

Promoting Effective Spill Response






Session 2: HNS Incidents Risks and Claims

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Brief Introduction to ITOPF

- not-for-profit organisation established 50 years ago.
- Funded by shipping industry (via P&I)
membership: 429.2 million GT (tanker tonnage), and 779.3 million GT (non-tanker tonnage)
- Main role: **promote effective response to oil and HNS spills**

Brief Introduction to ITOPF



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- Attending over **750** incidents onsite, in 100 countries and regions
- **33** HNS incidents since 2002, **22** site attendance

Contents

- Risks associated with shipping HNS
 - Regulatory framework to manage the risks
 - Assessing the risks
 - Hazardous, impacts, and losses & damages
- Risk assessment in practice
 - Example 1 – Palm Stearin
 - Example 2 – MTBE & IBAL
 - Example 3 – LPG

Risks posed by shipping HNS




EXPLOSIVE
1


NON-FLAMMABLE GAS
2


FLAMMABLE
3


FLAMMABLE SOLID
4


Photo credit: Irane-ma.com






ITOPF image



OXIDIZING AGENT
5.1


TOXIC
6


CORROSIVE
8


9

Regulatory framework to manage the risk



To manage the risks of shipping HNS

MARPOL 73/78
Annex I

- Oils carried in bulk

MARPOL 73/78

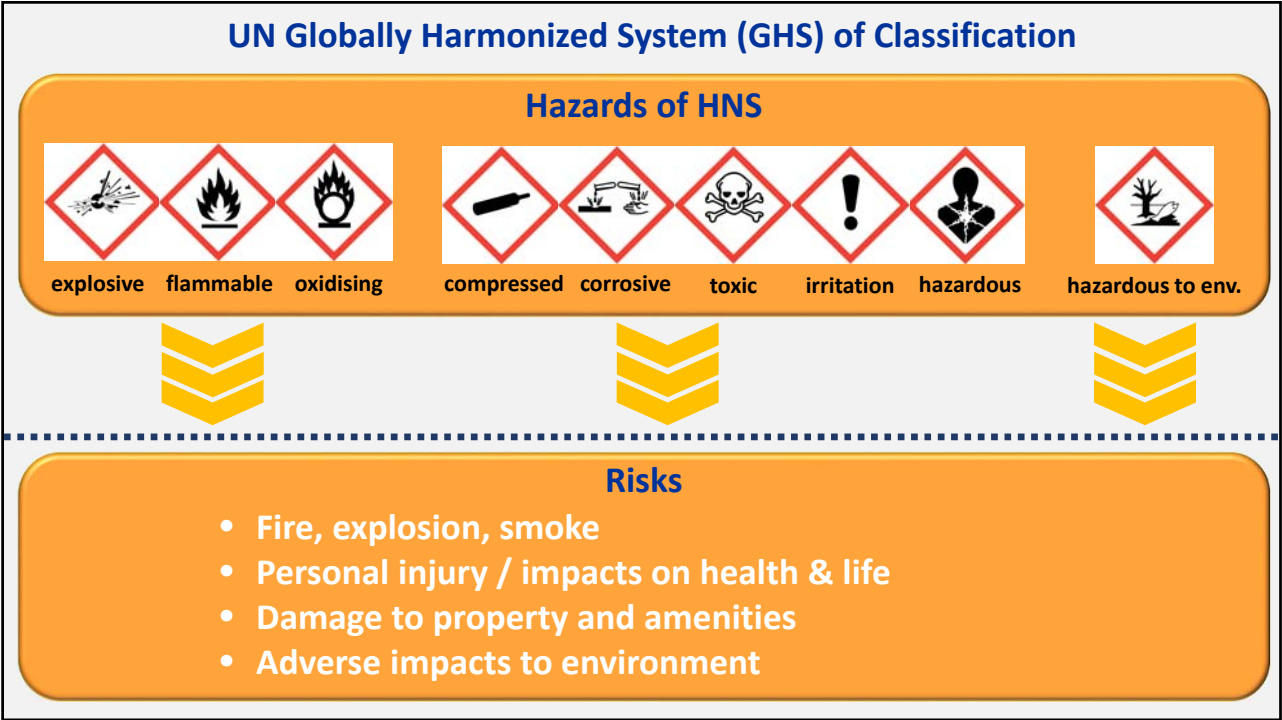
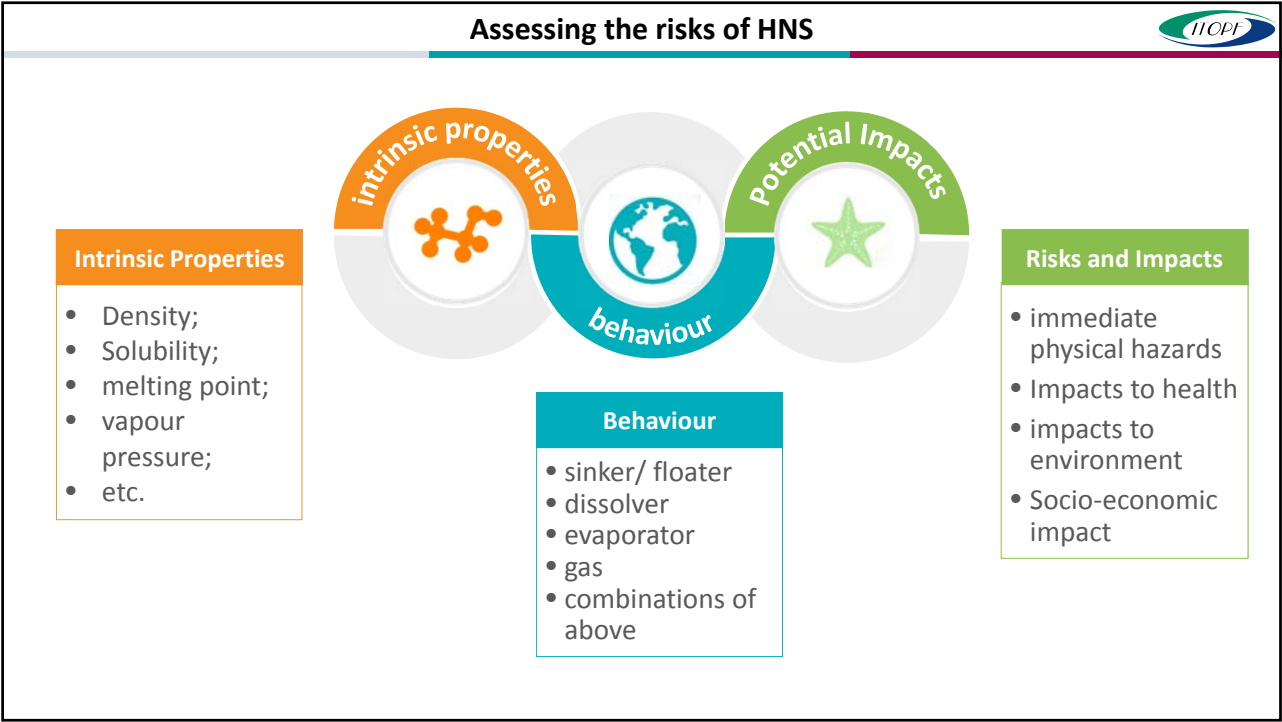
- all these substances are covered under the 2010 HNS Convention
- In additional:
 - liquid cargo with $FP \leq 60^{\circ}C$
 - residues from previous carriage in bulk

IGC Code

- Liquefied gases

IMSBC Code

- Solid bulk cargoes with chemical hazards (if subject to IMDG code in packaged form)



Risk assessment in practice – example 1. palm stearin spill




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Risk assessment in practice – example 1. properties of palm stearin

Refined, bleached, deodorised palm stearin

NAME	UN NO.	TRANSPORT MODE	CONTRIBUTIONS			HNS CLASSIFICATION						
			CONTRIBUTING	ACCOUNT	SECTOR	I	II	III	IV	V	VI	VII
PALM STEARIN		Bulk	✓	General	Other HNS		✓	✓				



15 min



Palm stearin transported in heated tank (about 60°C)

solidifies at 30°C ambient temperature

- Melting point ~ 44 - 56°C ➡ exists as **solid** after release
- Specific gravity 0.88 kg/m³ ➡ **floaters**
- Main components: triglycerides of fatty acids ➡ **not soluble** in water
- Low plasticity (partial crystallised) ➡ does **not aggregate** together
- **GESAMP Hazard profile**
 - no acute or chronic aquatic toxicity
 - no bio-concentration effect
 - no acute oral / dermal / inhalation toxicity to mammal
 - not irritating to skin or eye
 - no specific health concern
 - **may interference with wildlife**
- readily **biodegradable**, however may increase **BOD in confined area**

Risk assessment in practice – example 1. behaviour at sea



Day 2 - morning

plates / lumps up to 60cm in relatively concentrated area



Day 2 – afternoon

gradually broke into small pieces, formed belt / small slick under the influence of dominant current & wind



Day 3 – morning

Further scattered across wide area (200 – 300 km²), broke into tiny pieces (pea / rice), increasingly difficult to recover at sea

Risk assessment in practice – example 1. palm stearin - Response strategy



Before clean-up



After clean-up


- Palm stearin reached the shoreline;
- Shoreline clean-up is relatively simple (compared to oil spill);
- 211 MT palm stearin collected from the coast
- Some 100 MT of waste collected was turned into 50 MT of biodiesel

Risk assessment in practice – example 2. MTBE and Isobutanol





Risk assessment in practice – Example 2. fate and behaviour



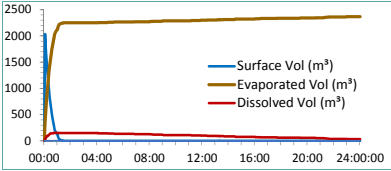
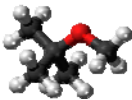
NAME	UN NO.	TRANSPORT MODE
MTBE/ETBE Blend		Bulk

MTBE ($C_5H_{12}O$)

Evaporator / dissolver

Main hazard: fire / explosion / irritant

GESAMP profile: low aquatic toxicity



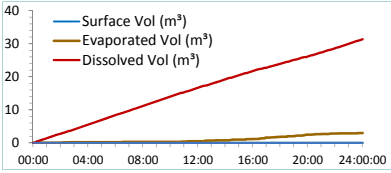
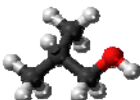
NAME	UN NO.	TRANSPORT MODE
Isobutanol		Bulk

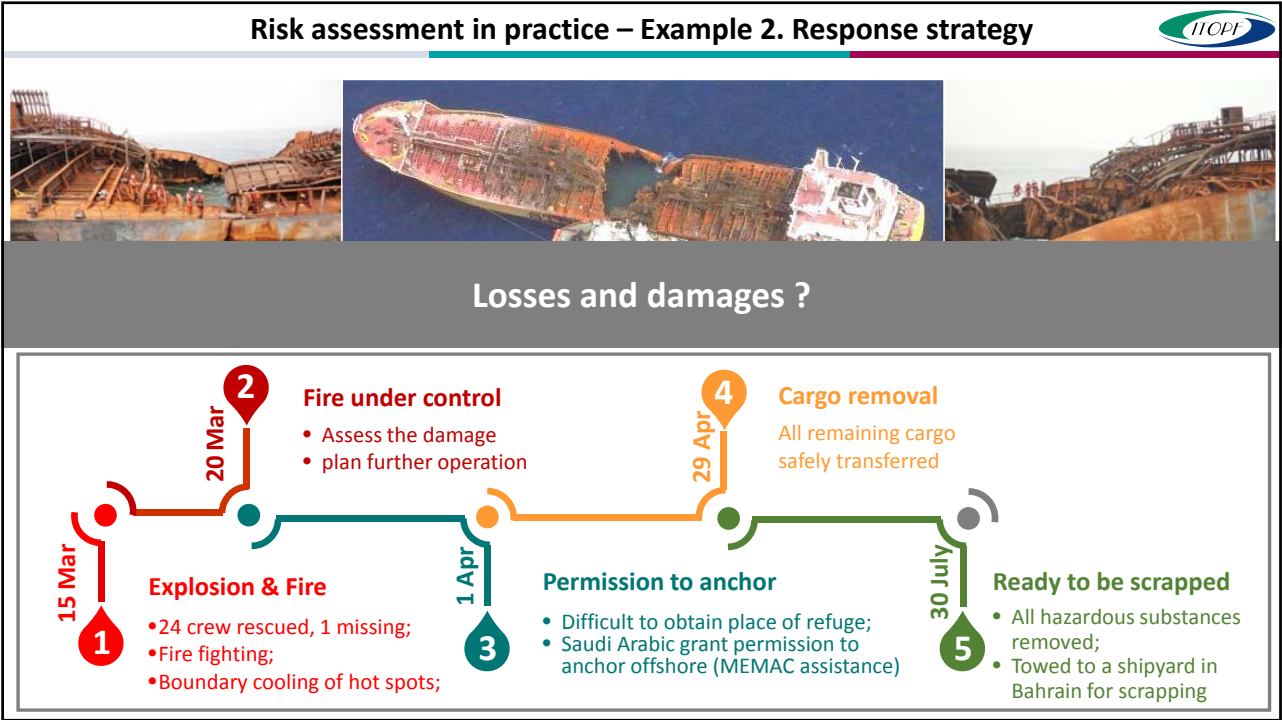
Isobutanol ($C_4H_{10}O$)

Evaporator / dissolver / self-condensation


Main hazard: fire / explosion / irritant

GESAMP profile: no profile



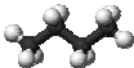


Risk assessment in practice – Example 3. butane



NAME	UN NO.	TRANSPORT MODE	CONTRIBUTIONS			HNS CLASSIFICATION						
			CONTRIBUTING	ACCOUNT	SECTOR	I	II	III	IV	V	VI	VII
BUTANE		Bulk	✓	LPG	LPG						✓	

Properties of butane




- Butane C₄H₁₀
- Boiling point: ≈ -1 °C;
- Highly flammable
- Increased pressure in tank, Boiling Liquid Expanding Vapour Explosion (BLEVE)
- Vapour Density: 2.0 (relative to air)

Situation Specific Risks

- Cooling system was not functioning properly
- Temperature of the tank = -5°C, but increases 0.5 °C per day;
- Cargo tanks were very full, very little headspace for expansion;
- Close to local village with dense population;
- Initial attempt to refloat was affected by monsoon rough sea state;

Risk assessment in practice – Example 3. response strategy



1st stage strategy

- Install secondary cooling system
- Modelling of temperature & pressure within tanks >> no uncontrolled release of gas from valves until Butane reached 15°C (≈ 30 days)

Losses and damages ?

2nd stage strategy

- Modelling showed removing ≈ 2000 tonnes of LPG would give enough headspace within tanks to allow gas to remain safe even if temperature reached ambient temp (35°C)
- Lightering operation: 2000 MT of butane removed by second LPG tanker
- Refloated during spring tide



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Thank you !

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