Theme: Non-Hydrocarbon Incidents

Title: How to Constitute a Globally Deployable Response Capability to Hazardous Noxious Substances (HNS) **Contact: michaelroldan@oilspillresponse.com**

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ABSTRACT

This paper shares one approach to constitute a globally deployable response capability to non-hydrocarbon incidents. The approach leverages the knowledge and experiences of seasoned oil spill responders. While in many ways similar to an oil spill response, a response to an HNS incident requires an additional level of attention to the physical and chemical properties of the substance released as well as to the multiple hazards to human health presented; non-hydrocarbon incidents can be quite diverse in behavior and response and so must be considered as a function of the specific cargo.

Of utmost importance for safety are the information sources used during an incident; whatever sources are used, these must provide readily extractable information for an unfolding response and in a framework that the user can mine efficiently and effectively. This paper describes one possible approach in way of a decision support system and includes examples of information guides.

The approach presented herein responds to industry needs; it must complement locally available resources and dovetail seamlessly with first responders and others who may already be on-scene. As well, to leverage the use of current oil spill resources and equipment wherever possible, the approach must be mindful of equipment compatibilities with the substance released.

This paper explains how to ensure deployable teams and those supporting remotely have the fundamental chemical knowledge and tools to identify all possible hazards and dynamically assess their risks while implementing sound response strategies based on a methodical decision support system.

INTRODUCTION

Oil spill responses are relatively similar for differing types of oils. Unfortunately, HNS responses vary from substance to substance. Speed and preparation are vital in responding to an HNS release. It is difficult enough to quickly mobilize people and equipment; HNS responders must be trained to methodically proceed and follow a plan. Without proper preparation long before an HNS incident occurs, responders won't have time to figure out what is need and what to do when an HNS is released or threatens to release.

As important as protecting the environment, protecting human life is paramount. Before a response begins, one must account for people in the vicinity of the incident that may be in danger especially those downwind or down slope. In addition, when planning and executing an HNS response one must evaluate the risk to the responders. Bravery is meritorious, but protecting your responders is more important; if nothing else, a dead responder can't respond.

Once you have evaluated the danger to human life, the next step is to size up the spill, how big it is, where it is coming from, and where it is going. And as you proceed in the respond, you must dynamically reevaluate. Things can, and often do, change during the course of any incident.

While some HNS generally behave the same and the response is similar, each HNS has unique properties and so, for an effective response you must do your homework before the spill occurs and have the training, equipment, and procedures determined and written down beforehand. This requires expenditure of time and money in advance, but without it you will never be able to mount an effective response.

PROCESS

The information gathering process presented here involves two steps. The first, as an overview, is grouping chemicals in a set of general categories that will provide a generalized response overview. Second, there would be specific guides for each HNS at risk. These guides would be reviewed fully during an incident.

For now, the HNS specific guides we would use are for pure chemicals. Mixtures can be treated as if they were pure substances, but data is usually unavailable for most mixtures. The best approach is to list the major components and use the "worst" data point for each data category. Another challenge that may appear at times is that the chemical composition is unknown to the responder, usually because the composition is a trade secret. In such cases an effective response is likely delayed until proper planning can account for the unknowns. Here the responder organization will have to ask the cargo owner or cargo manufacturer for guidance on how to respond; again, this ideally should be well in advance to provide enough information to create a cargo specific guide.

Overall, a responder's mantra must be "PREPARATION, PREPARATION, PREPARATION."

GROUPINGS

Figure 1. is the draft groupings table that OSRL could use when initially assessing a situation. N.B. The table includes, for completeness, substances beyond HNS.

Figure 2. Is an example of an HNS specific guide for Acetone. As more substances are considered, then the hazards of the grouping may be applied to streamline the process of creating additional guides. In others words, some guides may be very similar.

CONCLUSION

The approach of grouping based on a generalized response overview along with substance specific guides is intended to provide the quick initial information needed for OSRL's globally deployable response capability. The grouping and guides will form the backbone of OSRL's decision support system.

Grouping	FLAMMABLE	FLOATS/SINKS	VAPORIZES	FIRE FIGHTING AGENT	TOXIC VAPOR	TOXIC TO AQUATIC LIFE	DREDGE?	ALERT WATER USERS	CARRIAGE TEMP	CARRIAGE PRESSURE	EXAMPLE
1	YES	FLOATS	NO	POLAR SOLVENT FOAM, WATER FOG	NO	NO	NO	YES	AMBIANT	AMBIANT	BENZENE
2	YES	FLOATS	YES	DRE CHENICAL	NO	NO	NO	NO	CRYOGENIC	AMBIANT	LNG
3	YES	FLOATS	YES	DRE CHENICAL	NO	NO	NO	NO	AMBIENT	COMPRESSED	LPG
4	YES	SINKS	NO	WATER FOG	YES	YES	YES	YES	MOLLTEN	AMBIENT	MOLTEN SULPHUR
5	YES	FLOATS	YES	ORDINARY FOAM WATER FOG DRY CHEMICAL	NO	NO	NO	YES	AMBIENT	AMBIENT	CYCLOHEXANE
6	NO, BUT SERVES AS OXYDIZER	FLOATS	YES	REMOVE IGNITION SOURCES	NO	NO	NO	NO	CRYOGENIC	AMBIENT	OXYGEN
7	YES	FLOATS	YES	REMOVE IGNITION SOURCES.	SIMPLE ASPHYXIANT	NO	NO	NO	CRYOGENIC	AMBIENT	HYDROGEN
8	NO	FLOATS	YES	NOT FLAMMABLE	SIMPLE ASPHYXIANT	NO	NO	NO	CRYOGENIC	AMBIENT	NITROGEN
9	NO	FLOATS	YES	N.A.	YES	YES	NO	YES	CRYOGENIC	PRESSURIZED	CHLORINE REFRIGERATED
10	NO	FLOATS	YES	N.A.	YES	YES	NO	YES	AMBIENT	PRESSURIZED	CHLORINE PRESSURIZED
11	YES	FLOATS	NO	POLAR SOLVENT FOAM DRY CHEMICAL WATER FOG	YES	YES	NO	YES	AMBIENT	AMBIENT	ETHYLENE OXIDE

Figure 1. – Groupings Table (Draft)

Acetone – Grouping 1.

Fire: The vapor will form a vapor cloud that can burn back to the spill source. Stop the spill before attempting to extinguish the fire unless there is a high value structure in danger of igniting. Use solid water stream only to cool exposed tanks to prevent explosion; solid water streams may make the fire worse.

Spill: If not ignited, boom and pump the floating spilled material; use boom, pump, and tank approved by the manufacturer. Acetone is miscible in water, so it may completely dissolve and vaporize before it can be recovered. Use flammability detectors and sample tubs to determine the presence and level of Acetone vapor

Health: Do not allow contact with skin, eyes, lungs or mouth. If Acetone contacts skin, wash with soap and water. If swallowed, do not induce vomiting, pump stomach. Insulin may be of benefit if given with care. Do not enter confined spaces due to danger of explosion and asphyxiation. If Acetone contacts eyes, immediately flush with water.

Protective equipment: Wear protective equipment to avoid contact with skin (defatting skin), including goggles or face shield. Wear SCBA if the concentration is unknown or is high; excessive inhalation can lead to death. When protective equipment is wet with Acetone remove due to flammability hazard.

Compatibility: Follow manufacturers' guidelines. Acetone will dissolve many plastics and rubber. Acetone may form explosive mixtures with chromic anhydride, chromyl alcohol, hexacholromelamine, hydrogen peroxide, permonosulfuric acid, potassium terbutoxide and thioglycol. Incompatible with acids and oxidizers.

Numbers:

IDLH: 2,500 ppm
OSHA PEL: 1,000 ppm
NISOH PEL: 250 ppm
LFL 2.5%
LFL: 12.8%
Boiling Point: 133ºF
Freezing Point: -140ºF
Specific Gravity, liquid, at 68ºF: 0.79
Vapor Density relative to air: 2.0
Solubility: Miscible
Flash Point: -4ºF
Autoignition Temperature: 869ºF

Figure 2. – HNS Specific Guide (Draft)