

**UNECE Convention on the Transboundary  
Effects of Industrial Accidents**

Project under the Assistance Programme

Project on Hazard and Crisis Management in the Danube Delta



# WORKSHOP PROCEEDINGS

Join Visit

27 - 29 September 2011

Galati, Romania

## CONTENT

<b>OVERVIEW AND FINDINGS OF THE WORKSHOP.....</b>	<b>7</b>
<b>1 SAFETY STANDRTS APPLIED BY OIL TERMINALS.....</b>	<b>9</b>
<b>1.1 Presentation of the SC City Gaz SRL, Galati, Romania .....</b>	<b>9</b>
1.1.1 Location .....	9
1.1.2 Instalations and trans-loaded hazardouse substances.....	9
1.1.3 Prevention and protection measures .....	10
1.1.4 Security measures for the trans-loading.....	10
1.1.5 Fire and explosion prevention .....	10
1.1.6 Internal monitoring .....	11
1.1.7 Internal alarm.....	11
<b>1.2 Presentation of the SC Unicom Oil Terminal SA, Galati, Romania .....</b>	<b>12</b>
1.2.1 Location .....	12
1.2.2 Operational capacities .....	12
1.2.3 Terminal's infrastructure .....	12
1.2.4 Sewege system.....	13
1.2.5 Overflow signalisation.....	13
1.2.6 Fire and flood protection .....	13
1.2.7 Emergency situations prevention .....	14
1.2.8 Staff training.....	14
<b>1.3 Presentation of the Oil Terminal Giurgiulesti, Moldova .....</b>	<b>15</b>
1.3.1 Landing place.....	15
1.3.2 Technological pipelines.....	15
1.3.3 Reservuar park.....	16
1.3.4 Filling stations.....	16
1.3.5 Cleaning system of wastewaters.....	16
1.3.6 Equipment .....	16
1.3.7 Procedures.....	17

1.3.8	Staff training.....	17
<b>1.4</b>	<b>Presentation of the Reni Marine Commercial Port, Ukraine .....</b>	<b>18</b>
1.4.1	Location and capacities.....	18
1.4.2	Loading and uploading.....	18
1.4.3	Measures on prevention of water pollution .....	19
1.4.4	Liquefied carbon gases .....	19
1.4.5	Control systems .....	19
<b>1.5</b>	<b>Presentation of the Izmail Marine Comercial Port, Ukraine.....</b>	<b>20</b>
1.5.1	History .....	20
1.5.2	Location and capacities.....	20
1.5.3	Water protection measures and staff training .....	21
<b>2</b>	<b>TECHNICAL PRESENTATIONS ON THE CHECKLISTS METHODOLOGY</b>	
	<b>APPLICATION.....</b>	<b>22</b>
<b>2.1</b>	<b>Introduction of the checklist methodology.....</b>	<b>22</b>
2.1.1	Using checklist.....	22
2.1.2	Step 1 .....	22
2.1.3	Step 2 .....	22
2.1.4	Step 3 .....	23
2.1.5	Step 4 .....	23
2.1.6	Step 5 .....	28
2.1.7	Summary .....	28
<b>2.2</b>	<b>Storage and equipment.....</b>	<b>28</b>
2.2.1	Substance.....	28
2.2.2	Definition of storage .....	29
2.2.3	Requirements for starages.....	30
2.2.4	Protection against mechanical damage and flood protection .....	31
2.2.5	Flammable liquids.....	31
2.2.6	Venting devices.....	32
2.2.7	Overfill safety device .....	32

2.2.8	Markings / labelling .....	33
<b>2.3</b>	<b>Transshipment, overfill safety and pipeline .....</b>	<b>33</b>
2.3.1	Transshipment .....	33
2.3.2	In-plant pipelines.....	34
2.3.3	Overfill safety .....	35
<b>2.4</b>	<b>Sealing system and oil separator.....</b>	<b>35</b>
2.4.1	Sealing system.....	35
2.4.1.1.	Introduction .....	35
2.4.1.2.	Definition.....	36
2.4.1.3.	Requirements of sealing systems .....	36
2.4.1.4.	Materials .....	37
2.4.1.5.	Construction of joints .....	38
2.4.1.6.	Sealing area .....	38
2.4.1.7.	Monitoring sealing faces.....	38
2.4.2	Oil separator.....	39
2.4.2.1.	Range of application .....	39
2.4.2.2.	Mode of function / capacity .....	39
2.4.2.3.	Slurry trap.....	39
2.4.2.4.	Separator.....	40
2.4.2.5.	Sample shaft.....	40
2.4.2.6.	Placing and maintenance .....	40
<b>2.5</b>	<b>Fire- and flood-protection .....</b>	<b>40</b>
2.5.1	Fire protection .....	40
2.5.1.1.	Introduction .....	40
2.5.1.2.	Prevention of fire spread .....	41
2.5.1.3.	Detection and notification of fires and fire fighting.....	42
2.5.1.4.	Retention of fire-fighting water .....	43
2.5.1.5.	Organizational measures and monitoring.....	44
2.5.2.	Flood-protection .....	45
2.5.2.1.	Introduction .....	45
2.5.2.2.	Underground plant units.....	45

2.5.2.3.Overground plant units.....	46
2.5.2.4.Plant components.....	46
<b>2.6 Hazard management and plant monitoring.....</b>	<b>46</b>
2.6.1 Plant monitoring.....	47
2.6.2 Plant control.....	48
2.6.3 Internal alarm and hazard control planning .....	48
2.6.4 Analazing the potential risk for surface waters .....	49
<b>4 ANNEX I Final Agenda .....</b>	<b>51</b>
<b>5 ANNEX II List of participants.....</b>	<b>54</b>
<b>6 ANNEX III Certificate.....</b>	<b>56</b>

## OVERVIEW AND FINDINGS OF THE WORKSHOP

In the framework of the Danube Delta Project (DDP), Romanian, Ukrainian and Moldavian experts participated in a three days workshop to discuss basic safety requirements applicable at facilities dangerous to waters in the event of accidents. This event was held in Galati, Romania, on 27 to 29 September 2011. It was organized as part of the hazard management component of the DDP. An integral part of the workshop were joint visits to the oil terminals in Galati and Giurgiulesti (Republic of Moldova) to perform simulated inspections.

The workshop was attended in particular by inspectors from the project countries responsible in their every day work for assuring safe operation of hazardous industrial installations. Experts from Germany facilitated the workshop.

During the **First Day** of the workshop the checklist methodology was introduced by German experts. The checklist methodology has a modular design for inspection of safety equipment of installations at industrial facilities. It helps to provide the inspection of simple and complex installations by selecting the relevant checklist. The checklist methodology consists of follow modules:

- Storage and equipment
- Transshipment
- Overfill safety and pipelines
- Sailing system and oil separator
- Fire and flood protection
- Hazard management and plant monitoring

During the **Second Day** of the workshop the participants visited the oil terminals of Galati, Romania and Giurgiulesti, Republic of Moldova. The main task of the visit was the application of the checklists. The participants were divided into three groups, each of them received the task to work with concrete checklists and simulate an inspection on indicated unit of the terminal.

During the **Third Day** of the workshop the participants working in groups evaluated the visits to the oil terminals as well as discussed the checklist methodology and its future application in their countries.

The participating inspectors appreciated the possibility of getting acquainted with the checklist methodology during the workshop and to apply it in the visits to oil terminals. They highly valued the checklist modular structure to be applied for different facilities units such as e.g.: storage, transshipment; waste water treatment or pipelines. It was also appreciated that the checklist allows for systematic verification of safety standards of each inspected installation of an industrial facility and a simple identification of deficiencies.

The inspectors of the project countries expressed the desire to adopt the checklist into their national existing checklists and procedures for inspecting the industrial facilities dangerous to waters. They agreed that in the adoption process the checklist should be further tested by different regional inspectors. The checklist should be also used, where relevant, for training new inspectors. In this regard, it was requested that the countries are helped to translate the checklist into the national languages. Furthermore, the inspectors suggested that the checklist should be used as a benchmark for comparison and revision of safety standards in the project countries and requested the hazard management group to explore on possibilities to undertake such work.

The inspectors also requested that the English and Russian versions of the checklists are revised in a number of instances to improve on the clarity of the questions. The versions should be modified before the second joint visit to the ports of Reni and Izmail, Ukraine, planned for May 2012.

The workshop was closed with providing all its participants with a certificate acknowledging the participation in a hands-on training session on application of the checklist methodology for revision of basic safety measures at industrial facilities handling materials and substances which are hazardous for water.

# 1 SAFETY STANDARTS APPLIED BY OIL TERMINALS

## 1.1 Presentation of the SC City Gas SRL, Galati Oil Terminal, Romania

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*presented by Mr. Bogdan Golomoș, SC City Gas SRL, Romania*

### 1.1.1. Description and location of the SC City Gas SRL

The main activity performed by SC City Gas SRL is the trans-loading of LPG (liquefied petroleum gases). The LRG trans-loading terminal is located in Galati on the site of the Free Zone. The terminal has a total area of 14.000 cm, is administrated by Galati Free Zone, lots O3, O4, O5, P1 and P3, Platforms I and II are used by City Gas SRL Galati. SC City Gas SRL has the following neighbours:

- North: SC MERVIN SA
- South: SC UNICOM Oil Terminal SA; 800 m far from Danube Delta
- East: Free Zone Area; Lower Prut Floodplain Natural Park is located in 1 km and Danube Delta Biosphere Reserve is located in 5 km
- West: SC MINERSORT SA

### 1.1.2. Description of the installations and of the types of the trans-loaded hazardous substances

#### Type and quantity of hazardous substances

The Terminal's operations are performed with the following installations:

- Unloading / loading installation – railway – wide railway – auto ramp
- Storage / blending tanks – 10 x 90 mc

The installation consists of hoses, collectors, pipe-lines, calming gas devices, compressors and pumps.

The loading / unloading is made on the basis of the pressure difference between the tank and the wagon or by using the compressor.

No	Hazardous substance	Location	Max quantity (tons)	Max storage quantity (tones)	Physical state	Mod de storage	Observations on special hazards
1.	LPG (C3/C4 mix) Propane	Reserve park	630	390	Liquefied gas	Tank	Fire hazard



	Butane Propylene						
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### 1.1.3. Prevention and protection measures

#### *Measures against explosion or fire:*

- Specific instructions and work procedures
- Training of the employees
- Fire prevention and extinguishing means and sprinkling installation
- Restriction against bringing fire sources in the terminals
- Using gas detectors for checking the installation and proofness
- Using labour safety and anti-explosion equipment

#### *Measures against floods:*

In the Danube area, towards Unicom Oil Terminal, a protection wall against floods is set-up only in the area of Berth 53. A discharge channel existing in the East and South-East areas between City Gas and Unicom Oil Terminal.

#### *Measures against leakages:*

The auto loading ramp is provided with an oil decanter. There are no leakages from the tanks and installations (transformation into vapours).

### 1.1.4. Description of the security measures for the trans-loading

The operations for trans-loading hazardous substances are made under the strict surveillance of the terminal's operators and of the head of shift. Storage tanks are provided with measuring and control devices for indicating: the level, pressure and temperature. The tanks are loaded up to max. 85% of their capacity. Tanks, trucks and the trans-loading technological installation are provided with safety valves, excess debit valves and pneumatically operated closed valves. The proofing systems are being checked whenever the loading / unloading operations begin.

All communications related to the loading / unloading operations are made by means of anti-explosion two-way radio transceivers. The installations, wagons, vessels are connected to plugs, grounding systems against electrostatic energy.

The vessel / terminal trans-loading operations are monitored by the berth operator, OSFP and an advisor on hazardous goods.

### 1.1.5. Measures regarding fire and explosion prevention

Considering the specific risk factors and the possibility to encounter some internal or external emergencies, a series of measures against fires and explosions have been taken in order ensure the safety of the employees and of the neighbouring population and companies

The employees are constantly trained on NTSSM and Emergency Situations issues, the installations are being checked following a well-set yearly schedule, the fire prevention and extinguishing installations and the intervention means are periodically checked and maintained in an operational condition

Regulations are set regarding smoking and work with open fire; there are access, evaluation and emergency intervention ways

The alarm system is operational, having the following sound signals

- ⇒ Fire, LPG leakages alarm – continuous signal
- ⇒ Natural disasters and calamities alarm – duration of 2 minutes with pauses of 30 seconds between pulse signal
- ⇒ The company has an **Emergency Plan** to be used by external teams in case of fire; the company also has the following approved documentation: **Emergency Evacuation Plan** in case of accident; **Report related to the protection against explosions** for the installations located in dangerous areas, and regarding SEVESO, **Security Report** regarding the control of the dangers of major accidents.

#### 1.1.6. Terminal's internal monitoring

The operators and the head of shift are constantly monitoring the installations during their usage. There are well-defined work procedures for each trans-loading operation which includes an annual schedule for all the installations.

The operators check the installations and the joints' proofness at every change of shift. Pressurized installations (tanks and pipe-lines) have ISCIR authorization and are checked at the due date. The fire installations are periodically checked and constantly monitored

The maintenance staff performs all necessary works as per the revision and repair plan:

- cleaning of the filters
- changing and checking the safety valves
- Checking the vanes, hoses, and measurement and control equipment, etc.

All maintenance and trans-loading activities are registered and monitored in activity reports which are kept and archived.

#### 1.1.7. Description of the internal alarm

- Informing on the occurred emergency and the meeting of the emergency situations team
- Signalling and alarming
- Informing the own intervention team on the occurred event
- The emergency internal intervention is done as per the set emergency plan
- Training the intervention team
- Developing and organizing, together with the Emergency Situations Department, exercises and simulations on different scenarios on the intervention methods in case of emergencies
- Informing the authorities on the occurred events.

## 1.2. Presentation of the SC UNICOM Oil Terminal, Galati Oil Terminal, Romania

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*presented by Mr. Viorel Scarlet, SC UNICOM Oil Terminal, Romania*

### 1.2.1. Location

UNICOM Oil Terminal is located at Port Bazinul Nou, Dana 54, in the “free zone” area of the Galati port, with access to the maritime Danube and has 2 functional private pontoons with loading and unloading facilities for barges and marine vessels (min 8m depth at berth).

The company covers an area of 50,000 m<sup>2</sup> and is connected to flexible railway system of both European and CIS type (standard and respectively wide gauge), operational at the border point with Republic of Moldova and Ukraine.

The terminal is placed 1km near Lower Prut Floodplain Natural Park and about 5km from Danube Delta Biosphere Reserve.

The terminal is placed in a flooding area.

### 1.2.2. Operational capacities

For complying with the terminal's clients requests, the terminal has the following operational capacities:

1. Loading / unloading / transfusion of fuel oil from CIS rail cars: 2500 to / day
2. Unloading of white oils from the storage tanks: 1500 to / day
3. Unloading of white oils from ships into land storage tanks: 3000 to / day
4. Unloading road bitumen from ships 1.500 to / day
5. Unload road bitumen from storage tanks 200 to / day
6. Loading of white oils in rail tanks 2.000 to / day
7. Unloading of white oils by direct transloading (CIS / CFR rail cars): 1500 to / day
8. Loading / unloading of white oils or chemicals products from / in ships 1.200 to /day
9. Loading of fuel oil into tanks truck: 800 to / day
10. Loading of gasoil into tank trucks: 500 to / day
11. Ship's bunkering with gasoil: 5000 to / month
12. Bitumen delivery by tracks: 5000 to / month

### 1.2.3. Terminal's infrastructure

The terminal's infrastructure includes:

- Ramps for loading / unloading
- Pontoon barge and marine vessels
- Specific facilities for unloading / transhipment of CIS coaches - railway coaches and vice versa
- Tanks for storage / warehousing of black and white oil
- Central heating
- The oil terminal is accessible railways, sea and road to transport petroleum products, chemicals and petro-chemical liquids and dry goods.

SC UNICOM Oil Terminal has:

- A fleet of tanks for white products (diesel, gasoline) that includes two tanks of 3000 m<sup>3</sup> and four tanks of 1000 m<sup>3</sup>
- A fleet of tanks for black products (fuel oil) that includes three tanks of 10.000 m<sup>3</sup>
- A fleet of tanks serving central heating system comprising a reservoir of 1000 m<sup>3</sup> and 200 m<sup>3</sup>
- A park for petrochemicals and liquid chemicals products that includes two tanks of 3000 m<sup>3</sup>
- A fleet of tanks for bitumen road which includes two tanks of 50 m<sup>3</sup> and one of 200 m<sup>3</sup> tank

Each tank park rests with pumping station liquid.

These liquid products are made with normal rail tank cars (CFR) or large (type CIS) or ships are unloaded and taken over by technological pipelines for white products centrifugal pumps and pumps with screens that products for storage these products in storage tanks, where they will load latter in tank wagons normal way (type CFR) or large (type CIS), ships of tankers, or may be a direct decanting (without storage).

Storage tanks for petroleum and petrochemicals products are located in concrete vats, walled retention that are designed to take 30% of accidentally spilled oil in the tank. The tanks are metal, cylindrical, and above grand.

#### **1.2.4. Sewage system**

In the process of unloading / loading and storage of petroleum products resulting the technological waters infested with petroleum products, which together with the platform a society rainwater is collected through a sewage system length of 1000 m and directed to oil separator.

Prepurate water in oil separator is sent to the company's treatment plant.

#### **1.2.5. Overflow signalization**

On the oil terminal:

- Handling liquid flow meters is through the overflow signal
- Retention tanks are equipped with tanks parks closing valves designed to limit the area affected by accidental spills of productions
- Overflow valves
- Signalling and vehicular automatic petrol pumps to overcome the COV limit value
- Automatic shutdown of pump gasoline tankers loading at the maximum load

#### **1.2.6. Fire and flood protection**

##### Fire protection

SC UNICOM Oil Terminal SA Galati is equipment with technical means of first intervention in case of fire:

- Hand and portable fire extinguishers with powder or foam

- A plant producing mechanical foam for fire fighting, with a capacity of 8.000 litres of spumogen
- Water tanks for fire fighting and cooling is provided in the Danube River with two pumps Lortu, 320 mc / h. each. There can supply direct intervention autospecialelor Danube
- Network outside hydrants and fixed guns, the ring type, hydrants being planted all around the inside of the terminal, as well as inside
- Fixed foam extinguishing installation aeromechanical and water spray cooling installations mounted on each storage tank
- PSI pickets
- Mobil generator for foam

The personal, the fire service and other employees of civilian volunteers are specially trained to drive the terminal in case of fire. All are closing valves on pipelines and are equipped with connections that allow pouring products in other containers in case of emergency.

#### Flood protection

To combat the phenomenon of flooding, terminal has:

- A pump
- 4 submersible pumps
- Damming materials and equipment:
  - Vola
  - Truck
  - Raffia bags
  - Shovels, pickaxes, stretchers, plastic film etc.

In the company's cell consist of emergency and intervention teams that will operate under procedures and guidelines for intervention in case of disasters (earthquakes, floods, fire, landslides etc.).

#### **1.2.7. Emergency situation prevention**

To prevent and remove the causes of emergencies the company owns a number of facilities, equipment and plans:

- Private service for emergency situations
- Teams workplace interventions
- Means of intervention in case of fire
- Defence plan in case of fire
- Report security, internal and external emergency plan
- Instructions own intervention in case of fire
- Emergency cell plus notification scheme
- Port facility security plan

#### **1.2.8. Staff training**

To avoid the occurrence of extreme the terminal runs a series of activities such as:

- Exercises and training with staff on the line of defence against disasters
- Participation in the trainings conducted by ISU Galati in case of emergency situation (simulation)

- Regular training of all staff on working knowledge of instructions and contingency procedures
- Participation with ISU Galati to applications made within the terminal for protection against fire
- Display in places visible notice scheme in case of disasters

### 1.3. Presentation of the Giurgiulesti Oil Terminal, Moldova

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*presented by, Mr. Veaceslav Scripluc and Mr. Nelu Andreescu, Oil Terminal Giurgiulesti, Moldova*

#### 1.3.1. Landing place / berthage

The berthage has equipment to handle overflow of the oil (made in Germany) which provides the tightness of the system pipelines and fittings constructions. The design platform is used for collecting of accidental leaks storm water runoff from the platform and out trays and sending them into a special pit, from where the tankers transform it to the treatment plant.

Next to the berthage the special platform was built for the export of equipment to the store to collect the accidental leaks of petroleum products during the overload. The platform is a reinforced concrete construction covered with a special plastic polyethylene, its thickness is 2 mm (HDPE), which provides protection for soils from possible contamination. Wastewater is discharged from the platform via a special pipeline to the well with volume 6m<sup>3</sup>; from where the wastewaters are transported to the treatment facilities.

The berthage is equipped with:

- 7 foamers GPS-600, installed round the perimeter with total consumption 42 l per second
- Setting for the formation of the water curtain between a tanker and berth, its length is 36 m and height is 9 m.
- Cooling system platform

Fire protection equipment:

- Two tanks for water storage volume of 500 m<sup>3</sup> each
- The pumping station
- Reservoir foam
- Automatical fire protection system
- Mechanical equipment for extinguishing fires such as “Angus AF” of two kinds (mobile with 120 l and 900 l volume of foam)

#### 1.3.2. Technical pipelines

The technological pipelines are located underground and above ground. The above ground pipeline is put in special reinforced concrete trays. The metal trays are located under the pipeline to collect the emergency leaks. There is a drain for potential leaks from all trays into the wells to collect them. The system provides for the trays and pipes leaks to be

directed to emergency leakage collection tank. After being collected oil is pumped and sold by special vehicles and water is transported to oil water drainage of the treatment plant.

#### **1.3.3. Reservoir park**

The protection of groundwater from the pollution caused by potential leaks from tanks is provided by two reinforced concrete walls 1.6 m high and 2.0 m high, located at the distance of 15-30 m from each other. To prevent the infiltration into ground the tanks are covered with geo-membrane of high density polyethylene HDPE (2 mm).

The rainwater diversion is through the drainage system. In the cases of accident leaks the first wall fence was installed around the industrial sewage wells located in a closed operating condition, which block the penetration of oil waste into the drainage system and treatment facilities.

The reservoir park is equipped with integrated fire protection system which consists of:

- Ring network of pipelines to supply foam and water
- Stationery foam generators
- Pumping station to supply the foam
- Water cooling system tank

#### **1.3.4. Filling stations**

The concrete channel is located on the perimeter of the filling station, it is used for collecting of the rainwaters, and emergency leaks, as well as for liquids formed as a result of extinguishing fires.

In addition the drainage system is constructed for the collection of the wastewaters in accumulation reservoir with volume of 50 m<sup>3</sup>, from where these waters are transported to the treatment plant.

The filling station is equipped with fixed fire extinguishing installation of deluge and wheel and hand-held fire extinguishers.

#### **1.3.5. Cleaning systems of the wastewaters**

The wastewaters cleaning system consists of:

- Sewage system
- Reservoir for wastewaters accumulation
- Equipment for the wastewaters cleaning: oily substances (produced by Russia) and household sewage (produced by TOPAS, Check Republic)

Danube Logistics SRL provided a big financial support for purchasing the equipment for prevention of oil leaks and handling possible oil leaks. Mostly equipment was bought in American company “Elastec” – one of the largest manufactures of such equipment.

#### **1.3.6. Equipment**

“Optimax II” – the inhibiting oil booms with total length of 240 m (divided into parts of 30 m each). It consists of the booms for keeping the oil products, the diameter of the main part of boom is 18 cm and that of additional parts is 30 cm.

Constructed system (SKIMMER) 118/E – 150 Y consists of two vestibules with hydraulic motor. This construction can be located off-store to gather different oil products which can be pumped to the special reservoir on the river's bank for further storage.

The constructed system 118/E – 150 Y is powered by diesel motor and includes:

- Transfer pump
- Flexible hose set with fittings fixation
- Hydraulic hoses
- Power supply

Backed absorbent pads can be used in the case of emergency situation in the water area and at the oil terminal.

#### **1.3.7. Procedures**

The Giurgiulesti Oil Terminal has elaborated and adopted the following procedures and rules:

- Action plan in the case of oil spills
- Emergence situation action plan
- Plan for port facility security
- Port rules
- The port is in the process of signing the contract on services providing for preventive actions in the case of oil spilling
- The port is discussing actions aimed at mutual support during emergency situations with administrations of nearby ports.

#### **1.3.8. Staff training**

The port staff was trained to operate the equipment for containing oil products, that is usually used in case of oil spills. The training was organized by a Dutch company, responsible for manufacturing of such equipment and providing staff training.

In the framework of the training on oil terminal's operation supervised by international experts additional instructions as for the actions taken in case of oil spills were included into the training program.

The International Sea Organization has approved the two training courses for oil terminals staff on prevention of oil accidents and combating activities in the case of oil spills. The training courses will be launched in the nearest future.



## 1.4. Presentation of the Reni Marine Commercial Port, Ukraine

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*presented by Ms. Svitlana Povorozniuk, Reni Marine Commercial Port, Ukraine*

### 1.4.1. Location and capacities

Reni Port is huge transport port on the Danube River (Ukraine). It is located on the crossing of the borders of Ukraine, Romania and Moldova, as well as on the crossing of four international transport corridors, such as “Danube No7”, “Kritkiy No9”, “Traseka” and “Chornomorskyy”.

Total area is 940 sq. m. with extending of berthage of 3927 m. The port includes three places for goods, place for oil and float complex.

The area of the covered storage facilities is 30 000 sq.m; the area of the open spaces is 195 000 sq.m. These storages and places are connected to railways and roads. The port has big park of different equipment and transports.

#### ***Oil products***

The port capacity for the loading and uploading of oil products is 2 million tons per year. The port is specialized on the transporting of crude oil and petroleum products (crude gas, gas, diesel fuel, vacuum gasoil, gas condensate, fuel oil, coal tar).

### 1.4.2. Loading and uploading

Loading / uploading places:

- Total length of the berth – 258 m
- Depth near the berth - 12 m
- Maximum draft of the ships – 7 m
- Tonnage of the ships – up to 20 000 tons.

The method of loading / uploading:

- Directed transshipment “sea tanker – river tanker” / “river tanker – sea tanker”
- Transshipment with using of the reservoir “tanker – reservoir - tanker”

The intensity of discharge of products is simultaneous filling of 8 cisterns, 10 000-12 000 tons per day.

“Eksimnefteprodukt” private company:

- Provides of the transshipment and storage of oil products (all kinds of petroleum, all kinds of diesel fuel, fuel oil M-40 and M-100, oil base CAE-10, CAE-30, УБ-300, УБ-500)
- Capacity of the reservoir park (white oil products – 35 000 m<sup>3</sup>, black oil products – 45 000 m<sup>3</sup>, total – 80 000 m<sup>3</sup>)
- The speed of the filling of oil products (white oil products – 400 m<sup>3</sup> per hour; black oil products – 300 m<sup>3</sup> per hour)

Transshipment complex “Transbunker - Danube” provides the transshipment of white, black and chemical oil products and bunkering. The complex capacity is 350 000 tons per year, 42 tankers per day and has the ability to storage the 14 000 tons per hour. There is availability of direct transshipment as well as transshipment with using the reservoir. The intensity of discharge of products is filling of 20 cisterns in the same time.

#### **1.4.3. Measures on prevention of the water pollution**

The main measures on prevention of the water pollution are:

- Collecting wastewaters
- Collecting and utilization of the industrial and domestic waste
- Elimination and localization of emergency situations
- Waterproof materials for surface
- Concrete fences around the reservoir
- Concrete fences around the accumulating reservoirs for industrial waste waters and rain water
- Providing the constant monitoring

Other security issues:

- Installation of fire protection system
- Providing fire protection alarm system
- Mobile detectors of air pollution
- Lighting protection system
- Control system for measuring levels in the reservoirs

#### **1.4.4. Liquefied carbon gases**

“ReniLes” private company offers transshipment of liquefied carbon gases, such as vinyl chloride and propane-butane. The capacity is direct filling of 10 cisterns in the same time, the filling speed is 1 000 tons of LCG per day.

“Laguna-Reni” private company is located in the Reni Free Zone Port on 16 276 sq. m, it has 3 places for liquefied carbon gases transshipment. The company can service 10 cisterns at the same time. The company provides the transshipment of the 900 tons of liquefied carbon gases per day. There are 15 reservoirs with capacity 200 m<sup>3</sup> each and total capacity is 3000 m<sup>3</sup>. The reservoirs are located underground and are secured by concrete fences and sand.

#### **1.4.5. Control systems**

The control systems for measuring levels of gas pressure and temperature in the tankers:

- Warning – when filling level is above 86% - the warning signal goes off
- Maximum – when filling level exceeds 91% - the signal is activated
- Emergency – when filling level is more than 93% -there are come a sound and visual signal, emergency system goes off resulting in automatic closure of the reservoir door.

## 1.5. Presentation of the Izmail Marine Commercial Port, Ukraine

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*presented by Ms. Olena Broshevan, Izmail Marine Commercial Port, Ukraine*

### 1.5.1. History

Izmail Marine Commercial Port is one of the most up-to-date and highly equipped ports on the Danube River. Izmail port was built on 26<sup>th</sup> of the July, 1813 and was used for transportation of passengers and goods (wheat, fish, wool, honey and other goods of Bessarabia).

The stone quay with total length of 300 m and with a berthage for international and Russian ships was constructed in 1892.

In the period of 1918 till 1940 Bessarabia was a part of Romania and the carriage of goods was serviced by small Romanian ships. In 1940 Bessarabia was annexed to the Ukrainian Soviet Union and the floating cranes, conveyor belt and floating elevator were established in the port. In 1941 the first railway road was built from Arzis station.

On 26<sup>th</sup> of August, 1944 the Ukrainian troops have liberated Izmail from occupation, so this date is considered to be the beginning of modern history of the port.

Over last 200 years the port has belonged to the Russians, the Turkish, the Romanians, the Soviet Union and Ukrainian enterprises. The existence and operation of the port was very economically and politically important and necessary for all these states.

### 1.5.2. Location and capacities

Izmail is a large port where the railway, sea, river and automobile transport is connected. The port territory is 107.5 ha, as well as the territory of so called “85 km” is 15.2 ha and the remaining place “Potrovyk” is 4.09 ha. There are 24 berths with total length of 2618.6 m. The territory of the open storage is 201.1 thousand m<sup>2</sup>, and covered storage – 18.7 thousand m<sup>2</sup>. The port can service ships with length up to 150 m, width not more than 30 m and shift of 7 m. The port capacity allows for the carriage of 8.5 millions of goods per year.

The port consists of three production and reloading complexes:

- First complex handles package of goods, reloading of metals and other goods. There is an elevator on this complex.
- Second complex is used for reloading bulk cargo: coal, coke, ore, pellet, different concentrated substances; also it services containers with metal goods and grain.
- Third complex handles bulk cargo: equipment, metal, grain, ore, coal.

The bunker base of the port is situated on the “85 km” of the Danube River, where the fuel drains from railway cisterns into tank barges.

Due to its location, the port is the hub that connects the ports of the Mediterranean, Near East, North Africa and through the Danube Delta ports with the states of Western Europe and the Commonwealth of Independent States.

The port is equipped with modern equipment that allows for safe and high-quality reloading of different goods.

The port has its own fleet:

- Tow boats
- Self-propelled and non-self-propelled dry-cargo boats

- Bulk fleet
- Floating cranes
- Power boats.

The port provides the tow of its own boats, as well as the boats that come to water area of the port along 90 km of the Danube banks. There are no storages for oil products on the port territory. If required, oil reloading is provided by automobile transport. Reloading of oil products on oil tankers and further towing of the vessels is provided per technical documentation and in compliance with nature resources protection requirements.

### **1.5.3. Water protection measures and staff training**

The main measures for water protection are:

- Booms
- Biodestructors.

All ships have the instruction / plans of actions during emergency situation. Flood- and fire prevention measures are elaborated.

Every year the port together with Capitan Department and representatives from the labour and nature protection services provides training on emergence situation actions for the port staff. The relevant report is prepared based on the results of such training.

The port is constantly working on improving the process of loading and unloading operations and the introduction of new technological solutions, training and certification of personnel and job places.

The requirements for services quality are determined by standards, technique terms, instructions and guidelines of the Ministry of Infrastructure of Ukraine.

To achieve the goal of providing high quality and competitive services, the Izmail Marine Commercial Port has certified the quality management system ISO 9001: 2008

The port quality management system works according to the international requirements of ISO 9001: 2008, in order to improve the customer satisfaction through continuous improvement of the scope of activity of the port.

## 2. TECHNICAL PRESENTATIONS ON CHECKLIST METHODOLOGY APPLICATION

### 2.1. Introduction of the checklist methodology

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*Presented by Gerd Hofmann, Germany*

#### 2.1.1. Using checklist

Advantages using the checklist-method:

- Consistent procedure
- Systematic method
- Base for documentation
- Thread for inspection of complex installations
- Quality control
- Tool for beginners

The Checklists:

- Modular design for inspection of safety equipment of installations
- Inspection of simple and complex installations possible -> selection of relevant checklists
- Questionnaire based on the recommendations of the international river basin commissions

Manual of action for using the checklists:

- |        |  |
|--------|--|
| Step 1 | Dividing the factory into smaller units                  |
| Step 2 | Determination of substances which are hazardous to water |
| Step 3 | Inspection of certain plants                             |
| Step 4 | Hazard control planning                                  |
| Step 5 | Quantification of the safety level                       |

#### 2.1.2. Step 1

The facility can be divided into the small units:

- Transshipment
- Pipelines
- Waste water treatment
- Storage

#### 2.1.3. Step 2

Determination of the substances which are hazardous to water:



**Error! Hyperlink reference not valid.**

*substances which are*

*hazardous to water*

Classification of the substances by means of the character of risk in to three water risk classes:

WRC 1: Water risk Class 1 – low hazard to waters

WRC 2: Water risk Class 2 – hazard to waters

WRC 3: Water risk Class 3 – severe hazard to waters

Catalog for substances which are hazardous to water of the Federal Environmental Agency (UBA) are available at <http://webrigoletto.uba.de/rigoletto/public/welcome.do>

#### **2.1.4. Step 3**

Inspection of certain plants / choice of the relevant checklists:

- Storage
- Equipment of tanks
- Overfill safety systems
- Joint storage
- Sealing systems
- In-plant pipeline safety
- Wastewater split flows
- Fire protection strategy
- Plant monitoring
- Industrial plant in areas with a risk of flooding

#### **2.1.5. Step 5**

Hazard control planning:

- Checklist for the inspection of the Hazard control planning
- Internal alarm - and Hazard control planning
- Structure of safety reports

Design of the checklists:

##### **Part one**

Description of the safety requirements of installation (and parts of it) according to the recommendations

##### **Part two**

Questions catalog

##### **Part three**

Examples of measures

##### **Part four**

Assessment of the risk up to date

### **Part one:**

Checklist no. 2: <b>Overfill Safety Systems</b>	Page 2 of 7
 <b>Recommendations of the International Joint River Bodies for overfill safety systems</b>	
1    Containers may not be filled with substances hazardous to water unless an overfill safety system is used.	
2    Exceptions to the overfill safety systems requirement may only be made if it is ensured (in particular) that overfilling of the container is prevented by other means (e.g. manual filling with self-closing dispensing pistol).	
3    Before the highest permissible filling level is reached, the overfill safety system must either interrupt the filling operation automatically or release an acoustic alarm. (The highest permissible filling level must be determined taking into account the additional amount that will be delivered after interrupting the supply.)	
4    Efficiency of the system must be guaranteed at all times.	

### **Part two and part three**

#### Questionary:

<b>2    Exceptions</b>		
<b>2.1    The filling of a vessel may only take place without an overfilling prevention device in exceptional cases. Do you have an exceptional case?</b>		
<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Not applicable
<b>2.2    In this exceptional case, is overfilling of the vessel or vessels reliably prevented using other means?</b>		
<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Not applicable
<b>2.3    Do you fill vessels manually using dispensing devices with automatic response (dispensing valve or pistol)?</b>		
<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Not applicable
<input type="checkbox"/> Action	<input type="checkbox"/> No action	
 <i>Remarks:</i>		

Proposal for measures:

#### Examples of actions

##### Short-term measures:

- Training and instructing the staff to check the level gauging devices regularly and on how to take the right decision if there is a danger of overfilling.
- Ensure direct observation of the level in the vessel when filling.
- Only fill vessels with at least two operating personnel present.

##### Medium-term measures

- Install dispensing devices with automatic response or weight-controlled filling devices if vessels or mobile containers are filled manually by the operating staff.
- Install a level indicator, if in exceptional cases; the vessel is filled without an overfilling prevention device.

#### **Part four:** Assessment of the risk up to date

##### **Determination of the real risk**

##### ***Is the sub-point of the recommendation implemented?***

Yes	Partially	No
ρ	ρ	ρ
RC=1	RC=5	RC=10

Assessment of the result of each relevant question

Sub-point of the Recommendation	Possible category	Risk	Risk categories	Summary for the assessment of the result of each question
1+2	1 / 15 / 30			
3	1 / 5 / 10			
4	1 / 5 / 10			

##### **Average Risk of Checklist (ARC)**

Result for the risk relating to the checklist

Summary of the checklist:

Sub-point of the Recommendation	Possible category	Risk	Risk categories
1+2	1 / 15 / 30		1
3	1 / 5 / 10		1
4	1 / 5 / 10		10
<b>Average Risk of Checklist (ARC)</b>			<b>4,0</b>

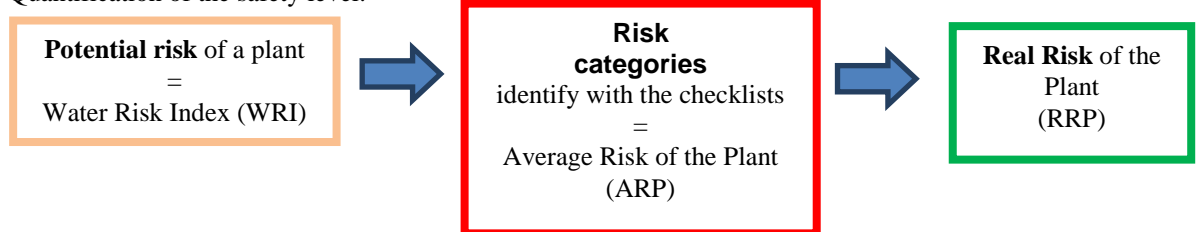


$$ARC_n = \frac{\sum_m RC_{SP}}{m}$$

$$ARC_n = (1 + 1 + 10) / 3$$

n – figure of the checklist

Quantification of the safety level:



#### **Water Risk Index (WRI):**

The equivalent of water risk class 3 ( **WRC 3-equivalent = EQ3**) is the sum of the volume of substances hazardous to water in a particular unit based on the water hazard class 3.

1 ton of substance classified as WHC 3 is at least 10 times more dangerous than 1 ton of WHC 2 substance and at least 100 times more dangerous than 1 ton of WHC 1

Example:

<u>Amount of substance in kg</u>	<u>WRC</u>	<u>WRC-3-Equivalent</u>	
1000	1	1000 * 10	= 10
700	2	700 * 10	= 70
50	3	50 * 10	= 50
<b>Sum</b>			<b>= 130</b>

The water risk index (WRI) corresponds to the exponent of base 10 of the WRC 3 equivalent.

*Example*

WRC-3-Equivalent = 130 kg

$$WRI = \log 130 = 2,11$$

WRI    1- 3    low potential risk  
 WRI    3 – 5    middle potential risk  
 WRI    5 – 10    high potential risk

Modified Water Risk Index:

M1 = 0,1 earthquake risk  
beginning with the level 4 Richter scale  
small damage possible

M2 = 0,1 danger of flooding  
flood at the last hundred years

M3 = 0,1 sensitive areas  
drinking water supply  
nature protection area

$$MWRI = WRI_s + M1 + M2 + M3$$

**Average Risk of Plant (ARP)**

**ARC:** Average Risk of the Checklist

**ARP:** Average Risk of the Plant

Checklist	Average Risk of the Checklist (ARC)
2	4,0
3	6,0
4	0,3
5	

N

**Average Risk of the Plant (ARP)** 3,4

**Real Risk of the Plant (RRP)**

$$RRP_i = \lg(10^{WRI_i} \bullet ARP_i) = \lg(EQ3_i \bullet ARP_i)$$

$(RRP_i - WRI_i) \leq 0,4$  high safety level

$0,4 < (RRP_i - WRI_i) \leq 0,8$  medium safety level

$(RRP_i - WRI_i) > 0,8$  low safety level

$$RRP_i = \lg(10^{WR_i} \bullet ARP_i) = \lg(EQ3_i \bullet ARP_i)$$

$RRP_i \leq 2$       *low risk*

$2 < RRP_i \leq 4$       *medium risk*

$RRP_i > 4$       *high risk*

#### 2.1.6. Summary

- A effective water protection needs permission and inspections. The license are only effective, when their regulations are controlled.
- Checklists ensure a consistent and systematic procedure of inspections and realized a high quality
- Checklists support the inspectors in his work
- Checklists support to identify the necessary measures and to assess the safety level of the installations.

## 2.2. Storage and equipment

---

*Presented by Mr. Arno Kilian, Germany*

#### 2.2.1. Subsistence

- R 52 harmful to water organisms,
- R 53 have harmful effects in aquatic environments in the long term
- Water risk classes (WRC), Germany
  - WRC 1: Water risk Class 1 – low hazard to waters (e.g. HCl, NaOH)
  - WRC 2: Water risk Class 2 – hazard to waters (e.g. Diesel)
  - WRC 3: Water risk Class 3 – severe hazard to waters (e.g. Benzene)

Level of plant safety:

1. Tank
2. Secondary containment
3. Monitoring internal / external
4. In case of damage: limit the impact

### 2.2.2. Definition of storage

- Storing is the process of keeping substances hazardous to water in containers (tanks, tank container and other vessels) to serve as a depot for consumption or source of supply to others. This also includes serving as a point of storage, if loading or offloading processes does not start within 24 h or the next working day.
- If this working day is a Saturday, then the time limit ends on the next working day

Storages are grouped according to types in:

- Underground
- Overground

#### *Underground storages*

- Single shell underground containers and pipelines are generally not allowed
  - *Exception:* solid and gaseous substances

#### *Overground storages*

- Placing the storage units in tight and resistant secondary containment
  - exception:  
storage units where other adequate environmental safety measures have been taken to prevent damages
  - solid and gaseous substances

#### *Stationary overground storage (liquids)*

- Determinating the Capacity of the secondary containment
  - the volume of the units placed in it or the volume of the biggest tank if several units are placed in the containment. It should be able to retain at least 10 % of the whole volume of all units placed in it. Communicating containers are considered to be one container

Containment of fire-fighting water, fire protection:

- The containment of fire-fighting water should be considered when calculating the entire capacity of the secondary containment
- The stability of overground tanks must be guaranteed to withstand the effect of fire for duration of 30 minutes.

Determination of secondary containment, moveable containers:

Total storage volume $V_{\text{tot}}$ in $\text{m}^3$	Size of secondary containment
$\leq 100$	10 % of $V_{\text{tot}}$ , at least volume of biggest container
$< 100 \leq 1000$	3 % of $V_{\text{tot}}$ , at least $10 \text{ m}^3$
$> 1000$	2 % of $V_{\text{tot}}$ , at least $30 \text{ m}^3$

The storages of solids should have:

- Roof
- Tight and resistant floor
- Tight and resistant packaging

Requirements for flat-bottom tank:

- Double shell bottom with leak detection
- Bottom can be inspected

Visibility for leak detection and inspection:

- height of tank  $< 1,5\text{m}$   
A= at least 0,4 m
- height of tank  $> 1,5\text{m}$   
A= at least 1,0 m

Number of tanks	Total volume	Rule
up to 10	$< 2000\text{ m}^3$	B $> 0,3\text{ D}$ at least 1 m
up to 10	$> 2000\text{ m}^3 < 50.000\text{ m}^3$	B $> 0,3\text{ D}$ at least 3 m
up to 4	$> 50.000\text{ m}^3$	B $> 0,5\text{ D}$ at least 3 m

### 2.2.3. Requirements for storages

The basic requirements: storage facilities should be:

- Tight
- Stable
- Resistant to possible physical and chemical influents

Additional requirements on tanks with internal overpressure and underpressure:

#### *Overpressure*

- pressure gauge
- safety device to control excess pressure as long as the permissible operating overpressure could be exceeded
- liquids or their vapour being released through safety relief valves must be safely discharged
- in very special cases, other safety devices can be used instead of safety relief valves to control excess pressure (e.g. bursting disc safety device)
- if the permissible operating pressure of a tank is less than the possible pressure from the pressure generator by 2 bars or more, an automatic device must be installed in the pressure supply line to reduce the pressure, so that the permissible operating pressure will not be exceeded
- each pressure pipe connection of a tank must be fitted with a shut-off device.
- inspection glass must be resistant to internal overpressure, the effects of the stored flammable liquid as well as their vapour and be protected from damages

#### *Underpressure*

- tanks in which underpressure could occur but are not designed to resist such underpressure must be fitted with an appropriate device to prevent underpressure

Other requirements of storage tanks

- flame-proof fittings
- heating
- internal and external protection against corrosion

- fire protection devices, e.g. fire alarm
- protection against lightning
- protection against explosions
- vapor recovery equipment
- ...

#### ***Electrostatic charge***

- plants and plant components must be protected against electrostatic charges that can result in dangerous discharges
- the filling of containers must be done so that risks do not arise from electrostatic discharges

### **2.2.4 Protection against mechanical damage and flood protection**



Protection against mechanical damage:

- The containers must be placed so that they are protected against possible mechanical damage e.g. by collisions with vehicles

Flood protection:

- In case of a possible displacement of the plant due to groundwater, static water and flood, the tank should be secured with suitable means against the force of buoyancy
- Tank openings should be located in flood zones above the flood level (e.g. for a 100-year event)

### **2.2.5 Flammable liquids**

F+		extremely flammable	flash point below 0°C
F		highly flammable	flash point from 0°C-21°C
R10		flammable	flash point from 21°C-55°C

- sufficient distance from each other and to buildings
- protective strip around the tanks
- protection against explosion and fire hazard
- limitation of storage volume in order to reduce the danger of fire

Distances

- the distance from tank with flammable liquids to the buildings should be at least 10 m
- the distances to each other depend of the storage volume, but not less than 10 m

Limitation of storage volume

- stationary tanks  
→ 150 m<sup>3</sup> per storage unit
- movable containers or tank container  
→ 100 m<sup>3</sup> per storage unit

#### **2.2.6. Venting devices**

The main requirements to venting devices:

- tanks should be equipped with aerating and venting devices to prevent dangerous underpressure and overpressure
- venting devices should not have shut-off valves
- compact and resistant to vapour of the stored liquids in regard to the strain that could be expected. Furthermore they should be sufficiently durable and resistant to the effects of fire
- sized to prevent the occurrence of dangerous under and overpressure at high flow rate of pumps and fluctuating temperatures in the tank
- joint pipe only when
  - liquid of the same danger class
  - no dangerous mixtures with one another
- protection from rainwater
- safe discharge of evaporating vapour/air - mixture during filling processes

#### ***Liquid level gauge:***

- each tank must be provided with a device for detecting the level of the liquid stock. This device can be left out for overground tanks if the shell is made of a transparent material (e.g. plastic)
- liquid level glasses must be
  - protected from damages and must be
  - partitioned into sections of not more than 2,5 m.
  - If liquid level glasses are not equipped with a safety device to prevent release of liquid when damaged, then they should be fitted with fast-closing shut-off device. The shut-off device should only be opened when checking the liquid level

#### **2.2.7. Overfill safety device**

- each tank must be equipped with an overfill safety device, which automatically interrupts the filling process in time before the permissible capacity is reached or trigger off an acoustic alarm
- this does not apply to overground vessels (tanks) with volume of not more than 1 m<sup>3</sup> if they are being filled with automatic dispensing valve

#### ***Leakage indicator***

- leakages on the wall of double shell containers must be indicated with an automatic indicator. Their functionality of it must be verified

#### ***Shut-off valves for Pipelines***

- each pipe connected below the permissible level of liquid in the tank must be fitted with a shut-off valve

- pipe connections above the permissible level of liquid in the tank must be fitted with a shut-off valve, if it is possible to pump out the contents of the tank through the pipe
- the shut-off valve must be installed as close as possible to the tank, must be easily accessible and easy to operate
- tank fittings of underground tanks should only be mounted on the top or in the vertex of the tank. The fittings must be easily accessible
- for the process of filling and emptying, each tank must be fitted with a system that allows a safe connection of a stationary or a detachable pipeline

#### **2.2.8. Marking or labelling**

- each tank must be furnished with a manufacturer's label, which contains all tank characteristics
- each tank must be furnished with legible and permanent labels to reflect the
  - kind of substances hazardous to water which are being handled in the plant
  - at which operating pressure
- filling ports of storage tanks that are mounted next to each other and containing liquids of different danger class or liquids that can form dangerous compounds when they come in contact must be characterised with a storage goods label

### **2.3. Transshipment, overfill safety and pipeline**

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*Presentment by Mr. Gerd Hofmann, Germany*

#### **2.3.1. Transshipment**

##### ***Trucks, railway wagons***

- Spillage of substances hazardous to water must be detected in time
- Transshipment sites must have collecting facilities capable of accommodating the volumes of liquid that can escape until suitable measures or
- Automatic safety systems take effect

Selection of the material:

- Expected mechanical stress
- Be sufficiently tight
- Resistant to spilled liquids

Spillage of substances hazardous to water must be detected fast

- Adequate distance
- Supervision of the transshipment process by person

When loading and offloading with the aid of pipeline, automatic safety devices must be provided which can interrupt the flow of substances in case of an accident



and thereby prevent the spillage of substances hazardous to water. Filling process using a flexible pipeline with automatic detachment on both side

***Ships*** are equipped with 1) quick disconnect coupler and 2) system on prevention against lifting.

Dry coupling devices

There are the coupling devices with automatic shut-off valves that closes automatically on both sides without leakages.

Equipment suitable for immediate use must be kept ready at transshipment sites to prevent the spread of dangerous substances or for removing the substances.

### **2.3.2. In-plant pipeline**

Pipelines are installation for transporting of substances hazardous to water inside in-plant terrain. Pipelines include the tubes, fittings, flanges and pumps.

- aboveground pipelines
- underground pipelines (completely or partly passed in the ground)

#### ***Primary safety systems***

= liquid-tight and resistant tubes, safety systems adverse high pressure, safety systems adverse knocking down etc.

#### ***Secondary safety systems***, in case of leakage

= double-walled or light-tight and resistant retaining basin

#### ***Third safety systems***

= continuous self-control and external control with regard to functional efficiency of the safety systems

Capacity of resistance:

- material
- wall thickness
- character of pipe connection

Operational demands:

- mechanical force
- deposit corrosion /aging
- operating data (character of the substance, temperature, pressure)

Mechanical resistance

- Drifting and declivity of the pipelines must not endanger their safety and tightness
- Pipelines must be adequately protected against mechanical damages, e.g. being bumped by vehicles

Resistance of pipeline to corrosion

- Rate of reduction. Material selection, character of the medium, sufficiently resistant, suitable coatings of the inner walls
- Reduction of the pipeline static

Stability adverse different operating conditions

- Protection against high temperature, in case exceeding the acceptable operating temperature is possible.
- Covering the pressure, in case exceeding the acceptable operating pressure is possible

#### ***Requirement for the technical construction***

Safety adverse leakage in case of underground pipelines

- **double-wall**, any leaks in the pipeline wall must be indicated by an approved **automatic leak indicator**, or
- designed as suction lines in which the liquid column is interrupted in the event of leaks, or precautions against the discharge of transported products must be taken in regular intervals, or
- equipped with a **suitable protective pipe** or be laid in a conduit; any escaping substances must be visible in a monitoring device.

Underground pipelines in containment have the protected tube/duck with detecting leakages by leakage sensor.

#### ***Construction of pipelines***

- The position and layout of the pipelines must be document
- Design, installation, inspection, maintenance of and alterations to the pipelines must be executed and documented professionally
- Pipelines must be labelled appropriately

### **2.3.3. Overfill safety**

Containers may not be filled with substances hazardous to water unless an overfill safety system is used. Before the highest permissible filling level is reached, the overfill safety system must either interrupt the filling operation automatically or release an acoustic alarm. The highest permissible filling level must be determined taking into account the additional amount that will be delivered after interrupting the supply.

Exceptions to the overfill safety systems requirement may only be made if it is ensured (in particular) that overfilling of the container is prevented by other means:

- Manual filling with self-closing dispensing pistol
- Filling based with weight or volume controlled devices

## **2.4. Sealing systems and oil separator**

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*Presented by Mr. Gregor Eichinger, Germany*

### **2.4.1 Sealing systems**

#### **2.4.1.1. Introduction**

Extract from IKSR/IKSE - commendations:

- Sealing systems are sealed and consistent constructions of troughs, containments and areas which come into contact with water-endangering liquid in case of leakage on ground plant facilities.
- Sealing systems should prevent from penetration of water-endangering liquid on collection pans, containments and draining surfaces.

#### **2.4.1.2. Definition**

Sealing surfaces are all components and assemblies, which could get in contact with water-endangering liquid:

- Draining surface
- Containment
- Trough, sump
- Floor drain
- Upturn
- Joint

*Draining surface:*

Facilities to drain off water-endangering liquid (usually incline > 2 %)

*Containment:*

Facilities to contain water-endangering liquid in a limited space of time

*Trough:*

Facilities to gather water-endangering liquid primarily

#### **2.4.1.3. Requirement of sealing system**

Sufficient tightness on principle:

*Level of load =*

Mode of leakage (material property)

Period of loading

*Level of resistance =*

Construction material of sealing system

Size of sealing system

#### ***Load of material***

The level of demand concerning to sealing systems is mainly characterized by following factors:

1. Resistivity of material
2. Period of loading
  - Space of time in which a leakage is identified + time of counteraction + space of time in which waste management is conducted
3. Operational demands caused by other exterior impacts
  - Static/dynamic stress, atmospheric influence

#### ***Material resistivity***

The resistivity to the material of the sealing system is to verify:

- Resistance to corrosion (Steel)
- Resistance to ageing and exposure to light , dispensability (synthetics)

- Penetration depth (porous materials: concrete, asphalt )

#### ***Verification of restiveness***

- Resistance register
- Reference objects
- Laboratory tests
- regulations, providing evidence by inspection authority

#### ***Period of load***

Three levels of loading containing appropriate requirements are to enumerate (suitable for in-plant survey and expeditiously discovering leakages):

Low	Period of load up to bits 8 hours - automatic malfunction message - permanent survey/inspection drift
Moderate	Period of load up to 72 hours - automatic malfunction message - survey per working day/inspection drift
High	Period of load up to 3 months - monthly survey/inspection drift

#### **Exterior impacts**

- Dynamic demands because of walk-on or drive (Truck traffic on filling site, stacker traffic in storage buildings and on stacking ground)
- Static demands caused by truck-loading
- Thermic influences on synthetics or concrete (high ambient temperature caused by production activities or temperature fluctuation caused by the weather)
- UV-radiation (sunlight on open areas) concerning synthetics
- Chemical impact (oil, grease, fuel, de-icing salt)

#### **2.4.1.4. Materials**

##### ***Steel***

Requirements:

- Minimum of thickness:   Stainless steel: 2 mm  
  Constructional steel: 5 mm
- Stability is documented through reference lists of build material
- Welded seams and plate thickness has to be checked randomly and non-destructive
- Prevention of contact corrosion (distance between ground and holding tank)

##### ***Synthetics and surface impoundments***

Requirements:

- Minimum of thickness 0,8 mm or according to standard approval
- Resistivity verification by means of reference lists or laboratory tests
- Tight joints
- Crack bridging capability from 0,1 mm to 0,5 mm (elasticity of surface impoundments)
- Sufficient adhesive strength to ground ( $\geq 1,5 \text{ N/mm}^2$ )

##### ***Concrete***

Requirements:

- Low and moderate demands:

- Concrete quality B 25 (Verification by reference documentation or insert of rebound hammer)
- Component thickness  $\geq 15$  cm
- High demand:
  - Concrete quality B 35, component thickness  $\geq 20$ cm
- Appropriate joint materials

### ***Asphalt***

Requirements:

Low and moderate demands

- Minimal of thickness 4 cm,  
Certification of porosity ( $\leq 3$ )
- Applicable joint material

Assessing penetration depth  $\Rightarrow$  Verification of tightness is established when penetration depth is less than 66% of component part thickness

#### **2.4.1.5. Construction of joints**

General requirements:

- Prefer joint less constructions
- Elaborateness planning of joint configuration and construction
- Joint hauling preferably in approachable and testable areas
- Joint configuration referred to system of rules

#### **2.4.1.6. Sealing area**

General requirements:

A sealed **operating area** in filling sites is to locate. This area is the surface while filling, it is identified with the horizontal line of pipe between connection tank truck and storage tank, additionally 2,5 m roundly. (Water-endangering liquids can blow out under pressure).

The size of operating area can be reduced by installing splash guard with a height of 1 meter minimum.

Pipe in connection with sealing system

- Pipes have to be testable for tightness, including junctions to components of sealing face
- Pipes and sealing components have to observe tightness and consistency requirements
- Single walled and below ground pipes shall have weld joints, bond or flanged connection which are equate to non-detachably connection

#### **2.4.1.7. Monitoring sealing faces**

Controlling and monitoring sealing faces

- Expert installation of a sealing system, documented orderly
- Certification of sealing system, conducted by an independent expert
- Periodical inspection of operational reliability in the framework of internal survey and external expert inspection

## Evaluation of sealing faces

### *Visual inspection*

- Checking surface for contamination and damages:
- Crack
- Damage caused by mechanical attack
- Damage caused by chemical attack
- Bubble formation, maceration and delamination
- Damaged joints

### *Technical inspection*

- Checking detected damages for the need for action:
- Quantify crack depth and crack width, test for crack transmissibility
- Expose parts of sealing face at random and evaluate
- Non-destructive test (rebound hammer)
- Measure abrasion of sealing face
- Core hole drilling at random

## **2.4.2. Oil separator**

### **2.4.2.1. Range of application**

- Oil separators are used on sites where oil loss or oil leakages are possible
- On open areas surface water and cleaning liquid could be added:
  - filling grounds, dealing with mineral oil products
  - fuel filling sites
  - truck wash
  - open repair shop
  - traffic zone of tank trucks and switching grounds

### **2.4.2.2. Mode of function / capacity**

#### *Mode of function*

- The mode of separation is a physical process, whereat difference in density to oil and water is used. The oil separator accelerates and controls this process.
- Generally, oil separator consists of three assemblies:
  - Slurry trap
  - Separator
  - Sample shaft

#### *Capacity*

- Separator capacity is specified by nominal value (Nenngröße , NG) NG 1 means a maximal flow of 1 l/s without exceeding limit value for carbon hydride
- NG determination is to calculate on an individual basis. All relevant parameter are to ascertain on a site inspection. In addition regional rain yield factor is to consider (heavy rain= 50 l/m<sup>2</sup>).

### **2.4.2.3. Slurry trap**

- The volume of slurry trap have to be in line with the oil-separator capacity:
  - NG 1 to 3: 600 l
  - NG 3 to 10: 2500l

NG > 10:            low quantity of slurry:            NG x 100 l  
                          moderate quantity of slurry : NG x 200 l  
                          high quantity of slurry :            NG x 300 l

- Incoming waste water is drained off and settled with dip tube or wash plate

#### **2.4.2.4. Oil separator**

- Oil separator should hold a limiting value of 20 mg/l for carbon hydride discharging wastewater to a sewage plant. Discharging wastewater in receiving waters a limiting value of 5 mg/l for carbon hydride is to advice.
- To keep a limit value of 5mg/l for carbon hydride a coalescence separator is necessary .
- An automatically acting shut-off feature avoids uncontrolled wastewater output.

#### **2.4.2.5. Sample shaft**

- An inclined trough at the bottom of the sample shaft permits wastewater extraction and quantity control
- Other split-flows wastewater shall not feed the shaft.

Fuel separator + coalescence separator used by high rate of inflow and heavy polluted wastewater.

#### **2.4.2.6. Placing and maintenance**

- Separator shaft must be at least 130 mm higher than the lowest intake works. Therewith an uncontrolled oil emersion can be averted
- Periodical controls are necessary to a proven und failure-free handling:
  - monthly function check
  - half-yearly maintenance
  - 5-yearly principal inspection (drawdown, cleaning, tightness control)
- Verification of personal qualification

## **2.5. Fire and flood protection**

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*Prepared by Ms. Evelyn Muller, Germany*

### **2.5.1. Fire protection**

#### **2.5.1.1. Introduction**

- Quick detection of fires and fire fighting
- Prevention of fire spread

- Retention of contaminated fire-fighting water:
  - Preventive fire protection
  - Kind of fire fighting measures
  - Fire-fighting water volume
  - Appropriate containment facilities
  - Disposal of contaminated fire-fighting water

#### 2.5.1.2. Prevention of fire spread

Preventive measures against fire spread

##### **Requirements:**

The limitation of the stored quantity in the area of storage section

- limits the dimension of a possible fire
- decrease the volume of fire-fighting water

##### **Measures:**

Dividing building into fire cells and zones separated by fire-resistant materials

- Limitation of height of goods stored
- Limitation of the area of storage section/stored quantity

##### **How are the storage sections to be separated?**

Inside of buildings:

by fire-resistant walls and ceilings (F90-A type; storage section > 1.600 m<sup>2</sup> firewall)

##### **Outside of buildings:**

by walls or distances (usually 10 m, in special cases 5 m)

##### **What are the requirements for the construction materials?**

Materials for containers, pipes and containment facilities must be fire-resistant for at least 30 minutes

##### **Maximum heights of stored goods for removable containers inside buildings?**

Maximum height:

- Block storage: 4 m
- Block storage with sprinkler: 5 m
- High-bay racking: 5 m
- Block- and rack storage: 6 m
- ↳ provided that each storage good unit is accessible for fire fighting from at least one side and a storage good depth of 1,5 m is not exceeded
- High-bay racking with sprinkler: 40 m

Maximum allowable stored quantity and area

Safety-category	Max. allowable stored quantity and area of storage section by density of goods of 0,7 bis 1,2 t/m <sup>2</sup> for		
	WGK 1	WGK 2	WGK 3



	tons/m <sup>2</sup>	tons/m <sup>2</sup>	tons/m <sup>2</sup>
K1	200	50	50
K2	800	400	200
K3	1200	800	600
K4	4000	3000	2400

Safety-category:

K1: fire brigade

K2: fire brigade and automatically fire detection system

K3: plant fire brigade and automatically fire detection system

K4: fire brigade and autom. fire detection and extinguishing system

#### 2.5.1.3. Detection and notification

Early detection and notification of fire allows an early start of fire fighting activities -> less fire spread and hence less fire-fighting water.

*Example:*

- Automatic fire detection system with appropriate certification
- Fire alarm forwarded to control centre (e.g. through public phone network)

#### *Start of fire fighting:*

Fire-extinguishing system	–	Extinguishment directly after start of fire
Plant fire brigade	–	Extinguishment after appr. 5 min
Fire brigade	–	Extinguishment after appr. 10 min

Provide sufficient fire water supply!

#### *Required fire water supply:*

Guideline values for industrial areas:	96 m <sup>3</sup> /h – 192 m <sup>3</sup> /h supply for at least 2 h
Area of storage < 2.500 m <sup>2</sup>	96 m <sup>3</sup> /h x 2h
Area of storage > 4.000 m <sup>2</sup>	192 m <sup>3</sup> /h x 2h
with automatic fire-extinguishing systems (sprinkler water not included)	96 m <sup>3</sup> /h x 1h

#### *Fire-fighting facilities*

Extinguishing agents:

Air foam, carbon dioxide, extinguishing powder, water

→ Mobile facilities

Fire extinguishers, mobile sprinkler

→ Stationary facilities

Water extinguishing system e.g. sprinkler, foam extinguishing system, CO2 extinguishing system

#### 2.5.1.4. Retention of fire-fighting water

Fire-fighting water retention – volume

Generally:

Retention of contaminated fire-fighting water to be considered in addition to leakage retention capacity

No fire-fighting water retention required if

- Storage volume:  $\leq 100$  t WGK 1 or  $\leq 10$  t WGK 2 or  $\leq 1$  t WGK3
- Container completely below ground
- Double-walled steel container with max. volume of 100 m<sup>3</sup>
- Only non-combustible substances, non-combustible materials for plants and buildings are used
- Fire is inherently impossible
- Only small volume of fire-fighting water to be expected (e.g. filling and reloading sites if appropriate fire extinguisher available)

Calculation:

$$V_G = V_P + W_L + W_B + V_{Sch} - P - E$$

$V_G$  = Total volume of retaining basin

$V_P$  = Required leakage retaining compliant to VAWS

$W_L$  = Water volume from extinguishing agent

x weighting factor  $F_G$  (volume retaining basin)

x weighting factor  $F_L$  (type of extinguishing/extinguishing system)

x weighting factor  $F_F$  (type of the fire brigade)

$W_B$  = Water volume sprinkling

x weighting factor  $F_G$

x weighting factor  $F_L$

x weighting factor  $F_F$

$V_{Sch}$  = volume air foam with 50% disaggregation

$P$  = drained flammable liquid (container, retaining basin)

$E$  = drained fire-fighting water

#### *Leak-tightness of retaining basins*

Sufficient leak-tightness generally means:

Resistance potential > load potential

- Basement and walls have to be sufficiently tight till disposal  
↳ fulfilled when using steel or waterproof concrete compliant to DIN 1045 (th=20 cm)
- Sewage system must fulfill corresponding leak-tightness requirements
- In individual cases special considerations regarding leak-tightness may be required, e.g. site located close to waters, hydrological characteristics of the plant site

#### *Fire water retaining -Containment facilities*

- automatically acting structural measures

- Collecting basin
- Subsurface construction
- automatically acting structural measures
  - Smoke detector controlled barrier
  - Liquid controlled compartment
- manual structural measures
  - Dam beams
- mobile systems
  - Hose systems, sewer covers, sealing bag

Automatically acting structural measures:

- Collecting basin
- Subsurface construction
- Smoke detector controlled barrier
- Liquid controlled compartment
- Swayable barrier
- Dam beams

Mobile system

- Hose system
- Sewer cover

Distinction between

- Local retention (on-site usually at the plant unit)
- Central retention (several plant units share one retention system)

#### **2.5.1.5. Organizational measures and monitoring**

Organisational measures

*Fire safety regulations*

Regulations regarding behaviour of personnel in case of fire and measures to prevent fires

*Warehouse organisation*

Basic principles and regulations about operating procedures in storage facilities

*Internal water and soil protection plan*

*Conception for retention of fire-fighting water*

Organisational regulations to determine internal reporting channels and operating sequences in case of occurrence of damage in order to limit consequences of damages

***Conception for retention of fire-fighting water***

Document about type and scope of the internal fire-fighting water retention

Content of the Concept

- Fire protection installations
- Definition of required retention volume
- Structurally engineered construction
- Organisational measures

***Internal water and soil protection plan***

Content of the plan

- Description of facilities and equipment for immediate measures (operation, availability)
- Directions for using activatable retention systems for fire-fighting water and operation of fire extinguishing systems
- Basic rules of behaviour
- Description of internal emergency procedures
- Policy for activation of external forces
- Notes of special risks (e.g. explosion danger, toxicity)
- Policy for internal and external reporting channels

### ***Monitoring by environmental authority***

Inspection scope:

1. Inspection of the technical system for retention of contaminated fire-fighting water
  - a. Containment facilities  
(Inspection of the condition, calculation of volume, reports about maintenance and repair)
  - b. Sewage systems, pumps, fittings, measuring, regulation and control device  
(Layout of sewage system, Conception for retention of fire-fighting water, function- and tightness tests)
2. Inspection of the organisational and infrastructural measures for retention contaminated fire-fighting water
  - a. Discussion of scenarios
  - b. Crisis management
  - c. internal emergency and danger prevention plans
  - d. Documentation of fire alarm tests and employee training

## **2.5.2. Flood protection**

### **2.5.2.1. Introduction**

Possible impact of flooding on plant units

- Unsecured containers may float or tip over
- Pipes may be damaged
- Containers may be warped or become leaky
- Water may ingress in venting pipes of fuel tanks and extrude fuel
- Floating objects may cause damage

### **2.5.2.2. Underground plan units**

*Requirements*

- Buoyancy control (1,3 empty container)
- Statically designed to withstand external water pressure

*Measures*

- Anchoring by steel bands enclosed in a concrete slab
- Cover with concrete slabs
- Cover with more earth
- Replace of plant components or units
- Move plant components or units outside of danger zone

#### **2.5.2.3. Overground plan units**

##### ***Outdoor overground plant units***

###### *Requirements*

- Protection against force of buoyancy and mechanical damages
- Drainage of flood water must not be impeded by containers and plant components
- Bottom edge and pipelines must be above the water level for a recurrence interval of HQ100

###### *Measures*

- Protective devices (Steel grids, steel supports, protective walls .....
- Move plant components or units out of danger zone

##### ***Aboveground storage systems within buildings***

###### *Requirements*

- Buoyancy control and protection against rotation
- Coated and sealed secondary containment
- Statically designed to withstand external water pressure

###### *Measures*

- Anchoring by steel bands enclosed in a concrete slab
- Steel braces fixed to the ceiling
- Seal penetrations in secondary containments
- Move plant components or units out of danger zone

#### **2.5.2.4. Plan components**

###### *Requirements*

- Open ends of venting pipes must not get flooded
- Protection against damage by floating objects and external water pressure
- No shut-off valves in venting pipes
- Tightness of openings which can be flooded
- Pneumatic level gauges

###### *Measures*

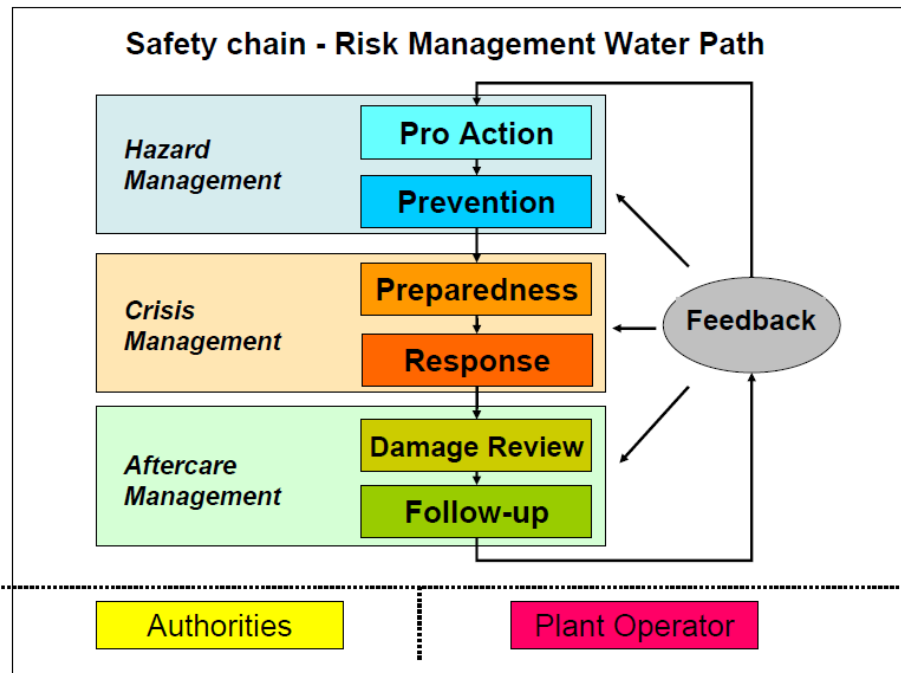
- Remove all shut-off devices in venting systems
- Replace seals
- Technical measures to limit the maximum pressure (rupture disk)
- Move plant components or units out of danger zone

## **2.6. Hazard management and plant monitoring**

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*Presented by Mr. Gerd Hofmann, Germany*

### 2.6.1. Plant monitoring



Permanent tightness of the plant and efficiency of the safety equipment is guaranteed by adequate plant monitoring:

- self control by the operator
- control by external authorized experts
- governmental inspection

Definition of the in-house responsibilities for specifying and checking safety measures by the plant operator

- guarantee the efficiency of the plant
- constant monitoring of the tightness of the plant and guarantee the efficiency of the safety equipment
- documenting in writing all regular checks that has taken place
- duty of reporting any accidental release of substances hazardous to water to the responsible authority immediately

Self-control by the operator

- Water hazard potential: character of the substances
- Possibility of substance spillage: scenarios of accidents and constitution of the plant
- Precautionary measures: constitution of the plant
- Necessity to protect waters: Sensitivity of the surrounding

Concept of Permanently control:

Assessment of the substance spillage based on the scenarios of the accidents -> Control of the relevant parameter -> chemical (c, pH), physical (T,p), biological (bacteriotoxicity) -> measuring equipment -> exceeding of the prescriptive limits malfunction of the measuring equipment ->

### 2.6.2. Plant control

System for monitoring waters:

→ accidental discharges of substances hazardous to water can be detected by regional and supra-regional checks

Governmental activities:

- License
- Inspection
  - before bringing into service
  - periodic inspection
  - after close down the installations
- Ensuring that plant operators live up to their responsibility in regard to plant monitoring,
- verifying how often monitoring by independent experts is organised by the operator
- Directive to realize necessary measures
- Conducting in-house random checks or checks by external experts on the installations

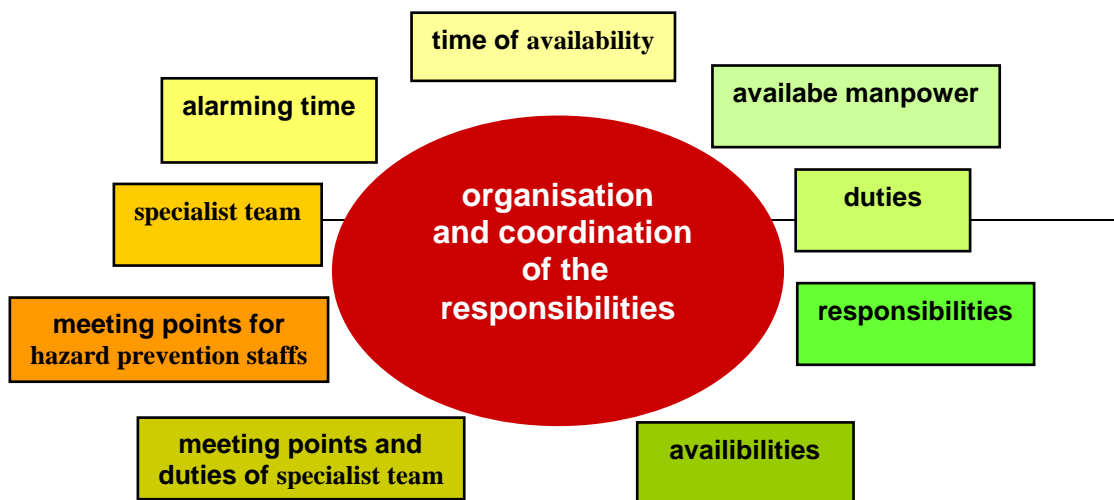
Experiences:

- Requirements of the license are **not completely realized**
- Installation are used **without license**
- During the operating time **defects arise** because of missing self-control and incorrect service
- Installations are not **close down according to the rules**

### 2.6.3. Internal alarm and hazard control monitoring

Accident-prone plants: detecting the basic responsibilities of operators, which can lead to an accident or which can be caused by an accident that has already occurred.

Description of type and procedure: organizational and technical measures



***Overview of the format for the in-house emergency plan:***

<b>Structure</b>	<b>Content:</b>
Setting of the prevention of hazard	Application area, objectives, responsibilities procedure of documentation
Action	Alarm plan, procedure of alarming, reaction
Documentation	Description of the plants, surrounding, hazard substances, documentation

<b>Information to the installation</b>	
Fire brigade plans	highly dangerous areas, data to the hazard substances permitted fire fighting means etc
Water supply	fire-fighting water, availability of cooling water
Power supply	emergency power supply, voltage switch
Drainage plans	shut-off devices, containment facilities and highly dangerous areas
In-plant alarm and warning equipment	
Emergency shut-down of hazardous installations	

***Alarm level according to the expected impact:***

Alarm level I: Internal alarm, accident can coped by own utilities

Alarm level II: internal alarm, accident, which can noticed by the heighbourhood; can still  
coped by own utilities; external authorities will be informed  
prophylactical

Alarm level III: External alarm, accident cannot coped probably by own utilities

Additional actions that could be done:

- Training in regular intervals on how to respond and the measures to be taken in the event of industrial accidents
  - Update the internal alarm and hazard control plans regularly
  - Ensure that the local authority and the personnel are informed about the alarm and hazard control plans
- Alarm in case of accidents with effects in the neighborhood countries.

**2.6.4. Analysing the potential risk for surface waters**

Dangerous technical installation

- Nature and quantity of potentially hazardous substances
- Effects of the substance
- Dispersion behavior of substances



- Possibilities of managing the damage further possible consequences
- nature of installation

*Accident scenarios*

Leakage  
 Overfilling  
 Total failure of containers  
 Fire outbreak and the amount of fire fighting water  
 Accidents during in-house transportation

*Consideration of the impact*

How long it takes to spread  
 How far it could spread

*Measures to limit the effects of industrial accidents*

Containing fire fighting water  
 Retaining basin  
 Fire fighting systems

*Measures by operator upon accident:*

- Detection of the possible area of influence and the necessity of protection (e.g. area of winning drinkingwater )
- Analyzing nature and amount of the consideration of the impact and the possible way of spread of the substances

## ANNEX I FINAL AGENDA

DAY 1	September 27
9.00 – 9.30	<b>Registration</b>
	<b>1. Opening</b>
9.30 – 10.00	Representative of Romania Representative of Germany Representative of Industrial Accident Convention
	Chair for the workshop: Mr. Francisc Senzaconi, Head of Prevention Disasters Office, GIES
	<b>2. Safety standards applied by oil terminals</b>
10.00 – 10.30	Representative from Galati terminal
10.30 – 11.00	Mr. Veaceslav Scripluc, and Mr. Nelu Andreescu representing terminal Giurgiulesti
11.00 – 11.30	<i>Coffee break</i>
11.30 – 12.00	Ms. Svitlana Povorozniuk representing Reni Marine Commercial Port
12.00 – 12.30	Ms. Olena Broshevan representing State Enterprise "Izmail Marine Commercial Port"
12.30 – 13.30	<i>Lunch</i>
	<b>3. Technical presentations</b>
13.30 – 14.00	Introduction to checklist methodology – Mr. Gerd Hofmann
14.00 – 14.40	Storage and equipment – Mr. Arno Kilian Q & A
14.40 – 15.20	Transshipment, overfill safety and pipeline – Mr. Gerd Hofmann Q & A
15.20 – 15.50	Coffee break
15.50 – 16.30	Sailings systems and oil separator – Mr. Gregor Eichinger Q & A
16.30 – 17.10	Fire- and flood-protection – Ms. Evelyn Muller

	Q & A
17.10 – 17.50	Hazard management and plant monitoring – Mr. Gerd Hofmann Q & A
17.50 – 18.00	Wrap up of Day 1 and practical information for the site visit
19.30	<i>Welcome dinner</i>
<b>DAY 2</b>	<b>September 28</b>
	<b>4. Joint visit</b> <i>With the application of the Checklist methodology</i>
08.30	Departure Hotel
09.00 – 12.30	Visit to oil terminal of Galati - Division into 4 groups
12.30 – 14:00	<i>Trip to Giurgiulesti and lunch</i>
14.00 – 17.30	Visit to oil terminal of Giurgiulesti - Division into 4 groups
17.30 – 18:30	Trip to Galati
19:30	<i>Dinner</i>
<b>Day 3</b>	<b>September 29</b>
09.00 – 9.15	Summary of the site visit and introduction to the break-out sessions
	<b>5. Break out session: Findings of the visits to the oil terminals and application of checklist methodology</b>
09.15 – 12.30	Group 1 Rapporteur: Group 2 Rapporteur: Group 3 Rapporteur: Group 4

	Rapporteur:
11.00 – 11.30	<i>Coffee break</i>
12.30 – 13.30	<i>Lunch</i>
	Presentation of findings
13.30 – 13.45	Group 1
13.45 – 14.00	Group 2
14.00 – 14.15	Group 3
14.15 – 14.30	Group 4
	<b>Break out session: Findings from the joint visits vis-à-vis the self-assessment reports and areas for possible improvements</b>
14.30 – 15.30	Group Moldova Rapporteur: Group Romania Rapporteur: Group Ukraine Rapporteur:
15.30 – 16.00	<i>Coffee break</i>
	Presentation of findings
16.00 – 16.10	Group Moldova
16.10 – 16.20	Group Romania
16.20 – 16.30	Group Ukraine
16.30 – 18.00	Discussion Moderator, Mr. Gerd Hofmann
18.00 – 18.15	Conclusions and closure

## ANNEX II LIST OF PARTICIPANTS

	First name	Last name	Institution
	<b>UKRAINE</b>		
1	Iryna	Shtets	State Environmental Inspection
2	Iryna	Zadvorna	Ministry of Environmental and Natural Resources
3	Oksana	Tarasova	Ministry of Environmental and Natural Resources
4	Yegeny	Patlatiuk	State Inspection for Environmental Protection of the North-Western Part of the Black Sea
5	Victor	Fedorovskyy	Department of Inspection of Civil Protection and Technogenic Safety in Odesa Oblast, MinEmergencies, Odesa
6	Kateryna	Pogosova	State Inspection of Civil Protection and Technogenic Safety, Ministry of Emergencies
7	Anatolii	Vasylchenko	Main Department of Ministry of Emergencies in Odesa Oblast
8	Serhii	Obodovskyi	Department of Civil Protection, Ministry of Emergencies of Ukraine
9	Roman	Bashtannyi	Information and Analytical Center of marine and River Transport of Ministry of Infrastructure of Ukraine
10	Olena	Broshevan	State Enterprise "Izmail Marine Commercial Port"
11	Svitlana	Povorozniuk	Reni Marine Commercial Port
12	Yulia	Vysochanska	State Inspection for Environmental Protection of the North-Western Part of the Black Sea
13	Nadiia	Kysil	State Environmental Inspection
14	Olexandr	Posmitnyy	Ministry of Environmental and Natural Resources
	<b>MOLDOVA</b>		
1	Gavril	Gilca	Ministry of Environmental, SHS
2	Svetlana	Stirbu	Ministry of Environmental, SHS
3	Alexandru	Mazur	Ministry of Environmental, SHS, driver
4	Valentina	Turcanu	Ministry of Environmental, SHS
5	Valentina	Tapes	State Environmental Inspectorate
6	Mihail	Mustea	State Environmental Inspectorate
7	Nelian	Capatina	State Environmental Inspectorate
8	Vladimir	Girnet	State Environmental Inspectorate, driver
9	Ion	Bularga	Ministry of Foreign Affairs, International Treaties Division
10	Vitalii	Mutaf	Emergency department, driver

11	Sergiu	Junea	Emergency department
12	Oleg	Moscalov	Emergency department
13	Ghenadie	Popa	Emergency department
14	Veaceslav	Scripluc	Giurgiulesti Port
<b>UNECE</b>			
1	Lukasz	Wyrowski	UNECE, TEIA Convention Secretariat
2	Gerhard	Winkelmann-Oei	Germany
3	Chris	Dijkens	UNECE
4	Michaela	Popovici	ICPDR
5	Lesya	Nikolayeva	expert (Zoi Environment Network)
6	Claudia	Kamke	Germany
<b>GERMANY</b>			
1	Evelyn	Müller	
2	Arno	Kilian	
3	Gregor	Eichinger	
4	Gerd	Hofmann	
<b>ROMANIA</b>			
1	Marilena	Ghiu	MEF
2	Septimius	Mara	MEF
3	Magdalena	Duta Ghergut	NEPA
4	Mariana	Mocanu	GNM
5	Carmen	Hamchevici	RWNA
6	Ruxandra	Boboceca	RWNA
7	Constantin	Lefter	RWNAD Dobrogea
8	Norvina	Bodnaras	LEPA Constanta
9	Francisc	Senzaconi	GIES
10	Claudiu	Bratu	GIES
11	Iulian	Matei	ANPM
12	Cristina	Pintilie	GIES
13	Berghiu	Gheorghe	GIES
<b>Romania - local level</b>			
14	Vasile	Balaban	CIES GL
15	Ion	Toma	CIES GL
16	Cristinel	Radu	CIES GL
17	Eugen	Oatu	LEPA GL
18	Carmen	Sandu	REPA
19	Daniel	Mocanu	CC GL - GNM
20	Bogdan	Golomoze	City GAZ
21	Ioan	Rogojina	City GAZ
22	Gheorghita	Medeleanu	Unicom Oil Terminal
23	Viorel	Scarlet	Unicom Oil Terminal
24	Doru	Bejenaru	Port Authority

## ANNEX III CERTIFICATE



# *Certificate*

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participated  
from 27<sup>th</sup> to 29<sup>th</sup> of September 2011  
*in the training within the*  
**- DANUBE DELTA PROJECT -**  
Joint Visit to the ports of Galați and Giurgiuleşti  
Galați, Romania

### **Content of the Seminar:**

- *Training on the Checklist methodology*
- *On-site Application of the Checklists for surveying and assessing industrial plant handling materials and substances which are hazardous to water*
- *Discussion on the harmonization of basic safety levels*

Lukasz Wyrowski  
UNECE

Gerhard Winkelmann-Oei  
Umweltbundesamt

Gerd Hofmann  
RP Darmstadt