

Key risks from tailings and UNECE's tools on strengthening mine tailings safety and preventing accidental pollution

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Subregional workshop on mine tailings safety and the prevention of accidental water pollution in Central Asia

25-26 May 2023, Dushanbe, Tajikistan and online

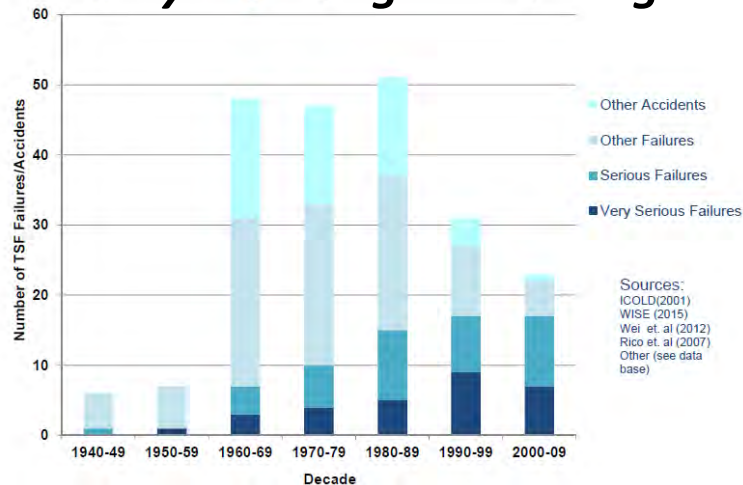
Setting the scene

Satellite imagery indicate that tailings facilities are among the largest man-made structures on earth.

Their safety, for the protection of life, the environment and property is an essential need in today's mining and processing operations.

Nevertheless, important number of tailing accidents have happened and even if general number of TMF accidents decreases, the frequency of serious grows.

This is why states, communities, mining industry and international institutions unify to improve safety and ensure sustainability including economic growth.



Reminder: some important TMF accidents:



Stava, 1985



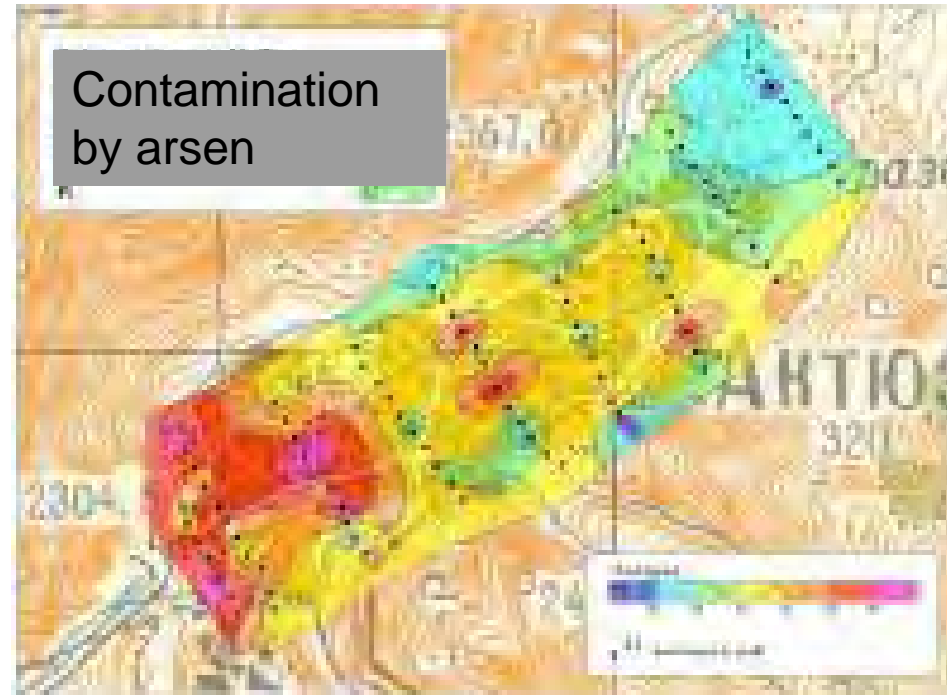
Baia Mare 2001



Brumadino 2019

In proximity: Ak-Tjuz tailing accident

- December 1964, due to the combination of earthquake, rain and bad management break and 680 000 m³ radioactive wastes leaked to the waley of Kichi-Kemin river. Flow of toxic mud 40 km.

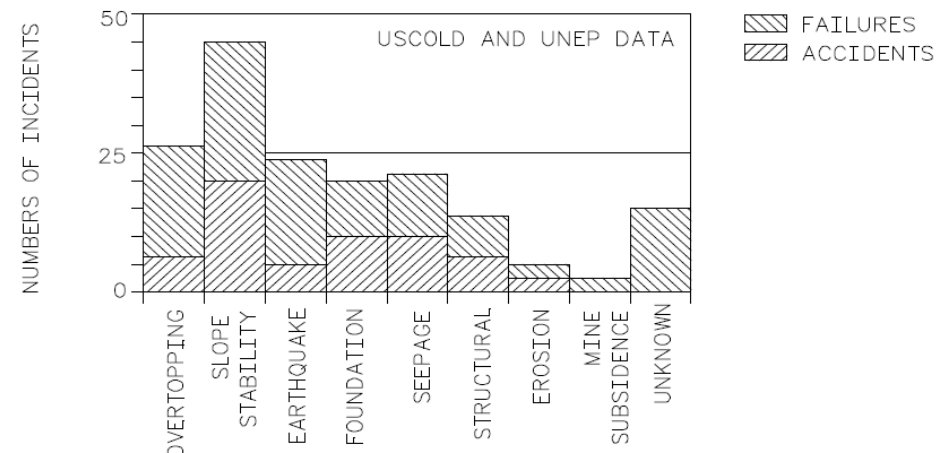


VARIABILITY OF PRIMARY CAUSES OF ACCIDENT

- Inadequate management
- Lack of control of hydraulical system
- Error in site selection and investigation
- Unsatisfactory foundation, lack of stability of downstream slope
- Seepage
- Overtopping
- Earthquake
- Landsliding

MAIN ROOT CAUSE:

RISK MANAGEMENT NEGLECTED



Most Frequent Causes of Dam Failures according ICOLD

Overtopping of a dam is often a precursor of dam failure. Overtopping can be due to inadequate spillway design, debris blockage of spillways, or settlement of the dam crest

Foundation defects, including settlement and slope instability, are another cause of dam failures.

«Piping», that is internal erosion caused by seepage, is the third main cause. Seepage often occurs around hydraulic structures, such as pipes and spillways; through animal burrows; around roots of woody vegetation; and through cracks in dams, dam appurtenances, and dam foundations.

The other causes of dam failures include structural failure of the materials used in dam construction and inadequate maintenance.

Natural events – earthquakes, landsliding...

VARIABILITY OF CONSEQUENCES MECHANISM

1. Flooding, wave of slurry destroy assets and kill
2. Contamination of surface water, living organisms intoxication
3. Drinking and irrigation surface water contamination
4. Drinking and irrigation underground water contamination
5. Soil contamination
6. As consequence of 2),3),4)ad.5 : Food chain contamination

» FREQUENTLY INVOLVES TRANSBOUNDARY EFFECT

IMPACTS OF ACCIDENTS:

- Consequences to human lives, health and well being. Evaluation of consequences with stakeholders is necessary
- Direct costs (remediation, compensation, ...)
- Social disturbance
- Consequence to environment – short time and long time impacts
- Economical consequences and operability
- Indirect costs

Difference of TMF accident compare to other dams

- Toxicity of material; not only „classified“ hazards, but also suspended matter, pH change, BOD...
- Inercy and viscosity of material released (inercy of flow)



Costs of TMF Failures

Direct costs: recent large failures \$30 to \$100 millions in direct costs

Environmental damage: some recent clean-up liabilities to several \$100's of millions

Closure liability: some recent examples in \$ 500 million to \$ 4 billion range

Industry/investor impacts: Shareholder value losses and industry imposed constraints and costs amounting to many billions of dollars

Social disturbance: no monetary value attributed

One mythus:

We will manage accident by
improvisation...



GREEN PHILIPPINES 2009



GREEN PHILIPPINES 2009







Another mythus:

„We operate it long time without any accident, so safety is prooved“



**Lassing Talk Mine,
Austria 1998**



**Aberfan, Wales (UK)
1966**

Reality is, that if you play Russian roulette for a while, this is not evidence that you are in safety...

Result of situation:

International community effort to improve tailings safety
and the prevention of accidents
UNECE plays a crucial role in this effort

Development of UNECE guidance materials *available usually in Russian language as well*

- **Safety Guidelines and Good Practices for Tailings Management Facilities**
- **Improving the safety of industrial tailings management facilities based on the example of Ukrainian facilities**
- **Guidance on Land-Use Planning, the Siting of Hazardous Activities and related Safety Aspects**
- **Overview of Methodologies for Hazard Rating of Industrial Sites**
- **Sectoral Checklist for Preparation and Inspection of a Safety Report**
- **Guidelines (to the Sectoral Checklist) for Preparation and Inspection of a Safety Report**



Key documents:



Conclusions

- Tailing facilities are necessary for industrial development, but without proper safety management they can cause major accidents
- To ensure safety, overall process of risk management including both prevention and preparedness should be applied and continuously improved
- International experience sharing, good practices exchange and cooperation is one from keys for success

Thank you for your kind attention



TAILINGS 2019, Airmaty