Accidental transboundary water pollution prevention – contingency planning, early warning, mitigation
Budapest 4/5 November 2019
UNECE Joint Expert Group and its work on preventing accidental water pollution

- UNECE JEG
- Guidelines and Checklists
- Outlook
UNECE Convention on the Transboundary Effects of Industrial Accidents

- Adopted in 1992 (Finland)
- Entered into force in 2000
- Now has 56 member states (incl. Israel) and 41 Parties, including EU
- Transboundary only
The UNECE strategy for Risk Reduction
→ Prevention of accidental water pollution

UNECE Joint Expert Group (JEG)

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Why JEG is important?

- Water Accidents > 95% of all transboundary accidents!!

- Major Accidents deriving more and more from Non-Seveso-Sites (i.e. Pipelines, TMFs, Transport, Off-Shore Terminals)

- Water- and IA- Convention provide the legal framework
Lessons Learnt!

- Water accidents can lead to the complete loss of an aquatic ecosystem!

- Accidents are extremely costly!

→ Safe operation of hazardous facilities is economically and ecologically a must
JEG Strategy

• A minimum set of requirements to ensure a basic and harmonized level of safety for hazardous activities

• A common understanding of safety approaches and standards for specific sectors

• Assistance of national authorities and operators in ensuring an adequate safety level by means of trainings and seminars

Tools & Products

Top → Down Safety Guidelines &

Bottom → Up Checklists
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Guidelines

Checklists

„Legally Binding“
If agreed by UNECE Parties

Living Document
- Dynamic State of the Art Technology
- Training activities
JEG - Tools and Products

→ Safety Guidelines

Accepted Good Practice
Procedures to ensure Conformity with International Standards

→ Pipelines

→ Tailings Management Facilities

→ Oil-Terminals

→ Fire-Water Retention

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JEG - Tools and Products

→ **Checklists**

Tools for Assistance (i.e. Training) of national authorities and operators in ensuring an adequate Safety Level

→ **Waterendangering Facilities**

→ **Hazardous Industries (Seveso)**

→ **Contingency Planning**

→ **Tailings Management Facilities**
TMF-Safety

• Worldwide dramatic growth of mining waste within the last decades.


- Amounts of mining wastes in the world (G.V. Mudd, 2007)

- The TMF at Ajka (Hungary) after the dam failure (2010)

- The river Ridder after TMF dam failure in East Kazakhstan (2016)
Pilot Project: TMFs in the Ukraine

Results:

- Inventory of > 400 TMF sites
- Checklist for the Safety of TMF
- Tailing Hazard Index (THI)
Methodology to improve TMF safety

TMF Checklist
- Questionnaire,
- Evaluation Matrix,
- Measure Catalogue;

for evaluation of the TMF Safety Level of individual TMFs

TMF Hazard Index “Tailings Hazard Index” (THI)

Preliminary Hazard Ranking of TMFs (large number)

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TMFs within the UNECE
Dam-Failure, Brumadinho, Brazil, 2019

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https://www.tagesschau.de/multimedia/video/video-501053.html
The severity of life loss on the base of historical failures

<table>
<thead>
<tr>
<th>Decade</th>
<th>Failures</th>
<th>Deaths</th>
<th>Severity of life loss</th>
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<tbody>
<tr>
<td>2008-2018</td>
<td>57</td>
<td>351</td>
<td>$10 \times 10^{-2}$</td>
</tr>
<tr>
<td>1998-2008</td>
<td>31</td>
<td>51</td>
<td>$1,5 \times 10^{-2}$</td>
</tr>
<tr>
<td>1988-1998</td>
<td>52</td>
<td>88</td>
<td>$2,5 \times 10^{-2}$</td>
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<tr>
<td>1978-1988</td>
<td>57</td>
<td>347</td>
<td>$9,9 \times 10^{-2}$</td>
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<td>1968-1978</td>
<td>51</td>
<td>315</td>
<td>$9 \times 10^{-2}$</td>
</tr>
<tr>
<td>1958-1968</td>
<td>46</td>
<td>1014</td>
<td>$29 \times 10^{-2}$</td>
</tr>
<tr>
<td><strong>Total (1958-2018)</strong></td>
<td>294</td>
<td>2166</td>
<td><strong>$10.0 \times 10^{-2}$</strong></td>
</tr>
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</table>

## Yearly Statistics

<table>
<thead>
<tr>
<th>Year</th>
<th>Failures</th>
<th>Deaths</th>
<th>Severity of life loss</th>
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<tbody>
<tr>
<td>2019</td>
<td>4</td>
<td>327</td>
<td>$9.3 \times 10^{-2}$</td>
</tr>
</tbody>
</table>
Riskmanagement at the Danube Delta
→ Safety Guidelines for Oil Terminals

Deep Water Horizon

Danube Delta
Safety Guideline for Oil Terminals

International Expert Group 2012 – 2013

→ Drafting Guideline

Members:
- UNECE-Secretariat
- DNV, Belgium
- EPSC, UK
- Ecoaudit, Ukraine
- GCE, Russia
- BAM, Germany
- PMI, Belgium
- UBA, Germany

Fire on Tanker – Germany 2011

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Gerhard Winkelmann-Oei
Umweltbundesamt

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Part 1: Principles & General Recommendations

Part 2: Technical Annex

Part 3: Further Reading
Part 1
Principles & General Recommendations

➔ UNECE-Parties
➔ Competent Authorities
➔ Operators
Part 2
Technical and Organizational Safety Aspects

1. Design & Planning
2. Procurement, Construction and Asset Integrity Management
3. Operations
4. Closure & Decommissioning
UNECE - Sources of Risk Pipeline-Accidents

1. Poland
→ Leakage of Oil-Pipeline under Vistula (10.12.2007)

2. China
→ Pipeline-Explosion at Dalian (16.07.2010)
An aerial photo, released by China's Xinhua news agency on July 17, 2010, shows an oil slick floating off the coast of Dalian, China.
Principles & Recommendations

- UNECE-Parties
- Authorities
- Operators
- Technical Annex
Safety Guidelines for Pipelines
ECE/CP.TEIA/2006/11 – ECE/MP.WAT/2006/8

ANNEX

- Design and Construction
- Pipeline Management System
- Hazard/Risk Assessment and Land Use Planning
- Inspection
- Emergency Planning

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Safety Guidelines for Fire Water Retention

Conclusion after the Joint UNECE Seminar to the 25th anniversary of the Sandoz accident (Bonn, 2011):

→ Sufficient safety measure to prevent transboundary waters from spills of fire water are still not in place, endangering whole River Catchments, and demonstrating the need for a Strategy/Guidance to Fire Water Retention!
Guidelines/Best Practices for Fire Water Management and Retention

→ Fire-Water Retention is a major element according to EU Seveso III Directive, in Annex II, Point 5., to restrict the effects of major accidents

→ However nearly no EU country has specific regulations for Fire-Water Retention

→ Non-EU countries, only Switzerland has developed a specific Guidance document
Guidelines/Best Practices for Fire Water Management and Retention

Part 1
Principles & General Recommendations

→ UNECE-Parties
→ Competent Authorities
→ Operators

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Guidelines/Best Practices for Fire Water Management and Retention

Part 2
Technical and Organizational Safety Aspects
Dimensioning of Fire Water Retention

1. Several complex Models are available (German Insurance Companies (VdS 2557) or the Swiss Guidance for fire-water retention) which can serve as examples for industrialized countries.

2. For less industrialized countries a rough and fast estimation according to a direct proportionality of the firewater retention volume needed to the largest fire-compartment area can be assumed (JEG-model resp. advanced JEG-Model).
Calculation of Fire-Water Retention-Volume according to different Models

Fire-Load ~500 MJ/m²

Fire-Load ~1296 MJ/m²
Outlook

1. Supporting existing Safety Guidelines with Checklists
   - Pipelines (Belorussia?)
   - Oil-Terminals
   - Fire Water Retention

2. JEG Cooperation with International River Commissions
   - Transboundary Exercises
   - Testing the Checklist(s) to Safety Guidelines

3. Establishing the TMF-Methodology within the UNECE-Region
   - TMF Pilot-Project with Kazakhstan/Kyrgyzstan (2020?)
   - TMF Pilot-Project(s) within the Danube-Region (2019 – 2022)
Thank You for your Attention!