

National Workshop on Hazardous and Noxious
Substances (HNS)
Contingency planning
Durban, South Africa

Hosted by South Africa



transport

Department:
Transport
REPUBLIC OF SOUTH AFRICA



SAMSA
SOUTH AFRICAN
MARITIME SAFETY AUTHORITY

NOTE

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Presentation of the GI WACAF Project

The Global Initiative for West, Central and Southern Africa

Launched in 2006, the Global Initiative for West, Central and Southern Africa (GI WACAF) Project is a partnership between the International Maritime Organization (IMO) and Ipieca, the global oil and gas industry association for environmental and social issues, to enhance the capacity of partner countries to prepare for and respond to marine oil spills.

The mission is to strengthen the national system for preparedness and response in case of an oil spill in 22 West, Central and Southern African Countries in accordance with the provisions set out in the International Convention on Oil Pollution Preparedness, Response and Cooperation, 1990 (OPRC 90).

To achieve its mission, the GI WACAF Project organizes and delivers workshops, seminars and exercises, that aim to communicate good practice in all aspects of spill preparedness and response, drawing on expertise and experience from within governments, industry and other organizations working in this specialized field. To prepare and implement these activities, the Project relies on the Project's network of dedicated government and industry focal points. Promoting cooperation amongst all relevant government agencies, oil industry business units and stakeholders both nationally, regionally and internationally is a major objective of the Project during these activities.

GI WACAF operates and delivers activities with contributions from both the IMO and eight oil company members of Ipieca, namely Azule Energy, BP, Chevron, ExxonMobil, Eni, Renaissance Africa Energy Company, Shell, Total Energies.



More information is available on the Project's website: www.giwacaf.net

Executive summary

Title of the event: national workshop on Hazardous and Noxious Substances Contingency planning

Date of the event: 25 to 28 November 2025

Type of event: National workshop

Number of participants: 21

Venue: Royal Palm Hotel, Durban, South Africa

Summary:

The objectives of the workshop on HNS Contingency Planning are to enhance national and regional capacities for preparedness and response to incidents involving Hazardous and Noxious Substances (HNS). Specifically, the workshop seeks to:

- to strengthen participants' understanding of the principles, structure, and operational mechanisms of HNS contingency planning, in line with international conventions and best practices.
- to promote effective coordination among competent authorities, improve communication and decision-making processes during emergency situations, and foster inter-agency and cross-border collaboration.
- To provide an opportunity to assess existing national frameworks, identify capacity gaps, and develop recommendations for the improvement and harmonization of response strategies.

Through presentations, group discussions, and practical exercises, participants will build the knowledge and skills necessary to support the development, implementation and continuous enhancement of national and regional HNS contingency plans.

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Introduction

Context of the workshop

Hazardous and Noxious Substances (HNS) are materials that, if accidentally released into the marine environment, can pose serious risks to human health, ecosystems, and maritime activities. With the growing volume of international trade and the frequent transport of chemical products by sea, the likelihood of HNS incidents has increased. Such emergencies require rapid, coordinated, and well-prepared responses to minimize environmental damage and protect public safety. Therefore, having a comprehensive HNS Contingency Plan is essential. It provides a structured framework for prevention, preparedness, and response, defining clear roles, communication procedures, and resource allocation among all relevant authorities and stakeholders.

Objective of the Workshop

The objectives of the workshop on HNS Contingency Planning are to enhance national and regional capacities for preparedness and response to incidents involving Hazardous and Noxious Substances (HNS). Specifically, the workshop seeks to:

- to strengthen participants' understanding of the principles, structure, and operational mechanisms of HNS contingency planning, in line with international conventions and best practices.
- to promote effective coordination among competent authorities, improve communication and decision-making processes during emergency situations, and foster inter-agency and cross-border collaboration.
- To provide an opportunity to assess existing national frameworks, identify capacity gaps, and develop recommendations for the improvement and harmonization of response strategies.

Agenda, venue, participants

Programme: please [see annex 2](#).

Venue: Royal Palm Hotel, Durban, South Africa

Participants: please [see annex 3](#).

Opening ceremony

Please see [annex 1](#).

Activities and presentations

Day 1

Presentation of the GI WACAF Project, introduction of workshop objectives

Marine Laigle first presented the objectives and activities of the Project as well as the respective roles of IMO and Ipieca. Reference was made to the history of the GI WACAF project which was established in 2006 with a focus on strengthening the capacity of countries to prepare for and respond to oil spills through the promotion of public-private cooperation. It was highlighted that participation in the regional initiative involves 22 countries of the western coast of Africa, from Mauritania to South Africa. Since its inception, significant progress has been made in improving spill response capabilities by raising awareness through national and regional workshops and training, such as this workshop.

Participants were given the opportunity to present themselves and provide details of their experience in the subject matter at hand.

Session 1: What are Hazardous and Noxious Substances?

Natalie Kirk (ITOPF) introduced the concept of Hazardous and Noxious Substances (HNS) and outlined the specific risks they pose to the marine environment, human health and maritime activities. The session highlighted the evolving context of marine pollution, marked by increasing maritime traffic, changes in global shipping routes and the growing transport of hazardous cargoes, including containerised dangerous goods and alternative marine fuels.

The presentation clarified the definition of HNS within the framework of relevant international instruments, in particular the OPRC-HNS Protocol and the HNS Convention and explained how HNS incidents differ fundamentally from oil spills in terms of behaviour, impacts and response requirements. HNS incidents are hazard-driven and often require specialised expertise, protective equipment and tailored response strategies.

Key challenges related to HNS response were discussed, including the wide range of substances involved, uncertainties linked to chemical mixtures, and the critical need for reliable information to support operational decision-making. The session also stressed that, in some situations, monitoring and risk management may be preferable to active intervention.

Session 2: Chemical substances, hazard, behavior and effects assessment

Franck Laruelle (ITOPF) provided an overview of the main characteristics of Hazardous and Noxious Substances (HNS) and the factors that determine their hazards and behaviour in the marine environment. The session explained how physical and chemical properties such as density, solubility, volatility, reactivity, flammability and toxicity influence the fate of substances following a release at sea, including whether they float, sink, dissolve or evaporate, sometimes in complex combinations.

The presentation highlighted the potential risks posed by HNS to human health, the environment and response operations, noting that impacts can be rapid and, in some cases, more severe than those associated with oil spills. It also stressed the importance of

understanding substance behaviour and exposure pathways to protect responders and affected populations.

Overall, the session underlined that the wide diversity of HNS and their behaviours require a strong technical understanding to support informed decision-making and the selection of appropriate and safe response strategies.

Session 3: Information Resources to HNS Incidents

Franck Laruelle (ITOPF) presented an overview of the key information resources which can be used to support preparedness and response to Hazardous and Noxious Substances (HNS) incidents. The presentation outlined the types of critical information needed during an HNS incident, including cargo and shipping manifests, UN and CAS numbers and Safety Data Sheets (SDS). A range of technical tools and databases commonly used during HNS incidents were introduced, including international guidelines, modelling software, chemical hazard databases and sensitivity assessment tools. Some of these resources are listed below:

- IMDG, IBC, IGC and IMSBC Codes. Useful to understand product hazards, shipboard safety measures, packaging and carriage requirements.
- ECHA CHEM. A public database of chemicals maintained by the European Chemicals Agency. Useful to understand product characteristics, fate and behaviour.
- The Emergency Response Guidebook (ERG). Available online and as an app. Useful to understand product hazards and identify immediate response actions. Note that the ERG was primarily designed with rail and road incidents in mind. The volumes of product involved in maritime accidents are significantly larger, consequently, some information such as recommended exclusion zones need to be interpreted with caution.
- CEDRE's Chemical Response Guides. Comprehensive source of information covering product hazards, fate and behaviour, toxicological data, spill response measures and transport and handling guidance. The list of chemicals for which these guides are available is relatively limited.
- CAMEO. Chemicals. U.S. National Oceanographic and Atmospheric Administration's (NOAA) database of hazardous materials. Useful to understand product hazards including reactivity as well as response actions.

It highlighted the importance of understanding both the limitations and complementarities of different information sources, and the need to cross-check data rather than relying on a single reference.

The session also underlined that, compared to oil spills, HNS incidents often involve greater uncertainty and higher risks to responders, making access to accurate, timely and verified information essential for safe decision-making.

Session 4: Monitoring & Evaluation: A key HNS Response Tool

Natalie Kirk (ITOPF) presented monitoring as a vital tool for evaluating the presence, spread and concentrations of a pollutant, defining exclusion zones, protecting sensitive resources,

and shaping response strategies during HNS incidents. The session emphasized that because HNS behavior is complex, monitoring is essential to "ground truth" theoretical models.

Key technical aspects included:

- Modeling & Air Monitoring: Use of 3D modeling to predict plume trajectories (atmospheric and marine), supplemented by real-time air monitoring to ensure responder and public safety.
- Safety Criteria: The distinction between Protective Action Criteria (PACs), used for public emergency decisions (evacuation, sheltering-in-place, PPE levels), and Occupational Exposure Limits (TWA, STEL), designed for chronic worker exposure.
- Flammability: Monitoring of the Lower and Upper Explosive Limits (LEL/UEL) to manage fire and explosion risks.
- Sampling: The importance of structured environmental sampling (water, sediment, biota) to assess long-term impacts and guide the implementation of restrictions including on fisheries and water usage.

The session concluded that effective HNS response relies on the rapid integration of modeling, remote sensing, and field measurements to provide a clear picture of the chemical hazard.

Session 5: Response strategies to HNS incidents

Franck Laruelle (ITOPF) outlined the strategic framework for responding to HNS incidents, emphasizing that unlike oil spills, HNS response is dictated by a wide variety of chemical behaviors and high safety risks. The approach prioritizes a rigorous initial assessment by specialized teams equipped with appropriate PPE to stabilize the vessel and measure gas levels.

Response strategies are then divided into three main levels of action covering the vessel, the cargo, and the released substance. For the vessel and its cargo, options include firefighting, cargo transfer, or emergency towage. Regarding released pollutants, tactics depend on their physical classification where gases and evaporators require monitoring and plume modeling, while floaters may be recovered if equipment compatibility and safety allow. For dissolvers, action is often limited to monitoring concentrations to protect water intakes, whereas sinkers may require complex underwater detection and dredging. In conclusion, the session highlighted that monitored natural recovery remains a valid strategic choice if active intervention is not practical or poses an unacceptable risk to responders.

Session 6: HNS PPE Requirements

Natalie Kirk (ITOPF) addressed the critical health and safety considerations essential for protecting first responders from the diverse toxicological and physical properties of hazardous substances. The session emphasized that effective management relies on a

thorough risk assessment to establish a site's risk profile, identifying hazards such as toxicity, flammability, and reactivity through Safety Data Sheets and chemical databases.

This assessment informs the establishment of site safety zones, specifically the hot, warm, and cold zones, which dictate the level of protection required and control the movement of personnel to prevent the spread of contamination. The presentation touched on the topic of levels of protection for Personal Protective Equipment (PPE), which are set by national legislation. Examples of classification systems used in the USA and in the European Union were discussed.

The USA levels of protection are set by OSHA and are as follows. Level A provides the highest level of respiratory and skin protection with a fully encapsulated chemical-protective suit and a self-contained breathing apparatus (SCBA), while Level B maintains highest respiratory protection offered by the SCBA but offers a lower level of skin protection. Level C is utilized when contaminants are identified and air-purifying respirators are sufficient, and Level D serves as a basic work uniform for sites with no known atmospheric hazards.

The session concluded with a demonstration of different types of PPE by SpillTech.



Session 7: Alternative Marine Fuels - Fate, Behaviour & Risks

Franck Laruelle (ITOPF) presented the evolving landscape of marine propulsion, highlighting the significant shift from conventional fuel oils to alternative fuels driven by global decarbonization goals. The session examined the "fuel soup" of the future, including transition fuels like LNG and biofuels, and emerging options such as methanol, ammonia, and hydrogen. It was noted that while the current fleet remains predominantly powered by conventional fuels, a substantial percentage of new vessel orders are designed for alternative fuels. The presentation detailed the unique risks associated with these substances, specifically ammonia's high toxicity and methanol's low flashpoint and invisible flame, which present entirely different challenges compared to traditional oil spill responses.

Franck Laruelle then focused on the difference with persistent fuel oils that require protracted shoreline clean-up, rather than with many alternative fuels that are non-persistent and will evaporate or dissolve, shifting the response focus toward immediate life safety, exclusion zones, and specialized firefighting. The session also addressed the legal complexities regarding compensation; alternative fuels carried as bunkers are not covered by the Bunker Convention or by the HNS Convention 2010. The former only covers hydrocarbon mineral oils and the latter will only cover HNS carried as cargo once it enters into force. As such, alternative fuels currently remain unaddressed by the international compensation regime. In conclusion, the transition to alternative fuels requires a reassessment of national preparedness, as future incidents will demand rapid, highly specialised interventions rather than traditional manual recovery methods.

Day 2

Session 9: HNS in South Africa

Winston Lobo, Senior Technical Manager from SAMSA, provided a comprehensive overview of the current status of HNS preparedness and response within South Africa, highlighting the country's strategic position and the associated maritime risks. The presentation emphasized that while South Africa has ratified international conventions like OPRC 90 for oil pollution and the HNS Convention 2010, the OPRC-HNS Protocol 2000 has not yet been ratified. A significant increase in maritime traffic was highlighted, due to regional conflicts, noting that 35% of containers lost at sea globally in 2024 occurred off the South African coast, posing substantial risks to the marine environment and responders.

The technical portion of the presentation detailed how HNS substances are identified through various international maritime codes, including the IBC Code for the carriage of chemicals in bulk form, the IGC Code for the carriage of liquefied gases in bulk, and the IMDG Code for the carriage of dangerous goods in packaged form. A critical gap was identified in the national regulatory framework: while the Marine Oil Pollution Act covers preparedness and response for oil, the current National Oil Spill Contingency Plan (NOSCP) does not yet contain specific elements for HNS. Current capabilities are centered around the Incident Management System (IMS), with ongoing training and previous large-scale exercises conducted to build response capacity. The session concluded that effective HNS management in South Africa requires further legislative integration and specialized information on the fate and behavior of chemical substances to address their unique risks compared to traditional oil spills

Session 10: Legal Framework and IMO Conventions

Natalie Kirk (ITOPF) provided a comprehensive overview of the international regulatory framework governing the safety, prevention, and compensation related to HNS incidents at sea. The session highlighted three main pillars of IMO instruments: safety and prevention (SOLAS and MARPOL), preparedness and response (OPRC-HNS Protocol), and liability and compensation (HNS Convention). Key technical codes were examined, including the IMDG Code for packaged dangerous goods, the IBC and IGC Codes for bulk chemicals and liquefied

gases, and the IMSBC Code for solid bulk cargoes, each providing specific standards for ship construction, equipment, and cargo handling to minimize risks. MARPOL Annex II and III were specifically discussed for their roles in regulating carriage of HNS in bulk and in packaged form, including the establishment of pollution categories, as well as requirements for packaging, marking, and discharge limits.

The presentation also addressed the HNS Convention 2010, noting its two-tiered compensation system funded by shipowners and HNS receivers, while emphasizing that it is not yet in force despite being a critical tool for filling some of the existing gaps in international liability regimes. In conclusion, the session reinforced that while a robust framework of mandatory codes exists to ensure maritime safety, full global implementation of the HNS Convention remains a key objective for comprehensive environmental and economic protection.

Session 11: Case studies

Franck Laruelle (ITOPF) presented a series of historical and contemporary case studies to illustrate the evolution of HNS incident management and outline associated challenges. The session opened with historical disasters such as the Mont Blanc (1917) and the Grandcamp (1947), which highlighted the catastrophic potential of explosive cargoes like ammonium nitrate.

Moving to more recent incidents, the case of the *Levli Sun* (2000) demonstrated the complexities of responding to a chemical tanker carrying multiple substances—styrene, methyl ethyl ketone, and isopropyl alcohol—where the decision was made to allow a controlled release from the sunken wreck after a thorough risk assessment determined that the environmental impact would be minimal compared to the risks of recovery.

The presentation also examined the *Stolt Valor* (2012) incident in the Persian Gulf, which underscored the critical and often difficult issue of securing a Place of Refuge (PoR) for a damaged chemical tanker. Despite significant damage from a bridge explosion and fire, the vessel was eventually stabilized through international coordination led by MEMAC, and its cargo was successfully transhipped at sea without a major spill.

Collectively, these cases emphasized that successful HNS response is heavily dependent on rapid technical risk assessments, effective international cooperation and timely decision making, in the face of a challenging political landscape that often influences whether ships in distress are permitted to enter national waters.”

Session 12: HNS HYDRONEXUS ITOPF Exercise

A half-day tabletop exercise, simulating the collision between an LNG-powered container ship and a chemical tanker carrying nitric acid, was delivered in the afternoon. Working in groups, participants gathered incident information, identified and prioritised sensitive resources for protection, and planned response operations. The exercise was designed to consolidate learning by highlighting the complexities and nuances involved in an HNS incident.



Day 3

Session 13: What's in the Box? Responding to DG Container Incidents

Franck Laruelle (ITOPF) examined the escalating challenges posed by container ship incidents, noting that the rapid increase in vessel size, from early ships carrying 500 TEU to modern Ultra Large Container Vessels (ULCVs) exceeding 24,000 TEU, has fundamentally changed the scale of potential HNS incidents.

The session highlighted the "black box" nature of containerized trade, where the sheer volume of cargo and the complexity of the Dangerous Goods (DG) manifest make rapid assessment difficult. Key operational challenges include the risk of chemical mixtures and unpredictable reactions when different substances interact with water, fire, or each other, alongside the issue of non-DG classified cargoes, such as plastic pellets or epoxy resins, which can still cause significant environmental harm. The presentation detailed the physical difficulty of responding to fires or leaks deep within a stack.

Furthermore, the session addressed the long-term complexity of debris recovery, as seen in cases where thousands of containers are lost at sea, requiring extensive sonar surveys and specialized salvage to prevent shoreline contamination. Ultimately, the session concluded that responding to DG container incidents is a high-stakes endeavor that requires precise cargo data, sophisticated modeling, and a recognition that traditional response options are often limited due to the behaviour of the substance as well as the physical constraints posed by the vessel.

Session 14: HNS Case Study 2: KEA TRADER and Mini-Exercise

ITOPF facilitated a second tabletop exercise based on the real-life 2017 grounding of the container ship KEA TRADER, which was carrying 50 containers of dangerous goods. During the exercise, participants were asked to identify which containers on board were at risk of releasing their contents and to consider the associated environmental hazards. Using documents such as the dangerous goods manifest, cargo plan by bay, capacity plan, and general arrangement plan, teams worked through locating hazardous containers, determining their stowage positions, and assessing which units were most vulnerable to flooding. The activity aimed to build familiarity with shipping documentation, strengthen participants' ability to navigate vessel layouts, and support timely decision making when evaluating environmental risks during an HNS incident.

Session 15: Case Study: X-PRESS PEARL

Natalie Kirk (ITOPF) provided an overview of the X-Press Pearl incident, which occurred off the coast of Sri Lanka in 2021 and illustrates the operational, environmental and socioeconomic challenges associated with HNS container fires. The vessel was on fire when it arrived at Colombo anchorage. The fire was suspected to have been caused by a leak of nitric acid cargo and continued to spread throughout the ship, ultimately resulting in the vessel sinking approximately 11 kilometres from the shoreline.

An early challenge involved interpreting the dangerous goods manifest, which listed 81 containers of hazardous substances, including methanol, vinyl acetate, sodium hydroxide, and various other flammable, corrosive, and reactive substances. Risk assessments were prepared for each dangerous good onboard, and atmospheric plume modelling and gas testing were conducted to determine whether nearby communities required evacuation.

During the sinking, the ship released containers and container fragments into the anchorage. This debris created a physical hazard for navigation and for local fishers. Salvors used side-scan sonar and ROV surveys to locate and recover containers. Concerns were also raised about the potential release of dangerous goods into the marine environment, prompting environmental monitoring.

However, the most significant issue arising from the incident was related not to the HNS cargo but to the 422 containers of plastic pellets. Several of these containers spilled, resulting in widespread pellet contamination along much of Sri Lanka's western coastline and a prolonged, labour-intensive cleanup operation.

This case demonstrates the multiple dimensions involved in responding to container ship incidents, highlighting the complexity of such events, the importance of accurate cargo documentation, the value of specialised HNS expertise.

Session 16: Handling of HNS and COTO Waste

Natalie Kirk (ITOPF) addressed the challenges of managing waste generated by HNS incidents. As with other types of waste, operations should be managed such that waste

volumes are minimised and solutions such as re-use and recycling are considered before resorting to disposal.

The disposal of hazardous waste is subject to regulatory control, and specialised licences are typically required for its transport, storage, and final disposal. Key operational standards such as rigorous labelling of hazardous properties, secure packaging to prevent secondary contamination during transport, and strict segregation of waste types were highlighted. Furthermore, the importance of meticulous documentation and record-keeping regarding waste composition and quantities was stressed, not only for site safety but also to support future claims and compensation processes.

In conclusion, the selection of disposal sites must be limited to authorized facilities capable of handling the specific technical requirements of HNS and contaminated waste.

Session 17: Place of refuge

Franck Laruelle (ITOPF) examined the complex technical and political challenges of granting a Place of Refuge (PoR) to a vessel in distress, particularly when hazardous and noxious substances are involved. The session used historical precedents like the *Castor* and the *Prestige* to illustrate how refusing a ship access to sheltered waters can escalate a manageable incident into a complex and large-scale pollution event.

A Place of Refuge is defined as a location where a ship can take action to stabilize its condition, reduce hazards, and protect the marine environment, with options ranging from ports and anchorages to natural shelters. The presentation detailed the IMO Guidelines on Places of Refuge, which require a balanced assessment of the risks to the coastal state versus the risks of leaving the vessel at sea. Technical considerations for such decisions include ship stability, the nature of the cargo, prevailing weather conditions, and the availability of salvage facilities.

The case of the *MSC Napoli* (2007) was highlighted as a successful example where a damaged container ship was intentionally beached in a controlled manner to allow for the safe removal of oil and over 2,300 containers, including dangerous goods, despite significant logistical and health and safety hurdles.

Ultimately, the session emphasized that while granting a PoR is often politically sensitive, it is frequently the most effective strategy for minimizing the overall impact of an HNS incident through controlled intervention and transshipment.

Session 18: Planification to contingency planning for HNS incident

Natalie Kirk (ITOPF) discussed the essential components of developing a robust contingency plan for HNS incidents, emphasizing that moving from oil spill response to HNS represents a significant paradigm shift due to the specialized knowledge and increased safety risks involved.

A successful HNS contingency plan must provide a clear definition of roles and responsibilities and be built upon scenario-based risk assessments that allow for a tiered and scalable response. Unlike traditional oil plans, the primary focus of HNS planning is the

immediate risk to human health, which necessitates a rapid and highly technical initial assessment.

The session detailed that capacity building for HNS takes longer and requires specialized training to foster inter-agency relationships and ensure that relevant experts are identified before an incident occurs. Key elements of the plan structure include identifying lead and advisory organizations, outlining regulatory frameworks, developing credible incident scenarios, mapping sensitive resources, and establishing an inventory of equipment stockpiles and waste management options.

Ultimately, the presentation reinforced that exercising these plans during "peacetime" is critical to streamlining communication and information sharing, ensuring that the national response mechanism can mobilize quickly and effectively when an HNS incident arises.

Session 19: Contingency Planning & Preparedness – A South African Context

Feroza Albertus, Control Environmental Officer from the Department of Forestry, Fisheries and Environment, provided a detailed overview of South Africa's National Oil Spill Contingency Plan (NOSCP) and its application within the broader national maritime emergency framework. The session highlighted the collaborative nature of South Africa's response structure, which integrates multiple government departments, including Transport, Mineral Resources, and Energy, alongside authorities like SAMSA and the Transnet National Ports Authority.

Central to the South African approach is a tiered response model that allows for scalability from local (Tier 1) to national (Tier 4) levels, ensuring that resources such as emergency towing vessels and specialized salvage equipment are deployed effectively according to the magnitude of the incident.

The presentation emphasized the use of the Incident Management System (IMS) to coordinate multi-agency efforts and protect sensitive coastal ecosystems and economic interests. To maintain readiness, the plan undergoes a structured review every five years, supplemented by biannual operational tests and post-incident evaluations to identify lessons learned and resource gaps.

The session concluded by reinforcing that while the current framework is robust and aligned with global standards for oil, the ongoing proactive engagement of stakeholders and continuous training remains essential for adapting these established preparedness measures to the specific challenges posed by HNS maritime risks.

Day 4

Session 20: Group work – HNS incident preparedness review

At the end of Day 3 and into Day 4, participants undertook a structured group exercise designed to review South Africa's current level of preparedness for HNS incidents. Each team examined a series of key preparedness components, from legislation and risk assessment to response capabilities, equipment, procedures, and training, and assessed how developed the national system is in each area. For every item, participants discussed whether relevant

mechanisms already exist, which agencies would lead, what information sources or tools are available, and where major gaps remain. This exercise functioned as an initial gap analysis to support IMOrg members who will be responsible for developing a national HNS contingency plan, helping them identify priority areas requiring further work. A table summarising the outputs of all groups is provided in Appendix 4.

A central topic of discussion was whether the future HNS contingency plan should stand as a separate document or be integrated into the existing NOSCP. Opinions were divided: some participants favoured a standalone plan due to the administrative challenges of amending the NOSCP, while others advocated for full integration, noting the substantial overlap between oil and HNS response elements and the benefits of maintaining a single, streamlined document going forward. The exercise did not aim to resolve these questions but to highlight the considerations involved and to provide the IMOrg with a clearer picture of the decisions and technical issues that will need to be addressed as national HNS preparedness work progresses.

Closing ceremony

The workshop concluded with a closing ceremony that included a final group discussion and roundtable exchange, during which participants shared questions, comments and key recommendations arising from the four days of discussions. This was followed by the workshop evaluation and concluding remarks delivered by Ms Anaïs Guillou (GI WACAF), who highlighted the main outcomes of the workshop and reaffirmed GI WACAF's commitment to supporting national and regional efforts to strengthen HNS preparedness and response. Ms Stella Matlala (Department of Transport) then delivered the closing remarks, emphasising the importance of continued collaboration, coordination among competent authorities and sustained capacity building. The ceremony concluded with the presentation of certificates to all participants, formally marking the completion of the workshop.

Recommendations from GI WACAF

Based on the discussions held during the workshop, GI WACAF formulated the following recommendations to support the development and strengthening of national HNS preparedness and response contingency plan.

Legal and institutional framework

- **Ratify relevant conventions.** It is recommended that South Africa considers ratifying the OPRC-HNS Protocol to strengthen their legal basis for preparedness and response to incidents involving Hazardous and Noxious Substances.
- **Define the scope.** The scope of the national HNS contingency arrangements should be clearly defined and aligned with the National Oil Spill Contingency Plan (NOSCP).
- **Determine the plan format.** South Africa is encouraged to determine whether the HNS contingency plan should be fully integrated into the NOSCP or maintained as a

standalone document, while ensuring clear interfaces with other relevant national emergency and sectoral plans. From an emergency response perspective, integrating HNS considerations within the NOSCP is often viewed as operationally advantageous. Incidents at sea frequently involve both oil and HNS, and maintaining both sets of provisions within a single framework helps ensure internal consistency, facilitates simultaneous updates, and simplifies use during a response.

- **Gazetted authority:** If not already in place, consider designating an individual to make operational decisions during an incident, such as directing nearby vessels to assist or requesting terminals to deploy equipment, to enable a rapid and coordinated response. For example, in Singapore the Port Master is formally gazetted under national legislation and holds such authority. In the United Kingdom, the Secretary of State's Representative for Maritime Salvage and Intervention (SOSREP) has ultimate control and legal power to make a final decision during national maritime emergencies on matters related to salvage and source containment, including granting a Place of Refuge to ships in distress. Establishing a similar mechanism could enhance the efficiency and timeliness of emergency actions.

Stakeholder mapping

- **Identify relevant public-sector stakeholders.** Additional public sector stakeholders beyond those already involved in oil spill preparedness should be formally identified to ensure that all organisations with HNS-relevant responsibilities or expertise are considered. This includes national authorities with roles in fire response, road and maritime transportation, public health, civil protection, and emergency management, as well as institutions with environmental monitoring capabilities, such as those responsible for sampling and laboratory analysis.
- **Identify relevant stakeholders from the private-sector and academia.** Stakeholder mapping should also capture technical expertise that exists outside government structures. This includes the chemical and petrochemical industries, specialist response organisations with experience in HNS, commercial service providers offering modelling or analytical capability, and academic or research institutions with relevant scientific or engineering expertise.
- **Integrate new stakeholders into the national preparedness system.** Identified organisations should be considered and approached early in planning so that their potential contributions during an HNS response are clearly understood. Thought should be given to how each would be integrated into the national response structure, including how their expertise would be activated and coordinated during an incident.

Risk assessment and response

- **Assess HNS risks.** An essential component of preparedness is a thorough assessment of national HNS risks. This includes identifying which substances are transported, in what quantities, how they are packaged, the points in their voyage where incidents are most likely, the potential release volumes during routine operations, and the geographical areas that may be affected. Existing systems for tracking bulk HNS, such as a database of all HNS transported in bulk or stored within ports, can support this process. Such a database typically contains information from

vessel declarations (ideally submitted 24 hours before arrival) on the type and quantity of HNS carried (including substance Safety Data Sheets where possible), as well as details on the terminals involved in loading or discharge operations. Using this information allows authorities to identify the main HNS moved in significant volumes nationally and to ensure that evolving risk profiles are reflected in the contingency plan.

- **Identify scenarios.** Using the information gleaned through the risk assessment exercise, consider developing several credible and representative scenarios to guide contingency planning.
- **Substance-specific risk assessment.** For each of the main substances at risk identified during the national HNS risk assessment exercise, consider developing a substance-specific fact sheet (also called a substance-specific risk assessment). The fact sheet should cover the substance's fate and behaviour, hazards, safety precautions, responder PPE requirements, and potential environmental and socioeconomic impacts. These fact sheets would provide incident managers and responders with an immediate and reliable reference to support timely and informed decision-making, particularly in the early stages of an incident, when critical information on substance behaviour, hazards, and response considerations is needed but not always readily available. Ensure that the fact sheets are prepared and reviewed by experts with proven technical expertise in maritime HNS incidents. An example of a substance-specific risk assessment prepared by ITOPF is provided in Appendix 5.
- **Define response strategies.** Response strategies should then be defined according to SEBC behaviour groups so that actions during an incident reflect the expected fate and behaviour of the substances involved.
- **Inventory response assets.** An inventory of existing HNS-relevant equipment should be compiled across government, private-sector, and port facilities, with any capability gaps identified early. Special consideration should be given to monitoring equipment (gas monitors, drones, etc), PPE and towage and firefighting assets. Consider mandating regular inspections of chemical terminals and equipment stores to ensure response readiness. These tasks are often under the purview of the port authority.
- **Consider waste management.** Address waste management requirements, including the applicable regulatory framework, options for temporary storage, and the availability of disposal facilities capable of handling HNS-contaminated waste. Consider making this information publicly available. For example, in Singapore the National Environment Agency (NEA) publishes a list of licensed industrial toxic-waste collectors on its website, indicating the types of substances each facility is authorised to treat or dispose of (a link is provided below). Having similar information readily available during an incident can help streamline decision-making.
[https://www.nea.gov.sg/docs/default-source/our-services/pollution-control/hazardous-waste/list-of-tiw-collectors-\(30-oct-23\).pdf](https://www.nea.gov.sg/docs/default-source/our-services/pollution-control/hazardous-waste/list-of-tiw-collectors-(30-oct-23).pdf).
- **Incorporate lessons from past incidents.** Lessons learned from previous national and international incidents should be reviewed and incorporated to ensure that recognised challenges and good practices are reflected in the developing contingency

plan. This process can be supported by integrating an After-Action Review (AAR) mechanism into the plan, providing a structured forum for all stakeholders to meet after each incident or planned exercise to review actions taken and identify improvements.

- **Places of refuge.** Consider how decisions would be made if a vessel in distress were to request a Place of Refuge, particularly when HNS are involved. Developing a clear decision-making process can help authorities weigh the risks of granting access to sheltered waters against the risks of keeping the ship offshore. This may include identifying potential locations where a vessel could be safely accommodated, outlining how technical assessments would be conducted, and determining which agencies would participate in the evaluation and who would make the final decision (see above recommendation on Gazetted Authority).

Training and exercises

- **Build capacity.** Consider complementing current OPRC training programmes with OPRC-HNS training. The goal is to build capacity within the incident management team and response organisations to address the various facets of an HNS response, from situational assessment and hazard identification to making timely, technically justified decisions within the short timeframes often required during such incidents.
- **Exercises for HNS incidents.** Consider expanding the national exercise schedule to include HNS-specific scenarios, giving agencies the opportunity to test plans, coordination arrangements, and operational procedures under conditions that reflect the unique characteristics of HNS incidents. Ensure the participation of all relevant stakeholders, including those newly identified through stakeholder mapping. If the expertise or experience needed to run credible HNS exercises is not available within the IMOrg, it may be possible to draw on the capabilities of government departments not typically involved in marine casualty management, or on specialists from the chemical and petrochemical industries.
- **Cross-border exercises.** Where risks warrant it, as identified through the risk-assessment process, joint exercises with neighbouring countries should also be incorporated into the plan, particularly when there is potential for cross-boundary HNS spills.

Organising work

- **Designate a leader.** If not already done, the IMOrg should consider designating a lead and a deputy to coordinate the development of the national HNS contingency plan and to maintain oversight of contributions from participating organisations.
- **Define work streams.** The work can be organised into clearly defined work streams, with a designated lead for each stream to support accountability and continuity.
- **Identify external expertise needs.** For every work stream, it may be helpful to identify the external expertise required, such as technical specialists, scientific advisors, or industry representatives, so that the necessary knowledge and support are incorporated into the planning process.

The national workshop on Hazardous and Noxious Substances (HNS) contingency planning, held in Durban in July 2025, represented a significant milestone in strengthening South Africa's marine pollution preparedness and response capabilities.

Through in-depth technical sessions and simulation exercises, participants developed a comprehensive understanding of the specific challenges associated with HNS incidents, which differ fundamentally from oil spills due to their diverse chemical behaviours and the heightened risks they pose to human health and responder safety. Discussions highlighted the critical importance of specialised expertise, appropriate personal protective equipment (PPE), and rapid access to reliable technical information to support effective and timely decision-making.

The review of the national framework confirmed the existence of solid foundations, notably through the Incident Management System (IMS) and the National Oil Spill Contingency Plan (NOSCP). However, the discussions also identified the need to further integrate HNS considerations into national preparedness arrangements in order to address remaining legislative, institutional and operational gaps.

This workshop also served as the starting point of the HNS contingency planning drafting process, acting as a kick-off meeting that brought together all relevant stakeholders around the table to initiate a structured and coordinated approach. The shared ambition is to develop a first draft of the HNS contingency framework within the coming months, building on the momentum and common understanding established during the workshop.

In conclusion, the effective development and implementation of an HNS contingency plan will rely on sustained inter-agency cooperation, the ratification of relevant international instruments such as the OPRC-HNS Protocol 2000, and the continuation of targeted training and exercise programmes. The GI WACAF project reiterates its commitment to supporting South Africa throughout the next phases of this process, with the objective of strengthening long-term protection of the marine environment and coastal populations.

Annex 1: Opening speeches

Anais Guillou, GI WACAF Project Manager, IMO/Ipieca

*Distinguished representatives of the Government of South Africa from the Department of Transport and SAMSA,
Esteemed facilitators from ITOPF,
Dear participants,
Good morning,*

It is my great pleasure to welcome you all to this national workshop on Hazardous and Noxious Substances (HNS) contingency planning here in Durban. We are grateful to the Government of South Africa for hosting us and for its continued commitment to strengthening preparedness and response capacity across the region

This workshop is part of the long-standing collaboration between the International Maritime Organization (IMO) and IPIECA under the Global Initiative for West, Central and Southern Africa—GI WACAF. Since 2006, this partnership has supported countries in enhancing their national systems for preparedness and response, guided by international conventions and by the practical experience of authorities and industry working together.

South Africa has long been recognised as one of the region’s leaders in maritime preparedness. The country’s robust regulatory frameworks, strong institutional arrangements, and operational capabilities—particularly through SAMSA and the Department of Transport—set a standard for the sub-region. But South Africa also faces significant and evolving HNS risks. As highlighted in your national context session scheduled for this week, these include intense shipping traffic along major global trade routes, a growing volume of dangerous goods transported in containers, and the increasing presence of alternative marine fuels.

These realities mean that preparedness must continue to evolve. Because of the variety of behaviours, properties and fates of chemicals, HNS spills are likely to require expertise not only from civil and governmental agencies but also private entities and industries. Certain components of preparedness are more critical for HNS spills, in particular health and safety aspects. Therefore, aspects relating to Personal protective equipment (PPE), decontamination and monitoring must be thoroughly planned.

Over the next four days, you will engage in presentations, discussions, and practical exercises designed not only to build technical knowledge, but to strengthen cooperation and decision-making among all actors. The programme aims to help South Africa refine its national HNS framework, identify gaps, and ensure alignment with international best practice.

As we begin this workshop, I would like to encourage each of you to engage fully, to exchange experiences openly, and to take advantage of the opportunity to strengthen the already solid foundations that South Africa has established. Your work this week will not only contribute to national readiness—it will enrich regional preparedness as well.

On behalf of GI WACAF, IMO and IPIECA, I wish you an excellent workshop and fruitful discussions. Thank you once again to our hosts for their dedication, and to all participants for your commitment to enhancing HNS preparedness and response.

Thank you.

Annex 2: Programme

Day 1 – Tuesday 25th November	
08:30 – 09:30	Registration of participants
09:30 – 10:00	Opening ceremony and workshop introduction <ul style="list-style-type: none"> • Welcome address, Anaïs Guillou, GI WACAF • Opening remarks, Captain Ravi Naicker, SAMSA
10:00 – 10:15	Introduction of the Workshop – Marine Laigle, GI WACAF <ul style="list-style-type: none"> • Presentation of the GI WACAF Project • Purpose of the workshop and programme agenda • Introduction of the facilitators
10:00 – 10:45	What are HNS? – Natalie Kirk, ITOPF
10:45 – 11:15	<i>Group photograph and coffee break</i>
11:30 – 12:15	Chemical substances, hazard, behavior and effects assessment – Franck Laruelle, ITOPF
12:15 – 13:00	Information Resources to HNS Incidents (+ mini exercise)
13:00 – 14:00	<i>Lunch</i>
14:00 – 14:45	Monitoring & Evaluation: A key HNS Response Tool – Natalie Kirk, ITOPF
14:45 – 15:15	Response strategies to HNS incidents – Franck Laruelle, ITOPF
15:15 – 15:45	HNS PPE Requirements – Natalie Kirk, ITOPF
15:45 – 16:00	<i>Tea/Coffee Break</i>
16:00 – 17:00	Alternative Marine Fuels: Fate, Behaviour & Risks including South Africa's Substances of Concern – Franck Laruelle, ITOPF
17:00	End of Day 1

Day 2 – Wednesday 26 th November	
08:30 -09:00	Welcome: recap of Day 1 and review of Day 2 timetable
09:00 – 09:30	HNS in South Africa – <i>Capt. Winston Lobo</i>
09:30 – 10:00	Legal framework and IMO Conventions – <i>Natalie Kirk, ITOPF</i>
10:00 – 10:45	Case studies – <i>Franck Laruelle, ITOPF</i>
10:45 – 11:15	Coffee break
11:15 – 13:00	Work session : HNS HYDRONEXUS Exercise
13:00 – 14:00	Lunch
14:00 – 15:15	Work session : HNS HYDRONEXUS Exercise
15:15-15:30	Coffee break
15:30-16:30	Work session : HNS HYDRONEXUS Exercise
16:30	End of Day 2

Day 3 – Thursday 27 th November	
08:30 – 09:00	Welcome
09:00 - 09:30	What's in the Box? Responding to DG Container Incidents – <i>Franck Laruelle, ITOPF</i>
09:30 – 10:45	HNS Case Study 2: KEA TRADER and Mini-Exercise
10:45 – 11:15	Coffee break
11:15 –11:45	Case Study: X-PRESS PEARL – <i>Natalie Kirk, ITOPF</i>
11:45 – 12:15	Handling of HNS and COTO Waste – <i>Natalie Kirk, ITOPF</i>
12:15 – 13:00	Place of refuge – <i>Franck Laruelle, ITOPF</i>
12:45 – 14:00	Lunch
14:00 – 14:30	Planification to contingency planning for HNS incident – <i>Natalie Kirk, ITOPF</i>

14:30 – 15:00	Contingency Planning & Preparedness – A South African Context - Feroza Albertus
15:00 – 15:15	Coffee break
15:15– 16:30	Group work – HNS incident preparedness review
16:30	End of Day

Day 4 – Friday 28th November	
08:30	Welcome
09:00 – 10:45	Group work – HNS incident preparedness review (continued)
10:45 – 11:15	Coffee break
11:15 -12:30	Group work – HNS incident preparedness review (continued)
12:30 – 13:00	Group discussion – round table – Questions, comments and recommendations
13:00 – 14:00	Lunch
14:00 – 14:30	Closing session <ul style="list-style-type: none"> • Workshop evaluation/ Conclusion, <i>Ms Anais Guillou, GI WACAF</i> • Closing Remarks <i>Ms Stella Matlala</i> <i>Department of Transport from South Africa</i> Presentation of Certificates
14:30	Coffee break and End of the workshop

Annex 3: List and contact of participants

ID	Name	Position	Organization	Email Address
1	Winston Lobo	Senior Technical Manager	South African Maritime Safety Authority	wlobo@samsa.org.za
2	Fatima Shaik	HEAD: Health, Safety, Security and Environment	Fuels Industry Association of South Africa	hsse@fuelsindustry.org.za
3	Lona Nondaka	Specialised Environmental Officer	Department of Forestry, Fisheries and the Environment	Lnondaka@dff.gov.za
4	Gareth Goosen	Director	Spill Tech	garethgoosen11@gmail.com
5	Zamafuze Ngcobo	Ops Manager	SARS	zngcobo@sars.gov.za
6	Salmaa Vincent	Marine Safety Specialist	Transnet National Ports Authority	salmaa.vincent@transnet.net
7	Wiseman Maomane	Intern	Department of Transport	MaomaneN@dot.gov.za
8	Feroza, ALBERTUS	Control Environmental Officer	Department of Forestry, Fisheries and Environment	fabertus@dff.gov.za
9	RAVI NAICKER	Senior Manager: Navigation, Security & Environment	SAMSA	rnaicker@samsa.org.za
10	Yolisa Tibane	Deputy Harbour Master	Transnet National Ports Authority	Yolisa.tibane@transnet.net
11	Stella Matlala	Deputy Director	Department of Transport	mamadis@dot.gov.za
12	Salmaa Vincent	Marine Safety Specialist	Transnet National ports Authority	salmaa.vincent@transnet.net
13	Sanele Khuzwayo	Marine Safety and Quality Systems Manager	Transnet National Ports Authority	Sanele.Khuzwayo2@transnet.net
14	Cebile Nzuzza	Senior Manager: Environment and Sustainability	Transnet National Ports Authority	Cebile.Nzuzza@transnet.net
15	Zandisile Mcinga	Lieutenant Colonel	Safety and Security	zandisilemcinga988@gmail.com
16	Seremi Maleka	DD: Project Management & Financial Administration	Department of Transport	Malekas@dot.gov.za
17	Mahlodi Mashita	Manager: Corporate Legal Advisory	SAMSA	mahlodimashita4@gmail.com
18	Sindile Kedibone Lenah Chauke	Warrant Officer	South African Police Services	ChaukeS4@saps.gov.za
19	Nic du Preez	International Operations Director	Drizit Environmental	nic@drizit.co.za
20	Tlou Matlala	DD: Maritime Policy Development and Legislation	Department of Transport	Matlalarvin@gmail.com
21	Sindile Chauke	Warrant Officer	SAPS	ChaukeS4@saps.gov.za

Annex 4: South Africa Preparedness Review Table

HNS preparedness review – consolidated

Existing emergency plans

Item	Started? Yes/No				Lead agency				Useful sources of information?				Notes			
	Team A	Team B	Team C	Team D	Team A	Team B	Team C	Team D	Team A	Team B	Team C	Team D	Team A	Team B	Team C	Team D
Ship board HNS plans on ships flying SA flag.	No	NOT SURE	No	Yes	DoT/IM Org	SAMSA	DOT/SAMSA	Shipping companies		REGISTRER OF SHIPS		The HNS plans, procedures, policies etc.	HNS Protocol not yet signed	23 CONVENTION VESSELS ON THE REGISTER		
HNS plans for seaports and HNS handling facilities.	No			Yes	DoT	TNPA	DOT/TNPA/SAMSA	TNPA, Various public and private companies		TNPA HSE & HARBOUR MASTER DEPT		The HNS plans, procedures, policies etc.	HNS Protocol not yet signed			
National HNS response plan. Integrated in NOSCP or separate?	No				DoT		DOT/SAMSA/DFEE	Samsa		IMORG-GOVT & INDUSTRY	NOSCP	There is no HNS plan.	Preparations for the plan will commence in January 2026	35% HNS & OIL ONE PLAN, 55% SEPARATE PLANS OIL &		

ITOPF
comment

General agreement regarding the overall lack of Contingency plans specific to HNS

General agreement on which relevant agencies would be involved/leading

Relevant legislation

Item	List legislation				Ratified (yes/no)				Notes			
	Team A	Team B	Team C	Team D	Team A	Team B	Team C	Team D	Team A	Team B	Team C	Team D
Which international conventions are relevant?	OPRC 1990 OPRC HNS PROTOCOL 2010	HNS CONVENTION-PROTOCOL	HNS Convention	HNS Convention, MARPOL, SOLAS	OPRC 1990: YES OPRC HNS PROTOCOL 2010: NO	YES	Aceeed	yes		4 COUNTRIES STILL TO RATIFY TO ENTER INTO FORCE	Not yet ratified. Other IMO conventions and international conventions	Conventions and supporting guidelines and documents
Which national laws are relevant?	OPRC Bill to be promulgated	MARPOL CONVENTION	MLC, OHS	OPRC Bill, NEMA, MARPOL Act, OHS Act		YES	SAMSA	yes		IMORG-GOVT & INDUSTRY		Legislation and supporting guidelines and documents

ITOPF
comment

International instruments known/understood if not always yet ratified. National legislation transposing international conventions and specific domestic regulations

HNS Convention, relevant annexes of MARPOL ratified. OPRC HNS not yet ratified.

Competent authority

Item	Same as oil? (Yes/No)				Name of authority				Notes			
	Team A	Team B	Team C	Team D	Team A	Team B	Team C	Team D	Team A	Team B	Team C	Team D
Competent national authority identified?	Yes				DoT	DOT/SAMSA		Samsa		DFFE TO ASSIST		
ITOPF comment	Competent National Authority for HNS incident clearly identified. Same as for NOSCP.											

Risk Assessment (what can go wrong?)

Item	Started? Yes/No				Lead agency				Useful sources of information?				Notes			
	Team A	Team B	Team C	Team D	Team A	Team B	Team C	Team D	Team A	Team B (Ravi)	Team C (Malhodi)	Team D	Team A	Team B (Ravi)	Team C (Malhodi)	Team D
HNS hazards are well understood and catalogued. Do we know what HNS is transported around in South Africa? Substances, quantities, locations, packaging type. Where	No	STARTED	No	Yes from the point of view of responders and experts	TNPA Customs	TNPA, DOT	DOT/SAMSA/TNPA	Technical and HNS experts (marine chemists etc.), Responders	None	ID 100, EXPLOSIVES & NNR PERMIT. IMDG DECLARATION SUBMITTED TO HM DEPT	Product manifest, IPMS, Navis system, international databases: CAMEO, GESAM	HNS Database s: UK National Health Service, Safety Data Sheets, Gesamp, SDS, Technical guidelines (ITOPF/IP	To develop a list of HNS substances being imported /exported/in transit	FAMILIAR WITH IMDG CARGO , CHEMICAL TANKERS & LIQUID BULK MOVING THROU	There is partial information that needs to be integrated	

do we get the information?											IECA/IMO)		GH THE PORTS. NNR=NATIONAL NUCLEAR REGULATORY		
Fate and behaviour of main HNS is understood. Trajectory, fate, toxicity, etc.	No	STARTED	Not well understood a HNS perspective. Modelling tools required, to model credible scenarios.	Yes from the point of view of responders and experts	None	DOT	None	Technical and HNS experts (marine chemists etc.), Responders	None	IMDG CODE, IMBSC CODE, IGC CODE	HNS Database s: UK National Health Service, Safety Data Sheets, Gesamp, SDS, Technical guidelines (ITOPF/IP IECA/IMO)		NATIONAL WORKSHOP ON HNS CONTINGENCY PLANNING ,25-28 NOV 2025		
Identification of resources at risk. What is likely to be impacted and how?	Yes	PORTS, COMMUNITIES, ENVIRONMENT	No	Yes	DoT	ALL DEPTS	DOT/SA MSA/TN PA	Various government departments (DFFE, municipalities etc.),	None	VARIOUS	Maps, GIS, national databases	Comprehensive resources at risk have been identified in the NOSCP will need	MARINE WILDLIFE , ECO-TOURISM, TOURISM		

										B / CAIA DoEL / DFFE / Dept Water and Sanitatio n / Disaster Manage ment / TPT						
First Responders/Evaluation Team First to deploy to casualty (sometimes even before the risk profile is fully understood) to stabilise casualty and gain information.	Yes	Possible. Based on the risk assessment	Yes	DoT/IM Org	SAMSA/T NPA	TNPA/SAMSA/Local FD	Samsa, spill response, salvors	Will be required	TNPA FIRST RESPONDER COMPANIES	AMSOL / Smit / Drizit/Spill Tech/Product Specialist (Manufacturer) SDS/ Rescue SA / Rural Metro / NSRI / SANCCOB / CAIA DoEL / DFFE / Dept Water and Sanitation /	Response plans	Proper training for HNS will be required	PORT LIMIT RESTRICTIONS, ISO STANDARDS 9001, 18000, 45001, RISK REGISTER			

											Disaster Management / TPT					
Health & Safety Site specific plans, PPE requirements, responder exposure tracking, first aid and responder evacuation.	No	Yes	Possible. Based on the risk assessment	Yes	DoT/IM Org	SAMSA/T NPA	TNPA/SAMSA/Local FD	Responders: Spill Response, Salvors	None	SAMSA, TNPA HSE, DEL	AMSOL / Smit / Drizit/Spill Tech/Product Specialist (Manufacturer) SDS/ Rescue SA / Rural Metro / NSRI / SANCCOB / CAIA DoEL / DFFE / Dept Water and Sanitation / Disaster Management / TPT / Specialist suppliers	Risk assessments, health and safety plans and procedures, SDS	MARINE HNS RESPONSE MANUAL	OHS ACT, PORT AND SAMSA RISK REGISTER, PORT SOP, MARINE NOTICES, PORT EVACUATION PLAN		

											(Monitoring)					
<p>Priorities for protection What is more important than the rest? Scenario-based?</p>	Yes	Based on the risk assessment (per scenario)	Yes	DoT/IM Org	SAMSA, DOT	TNPA/SAMSA/Local FD	Samsa, DFFE	None	IMORG-GOVT & INDUSTRY	AMSOL / Smit / Drizit/Spill Tech/Product Specialist (Manufacturer) SDS/Rescue SA / Rural Metro / NSRI / SANCCOB / CAIA DoEL / DFFE / Dept Water and Sanitation / Disaster Management / TPT	Incident management structure (form 201)	MARINE HNS RESPONSE MANUAL IMO relevant Publications	SENSITIVITY ATLAS, MARINCE SPATIAL PLANNING MAP, NATIONAL DISASTER MANAGEMENT CENTRE			

Operational air monitoring Location and concentrations of pollutant/impacts.	No	NOT SURE - TNPA MAY HAVE INTSAL LED A FEW IN THE PORTS	Based on the risk assessment (per scenario)	Yes	DoT/IM Org	DOT	TNPA/SA MSA/Local FD	Responsible company	None	ENVIRONMENT CONSULTANTS,CSIR	AMSOL / Smit / Drizit/Spi II Tech/Product Specialist (Manufacturer) SDS/ Rescue SA / Rural Metro / NSRI / SANCCOB / CAIA DoEL / DFFE / Dept Water and Sanitation / Disaster Management / TPT / Specialist suppliers (Monitoring)	Air monitoring and air quality reports, HNS info (databases, SDS), laboratory analysis	MARINE HNS RESPONSE MANUAL IMO relevant Publications	TNPA SENSORS IN THE PORTS		
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<p>Operational water and sediment monitoring Location and concentrations of pollutant/impacts. Adequate laboratory capability available?</p>	<p>Yes</p>		<p>Based on the risk assessment (per scenario)</p>	<p>Yes</p>	<p>DoT/IM Org</p>	<p>TNPA</p>	<p>TNPA/SA MSA/Local FD</p>	<p>Responsible company</p>	<p>Will be required</p>	<p>DOT,DFE,CSIR,TNPA DREDGING SERVICES,ENVIRONMENTAL CONSULTANTS,ACADEMIA</p>	<p>AMSOL / Smit / Drizit/Spi II Tech/Product Specialist (Manufacturer) SDS/ Rescue SA / Rural Metro / NSRI / SANCCOB / CAIA DoEL / DFFE / Dept Water and Sanitation / Disaster Management / TPT</p>	<p>Monitoring reports, HNS info (databases, SDS), laboratory analysis</p>	<p>MARINE HNS RESPONSE MANUAL IMO relevant Publications</p>	<p>BATHYMETRY SURVEY RESULTS - DOD & TNPA, SA WATER QUALITY GUIDELINES, OCIMS</p>		
<p>Establishment of exclusion zones</p>	<p>No</p>	<p>Yes</p>	<p>Based on the risk assessment (per scenario)</p>	<p>Yes</p>	<p>DoT/IM Org</p>	<p>SANHO, DFFE</p>	<p>TNPA/SA MSA/Local FD</p>	<p>Samsa</p>		<p>SANHO PUBLICATIONS, GOVT DEPTS</p>	<p>AMSOL / Smit / Drizit/Spi II Tech/Product Specialist (Manufa</p>	<p>Assessment reports</p>	<p>To develop the exclusion and evacuation zones</p>	<p>NAVIGATION WARNINGS-EXCLUSION ZONE AT FA</p>		

											cturer) SDS/ Rescue SA / Rural Metro / NSRI / SANCCO B / CAIA DoEL / DFFE / Dept Water and Sanitatio n / Disaster Manage ment / TPT			PLATF ORM, MARIN E SPATIA L PLANN ING ACT		
Evacuation Reference other plans or develop new ones?	No	Yes	Based on the risk assess ment (per scenari o)	Yes	DoT/IM Org	NDMC	TNPA/SA MSA/Loc al FD	Samsa		FIRE SERVICES , SAPS,ND MC	AMSOL / Smit / Drizit/Spi ll Tech/Pro duct Specialist (Manufa cturer) SDS/ Rescue SA / Rural Metro / NSRI / SANCCO	Evacuati on reports	To develop the source to control measur es	NDM ACT		

											B / CAIA DoEL / DFFE / Dept Water and Sanitatio n / Disaster Manage ment / TPT						
Source control measures Ex: Permit controlled release? Dumping of firefighting water at sea? Who takes the decision? Who issues the permits?	No	Yes	Based on the risk assessment (per scenario)	Yes	DFFE	DFFE	TNPA/SA MSA/Local FD	DFFE		DOT, DFFE, CSIR, ENVIRONMENTAL CONSULTANTS, AC ADEMIA	AMSOL / Smit / Drizit/Spill Tech/Product Specialist (Manufacturer) SDS/ Rescue SA / Rural Metro / NSRI / SANCCOB / CAIA DoEL / DFFE / Dept Water and Sanitation /	Legislation (NEMA), Directive,	To be finalized in the plan.	NEM (ICM ACT)- DUMPING PERMITS			

											Disaster Management / TPT						
Defining response strategy Floaters, Sinkers, Dissolvers, Evaporators	No	NOT SURE - TNPA MAY HAVE INTSAL LED A FEW IN THE PORTS	Based on the risk assessment (per scenario)	Yes	DoT/IM Org	IMORG	TNPA/SA MSA/Local FD	Responders and technical experts	Marine Chemist Modelling Marine Biologist	DOT,DFFE,CSIR,TNPA DREDGING SERVICES,ENVIRONMENTAL CONSULTANTS,ACADEMIA	AMSOL / Smit / Drizit/Spill Tech/Product Specialist (Manufacturer) SDS/ Rescue SA / Rural Metro / NSRI / SANCCOB / CAIA DoEL / DFFE / Dept Water and Sanitation / Disaster Management / TPT	Databases/GESAMP/SDS	IMDG CODE,IMBSC CODE,IBC CODE				

<p>Responders (agencies, private sector) Who will do the response? Firefighters, HNS experts, etc.?</p>	<p>Partial Yes,</p>	<p>Yes</p>	<p>Based on the risk assessment (per scenario)</p>	<p>Salvors, Spill Response, HNS Experts, Consultants, Fire Fighters, SOEs, Government</p>	<p>DoT/IM Org</p>	<p>IMORG</p>	<p>TNPA/SAMSA/Local FD</p>	<p>Samsa</p>	<p>Trained Fire Fighters in HNS substances NSIR International Fire Fighters capability ETV</p>	<p>NDMC, INDUSTRY RESPONDERS</p>	<p>AMSOL / Smit / Drizit/Spi II Tech/Product Specialist (Manufacturer) SDS/Rescue SA / Rural Metro / NSRI / SANCCOB / CAIA DoEL / DFFE / Dept Water and Sanitation / Disaster Management / TPT</p>	<p>Response plans</p>	<p>Manual HNS SDS Databases GESAMP</p>	<p>TO BE IDENTIFIED</p>		
<p>Surveillance Helicopters, drones, satellite, etc.</p>	<p>Partial Yes,-reconsider additional detection</p>	<p>Yes</p>	<p>Based on the risk assessment (per scenario)</p>	<p>Yes</p>	<p>DoT/IM Org</p>	<p>SANDEF, DOT, SASAR</p>	<p>TNPA/SAMSA/Local FD</p>	<p>Samsa</p>	<p>Aviation Experts Registered Drone operators</p>	<p>SANSA, SANDF, INDUSTRY</p>	<p>AMSOL / Smit / Drizit/Spi II Tech/Product Specialist (Manufa</p>	<p>Response plans</p>	<p>IOTPF OCIMS SANSA</p>	<p>LIMITED AERIAL RESOURCE CAPABILITY</p>		

	equipment for the different HNS Substances										cturer) SDS/ Rescue SA / Rural Metro / NSRI / SANCCO B / CAIA DoEL / DFFE / Dept Water and Sanitatio n / Disaster Management / TPT					
Firefighting at sea	Partial yes-substance dependent,ETV or other available tugs	Yes	Similar to oil, however, product has a Class base	Yes	DoT/IM Org	DOT	TNPA/SA MSA/Local FD	Samsa	Trained Fire Fighters in HNS substances	TNPA, AMSOL, SMIT, NDMC, DFFE, SANDF	AMSOL / Smit / TNPA	Response plans	SDS Databases	NDMC ,SALVORS		
Towage	Yes		Similar to oil	Yes	DoT/IM Org	DOT		Samsa	ETV Personnel Salvage Master	TNPA, AMSOL, SMIT	TNPA / Smit / AMSOL	Response plans	Ship specs emergency towing plan	TNPA & SALVORS		

Wildlife response	Partial Yes	Yes	Similar to oil, however, may require specific intervention for HNS exposure	Yes	DoT/IM Org	DFFE,IM ORG		DFFE	Marine Biologist Wildlife Responders	CAPE NATURE, SANPARKS, SANCCOB, SPCA & GREEN SCORPIONS	AMSOL / Smit / Drizit/Spill Tech/Product Specialist (Manufacturer) SDS/ Rescue SA / Rural Metro / NSRI / SANCCOB / CAIA DoEL / DFFE / Dept Water and Sanitation / Disaster Management / TPT / OSRL	Response plans	SDS Databases SANBI ITOPF SANCCOB DFFE	NOSCP & NOWP RCP		
Shoreline response for persistent products/packages	Partial yes-substance dependent	Yes	No answer. List of resources listed	Yes	DoT/IM Org	IMORG		DFFE	Coastal ecologist Coastal Managers Environ	ITOPF,OSRL,IPIECA,LOCAL RESPONDERS	Drizit/Spill Tech/Product Specialist (Manufacturer)	Response plans	Local Authorities DFFE Provincial Depart	NOSCP & NOWP RCP		

			suggest Yes					mental Experts		SDS DoEL / DFFE / Dept Water and Sanitatio n / Disaster Manage ment		ment Databas e			
Waste management plan Is HNS waste regulated? How?			yes	DoT/IM Org	DFFE	DFFE	DFFE	Coastal ecologist Coastal Manager s Environ mental Experts	ITOPF, OSRL, IPIECA, LOCAL RESPON DERS	Drizit/Spi ll Tech/Pro duct Specialist (Manufa cturer) SDS DoEL / DFFE / Dept Water and Sanitatio n / Disaster Manage ment	Legislati on	Local Authorit ies DFFE Provinci al Depart ment Databas e	WAST E MGT ACT		
Post spill monitoring Study the recovery of environmental assets. Are there national companies/un iversities	Partial yes		Yes	DoT/IM Org	DFFE	DFFE	DFFE	Coastal ecologist Coastal Manager s Environ mental Experts Marine	DOT, DFFE, CSIR, TNPA DREDGIN G SERVICES , ENVIRON	Drizit/Spi ll Tech/Pro duct Specialist (Manufa cturer) SDS DoEL / DFFE /	Assessm ent Reports, laborato ry analysis, HNS informa	CSIR DFFE SANBI Tertiary Instituti ons SAEON	IPIECA, ITOPF TIPS		

<p>capable of doing the work? Adequate laboratory capability available?</p>								<p>Biologist Research Scientists</p>	<p>CONSULTANTS, ACADEMIA, ITOPF</p>	<p>Dept Water and Sanitation / Disaster Management</p>	<p>tion (databases, SDS)</p>				
<p>ITOPF comment</p>	<p>Response / Incident Management organisation in place. Significant capabilities available between public and private sector. Need for clarifying operational aspects specifically for Marine HNS incidents in Contingency Plans.</p> <p style="text-align: center;">Relevant agencies, private sector entities and potential expertise clearly identified</p>														

Procedures

Item	Same as oil? Yes/No				Lead agency				Details			
	Team A	Team B	Team C	Team D	Team A	Team B	Team C	Team D	Team A	Team B	Team C	Team D
<p>Notification and reporting procedures.</p>	<p>Partial, Yes</p>	<p>Yes</p>			<p>DoT/SAMSA</p>		<p>MRCC / SAMSA / TNPA / DFFE</p>	<p>Samsa, DFFE</p>	<p>Same as in the NOSCP with additional notifications for HNS related stakeholders.</p>	<p>MARINE NOTICES</p>		<p>SAMSA notification, NEMA Section 30</p>
<p>Places of refuge Procedures in place for deciding where to send ships in trouble.</p>	<p>To be reviewed for both oil and HNS</p>	<p>Yes</p>	<p>No</p>		<p>DoT/SAMSA</p>	<p>DOT</p>		<p>SAMSA</p>	<p>Dependent on HNS and case by case</p>	<p>IMO CIRCULAR-A.1184(33) & NOSCP</p>		

Coordination between maritime HNS contingency plan and land based civil protection. In cases where threat spreads to population centres.	Partial yes	Yes	No	DoT/IM Org	NDMC	IMOrg	SAMSA	Coordination with Disaster Management is in place	TO A LIMITED DEGREE			
Requests for international assistance. What are the procedures? Who can help?	Yes			DoT/IM Org	DOT		SAMSA	IMO ITOPF OSRL	IMO GUIDELINE - REQUEST FORM	ITOPF, P&I clubs, CEDRE	OSRL	
Termination of operations Who decides it is safe to stop work?	Yes		Yes, but not for HNS	Yes	DoT/SAMSA		DOT/SAMSA/DoEL/DFFE/TNPA	SAMSA	Incident Commader	DEMOB PROVISION IN THE PLAN		Assesment reports
Termination of protective actions Who decides if it is safe for people to come back? For fisheries to reopen? For bathing to resume?	Yes		Yes, but not for HNS	Yes	DoT/SAMSA	DOT,SAMSA,DFFE	DOT/SAMSA/DoEL/DFFE/TNPA	SAMSA, DFFE	Local Disaster Management Authority	PROVISION IN THE PLAN	After the risk assessment review	Assesment reports

<p>Coordination with neighbouring countries in case of cross border incidents Do neighbouring countries have HNS contingency plans? Who is the lead authority? Are the significant HNS risks in border areas?</p>	<p>No</p>	<p>Yes</p>	<p>DoT/IM Org</p>	<p>DIRCO, DOT</p>	<p>BMA, SAMSA, IMO, SA, RS, DIRCO</p>	<p>SAMSA</p>	<p>To be specified in the HNS Plan</p>	<p>SEABORDERS - MOZAMBIQUE (NAIROBI CONVENTION) & NAMIBIA (BCC). SOME CONSIDERATION FOR LAND BORDERS (BOTSWANA, ZIMBABWE, ESWATINI, LESOTHO,)</p>	<p>SA is likely to be the first to have HNS plan. Neighbouring countries do pose HNS risks.</p>	<p>GIWACAF, Benguela Current Convention</p>
<p>ITOPF comment</p>	<p>Emergency procedures in place in-country, based on NOSCP approach. Lack of international coordination with neighbouring countries which should form part of the contingency planning process / ratification of OPRC HNS.</p>		<p>Lead and other relevant agencies clearly identified</p>							

Equipment

Item	What is available?				Where is it?				Quantities?			
	Team A	Team B	Team C	Team D	Team A	Team B	Team C	Team D	Team A	Team B	Team C	Team D
PPE for each level of protection	HNS-Unknown	UNKNOWN	Personal monitors, PIDs, Area sample monitors, SCBA, Respirators, Chemical suits, Bunker gear, Fire retardant and Fireproof gear, HAZMAT suits, Boots, Safety shoes and Gumboots, Facials, Goggles, Appropriate head protection, Specialise	All levels		NATIONAL	Private service providers, e.g Dromex, Delta health, Pienaar brothers, Drager and Service Providers, Authorities, Macro, Builders Warehouse (general PPE).	Throughout SA		LIMITED AVAILABILITY	Specialised equipment may be limited	Sufficient

			d head protection, Equipment for other high risk activities, e.g working at heights, confined space, entries, etc.									
Decontamination equipment	HNS-Unknown	UNKNOWN	Same as oil, may need some additional neutralisers	Decontamination units		NATIONAL		Throughout SA		LIMITED AVAILABILITY		Sufficient
Monitoring equipment	HNS-Unknown	UNKNOWN	Specialised air sampling, water sampling, etc, based on the chemical	PIDs, Gas Monitors, PH meters, samplers ect		NATIONAL	Specialised service providers like Drager. Environmental monitoring	Throughout SA		LIMITED AVAILABILITY	To be determined by the service provider	Sufficient

			of concern.				g service providers.					
Towage	ETV	TNPA, AMSOL, SMIT	Approximately 50 tugs and 1 ETV	Tugs	Cape Town	CPT, DBN, NATIONAL	It depends where the need it (CT, EL, etc)	All tug	1	AMSOL ETV CONTRACTED UNTIL 2029	Approximately 50 tugs and 1 Emergency Towing Vessel	Sufficient
Fire fighting	ETV/Port Tugs	TNPA, AMSOL, SMIT	Same as above and there is also fire fighting capability at Ports	Municipal function, TNPA and private operator	Cape Town	NATIONAL FIRE SERVICE, TNPA, SALVORS	At the ports	Throughout SA	1	PORT SPECIFIC	Same as above	Sufficient
Wreck management	ETV/Salvage companies	DOT	Nothing available in S.A	Salvage and wreck removal companies	Cape Town	CONTRACTED SERVICE	U.S and EU, (Smit, AMSOL & Resolve Marine), P&I club all 3 will outsource as they do not have capabilities	Throughout SA	1	SAMSA ISSUES DIRECTIVES FOR REMOVAL	Depends on the size of the vessel and how you want to dispose it	Sufficient

Dredging	HNS-Unknown	TNPA	3 dredgers available in S.A	Dredgers		DREDGING SERVICES	3 dredgers available in S.A	TNPA		NAME THE TNPA VESSELS		
ITOPF comment	Significant response capabilities available, for land-based / shoreline incident in particular. Marine capabilities available as well although not necessarily homogeneously distributed along the coastline / between major ports.											

Financing

Item	Same as oil? Yes/No				Lead agency				Details			
	Team A	Team B	Team C	Team D	Team A	Team B	Team C	Team D	Team A	Team B	Team C	Team D
An emergency fund is available to enable immediate response actions.	No	Yes	No		DoT/SAMSA		DOT & TNPA	SAMSA	To be legislated	MARITIME FUND PROVISION IN THE SAMSA ACT	Polluter pays principle	
Claims procedures in place.	No	Yes	As per P&I Club	No	DOT/SAMSA		Local P&I club correspondent, TOPIC, AR Brink & Bidvest P&I club	No	Ratification not yet ratified	NEMA PROVISION S28-POLLUTER PAY PRINCIPLE	12 world wide P&I clubs, management dependent on which club the vessel is registered with	
ITOPF comment	Mixed perception. Need for clarification within IMOrg and inclusion in HNS CP											

Training and exercises

Item	Same as oil? Yes/No				Lead agency				Technical experts (national, international, private sector)			
	Team A	Team B	Team C	Team D	Team A	Team B	Team C	Team D	Team A	Team B	Team C	Team D
A training programme for personnel is developed. Should be adapted to role (risk assessment, PPE, response, monitoring, claims, etc.)	To be developed	Yes	No	Yes	DOT/SAMSA	IMORG	DOT/SAMSA	Private (spill response companies, salvors and Government (TNPA, DFFE, SAMSA))	ITOPF IMO Government	ITOPF, IPIECA	The service providers and product specialists will be trained	National
An exercise schedule is established	No			Yes	DOT/SAMSA	IMORG	DOT/SAMSA	Private (spill response companies, salvors and Government (TNPA, DFFE, SAMSA))	ITOPF IMO	ITOPF, IPIECA	it should be a tired drill/response	National
ITOPF comment	Mixed perception probably due to confusion between Oil and HNS related training and exercising. Need for clarification and inclusion in HNS CP				Lead / relevant agencies and other entities clearly identified							

Reference materials				
Item	List reference materials			
	Team A	Team B	Team C	Team D
<p>List of reference materials relevant to HNS Either list all relevant reference materials to be referenced in the Plan here OR list them in the "useful sources of information column" in the above sections.</p>	ECHA CAMEO GESAMP SDS ITOPF IMO	HAZARDOUS & SUBSTANCES ACT, OSHA, SAMSA ACT, NEMA(AIR QUALITY MGT), SANS CODE, GESAMP, GESTIS, IMDG CODE, IBC CODE, IGC CODE, HNS FINDER, CAMEO	GESAMP, CAMEO, ERG book, IMDG code, chemical manufactures' websites: SASOL, Existing legislation: Harzadous chemical agents etc, Pvt company data book, NIOSH	National Workshop on Hazardous and Noxious Substances Contingency Planning HNS product Specific Information IPIECA, IMO, ITOPF Guidelines Legislation other
<p>unece.org/info/Transport/Dangerous-Goods/events/397660</p>		ECOSOC Sub- Committee of Experts on the Globally Harmonized System of Classification and Labelling of Chemicals (AC.10/C.4) (49th session)		

Annex 5: Example Substance-Specific Risk Assessment prepared by ITOPF for the table-top exercise.



ITOPF Liquefied Natural Gas (LNG) Risk profile

Incident:	HARMONY STAR / HYDRO NEXUS
Date:	23 rd October 2024
Prepared by:	Conor Bolas, ITOPF Technical Adviser
Revised by:	Dr Annabelle Nicolas-Kopec, ITOPF Senior Technical Adviser

Substance	<p>Liquefied natural gas (LNG)</p> <p>CAS Number: 8006-14-2</p> <p>UN Number: 1972</p> <p>Alternate names: Methane, Natural Gas, refrigerated liquid with high methane content, Marsh Gas, Methyl Hydride, Biogas.</p> <p>Liquefied Natural Gas (LNG) is a gaseous mixture of low-molecular weight paraffin hydrocarbons. It contains mostly methane and ethane, and may contain small amounts of propane, butane, longer-chain hydrocarbons, nitrogen, carbon dioxide, hydrogen sulphide, and/or helium. Given that the majority of these compounds have carbon chain lengths 1 - 4, using methane as a proxy for the physical and chemical properties of LNG is</p>
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	reasonable. However, it should be noted that LNGs from different sources have different compositions and therefore different physio-chemical properties.
Quantity	Total: 8,000 m ³ in bunker tank Spilled: Unknown, estimated to be 8,000 m ³
Fate and Behaviour	With a boiling point of -161.5°C, methane is a gas at 20°C. Therefore, upon release the liquid will rapidly boil and convert from liquid to gas. LNG may vaporise explosively. There may be the formation of white fog around the vessel as the air moisture condenses. The gaseous plume would initially spread at ground level, but as the gas increases in temperature, the plume will quickly rise into the atmosphere. Liquid LNG may be present at the release point for a short period of time in the case of a large release.
Hazards	Cryogenic: Given its very low boiling point and its rapid expansion, released LNG will cause a significant drop in temperature near the release area, giving rise to extreme cold risks. Asphyxiation: As the gas displaces oxygen, there is a high risk of asphyxiation, particularly in enclosed spaces immediately after the release. Fire/explosion: Natural gas is extremely flammable and poses a great risk of fire. With a flammable range in air of 5.3 to 14% by volume, any ignition source poses a great risk. Hence, great care should be taken not to expose the plume to an ignition source (e.g. spark, hot surface, naked flame). In case of fire, intact tanks may pose a Boiling Liquid Expanding Vapour Explosion (BLEVE) risk, due to pressure build up from rapidly expanding gases.
PPE / Precautions	To be provided later



Potential environmental impacts	To be provided later
Potential socio-economic impacts	To be provided later
Advised response actions	To be provided later