

Principles of Air Monitoring for In-Situ Burn Operations



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What are the airborne hazards?

Is smoke the greatest hazard?

Benzene?

Carbon Monoxide?

SMALL BOAT AND VESSEL OPS?



IGNITION OPERATIONS...



FIRE CONTROL...





LAND BASED...



MOST COMMONLY REPORTED SYMPTOMS NIOSH HEALTH HAZARD EVALUATION (HHE)

- In-situ burns:
 - upper respiratory symptoms;
 - headaches;
 - fatigue;
 - back pain; and
 - feeling stressed, worried, and pressured

EVALUATION OF HAZARDS

- How do you evaluate hazards?
- First, detect and measure (when able)
 - Physical
 - Chemical
 - Biological
 - Ergonomic



ISB AIR MONITORING

Real-Time Air Monitoring

- Consists of hand-held roaming readings
- Allows for:
 - Portable, fast, and accurate real-time readings
 - Constant Monitoring
 - Alarm Capabilities
 - Data Logging



Personnel Air Sampling

- Personal badges placed in workers' breathing zone to assess exposure to constituents of burned materials



Exposure Limits

Chemicals	OSHA-PEL		ACGIH-TLV	
	TWA (ppm)	STEL/CEIL (C) (ppm)	TWA (ppm)	STEL/CEIL (C) (ppm)
CO	50	-	25	-
NO ₂	-	5 (C)	0.2	-
SO ₂	5	-	-	0.25
H ₂ S	-	20 (C); 50 ¹	1	5
n-Hexane	500	-	50	-
Benzene	1	5	0.5	2.5
Toluene	200	300 (C); 500 ¹	20	-
Ethylbenzene	100	-	20	-
Xylene	100	-	100	150

Wildfire Smoke Guidelines

PM_{2.5} 0.351 mg/m³

*The above can be detected using hand-held air monitoring equipment and personal sampling badges

¹ 10 minute peak; once per 8 hour shift

Equipment



USCG ON SCENE COORDINATOR REPORT – DWH OIL SPILL (SEP 2011)

- There were no injuries or illnesses resulting from the burning operations.
- Vessels downwind from plume easily removed themselves from paths of exposure.
- SMART monitoring results indicated no health impacts to burn group members.
- Extensive air sampling for dioxin indicated that there was no threat to workers and communities.

DWH - NIOSH OFF-SHORE EVALUATION

- 2,316 sampling points; Personal breathing zone sampling was conducted on 45 individuals
- 1,426 of the 2,316 (62%) samples were non-detect
- 196 of the 890 (22%) detectable samples were less than the minimum quantifiable concentration (MQC)
- 1 individual's exposure to carbon monoxide exceeded the NIOSH ceiling REL of 200 parts per million
 - occurred at an in-situ burn site while the gasoline-powered igniter boat was idling result of engine exhaust rather than from burning surface oil

SIMILARLY

“Essentially, per NOAA, the overall air quality near the DWH site in the Gulf of Mexico was similar to that of a major city (NOAA website 2011). If vessels avoid positioning downwind of a controlled ISB, then the concern of potential exposure is minimized.”

(Ref: N. Mabile, Considerations for the Application of Controlled In-Situ Burning, 2013)

SO, WHAT IS THE ANSWER?

- Unfortunately, it's not that obvious
- Every burn will be unique
- Safety Professionals and Industrial Hygienists live in the world of grey
- Need system to help Safety Officers and Industrial Hygienists in their decision making
- API Safety and IH Guidelines (coming soon)

ISB: GUIDANCE FOR SAFETY OFFICERS AND INDUSTRIAL HYGIENIST

- Due in early 2015 (3 year project)
- Comprehensive yet concise guide
- Unique take on safety guidance
- Focus is on:
 - RBDM –Risk Based Decision Making
 - PDCA – Plan Do Check Act (continual improvement process)

STEP BY STEP PROCESS - ANTICIPATE, RECOGNIZE, EVALUATE, CONTROL

1. Identify hazards
2. Analyze Hazards - Job Hazard Analysis (JHA)
3. Assess & Evaluate Risks - Risk Assessment (RA)
4. Develop controls
5. Verify controls
6. Accept risk?
 - If yes -> Implement and train -> Measure and monitor
 - If no -> Ensure objectives are understood and determine if tasks should be reconsidered

DEVELOP CONTROLS

- Difficult to implement desired engineering controls
- Must work with Operations Section closely to develop safe work practices
- Integrate safety into plan's design
- Continuously reassess risk
- Restart process as information is gathered, near misses or mishaps occur or with changing conditions (oil, weather, environment)

THANK YOU FOR YOUR TIME

Please contact me if you have questions:

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