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Checklists for surveying and assessing industrial plant handling materials and substances, which are hazardous to water

Overview and notes on using

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Checklists for surveying and assessing industrial plant handling materials and substances, which are hazardous to water

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by

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Preface

The federal environment agency in Germany started the project „Plant-related water pollution control technology transfer to Romania, Moldavia and the Ukraine“ after the disaster in Baia Mare (Romania) to considerably improve the safety level of industrial plant in respect to the protection of the seas and rivers

A very important result of this project is the development of the so called checklists method.

Checklists for the realization of the recommendations of the river basin committees

Application of the checklists method allows the verification of compliancy with basic safety precautions by small plants as well as the verification of compliancy of complex industrial plants with additional plant safety precautions.

Based on the recommendations of the river basin committees (UNECE)

- Recommendations for **Functional units** (e. g. storage, sealing systems, fire prevention etc.)
- Recommendations for **Branches** (e. g. cellulose industry)
- Recommendations for **Risk areas** (e. g. contaminated surfaces)

there were corresponding Checklists developed.

The following checklists are now available for Functional units:

1. [Substances](#)
2. [Overfill safety systems](#)
3. [In-plant pipeline safety](#)
4. [Joint storage](#)
5. [Sealing systems](#)
6. [Wastewater split flows](#)
7. [Transshipment](#)
8. [Fire protection strategy](#)
9. [Plant monitoring](#)
10. [Internal alarm and hazard control planning](#)
11. [Industrial plant in areas with a risk of flooding](#)
12. [Structure of Safety reports](#)
13. [Storage](#)
14. [Equipment of tanks](#)
15. Temporary closure of industrial facilities
16. Closure of industrial facilities for the long-term period
17. Safety Manual at industrial facilities on the example of oil distillation plants
18. Construction and equipment of industrial facilities at the example of oil distillation plants

The checklists are divided into four parts.

1. The first part is the organizational and technical recommendations. These will be quoted from the original text.
2. The second part is the method of querying to ascertain if the recommendations are complied with.
3. The measures to be taken are recommended according to the problem. These are organizational and technical measures which are graded in short-, medium- and long-term measures. They can be used by plant operators as investment plan and by the authority as catalogues of demand.
4. The fourth part is a quantitative evaluation of the safety level (see the Action Guidance).

The sequence and the numbering of each of the paragraphs in the checklists match the sequence of numbering of the Recommendations.

Notes on using the checklists

Systematic and unified approach when assessing

The checklists are intended to allow a systematic and unified approach when investigating and assessing the state of industrial plant which handles water-polluting substances.

Measures and catalogues of measures

If the requirements of the Recommendations of International Commission for the Protection of the Rhine (ICPR) are not or only partially fulfilled, suitable remedial actions must be specified by the experts. The actions should be differentiated into short-term, medium-term and long-term measures. The following criteria should be considered when deciding on the measures which are appropriate:

Short-term measures

Short-term measures are normally low cost measures. These activities normally, they can be implemented by the plant operator using means that are already available in the factory. They should consist of simple technical or organisational actions with the purpose of immediate improvement of the present condition of the plant with respect to water protection.

Medium-term measures

Medium-term measures are technical and/or organisational actions with the intention of satisfying the recommendations ICPR/ICPERI (International Commission for the Protection of the Elbe River). The financial capability of the plant operator is taken into consideration.

Long-term measures

Long-term measures should guarantee the technical implementation of proposed measures which satisfy the recommendations with the aim of implementing the European standards for plant-related water protection.

The examples of measures contained in each of the sections of the checklists are intended to help the user of the checklists as a support to choose a measure which is applicable to the respective situation. The measures should be summarised by experts as a catalogue of measures (see the example catalogues in the appendix).

Examples of measures:

Measures for sealing surfaces and secondary containments



Flat bottom tanks in secondary containment: The vertical walls of the secondary containment are visible in the picture.

Flat bottom tank in a secondary containment: Showing renovated and sealed joints in the vicinity of the circular foundation and the ground sealing surface.



Flat bottom tank in a renovated secondary containment:

The floor of the secondary containment and the lower part of the vertical wall surface is tight and resistant towards the storage environment. The upper part of the wall surface is also renovated and is for retaining fire-fighting water or foam. The flat bottom tanks are provided with a double bottom. The space between the double bottoms is being monitored for leaks.

Measures for unloading or loading from railway tank wagons



Unloading a railway tank wagon: Connecting pipe fitted with safety hose coupling; drips from which are collected in the mobile collecting tray.

Safety hose coupling:

The valve is part of the connecting hose. The valve is opened by compressed air when unloading. The valve closes automatically when the compressed air feed is interrupted.

*Unloading a railway tank wagon:*

Well designed collecting basin with sufficient retention volume.

Measures for loading and unloading from road tankers (fueller TKW)

*Road tanker station used for loading and unloading tank cars:*

Roof as a protection against large quantities of rainwater. The ground surface is sealed and resistant to the environment. The required retention volume is low since safety hose couplings are used.

Road tanker station: Showing the parking space for the vehicle: The floor is constructed with a slope towards a point to drain off rain-water. The drainage outlet is closed by a valve during loading or unloading operations.



Measures for outdoor installation of pumps



Delivery pumps for fuel and heating oil in a pump basin:

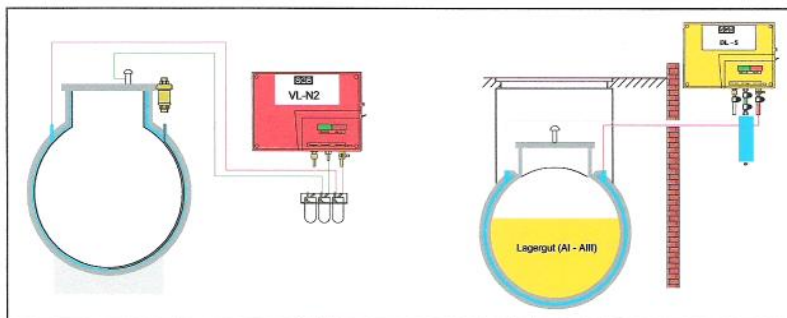
This pump basin is connected to the waste water system through a shut-off valve. The waste water system has a separator for low density liquids. Drainage is carried out manually by the operating personnel.

Delivery pumps for fuel and heating oil in a pump basin:

This picture shows the fire-fighting water connecting point for the fire brigade and a metal crash barrier for protecting the pumps against damage.



Safety measures to avoid accidental discharge of substances hazardous to water for tanks and pipelines



Leakage indicator (LAG) for underground tanks + pipelines

Class I

This kind of system indicates leakages below and above liquid surface in double shell tank systems. Leakages are indicated **before** substances are discharged into the environment (over- and negative pressure).

Example of a catalogue of measures for retaining, sealing and protecting against overfilling

Nr.	Situation	Short-term measures	Medium-term measures	Long-term measures
1	Overfilling	Filling of the tank should always be carried out by two operating staff.	Improve the level indicator (available in general)	provide the storage tanks with approved overfilling devices
2	Sealing of flat bottom tanks	Tanks installed on the ground : measure the wall thickness at the bottom of the tank	Carry out internal checks regularly and measure the wall thickness at the bottom of the tank, e.g. every 5 years	Provide the tank with a double bottom and monitor the space between the two bottom with an approved leakage indicator of class I
3	Inadmissible pressure within the tank	Shut-off valves in the vent pipes of the tanks must be mechanically secured in the open position.	Install aeration and vent pipes (if meaningful). The aeration pipe should be without a shut-off device.	
4	secondary containment	repair existing sealed surfaces (floor and wall surfaces)	Carry out a principal renovation of existing sealed surfaces. Demonstrate the tightness of the seals and the durability of the sealing materials.	Provide secondary containment , i.e. leak-proof floor and wall surfaces, with a capacity equal to the largest quantity of the substance (also consider the volume of fire-fighting water). The sealing material must be resistant to the stored substance.
5	Drainage systems of the secondary containment		Provide floor drainage with shut-off valve.	For new installations, install a drainage system which discharge to the waste water system using a pump, i.e. the secondary containment should not have gravity drainage into the waste water system. Provide drainage via a shut-off valve or a floor drain which is mechanically secured in the closed position and can only be opened manually by the operating staff.

Example of a catalogue of measures for loading and unloading of railway tank wagons

Nr.	Situation	Short-term measures	Medium-term measures	Long-term measures
1	Floor seals	Use a mobile collecting tray. Carry out Loading and unloading operations with two operating staff.	Renovate existing sealed surfaces	If no sealed surface present: - provide a sealed surface which is as large as the railway tank wagon.
2	Containment of leaks	Use a mobile collecting tray.		Provide shut-off devices between sealed surfaces and the waste water system
3	Sizing of the containment volume			Provide a retention volume which is large enough (based on the "5 minutes rule") Use a safety hose coupling at the connection between the railway tank wagon and the coupling hose and an emergency stopping system (When using a safety hose coupling, the retention volume should be provided for the contents of the hose).
4	Appropriate unloading			Unload the railway tank wagon into a storage vessel.

Example of a catalogue of measures for pipe work				
Nr.	Situation	Short-term measures	Medium-term measures	Long-term measures
1	Tightness of pipe wall	<p>Carry out wall thickness measurements on selected pipes.</p> <p>Check the external state of pipes which are fitted with thermal insulation (random checks).</p>		Carry out pressure tests on selected pipes. Additional equipping with the two walled pipes with the Device for Leakage Indication (DLI) – class 1.
2	Tightness of the pipe couplings	Improve the safety of pipe installations (e.g. provide flanges with bolted connections where necessary)		See 1