



**Interreg**



EUROPEAN UNION

Danube Transnational Programme

**Danube SKILLS**

*Increased institutional capacity in Danube navigation by boosting joint transnational competences and skills in education and public development services*

**SAFETY PRACTICES  
IN EMERGENCY SITUATIONS DURING  
SHIP OPERATION  
*MODULE V – ENVIRONMENT PROTECTION***

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## 1. GENERAL DEFINITION

**The following terms are defined** in the course compendium:

biodegradation; bilge water; cargo remnants; ecosystem; waste occurring on board; oil spill; Oil Pollution Emergency Plan- OPEP; petroleum; reception facility; waste grease; oil and greasy waste occurring during the operation of the vessel; waste oil



## 2. INTRODUCTION

**These course notes were designed** both for trainers who will be involved in training of such training module and the trainees as learning aids in order to facilitate the learning process.

**The main objective** of this course compendium is to provide practical guidance for trainers and trainees to protect the environment and to be able to apply emergency measures during pollution accidents or incidents during navigation on inland waterways.



## 3. LEARNING OUTCOMES

By the end of this course, trainees will be able to:

- state that it is a legal requirement to protect the marine environment from pollution by vessels;
- describe the effects of operational or accidental water pollution;
- describe procedures adopted on board to minimize water pollution.



## 4. PROTECTION OF THE ENVIRONMENT

### 4.1 International regulations concerning the protection of the environment

**CEVNI** – European Code for Inland Waterways

**CDNI**- Convention on Collection, Deposit and Reception of Waste Produced during Navigation on the Rhine and Inland Waterways

Convention on Cooperation for the Protection and Sustainable use of the Danube River  
**(Danube River Protection Convention)**

**Directive 2000/60/EC** of the European Parliament and of the Council establishing a framework for Community action in the field of water policy

European Agreement concerning the international carriage of dangerous waterways – **ADN**



## 4. PROTECTION OF THE ENVIRONMENT

### 4.2 Water pollution

Water pollution is caused by the intentional or unintentional release of toxic chemicals/materials, contaminants and harmful compounds into various bodies of water such as rivers, lakes and the ocean.

#### **Water pollution causes, effects and consequences**

Water pollution may be caused by any hazardous substance or material that makes contact with the earth's water supply. This may include oil from oil tankers and oil refineries, garbage from construction sites, city streets and residential lawns, improper disposal of hazardous materials from garbage disposal companies, chemical spills and improper chemical disposal, sewage leaks and agricultural runoffs etc.

Once water becomes polluted it becomes unsafe for consumption due to the dangerous or toxic materials that are contained within the water.

If contaminated water is consumed it could lead to sickness, infections, exposure to diseases and even death.



## 4. PROTECTION OF THE ENVIRONMENT

### Effects of water pollution:

- toxic rainfall can occur in areas where water and/or air is polluted with toxic chemicals and materials;
- polluted water can lead to sickness, disease, infections, deformities and even death among animals and plant life;
- once water becomes polluted it can affect people and animals either directly through consumption or indirectly through food sources, land degradation and the overabundance of plants and algae which can cover the surface of various bodies of water making it undrinkable and affecting the animals that live in that body of water.



## 4. PROTECTION OF THE ENVIRONMENT

### 4.3 Environmental effects of oil spills

An oil spill is the release of a liquid petroleum hydrocarbon into the environment, especially the marine and inland ecosystem, due to human activity, and is a form of pollution



**Oil spills accident**





## 4. PROTECTION OF THE ENVIRONMENT

### 4.3 Environmental effects of oil spills

An oil spill is the release of a liquid petroleum hydrocarbon into the environment, especially the marine and inland ecosystem, due to human activity, and is a form of pollution

When an oil spill occurs, many elements of the environment may be affected.

Depending on the magnitude of the spill and its location, the effects can vary, ranging from minimal to serious ones.

For instance, oil spills can have a major impact on the temporary animal and fish loss of habitat.

Heavy oils may affect several organism functions like respiration, feeding, and thermo-regulation. At the same time, the entire ecosystem can change temporarily because of the chemical components and elements of the spilled oil that are toxic to the environment.



## 4. PROTECTION OF THE ENVIRONMENT

### 4.3 Environmental effects of oil spills

#### Oil Spill on Ship during transfer

Anyone who sees oil on deck must:

- immediately close the ship side scuppers and alarm the ship staff by shouting and contacting duty officer on bridge and engine room;
- Stop all the transfer immediately, locate the effected tank and its sounding pipe, and vent position;
- The Boatmaster shall call the emergency muster and everybody must carry out their duty as listed in the muster list for oil spill.
- Use the equipment and other means to contain the spill within the ship.
- Lower the quantity of spilled tank to a safer level in any other permissible tank.
- Put sawdust over the scupper plug will give an additional barrier for oil to go overboard;
- Collect the spread oil in a 200-litre drum and clear the affected area.
- The Boatmaster must enter the whole scenario in the ship's incident report form and call up for a meeting to discuss the accident so such accidents can be avoided in near future.



## 4. PROTECTION OF THE ENVIRONMENT

### 4.3 Environmental effects of oil spills

#### Oil Spill during Bunkering Operation or Sludge Discharge Operation

One stand by officer is always present in the bunkering manifold. If he sees any oil or leakage near that area he must immediately, shout “stop” to the bunker-supplying vessel loudly or in the VHF and immediately press the remote switch (if same exists).

For sludge disposal operation, if any spill occurs immediately stop the ship’s sludge transfer pump from remote panel, normally situated near the bunker manifold.

Inform the Chief engineer, duty officer about the emergency situation.

The Boatmaster will call for emergency muster and crew will carry out their duties as per the muster list for oil spill emergency.

A foam type portable fire extinguisher must be readily available to avoid the worsening of the situation by fire.



## 4. PROTECTION OF THE ENVIRONMENT

### 4.3 Environmental effects of oil spills

#### Actions to be taken in Case Oil goes Overboard

If the oil spill goes overboard, the Boatmaster will immediately inform the competent authority like port state control and owner or office management.

Measures shall be taken to limit the area of spill in the water with use of oil booms and other oil spill equipment, and all efforts shall be made not to allow further oil to go overboard.

Use of Oil spill dispersant chemical can be done to contain the spill but with prior permission from port state authorities.

The Boatmaster shall contact the 24 hours Oil Spill Response Organization for further cleaning up operation by shore team.

Entry shall be made in: Bridge log book, Engine room log book and Oil Record Book about the spill.



## 4. PROTECTION OF THE ENVIRONMENT

### 4.4 Air pollution

Air pollution refers to the release of pollutants into the air that are detrimental to human health and the planet as a whole.

Air pollution can further be classified into two sections:

- visible air pollution; and
- invisible air pollution.



## 4. PROTECTION OF THE ENVIRONMENT

### 4.4 Air pollution

#### **Causes of Air pollution:**

Burning of Fossil Fuels

Agricultural activities

Exhaust from factories and industries

Mining operations

Indoor air pollution

Suspended particulate matter



## 4. PROTECTION OF THE ENVIRONMENT

### 4.4 Air pollution

#### Effects of Air pollution

Respiratory and heart problems

Global warming

Acid Rain

Eutrophication

Effect on Wildlife

Depletion of Ozone layer

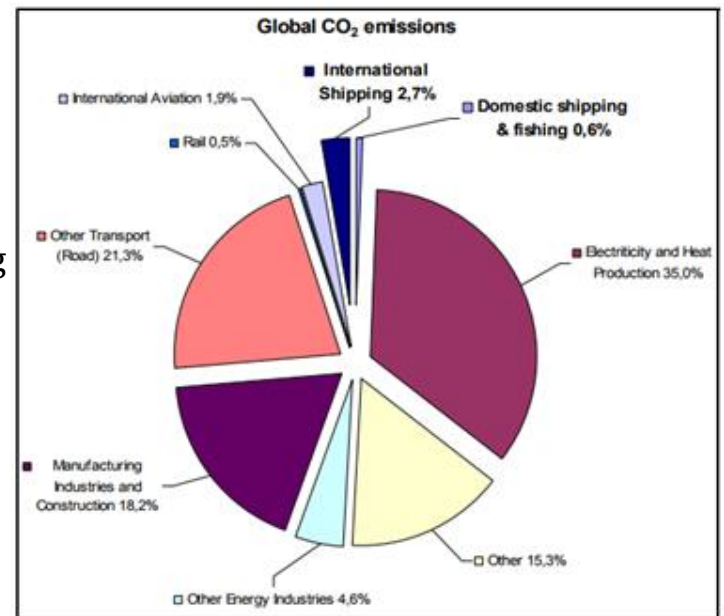


## 4. PROTECTION OF THE ENVIRONMENT

### 4.4 Air pollution

#### IWT impact on air pollution

Inland Waterway Transport (IWT) is an efficient, safe and environmentally friendly mode of transport. However, the previously undisputed competitive position of IWT in the field of emissions, in comparison to air, is increasingly being contested. The gap – regarding emissions to air – between road transport and IWT is rapidly becoming smaller. A major concern thereby, is the poor progress made on the emission of air pollutants with in particular, the emission of nitrogen oxides (NO<sub>x</sub>) and particulate matter (PM).





## 4. PROTECTION OF THE ENVIRONMENT

### 4.4 Air pollution

#### Dangerous goods and environmental aspects

Environmentally hazardous substances to the aquatic environment include, inter alia, liquid or solid substances pollutant to the aquatic environment and solutions and mixtures of such substances (such as preparations and wastes).

The basic elements for classification of environmentally hazardous substances (aquatic environment) are as follows:

- Acute aquatic toxicity;
- Chronic aquatic toxicity;
- Potential for actual bioaccumulation; and
- Degradation (biotic or abiotic) for organic chemicals.



## 5. POLLUTION PREVENTION

### 5.1 General precautions to prevent pollution of the environment

**Pollution prevention approaches include:**

**In the energy sector:**

- increasing efficiency in energy use;
- use of environmentally benign fuel sources.

**In the agricultural sector:**

- reducing the use of water and chemical inputs;
- adoption of less environmentally harmful pesticides or cultivation of crop strains with natural resistance to pests; and
- protection of sensitive areas.

**In the industrial sector:**

- modifying a production process to produce less waste;
- using non-toxic or less toxic chemicals as cleaners, degreasers and other maintenance chemicals;
- implementing water and energy conservation practices;
- reusing materials such as drums and pallets rather than disposing of them as waste.



## **5. POLLUTION PREVENTION**

### **5.2 Safe Bunkering operations and procedures**

Personnel involved in the bunkering operation on board should have no other tasks and should remain at their workstations during topping-off. Generally, bunkering during cargo operations is not considered to be best practice owing to the need to avoid conflicts of interest for operational personnel. Spillages often occur when crew members are distracted by another task. Companies should require that all bunkering operations are controlled under procedures that are incorporated in a Safety Management System.

First the procedure has to be developed and, it should be implemented by use of a check-list (model from Appendix 5 – ISGINTT- International Safety Guide for Inland Navigation Tank-barges and Terminals).



## **5. POLLUTION PREVENTION**

### **5.2 Prevention of further damage after a collision accident by vessels**

It is important while navigating vessel the crew members understand practical procedures to avoid collision guided by boatmaster standing orders. These procedures are only indicative, not exhaustive in nature and one must always be guided by practices of good seamanship. Call attention of other vessels that are in adjacent waters by turning on deck lights, putting up the lights or shaped objects to show not under command, using VHF, and other possible means.

Upon collision with another vessel, “Go Astern” as early as possible to limit the damage and to avoid further contact. But if the bow of the vessel has penetrated into the side shell of the other vessel, reverse the engine only after an initial damage assessment as one of the vessels may suddenly lose her buoyancy and sink, or cause/increase oil pollution.



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## **6. REDUCING FUEL CONSUMPTION AND EMISSIONS IN IWT**

### **6.1 Measures for reducing fuel consumption and emissions in IWT**

Emissions reduction measures in inland shipping can be categorized into three main groups:

- **Technical measures:** measures related to the propulsion system, vessel design and vessel equipment, exhaust after treatment, engine internal measures, use of alternative fuel/energy (LNG, electricity, hydrogen, biofuel);
- **Operational measures:** measures related to speed reduction, smart steaming, journey planning, on board information systems, optimal maintenance;
- **Traffic and transport management:** measures related to the organization of the logical chain, to the interface between inland waterway vessels and other transport modes, to the interface of inland vessels and infrastructure (locks, terminals in inland seaports etc.)



## **6. REDUCING FUEL CONSUMPTION AND EMISSIONS IN IWT**

### **6.2 Research and development needs in support of greening the IWT fleet**

The following non-exclusive list of topics has been identified as requiring further R&D efforts:

- Clean technology needs to be developed for using LNG as mono-fuel as well as dual-fuel in the IWT context, and/or gas-electric applications, in order to further reduce fuel costs and to reduce the engine-out performance as regards NO<sub>x</sub> and PM;
- The development of Stage V diesel engines has started, by using a combination of techniques that have been developed for smaller engines but are currently still considered experimental for large engines;
- Research on technical solutions to prevent or reduce methane emissions, for instance by using pressure LNG technologies or methane slip catalysts;
- Capacity building of systems integrators that provide Stage IV and V engines by integrating components from various suppliers;
- Technologies and procedures for monitoring compliance with emission standard.



## 7. WASTE COLLECTION AND DISPOSAL

### 7.1 Applicable regulations concerning waste

**CEVNI** – European Code for Inland Waterways- UNECE

**CDNI**-Convention on collection, deposit and reception of waste produced during Navigation on the Rhine and Inland Waterway- CCNR

**Recommendations** relating to the organization of the collection of waste from vessels navigating on the Danube- DC





## 7. WASTE COLLECTION AND DISPOSAL

### 7.2 Waste generated in inland navigation - collection and disposal

Waste types in inland navigation	SHIP-BORNE WASTE	Oily and greasy ship borne waste Used oil Bilge water Other oily and greasy waste
		Other ship borne waste Domestic sewage Sewage sludge Domestic refuse Other hazardous waste
	WASTE ORIGINATING FROM CARGO	Residual charges
		Washing water, ballast water, rain water, slops Other shipload waste

#### Ship-borne waste management





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**Thank you for your attention!**



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