TMF safety and management following the Baia Mare accident (2000) Lessons learned and Good Practices

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Content:

- Introduction: the Baia Mare TMF disaster
- Post accident measures: short-term and long-term
- Lessons learned
- Good practices


AURUL TMF
E58

Baia Mare disaster – 30 January 2000

Causes:

- Heavy rainfall: aprox. 36 l/m^2 for 24 hours
- Melting of snow: aprox. 43 cm on the TMF surface
- Inappropriate design of the TMF;
- Inadequate monitoring and dam construction, bad maintenance and operation of the TMF;
- Water wasn't pumped of;
- Authorities were not contacted before the accident about the bad situation of the dam.

Baia Mare disaster

Consequences:

- Dam failure of Aurul TMF on the S-E side

- 22,3 m length and 2,5 m depth breach and the spill of 100.000 m^3 toxic water and sludge containing cyanide and heavy metals (copper, lead, zinc, iron, magnesium)

- Trans-boundary effects: extensive contamination of a major river system, from the Szamos streams and the Tisza River, to the Danube River

Baia Mare disaster

Cyanide concetration measurements in Hungary:

	Measurement place:	Date:	Max. concentration:
1.	Szamos at Csenger	01.02.	32.6 mg/l cyanide
2.	Tisza at Lonya	03.02	13.5 mg/l cyanide
3.	Tisza at Tiszalök	05.02	3.7 mg/l cyanide
4.	Tisza at Kisköre	08.02	3.8 mg/l cyanide
5.	Tisza at Szolnok	09.02	3.2 mg/l cyanide
6.	Tisza at Tape	11.02	2.2 mg/l cyanide
7.	Tisza at Tiszasziget	11.02	1.49 mg/l cyanide

Baia Mare disaster

- contamination and interruption of the drinking water in 24 towns and of 2.5 million people;
- massive fish-kill and destruction of aquatic species in the river systems
- 100 million $ compensations costs payed for Hungary

Baia Mare disaster

- **Short term measures:**
- Attempts to block the breach using polyethylene bags filled with sterile material from Meda TMF

- Population was alerted fast by the ICPDR and Danube International Alarming Center – CIPA ROM, using DBAM (Danube Basin Alarm Model) software

- Population was not affected directly by the pollution due to the fast information flux.

Baia Mare disaster

Short term measures: until 13 June 2000

- Compliance with safety requirements from original design (beach size, guard ditch, slope of the downstream face) using normal deposition technology or mechanical deposition where necessary

- Stringent monitoring of TMF: water level, beach size, meteorological conditions and water balance.

Baia Mare disaster

Longterm measures:

New legislation: at national level

- Strenghtening the legal framework for hidrotechnical constructions with potential risk for population and environment (NTLH 021, 022, 023) (Ministry of Environment and Ministry of Public Works and Land-use Planning):
- - Methodology for establishing the importance cathegories of dams (NTLH 021)
- - Methodology for assessment of dams safety (NTLH 022)
- - Methodology for assessment of TMF dams safety (NTLH 023)

Baia Mare disaster

- **Longterm measures:**

New legislation: at EU level

- Seveso II Directive ammended by Directive 105/2003/EC: article 4 wass amended as follows:
- "waste land-fill sites, with the exception of operational tailings disposal facilities, including tailing ponds or dams, containing dangerous substances as defined in Annex I, in particular when used in connection with the chemical and thermal processing of minerals".
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Lessons learned

- **Based on the Baia Mare Task Force report from December 2000:**
- A construction standard may be expressed in terms of capacity to withstand the worst conditions experienced in the last 100 years.
- Climate change and its effects must be taken into consideration in the design of TMFs.
- No new TMFs, where cyanide is used, should be based on the storage of water/slurry containing cyanide in tailings ponds open to the elements.

http://viso.jrc.ec.europa.eu/pecomines_ext/docs/bmtf_report.pdf

Lessons learned

- A need for ratification of UN-ECE Conventions which focus on the prevention of, and response to, environmental accidents.
- There is an urgent need for a thorough investigation for the safety of TMFs.
- Risk assessment methodology and risk categorisation for TMFs should be set out in mandatory regulation.
- http://viso.jrc.ec.europa.eu/pecomines_ext/docs/bmtf_report.pdf

Lessons learned

- A common methodology is necessary to be developed:
- **TMF checklist methodology**

- based on the

- **Safety guidelines and good practices for Tailings Management Facilities (2014)**

Good Practices

- Detoxification of cynide content directly at the process plant, before deposition at TMF.
- Open circuit TMF operation: periodical water purification and discharge.
- Minimum 50 m beach width between dam and water surface.

Good Practices

- Daily monitoring of parameters: water balance, dam stability, piezometric level etc.
- Risk assessment for 1 to 1.000 years and 1 to 10.000 years flood events.
- Construction of secondary polders.

Conclusions

- The TMF checklist method developed within the project "*Improving the safety of industrial tailings management facilities based on the example of Ukrainian facilities*" is a first opportunity for UN-ECE and other countries to work with a unitary approach which can help to prevent future TMF disasters.

- The implication of national level authorities is very important for the implementation of the TMF checklist method.

Thank you for your attention!

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