



Health and Safety Best Practices Guides

Petroleum Spill Responses (Draft Final)

Created: August 13, 2015, Updated: July 9, 2019, Version 3.1

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Hazard Summary (See specific Safety Data Sheets for more information)

Health Hazards: May be fatal if swallowed and enters airways. May cause genetic defects. May cause cancer. Causes skin irritation. Causes serious eye irritation. May cause drowsiness or dizziness.

Physical Hazards: Fire and explosive hazards. Heat Stress Hazards. Slip, Trip and Fall Hazards.

Signs and Symptoms of Exposure (See SDS for more information)

Short-term over-exposures to this material may cause irritation to skin and eyes, headache, dizziness, nausea, vomiting, weakness, loss of coordination, blurred vision, drowsiness, confusion, or disorientation.

Long term inhalation over-exposures to this material may cause cancer. Contains material that may cause heritable genetic damage. Contains material that may cause damage to the blood and blood forming organs.

Emergency Actions (See SDS for more information)

First-aid measures general: If exposed or concerned: Get medical advice/attention.

First-aid measures after inhalation: Remove to fresh air and keep in a position comfortable for breathing. In case of irregular breathing or respiratory arrest provide artificial respiration.

First-aid measures after skin contact: Wash immediately with water for 15 minutes. Remove affected clothing and wash all exposed skin area with mild soap and water, followed by warm water rinse.

First-aid measures after eye contact: Rinse immediately and thoroughly with water, hold eyelids open for 15 minutes.

First-aid measures after ingestion: Immediately call a POISON CONTROL CENTER and/or 911. Rinse mouth.

Air Monitoring/Sampling Equipment

<p>On-Site Monitoring</p>	<p>Deploy direct reading instruments on-site (Exclusion Zone, Command Post, Staging Areas, etc.) to ensure exposures are below Action Levels. Use data to guide PPE decisions, or the relocation of the command post/staging area.</p> <p>When using the MultiRAE Benzene or the UltraRAE 3000 (w/ benzene separation tubes), use the Quant Meter w/ Drager Benzene Tubes (0.25 to 10 ppm) or Drager Benzene CMS (0.2 to 10 PPM) to verify the accuracy of the RAE Units.</p> <p>Remember, per ERRPB SOG, complete a radiation survey at all Emergency Response and Removal Sites. Radiation may be present at oil storage/refinery facilities and at oil production facilities. Exposure to Radium and Radium Daughters is possible at spills from oil production facilities. Wear your TLD badge and EPD. See the Radiation Emergency Response Health and Safety Best Practices Guide for details on radiation detection equipment and clearance criteria.</p>
<p>Community Monitoring</p>	<p>A combination of the following provides the best coverage for nearby residents and the highest quality data to drive recommendations and decisions.</p> <p>Fixed Locations –Fixed locations should be deployed near receptors and in an area where there is shore power to alleviate instrument battery maintenance. Location should be selected that are downwind. When using portable generators, assure that generator exhaust does not impact instruments. Fixed locations provide the best analysis of actual human exposure over time, but the data is limited to a small location.</p> <p>Roving Air Monitoring – Roving teams should identify areas downwind to drive through. Roving air monitoring provides coverage of large areas but is limited in its effectiveness to estimate actual human exposure over time. Roving air monitoring is best to deploy and monitor throughout neighborhoods with potential particulate and chemical exposure. Roving air monitoring teams allow flexibility to mobilize to sensitive areas (Schools, Day Care, Etc.) for immediate assessment of compounds of concern.</p>
<p>Industrial Hygiene Sampling</p>	<p>Benzene is toxic and a known carcinogen. From an inhalation exposure standpoint, Benzene exposure is the main respiratory protection driver at oil spills due it is low exposure limits. Implement industrial hygiene sampling for benzene using the 3M 3520 Passive Diffusion Badge if personnel are working in an area where benzene exposure is possible. The badges clip to the responders outside clothing/PPE and should be worn for the duration of the work shift when personnel are assigned to the SCAT Team, Sample Teams or other operations that are down range at the spill site. Switch out the badges at least every 8 hours.</p> <p>The Emergency Response Trucks and the Alabama Outpost OSC are each equipped with sampling kits. Reach back to the Branch Safety Officer if additional badges are needed. Directions on the use of the badges, sampling chain of custodies and shipping supplies are found in the kit that was deployed in the Response Trucks and w/ the Outpost OSC.</p>

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Equipment (Linked to ERTG QSG)	Notes					
MultiRAE Pro	PID only detects VOC's with an Ionization Potential (IP) <10.6; also H ₂ S, CO, %O ₂ , and %LEL. See RAE Systems Technical Note TN-106 for information on PID use and correction factors.					
MultiRAE Benzene (ERTG QSG not available, linked to the RAE Operations Manual)	Standard MultiRAE configuration with a 9.8 eV lamp. Use the separation tube cartridge to switch from total VOC monitoring to benzene specific monitoring					
UltraRAE 3000 (ERTG QSG not available, linked to the RAE Operations Manual)	Use the separation tube to switch from total VOC monitoring to benzene specific monitoring. Use the Quant Meter w/ Drager Benzene Tubes (0.25 to 10 ppm) or Drager Benzene CMS (0.2 to 10 PPM) to verify the accuracy. See RAE Systems Technical Note TN-127 for details on benzene specific measurements in petroleum hydrocarbon mixtures using the UltraRAE.					
TVA 2020	Non-specific, FID will detect total VOC's. PID will detect VOC's w/ an IP <10.6					
Draeger Chip Management System (CMS)	Benzene – 10 to 250 ppm and 0.2 to 10 ppm, Petroleum Hydrocarbons – 20 to 500 ppm, Toluene – 10 to 300 ppm					
Draeger Tubes	Benzene – 0.25 to 10 ppm, Toluene – 5 to 300 ppm					
UltraRAE 3000	Use benzene-specific separation tube for Benzene monitoring.					
DustTrak Particulate monitor	Follow SOG#: T106 - Particulate Monitoring Guideline at Fires .					
Personnel Sampling: <ol style="list-style-type: none"> GilAir Sample Pump SKC Sample Pump 3M 3520 VOC Diffusion Monitor 	Analytical methods: <ol style="list-style-type: none"> Oil Mist - NIOSH 5026 Benzene – NIOSH 3700 VOC's – NIOSH 2549 Hydrocarbons – NIOSH 1500 Benzene using the 3M 3520 Diffusion Monitor – OSHA 1005 Will also need a DryCal Calibrator and appropriate sampling media for the Method. The 3M 3520 Diffusion Badges are kept on the Response Truck, with the AL Outpost and at the RRC.					
Exposure Limits						
Contaminant	IDLH ¹⁰	OSHA Exposure Limits ¹⁰	ACGIH Exposure Limits ¹²	Explosive Range ¹⁰	Ionization Potential ^{10, a}	PID Correction Factors ¹¹
Benzene	500ppm	TWA: 1 ppm, STEL: 5ppm	TWA: 0.5ppm, STEL: 2.5ppm	1.2-7.8%	9.24 eV	0.47
Butane	1600ppm (10%LEL)	--	STEL: 1000ppm	1.6-8.4%	10.63 eV	--
Carbon Monoxide	1200ppm	TWA: 35ppm, Ceiling: 200ppm	TWA: 25ppm	12.5-74%	--	--
Diesel Fuel	600ppm (10%LEL)	--	TWA: 100mg/m ³ /~11ppm (total hydrocarbon vapor)	0.6-7.5%	Mixture	0.7
Ethyl Benzene	800ppm (10%LEL)	TWA: 100ppm	TWA: 20ppm	0.8-6.7%	8.76 eV	0.65
Gasoline	--	--	TWA: 300ppm, STEL: 500ppm	1.4-7.6%	Mixture	0.9-1.0
Hydrogen Sulfide	100ppm	Ceiling: 20ppm	TWA: 1ppm, STEL: 5ppm	4.0-44.0%	10.46 eV	3.3
Kerosene (Jet Fuel)	700ppm (10%LEL)	--	TWA: 200 mg/m ³ /~29ppm (total hydrocarbon vapor)	0.7-5.0%	Mixture	0.6-1.0
Nitrogen Dioxide	20ppm	Ceiling: 5ppm	TWA: 0.2ppm	--	--	--
Oil Mist	2500 mg/m ³	TWA: 5 mg/m ³ /~0.3ppm	--	--	Mixture	--
Pentane	1500ppm (10%LEL)	TWA: 1000ppm	1000ppm	1.5-7.8%	10.34 eV	8.4
Pet. Distillates	1100ppm (10%LEL)	TWA: 500ppm	--	1.1-5.9%	Mixture	--
PNOS/PNOR ^b	--	TWA: 15 mg/m ³	TWA: 10 mg/m ³	--	--	--
Sulfur Dioxide	100ppm	TWA: 5ppm	STEL: 0.25ppm	--	--	--
Toluene	500ppm	TWA: 200ppm, Ceiling: 300ppm	TWA: 20 ppm	1.1-7.1%	8.82 eV	0.45
Xylenes	900ppm (10%LEL)	TWA: 100ppm	TWA: 100ppm, STEL: 150ppm	0.9-7.0	8.44 – 8.56 eV	0.39-0.40
^a - See RAE Systems Technical Note TN-106 for information on PID and use the proper correction factors ^b - PNOS – Particulates not otherwise specified (ACGIH Definition), PNOR – Particulates not otherwise regulated (OSHA Definition)						

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Action Levels:	
Contaminant/Hazard	Action
Fire or Explosion Hazard Oxygen Deficient or Rich Atmosphere	Leave the work zone and implement engineering controls. Engineering controls used in a potentially explosive atmosphere must be rated explosion proof.
Exceed an OSHA or ACGIH Exposure Limit	Leave the work zone and implement engineering controls. Don Level C or B PPE. Replace cartridges at the end of each work shift and/or based on manufacturers recommendations. Do not reenter the work zone if LEL levels are still >10%.
Oxygen Deficient Atmosphere and/or Exceed the Maximum Use Concentration of Respirator	Leave the work zone and implement engineering controls. Don Level B PPE. Do not reenter the work zone if LEL levels are still >10%.
Exceed the maximum use concentration (MUC) for air purifying respirators	Leave the work zone and implement engineering controls. Do not reenter the work zone in Level C until concentration of contaminants are confirmed to be below the respirator's MUC. MUC for SCOTT Full Face with Combo Cartridges for Benzene is 25ppm
Exceed PM2.5 Criteria for Very Unhealthy - >300 – 500 µg/m3	Using the PEL and TLV for PNOS/PNOR may not be appropriate for industrial fires since there are VOCs, SVOCs, and other toxic compounds in the products of combustion that cannot be quantified in real time. Consider moving command operations, implementing remote extinguishing, donning respiratory protection, etc. if the criteria are exceeded. Follow SOG#: T106 - Particulate Monitoring Guideline at Fires.

Personal Protection Equipment

Level D:	Safety Toe/Shank Work Boots, Safety Glasses, Flame Resistant Coveralls (as needed), Work Gloves (as needed), Hard Hat, High-Vis Vest (as needed), Hearing Protection (as needed), personal flotation device (as needed), Chest waders (as needed)
Level C:	Safety Toe/Shank Work Boots or HAZMAT Boots, Appropriate Chemical Protective Suit, Flame Resistant Coveralls (as needed), Full Face APR with Appropriate Cartridges, Appropriate Chemical Protective Gloves, Work Gloves (as needed), Hard Hat, High-Vis Vest (as needed), Hearing Protection (as needed).
Level B:	Safety Toe/Shank Boots or HAZMAT Boots, Appropriate Chemical Protective Suit, Flame Resistant Coveralls (as needed), and Chemical Protective Gloves, SCBA, Work Gloves (as needed), Hard Hat, Hearing Protection (as needed)

NOTE: See [SOG#: P103 - Oil Spill Respiratory Protection Recommendations](#) for information on respiratory protection

Always review the PPE permeation rates for the specific compounds involved. The following are permeation rates for equipment carried by ERRPB. Always confirm this information with SDS or Specific Manufacturer.

Permeation Rates are in Minutes, unless otherwise noted.

imm.: Chemical moves through suit, glove or boot material immediately. Blank Cells - No testing data available.

Chemical Name	Physical State	Chemical Protective Suits					Chemical Protective Gloves					Boots	
		DuPont Tychem QC	DuPont Tychem SL - Saranex	DuPont Tychem BR	DuPont Tychem Responder	DuPont Tychem TK	North Silver Shield	Ansell Barrier	North Viton	North Butyl	Ansell Solvex Nitrile	Tingley HAZPROOF	Onguard Boot Cover
Crude oil	Liquid	imm.	>480	>480	>480	>480							
Diesel fuel	Liquid	imm.	48	>480	>480	>480							
Ethanol	Liquid		>480		>480		>480	>480		>480	240		Excellent
Fuel oil	Liquid	imm.	>480		>480								
Gasoline	Liquid		imm.	>480	>480	>480		170			>480		Poor
Kerosene and Jet Fuel	Liquid		58	>480	>480	>480		>480			>360		Poor

Decontamination

Dry removal of PPE following standard contamination control techniques is typically appropriate. Wash hands and face with soap and water after exiting the contaminate reduction zone. Use a degreasing solution to decontaminate waders, chemical protective boots, tools and equipment.

Special Considerations

- Light ends (e.g. pentanes, butanes, benzene, xylenes, toluene, and ethyl benzene) often volatilize during the first few days of the response as the oil weathers. **Do not underestimate the explosive hazards of the light ends.**
- Exposure to carcinogens should be as low as reasonably achievable. Implement engineering controls even if air monitoring indicates respiratory protection is not required.
- Additional health and safety considerations and controls are needed during In-situ Burning Operations. See [SOG # P103](#) for additional information.
- Waste material sent for disposal may have naturally occurring radioactive materials (NORM). Oil production operations can technologically enhance (TE) the NORM. Disposal Regulations vary by State:
 - In Kentucky:
 - Collect 5 representative samples from the pile and combine into one composite sample
 - Send off to a NELAC accredited laboratory for a combined Radium 226 and 228 analyses
 - If the waste is less than 5.0 pCi/g; there are no NORM waste disposal restrictions and the waste can be disposal at a facility permitted to accept oil contaminated debris.
 - If the waste is between 5.0 and 100 pCi/g, the waste must go to a landfill specifically approved by KYDEP. Between 100 and 200 pCi/g, the landfill restrictions get more stringent. Greater than 200 pCi/g cannot be disposed of within the Commonwealth.

Resources/References:

1. [Emergency Response and Removal Health and Safety Standard Operating Guidelines](#)
 - a. [Equipment DECON SOG](#)
 - b. [Personnel DECON SOG](#)
 - c. [PPE Dress Out SOG](#)
2. [Emergency Response, Removal and Prevention PPE Selection Guides](#)
3. [NIOSH Respiratory Protection Recommendations – Deepwater Horizon Response](#)
4. [Emergency Response Air Monitoring Guidance Tables \(EPA ERTG, 2012, Version 3\)](#)
5. [Hazard Evaluation Flow Chart for Unknowns \(EPA ERTG, 2005, Version 6\)](#)
6. [NIOSH Pocket Guide to Chemical Hazards](#)
7. [RAE Systems Technical Note TN-106](#)
8. [RAE Systems Technical Note TN-127: Benzene Specific Measurements in Petroleum Hydrocarbons Using the UltraRAE](#)
9. [American Conference of Governmental Industrial Hygienist TLVs and BEIs](#)
10. [SCOTT Safety SureLife Cartridge Calculator](#)
11. [MSA Emergency Response Application \(Respirator Cartridge Calculator\)](#)