



Health risks and prevention practices during handling of fumigated containers in ports



Department of Occupational Medicine



Introduction

(Annick Starren, projectmanager, EU-OSHA)

- **EU-OSHA Bilbao:**
Tripartite EU body committed to making Europe a safer, healthier and more productive place to work, by promoting a culture of risk prevention to improve working conditions.
- **In 2016 this study has been commissioned to:**
Helse Bergen, Haukeland Universitetssjukehus (Magne Bråtveit and Rune Djurhuus).
- **Aim of this presentation today:**
 - to take notice of the draft report;
 - specifically we are interested in SSDC's input regarding the handling of fumigated containers in practice, e.g. examples of guidelines or good practices related to the prevention of risks from exposure of fumigated containers in ports.



Outline

- **Background**
- **Objectives**
- **Methods**
- **Legislation and regulations**
- **Fumigants and potential health risks**
- **Preventive actions and strategies**
- **Conclusions and recommendations**

Fumigation of transport containers

Containers are fumigated to protect the goods against pests

- insects
- rodents
- microorganisms



- AND to prevent spread of unwanted organisms

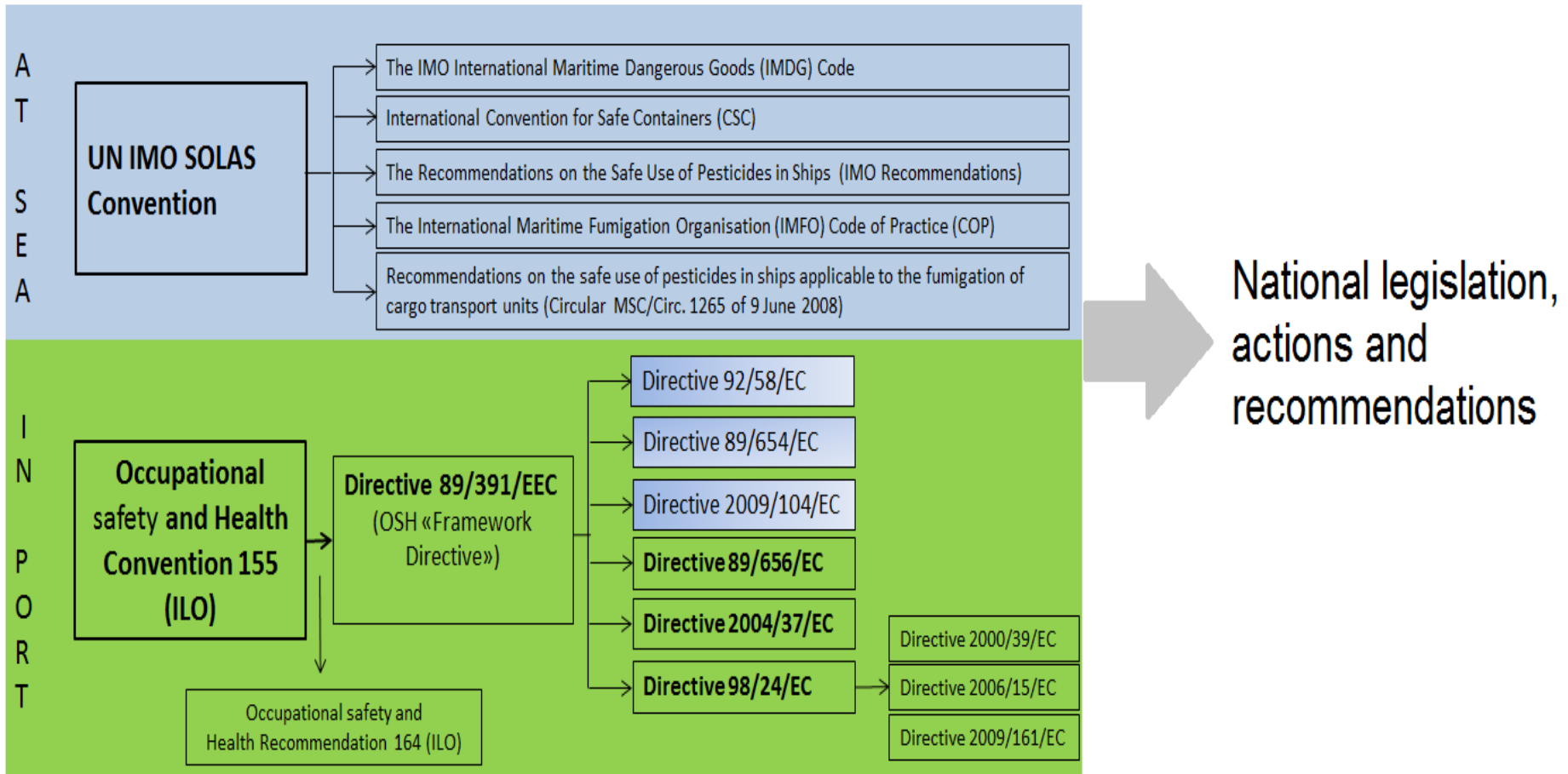


Objectives

- **Provide a review of potential safety and health risks imposed by exposure to fumigated freight containers in ports**
- **Identify prevention gaps**
- **Suggest recommendations on how these risks can be minimalized.**

- **The report describes relevant legislation and policy, guidance, and examples of preventive actions (good practices) and strategies that are used, and identifies health and safety risks including final conclusions and recommendations.**

Legislation and regulations



Relevant fumigants

Phosphine and Methyl bromide are the major ones today

- **Phosphine (PH₃) - high acute toxicity, possible long-term heart effects**
- **Methyl bromide - acute toxic, long term effects on CNS**
- **Formaldehyde - irritating at low concentrations, severe long-term effects; carcinogenic**
- **Ethylene oxide - irritating at low concentrations, severe long-term effects; carcinogenic**

Potentially exposed workers

- Exposure during fumigation
- Dock workers/customs, when opening/unloading containers that are not declared gas-free
- Workers opening fumigated containers at final destinations or warehouses - *not in the scope of this study*



- **Most containers arriving Europe are not opened at the ports**
- **No available information about which fraction of containers are opened at the ports**

Adverse health effects related to fumigated containers

- **So far no reports of fatalities**
- **Several reports describe adverse health effects in workers opening and unloading containers.**
 - Representatives from research institutions and regulatory bodies suggest that a lot of near-accidents and intoxications with serious outcomes are never reported.

The actual number of incidents with adverse health effects is not known, severe underreporting is indicated

Pesticides and types of cargo

Cargo:

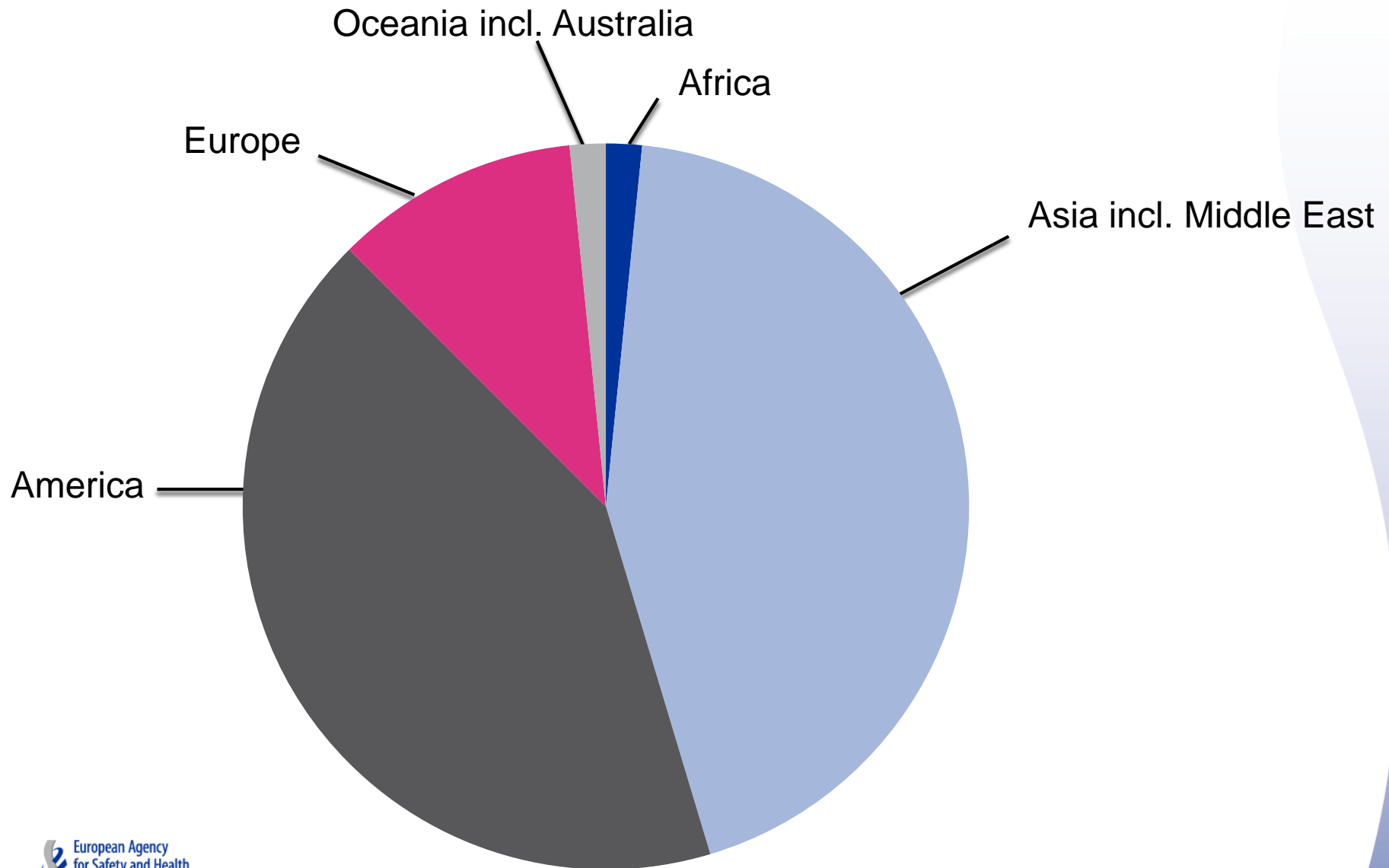
- Furniture, wood
- Apparatus, electronics
- Stone
- Plastics, textiles, shoes
- Glass, metal
- Foodstuffs
- Others

General impression:

No consistent distribution of pesticides between types of cargo - except phosphine in foodstuffs

Origin of containers with pesticide content > OEL (NL)

(Knol-de Vos, T. 2003. RIVM report 609021025/2003)



Good practices in opening containers

Have to be based on risk assessments.

- Follow procedures for safe opening, e.g.;
- The Technical Rules for Hazardous Substances“ (TRGS 512) on Fumigations (BAuA, 2007) <https://www.baua.de/EN/Topics/Work-design/Hazardous-substances/TRGS.html>
- Safe handling of gasses in shipping containers (Gezond Transport, 2011) <http://www.kgn-measurement.nl/Protocol%20gasses%20in%20import%20containers.pdf>
- Good practice for safely entering shipping containers (WorkSafe New Zealand, 2017) <http://www.worksafe.govt.nz/worksafe/information-guidance/all-guidance-items/keeping-safe-from-harmful-substances/keeping-safe-from-harmful-substances.pdf>

Preventive actions and strategies

- **Identification of risk containers**
- **Monitoring equipment**
- **Degasification and ventilation**
- **Personal protective equipment**

Monitoring equipment



GC-MS



(Johansson & Svedberg, 2014)

Syft Technologies Voice200® Instrument

SIFT-MS

PID



Dräger sampling tubes and systems
Dräger-Tubes

High precision guaranteed. The Dräger sampling tubes and systems are very reliable in use even with complex compounds and mixtures of substances.

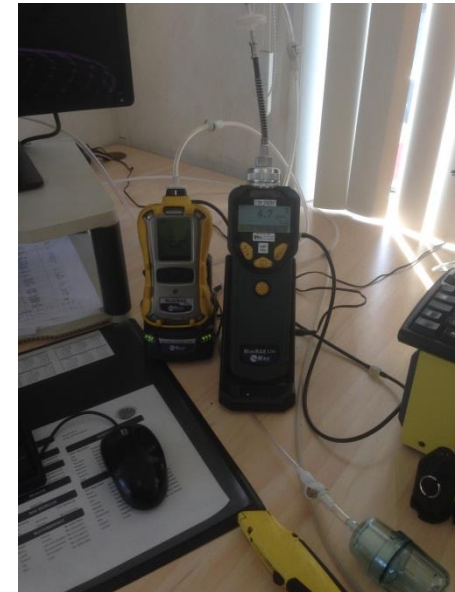
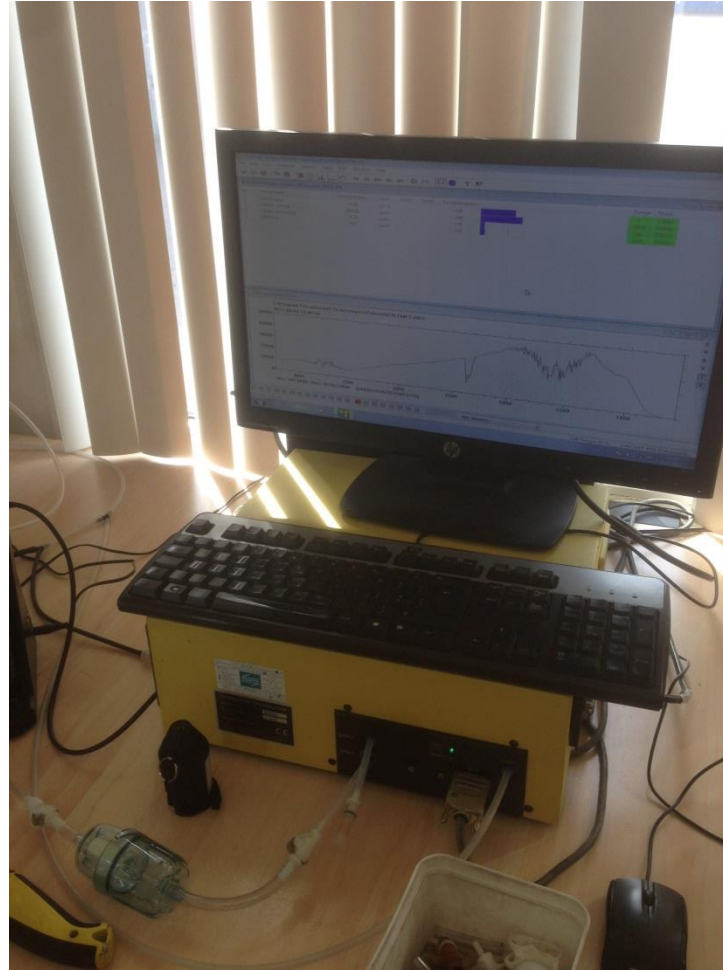


Colorimetric indicator tubes

Dräger. Technology for Life®

**Adequate, standardized screening/monitoring kit
for containers is needed**


Example of measurement station



Example of a gas-free certificate

GASMEETRAPPOR / GAS MEASURING CERTIFICATE

119917

Containernummer / Container number: Lading / Cargo: Referentie / Reference: Opdrachtgever / Client: Locatie / Location: Meting / Measurement: Type meting / Type of measurement: Meetmethode / Method of measurement: Temperatuur / Temperature:	CAIU8176750 Lightmakers 161093 Gasmeetstation Rotterdam B.V. / Gasmeetstation Rotterdam B.V. GMS Eerste meting / First measurement vrije ruimte in container, gemeten vanaf buiten FTIR Ex/Ox/Tox 15,00 °C Datum / Date: 08-06-2016 Tijd / Time 07:15	Oude zegel / Old seal: 532341K Nieuw zegel / New seal: NVT																																																																																				
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Advies / Advice	Container lossen binnen 24u / discharge container within 24hrs																																																																																					

Release certificate for documentation of safe concentrations of fumigants after measurements.

Example of off-gassing station at a European port



Container air is extracted through a «mouthpiece» inserted between the sealings of the door

It may take at least 12 hours to completely replace the container air, - due to small ventilation openings in the container and narrow opening of the mouthpiece.

Facilities for forced extract ventilation should be available at ports.

Personal protective equipment (PPE)

- Risk assessments determines when and which type of PPE to use
- PPE is an option only when other preventive measures are not sufficient to reduce fumigants below accepted concentrations
- PPE are recommended when fumigated containers are opened and entered, e.g. when;
 - Inspection by food inspectorate or the customs
 - Removing solid residues of phosphine before degasification

Easily understandable information sheets should be available including figures on what PPE to use for different scenarios

Conclusions

- **The fumigation problem is presumably underestimated**
- **Major problems;**
 - fumigated containers are almost never labelled
 - present practices does not follow safe procedures based on appropriate risk assessments
- **Recommendations and procedures for control measures should be developed**
 - measurement technology/strategy, degasification/ventilation methods and PPE for different scenarios

Prioritized recommendations

- **Containers should not be opened until the risk assessment concludes that it is safe,**
 - based on shipping documents or by approved measurements of the container atmosphere, if necessary after sufficient ventilation has been performed
- **A standardized screening/monitoring procedure for containers arriving at European harbours**
 - measurement technology and selection of fumigants, e.g. at least for MeBr and PH₃ with sufficient sensitivity, -at least below 1/10 of the occupational exposure limit.
- **Enforce relevant regulations regarding labelling**