AreaRAE PID***	0-2000 ppm	Y													
	TVA 1000B***	0.5-2,000 ppm (PID) 1-50,000 ppm (FID)	Y			NA										
Arsenic (organic compounds)	Dräger Tube	0-3 mg organic arsenic/m^3	Y	NA	NA	NA	PEL = 0.5 mg/m^3 TLV = 0.2 mg/m^3	NA	NA	NA	NA	0.025 mg/m^3	NA	PTFE Filter, 225-17-01	NIOSH 5022	1-3 L/min; 960 L
Copper	Personal DataRAM****	0.001-400 mg/m^3	N	NA	NA	NA	PEL = 0.1 mg/m^3 (fume), 1 mg/m^3 (dust) REL = 0.1 mg/m^3 (fume), 1 mg/m^3 (dust) TLV = 0.2 mg/m^3 (fume), 1 mg/m^3 (dust, mist)	100 mg/m^3	NA	NA	NA	1 mg/m^3	NA	MCE Cassette, 225-3-01	NIOSH 7029	1-3 L/min; 480 L
	DataRAM 4****	0.001-400 mg/m^3	N													
Chromium (VI)	Personal DataRAM****	0.001-400 mg/m^3	N	NA	NA	NA	PEL = 0.005 mg/m^3 REL = 0.001 mg/m^3 TLV = 0.05 mg/m^3	15 mg/m^3	NA	NA	NA	NA	NA	PVC Cassette, 225-802	NIOSH 7600	1-4 L/min; 240 L
	DataRAM 4****	0.001-400 mg/m^3	N													
Lead	Personal DataRAM****	0.001-400 mg/m^3	N	NA	NA	NA	PEL = 0.05 mg/m^3 REL = 0.05 mg/m^3 TLV = 0.05 mg/m^3	100 mg/m^3	NA	NA	NA	0.05 mg/m^3	NA	MCE Cassette, 225-3-01	NIOSH 7300	1-4 L/min; 50-2000 L
	DataRAM 4****	0.001-400 mg/m^3	N													
Particulate																
Particulate	Personal DataRAM****	0.001-400 mg/m^3	N	NA	NA	NA	PEL = 15 mg/m^3 (total), 5 mg/m^3 (respirable) TLV = 10 mg/m^3 (total), 3 mg/m^3 (respirable)	NA	NA	NA	NA	10 mg/m^3	NA	Filter (total) Cyclone + Filter (resp)	NIOSH 0500 (total) NIOSH 0600 (resp)	1-2 L/min (total) 1.7-2.5 L/min (resp)
	DataRAM 4****	0.001-400 mg/m^3	N													
	eBAM	0-100 mg/m^3	N													

Table 14 -- Wood-Treating Facility (Spill or Release)

Target Compound[1]	Instrument	Detection Level	Intrinsically Safe (Y/N)	IP	PID CF (ISO)	Conversion	Occupational Action Levels		AEGL-1			TEEL-0	ERPG-1	Air Sampling		
							TWA	IDLH	1-hr	4-hr	8-hr	15-min TWA	1-hr	Media	Method	Flow Rate/ Total Volume
Radiation[2]																
Radiation	Ludlum Model 192	0-5,000 µR/hr	N	NA	NA	NA	60-100 µR/hr*	NA	NA	NA	NA	NA	NA	RADeCO Filter Paper (2")	RSSOP 209/501	α = 2500 ft^3 β/γ = 1250 ft^3
	Ludlum Model 2241-2 w/Pancake Probe	0-100,000 cpm or 0-200 mR/hr	N				300 cpm*									
	Ludlum Model 2241-3 w/Pancake Probe	0-100,000 cpm or 0-200 mR/hr	N				300 cpm*									
	*These are not TWA(s). Normal gamma radiation background is from 5-20 µR/hr; however, higher backgrounds may exist. If readings are 3 times background or greater than 60-100 µR/hr or greater than 300 cpm, then stop work and consult with a Health Physicist. Refer to Hazardous Evaluation Flow Chart for Unknowns in Attachment A.															

Instrument Guidance | Regulatory Guidance | Reference

Table 14 -- Wood-Treating Facility (Spill or Release)

Notes:
For guidance only. These tables do not supersede a SSHASP at any time or on any response.

[1] Does not include all pollutants associated with this type of event, only the most common pollutants with the lowest action levels. Depending on the chemical of concern, certain Dräger tubes and chips can be used. In addition, single-gas instruments and sensors and/or a gas chromatography-mass spectrometry instrument may be used.

[2] Standard EPA Emergency Response Protocol is to screen for radiation with a Micro-R at all emergency responses. If readings are three times background, responders consult with a Health Physicist. Additional radiation equipment is available to monitor for Alpha, Beta and Gamma, but is not included in this table.

AEGL-1 is the airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience notable discomfort, irritation, or certain asymptomatic non-sensory effects; however, the effects are not disabling and are transient and reversible upon cessation of exposure.

AEGL-2 is the airborne concentration (expressed as ppm or mg/m^3) of a substance above which it is predicted that the general population, including susceptible individuals, could experience irreversible or other serious, long-lasting adverse health effects or an impaired ability to escape.

TEEL-0 is the temporary level of concern derived according to a tiered, formula-like methodology; representing concentrations associated with no effects.

ERPG-1 is the acute exposure concentration of the general population for up to 1 hour associated with effects expected to be mild or transient.

PAC-1 is based on the applicable AEGL-1, ERPG-1, or TEEL-1 value

Data on tables are from the following sources:

http://www.epa.gov/oppt/aegl/pubs/chemlist.htm	EPA's website used to research AEGLs using the chemical's name or chemical abstracts service registry numbers.
http://www.cdc.gov/niosh/npg/npgsyn-a.html	CDC NIOSH Pocket Guide to Chemical Hazards website
http://wiser.nlm.nih.gov/	WISER website
http://www.skcinc.com/	SKC, Inc. website (Air Sampling Media Part No. is specific to SKC)

*AEGL-2--There are no AEGL-1 for this compound
*PAC-1--There are no ERPG-1 for this compound
**MIRAN SapphIRe has problems with complex mixtures (*e.g.;* distinguishing benzene from gasoline vapor)
***PIDs/FIDs are non-specific detectors and cannot differentiate between VOCs, even with CFs applied. See RAE PID CF Guidance Document TN-106 for information and TVA Response Factor document P/N 50039 THERMO.
****Personal DataRAMs/DataRAMs are non-specific detectors and cannot differentiate between particulates
*****PAHs are most conservative value (anthracene, benzo(a)pyrene, chrysene, naphthalene, phenanthrene, pyrene)

Acronyms:

≥ -- greater than or equal to
ACGIH -- American Conference of Governmental Industrial Hygienists
AEGL -- acute exposure guideline levels
C -- ceiling (concentrations that should not be exceeded during any part of work exposure)
CDC -- Centers for Disease Control and Prevention
CF -- conversion factor
cpm -- counts per minute
EPA -- U.S. Environmental Protection Agency
ERPG -- emergency response planning guideline
eV -- electron volt
FID -- flame ionization detector
IDLH -- immediately dangerous to life and health
IP -- ionization potential
ISO -- isobutylene
L/min -- liter per minute
mg/m^3 -- milligrams per cubic meter
µR/hr -- micro Roentgens per hour
NA -- not available/applicable
NIOSH -- National Institute for Occupational Safety and Health
OSHA -- Occupational Safety and Health Administration
PEL -- permissible exposure limit (OSHA)
PID -- photoionization detector
ppb -- parts per billion
ppm -- parts per million
R/hr -- Roentgens per hour
REL -- recommended exposure limit (NIOSH)
S -- skin notation (compound may be absorbed through the skin)
SPM -- single-point monitor
SSHASP -- site-specific health and safety plan
TEEL -- temporary emergency exposure limit
TLV -- time-limited value (ACGIH)
TWA -- time-weighted average
WISER -- Wireless Information System for Emergency Responders
Y w/option - yes with option; see manufacturer's instrument manual for information

Table 15 -- Volcano

Target Compound[1]	Instrument	Detection Level	Intrinsically Safe (Y/N)	IP	PID CF (ISO)	Conversion	Occupational Action Levels		AEGL-1			TEEL-0	ERPG-1	Air Sampling		
	Instrument Guidance						Regulatory Guidance							Reference		
							TWA	IDLH	1-hr	4-hr	8-hr	15-min TWA	1-hr	Media	Method	Flow Rate/ Total Volume
VOCs and Gases																
Carbon Monoxide	MultiRAE/AreaRAE CO Sensor	0-500 ppm	Y	14.01 eV	NA	1 ppm = 1.15 mg/m3	PEL = 50 ppm REL = 35 ppm, C 200 ppm TLV = 25 ppm	1200 ppm	83 ppm*	33 ppm*	27 ppm*	50 ppm	200 ppm	Sample Bag, 245-05	OSHA ID 209	NA
	MultiRAE Pro CO Sensor	0-2000 ppm ext. range	Y													
	Dräger Tube	≥2-300 ppm	Y													
	Dräger Chip	5-150 ppm	N (Y w/option)													
	ToxiRAE II CO	≥0-500 ppm	Y													
	GFG Inc. Micro IV	0-2000 ppm	Y													
	MIRAN SapphIRe**	4.5-250 ppm	Y													
Carbon Dioxide	Dräger Pac III	0-5% Vol.	Y	13.77 eV	NA	1 ppm = 1.8 mg/m^3	PEL = 5000 ppm, ST 30,000 ppm REL = 5000 ppm, ST 30,000 ppm TLV = 5000 ppm, ST 30,000 ppm	40,000 ppm	NA	NA	NA	5000 ppm	NA	Carbon Dioxide Tube, 800-01381	NA	0.02-0.1 L/min; NA
	Dräger Tube	2-12% Vol.	Y													
	Dräger Chip	200-25,000 ppm	N (Y w/option)													
	MIRAN SapphIRe**	7.5-2000 ppm	Y													
Hydrogen Sulfide	MultiRAE/AreaRAE H_2S Sensor	0-100 ppm	Y	10.46 eV	NA	1 ppm = 1.4 mg/m^3	PEL = C 20 ppm, 50 ppm (10 mins) REL = C 10 ppm (10 mins) TLV = 10 ppm, ST 15 ppm	100 ppm	0.51 ppm	0.36 ppm	0.33 ppm	0.51 ppm	0.1 ppm	Silica Gel Tube, 266-177	OSHA 1008	0.05 L/min; 12 L
	MultiRAE Pro H_2S Sensor	0-1000 ppm ext. range	Y													
	Dräger Tube	≥0.2-6 ppm	Y													
	Dräger Chip	≥0.2-5 ppm	N (Y w/option)													
	SPM	1.1-30 ppm	N (Y w/option)													
	MultiRAE/AreaRAE PID***	0-2000 ppm	Y		3.3 (10.6 lamp)											
	GFG Inc. Micro IV	0-500 ppm	Y		NA											
	TVA 1000B***	0.5-2,000 ppm (PID)	Y													
Sulfur Dioxide	MultiRAE/AreaRAE SO_2 Sensor	0-20 ppm	Y	12.3 eV	NA	1 ppm = 2.62 mg/m^3	PEL = 5 ppm REL = 2 ppm, ST 5 ppm TLV = 2 ppm, ST 5 ppm	100 ppm	0.2 ppm	0.2 ppm	0.2 ppm	0.2 ppm	0.3 ppm	MCE Cassette, 225-9005	NIOSH 6004	0.5-1.5 L/min; 180 L
	Dräger Pac III	0-100 ppm	Y													
	Dräger Tube	≥0.1-3 ppm	Y													
	Dräger Chip	≥0.4-10 ppm	N (Y w/option)													
	MIRAN SapphIRe**	6-30 ppm	Y													
	GFG Inc. Micro IV	1-10 ppm	Y													
	SPM	0.2-6 ppm	N (Y w/option)													
Particulate																
Particulate	Personal DataRAM****	0.001-400 mg/m^3	N	NA	NA	NA	PEL = 15 mg/m^3 (total), 5 mg/m^3 (respirable) TLV = 10 mg/m^3 (total), 3 mg/m^3 (respirable)	NA	NA	NA	NA	10 mg/m^3	NA	Filter (total) Cyclone + Filter (resp)	NIOSH 0500 (total) NIOSH 0600 (resp)	1-2 L/min (total) 1.7-2.5 L/min (resp)
	DataRAM 4****	0.001-400 mg/m^3	N													
	eBAM	0-100 mg/m^3	N													

Table 15 -- Volcano

Instrument Guidance							Regulatory Guidance							Reference		
Target Compound[1]	Instrument	Detection Level	Intrinsically Safe (Y/N)	IP	PID CF (ISO)	Conversion	Occupational Action Levels		AEGL-1			TEEL-0	ERPG-1	Air Sampling		
							TWA	IDLH	1-hr	4-hr	8-hr	15-min TWA	1-hr	Media	Method	Flow Rate/ Total Volume
Radiation[2]																
Radiation	Ludlum Model 192	0-5,000 µR/hr	N	NA	NA	NA	60-100 µR/hr*	NA	NA	NA	NA	NA	NA	RADeCO Filter Paper (2")	RSSOP 209/501	α = 2500 ft^3 β/γ = 1250 ft^3
	Ludlum Model 2241-2 w/Pancake Probe	0-100,000 cpm or 0-200 mR/hr	N				300 cpm*									
	Ludlum Model 2241-3 w/Pancake Probe	0-100,000 cpm or 0-200 mR/hr	N				300 cpm*									
	*These are not TWA(s). Normal gamma radiation background is from 5-20 µR/hr; however, higher backgrounds may exist. If readings are 3 times background or greater than 60-100 µR/hr or greater than 300 cpm, then stop work and consult with a Health Physicist. Refer to Hazardous Evaluation Flow Chart for Unknowns in Attachment A.															

Table 15 -- Volcano

Notes:

For guidance only. These tables do not supersede a SSHASP at any time or on any response.

[1] Does not include all pollutants associated with this type of event, only the most common pollutants with the lowest action levels. Depending on the chemical of concern, certain Dräger tubes and chips can be used. In addition, single-gas instruments and sensors and/or a gas chromatography-mass spectrometry instrument may be used.

[2] Standard EPA Emergency Response Protocol is to screen for radiation with a Micro-R at all emergency responses. If readings are three times background, responders consult with a Health Physicist. Additional radiation equipment is available to monitor for Alpha, Beta and Gamma, but is not included in this table.

AEGL-1 is the airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience notable discomfort, irritation, or certain asymptomatic non-sensory effects; however, the effects are not disabling and are transient and reversible upon cessation of exposure.

AEGL-2 is the airborne concentration (expressed as ppm or mg/m^3) of a substance above which it is predicted that the general population, including susceptible individuals, could experience irreversible or other serious, long-lasting adverse health effects or an impaired ability to escape.

TEEL-0 is the temporary level of concern derived according to a tiered, formula-like methodology; representing concentrations associated with no effects.

ERPG-1 is the acute exposure concentration of the general population for up to 1 hour associated with effects expected to be mild or transient.

Data on tables are from the following sources:

http://www.epa.gov/oppt/aegl/pubs/chemlist.htm	EPA's website used to research AEGLs using the chemical's name or chemical abstracts service registry numbers.
http://www.cdc.gov/niosh/npg/npgsyn-a.html	CDC NIOSH Pocket Guide to Chemical Hazards website
http://wiser.nlm.nih.gov/	WISER website
http://www.skcinc.com/	SKC, Inc. website (Air Sampling Media Part No. is specific to SKC)

*AEGL-2--There are no AEGL-1 for this compound

**MIRAN SapphIRe has problems with complex mixtures (e.g.; distinguishing benzene from gasoline vapor)

***PIDs/FIDs are non-specific detectors and cannot differentiate between VOCs, even with CFs applied. See RAE PID CF Guidance Document TN-106 for information and TVA Response Factor document P/N 50039 THERMO.

****Personal DataRAMs/DataRAMs are non-specific detectors and cannot differentiate between particulates

Acronyms:

≥ -- greater than or equal to
% -- percent
ACGIH -- American Conference of Governmental Industrial Hygienists
AEGL -- acute exposure guideline levels
CDC -- Centers for Disease Control and Prevention
CF -- conversion factor
cpm -- counts per minute
EPA -- U.S. Environmental Protection Agency
ERPG -- emergency response planning guideline
eV -- electron volt
IDLH -- immediately dangerous to life and health
IP -- ionization potential
ISO -- isobutylene
L/min -- liter per minute
mg/m^3 -- milligrams per cubic meter
µR/hr -- micro Roentgens per hour
NA -- not available/applicable
NIOSH -- National Institute for Occupational Safety and Health
OSHA -- Occupational Safety and Health Administration
PEL -- permissible exposure limit (OSHA)
PID -- photoionization detector
ppm -- parts per million
R/hr -- Roentgens per hour
rec. -- recommended
REL -- recommended exposure limit (NIOSH)
SPM -- single-point monitor
SSHASP -- site-specific health and safety plan
TEEL -- temporary emergency exposure limit
TLV -- time-limited value (ACGIH)
TWA -- time-weighted average
VOC -- volatile organic compound
Vol. -- volume
WISER -- Wireless Information System for Emergency Responders
Y w/option - yes with option; see manufacturer's instrument manual for information

Table 16 -- Chemical Warfare Agents

Target Compound[1]	Instrument (Instrument Guidance)	Detection Level (Instrument Guidance)	Intrinsically Safe (Y/N) (Instrument Guidance)	IP[2] (Instrument Guidance)	PID CF (ISO)[2] (Instrument Guidance)	Conversion (Instrument Guidance)	Occupational Action Levels (Regulatory Guidance): TWA/AEL	Occupational Action Levels (Regulatory Guidance): IDLH	AEGL-1 (Regulatory Guidance): 1-hr	AEGL-1 (Regulatory Guidance): 4-hr	AEGL-1 (Regulatory Guidance): 8-hr	TEEL-0 (Regulatory Guidance): 15-min TWA	ERPG-1 (Regulatory Guidance): 1-hr	Air Sampling (Reference): Media	Air Sampling (Reference): Method	Air Sampling (Reference): Flow Rate/ Total Volume
Nerve																
Tabun (GA)	APD 2000	15 ppb	N	NA	NA	1 ppm = 6.63 mg/m^3	WPL = 0.00003 mg/m^3 STEL = 0.0001 mg/m^3 GPL = 0.000001 mg/m^3	0.1 mg/m^3	0.00042 ppm (0.0028 mg/m^3)	0.00021 ppm (0.0014 mg/m^3)	0.00015 ppm (0.001 mg/m^3)	0.000125 ppm	0.00042 ppm*	Tenax Tube, DAAMS	NA	NA
	ChemPro 100i	0.1 mg/m^3	N													
	AP2C	1.5 ppb	N													
	AP4C	10 µg/m^3	N													
	SAW Mini-CAD	0.17 ppm	N													
	HAPSITE	0.1-10 ppb	N													
	M256 A-1	0.001 ppm	Y													
	Dräger CDS Tube	0.025 ppm	Y													
	MultiRAE/AreaRAE PID**	0-2000 ppm	Y		0.8 (10.6 lamp)											
	TVA 1000B**	0.5-2000 ppm (PID) 1-50,000 ppm (FID)	Y		NA											
Sarin (GB)	APD 2000	15 ppb	N	NA	NA	1 ppm = 5.73 mg/m^3	WPL = 0.00003 mg/m^3 STEL = 0.0001 mg/m^3 GPL = 0.000001 mg/m^3	0.1 mg/m^3	0.00048 ppm (0.0028 mg/m^3)	0.00024 ppm (0.0014 mg/m^3)	0.00017 ppm (0.001 mg/m^3)	0.00015 ppm	0.00048 ppm*	XAD-2 OVS Tube, 226-30-16	OSHA CSI	1 L/min; 480 L
	ChemPro 100i	0.1 mg/m^3	N													
	AP2C	1.5 ppb	N													
	AP4C	10 µg/m^3	N													
	SAW Mini-CAD	0.17 ppm	N													
	HAPSITE	0.1-10 ppb	N													
	M256 A-1	0.0008 ppm	Y													
	Dräger CDS Tube	0.025 ppm	Y													
	MultiRAE/AreaRAE PID**	0-2000 ppm	Y	<16 eV	3-6 (10.6 lamp)											
	TVA 1000B**	0.5-2000 ppm (PID) 1-50,000 ppm (FID)	Y		NA											
Soman (GD)	APD 2000	15 ppb	N	NA	NA	1 ppm = 7.45 mg/m^3	WPL = 0.00003 mg/m^3 STEL = 0.0001 mg/m^3 GPL = 0.000001 mg/m^3	NA	0.00018 ppm (0.0014 mg/m^3)	0.000091 ppm (0.0007 mg/m^3)	0.000065 ppm (0.0005 mg/m^3)	0.00003 ppm	0.00018 ppm*	Sorbent Tube, DAAMS***	NA	NA
	ChemPro 100i	0.1 mg/m^3	N													
	AP2C	1.5 ppb	N													
	AP4C	10 µg/m^3	N													
	SAW Mini-CAD	0.02 ppm	N													
	HAPSITE	0.1-10 ppb	N													
	M256 A-1	0.001 ppm	Y													
	Dräger CDS Tube	0.025 ppm	Y													
	MultiRAE/AreaRAE PID**	0-2000 ppm	Y	<10.6 eV	~3 (10.6 lamp)											
	TVA 1000B**	0.5-2000 ppm (PID) 1-50,000 ppm (FID)	Y		NA											

Table 16 -- Chemical Warfare Agents

Target Compound[1]	Instrument	Detection Level	Intrinsically Safe (Y/N)	IP[2]	PID CF (ISO)[2]	Conversion	Occupational Action Levels: TWA/AEL	Occupational Action Levels: IDLH	AEGL-1: 1-hr	AEGL-1: 4-hr	AEGL-1: 8-hr	TEEL-0: 15-min TWA	ERPG-1: 1-hr	Air Sampling: Media	Air Sampling: Method	Air Sampling: Flow Rate/ Total Volume
Nerve (continued)																
Cyclo-Sarin (GF)	APD 2000	15 ppb	N	NA	NA	1 ppm = 7.36 mg/m^3	PEL = 0.003 mg/m^3 U-STEL = 0.001 mg/m^3 WPL = 0.00003 mg/m^3 GPL = 0.000001 mg/m^3 A-TWA = 0.00003 mg/m^3	NA	0.00020 ppm (0.0014 mg/m^3)	0.0001 ppm (0.0007 mg/m^3)	0.00007 ppm (0.0005 mg/m^3)	0.00006 ppm	0.0002 ppm*	NA	NA	NA
	ChemPro 100i	0.1 mg/m^3	N													
	AP2C	1.5 ppb	N													
	AP4C	10 µg/m^3	N													
	SAW Mini-CAD	0.01 ppm	N													
	HAPSITE	0.1-10 ppb	N													
	M256 A-1	0.002 ppm	Y													
	Dräger CDS Tube	0.025 ppm	Y													
	MultiRAE/AreaRAE PID**	0-2000 ppm	Y	10.6 eV	~3 (10.6 lamp)											
	TVA 1000B**	0.5-2000 ppm (PID) 1-50,000 ppm (FID)	Y		NA											
VX	APD 2000	15 ppb	N	NA	NA	1 ppm = 10.93 mg/m^3	STEL = 0.00001 mg/m^3 WPL = 0.000001 mg/m^3 GPL = 0.0000006 mg/m^3	0.003 mg/m^3	0.000016 ppm (0.00017 mg/m^3)	0.0000091 ppm (0.0001 mg/m^3)	0.0000065 ppm (0.000071 mg/m^3)	0.000005 ppm	0.000016 ppm*	Sorbent Tube, Tenax	NA	NA
	ChemPro 100i	0.1 mg/m^3	N													
	AP2C	1.5 ppb	N													
	AP4C	10 µg/m^3	N													
	SAW Mini-CAD	0.01 ppm	N													
	HAPSITE	0.1-10 ppb	N													
	M256 A-1	0.002 ppm	Y													
	Dräger CDS Tube	0.025 ppm	Y													
	MultiRAE/AreaRAE PID**	0-2000 ppm	Y		~0.5 (10.6 lamp)											
	TVA 1000B**	0.5-2000 ppm (PID) 1-50,000 ppm (FID)	Y		NA											
Blister																
Mustard (H) & Distilled Mustard (HD)	APD 2000	300 ppb	N	NA	NA	1 ppm = 6.5 mg/m^3	STEL = 0.003 mg/m^3 WPL = 0.0004 mg/m^3 GPL = 0.00002 mg/m^3	0.7 mg/m^3	0.01 ppm (0.067 mg/m^3)	0.003 ppm (0.017 mg/m^3)	0.001 ppm (0.0083 mg/m^3)	0.0035 ppm	0.01 ppm*	Sorbent Tube, Tenax	NA	NA
	ChemPro 100i	2 mg/m^3	N													
	AP2C	1.5 ppb	N													
	AP4C	0.5 mg/m^3	N													
	SAW Mini-CAD	0.09 ppm	N													
	HAPSITE	0.1-10 ppb	N													
	M256 A-1	0.31 ppm	Y													
	Dräger CDS Tube	1 mg/m^3	Y													
	MultiRAE/AreaRAE PID**	0-2000 ppm	Y	<11.1 eV	~0.5 (10.6 lamp)											
	TVA 1000B**	0.5-2000 ppm (PID) 1-50,000 ppm (FID)	Y		NA											

Instrument Guidance | Regulatory Guidance | Reference

Table 16 -- Chemical Warfare Agents

Target Compound[1]	Instrument (Instrument Guidance)	Detection Level (Instrument Guidance)	Intrinsically Safe (Y/N) (Instrument Guidance)	IP[2] (Instrument Guidance)	PID CF (ISO)[2] (Instrument Guidance)	Conversion (Instrument Guidance)	Occupational Action Levels (Regulatory Guidance): TWA/AEL	Occupational Action Levels (Regulatory Guidance): IDLH	AEGL-1 (Regulatory Guidance): 1-hr	AEGL-1 (Regulatory Guidance): 4-hr	AEGL-1 (Regulatory Guidance): 8-hr	TEEL-0 (Regulatory Guidance): 15-min TWA	ERPG-1 (Regulatory Guidance): 1-hr	Air Sampling (Reference): Media	Air Sampling (Reference): Method	Air Sampling (Reference): Flow Rate/ Total Volume
Blister (continued)																
Nitrogen Mustard (HN1, HN2, HN3)	APD 2000	300 ppb	N	NA	NA	1 ppm = HN1 -- 6.95 mg/m^3 HN2 -- 6.38 mg/m^3 HN3 -- 8.36 mg/m^3	NA	HN1 = 1 ppm HN2 =NI HN3 = NI	0.0022 mg/m^3*	0.0056 mg/m^3*	0.0028 mg/m^3*	HN1: 0.004 mg/m^3 HN2: 001 mg/m^3 HN3: 0.001 mg/m^3	HN1: 0.0125 mg/m^3* HN2: 0.003 mg/m^3* HN3: 0.003 mg/m^3*	NA	NA	NA
	ChemPro 100i	5 mg/m^3 (HN3)	N													
	AP4C	10 mg/m^3	N													
	SAW Mini-CAD	does not	N													
	M256 A-1	0.6 ppm	Y													
	Dräger CDS Tube	1 mg/m^3	Y													
	MultiRAE/AreaRAE PID**	0-2000 ppm	Y	<11.1 eV	~0.5 (10.6 lamp)											
	TVA 1000B**	0.5-2000 ppm (PID) 1-50,000 ppm (FID)	Y		NA											
Lewisite (L)	APD 2000	200 ppb	N	NA	NA	1 ppm = 8.47 mg/m^3	NA	NA	0.12 mg/m^3*	0.035 mg/m^3*	0.018 mg/m^3*	0.12 mg/m^3	0.12 mg/m^3*	Sorbent Tube, Tenax	NA	NA
	ChemPro 100i	2 mg/m^3	N													
	AP4C	1.5 mg/m^3	N													
	M256 A-1	1 ppm	Y													
	Dräger CDS Tube	3 mg/m^3	Y													
	MultiRAE/AreaRAE PID**	0-2000 ppm	Y	~10.6 eV	1 (10.6 lamp)											
	TVA 1000B**	0.5-2000 ppm (PID) 1-50,000 ppm (FID)	Y		NA											
Phosgene Oxime (CX)	MultiRAE/AreaRAE PID**	0-2000 ppm	Y	~10.6 eV	1 (10.6 lamp)	1 ppm = 4.66 mg/m^3	NA	NA	0.028 mg/m^3	0.0069 mg/m^3	0.0035 mg/m^3	0.0075 mg/m^3	0.028 mg/m^3*	NA	NA	NA
	TVA 1000B**	0.5-2000 ppm (PID) 1-50,000 ppm (FID)	Y		NA											
Systemic/Blood																
Hydrogen Cyanide (AC), HCN	AP4C	10 mg/m^3 or 1.5 ppm	N	NA	NA	1 ppm = 1.1 mg/m^3	REL = ST 4.7 mg/m^3 S PEL = 10 ppm S TLV = C 4.7 ppm S	50 ppm	2 ppm	1.3 ppm	1 ppm	1.9 ppm	2 ppm*	Soda Lime Tube, 226-28	NIOSH 6010	0.05-0.2 L/min; 2-90 L
	ChemPro 100i	50 mg/m^3	N													
	M256 A-1	7.13 ppm	Y													
	Dräger CDS Tube	1 ppm	Y													
	Dräger CDS Chips	2 ppm	Y													
Cyanogen Chloride (CK)	M256 A-1	0.25 ppm	Y	12.34 eV	NA	1 ppm = 2.51 mg/m^3	REL = C 0.3 mg/m^3 TLV = C 0.3 ppm	NA	NA	NA	NA	0.02 ppm	0.06 ppm*	XAD-2 Tube, 226-117	OSHA CSI	0.2 L/min; 1 L
	ChemPro 100i	50 mg/m^3	N													
	Dräger CDS Tube	3.13 ppm	Y													

Table 16 -- Chemical Warfare Agents

Target Compound[1]	Instrument	Detection Level	Intrinsically Safe (Y/N)	IP[2]	PID CF (ISO)[2]	Conversion	Occupational Action Levels: TWA/AEL	Occupational Action Levels: IDLH	AEGL-1: 1-hr	AEGL-1: 4-hr	AEGL-1: 8-hr	TEEL-0: 15-min TWA	ERPG-1: 1-hr	Air Sampling: Media	Air Sampling: Method	Air Sampling: Flow Rate/ Total Volume
Systemic/Blood (continued)																
Arsine (SA)	ChemPro 100i	3 ppm	N	9.89 eV	NA	1 ppm = 3.19 mg/m^3	REL = C 0.002 mg/m^3 PEL = 0.05 ppm TLV = 0.05 ppm	3 ppm	0.17 ppm*	0.04 ppm*	0.02 ppm*	0.005 ppm	0.025 ppm*	Anasorb CSC Tube, 226-01	NIOSH 6001	0.02-0.2 L/min; 10 L
	Dräger CDS Tube	0.1 ppm	Y													
	MultiRAE/AreaRAE PID**	0-2000 ppm	Y													
	TVA 1000B**	0.5-2,000 ppm (PID) 1-50,000 ppm (FID)	Y		NA											
Radiation[3]																
Radiation	Ludlum Model 192	0-5,000 µR/hr	N	NA	NA	NA	60-100 µR/hr*	NA	NA	NA	NA	NA	NA	RADeCO Filter Paper (2")	RSSOP 209/501	α = 2500 ft^3 β/γ = 1250 ft^3
	Ludlum Model 2241-2 w/Pancake Probe	0-100,000 cpm or 0-200 mR/hr	N				300 cpm*									
	Ludlum Model 2241-3 w/Pancake Probe	0-100,000 cpm or 0-200 mR/hr	N				300 cpm*									
	*These are not TWA(s). Normal gamma radiation background is from 5-20 µR/hr; however, higher backgrounds may exist. If readings are 3 times background or greater than 60-100 µR/hr or greater than 300 cpm, then stop work and consult with a Health Physicist. Refer to Hazardous Evaluation Flow Chart for Unknowns in Attachment A.															

EMERGENCY RESPONSE TECHNICAL GROUP

Table 16 -- Chemical Warfare Agents

Notes:
For guidance only. These tables do not supersede a SSHASP at any time or on any response.

[1] Does not include all pollutants associated with this type of event, only the most common pollutants with the lowest action levels.
[2] Estimated response of warfare agent detection products by PID. Source: RAE TN-159.
[4] Standard EPA Emergency Response Protocol is to screen for radiation with a Micro-R at all emergency responses. If readings are three times background, responders consult with a Health Physicist. Additional radiation equipment is available to monitor for Alpha, Beta and Gamma, but is not included in this table.

AEGL-1 is the airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience notable discomfort, irritation, or certain asymptomatic non-sensory effects; however, the effects are not disabling and are transient and reversible upon cessation of exposure.
AEGL-2 is the airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience irreversible or other serious, long-lasting adverse health effects or an impaired ability to escape.
TEEL-0 is the temporary level of concern derived according to a tiered, formula-like methodology; representing concentrations associated with no effects.
ERPG-1 is the acute exposure concentration of the general population for up to 1 hour associated with effects expected to be mild or transient.
PAC-1 is based on the applicable AEGL-1, ERPG-1, or TEEL-1 value

Data on tables are from the following sources:

http://www.epa.gov/oppt/aegl/pubs/chemlist.htm	EPA's website used to research AEGLs using the chemical's name or chemical abstracts service registry numbers.
http://www.cdc.gov/niosh/npg/npgsyn-a.html	CDC NIOSH Pocket Guide to Chemical Hazards website
http://wiser.nlm.nih.gov/	WISER website
http://www.skcinc.com/	SKC, Inc. website (Air Sampling Media Part No. is specific to SKC)

*AEGL-2--There are no AEGL-1 for this compound
*PAC-1--There are no ERPG-1 for this compound
**PIDs/FIDs are non-specific detectors and cannot differentiate between VOCs, even with CFs applied. See RAE PID CF Guidance Document TN-106 for information and TVA Response Factor document P/N 50039 THERMO.
***The method can capture GD, but laboratory analysis capability maybe limited.

Acronyms:
~ -- approximately
≥ -- greater than or equal to
< -- less than
A-TWA -- ATSDR time-weighted average
ACGIH -- American Conference of Governmental Industrial Hygienists
AEGL -- acute exposure guideline levels
AEL -- airborne exposure limits (CDC)
ATSDR -- Agency for Toxic Substances and Disease Registry
C -- ceiling (concentrations that should not be exceeded during any part of work exposure)
C-STEL -- CDC short-term exposure limit
CDC -- Centers for Disease Control and Prevention
CF -- conversion factor
cpm -- counts per minute
DAAMS - Depot Area Air Monitoring System
DOE -- U.S. Department of Energy
EPA -- U.S. Environmental Protection Agency
ERPG -- emergency response planning guideline
eV -- electron volt
FID -- flame ionization detector
GPL -- general population limit
IDLH -- immediately dangerous to life and health
IP -- ionization potential
ISO -- isobutylene
L/min -- liter per minute
mg/m^3 -- milligrams per cubic meter
µg/m^3 -- micrograms per cubic meter
µR/hr -- micro Roentgens per hour
NA -- not available/applicable
NIOSH -- National Institute for Occupational Safety and Health
OSHA -- Occupational Safety and Health Administration
PEL -- permissible exposure limit (OSHA)
PID -- photoionization detector
ppb -- parts per billion
ppm -- parts per million
R/hr -- Roentgens per hour
REL -- recommended exposure limit (NIOSH)
SPM -- single-point monitor
SSHASP -- site-specific health and safety plan
STEL -- short-term exposure limit
TEEL -- temporary emergency exposure limit (DOE)
TLV -- time-limited value (ACGIH)
TWA -- time-weighted average
WISER -- Wireless Information System for Emergency Responders
WPL -- worker population limit
Y w/option - yes with option; see manufacturer's instrument manual for information

Table 17 -- Ethanol (Spill, Release, or Fire)

Target Compound[1]	Instrument (Instrument Guidance)	Detection Level (Instrument Guidance)	Intrinsically Safe (Y/N) (Instrument Guidance)	IP (Instrument Guidance)	PID CF (ISO) (Instrument Guidance)	Conversion (Instrument Guidance)	Occupational Action Levels (Regulatory Guidance): TWA	Occupational Action Levels (Regulatory Guidance): IDLH	AEGL-1 (Regulatory Guidance): 1-hr	AEGL-1 (Regulatory Guidance): 4-hr	AEGL-1 (Regulatory Guidance): 8-hr	TEEL-0 (Regulatory Guidance): 15-min TWA	ERPG-1 (Regulatory Guidance): 1-hr	Air Sampling (Reference): Media	Air Sampling (Reference): Method	Air Sampling (Reference): Flow Rate/ Total Volume
VOCs and Gases																
Benzene	UltraRAE-PID***	0.1-2000 ppm	Y	9.24 eV	NA	1 ppm = 3.19 mg/m^3	PEL = 1 ppm REL = 0.1 ppm, ST 1 ppm TLV = 10 ppm	500 ppm	52 ppm	18 ppm	9 ppm	1 ppm	50 ppm	Anasorb CSC Tube, 226-01	NIOSH 1501	≤0.2 L/min; 6 L
	Dräger Tube	≥0.5-10 ppm	Y													
	Dräger Chip	≥0.2-10 ppm	N (Y w/option)													
	MIRAN SapphIRe**	10-200 ppm	Y													
	ppbRAE-PID***	1ppb-200ppm	Y		0.53 (10.6 lamp)											
	MultiRAE/AreaRAE PID***	0-2000 ppm	Y													
	TVA 1000B***	0.5-2,000 ppm (PID) 1-50,000 ppm (FID)	Y		10.6 lamp 0.702 (10 ppm) - 1.781 (2000 ppm)											
Carbon Monoxide	MultiRAE/AreaRAE CO Sensor	0-500 ppm	Y	14.01 eV	NA	1 ppm = 1.15 mg/m3	PEL = 50 ppm REL = 35 ppm, C 200 ppm TLV = 25 ppm	1200 ppm	83 ppm*	33 ppm*	27 ppm*	50 ppm	200 ppm	Sample Bag, 245-05	OSHA ID 209	NA
	MultiRAE Pro CO Sensor	0-2000 ppm ext. range	Y													
	Dräger Tube	≥2-300 ppm	Y													
	Dräger Chip	5-150 ppm	N (Y w/option)													
	ToxiRAE II CO	≥0-500 ppm	Y													
	GFG Inc. Micro IV	0-2000 ppm	Y													
	MIRAN SapphIRe**	4.5-250 ppm	Y													
Ethanol	MultiRAE/AreaRAE PID***	0-2000 ppm	Y	10.47 eV	10 (10.6 lamp)	1 ppm = 1.89 mg/m^3	PEL = 1000 ppm REL = 1000 ppm TLV = 1000 ppm	3300 ppm	NA	NA	NA	500 ppm	1800 ppm	Anasorb CSC Tube, 226-01	NIOSH 1400 (Alcohols I)	≤ 0.05 L/min; 1 L
	Dräger Tube	25-2000 ppm	Y		NA											
	Dräger Chip	100-2500 ppm	N (Y w/option)													
	MIRAN SapphIRe*	5-2000 ppm	Y													
	TVA 1000B***	0.5-2,000 ppm (PID) 1-50,000 ppm (FID)	Y		10.6 lamp 5.303 (10 ppm) - 7.066 (2000 ppm)											
Gasoline	MultiRAE/AreaRAE PID***	0-2000 ppm	Y	NA	0.9	1 ppm = 4.5 mg/m^3 (approx.)	PEL = None TLV = 300 ppm	NA	730 ppm	730 ppm	730 ppm	200 ppm	200 ppm	Anasorb CSC Tube, 226-01	OSHA PV2028	≤ 0.1 L/min (10 L max vol.); 10 L
	TVA 1000B***	0.5-2,000 ppm (PID) 1-50,000 ppm (FID)	Y		NA											
Nitric Oxide	MultiRAE/AreaRAE NO Sensor	0-250 ppm	Y	11.95 eV	NA	1 ppm = 1.23 mg/m^3	PEL = 25 ppm REL = 25 ppm TLV = 25 ppm	100 ppm	NA	NA	NA	0.5 ppm	NA	Molecular Sieve Tube, 226-40	NIOSH 6014	0.025 L/min; 1.5-6 L
	ToxiRAE II NO	0-250 ppm	Y													
	Dräger Pac III	0-100 ppm	Y													
	GFG Inc. Micro IV	0-100 ppm	Y													

Table 17 -- Ethanol (Spill, Release, or Fire)

Target Compound[1]	Instrument (Instrument Guidance)	Detection Level	Intrinsically Safe (Y/N)	IP	PID CF (ISO)	Conversion	Occupational Action Levels (Regulatory Guidance): TWA	IDLH	AEGL-1: 1-hr	4-hr	8-hr	TEEL-0: 15-min TWA	ERPG-1: 1-hr	Air Sampling (Reference): Media	Method	Flow Rate/ Total Volume
VOCs and Gases (continued)																
Hydrogen Sulfide	MultiRAE/AreaRAE H_2S Sensor	0-100 ppm	Y	10.46 eV	NA	1 ppm = 1.4 mg/m^3	PEL = C 20 ppm, 50 ppm (10 mins) REL = C 10 ppm (10 mins) TLV = 10 ppm, ST 15 ppm	100 ppm	0.51 ppm	0.36 ppm	0.33 ppm	0.51 ppm	0.1 ppm	Silica Gel Tube, 266-177	OSHA 1008	0.05 L/min; 12 L
	MultiRAE Pro H_2S Sensor	0-1000 ppm ext. range	Y													
	Dräger Tube	≥0.2-6 ppm	Y													
	Dräger Chip	≥0.2-5 ppm	N (Y w/option)													
	SPM	1.1-30 ppm	N (Y w/option)													
	MultiRAE/AreaRAE PID***	0-2000 ppm	Y		3.3 (10.6 lamp)											
	GFG Inc. Micro IV	0-500 ppm	Y		NA											
	TVA 1000B***	0.5-2,000 ppm (PID)	Y													
Sulfur Dioxide	MultiRAE/AreaRAE SO_2 Sensor	0-20 ppm	Y	12.3 eV	NA	1 ppm = 2.62 mg/m^3	PEL = 5 ppm REL = 2 ppm, ST 5 ppm TLV = 2 ppm, ST 5 ppm	100 ppm	0.2 ppm	0.2 ppm	0.2 ppm	0.2 ppm	0.3 ppm	MCE Cassette, 225-9005	NIOSH 6004	0.5-1.5 L/min; 180 L
	Dräger Pac III	0-100 ppm	Y													
	Dräger Tube	≥0.1-3 ppm	Y													
	Dräger Chip	≥0.4-10 ppm	N (Y w/option)													
	MIRAN SapphIRe**	6-30 ppm	Y													
	GFG Inc. Micro IV	1-10 ppm	Y													
	SPM	0.2-6 ppm	N (Y w/option)													
Ammonia	MultiRAE/AreaRAE NH_3 Sensor	0-50 ppm	Y	10.18 eV	NA	1 ppm = 0.7 mg/m^3	PEL = 50 ppm REL = 25 ppm, ST 35 ppm TLV = 25 ppm, ST 35 ppm	300 ppm	30 ppm	30 ppm	30 ppm	30 ppm	25 ppm	Silica Gel Tube, 226-10-06	NIOSH 6015	0.1-0.2 L/min; 72 L
	MultiRAE Pro NH_3 Sensor	0-100 ppm	Y													
	Dräger Tube	≥0.25-3 ppm	Y													
	Dräger Chip	≥0.2-5 ppm	N (Y w/option)													
	Dräger Pac III	0-300 ppm	Y													
	SPM	2.6-75 ppm	N (Y w/option)													
	ToxiRAE II NH_3	0-50 ppm	Y													
	MIRAN SapphIRe*	0-500 ppm	Y													
	MultiRAE/AreaRAE PID***	0-2000 ppm	Y		9.7 (10.6 lamp)											
	TVA 1000B***	0.5-2,000 ppm (PID)	Y		10.6 lamp 21.666 (10 ppm) - 22.980 (2000 ppm)											
Sodium Hydroxide	Dräger pH Tube	Qualitative	Y	NA	NA	NA	PEL = 2 mg/m^3 REL = C 2 mg/m^3 TLV = C 2 mg/m^3	10 mg/m^3	NA	NA	NA	0.5 mg/m3	0.5 mg/m3	PTFE Filter, 225-17-01	NIOSH 7401	1-4 L/min; 360 L
	pH Paper	NA	Y													
Sulfuric Acid	Dräger Tube	1-5 mg/m^3	Y	12.4 eV	NA	NA	PEL = 1 mg/m^3 REL = 1 mg/m^3 TLV = 1 mg/m^3, ST 3 mg/m^3	15 mg/m^3	0.2 mg/m^3	0.2 mg/m^3	0.2 mg/m^3	0.2 mg/m^3	2 mg/m^3	Silica Gel Tube, 226-10-03	NIOSH 7903	0.2-0.5 L/min; 48 L
	pH Paper	NA	Y													
	SPM	26-750 ppb	N (Y w/option)													

Table 17 -- Ethanol (Spill, Release, or Fire)

Instrument Guidance							Regulatory Guidance							Reference		
Target Compound[1]	Instrument	Detection Level	Intrinsically Safe (Y/N)	IP	PID CF (ISO)	Conversion	Occupational Action Levels		AEGL-1			TEEL-0	ERPG-1	Air Sampling		
							TWA	IDLH	1-hr	4-hr	8-hr	15-min TWA	1-hr	Media	Method	Flow Rate/ Total Volume
Particulate																
Particulate	Personal DataRAM****	0.001-400 mg/m^3	N	NA	NA	NA	PEL = 15 mg/m^3 (total), 5 mg/m^3 (respirable) TLV = 10 mg/m^3 (total), 3 mg/m^3 (respirable)	NA	NA	NA	NA	10 mg/m^3	NA	Filter (total) Cyclone + Filter (resp)	NIOSH 0500 (total) NIOSH 0600 (resp)	1-2 L/min (total) 1.7-2.5 L/min (resp)
	DataRAM 4****	0.001-400 mg/m^3	N													
	eBAM	0-100 mg/m^3	N													
Radiation[2]																
Radiation	Ludlum Model 192	0-5,000 µR/hr	N	NA	NA	NA	60-100 µR/hr*	NA	NA	NA	NA	NA	NA	RADeCO Filter Paper (2")	RSSOP 209/501	α = 2500 ft^3 β/γ = 1250 ft^3
	Ludlum Model 2241-2 w/Pancake Probe	0-100,000 cpm or 0-200 mR/hr	N				300 cpm*									
	Ludlum Model 2241-3 w/Pancake Probe	0-100,000 cpm or 0-200 mR/hr	N				300 cpm*									
	*These are not TWA(s). Normal gamma radiation background is from 5-20 µR/hr; however, higher backgrounds may exist. If readings are 3 times background or greater than 60-100 µR/hr or greater than 300 cpm, then stop work and consult with a Health Physicist. Refer to Hazardous Evaluation Flow Chart for Unknowns in Attachment A.															

EMERGENCY RESPONSE TECHNICAL GROUP

Table 17 -- Ethanol (Spill, Release, or Fire)

Notes:

For guidance only. These tables do not supersede a SSHASP at any time or on any response.

[1] Does not include all pollutants associated with this type of event, only the most common pollutants with the lowest action levels. Depending on the chemical of concern, certain Dräger tubes and chips can be used. In addition, single-gas instruments and sensors and/or a gas chromatography-mass spectrometry instrument may be used.

[2] Standard EPA Emergency Response Protocol is to screen for radiation with a Micro-R at all emergency responses. If readings are three times background, responders consult with a Health Physicist. Additional radiation equipment is available to monitor for Alpha, Beta and Gamma, but is not included in this table.

AEGL-1 is the airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience notable discomfort, irritation, or certain asymptomatic non-sensory effects; however, the effects are not disabling and are transient and reversible upon cessation of exposure.

AEGL-2 is the airborne concentration (expressed as ppm or mg/m^3) of a substance above which it is predicted that the general population, including susceptible individuals, could experience irreversible or other serious, long-lasting adverse health effects or an impaired ability to escape.

TEEL-0 is the temporary level of concern derived according to a tiered, formula-like methodology; representing concentrations associated with no effects.

ERPG-1 is the acute exposure concentration of the general population for up to 1 hour associated with effects expected to be mild or transient.

Data on tables are from the following sources:

http://www.epa.gov/oppt/aegl/pubs/chemlist.htm	EPA's website used to research AEGLs using the chemical's name or chemical abstracts service registry numbers.
http://www.cdc.gov/niosh/npg/npgsyn-a.html	CDC NIOSH Pocket Guide to Chemical Hazards website
http://wiser.nlm.nih.gov/	WISER website
http://www.skcinc.com/	SKC, Inc. website (Air Sampling Media Part No. is specific to SKC)

*AEGL-2--There are no AEGL-1 for this compound

**MIRAN SapphIRe has problems with complex mixtures (*e.g.;* distinguishing benzene from gasoline vapor)

***PIDs/FIDs are non-specific detectors and cannot differentiate between VOCs, even with CFs applied. See RAE PID CF Guidance Document TN-106 for information and TVA Response Factor document P/N 50039 THERMO.

****Personal DataRAMs/DataRAMs are non-specific detectors and cannot differentiate between particulates

Acronyms:

≥ -- greater than or equal to
% -- percent
ACGIH -- American Conference of Governmental Industrial Hygienists
AEGL -- acute exposure guideline levels
CDC -- Centers for Disease Control and Prevention
CF -- conversion factor
CO -- carbon monoxide
cpm -- counts per minute
EPA -- U.S. Environmental Protection Agency
ERPG -- emergency response planning guideline
eV -- electron volt
FID -- flame ionization detector
IDLH -- immediately dangerous to life and health
IP -- ionization potential
ISO -- isobutylene
mg/m^3 -- milligrams per cubic meter
µR/hr -- micro Roentgens per hour
NA -- not available/applicable
NIOSH -- National Institute for Occupational Safety and Health
OSHA -- Occupational Safety and Health Administration
PEL -- permissible exposure limit (OSHA)
PID -- photoionization detector
ppm -- parts per million
R/hr -- Roentgens per hour
rec. -- recommended
REL -- recommended exposure limit (NIOSH)
SPM -- single-point monitor
SSHASP -- site-specific health and safety plan
TEEL -- temporary emergency exposure limit
TLV -- time-limited value (ACGIH)
TWA -- time-weighted average
VOC -- volatile organic compound
Vol. -- volume
WISER -- Wireless Information System for Emergency Responders
Y w/option - yes with option; see manufacturer's instrument manual for information

Table 18 -- Spacecraft Debris

Target Compound[1]	Instrument (Instrument Guidance)	Detection Level (Instrument Guidance)	Intrinsically Safe (Y/N) (Instrument Guidance)	IP (Instrument Guidance)	PID CF (ISO) (Instrument Guidance)	Conversion (Instrument Guidance)	Occupational Action Levels (Regulatory Guidance): TWA	Occupational Action Levels (Regulatory Guidance): IDLH	AEGL-1 (Regulatory Guidance): 1-hr	AEGL-1 (Regulatory Guidance): 4-hr	AEGL-1 (Regulatory Guidance): 8-hr	TEEL-0 (Regulatory Guidance): 15-min TWA	ERPG-1 (Regulatory Guidance): 1-hr	Air Sampling (Reference): Media	Air Sampling (Reference): Method	Air Sampling (Reference): Flow Rate/ Total Volume
VOCs and Gases																
Liquid Oxygen	MultiRAE/AreaRAE O_2 Sensor	0-30% Vol.	Y	15.58 eV	NA	1 ppm = 2.21 mg/m^3	PEL = 0.05 ppm REL = 0.05 ppm TLV = 0.05 ppm	0.5 ppm	NA	NA	NA	0.1 ppm	NA	Oxygen Tube, 810-31B	OSHA CSI	NA
Liquid Hydrogen	MultiRAE/AreaRAE	0-100% LEL, 0-30% O_2	Y	15.43 eV	NA	1 ppm = 0.82 mg/m^3	PEL = 3 ppm REL = 3 ppm TLV = 5 ppm	30 ppm	1 ppm	1 ppm	1 ppm	0.35 ppm	NA	Hydrogen Tube, 810-30	OSHA CSI	NA
Liquid Methane	TVA 1000B***	1-50,000 ppm (FID) no response (PID)	Y	12.61 eV	NA	1 ppm = 3.77 mg/m^3	PEL = 200 ppm REL = 100 ppm TLV = NA	500 ppm	200 ppm	200 ppm	200 ppm	1000 ppm	NA	Natural Gas Tube, 800-20001	OSHA CSI	NA
	MultiRAE/AreaRAE	0-100% LEL, 0-30% O_2	Y													
Ethanol	MultiRAE/AreaRAE PID***	0-2000 ppm	Y	10.47 eV	10 (10.6 lamp)	1 ppm = 1.89 mg/m^3	PEL = 1000 ppm REL = 1000 ppm TLV = 1000 ppm	3300 ppm	NA	NA	NA	500 ppm	1800 ppm	Anasorb CSC Tube, 226-01	NIOSH 1400 (Alcohols I)	≤ 0.05 L/min; 1 L
	Dräger Tube	25-2000 ppm	Y		NA											
	Dräger Chip	100-2500 ppm	N (Y w/option)													
	MIRAN SapphIRe*	5-2000 ppm	Y													
	TVA 1000B***	0.5-2,000 ppm (PID) 1-50,000 ppm (FID)	Y		10.6 lamp 5.303 (10 ppm) - 7.066 (2000 ppm)											
Kerosene	MultiRAE/AreaRAE	0-100% LEL, 0-30% O_2	Y	NA	NA	NA	PEL = NA REL = 100 mg/m^3 TLV = NA	NA	290 mg/m^3	290 mg/m^3	290 mg/m^3	0.19 ppm	NA	Anasorb CSC Tube, 226-01	OSHA PV 2139	0.1 L/min; 20 L
Hydrazine	MultiRAE/AreaRAE PID***	0-2000 ppm	Y	8.1 eV	2.6 (10.6 lamp)	1 ppm = 1.31 mg/m^3	PEL = 1.3 mg/m^3 REL = 0.04 mg/m^3 TLV = 1.3 mg/m^3	50 ppm	0.1 ppm	0.1 ppm	0.1 ppm	0.01 ppm	0.5 ppm	Glass Impinger, 225-36-2	NIOSH 3503	1 L/min; 90 L
	Dräger Tube	0.01-0.4 ppm	Y		NA											
Monomethyl hydrazine (MMH)	MultiRAE/AreaRAE PID***	0-2000 ppm	Y	NA	NA	1 ppm = 1.89 mg/m3	PEL = 0.2 ppm REL = 0.04 ppm TLV = 0.2 ppm	20 ppm	0.9 ppm*	0.23 ppm*	0.11 ppm*	0.01 ppm	NA	NA	NA	NA
	Dräger Tube	0.01-0.4 ppm	Y													
Dimethyl hydrazine (UDMH)	MultiRAE/AreaRAE PID***	0-2000 ppm	Y	7.28 eV	0.8 (10.6 lamp)	1 ppm = 2.46 mg/m3	PEL = 0.5 ppm REL = 0.06 ppm TLV = 0.5 ppm	15 ppm	3 ppm*	0.75 ppm*	0.38 ppm*	0.01 ppm	NA	NA	NA	NA
	Dräger Tube	0.01-0.4 ppm	Y		NA											
Nitrogen Tetroxide	MultiRAE/AreaRAE NO Sensor	0-250 ppm	Y	10.8 eV	NA	1 ppm = 1.88 mg/m3	PEL = 5 ppm REL = 1 ppm TLV = NA	20 ppm	0.5 ppm	0.5 ppm	0.5 ppm	0.3 ppm	NA	Molecular Sieve Tube, 226-40	NIOSH 6014	25-200 ml/min; 1.5-6 L
	MultiRAE/AreaRAE NO_2 Sensor	0-20 ppm	Y													
	MultiRAE/AreaRAE PID***	0-2000 ppm	Y													
Hydrogen Peroxide	Dräger Tube	0.1-3 ppm	Y	10.54 eV	NA	1 ppm = 1.39 mg/m^3	REL = 1 ppm PEL = 1 ppm TLV = 1 ppm	75 ppm	NA	NA	NA	1 ppm	10 ppm	Glass Impinger, 225-36-2	OSHA ID-126-SG	1 L/min; 100 L
	MultiRAE/AreaRAE O_2 Sensor	0-30% Vol.	Y													

Table 18 -- Spacecraft Debris

Target Compound[1]	Instrument	Detection Level	Intrinsically Safe (Y/N)	IP	PID CF (ISO)	Conversion	Occupational Action Levels		AEGL-1			TEEL-0	ERPG-1	Air Sampling		
							TWA	IDLH	1-hr	4-hr	8-hr	15-min TWA	1-hr	Media	Method	Flow Rate/ Total Volume
VOCs and Gases (continued)																
Red-Fuming Nitric Acid	Dräger Tube	≥1-50 ppm	Y	11.95 eV	NA	1 ppm = 2.58 mg/m^3	REL = 2 ppm PEL = 2 ppm TLV = 2 ppm	25 ppm	0.53 ppm	0.53 ppm	0.53 ppm	0.53 ppm	1 ppm	Silica Gel Tube, 226-10-03	NIOSH 7903	0.2 L/min; 48 L
	MultiRAE/AreaRAE NO Sensor	0-250 ppm	Y													
	MultiRAE/AreaRAE NO_2 Sensor	0-20 ppm	Y													
	MultiRAE/AreaRAE PID***	0-2000 ppm	Y													
Nitrous Oxide	MultiRAE/AreaRAE NO Sensor	0-250 ppm	Y	12.89 eV	NA	1 ppm = 1.80 mg/m^3	REL = 25 ppm TLV = 50 ppm	NA	NA	NA	NA	50 ppm	150 ppm*	PVDF Bag, 248-05	NIOSH 6600	0.1-4 L/min; 3 L
	MultiRAE/AreaRAE NO_2 Sensor	0-20 ppm	Y													
Hydroxyl-terminated polybutadiene	Personal DataRAM****	0.001-400 mg/m^3	N	NA	NA	NA	REL = 50 ppm Ca PEL = 1 ppm TLV = 2 ppm	NA	NA	NA	NA	NA	NA	NA	NA	NA
	DataRAM 4****	0.001-400 mg/m^3	N													
	ppbRAE-PID***	1ppb-200ppm	Y													
	MultiRAE/AreaRAE PID***	0-2000 ppm	Y													
Ammonium Perchlorate	MultiRAE/AreaRAE Cl_2 Sensor	0-10 ppm	Y	NA	NA	NA	NA	NA	NA	NA	NA	5 mg/m^3	15 mg/m^3*	NA	NA	NA
	Dräger Tube ClO_2	0.025-3 ppm	Y													
	Dräger Tube HCl	≥1-10 ppm	Y													
	MultiRAE/AreaRAE O_2 Sensor	0-30% Vol.	Y													
Acetaldehyde	MultiRAE/AreaRAE PID***	0-2000 ppm	Y	10.22 eV	6 (10.6 lamp)	1 ppm = 1.80 mg/m^3	REL = Ca PEL = 200 ppm TLV = C 25 ppm	2000 ppm Ca	45 ppm	45 ppm	45 ppm	25 ppm	10 ppm	XAD-2 Tube, 226-27	NIOSH 2538	0.02 L/min; 10 L
	MultiRAE/AreaRAE CO Sensor	0-500 ppm	Y													
	Dräger Tube	100-1000 ppm	Y		NA											
	TVA 1000B***	0.5-2,000 ppm (PID) 1-50,000 ppm (FID)	Y													
Carbon Monoxide	MultiRAE/AreaRAE CO Sensor	0-500 ppm	Y	14.01 eV	NA	1 ppm = 1.15 mg/m3	PEL = 50 ppm REL = 35 ppm, C 200 ppm TLV = 25 ppm	1200 ppm	83 ppm*	33 ppm*	27 ppm*	50 ppm	200 ppm	Sample Bag, 245-05	OSHA ID 209	NA
	MultiRAE Pro CO Sensor	0-2000 ppm ext. range	Y													
	Dräger Tube	≥2-300 ppm	Y													
	Dräger Chip	5-150 ppm	N (Y w/option)													
	ToxiRAE II CO	≥0-500 ppm	Y													
	GFG Inc. Micro IV	0-2000 ppm	Y													
	MIRAN SapphIRe**	4.5-250 ppm	Y													

Table 18 -- Spacecraft Debris

Target Compound[1]	Instrument (Instrument Guidance)	Detection Level (Instrument Guidance)	Intrinsically Safe (Y/N) (Instrument Guidance)	IP (Instrument Guidance)	PID CF (ISO) (Instrument Guidance)	Conversion (Instrument Guidance)	Occupational Action Levels (Regulatory Guidance): TWA	Occupational Action Levels (Regulatory Guidance): IDLH	AEGL-1 (Regulatory Guidance): 1-hr	AEGL-1 (Regulatory Guidance): 4-hr	AEGL-1 (Regulatory Guidance): 8-hr	TEEL-0 (Regulatory Guidance): 15-min TWA	ERPG-1 (Regulatory Guidance): 1-hr	Air Sampling (Reference): Media	Air Sampling (Reference): Method	Air Sampling (Reference): Flow Rate/ Total Volume
VOCs and Gases (continued)																
Ammonia	MultiRAE/AreaRAE NH_3 Sensor	0-50 ppm	Y	10.18 eV	NA	1 ppm = 0.7 mg/m^3	PEL = 50 ppm REL = 25 ppm, ST 35 ppm TLV = 25 ppm, ST 35 ppm	300 ppm	30 ppm	30 ppm	30 ppm	30 ppm	25 ppm	Silica Gel Tube, 226-10-06	NIOSH 6015	0.1-0.2 L/min; 72 L
	MultiRAE Pro NH_3 Sensor	0-100 ppm	Y													
	Dräger Tube	≥0.25-3 ppm	Y													
	Dräger Chip	≥0.2-5 ppm	N (Y w/option)													
	Dräger Pac III	0-300 ppm	Y													
	SPM	2.6-75 ppm	N (Y w/option)													
	ToxiRAE II NH_3	0-50 ppm	Y													
	MIRAN SapphIRe*	0-500 ppm	Y													
	MultiRAE/AreaRAE PID**	0-2000 ppm	Y		9.7 (10.6 lamp)											
	TVA 1000B***	0.5-2,000 ppm (PID)	Y		10.6 lamp 21.666 (10 ppm) - 22.980 (2000 ppm)											
Formaldehyde	MultiRAE/AreaRAE PID**	0-2000 ppm	Y	10.88 eV	1.6 (11.7 lamp)	1 ppm = 1.23 mg/m^3	REL = Ca 0.016 ppm, C 0.1 ppm (15-min) PEL = 0.75 ppm, ST 2 ppm TLV = C 0.3 ppm	20 ppm Ca	0.9 ppm	0.9 ppm	0.9 ppm	0.3 ppm	1 ppm	Silica Gel Tube, 226-119	NIOSH 2016	0.03-1.5 L/min; 1-<15 L
	MultiRAE Pro HCHO Sensor	0-10 ppm	Y		NA											
	MultiRAE/AreaRAE CO Sensor	0-500 ppm	Y													
	Dräger Tube	0.2-5 ppm	Y													
	TVA 1000B***	0.5-2,000 ppm (PID) 1-50,000 ppm (FID)	Y		10.6 lamp 1.169 (10 ppm) - 0.605 (500 ppm)											
Vinyl Chloride	MultiRAE/AreaRAE PID***	0-2000 ppm	Y	9.99 eV	2 (10.6 lamp)	1 ppm = 2.56 mg/m^3	PEL = 1 ppm, C 5 ppm (15 mins) REL = Ca TLV = 5 ppm	NA	250 ppm	140 ppm	70 ppm	1 ppm	500 ppm	Anasorb CSC Tube, 226-01	NIOSH 1007	0.05 L/min; 5 L
	Dräger Tube	≥0.5-30 ppm	Y		NA											
	Dräger Chip	≥0.3-10 ppm	N (Y w/option)													
	MIRAN SapphIRe**	2-20 ppm	Y													
	Dräger Pac III	0-100 ppm	Y													
Methanol	MultiRAE/AreaRAE PID***	0-2000 ppm	Y	10.84 eV	2.5 (11.7 lamp)	1 ppm = 1.31 mg/m^3	REL = 200 ppm, ST 250 ppm S PEL = 200 ppm TLV = 200 ppm S, ST 250 ppm S	6000 ppm	530 ppm	340 ppm	270 ppm	200 ppm	200 ppm	Silica Gel Tube, 226-51	NIOSH 2000	0.02-0.2 L/min; 5 L
	MultiRAE/AreaRAE CO Sensor	0-500 ppm	Y		NA											
	TVA 1000B***	0.5-2,000 ppm (PID) 1-50,000 ppm (FID)	Y		11.8 lamp 5.265 (10 ppm) - 7.167 (2000 ppm)											

Table 18 -- Spacecraft Debris

Target Compound[1]	Instrument	Detection Level	Intrinsically Safe (Y/N)	IP	PID CF (ISO)	Conversion	Occupational Action Levels		AEGL-1			TEEL-0	ERPG-1	Air Sampling		
							TWA	IDLH	1-hr	4-hr	8-hr	15-min TWA	1-hr	Media	Method	Flow Rate/ Total Volume
	Instrument Guidance						Regulatory Guidance							Reference		
VOCs and Gases (continued)																
Freon 113	Dräger Tube	200-2600 ppm	Y	11.99 eV	NA	1 ppm = 7.67 mg/m^3	REL = 1000 ppm, ST 1250 ppm PEL = 1000 ppm TLV = 1000 ppm, ST 1250 ppm	2000 ppm	NA	NA	NA	1000 ppm	1250 ppm*	Anasorb CSC Tube, 226-01	NIOSH 1020	0.01-0.05 L/min; 2.4 L
	MultiRAE/AreaRAE Cl_2 Sensor	0-10 ppm	Y		1 (11.7 lamp)											
	Dräger Tube ClO_2	0.025-3 ppm	Y		NA											
	Dräger Tube HCl	≥1-10 ppm	Y													
	Dräger Tube F	0.1-2 ppm	Y													
	AreaRAE HF Sensor	2-10 ppm	Y													
	TVA 1000B***	0.5-2,000 ppm (PID) 1-50,000 ppm (FID)	Y		NA											
Octamethyl trisiloxane	MultiRAE/AreaRAE PID***	0-2000 ppm	Y	<10 eV	0.18 (10.6 lamp)	NA	PEL = 200 ppm	NA	NA	NA	NA	NA	NA	NA	NA	NA
	MultiRAE/AreaRAE CO Sensor	0-500 ppm	Y		NA											
	Dräger Tube Formaldehyde	0.2-5 ppm	Y													
	TVA 1000B***	0.5-2,000 ppm (PID) 1-50,000 ppm (FID)	Y													
Particulate																
Particulate	Personal DataRAM****	0.001-400 mg/m^3	N	NA	NA	NA	PEL = 15 mg/m^3 (total), 5 mg/m^3 (respirable) TLV = 10 mg/m^3 (total), 3 mg/m^3 (respirable)	NA	NA	NA	NA	10 mg/m^3	NA	Filter (total) Cyclone + Filter (resp)	NIOSH 0500 (total) NIOSH 0600 (resp)	1-2 L/min (total) 1.7-2.5 L/min (resp)
	DataRAM 4****	0.001-400 mg/m^3	N													
	eBAM	0-100 mg/m^3	N													
Radiation[2]																
Radiation	Ludlum Model 192	0-5,000 µR/hr	N	NA	NA	NA	60-100 µR/hr*	NA	NA	NA	NA	NA	NA	RADeCO Filter Paper (2")	RSSOP 209/501	α = 2500 ft^3 β/γ = 1250 ft^3
	Ludlum Model 2241-2 w/Pancake Probe	0-100,000 cpm or 0-200 mR/hr	N				300 cpm*									
	Ludlum Model 2241-3 w/Pancake Probe	0-100,000 cpm or 0-200 mR/hr	N				300 cpm*									
	*These are not TWA(s). Normal gamma radiation background is from 5-20 µR/hr; however, higher backgrounds may exist. If readings are 3 times background or greater than 60-100 µR/hr or greater than 300 cpm, then stop work and consult with a Health Physicist. Refer to Hazardous Evaluation Flow Chart for Unknowns in Attachment A.															

Table 18 -- Spacecraft Debris

Notes:

For guidance only. These tables do not supersede a SSHASP at any time or on any response.

[1] Does not include all pollutants associated with this type of event, only the most common pollutants with the lowest action levels. Depending on the chemical of concern, certain Dräger tubes and chips can be used. In addition, single-gas instruments and sensors and/or a gas chromatography-mass spectrometry instrument may be used.

[2] Standard EPA Emergency Response Protocol is to screen for radiation with a Micro-R at all emergency responses. If readings are three times background, responders consult with a Health Physicist. Additional radiation equipment is available to monitor for Alpha, Beta and Gamma, but is not included in this table.

AEGL-1 is the airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience notable discomfort, irritation, or certain asymptomatic non-sensory effects; however, the effects are not disabling and are transient and reversible upon cessation of exposure.

AEGL-2 is the airborne concentration (expressed as ppm or mg/m^3) of a substance above which it is predicted that the general population, including susceptible individuals, could experience irreversible or other serious, long-lasting adverse health effects or an impaired ability to escape.

TEEL-0 is the temporary level of concern derived according to a tiered, formula-like methodology; representing concentrations associated with no effects.

ERPG-1 is the acute exposure concentration of the general population for up to 1 hour associated with effects expected to be mild or transient.

Data on tables are from the following sources:

http://www.epa.gov/oppt/aegl/pubs/chemlist.htm	EPA's website used to research AEGLs using the chemical's name or chemical abstracts service registry numbers.
http://www.cdc.gov/niosh/npg/npgsyn-a.html	CDC NIOSH Pocket Guide to Chemical Hazards website
http://wiser.nlm.nih.gov/	WISER website
http://www.skcinc.com/	SKC, Inc. website (Air Sampling Media Part No. is specific to SKC)
	Spacecraft Maximum Allowable Concentrations for Selected Airborne Contaminates, Volume 5, 2008

*AEGL-2--There are no AEGL-1 for this compound

**MIRAN SapphIRe has problems with complex mixtures (*e.g.;* distinguishing benzene from gasoline vapor)

***PIDs/FIDs are non-specific detectors and cannot differentiate between VOCs, even with CFs applied. See RAE PID CF Guidance Document TN-106 for information and TVA Response Factor document P/N 50039 THERMO.

****Personal DataRAMs/DataRAMs are non-specific detectors and cannot differentiate between particulates

Acronyms:

≥ -- greater than or equal to
% -- percent
ACGIH -- American Conference of Governmental Industrial Hygienists
AEGL -- acute exposure guideline levels
CDC -- Centers for Disease Control and Prevention
CF -- conversion factor
CO -- carbon monoxide
cpm -- counts per minute
EPA -- U.S. Environmental Protection Agency
ERPG -- emergency response planning guideline
eV -- electron volt
FID -- flame ionization detector
IDLH -- immediately dangerous to life and health
IP -- ionization potential
ISO -- isobutylene
mg/m^3 -- milligrams per cubic meter
µR/hr -- micro Roentgens per hour
NA -- not available/applicable
NIOSH -- National Institute for Occupational Safety and Health
OSHA -- Occupational Safety and Health Administration
PBAN -- polybutadiene acrylic acid acrylonitrile
PEL -- permissible exposure limit (OSHA)
PID -- photoionization detector
ppm -- parts per million
R/hr -- Roentgens per hour
rec. -- recommended
REL -- recommended exposure limit (NIOSH)
SPM -- single-point monitor
SSHASP -- site-specific health and safety plan
TEEL -- temporary emergency exposure limit
TLV -- time-limited value (ACGIH)
TWA -- time-weighted average
VOC -- volatile organic compound
Vol. -- volume
WISER -- Wireless Information System for Emergency Responders
Y w/option - yes with option; see manufacturer's instrument manual for information

Table 19 -- Special Event

(Also refer to Hazardous Evaluation Flow Chart for Unknowns and Table 16)

Target Compound[1]	Instrument	Detection Level	Intrinsically Safe (Y/N)	IP	PID CF (ISO)	Conversion	Occupational Action Levels		AEGL-1			TEEL-0	ERPG-1	Air Sampling		
							TWA	IDLH	1-hr	4-hr	8-hr	15-min TWA	1-hr	Media	Method	Flow Rate/ Total Volume
2-Chlorobenzalmalononitrile (CS)																
Tear Gas/ Coughing Smoke	APD 2000	4 ppb	N	NA	NA	1 ppm = 7.71 mg/m^3	REL = C 0.05 ppm S PEL = 0.05 ppm	2 mg/m^3	0.05 mg/m^3	0.05 mg/m^3	0.05 mg/m^3	0.05 mg/m^3	0.005 mg/m^3	NA	P&CAM304 (II-5)	NA
Phenacyl chloride or 2-chloro-1-phenylethanone (CN)																
Mace	APD 2000	4 ppb	N	9.44 eV	NA	1 ppm = 6.32 mg/m^3	REL = 0.3 mg/m^3 PEL = 0.3 mg/m^3	15 mg/m^3	NA	NA	NA	NA	NA	NA	P&CAM291 (II-5)	NA
	MultiRAE/AreaRAE PID***	0-2000 ppm	Y		9.7 (10.6 lamp)											
	TVA 1000B***	0.5-2,000 ppm (PID)	Y		NA											
Oleoresin Capsicum (OC)																
Pepper Spray	APD 2000	4 ppb	N	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Glass Fiber Filter, 225-16	NIOSH 5041	1 L/min; 480 L
	ChemPro 100i	*****	N													
Particulate																
Particulate	Personal DataRAM****	0.001-400 mg/m^3	N	NA	NA	NA	PEL = 15 mg/m^3 (total), 5 mg/m^3 (respirable) TLV = 10 mg/m^3 (total), 3 mg/m^3 (respirable)	NA	NA	NA	NA	10 mg/m^3	NA	Filter (total) Cyclone + Filter (resp)	NIOSH 0500 (total) NIOSH 0600 (resp)	1-2 L/min (total) 1.7-2.5 L/min (resp)
	DataRAM 4****	0.001-400 mg/m^3	N													
	eBAM	0-100 mg/m^3	N													
Radiation[2]																
Radiation	Ludlum Model 192	0-5,000 µR/hr	N	NA	NA	NA	60-100 µR/hr*	NA	NA	NA	NA	NA	NA	RADeCO Filter Paper (2")	RSSOP 209/501	α = 2500 ft^3 β/γ = 1250 ft^3
	Ludlum Model 2241-2 w/Pancake Probe	0-100,000 cpm or 0-200 mR/hr	N				300 cpm*									
	Ludlum Model 2241-3 w/Pancake Probe	0-100,000 cpm or 0-200 mR/hr	N				300 cpm*									
	*These are not TWA(s). Normal gamma radiation background is from 5-20 µR/hr; however, higher backgrounds may exist. If readings are 3 times background or greater than 60-100 µR/hr or greater than 300 cpm, then stop work and consult with a Health Physicist. Refer to Hazardous Evaluation Flow Chart for Unknowns in Attachment A.															

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Table 19 -- Special Event

(Also refer to Hazardous Evaluation Flow Chart for Unknowns and Table 16)

Notes:

For guidance only. These tables do not supersede a SSHASP at any time or on any response.

[1] Does not include all pollutants associated with this type of event, only the most common pollutants with the lowest action levels. Depending on the chemical of concern, certain Dräger tubes and chips can be used. In addition, single-gas instruments and sensors and/or a gas chromatography-mass spectrometry instrument may be used.

[2] Standard EPA Emergency Response Protocol is to screen for radiation with a Micro-R at all emergency responses. If readings are three times background, responders consult with a Health Physicist. Additional radiation equipment is available to monitor for Alpha, Beta and Gamma, but is not included in this table.

AEGL-1 is the airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience notable discomfort, irritation, or certain asymptomatic non-sensory effects; however, the effects are not disabling and are transient and reversible upon cessation of exposure.

AEGL-2 is the airborne concentration (expressed as ppm or mg/m^3) of a substance above which it is predicted that the general population, including susceptible individuals, could experience irreversible or other serious, long-lasting adverse health effects or an impaired ability to escape.

TEEL-0 is the temporary level of concern derived according to a tiered, formula-like methodology; representing concentrations associated with no effects.

ERPG-1 is the acute exposure concentration of the general population for up to 1 hour associated with effects expected to be mild or transient.

Data on tables are from the following sources:

http://www.epa.gov/oppt/aegl/pubs/chemlist.htm	EPA's website used to research AEGLs using the chemical's name or chemical abstracts service registry numbers.
http://www.cdc.gov/niosh/npg/npgsyn-a.html	CDC NIOSH Pocket Guide to Chemical Hazards website
http://wiser.nlm.nih.gov/	WISER website
http://www.skcinc.com/	SKC, Inc. website (Air Sampling Media Part No. is specific to SKC)

*AEGL-2--There are no AEGL-1 for this compound

**MIRAN SapphIRe has problems with complex mixtures (*e.g.;* distinguishing benzene from gasoline vapor)

***PIDs/FIDs are non-specific detectors and cannot differentiate between VOCs, even with CFs applied. See RAE PID CF Guidance Document TN-106 for information and TVA Response Factor document P/N 50039 THERMO.

****Personal DataRAMs/DataRAMs are non-specific detectors and cannot differentiate between particulates

*****Detectability after attack = 1 hour (2% OC); Designed to identify the presence of OC

Acronyms:

≥ -- greater than or equal to
% -- percent
ACGIH -- American Conference of Governmental Industrial Hygienists
AEGL -- acute exposure guideline levels
CDC -- Centers for Disease Control and Prevention
CF -- conversion factor
CO -- carbon monoxide
cpm -- counts per minute
EPA -- U.S. Environmental Protection Agency
ERPG -- emergency response planning guideline
eV -- electron volt
FID -- flame ionization detector
IDLH -- immediately dangerous to life and health
IP -- ionization potential
ISO -- isobutylene
mg/m^3 -- milligrams per cubic meter
µR/hr -- micro Roentgens per hour
NA -- not available/applicable
NIOSH -- National Institute for Occupational Safety and Health
OSHA -- Occupational Safety and Health Administration
PEL -- permissible exposure limit (OSHA)
PID -- photoionization detector
ppm -- parts per million
R/hr -- Roentgens per hour
rec. -- recommended
REL -- recommended exposure limit (NIOSH)
SPM -- single-point monitor
SSHASP -- site-specific health and safety plan
TEEL -- temporary emergency exposure limit
TLV -- time-limited value (ACGIH)
TWA -- time-weighted average
VOC -- volatile organic compound
Vol. -- volume
WISER -- Wireless Information System for Emergency Responders
Y w/option - yes with option; see manufacturer's instrument manual for information

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Table 20 -- Clandestine Lab

Target Compound[1]	Instrument	Detection Level	Intrinsically Safe (Y/N)	IP	PID CF (ISO)	Conversion	Occupational Action Levels		AEGL-1			TEEL-0	ERPG-1	Air Sampling		
							TWA	IDLH	1-hr	4-hr	8-hr	15-min TWA	1-hr	Media	Method	Flow Rate/ Total Volume
Acids																
Hydrochloric Acid (Hydrogen Chloride)	AreaRAE HCl Sensor	2-15 ppm	Y	12.74 eV	NA	1 ppm = 1.49 mg/m^3	PEL = C 5 ppm REL = C 5 ppm TLV = C 5 ppm	50 ppm	1.8 ppm	1.8 ppm	1.8 ppm	0.5 ppm	NA	Silica Gel Tube, 226-10-03	NIOSH 7903	0.2-0.5 L/min; 48 L
	MultiRAE Pro HCl Sensor	0-15 ppm	Y													
	Dräger Tube	≥1-10 ppm	Y													
	Dräger Chip	≥1-25 ppm	N (Y w/option)													
	pH Paper	NA	Y													
	SPM	0.5-15 ppm	N (Y w/option)													
	Dräger Pac III	0-30 ppm	Y													
	GFG Inc. Micro IV	0-30 ppm	Y													
Sulfuric Acid	Dräger Tube	1-5 mg/m^3	Y	12.4 eV	NA	NA	PEL = 1 mg/m^3 REL = 1 mg/m^3 TLV = 1 mg/m^3, ST 3 mg/m^3	15 mg/m^3	0.2 mg/m^3	0.2 mg/m^3	0.2 mg/m^3	0.2 mg/m^3	2 mg/m^3	Silica Gel Tube, 226-10-03	NIOSH 7903	0.2-0.5 L/min; 48 L
	pH Paper	NA	Y													
	SPM	26-750 ppb	N (Y w/option)													
Hydriodic Acid (Iodine Vapors)	pH Paper	NA	Y	NA	NA	NA	NA	NA	1 ppm	1 ppm	1 ppm	0.35 ppm	1 ppm*	Anasorb 747 Tube, 226-80	OSHA ID 212	0.5 L/min; 2.5 L
	MultiRAE/AreaRAE PID***	0-2000 ppm	Y													
VOCs and Gases																
Acetone	Dräger Tube	≥40-12,000	Y	9.69 eV	NA	1 ppm = 2.38 mg/m3	REL = 250 ppm PEL = 1000 ppm TLV = 500 ppm	2500 ppm	200 ppm	200 ppm	200 ppm	200 ppm	200 ppm*	Anasorb CSC Tube, 226-01	NIOSH 1300	0.01 to 0.2 L/min; 2 L
	MultiRAE/AreaRAE PID**	0-2000 ppm	Y		1.1 (10.6 lamp)											
Carbon Monoxide	MultiRAE/AreaRAE CO Sensor	0-500 ppm	Y	14.01 eV	NA	1 ppm = 1.15 mg/m3	PEL = 50 ppm REL = 35 ppm, C 200 ppm TLV = 25 ppm	1200 ppm	83 ppm*	33 ppm*	27 ppm*	50 ppm	200 ppm	Sample Bag, 245-05	OSHA ID 209	NA
	MultiRAE Pro CO Sensor	0-2000 ppm ext. range	Y													
	Dräger Tube	≥2-300 ppm	Y													
	Dräger Chip	5-150 ppm	N (Y w/option)													
	ToxiRAE II CO	≥0-500 ppm	Y													
	GFG Inc. Micro IV	0-2000 ppm	Y													
	MIRAN SapphIRe**	4.5-250 ppm	Y													
Carbon Dioxide	Dräger Pac III	0-5% Vol.	Y	13.77 eV	NA	1 ppm = 1.8 mg/m^3	PEL = 5000 ppm, ST 30,000 ppm REL = 5000 ppm, ST 30,000 ppm TLV = 5000 ppm, ST 30,000 ppm	40,000 ppm	NA	NA	NA	5000 ppm	NA	Carbon Dioxide Tube, 800-01381	NA	0.02-0.1 L/min; NA
	Dräger Tube	2-12% Vol.	Y													
	Dräger Chip	200-25,000 ppm	N (Y w/option)													
	MIRAN SapphIRe**	7.5-2000 ppm	Y													
Ether	MultiRAE/AreaRAE PID***	0-2000 ppm	Y	9.53 eV	NA	1 ppm = 3.03 mg/m3	REL = 400 ppm, ST 500 ppm PEL = 400 ppm TLV = 400 ppm, ST 500 ppm	1900 ppm	NA	NA	NA	400 ppm	500 ppm*	Anasorb CSC Tube, 226-01	NIOSH 1610	0.01 to 0.2 L/min; 0.25-3 L
Iodine Crystal (Iodine Vapors)	Dräger Tube	≥0.1-6 ppm	Y	9.31 eV	NA	1 ppm = 10.38 mg/m^3	REL = C 0.1 ppm PEL = C 0.1 ppm TLV = C 0.1 ppm	2 ppm	NA	NA	NA	0.01 ppm	0.1 ppm*	Anasorb CSC Tube, 226-67	NIOSH 6005	0.5 to 1 L/min; 15 L
	MultiRAE/AreaRAE PID***	0-2000 ppm	Y		0.1 (10.6 lamp)											

Instrument Guidance | Regulatory Guidance | Reference

Table 20 -- Clandestine Lab

Target Compound[1]	Instrument	Detection Level	Intrinsically Safe (Y/N)	IP	PID CF (ISO)	Conversion	Occupational Action Levels		AEGL-1			TEEL-0	ERPG-1	Air Sampling		
							TWA	IDLH	1-hr	4-hr	8-hr	15-min TWA	1-hr	Media	Method	Flow Rate/ Total Volume
VOCs and Gases (continued)																
Nitric Oxide	MultiRAE/AreaRAE NO Sensor	0-250 ppm	Y	11.95 eV	NA	1 ppm = 1.23 mg/m^3	PEL = 25 ppm REL = 25 ppm TLV = 25 ppm	100 ppm	NA	NA	NA	0.5 ppm	NA	Molecular Sieve Tube, 226-40	NIOSH 6014	0.025 L/min; 1.5-6 L
	ToxiRAE II NO	0-250 ppm	Y													
	Dräger Pac III	0-100 ppm	Y													
	GFG Inc. Micro IV	0-100 ppm	Y													
Nitrogen Dioxide	MultiRAE/AreaRAE NO_2 Sensor	0-20 ppm	Y	9.75 eV	NA	1 ppm = 1.88 mg/m^3	PEL = C 5 ppm REL = ST 1 ppm TLV = 3 ppm, ST 5 ppm	20 ppm	0.5 ppm	0.5 ppm	0.5 ppm	0.5 ppm	1 ppm	Molecular Sieve Tube, 226-40-02	NIOSH 6014	0.025-0.2 L/min; 1.5-6 L
	Dräger Tube	≥0.5-25 ppm	Y													
	Dräger Chip	0.5-25 ppm	N (Y w/option)													
	SPM	0.3-9 ppm	N (Y w/option)													
	ToxiRAE II NO_2	0-20 ppm	Y													
	Dräger Pac III	0-50 ppm	Y													
	GFG Inc. Micro IV	0-30 ppm	Y													
	MultiRAE/AreaRAE PID***	0-2000 ppm	Y		16 (10.6 lamp)											
	TVA 1000B***	0.5-2,000 ppm (PID)	Y		NA											
Phosphine	MultiRAE/AreaRAE PH_3 Sensor	0-5 ppm	Y	9.96 eV	NA	1 ppm = 1.39 mg/m^3	PEL = 0.3 mg/m^3 REL = 0.3 mg/m^3, ST 1 ppm TLV = 0.3 mg/m^3	50 ppm	2 ppm*	0.5 ppm*	0.25 ppm*	0.3 ppm	NA	Silica Gel Tube, 226-165A	NIOSH 6002	0.01-0.2 L/min; 12 L
	ToxiRAE	0-5 ppm	Y													
	Dräger Pac III	0-10 ppm	Y													
	Dräger Tube	≥0.1-1 ppm	Y													
	Dräger Chip	0.1-2.5 ppm or higher	N (Y w/option)													
	GFG Inc. Micro IV	0-10 ppm	Y													
	SPM	32-900 ppb	N (Y w/option)													
	MultiRAE/AreaRAE PID***	0-200 ppm	Y		3.9 (10.6 lamp)											
Red Phosphorus	MultiRAE/AreaRAE PID***	0-2000 ppm	Y	10.49 eV	NA	NA	NA	NA	NA	NA	NA	0.05 mg/m^3	0.4 mg/m^3*	Tenax Tube, 226-35-03	NIOSH 7905	0.2 L/min; 12 L
Toluene	Dräger Tube	≥5-1800 ppm	Y	8.82 eV	NA	1 ppm = 3.77 mg/m^3	REL = 100 ppm, ST 150 ppm PEL = 200 ppm, C 300 ppm, 500 ppm (10-min. max. peak) TLV = 50 ppm S	500 ppm	200 ppm	200 ppm	200 ppm	20 ppm	50 ppm	Anasorb CSC Tube, 226-01	NIOSH 1501	≤0.2 L/min; 1-8 L
	MultiRAE/AreaRAE PID***	0-2000 ppm	Y		0.5 (10.6 lamp)											
Sodium Hydroxide	Dräger pH Tube	Qualitative	Y	NA	NA	NA	PEL = 2 mg/m^3 REL = C 2 mg/m^3 TLV = C 2 mg/m^3	10 mg/m^3	NA	NA	NA	0.5 mg/m3	0.5 mg/m3	PTFE Filter, 225-17-01	NIOSH 7401	1-4 L/min; 360 L
	pH Paper	NA	Y													

Instrument Guidance | Regulatory Guidance | Reference

Table 20 -- Clandestine Lab

Target Compound[1]	Instrument (Instrument Guidance)	Detection Level (Instrument Guidance)	Intrinsically Safe (Y/N) (Instrument Guidance)	IP (Instrument Guidance)	PID CF (ISO) (Instrument Guidance)	Conversion (Instrument Guidance)	Occupational Action Levels (Regulatory Guidance): TWA	Occupational Action Levels (Regulatory Guidance): IDLH	AEGL-1 (Regulatory Guidance): 1-hr	AEGL-1 (Regulatory Guidance): 4-hr	AEGL-1 (Regulatory Guidance): 8-hr	TEEL-0 (Regulatory Guidance): 15-min TWA	ERPG-1 (Regulatory Guidance): 1-hr	Air Sampling (Reference): Media	Air Sampling (Reference): Method	Air Sampling (Reference): Flow Rate/ Total Volume
VOCs and Gases (continued)																
Ammonia	MultiRAE/AreaRAE NH_3 Sensor	0-50 ppm	Y	10.18 eV	NA	1 ppm = 0.7 mg/m^3	PEL = 50 ppm REL = 25 ppm, ST 35 ppm TLV = 25 ppm, ST 35 ppm	300 ppm	30 ppm	30 ppm	30 ppm	30 ppm	25 ppm	Silica Gel Tube, 226-10-06	NIOSH 6015	0.1-0.2 L/min; 72 L
	MultiRAE Pro NH_3 Sensor	0-100 ppm	Y													
	Dräger Tube	≥0.25-3 ppm	Y													
	Dräger Chip	≥0.2-5 ppm	N (Y w/option)													
	Dräger Pac III	0-300 ppm	Y													
	SPM	2.6-75 ppm	N (Y w/option)													
	ToxiRAE II NH_3	0-50 ppm	Y													
	MIRAN SapphIRe*	0-500 ppm	Y													
	MultiRAE/AreaRAE PID***	0-2000 ppm	Y		9.7 (10.6 lamp)											
	TVA 1000B***	0.5-2,000 ppm (PID)	Y		10.6 lamp 21.666 (10 ppm) - 22.980 (2000 ppm)											
Benzene	UltraRAE-PID***	0.1-2000 ppm	Y	9.24 eV	NA	1 ppm = 3.19 mg/m^3	PEL = 1 ppm REL = 0.1 ppm, ST 1 ppm TLV = 10 ppm	500 ppm	52 ppm	18 ppm	9 ppm	1 ppm	50 ppm	Anasorb CSC Tube, 226-01	NIOSH 1501	≤0.2 L/min; 6 L
	Dräger Tube	≥0.5-10 ppm	Y													
	Dräger Chip	≥0.2-10 ppm	N (Y w/option)													
	MIRAN SapphIRe**	10-200 ppm	Y													
	ppbRAE-PID***	1ppb-200ppm	Y													
	MultiRAE/AreaRAE PID***	0-2000 ppm	Y		0.53 (10.6 lamp)											
	TVA 1000B***	0.5-2,000 ppm (PID) 1-50,000 ppm (FID)	Y		10.6 lamp 0.702 (10 ppm) - 1.781 (2000 ppm)											
Methanol	MultiRAE/AreaRAE PID***	0-2000 ppm	Y	10.84 eV	2.5 (11.7 lamp)	1 ppm = 1.31 mg/m^3	REL = 200 ppm, ST 250 ppm S PEL = 200 ppm TLV = 200 ppm S, ST 250 ppm S	6000 ppm	530 ppm	340 ppm	270 ppm	200 ppm	200 ppm	Silica Gel Tube, 226-51	NIOSH 2000	0.02-0.2 L/min; 5 L
	MultiRAE/AreaRAE CO Sensor	0-500 ppm	Y		NA											
	TVA 1000B***	0.5-2,000 ppm (PID) 1-50,000 ppm (FID)	Y		11.8 lamp 5.265 (10 ppm) - 7.167 (2000 ppm)											
Particulate																
Particulate	Personal DataRAM****	0.001-400 mg/m^3	N	NA	NA	NA	PEL = 15 mg/m^3 (total), 5 mg/m^3 (respirable) TLV = 10 mg/m^3 (total), 3 mg/m^3 (respirable)	NA	NA	NA	NA	10 mg/m^3	NA	Filter (total) Cyclone + Filter (resp)	NIOSH 0500 (total) NIOSH 0600 (resp)	1-2 L/min (total) 1.7-2.5 L/min (resp)
	DataRAM 4****	0.001-400 mg/m^3	N													
	eBAM	0-100 mg/m^3	N													

Table 20 -- Clandestine Lab

Target Compound[1]	Instrument	Detection Level	Intrinsically Safe (Y/N)	IP	PID CF (ISO)	Conversion	Occupational Action Levels		AEGL-1			TEEL-0	ERPG-1	Air Sampling		
							TWA	IDLH	1-hr	4-hr	8-hr	15-min TWA	1-hr	Media	Method	Flow Rate/ Total Volume
Radiation[2]																
Radiation	Ludlum Model 192	0-5,000 µR/hr	N	NA	NA	NA	60-100 µR/hr*	NA	NA	NA	NA	NA	NA	RADeCO Filter Paper (2")	RSSOP 209/501	α = 2500 ft^3 β/γ = 1250 ft^3
	Ludlum Model 2241-2 w/Pancake Probe	0-100,000 cpm or 0-200 mR/hr	N				300 cpm*									
	Ludlum Model 2241-3 w/Pancake Probe	0-100,000 cpm or 0-200 mR/hr	N				300 cpm*									
	*These are not TWA(s). Normal gamma radiation background is from 5-20 µR/hr; however, higher backgrounds may exist. If readings are 3 times background or greater than 60-100 µR/hr or greater than 300 cpm, then stop work and consult with a Health Physicist. Refer to Hazardous Evaluation Flow Chart for Unknowns in Attachment A.															

Instrument Guidance | Regulatory Guidance | Reference

Table 20 -- Clandestine Lab

Notes:

For guidance only. These tables do not supersede a SSHASP at any time or on any response.

[1] Does not include all pollutants associated with this type of event, only the most common pollutants with the lowest action levels. Depending on the chemical of concern, certain Dräger tubes and chips can be used. In addition, single-gas instruments and sensors and/or a gas chromatography-mass spectrometry instrument may be used.

[2] Standard EPA Emergency Response Protocol is to screen for radiation with a Micro-R at all emergency responses. If readings are three times background, responders consult with a Health Physicist. Additional radiation equipment is available to monitor for Alpha, Beta and Gamma, but is not included in this table.

AEGL-1 is the airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience notable discomfort, irritation, or certain asymptomatic non-sensory effects; however, the effects are not disabling and are transient and reversible upon cessation of exposure.

AEGL-2 is the airborne concentration (expressed as ppm or mg/m^3) of a substance above which it is predicted that the general population, including susceptible individuals, could experience irreversible or other serious, long-lasting adverse health effects or an impaired ability to escape.

TEEL-0 is the temporary level of concern derived according to a tiered, formula-like methodology; representing concentrations associated with no effects.

ERPG-1 is the acute exposure concentration of the general population for up to 1 hour associated with effects expected to be mild or transient.

Data on tables are from the following sources:

http://www.epa.gov/oppt/aegl/pubs/chemlist.htm	EPA's website used to research AEGLs using the chemical's name or chemical abstracts service registry numbers.
http://www.cdc.gov/niosh/npg/npgsyn-a.html	CDC NIOSH Pocket Guide to Chemical Hazards website
http://wiser.nlm.nih.gov/	WISER website
http://www.skcinc.com/	SKC, Inc. website (Air Sampling Media Part No. is specific to SKC)

*AEGL-2--There are no AEGL-1 for this compound

**MIRAN SapphIRe has problems with complex mixtures (*e.g.;* distinguishing benzene from gasoline vapor)

***PIDs/FIDs are non-specific detectors and cannot differentiate between VOCs, even with CFs applied. See RAE PID CF Guidance Document TN-106 for information and TVA Response Factor document P/N 50039 THERMO.

****Personal DataRAMs/DataRAMs are non-specific detectors and cannot differentiate between particulates

Acronyms:

≥ -- greater than or equal to
% -- percent
ACGIH -- American Conference of Governmental Industrial Hygienists
AEGL -- acute exposure guideline levels
CDC -- Centers for Disease Control and Prevention
CF -- conversion factor
CO -- carbon monoxide
cpm -- counts per minute
EPA -- U.S. Environmental Protection Agency
ERPG -- emergency response planning guideline
eV -- electron volt
FID -- flame ionization detector
IDLH -- immediately dangerous to life and health
IP -- ionization potential
ISO -- isobutylene
mg/m^3 -- milligrams per cubic meter
µR/hr -- micro Roentgens per hour
NA -- not available/applicable
NIOSH -- National Institute for Occupational Safety and Health
OSHA -- Occupational Safety and Health Administration
PEL -- permissible exposure limit (OSHA)
PID -- photoionization detector
ppm -- parts per million
R/hr -- Roentgens per hour
rec. -- recommended
REL -- recommended exposure limit (NIOSH)
SPM -- single-point monitor
SSHASP -- site-specific health and safety plan
TEEL -- temporary emergency exposure limit
TLV -- time-limited value (ACGIH)
TWA -- time-weighted average
VOC -- volatile organic compound
Vol. -- volume
WISER -- Wireless Information System for Emergency Responders
Y w/option - yes with option; see manufacturer's instrument manual for information

Attachment A – Hazard Evaluation Flowchart for Unknowns

Hazard Evaluation Flow Chart for Unknowns

Early Considerations!

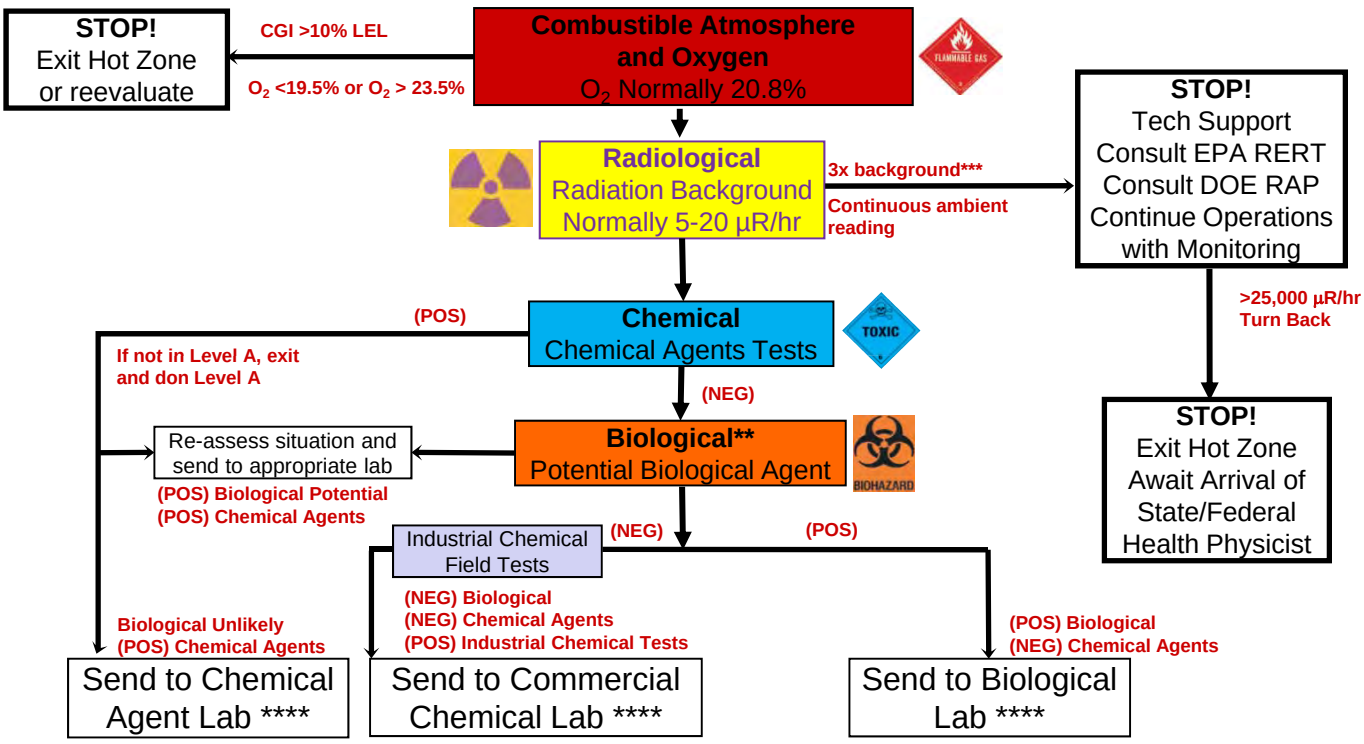
Collect intelligence, Document signs and symptoms of victims, Evaluate scene and situation, Potential explosives should be evaluated by the local bomb squad, Cordon off area, Isolate, Evacuate, Disable HVAC, Seal doors and cracks, Delineate hotzone (wind direction and intensity), Turn on radiation meter while preparing entry, Approach uphill/upwind/ upstream, Follow H&S plan, Sampling plan, and Decontamination procedures for personnel/sample containers/equipment, Conduct written and photographic documentation, Consult with Incident Commander and law enforcement

Calibrate instruments/Collect background readings

Team dons Level A or B PPE (consult with H&S Manager)

Team enters hot zone

Air	Liquid/Solid
1st Entry: Multi-Gas Monitor with PID* (MultiRAE); CGI/O_2*; Radiation Meter (Gamma); Ratemeter with Pancake Probe; FID; AP2C; AP4C; M256 Kit; Chemical Agent Detector Strips; digital camera	**1st Entry:** Multi-Gas Monitor with PID* (MultiRAE); CGI/O_2*; Radiation Meter (Gamma); Ratemeter with Pancake Probe; FID; pH Paper; AP2C; AP4C; M8/M9 Paper; digital camera
2nd Entry: Dräger tubes/chips; Multi-Gas Monitor with PID (MultiRAE); Chemical Specific Monitor (ToxiRAE); SAM940; identiFINDER; Ratemeter with Pancake Probe; SPM; Lumex MVA ***Collect Air Samples As Appropriate***	**2nd Entry:** Dräger tubes/chips; Multi-Gas Monitor with PID (MultiRAE); Chemical Specific Monitor (ToxiRAE); SAM940; identiFINDER; Ratemeter with Pancake Probe; Lumex MVA ***Collect Liquid/Solid Samples As Appropriate***
Additional Monitoring: Portable GCMS; Particulate Monitor (DataRAM); AreaRAE; TAGA; ASPECT	**Additional Monitoring:** Portable GCMS; Raman Spectrometer (Ahura FD)HAZMAT ID FTIR; Industrial Chemical Field Tests; PCR



***Intrinsically safe**
**** If the situation is suspicious send samples to biological lab.**
***** >60 to 100 mR/hr OR >300 cpm w/Pancake Probe**
****** Send to lab if radiation is less than 3 times background. If above, consult with laboratory prior to shipping.**

Attachment H

TDD No 1-WESTON-042-15-007

Technical Direction Document

U.S. EPA, Region 6
1445 Ross Avenue, Suite 1200
Dallas, TX 75202-2733

Vendor : WESTON SOLUTIONS, INC.

TDD # : 1/WESTON-042-15-007
Amendment # :
Contract # : EP-W-06-042

TDD Title : Gerdau Ameristeel Fire
Purpose : TDD INITIATION
Priority : HIGH
Overtime Authorized : Yes
Invoice Unit :

Verbal Date : 01/29/2015
Start Date : 01/29/2015
Completion Date : 04/17/2015
Effective Date : 01/29/2015

SSID : A6G9
Project/Site Name : Gerdau Ameristeel Fire
Project Address : 300 Ward Rd
County : Ellis
City : Midlothian
State : TX
Zip Code : 76065

Work Area : Response / Removal
Work Area Code : RS
Activity : Fund Lead Removal
Activity Code : RV
Operable Unit :
Emergency Code :
FPN :
Performance Based : No

Authorized TDD Ceiling :

	Amount	LOE (Hours)
Previous Action(s) :	$0.00	0.00
This Action :	$8,000.00	0.00
New Total :	$8,000.00	0.00

Specific Elements :

See Schedule

Description of Work :

See Schedule

Region Specific :

CERCLIS:

Misc 2 :

Accounting and Appropriation Information:

SFO:

Line	Budget / FY	Approp. Code	Budget Org.	Program Element	Object Class	Site Project	Cost Org.	DCN Line-ID	Funding Category	TDD Amount
1	14	T	6A00	303DC6	2505	06WQWQ00	C001	146ARSC030-001	REMOVAL SUPPORT	$8,000.00

U.S. EPA, Region 6
1445 Ross Avenue, Suite 1200
Dallas, TX 75202-2733

TDD # : 1/WESTON-042-15-007
Amendment # :
Contract # : EP-W-06-042

Vendor : WESTON SOLUTIONS, INC.

Project Officer : Will LaBombard	(Signature)	(Date)	**Branch Mail Code:**
		Phone Number : 214-665-7199
		Fax Number :
Contracting Officer Representative : John Martin	(Signature)	(Date)	**Branch Mail Code :**
		Phone Number : 214-665-6748
		Fax Number :
Contract Specialist: Michael J. Pheeny	(Signature)	(Date)	**Branch Mail Code :**
		Phone Number : 214-665-2798
		Fax Number :
Contracting Officer : Michael J. Pheeny	Electronically Signed by Michael J. Pheeny (Signature)	02/09/2015 (Date)	**Branch Mail Code :**
		Phone Number : 214-665-2798
		Fax Number :
Other Agency Official :	(Signature)	(Date)	**Branch Mail Code :**
		Phone Number :
		Fax Number :

Specific Elements: Analyze -Data that has been collected.,Collect -Samples ,Document -The removal activities. Prepare a written report.,Support -The removal activities,Advise -The OSC on disposal options and completion of the removal activities.
Description of Work: Respond to scene immediately to support removal assessment activities including air monitoring, photodocumentaion, logbook, and drafting POLREP.

This initial will require $8,000.