

Mine tailings safety: Addressing gaps to protect human beings and the environment

Intergovernmental regional consultation under
UNEA resolution 5/12 on environmental aspects of
minerals and metals management



Overview

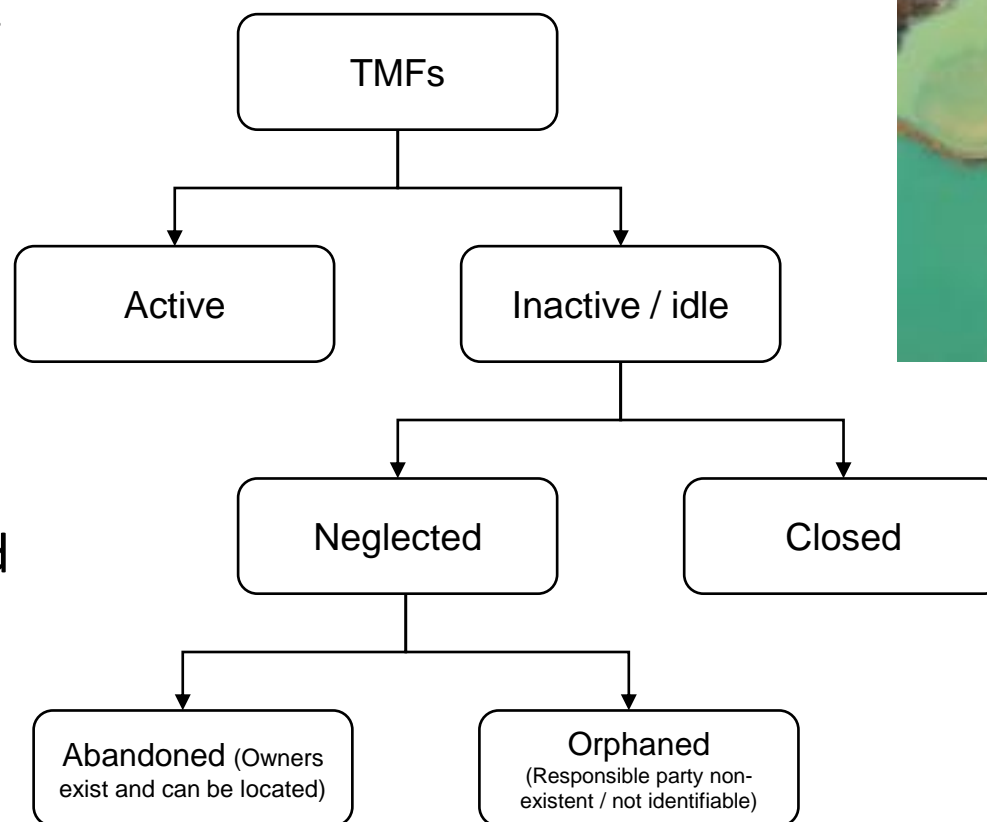
1. Background
 - Definitions
 - Global trends
 - Hazards and risks of TMFs
 - Key knowledge gaps / needs
2. Instruments, tools, activities to address gaps
 - UNECE's role
 - Key instruments
 - Safety Guidelines & Good Practices
 - TMF Methodology
 - Mapping, capacity building, policy
 - Resource management
3. 2030 Roadmap for Action



1. Background

Definitions

- Tailings: fine-grained (particle-sized) waste material remaining after extracting recoverable metals and minerals; rejected at the 'tail end' of an extraction process
- Tailings management facilities (TMFs): the whole set of structures required for the handling of tailings; they could entail tailings storage, tailings dams, tailings impoundments, clarification ponds, delivery pipelines, etc. TMFs exist in various forms



Global low-carbon energy transition

Why critical raw materials (CRMs) matter?



CRMs essential for renewable energy and energy storage systems

Increasing demand for CRMs is projected, creating potential shortages, trade dependency and geopolitical challenges

CRMs play a key role in achieving SDGs 7 (Energy), 9 (Innovation), and 13 (Climate Action).



Transforming Extractive Industries for Sustainable Development

MAY 2021

Extractive industries have immense potential to drive growth, support sustainable development, and reduce poverty in developing countries.

UN Policy Brief, May 2021

Extractive industries play a dominant role in the economies of 81 countries that account for a quarter of global GDP, half of the world's population and nearly 70 per cent of those living in extreme poverty.

UN priorities

- Financing for development
- Governance
- Green Economy
- Just Transition
- Circular Economy
- Global collaboration.



WORKING GROUP
ON TRANSFORMING THE EXTRACTIVE INDUSTRIES
FOR SUSTAINABLE DEVELOPMENT



UNECE

UN
environment
programme



UN Secretary General's Working Group on Transforming Extractive Industries for Sustainable Development



Develop a **common narrative and framework**



Frame an implementation initiative to
deploy recommendations



Develop **policy recommendations**, tailored to
national governments, non-state actors.



Provide a **central hub of information and
knowledge exchange** on global policy
actions, global standards, tools and best
practices.



Foster collaboration to respond better to
existing and emerging needs for state and
non-state actors.



**Align efforts with ongoing processes and
events** relevant to extractive industries

Focus on Framework on Critical Raw Materials Development in LDCs and LLDCs.

Hazards and risks of TMFs

- TMF failures can release a tsunami-like wave of mine waste capable of killing and destroying everything in its path
- Harm or risk to human health, infrastructure, biodiversity and natural resources and neighboring countries
- Accidental water pollution and environmental degradation of transboundary watercourses / international lakes
- Significant costs for emergency response, clean-up, repairs, disruption of economic activity, claims for damages, and legal costs for governments and businesses

TMF cyanide spill at Ridder (Kazakhstan, 2016)



Baia Mare cyanide spill (Romania, 2000)



Mount Polley tailings dam break (Canada, 2014)



Brumandinho dam collapse (Brazil, 2019)

Sources:

1. <https://siberiantimes.com/ecology/others/news/n0671-stinking-poisoned-water-flows-towards-siberia-from-mining-city-ridder-in-kazakhstan/>
2. UNEP, 2017
3. https://en.wikipedia.org/wiki/Mount_Polley_mine_disaster#/media/File:Mount_Polley_Mine_dam_breach_2014.jpg

Natural Hazards Triggering Technological Disasters (Natech events)

- Natural hazards and increasingly frequent and severe extreme weather events and other effects of climate change increase risks of TMF failures
- Baia Mare (Romania) in 2000: overflow of TMF after heavy rainfall combined with unexpected snowmelt and design deficiencies, led to vast transboundary water pollution affecting several countries
- Krasnoyarsk (Russia) in 2019: TMF dam break at a gold mining factory following heavy rains entailed significant pollution of the Seyba river
- Northwestern Serbia in 2014: heavy rain triggered a landslide that damaged parts of the Stolice tailings dams drainage system, leading to pollution of the Kostajnik River



Sources:

<https://commons.wikimedia.org/w/index.php?curid=42070845>

<https://www.bbc.com/news/world-europe-50108413>

<https://earthworks.org/blog/history-of-mine-waste-failures-in-serbia-sheds-light-on-new-threats/>

Key knowledge gaps / needs (cont.)

- Lack of knowledge of TMFs within countries, regions and across the globe; need to know the number of TMFs at these levels, as well as their location, state, and condition; without this, the hazards and risks cannot be understood or addressed
- Lack of knowledge on the transboundary effects of TMFs on soil and water in case of a TMF failure; need to understand their location along watercourses and upstream dams
- Effective management of TMF risks to prevent accidents; international instruments, frameworks and guidelines can support the development of national policies and platforms for ensuring policy coherence and governance
- Preventing accidental water pollution from TMF failures and preparedness to mitigate possible effects, including in cooperation with neighbouring and riparian countries and through river basin commissions
- Ensuring adaptation to climate change encompasses TMFs and the possible effects of climate change are considered in TMF safety (risk assessments, safety measures, contingency plans, etc.)

Key knowledge gaps / needs

- Ensuring the public has access to information on TMFs, their risks and impacts and what to do in case of an emergency, effective public participation in decision-making on TMFs and access to justice, including across borders with regards to transboundary aspects of TMFs
- Regular exchanges of information and knowledge across countries and regions and capacity-building activities incl. to address TMF safety against climate change, cybersecurity, public health emergencies, war, etc.
- Integration of the hazards and risks of TMFs (including Natech risks) into laws, policies and strategies at the national, local, river basin commissions levels, and measures to address them
- Enhancing national coordination and working with all stakeholders, including authorities, operators, the public, etc. to address TMF risks; essential to also for authorities to coordinate across borders and prepare joint and harmonized preparedness and response measures in case of transboundary effects

2. Instruments, tools and exercises to address gaps and strengthen mine tailing safety

UNECE's role for strengthening tailings safety

- Only UN Regional Commission with an international legal instrument covering TMFs and with a roadmap for strengthening TMF safety
- Specific instruments and guidance that applies to TMF safety (available worldwide)
- Secretariat to global and regional treaties on protection of human beings and the environment:
 - Industrial Accidents Convention: Prevention, preparedness, response to TMF accidents; international and transboundary cooperation
 - Water Convention: Management of international lakes and transboundary watercourses; prevention of accidental water pollution from TMF failures
 - Aarhus Convention: Access to information, public participation in decision-making and access to justice in environmental matters, incl. TMF-related
 - PRTR Protocol: Industry reporting to and public access to information through Pollutant Release and Transfer Registers
 - Others
- Agenda and system for sustainable resource management and classification

Convention on the Transboundary Effects of Industrial Accidents

Convention on the Transboundary
Effects of Industrial Accidents
as amended on 15 December 2015

Convention sur les effets transfrontières
des accidents industriels
telle que modifiée le 15 décembre 2015

Конвенция о трансграничном
воздействии промышленных аварий
с поправками от 15 декабря 2015 года



- Adopted 1992, entered into force 2000, 42 Parties in UNECE region
- Purpose: in the interest of present and future generations, to protect humans and the environment against the effects of industrial accidents
- Scope: activities (including TMFs) that involve a hazardous substance listed in Annex I and that are capable of causing transboundary effects
- Key components:
 - Identification of hazardous activities and notification to neighbouring / riparian countries
 - Preventive measures, e.g. risk analysis, operator training, monitoring, land-use planning
 - Preparedness, e.g. on-site and off-site contingency planning, early warning and notification systems
 - Public information and participation (more measures provided in Aarhus Convention and PRTR Protocol)
 - Response, e.g. readiness, joint / coordinated measures, mutual assistance
 - Transboundary cooperation

Decision 2020/1
Strengthening mine tailings safety in the United Nations
Economic Commission for Europe region and beyond

The Conference of the Parties,

Alarmed by the increasing frequency of serious tailings dam failures over recent decades, causing deaths and the destruction of families, homes, infrastructure, ecosystems and the environment,

Increasingly aware of the far-reaching and potentially transboundary nature of accidental water pollution caused by tailings dam failure, both within and beyond the United Nations Economic Commission for Europe (ECE) region, making tailings dam failures a matter not only of national but also of regional concern, calling for joint prevention and management approaches,

Concerned by the observation that the majority of tailings dam failures can be attributed to a limited number of human factors, notably a lack of management continuity and inadequate resources for maintenance and management of tailings management facilities,

Conscious of the economic importance of the mining sector and its role in the transition to low-carbon energy production and storage technologies, and the interconnection of sustainably deployed infrastructure, mining safety, human well-being and the environment,

Conscious also of the projected increase in global demand for mineral extraction and mining activities in and beyond the ECE region, which will, among other things, result in an increase in hazardous waste stored in mine tailings, requiring more reliable and resilient tailings design, management and land-use planning,

Noting with concern the elevated risk of accidents from mine tailings as a result of an increase in the frequency and intensity of climate-related extreme weather events (such as high energy storms, wind gusts, heavy precipitation and extreme temperatures), and slow-onset climate events¹ (such as rising sea levels, thawing of permafrost, land degradation and retreating glaciers), while also noting a lack of awareness in the mining sector concerning these phenomena,

Emphasizing the need for full awareness of disaster risk linked to mine tailings operations and the consequences of tailings dam failures, as well as the need for communities, tailings management operators and competent authorities to take strengthened disaster resilience and disaster risk reduction measures to mitigate such risks, and for the involvement of all concerned stakeholders in respective decision-making on mine tailings safety,

Appreciating synergies between the strengthened implementation of the Convention on the Transboundary Effects of Industrial Accidents, the Sendai Framework for Disaster Risk Reduction 2015–2030 and the Sustainable Development Goals of the 2030 Agenda for Sustainable Development; and recognizing the linkages with the objectives for adaptation to climate change under the Paris Agreement,

Recognizing the importance of establishing a high level of tailings safety in the ECE region by addressing regional hotspots, in line with the implementation of the Convention's Long-Term Strategy until 2030,²

Recalling the endorsement of the Safety guidelines and good practices for tailings management facilities,³ which were developed by the Joint Expert Group on Water and Industrial Accidents further to the evaluation of the Working Group on Development – at its

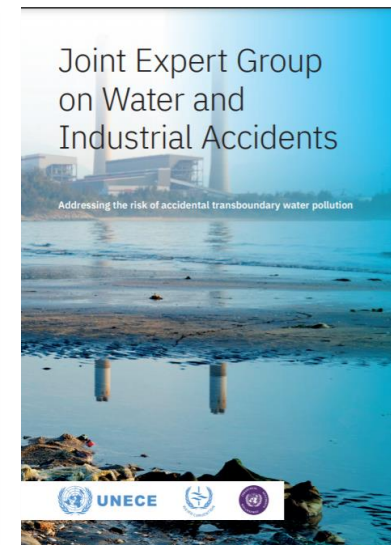
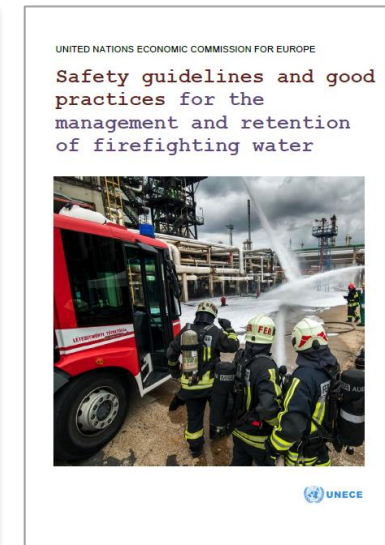
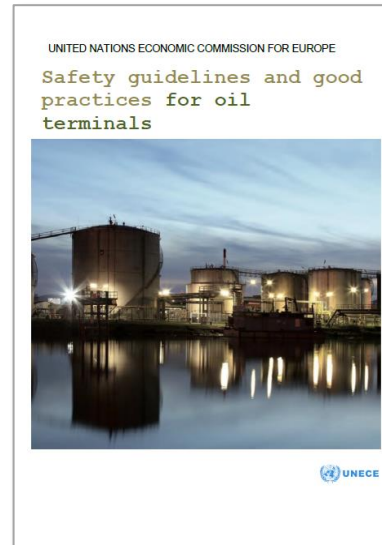
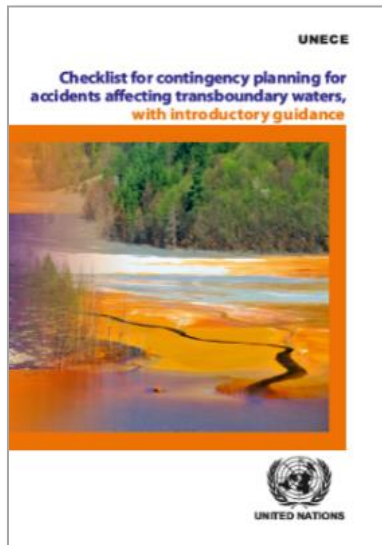
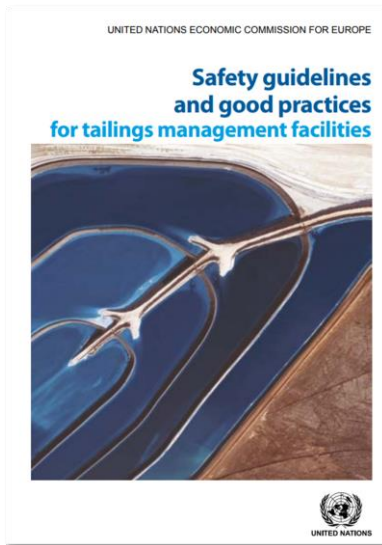
¹ Slow-onset climate events are defined in the United Nations Framework Convention on Climate Change [technical paper on slow onset events \(FCCC/TP/2012/7\)](#). The paper indicates a need to integrate disaster risk reduction, adaptation to climate change and sustainable development efforts to address the impacts of slow-onset climate events.

² See ECE/CP.TEIA/38/Add.1.

³ United Nations publication, ECE/CP.TEIA/26.

- In 2020, the Industrial Accidents Convention COP adopted [Decision 2020/1](#) on strengthening mine tailings safety in the UNECE region and beyond
- Built on outcomes of the Seminar on mine tailings safety in the UNECE region and beyond (online, 1 December 2020)
- Requests Parties (and invites other countries) to increase efforts to strengthen tailings safety and prevent failures, in view of elevated risk of such accidents posed by increasing frequency and severity of extreme weather events due to climate change
- Reminds Parties that identification of hazardous activities and notification processes shall entail TMFs
- Urges Parties (and invites other countries) to facilitate the application of the UNECE Safety Guidelines for TMFs, TMF Methodology and good practices in the ECE region through capacity development, technology/knowledge transfer, sharing of experiences and lessons learned
- Calls on Parties to improve inter-institutional and stakeholder coordination at the national and local levels and across borders, while increasing transparency for communities and other stakeholders on how these risks are taken into account

Safety guidelines, good practices and checklists, jointly developed under the UNECE Industrial Accidents and Water Conventions



Safety guidelines and good practices for tailings management facilities

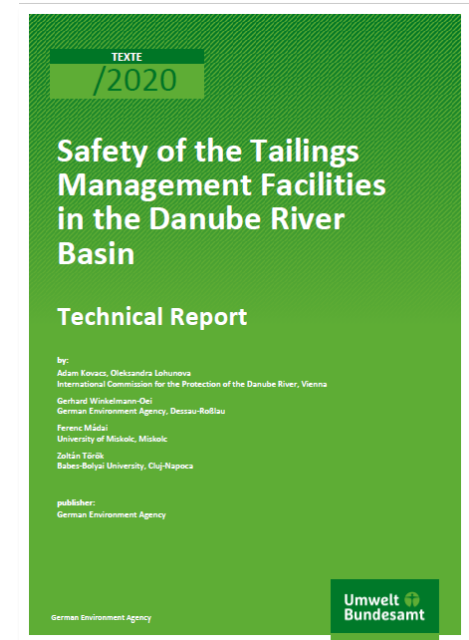
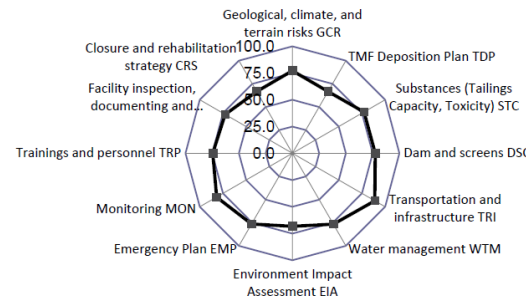


UNITED NATIONS

- Developed by the Joint Expert Group on Water and Industrial Accidents (JEG)
- Endorsed at Industrial Accidents Convention CoP-5 (2008) and Water Convention MoP-5 (2009)
- Aim to reduce frequency and severity of TMF failures
- Provides safety principles and recommendations for:
 - Governments
 - Competent authorities
 - TMF operators
- Includes aspects related to:
 - Pre-construction and construction
 - Operation and management
 - Facility inspections
 - Identification, assessment, management of abandoned sites
 - Emergency planning
- TMF Methodology was developed to support countries in the practical application of the guidelines

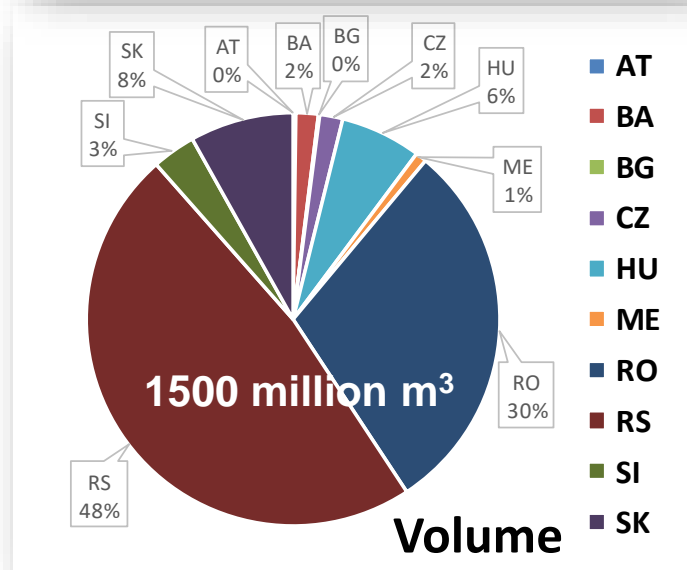
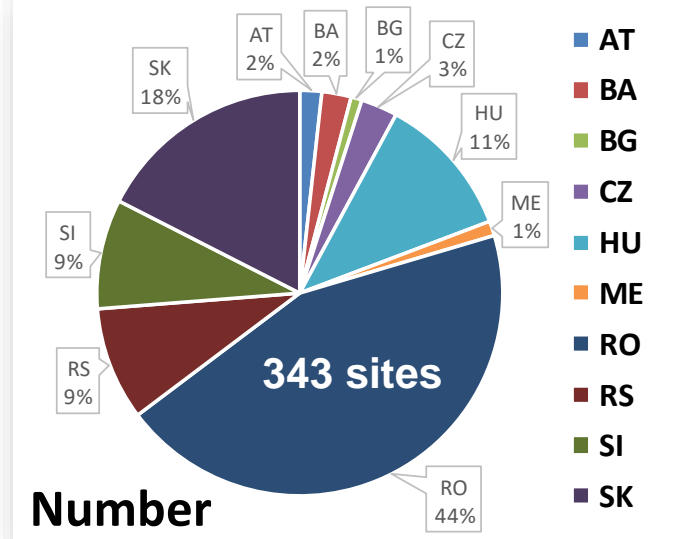
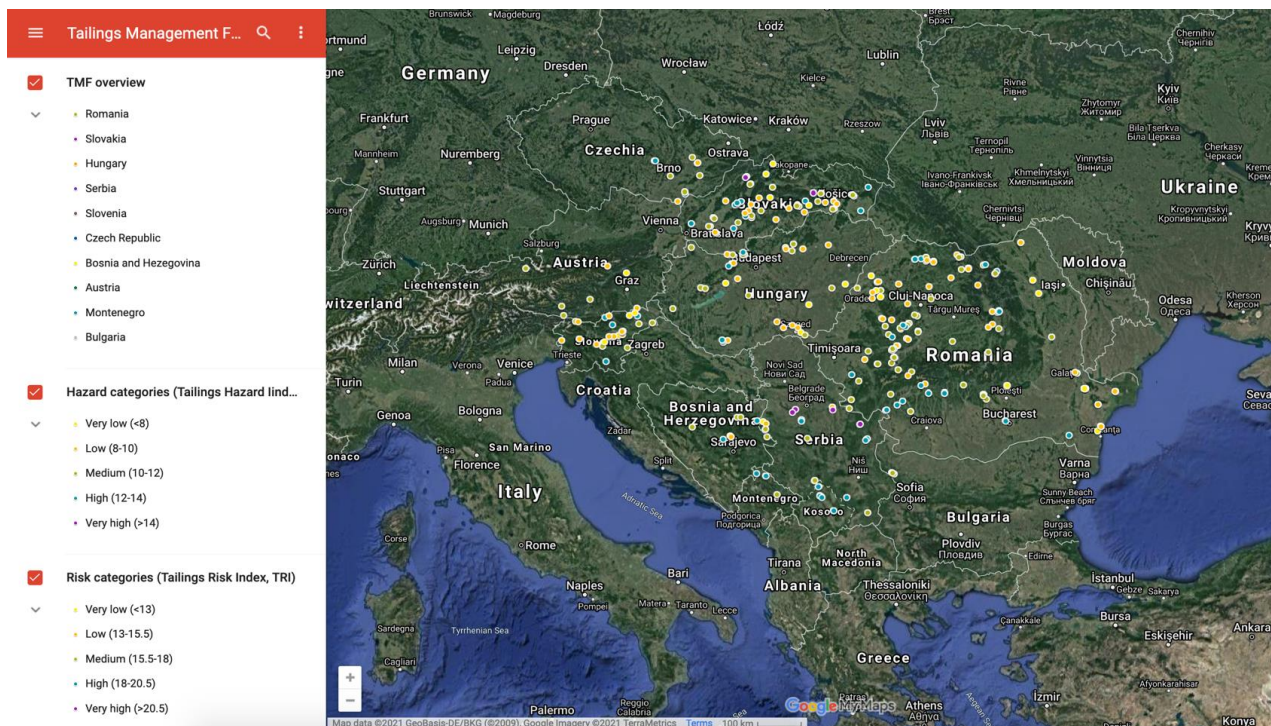
Methodology for improving TMF safety

- Created by German Federal Environment Agency (UBA) in 2016 under the project on improving the safety of TMFs in Ukraine (2013-2015), to operationalize the UNECE Safety Guidelines
- Refined in 2020 under the project on Capacity development to improve safety conditions of tailings management facilities in the Danube River Basin
- Practical tool to be applied by operators and competent authorities to reduce tailings risks
- Consists of 3 components:
 1. Tailings Hazards Index (THI) & Tailings Risk Index (TRI)
 2. Checklist methodology
 3. Measure Catalogue
- Evaluation Matrix for the TMF safety level from the checklist methodology



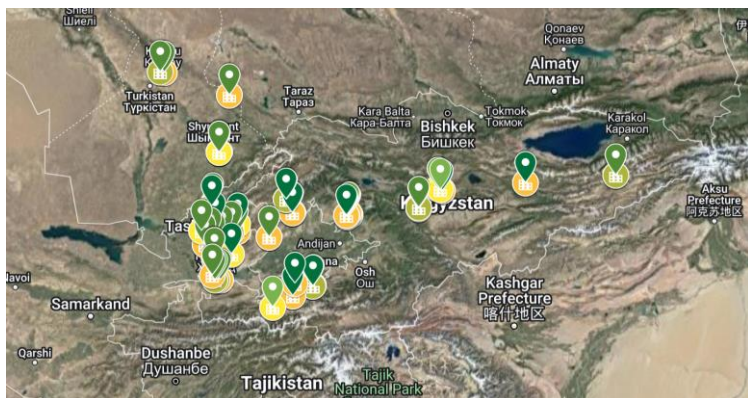
TMF mapping: Danube River Basin

- 343 TMFs identified under the Project “Capacity development to improve safety conditions of tailings management facilities in the Danube River Basin – Phase I: North-Eastern Danube countries”
- Carried out by the International Commission for the Protection of the Danube River (ICPDR) and financed by the German Environment Agency

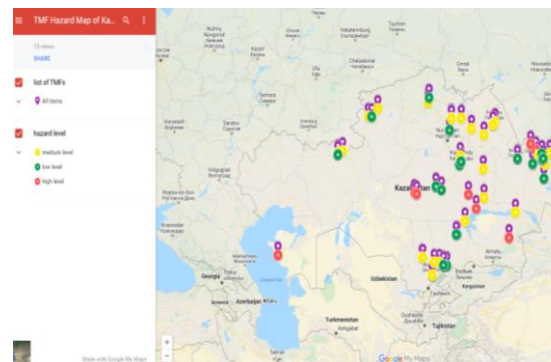


TMF mapping: Central Asia

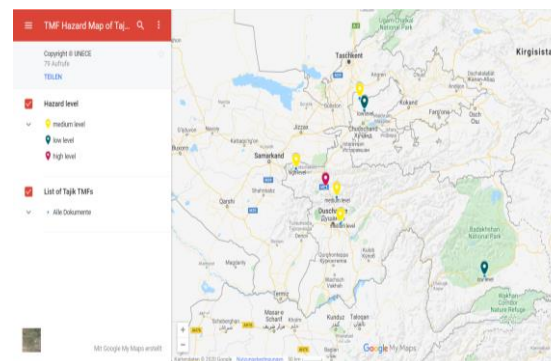
- TMF inventory project under the UNECE Industrial Accidents Convention thanks to funding by Switzerland, Germany and the EU
- 237 TMFs identified across Central Asia with 59 or 25% capable of causing transboundary effects
- All TMFs assessed using the TMF Methodology, incl. Tailings Hazard (THI) and Tailings Risk (TRI) Indexes



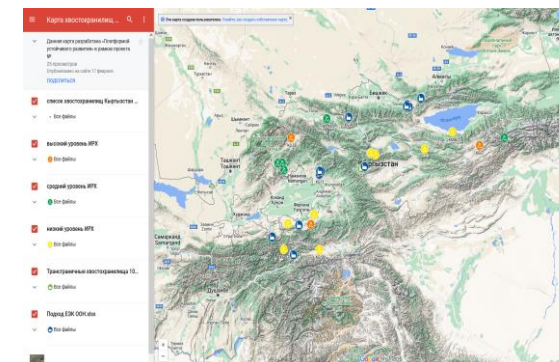
Syr Darya River basin: 61 TMFs with 33 capable of transboundary effects (19 KYR, 10 TAJ, 4 UZB) ([ENG](#), [RUS](#))



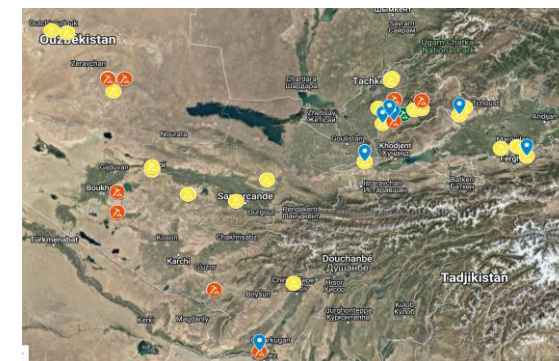
Kazakhstan: 121 TMFs with 7 capable of transboundary effects ([ENG](#), [RUS](#))



Tajikistan: 13 TMFs with 4 capable of transboundary effects ([ENG](#), [RUS](#))



Kyrgyzstan: 62 TMFs with 38 capable of transboundary effects ([ENG](#), [RUS](#))



Uzbekistan: 41 TMFs with 10 capable of transboundary effects ([ENG](#), [RUS](#))

Capacity building: Understanding the risks

On-site training in Kazakhstan (2019)

- Held in Kokshetau 11-13 June together with Kyrgyzstan and Tajikistan
- On-site training report was prepared based on safety evaluation of «Altyntau Kokshetau» TMF

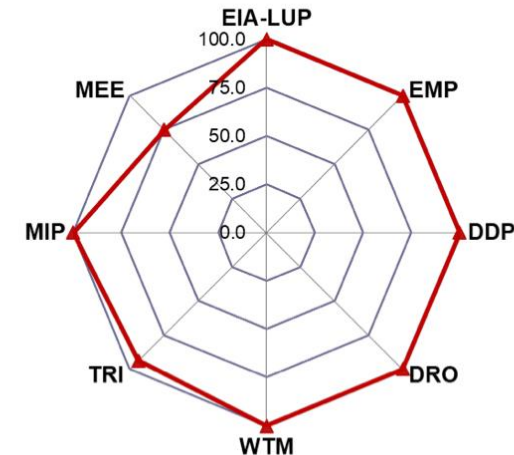
On-site training in Tajikistan (2021)

- 23 April – technical/preparatory meeting
- 2-4 June – on-site training in Penjikent and online evaluation workshop
- On-site training report was prepared based on safety evaluation of «Zarafshon» TMF
- E.g: short –term recommended measure:” *Develop an action and monitoring plan for TMF closure*”

Project reports contain the results of TMF Methodology application and recommendations for operators and competent authorities to improve TMF safety



Spider diagram of categorial evaluation for Group 1 questions



Fostering governance & policy cooperation

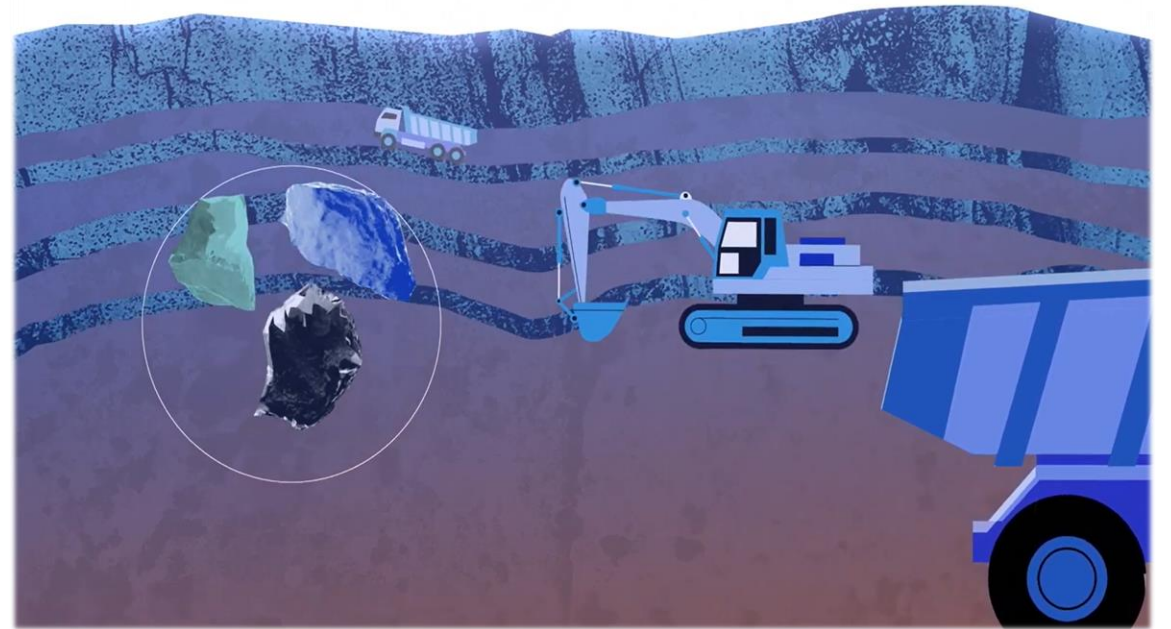
Establishment of Interinstitutional Working Groups on Tailings Safety and the Prevention of Accidental Water Pollution (IIWG):

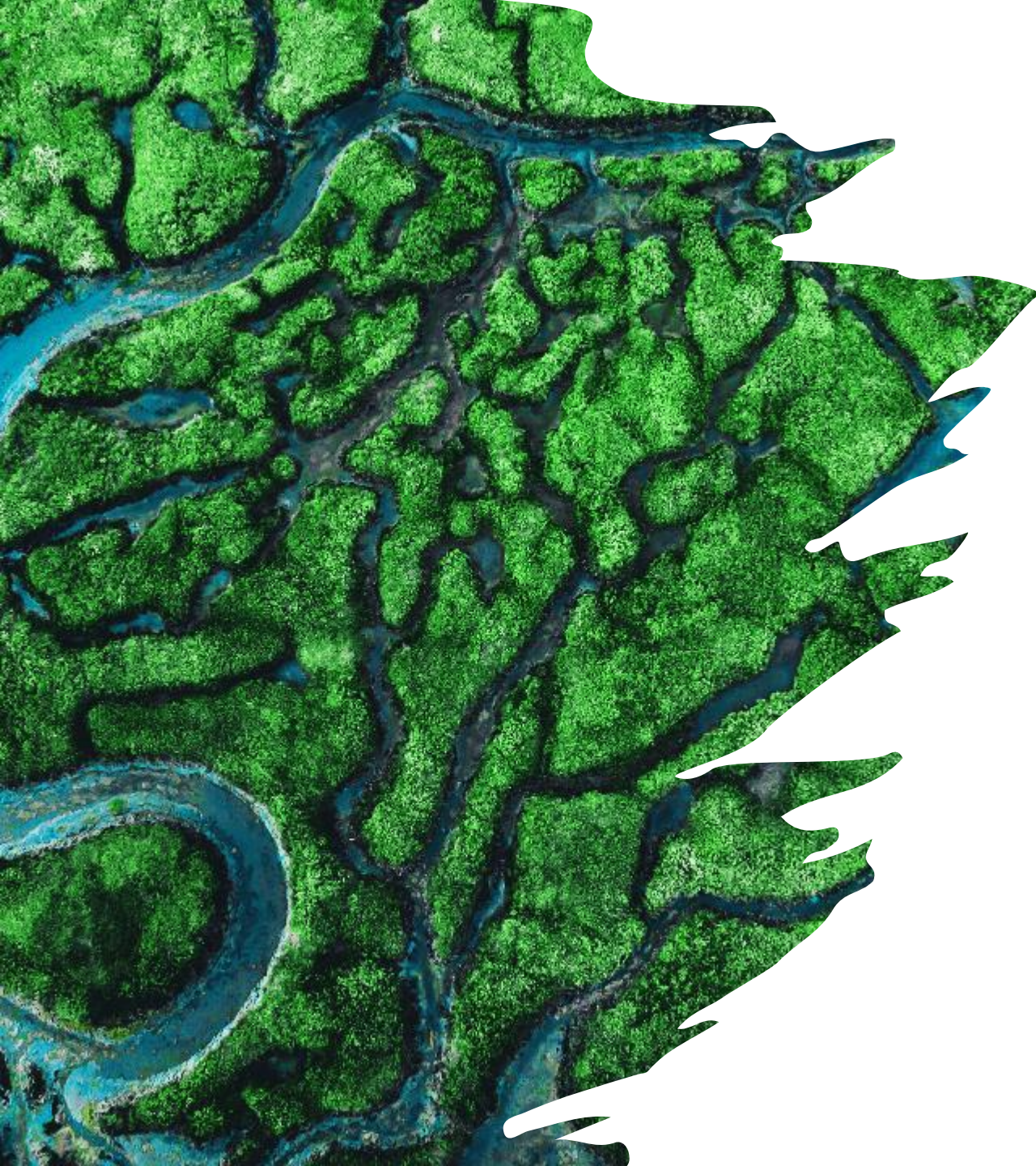
- Aim to enhance tailings governance, prevent accidental water pollution and address existing legislative and administrative gaps
- Platform for cooperation and policy dialogue, exchange of knowledge and good practices (e.g. UNECE Safety Guidelines and TMF Methodology) among competent authorities, operators, academia, NGOs and other stakeholders
- Formally established by Kazakhstan and Tajikistan in 2022 under UNECE projects with financial support from Switzerland; discussions ongoing for an IIWG in Uzbekistan
- Will result in:
 - ✓ Better coordination and governance
 - ✓ Increased understanding of TMFs Safety; existing tools and instruments
 - ✓ Higher awareness of TMFs hazards and related disaster risks, incl. Natech
 - ✓ Strengthened outreach and partnership with other international organization, industry, NGOs and academia
 - ✓ Enhanced transboundary cooperation and exchange of the information



Online Toolkit and Training for Strengthening Mine Tailings Safety

- [Online toolkit](#) was developed to assist countries in strengthening TMF safety and management practices
- Contributes to improved knowledge on TMF safety through online training on application of relevant safety guidelines and methodology
- Consists of:
 - ✓ Background information on TMF safety
 - ✓ 3-step practical training (including a video in [ENG](#) and [RUS](#))
 - ✓ Summary of UNECE TMF-related work and partners
 - ✓ Further reading (key reports and references)





UNECE's agenda on Sustainable Resource Management

Social viability

Financing projects

UNFC and UNRMS

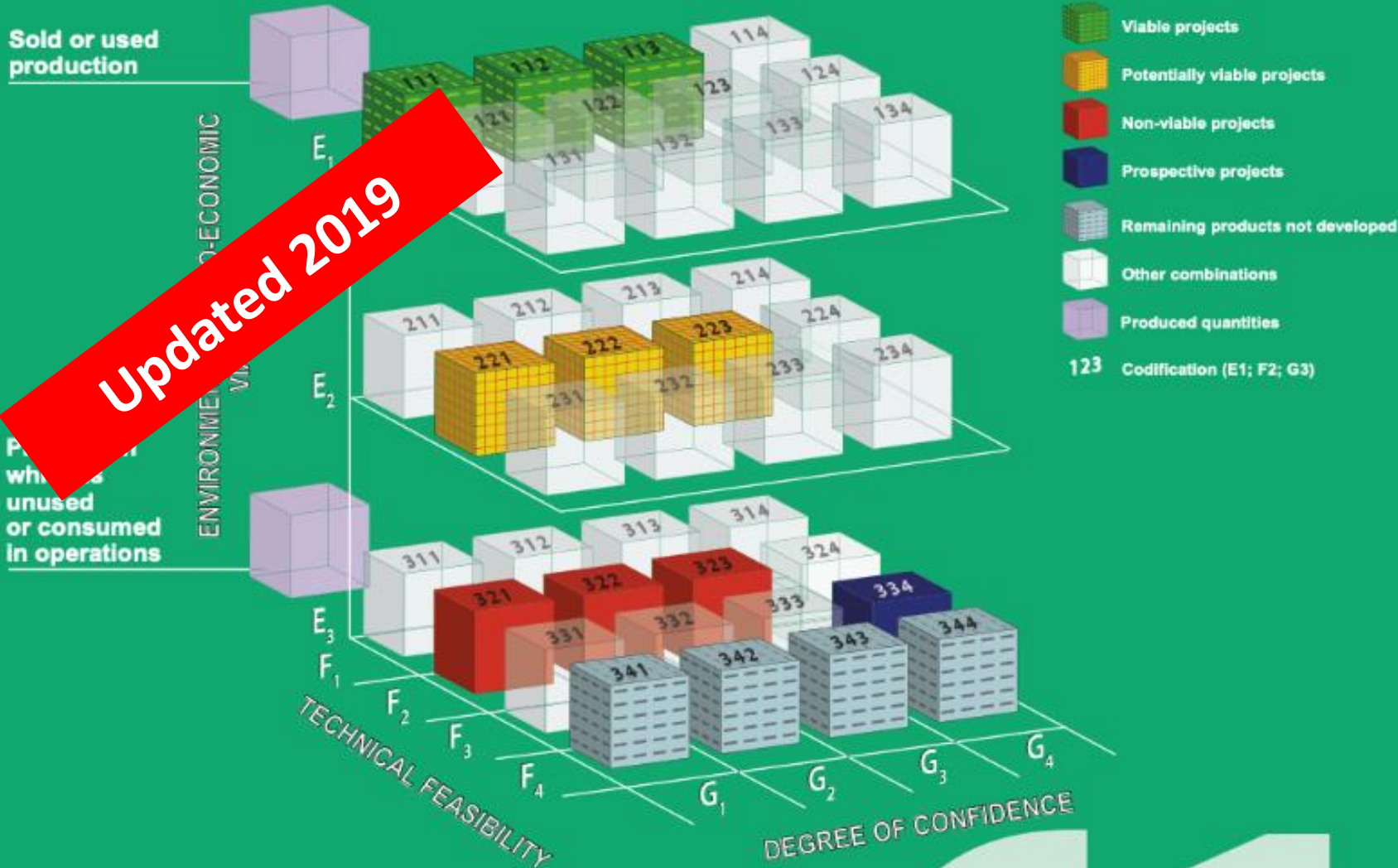
Traceability and transparency

Environmental risk reduction

United Nations Framework Classification for Resources (UNFC)



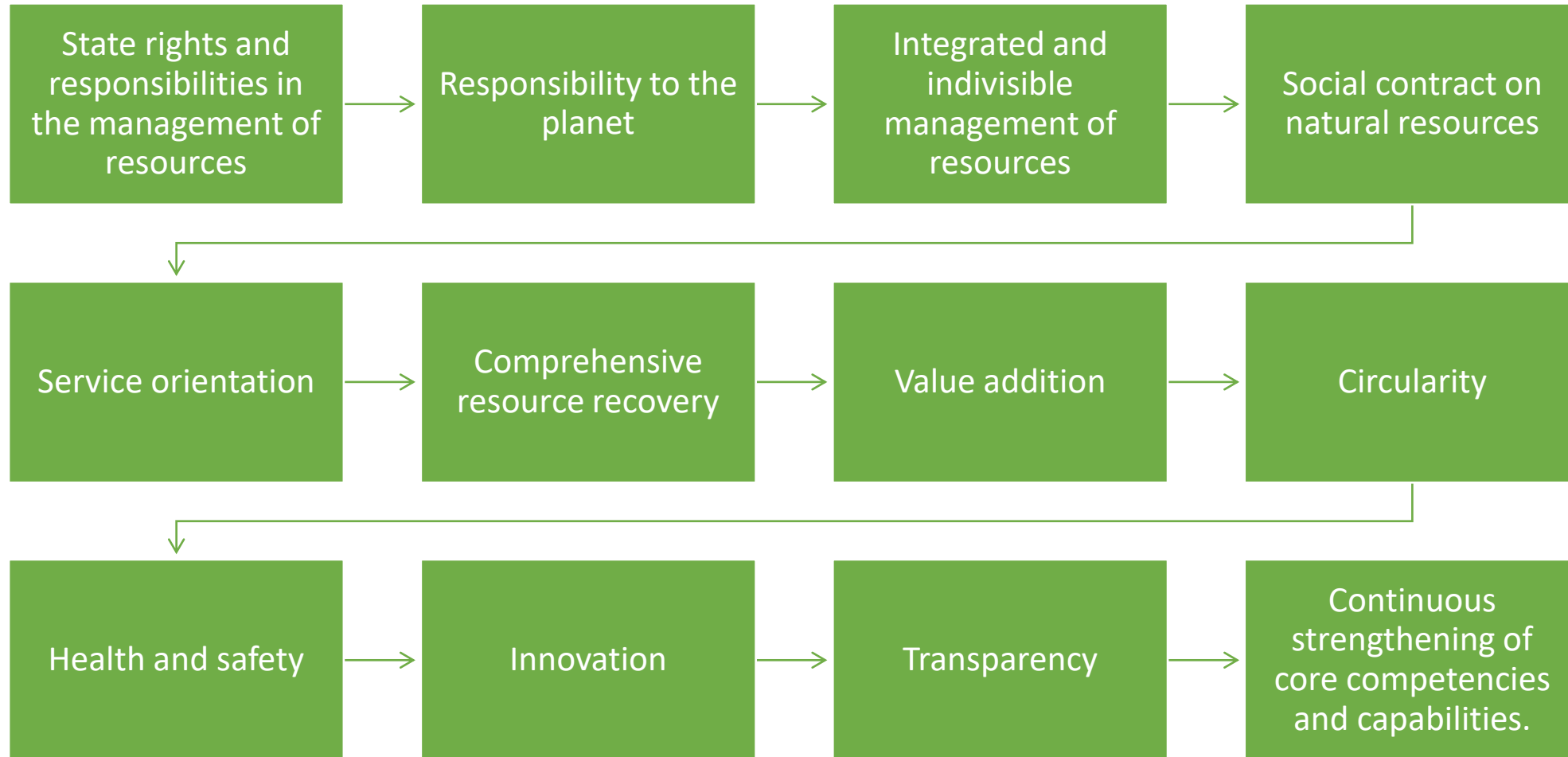
UNECE



- Applicable across resources and countries
- Includes environmental, social, and economic dimensions

United Nations Resource Management System

Based on 12 Fundamental Principles



3. Roadmap for action to strengthen mine tailings safety within and beyond the UNECE region

**Economic Commission for Europe**

Conference of the Parties to the Convention on the
Transboundary Effects of Industrial Accidents

Twelfth meeting

Geneva, 29 November–1 December 2022

Item 9 of the provisional agenda

Road map for action to strengthen

mine tailings safety within and beyond the

United Nations Economic Commission for Europe region

**Road map for action to strengthen mine tailings safety within
and beyond the United Nations Economic Commission for
Europe region**

Prepared by the Bureau of the Convention

Summary

The safe management of mine tailings is a major concern within the United Nations Economic Commission for Europe region and beyond. At its eleventh meeting (Geneva (hybrid), 7–9 December 2020), the Conference of the Parties to the Convention on the Transboundary Effects of Industrial Accidents discussed past and future work to address mine tailings safety under the Convention. It took note of the conclusions and recommendations of the preceding Seminar on mine tailings safety in the United Nations Economic Commission for Europe region and beyond (online, 1 December 2020), which was organized by Bureau members and the secretariat. Furthermore, it adopted decision 2020/1 on strengthening mine tailings safety in the United Nations Economic Commission for Europe region and beyond (ECE/CP.TEIA/42/Add.1). Through the decision, the Conference of the Parties requested the Bureau to prepare an orientation paper for consideration at its twelfth meeting.

The present document, prepared by the Bureau, in particular its small group on tailings safety, in cooperation with the secretariat, outlines key objectives to further strengthen mine tailings safety and calls upon Parties and member States within the United Nations Economic Commission for Europe region and beyond to take specific actions until 2030 to do so. The road map supports progress towards the Convention's long-term strategy for 2030, which contains actions to strengthen implementation, address industrial safety hotspots and continuously work to prevent accidental water pollution. * Parties will be invited to express their views on the present road map, endorse it and thereby set the agenda for strengthening mine tailings safety with the proposed actions over the next eight years, including through activities under the Convention in future workplans.

* See ECE/CP.TEIA/38/Add.1, section III (1).



- Developed by Industrial Accidents Convention's Bureau and UNECE secretariat, in consultation with OECD, OSCE, UNDRR, UNEP, UNDP and EU Joint Research Centre
- Endorsed by Industrial Accidents Convention CoP-12 (Geneva, December 2022)
- Purpose:
 - Defines five key objectives to strengthen mine tailings safety
 - Provides direction, actions and priorities for countries to achieve the key objectives
 - Highlights activities that UNECE, in cooperation with partner organizations, can conduct to support countries in implementation
- Intended use: Parties and member States within and beyond the UNECE region

Five key objectives

- A. Understanding TMF-related risks within and across national borders
- B. Addressing TMF risks through policy and governance
- C. Prevention and preparedness for accidental water pollution from TMFs to ensure water quality
- D. Prevention of natural hazard-triggered industrial accidents (Natech events) and adaptation to climate change
- E. Exchange of information and knowledge and capacity-building

Objective A – Understanding TMF-related risks within and across national borders

Actions to be taken by Parties and member States within and beyond the UNECE region

- Collect and provide data on TMFs when reporting on hazardous activities; regularly review and update TMF data
- Apply UNECE Safety Guidelines and TMF Methodology to identify, map and improve safe management of TMFs; work towards their harmonized application
- Conduct mapping and inventory exercises, share the data with UNECE secretariat to develop regional overview and ensure availability of the information to the public
- Complete and use notification template to inform all potentially affected countries about TMFs with possible transboundary risks
- Conduct on-site trainings to identify TMF hazards and risks and means to address them

Objective B – Addressing TMF risks through policy and governance

Actions to be taken by Parties and member States within and beyond the UNECE region

- Review national legislation, policies and strategies in line with Convention
- Consider results of risk assessments of TMFs when developing and updating policies/decision-making procedures on land-use planning and siting of TMFs
- Establish / further develop national coordination mechanisms (e.g. IIWGs) to cooperate on managing TMF risks, covering also transboundary context
- Participate in intergovernmental process that UNEP will facilitate following adoption of UNEA of UNEP resolution 5/12

Objective C – Prevention and preparedness for accidental water pollution from TMFs

Actions to be taken by Parties and member States within and beyond the UNECE region

- Establish and maintain policy dialogues to prevent accidental water pollution and further understand elevated risks posed by climate change impacts
- Conduct multi-hazard, multi-risk mapping exercises in river basins, including TMFs, using Safety Guidelines and TMF Methodology, and ensure information available to affected public
- Develop internal and external contingency plans, including joint or harmonized plans for TMFs with neighbouring and riparian countries and through river basin commissions; test these plans through exercises, and review and refine them

Objective D – Prevention of Natech events and climate change adaptation

Actions to be taken by Parties and member States within and beyond the UNECE region

- Integrate Natech risks into TMF safety management plans and respective reviews (audits, evaluations) by authorities
- Review scientific data and engage with experts on CC impacts to better understand linkages with industrial safety, particularly TMFs and adaptation measures needed
- Review existing risk assessment methodologies and update them to include Natech risks and compounding risks from CC
- Improve adaptation to CC risks, incl. through contingency planning and (transboundary) exercises for Natech accident scenarios

Objective E – Exchange of information and knowledge and capacity-building

Actions to be taken by Parties and member States within and beyond the UNECE region

- Foster regular exchange of information and knowledge about good practices, lessons learned and innovations for TMF safety (among competent authorities, international organizations, NGOs, TMF operators, academia and experts)
- Consider developing policy group on TMF safety to support implementation of actions in the Roadmap and UNEA of UNEP resolution 5/12

Joint or complementary actions by UNECE secretariat and other international organizations

- UNECE secretariat to invite all partners that work on TMF safety to join and participate in interactive network to be developed

Timeline of UNECE-supported activities

2023–2024

- Advancement of understanding of TMF risks
- Review and update of existing policies and legislation
- Facilitation of existing or establishment of new working groups and national coordination mechanisms
- Countries to report on TMFs in national implementation reports under the Industrial Accident Convention

2025–2026

- Improvement of joint understanding and governance of the risks among countries
- Preparation of an overview of: TMFs in the UNECE region, possibly existing hazards, risks and hotspots; as such to overcome gaps...
- UNECE to facilitate a multi-stakeholder dialogue on strengths and challenges, depending on funding

Thank you for your attention

For more information: www.unece.org/env/teia

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