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

Nº 10

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Nº 10

Internal alarm and hazard control planning

by

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Recommendations of the International River Basin commission for internal alarm and hazard control planning

The internal alarm and hazard control planning belong to one of the basic responsibilities of operators of Accident-prone plants. This should include the type and procedure of planned organisational and technical measures after detecting a hazardous situation which can lead to an accident or that can be caused by an accident that has already occurred.

1. The internal alarm and hazard control plan must guarantee the rapid report of hazards to the internal and/or external organ designated to receive such reports immediately.
2. The internal alarm plan and hazard control plan must contain precise instructions related to specific plants and / or groups of plants for those persons or groups of persons in charge of passing on all messages in emergency cases
3. Depending on the scope of the anticipated impacts, different alert levels must be fixed in agreement with the authorities responsible for disaster control. For such situations various co-ordinated alarm procedures are needed (e.g. Rhine or Elbe warning and alarm system).
4. The plant operator must specify jointly with the authorities who is responsible for which measures in the event of an industrial accident.
5. For the internal alarm and hazard control plan it is necessary to specify the persons in charge, their functions and responsibilities, their availability, meeting points and tasks for special squads of the emergency team. In addition, special experts must be listed by names and a schedule for their assignment specified.
6. Specify the method of warning and alarming of the water users affected by an industrial accident as well as informing the public.
7. For plant-related hazard prevention plan, the following general information are amongst others necessary:
 - Listing of available emergency resources
 - A description of the waters in the vicinity of the installation and any special uses (e.g. drinking water protection area)
 - Nature and quantity of substances in the fire sector and storage facilities of the plants, including safety data sheets and as the case may be, also in-house information on the substance
8. For every plant site or unit where there is high danger risk in case of accidental release of substances hazardous to water, the following information must be provided:
 - Fire brigade plans (highly dangerous areas, permitted fire fighting means etc.)
 - Water supply (e.g. fire-fighting water, availability of cooling water)
 - Power supply (e.g. emergency power supply, voltage switch)
 - Drainage plans (e.g. shut-off devices, containment facilities and highly dangerous areas)
 - In-plant alarm and warning equipment
 - Emergency shut-down of hazardous installations (e.g. reactors).

9. The main emphasis when specifying hazard control plans must be on the relevant substances hazardous to water and relevant dangerous technical facilities. The crucial factors here are:
- Nature and quantity of potentially hazardous substances and their effects,
 - Dispersion behaviour of substances, possibilities of managing the damage, further possible consequences
 - Nature of installation
10. Description of the industrial accident scenarios and the corresponding consideration of the impacts of accidental release of substances hazardous to water into surface waters (in terms of how long it takes for it to spread and how far it could spread).
11. Description of measures to limit the effects of industrial accidents (e.g. facilities for containing fire fighting water, collecting tanks, fire fighting systems) on the basis of the relevant industrial accident scenarios such as
- Leakage
 - Overfilling
 - Total failure of vessels, containers, pipelines or other parts of the plant
 - Fire outbreak and the amount of water needed to combat the fire
 - Accidents during in-house transportation of hazardous goods.
12. Training in regular intervals on how to respond and the measures to be taken in the event of industrial accidents.
13. Update the internal alarm and hazard control plans regularly.
14. Ensure that the local authority and the personnel are informed about the alarm and hazard control plans.



Checklist for monitoring the implementation of the recommendations

1. Alarm planning and alarm procedures

1.1 Can the danger alarm be reported to an internal organ immediately?

- Yes

 No → 1.3

 Not applicable
 Action

 No action

1.2 Is the internal post authorized to immediately inform about accident the external post and to make necessary decisions to take needed measures for prevention of danger?

- *authorised*

- Yes

 No

 Not applicable
 Action

 No action

1.3 Is this external authority authorised to pass on the information as well as order the implementation of necessary hazard control measures?

- Yes

 No

 Not applicable

- *is this organ well equipped for this task?*

(Ensure that all information contained in the appendix of [„Checklist for failure in the normal operation of the plant“](#) is communicated to external authority)

- Yes

 No

 Not applicable
 Action

 No action

Remarks:

Examples of actions:

Short-term measures:

- Name an internal hazard response unit and specify the responsibilities and tasks.
- Instruct the personnel on the hazard reporting procedures.
- Install additional internal alarm systems such as alarming devices for emergency signals (sirens, alarm signalling lamps, telephones, and courier).
- Name the responsible partners from the external authorities, e.g. the public fire brigade, police, local government, civil defence authority.
- Specify the external and the local authorities to which the alarm should be reported by the internal hazard response unit.
- Install and test systems for reporting alarms to the external authorities, e.g. radio-telephones.

Medium-term measures:

- Install all necessary technical infrastructures and specify organisational measures for the internal hazard response unit, e.g. central rooms and communication infrastructures.
- Prepare a complete list of external hazard prevention authorities.
- Training on hazard reporting procedures.

Determination of the real risk

Is the sub-point of the recommendation implemented?

Yes

RC=1

Partially

RC=5

No

RC=10

2. Alarm planning for industrial plant and/or plant facilities**2.1 Does the internal alarm plan contain specific instructions for the personnel responsible for reporting an alarm in case of accidents?** Yes No → 3 Not applicable Action No action

Remarks:

Examples of actions:Short-term measures:

- Develop a list of persons, responsible for reporting alarms in case of accidents.
- Define specific instructions for these personnel, e.g.:
 - To which in-house organ should the alarm be reported?
 - Which information should be contained in the alarm report?
 - What has happened (type of accident: release of substances, fire, explosion? Which substances have been released and which amount?)
 - When did the accident occurred?
 - Where did the accident occurred?
 - How did the accident happen?
 - Who and what is affected (injury to persons, material damage)?
- Formulate specific instructions which contain special features of the plant or plant complex, e.g.:
 - Type and special properties of the substances which could be released,
 - Information on the location of the plant and where the plant is installed (outdoors or indoors).
 - Possible fire and explosion risks.

Medium-term measures:

- To develop differentiated and detailed instructions on the necessary steps in the internal alarm and hazard prevention plans.

Determination of the real risk

Is the sub-point of the recommendation implemented?

Yes

RC=1

Partially

RC=5

No

RC=10

3. Alarm levels and alarming procedures**3.1 Have alarm levels been specified in coordination with the local authority (the civil defence) according to the expected extent of the effects of accidents?** Yes No Not applicable Action No action

3.2 Have alarm reporting procedures been specified in coordination/agreement with the local authority (e.g. on the basis of International warning and alarming plan)?

- Yes No Not applicable
 Action No action

Remarks:

Examples of actions:

Short-term measures:

- Simplified specification of alarm levels e.g. according to the following criteria:
 - Effects of the accident are limited to a small area within the company.
 - Effects of the accident are limited to the company premises.
 - The accident affects the company's premises and the immediate vicinity.
 - The accident affects the company's premises and the general public.
- Specify the alarm levels in coordination/agreement with the local authority (e.g. civil defence).
- Specifications on the alarm reporting procedures both internally and externally. (For example: in which order should the personnel responsible be notified and for which alarm levels).
- Instructing the responsible personnel on hazard prevention.
- Issue instructions to all personnel of the company.

Medium-term measures:

- Examine the alarm levels and where necessary update them or concretise them.
- Training on the alarm reporting procedures and hazard prevention.
- Take the alarm levels and alarm reporting procedures in the alarm and hazard prevention plan into consideration.

Determination of the real risk

Is the sub-point of the recommendation implemented?

- | | | |
|--------------------------|--------------------------|--------------------------|
| Yes | Partially | No |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| RC=1 | RC=5 | RC=10 |

4. Assigning responsibilities in cooperation with the local authorities

4.1 Has the plant operator specified the person responsible for the implementation of certain measures in case of an accident in cooperation with the local authorities?

- Yes No Not applicable
 Action No action

4.2 Are the local authorities to be informed listed by name in the alarm and hazard prevention plan?

- Yes No Not applicable
 Action No action

4.3 Are those personnel responsible for hazard prevention in your company known to the local authorities?

- Yes No Not applicable
 Action No action

Remarks:

Examples of actions:

Short-term measures:

- Establish contact with the authorities responsible for planning and organisation of hazard prevention.
- The alarm and hazard prevention plan should specify the authorities to be notified in case of an accident.
- Name the staff of the local authorities responsible including their duties and document it in the company's alarm and hazard prevention plan.
- The duties and responsibilities for hazard prevention should be specified and a company's staff responsible for this job should be named. The name of this staff should be made known to the local authorities.
- The means and method of communication should be specified and included in the company's alarm and hazard prevention plan.
- Clarify those measures for hazard prevention that can be ordered by the local authorities and document these measures in the company's alarm and hazard prevention plan.
- The additional measures to be taken by plant operator in case of accident should be specified in coordination with the local authorities. For example:
 - Informing the public,
 - Safety measures in the direct vicinity of the company,
 - Safe disposal of dangerous substances.

Medium-term measures:

- Varied and detailed description of the exchange of information and communication with the local authorities should be included in the alarm and hazard prevention plan.

Determination of the real risk

Is the sub-point of the recommendation implemented?

Yes

RC=1

Partially

RC=5

No

RC=10

5. Assigning responsibilities and duties

5.1 Was the personal responsibility set up for distribution of available resources, involved in prevention of hazard at the plant?

- Yes No Not applicable
 Action No action

5.2 Has the duties of the staff responsible for hazard prevention been specified?

- Yes No Not applicable
 Action No action

5.3 Does the personnel involved in hazard prevention activities have corresponding qualification to do their tasks?

- Yes No Not applicable
 Action No action

5.4 Were the duties of special subdivisions and their heads specified?

- Yes No Not applicable
 Action No action

5.5 Is the availability of resources and especially the specialist staff their heads guaranteed?

- Yes No Not applicable
 Action No action

5.6 Is a point of meeting within the company's premises specified for all hazard prevention staffs?

- Yes No Not applicable
 Action No action

5.7 Was the location of special staff determined?

- Yes No Not applicable
 Action No action

5.8 Were the tasks of special staff determined?

- Yes No Not applicable
 Action No action

5.9 Was the detailed list of requirements developed and agreed to be used by external specialists, for example on servicing specialised devices and special machines?

- Yes No Not applicable
 Action No action

5.10 Was alarming time specified?

- Yes No Not applicable
 Action No action

5.11 Was the time defined for readiness of hazard prevention personnel and technical auxiliary equipment?

- Yes No Not applicable
 Action No action

Remarks:

Examples of actions:**Short-term measures:**

- Appoint responsible persons and other personnel responsible for the organisation and execution of the hazard prevention measures.

- Instruct and train the team leaders and the other personnel regarding their duties.
- Availability of specialists who may be required.
- Definition of meeting points within and outside the company's premises.
- Simplified assessment of the alarming time and the time needed to implement the measures.

Medium-term measures:

- Include a detailed description of the organisational structure and the duties for hazard prevention in the alarm and hazard prevention plan.
- Training.

Determination of the real risk

Is the sub-point of the recommendation implemented?

Yes

RC=1

Partially

RC=5

No

RC=10

6. Warning/alarming of the users affected by the accident

6.1. Are the users of the waters affected by the accident and the members of the public eventually affected by the accident known?

Yes

No → 7

Not applicable

Action

No action

6.2. Are warning and alarming of the users of the waters affected by the accident and the members of the public that could be affected by the accident guaranteed?

Yes

No

Not applicable

Action

No action

Remarks:

Examples of actions:

Short-term measures:

- Determine the users of the waters who could be affected in case of an accident.
- Reach agreement with the local authorities on the type and scope of information required.

Medium-term measures:

- Include a description of all necessary internal and external paths of communication and the extent of information for the affected users of the waters and other members of the public in the internal/external alarm and hazard prevention plans.

Determination of the real risk

Is the sub-point of the recommendation implemented?

Yes

RC=1

Partially

RC=5

No

RC=10

7. Information for plant-related alarm and hazard prevention planning

7.1 Is all general information necessary for the hazard prevention planning available and up to date?

- List of available equipment and materials for hazard prevention

Available yes No not applicable
 Updated yes No not applicable

- *Description of the waters and the state of the groundwater in the vicinity of the plant*

Available yes No not applicable
 Updated yes No not applicable

- *Description of the type and quantity of the substances in each plant, plant units or fire sector*

Available yes No not applicable
 Updated yes No not applicable

- *Detailed information on the substances (e.g. substance data sheet)*

Available yes No not applicable
 Updated yes No not applicable

Action No action

Remarks:

Examples of actions:
Short-term measures:

- Prepare a list of available equipment and materials for hazard prevention, e.g.
 - Fire fighting equipment (list of hydrants), storage location for hoses, fire extinguishers,
 - Emergency power supplies, special pumps, special tools and similar equipment.
 - Bonding agents to absorb released substances, suction devices, mobile containers,
 - Protective masks, protective clothing, breathing equipment.
- Maps with information on surface water which are at risk of being contaminated.
- Determination of the type and quantity of substances in each of the plant sectors.
- Data sheets of the substances.

Medium-term measures:

- Include the necessary general information for hazard prevention in the internal alarm and hazard prevention plan.

Determination of the real risk
 Is the sub-point of the recommendation implemented?

Yes	Partially	No
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
RC=1	RC=5	RC=10

8. Information available within the plant unit

8.1 Are fire brigade plans with information on areas of particular danger, details of dangerous substances, information on approach routes and permissible fire-fighting agents available?

Yes No Not applicable
 Action No action

8.2 Is information available on the water supplies, e.g. availability of fire fighting water and cooling water?

Yes No Not applicable
 Action No action

8.3 Is information available on the supply of electrical power, e.g. emergency supplies, possibility of switching off electrical equipment etc.?

- Yes No Not applicable
 Action No action

8.4 Is information available on drainage and sewage systems, e.g. the location of shut off valves, the location and size of retention systems and in particular dangerous areas in the vicinity of the wastewater system?

- Yes No Not applicable
 Action No action

8.5 Is information on the devices for triggering an internal alarm and warning available?

- Yes No Not applicable
 Action No action

8.6 Is information available on how to trigger off an emergency shut down and its effects, in particular in the case of reaction vessels and other process systems?

- Yes No Not applicable
 Action No action

Remarks:

Examples of actions:

Short-term measures:

- Simplified method of preparing documents.

Medium-term measures:

- Include the necessary information of the plant locations in the internal alarm and hazard prevention plan.

Determination of the real risk

Is the sub-point of the recommendation implemented?

Yes

RC=1

Partially

RC=5

No

RC=10

9. Main danger areas where more emphasis should be laid in the hazard prevention plan

9.1 Are the danger areas where more emphasis should be laid, specified in the hazard prevention plan?

- Yes No → 10 Not applicable
 Action No action

9.2 Has the following factors been considered when specifying the main dangers?

- Type and quantity of dangerous substances and their effects

Yes

No

Not applicable

- Behaviour of the substances when dispersed, technique for cleaning up the damages, possible effects and consequences.

Yes

No

Not applicable

- Type of plant

Yes

No

Not applicable

Action

No action

Remarks:

Examples of actions:**Short-term measures:**

- Determine the danger areas where more emphasis should be laid considering the following:
 - Sectors with considerable quantities of dangerous substances,
 - The presence of dangerous substances in rooms,
 - Areas where dangerous substances or substances which can form dangerous reactions with one another are handled,
 - Special behaviour of the substances when they are released, causing fire outbreak or pollute the fire-fighting Water, e.g. when combating the fire.

Medium-term measures:

- Consider and include the above factors in the alarm and hazard prevention plan.
- Reach agreement with the fire brigade on the specification of the danger areas where more emphasis should be laid.

Determination of the real risk

Is the sub-point of the recommendation implemented?

Yes

RC=1

Partially

RC=5

No

RC=10

10. Description of accident scenarios and possible effects

10.1 Have accident scenarios been described for relevant plant units? (For example such decisive scenarios like leakage, overfilling of containers, complete failure of containers or pipelines, fire outbreaks resulting in polluted water, accidents within the plant complex when transporting dangerous substances).

Breach	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Not applicable
Overfill	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Not applicable
Complete failure of walls	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Not applicable
Fire	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Not applicable
Explosion	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Not applicable
In-house failure	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Not applicable

10.2 Has the effects of the release of water-polluting substances to surface waters as a result of accidents been analysed?

- Yes No → 11 Not applicable
 Action No action

10.3 Is data available about how long and where substances were being released and spread?

- Yes No Not applicable
 Action No action

Remarks:

Examples of actions:**Medium-term measures:**

- Determine the plant units and substances which should be considered in the accident analysis.
- Define accident scenarios and determine the possible effects.
- Include the accident analysis and the results in the alarm and hazard prevention plan.

Determination of the real risk

Is the sub-point of the recommendation implemented?

- | | | |
|--------------------------|--------------------------|--------------------------|
| Yes | Partially | No |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| RC=1 | RC=5 | RC=10 |

11. Description of measures available to limit accident effects**11.1 Are the following accident scenarios considered in determining and describing the measures for limiting the effects of an accident?**

- *Leakages in pipelines, containers and process equipment.*
- Yes No Not applicable
- *Overfilling of containers.*
- Yes No Not applicable
- *Complete failure of vessels, containers, pipelines or other equipment.*
- Yes No Not applicable
- *Fire outbreaks and the amount of water needed to combat the fire.*
- Yes No Not applicable
- *Accidents within the plant during transportation of dangerous substances*
- Yes No Not applicable
- Action No action

11.2 Are the measures described sufficiently in the company's alarm and hazard prevention plan regarding limiting the effects of the accident (e.g. fire-fighting water retention systems, collecting basins, fire-fighting systems)?

- Yes No Not applicable
 Action No action

11.3 Are the storages available for materials needed in the extreme case?**Reference:** To evaluate these storages - look at Checklists for storages

- Yes → 11.3.1 No → 12 Not applicable
 Action No action

11.3.1. Is it easy access storages for materials needed in the extreme case?

- Yes No Not applicable
 Action No action

11.3.2. Is it in place the well functioning management system for the storage of materials needed in extreme cases?

- Yes No Not applicable
 Action No action

11.3.3. Were the materials defined by type, needed in extreme cases?

- Yes → 11.3.3.1. No → 11.3.4 Not applicable
 Action No action

11.3.3.1. Are there set up kinds of materials, needed in extreme cases?

- Yes → 11.3.4 No → 12 Not applicable
 Action No action

11.3.4. Is the amount of materials set up to use in extreme cases?

- Yes → 11.3.4.1 No → 12 Not applicable
 Action Action

11.3.4.1. Is there available a set up amount of materials needed in extreme cases?

- Yes No Not applicable
 Action No action

*Remarks:****Examples of actions:******Short-term measures:***

- Brief description of the containment systems for water contaminated as a result of an accident.
- Brief description of the fire-fighting systems and the retention systems for fire fighting water.
- Brief description of the planned measures in case of accidents within the plant complex when transporting dangerous substances.
- Brief description of the secondary containment and retention systems for dangerous substances which are released as a result of an accident, e.g. due to overfilling of vessels or failure of containers and pipelines.

Medium-term measures:

- Include measures to limit the effects of the accident in the internal alarm and hazard prevention plan.

Determination of the real risk

Is the sub-point of the recommendation implemented?

Yes <input type="checkbox"/>	Partially <input type="checkbox"/>	No <input type="checkbox"/>
RC=1	RC=5	RC=10

12. Training**12.1 Are the regular trainings conducted on accident response and required measures?**

- | | | |
|---------------------------------|------------------------------------|---|
| <input type="checkbox"/> Yes | <input type="checkbox"/> No → 13 | <input type="checkbox"/> Not applicable |
| <input type="checkbox"/> Action | <input type="checkbox"/> No action | |

12.2 Are the conducted trainings documented?

- | | | |
|---------------------------------|------------------------------------|---|
| <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Not applicable |
| <input type="checkbox"/> Action | <input type="checkbox"/> No action | |

Remarks:

Examples of actions:Short-term measures:

- Develop a Training Plan on hazard prevention in case of accidents.

Medium-term measures:

- Arrange trainings/drills on hazard prevention in case of accidents.
- Include information regarding the trainings conducted for hazard prevention in the internal alarm and hazard prevention plan.

Determination of the real risk

Is the sub-point of the recommendation implemented?

Yes <input type="checkbox"/>	Partially <input type="checkbox"/>	No <input type="checkbox"/>
RC=1	RC=5	RC=10

13. Updating the alarm and hazard prevention plans**13.1 Is the alarm and hazard prevention plan as well as the changes after them updated regularly?**

- | | | | |
|---------------|---------------------------------|------------------------------------|-----|
| Regularly | <input type="checkbox"/> Yes | <input type="checkbox"/> No | and |
| After changes | <input type="checkbox"/> Yes | <input type="checkbox"/> No | |
| | <input type="checkbox"/> Action | <input type="checkbox"/> No action | |

Remarks:

Examples of actions:Short-term measures:

- Specify when the alarm and hazard prevention plan must be updated.

Determination of the real risk

Is the sub-point of the recommendation implemented?

Yes

RC=1

Partially

RC=5

No

RC=10

14. Informing the local authorities and company staff**14.1 Are the local authorities and the staff of the company informed on the alarm and hazard prevention plans? (e. g. regular discussions with the authorities, meetings, training the staff)**

Staff Yes No and
 Authorities Yes No

Action No action

14.2 Are these information meetings regular?

Yes No Not applicable

Action No action

Remarks:

Examples of actions:Short-term measures:

- Arrange regular discussions on the alarm and hazard prevention plan with the local authorities.
- Conduct regular discussions with company's staff responsible for the hazard prevention measures.
- Specify the required training on hazard prevention measures for company staff.

Medium-term measures:

- Include information in the alarm and hazard prevention plan
- Conduct staff training.
- Hold meetings with the local authorities.
- Discuss with company personnel responsible for hazard prevention measures.

Determination of the real risk

Is the sub-point of the recommendation implemented?

Yes

RC=1

Partially

RC=5

No

RC=10

Summary of the Checklist

Sub-point of the Recommendation	Possible Risk category	Risk categories
1	1 / 5 / 10	
2	1 / 5 / 10	
3	1 / 5 / 10	
4	1 / 5 / 10	
5	1 / 5 / 10	
6	1 / 5 / 10	
7	1 / 5 / 10	
8	1 / 5 / 10	
9	1 / 5 / 10	
10	1 / 5 / 10	
11	1 / 5 / 10	
12	1 / 5 / 10	
13	1 / 5 / 10	
14	1 / 5 / 10	

Average Risk of the Checklist (ARC)