



Final Draft

International Commission for the Protection of the Danube River (ICPDR)  
APC (Accident Prevention and Control) Expert Group

**Recommendation**  
**Safety Requirements for Contaminated Sites**  
**in Flood-risk Areas**



Elaborated by the ICPDR APC Expert Group



in the framework of the UNDP/GEF Danube Regional Project

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## 1 Introduction

Sites contaminated as a result of industrial activities and former waste disposal operations represent a potential danger for the environment. This is especially true of sites contaminated by hazardous substances which could be mobilised and enter water bodies in the event of a flood. The dramatic floods in recent years at Elbe, Danube and Oder rivers have shown that the release of toxic substances from contaminated sites may cause significant harm to water bodies in Europe. A first survey of potentially contaminated sites in the Danube catchment, initiated by the ICPDR, has shown the relevance of this problem for the Danube river basin and has emphasized the need for further action. For this reason the ICPDR decided to work out safety requirements for contaminated sites located in flood-risk areas in order to improve the safety level of those sites.

Beyond the scope of these requirements the ICPDR wishes to draw attention to the relevance of the precautionary principle: Countries should establish the policy framework and take the measures necessary to prevent any future contamination of sites in areas prone to flooding.

## 2 Purpose of the Recommendation

The Recommendation serves as a basic guideline for mitigating potential harmful impacts due to flooding of contaminated sites. The Recommendation describes the basic requirements for technical and organisational measures to improve the safety level of contaminated sites which could pose a hazard to water in case of flooding.

## 3 Definitions

### **Sites suspected of being contaminated:**

These are sites suspected of having harmful impacts on soil, soil functions or water which may lead to risks or significant harm to human health and the environment. Sites suspected of being contaminated comprise:

- Closed-down waste disposal installations (former waste disposal sites) and other sites, at which wastes have been treated, stored or disposed of in the past, and

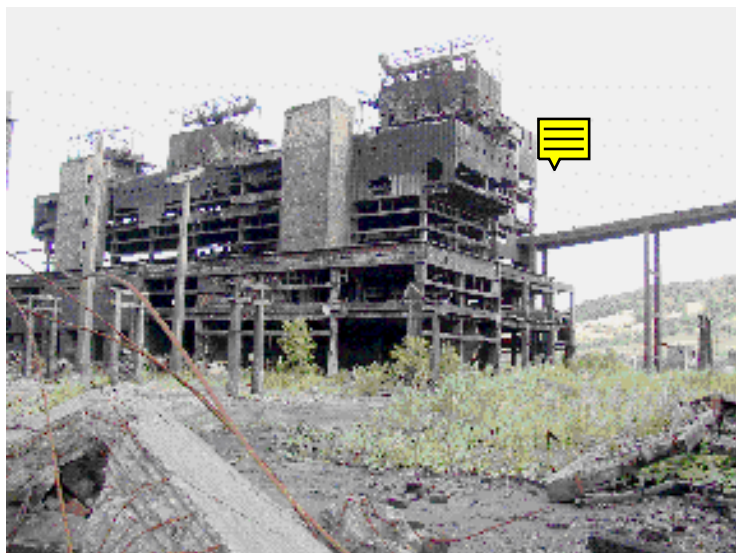
- closed down industrial installations (former industrial sites) and other sites, at which environmentally hazardous substances have been handled which could cause hazards to human health and the environment.

**Contaminated sites:**

Contaminated sites are suspect sites which have been confirmed as being contaminated and /or subject to harmful soil changes.

**Highly contaminated zones (hot spots):**

Hazardous substances at contaminated sites are not usually distributed evenly across the whole site, but are concentrated at locations where the chemicals were handled or stored.



**4 Scope of application**

The Recommendation applies to all contaminated sites which are prone to flooding and contaminated by substances hazardous to water. The case of flooding includes, besides flooding,

- backflow from water bodies or sewer systems or
- a rise of the groundwater table as a result of long-term flood events.

The following sites are covered by the scope of the Recommendation:

- Sites suspected to have high potential for posing a hazard to water,

- sites contaminated as a result of former industrial activities and former waste disposal operations, and
- closed-down plants and plant components containing water endangering substances, which are not effectively secured and might present a hazard to water in case of flooding.

Radioactively contaminated sites do not fall within the scope of these requirements, nor do sites presenting a potential hazard due to genetically modified organisms.

Facilities covered by this Recommendation include, for example:

- Underground installations
- Surface facilities
- Above-ground storage systems within buildings
- Components of closed-down plants
- Former waste disposal sites



## 5 Safety requirements

### 5.1 Administrative requirements

1. Potentially contaminated and contaminated sites should be recorded in an appropriate database (e.g. land registry).
2. In general the “Polluter Pays Principle” has to be applied



- in investigations necessary to determine the contamination situation of sites suspected of being contaminated and further necessary measures and
  - when formulating proposals for remedial actions and in their implementation.
3. The financing of investigations and remediation should be ensured, e.g. through national agreements or funds, especially in cases where the polluter cannot be held liable.
  4. Authorities should be enabled
    - to carry out the monitoring of contaminated sites and sites suspected of being contaminated,
    - to order monitoring measures and/or remedial measures
  5. Enabled authorities are responsible for ensuring that identified suspect sites are investigated and, if necessary, remedial measures are implemented.

## 5.2 Requirements of risk estimation

1. Site identification:
 

All abandoned industrial and waste disposal sites located in flood-risk areas are suspected of being hazardous to water bodies in case of flooding. The following measures should be carried out in an initial survey to determine whether suspect sites are hazardous or non hazardous to water in case of flooding:

  - Initial estimation of the risk by classifying the water endangering potential of the former use (type of industrial branch or type of waste disposed of).
  - Prioritisation of suspect sites according to the estimated water endangering potential.
  - Estimation of the flood risk at the site.

Sites for which a safety risk has been identified should be investigated in more detail. A first proposal for immediate measures should be formulated if there are obvious safety risks.
2. Further site investigations:
 

They serve to generate additional information for a more precise characterisation of the hazard situation of the investigated site.

This information should cover the following points

  - a description of the contamination situation,
  - the determination of any assets that would be endangered in case of flooding, and

- a proposal for further measures to enhance the safety of the site, if necessary.

### 3. Detailed investigations

Based on detailed investigations and the identification of highly contaminated zones a list of measures should be drawn up to serve as a basis for the selection of specific remedial measures.

Results of each investigation step should be documented in a database.

## 5.3 Technical requirements

### 5.3.1 Preventive measures

Preventive measures include inter alia:

- Controlling the stability and necessary static design and capacity of dams,
- Regular supervision and control of sites with a high risk potential,
- Increasing the retention time through:
  - storage basins for heavy rainfall and snowmelt water
  - building of reservoirs
  - renaturation and/or protection of floodplain forests
- Construction of dams at sites with a high flood risk.

### 5.3.2 Requirements for the remediation of contaminated sites

Different decontamination methods are available for contaminated sites in flood-risk areas:

- removal of soil and disposal in safe landfills,
- removal of barrels and tanks, or
- decontamination by chemical, physical or biological methods

In addition to conventional decontamination measures, containment measures, designed to permanently prevent the spread of pollutants, can be considered. Such measures include for example:

- Encapsulating of contaminated bodies of soil
- Sealing of surfaces.

Investigations should be performed to select the optimal treatment for each site.

If immediate action is necessary because human health is threatened, appropriate protective or restrictive measures should be carried out (e.g. restriction of access).