FINAL REPORT

Assistance in safety improvement of tailings management facilities (TMF) in Armenia and Georgia

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Assistance in safety improvement of tailings management facilities (TMF) in Armenia and Georgia

Final Report by

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Abstract

The failure of tailings management facilities is an enormous problem all over the world and regularly leads to major catastrophes.

These accidents at TMFs are posing a high risk to people and the environment in near to TMFs and also often have a transboundary impact.

Armenia and Georgia, with financial and professional support of the German Environmental Agency, had the opportunity to strengthen their national capacities of competent authorities and mining enterprises and gain and develop additional knowledge to safety aspects of TMFs within the framework of the Advisory Assistance project "Assistance in safety improvement of tailings management facilities (TMF) in Armenia and Georgia".

This project was funded and coordinated by German Environment Agency; the project implementation was supported by the Ministry of Environment and the Ministry of Emergency Situations of Armenia and Georgia.

Throughout the whole period of the project implementation the UNECE Joint Expert Group on Water and Industrial Accidents (UNECE JEG) and the members of an International Advisory Board, headed by the German Environment Agency, provided professional support based on international experience.

The project results were presented at a number of national and international meetings and will be valuable also for other UNECE countries facing similar environmental problems caused by mining activities. The obtained results demonstrated the importance of finding the sustainable way to the solution of the TMF problems. It is especially required to address the TMF issues both on the practical level at places and nationally on the legislative level.

Kurzbeschreibung

Das Versagen von industriellen Rückhaltebecken (TMF, Engl. Tailings Management Facilities - TMF) ist weltweit ein enormes Problem und führt regelmäßig zu großen Katastrophen.

Diese Unfälle an den TMFs stellen ein hohes Risiko für Mensch und Umwelt in direkter Nähe von Rückhaltebecken dar und wirken sich häufig auch grenzüberschreitend aus.

Mit finanzieller und fachlicher Unterstützung des deutschen Umweltbundesamtes hatten Armenien und Georgien jetzt im Rahmen des Beratungshilfe-Projektes "Unterstützung bei der Verbesserung der Sicherheit industrieller Rückhaltebecken in Armenien und Georgien“ die Möglichkeit, die nationalen Kapazitäten der zuständigen Behörden und Bergbauunternehmen zu stärken und zusätzliches Wissen hinsichtlich der Sicherheitsaspekte von TMFs im Rahmen des aufzubauen.

Dieses Projekt wurde vom Umweltbundesamt gefördert und koordiniert. Die Projektdurchführung wurde von den Umweltministerien und Notfallministerien Armeniens und Georgiens unterstützt.

Während des gesamten Projektdurchführungszeitraums leisteten die gemeinsame UNECE-Expertengruppe der UNECE Konvention über Industrieunfälle und Wasser (UNECE JEG) sowie die Mitglieder eines internationalen Projektbeirates unter Leitung des Umweltbundesamts professionelle Unterstützung auf der Grundlage internationaler Erfahrungen.

Die Projektergebnisse wurden auf einer Reihe von nationalen und internationalen Treffen präsentiert und werden auch für andere UNECE-Länder von Nutzen sein, die mit vergleichbaren Umweltproblemen aus Bergbauaktivitäten zu tun haben. Die erzielten Ergebnisse zeigten, dass ein nachhaltiger Weg zur Lösung der TMF-Probleme sehr wichtig ist. Es ist insbesondere erforderlich, die TMF-Problematik sowohl auf praktischer Ebene vor Ort, als auch national auf legislativer Ebene anzugehen.

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AAP	Advisory Assistance Programme
CJSC	Closed Joint Stock Company
COP	Conference of the Parties
CJSC	Close Joint Stock Company
ICPDR	International Commission for the Protection of the Danube River
JEG	Joint Expert Group
LGB	Local Governmental Bodies
LEPL	Legal Entity Under Public Law
LLC	Limited liability company
MES RA	Ministry of Emergency Situations of Republic of Armenia
NGO	Non-Governmental Organization
RA	Republic of Armenia
SNCO	State non-commissioned company
TMF	Tailings Management Facilities
THI	Tailings Hazard Index
ToT	Training of trainers
UBA	Umwelbudesamt (German Environment Agency)
UNECE	United Nations Economic Commission for Europe
USSR	Union of Soviet Socialist Republics
WB	World Bank
WP	Working Package

Summary

► Project background

The failure of tailings management facilities is an enormous problem all over the world and regularly leads to major catastrophes.

The most recent example was the dramatic TMF failure in Brazil resulting in hundreds of dead people and a disastrous contamination of large river basins.

Other disasters are well known in Europe including those in the Danube catchment area, at Kolontar in Hungary and at Baia Mare in Romania. Accidents at TMFs are posing a high risk to people and environment in the near vicinity of TMFs and also often have a transboundary impact.

Accidents at TMFs, particularly in the countries with economies in transition, including Armenia and Georgia, can result in catastrophes not only at local, but also at national and transboundary levels.

Mining sector is one of the leading branches of the industry in Armenia and in Georgia. For this reason, mining should be regulated by effective state governance and on a sound legal basis. These conditions have not yet been met in both countries.

At the same time, a number of international regulations already exist. The UNECE Convention on the Transboundary Effects of Industrial Accidents provides a legal basis for the countries in their efforts to prevent industrial accidents. It also promotes enhancing of international cooperation among the neighbouring countries in case of emergencies.

The UNECE Safety Guidelines and Good Practices for TMFs (2008) were elaborated under the auspices of the German Environmental Agency (UBA). The user-friendly TMF safety methodology developed on this basis is an efficient tool for training of staff both in the governance bodies and in mining enterprises.

In addition, an assessment system based on the hazard index is proposed that allows both governments and international organizations to quickly overview the most problematic TMFs, while purposeful and effective using limited financial and human resources to minimize the potential hazard of these facilities.

In addition, an appropriate cartographic assessment allows a quick overview of high-risk sites, both at the national level and throughout the UNECE region.

► Project activities

Armenia and Georgia, with financial support of the German Environmental Agency, had the opportunity to strengthen the national capacities of competent authorities and mining enterprises by gaining additional knowledge to safety aspects of TMFs within the framework of the project on "Assistance in safety improvement of tailings management facilities (TMF) in Armenia and Georgia".

This project was implemented during 2017-2020 by the non-governmental NGO “Eco Peace” (Armenia) within the framework of Advisory Assistance Programme for Environmental Protection in the Countries in Central and Eastern Europe, the Caucasus and Central Asia by the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety. It was coordinated by the German Environment Agency with the assistance of the project Advisory Board, UNECE Joint Expert Group (JEG) and supported by the Ministries of Environment and Ministries of Emergency Situations of Armenia and Georgia. The overall project objective was to contribute to the improvement/strengthening of national capacities and know-how of competent authorities and industrial enterprises in Armenia and Georgia on TMS safety.

The long-term goal of the project was to sustainably anchor the TMF methodology for evaluation and analysis of the safety of tailings management facilities (TMFs), successfully developed by the German Environment Agency in previous pilot projects, and to further use and improve in the other UNECE countries.

The successful experience of the application of the TMF methodology in Caucasus region, where numerous TMF sites are located, allowed improving this methodology and making it as the more effective working tool for quick and efficient visual inspection of TMFs and for thorough inspection of relevant documentations.

The project addressed the following main/key tasks according to the Terms of Reference:

- Analysis of legislative and administrative situation in Georgia and Armenia, suggestions made for its improvement;
- Training of trainers in Armenia using the TMF safety methodology for the mining sector specialists/responsible bodies from the different UNECE countries;
- Inventory and mapping of TMFs in the UNECE countries participating in the training-of-trainers held in Armenia with comparative analysis;
- Transfer of the knowledge acquired by trained Armenian and Georgian trainers to the representatives of competent authorities responsible for the local control of TMF safety;
- Revision/review of the TMF methodology taking into account the possibility of implementing similar training courses in the other countries of the UNECE region;
- Field training exercise in the basin of the transboundary Debed river (with the emphasis/focus on possible transboundary TMF-caused emergences) with the application/ testing of the UNECE Checklist for Contingency planning;
- Discussions with the UNECE Joint Expert Group (JEG) and project advisory board members allowed providing the professional guidance and assessment of the activities based on the international experience.

Project activities included the Kick-off meeting (December 2017, Yerevan, Armenia); the First meeting of the project Advisory Board (May 2018, Yerevan, Armenia); Field training exercise in the transboundary Debed river basin (July 2018, Akhtala, Armenia); Training of trainers with back-to-back 18th meeting of the UNECE JEG Expert Group on Water and Industrial Accidents and project Advisory Board (AB) second Meeting (September 2018, Tsaghkadzor, Armenia), Third meeting of the project Advisory Board (April 2019, Tbilisi, Georgia), two Regional trainings in Armenia (July 2019, Akhtala and Dastakert towns, Armenia), Regional training in Georgia (August 2019, Kazreti, Georgia) and Final workshop with back-to-back fourth Meeting of the project Advisory Board (AB) (September 2019, Batumi, Georgia). In parallel, the experts the experts worked on the improvement of the TMF methodology and the checklist, TMF inventory, ranking tailings hazard and mapping.

Large-scale works were done before and after each event, including but not limited to the following: preparation of training materials; collection and analysis of the participants' feedback after each training event; discussions and agreeing of possible amendments to the TMF methodology for its further implementation; development of the scenario for the field exercise and application of the UNECE Checklist for contingency planning; discussions and recommendations for possible modifications in the UNECE Checklist for contingency planning, etc.

► Educational/training component of the project

The educational/training component was one of the project main activities and included conducting the training of trainers for mining sector professionals with participation of international experts from different UNECE countries. The training participants represented competent ministries, legislative bodies, and private sector responsible for environmental and industrial safety and operators of mining companies.

The theoretical knowledge was strengthened through practical application of the methodology during the visual inspection conducted directly on the TMF site located in the Lori region of Armenia.

The trainings' participants were international and national experts including the members of UNECE Joint Expert Group on Water and Industrial accidents (JEG), project Advisory Board members, representatives of Armenian and Georgian competent authorities on the national and regional level, as well as the responsible staff from the mining companies.

The training was held in Armenia with the participation of international experts representing more than 12 countries: Romania, Serbia, Hungary, Ukraine, Moldova, Belarus, Kazakhstan, Kyrgyzstan, Germany, Austria, Sweden, Georgia and Armenia. Training materials were prepared by Ukrainian trainers, who awarded certificates to the participants, who successfully completed the training, providing positive training results.

The TMF operator, "Akhtala ore-dressing combine" CJSC, was actively involved in the training and guaranteed the possibility of organizing and carrying out practical training onthe active TMF site. This training created the basis for the trained participants from different countries to conduct similar courses in the future for the competent authorities in their countries.

The experiences gained through inventories and mapping of TMFs shall be now used for getting an overview to the risk of TMF within all UNECE countries in the near future.

The follow up activities also included additional regional training events in Armenia and Georgia, during which the knowledge acquired in the main training was passed on independently to other specialists.

Three regional trainings took place in 2019: two in Armenia and one in Georgia. The participants were operators, employees of the competent authorities/ministries responsible for the local control over the safety in the mining sector in Armenia and Georgia.

These trainings served for further improvement of the TMF methodology based on recommendations of training participants to make it even more effective.

The important aspect was that the TMF methodology was applied to an abandoned TMF for the first time, as a result the methodology and the corresponding checklist on inspection for closed, rehabilitated or abandoned TMFs was fully reviewed and revised.

► Legislative component of the project

Another important component of the project was the activity regarding supporting of mining sector legislation in Georgia and Armenia.

A consolidated report on the management of Georgian TMFs was prepared with the recommendations for the necessary actions for normative regulation of the sector. This analysis also included some general strategies for post-Soviet countries.

Based on the project experience in Armenia the "Manual on Safe Management of the TMFs" was fully revised and re-edited.

All those works were carried out taking into account national and international requirements, the legislative reforms in Armenia and Georgia over the past years and the approaches of the UNECE Safety guidelines for Tailings Management Facilities.

All those works were carried out taking into account national and international requirements, the legislative reforms in Armenia and Georgia over the past years and the approaches of the UNECE Safety guidelines for Tailings Management Facilities.

► Transboundary cooperation component

In order to improve cross-border cooperation between Armenia and Georgia, a field exercise was conducted within the framework of the project on the territory of an active TMF in Armenia. It is located in the Debed river basin and in case of an accident could cause serious transboundary pollution.

The main goals of the exercise were:

- the application and testing of the UNECE Checklist for Contingency planning and providing recommendations to optimize the Armenian-Georgian alert system in case of possible transboundary emergency situations by TMF accidents.
- Improvement of the level of Armenia-Georgia cooperation in the transboundary context in increasing the efficiency of information provision in case of possible transboundary emergency situations.

During this activity the UNECE Checklist for contingency planning was tested, which allowed defining respective reporting steps and the efficiency of the UNECE Checklist for contingency planning, and elaborating the proposals with appropriate adjustments and changes.

The proposed recommendations can serve a basis for the amendment of the national regulations regarding international contingency planning in case of TMF accidents. The international warning and alarm system for the Kura River can be considered as a very useful initiative for Armenia and Georgia.

► Results

The main results of the project are:

a) Trained national trainers who can transfer their gained knowledge to other personnel working in the mining sector in Armenia, Georgia and other UNECE countries.

b) Tested TMF-methodology in Armenia and Georgia and gained knowledge on efficient inspection procedures based on the TMF checklist.

c) Improved TMF methodology based on recommendations of training participants.

d) TMF inventories and individual THI-Calculations for the countries participating in the training with comparative analysis; TMFs mapping.

e) Further sustainable use of the TMF methodology in other UNECE countries (follow-up projects in Kazakhstan and Romania).

f) Tested TMF-methodology at abandoned TMFs and amendments of the respective checklist.

g) Integrated analysis of the legislative and administrative situation in Georgia on the TMF sector and recommendations for its future improvement.

h) Improved national capacities; enhanced emergency preparedness and cross-border cooperation between Armenia and Georgia.

i) Amendments/recommendations to the UNECE Checklist for Contingency Planning.

The Project results will be valuable also for the other UNECE countries facing similar environmental problems caused by mining activities.

The project outcomes/results demonstrated the importance of finding a sustainable way to the solution of the TMF problems and growing needs to address the TMF issue on the practical and legislative levels.

The first steps are important. The methodology provides assistance for this and demonstrates how to gradually increase the level of TMF safety.

This report includes the details of all activities within the project and the outcomes/results, which demonstrated the importance of finding a sustainable way to the solution of the TMF problems and growing needs to address the TMF issue on the practical and legislative levels.

Zusammenfassung

► Projekthintergrund

Das Versagen von industriellen Rückhaltebecken ist weltweit ein enormes Problem und führt regelmäßig zu großen Katastrophen.
Die jüngsten Beispiele sind die dramatischen TMF-Unfälle in Brasilien, die zu Hunderten von Toten und einer katastrophalen Kontamination großer Flusseinzugsgebiete führten. Andere Katastrophen sind in Europa bekannt, wie die im Einzugsgebiet der Donau, in Kolontar in Ungarn und in Baia Mare in Rumänien.

Unfälle bei TMFs stellen ein hohes Risiko für Mensch und Umwelt in direkter Nähe von TMFs dar und wirken sich häufig auch grenzüberschreitend aus. Insbesondere in Ländern mit Volkswirtschaften im Übergang, einschließlich Armenien und Georgien, können TMF-Unfälle nicht nur zu lokalen, sondern auch zu großen überregionalen und nationalen Katastrophen führen.

Der Bergbausektor ist einer der führenden Wirtschaftszweige in Armenien und in Georgien.

Aus diesem Grund muss diesen Bergbau-Aktivitäten auch eine effiziente öffentliche Verwaltung auf einer verlässlichen gesetzlichen Grundlage gegenübergestellt werden. In beiden Ländern sind diese Voraussetzungen noch nicht erfüllt.

Demgegenüber gibt es bereits eine Reihe von internationalen Vorgaben. So bietet die UNECE-Konvention über die grenzüberschreitenden Auswirkungen von Industrieunfällen den Vertragsstaaten eine Hilfestellung für die Schaffung von Rechtsgrundlagen für ihre Bemühungen zur Verhütung von Industrieunfällen. Gezielt soll auch die Verbesserung der internationalen Zusammenarbeit zwischen den Nachbarländern in Notfällen, gefördert werden.

Die UNECE-Sicherheitsrichtlinien und bewährten Praktiken für TMFs (2008) wurden unter der Federführung des Umweltbundesamtes (UBA) erstellt. Die auf dieser Grundlage entwickelte anwenderfreundliche TMF-Methodik ist sowohl für die Verwaltung als auch die Bergbau-Unternehmen ein gutes Instrument für Schulungen ihrer Mitarbeiter.

Darüber hinaus liegt ein Index-basiertes Bewertungssystem vor, dass sowohl Regierungen als auch internationalen Organisationen einen schnellen Überblick zu hochproblematischen TMF-Standorten gibt, um begrenzte finanzielle und personelle Ressourcen zielgerichtet und effizient zur Reduzierung der TMF-Gefahrenpotentiale einzusetzen.

Darüber hinaus ermöglicht eine entsprechende kartographische Auswertung (Mapping) einen einfachen Überblick über die Standorte mit hohem Risiko national als auch in der gesamten UNECE-Region.

► Projekt Aktivitäten

Mit finanzieller Unterstützung des Umweltbundesamtes hatten Armenien und Georgien die Möglichkeit, die nationalen Kapazitäten der zuständigen Behörden und Bergbauunternehmen zu stärken und zusätzliches Wissen hinsichtlich der Sicherheitsaspekte von TMFs im Rahmen des Projekts "Unterstützung bei der Verbesserung der Sicherheit industrieller Rückhaltebecken in Armenien und Georgien" zu erwerben.

Dieses Projekt wurde im Zeitraum 2017-2020 von der Nichtregierungsorganisation „Eco Peace“ (Armenien) im Rahmen des Beratungshilfeprogramms des Bundesumweltministeriums für den Umweltschutz in den Ländern Mittel- und Osteuropas, des Kaukasus und Zentralasiens durchgeführt. Es wurde vom Umweltbundesamt finanziert und mit Unterstützung des Projektbeirats, der UNECE

Joint Expert Group (JEG) koordiniert und vom armenischen und georgischem Umweltministerium und dem Notfallministerium unterstützt.

Das übergeordnete Ziel des Projekts bestand darin, zur Verbesserung/Stärkung der nationalen Kapazitäten und des Know How zur Sicherheit von TMFs bei zuständigen Behörden und Industrieunternehmen in Armenien und Georgien beizutragen.

Langfristiges Ziel des Projekts war die nachhaltige Verankerung der TMF-Methodik zur Bewertung und Analyse der Sicherheit von industriellen Rückhaltebecken, die das Umweltbundesamt in früheren Pilotprojekten entwickelt hatte nunmehr auch in anderen UNECE-Ländern weiter einzusetzen und zu verbessern.

Die erfolgreiche Anwendung der TMF-Methodik in der Region Kaukasus, wo zahlreiche TMF-Standorte zu finden sind, ermöglichte die Verbesserung dieser Methodik und verwandelte sie zu einem effektiveren Tool für eine schnelle und effiziente Sichtprüfung von TMFs sowie für die gründliche Prüfung relevanter Dokumentation.

Das Projekt zielte auf die Erfüllung der folgenden Haupt-/Schlüsselaufgaben gemäß der Leistungsbeschreibung ab:

- Analyse der legislativen und administrativen Situation in Georgien und Armenien und Vorschläge zur weiteren Verbesserung;
- Schulungen zur TMF-Methodik: „Train the trainers“ Trainers in Armenien für Bergbauspezialisten/zuständige Stellen aus den verschiedenen UNECE-Ländern.
- Inventaraufnahme und Kartierung der TMFs in den UNECE-Teilnehmerländern beim Training der Trainers in Armenien mit vergleichender Analyse;
- Weitergabe der von geschulten armenischen und georgischen Trainern erworbenen Kenntnisse an die Vertreter der zuständigen Behörden, die für die lokale Kontrolle von TMF zuständig sind;
- Überarbeitung/Überprüfung der TMF-Methodik unter Berücksichtigung der Möglichkeit, ähnliche Schulungskurse in den anderen Ländern der UNECE-Region durchzuführen;
- Feldtrainingsübung im Einzugsgebiet des grenzüberschreitenden Debed-Flusses (mit Schwerpunkt auf mögliche grenzüberschreitende TMF-Notfällen) mit Anwendung/Erprobung der UNECE-Checkliste für die Notfallplanung;
- Diskussions-Austausch mit den Mitgliedern des UNECE Joint Expert Group (JEG) und des Projektbeirats, der auf Grundlage seiner internationalen Erfahrung eine professionelle Anleitung und Bewertung der Aktivitäten lieferte.

Die Projektaktivitäten umfassten ein Auftakttreffen (Dezember 2017, Eriwan, Armenien); die erste Sitzung des Projektbeirats (Mai 2018, Eriwan, Armenien); Feldtraining im grenzüberschreitenden Debed-Einzugsgebiet (Juli 2018, Akhtala, Armenien); Ausbildung von Ausbildern mit aufeinanderfolgender 18. Sitzung der Gemeinsamen UNECE JEG-Expertengruppe für die Verhinderung von Gewässerunfällen sowie die zweite Sitzung des Projektbeirats (September 2018, Tsaghkadzor, Armenien), dritte Sitzung des Projektbeirats (April 2019, Tiflis, Georgien), zwei regionale Trainingsveranstaltungen in Armenien (Juli 2019, Städte Akhtala und Dastakert, Armenien), regionales Training in Georgien (August 2019, Kazreti, Georgien) und Abschlussworkshop mit aufeinander folgendem vierten Projekttreffen des Projekt-Beirates (September 2019, Batumi, Georgien). Parallel dazu arbeiteten die Experten an der Verbesserung der TMF-Methodik und der

Checkliste, der TMF-Bestandsaufnahme, der Einstufung der Gefährdung durch Rückstände und der Kartierung.

Vor und nach jeder Veranstaltung wurden umfangreiche Arbeiten durchgeführt, unter anderem: Vorbereitung von Schulungsunterlagen; Sammeln und Analysieren der Rückmeldungen der Teilnehmer nach jeder Trainingsveranstaltungen; Erörterung und Vereinbarung möglicher Änderungen der TMF-Methodik für deren weitere Umsetzung; Entwicklung des Szenarios für die Feldübung und Anwendung der UNECE-Checkliste für die Notfallplanung; Diskussionen und Empfehlungen für mögliche Änderungen in der UNECE-Checkliste für die Notfallplanung usw.

► Bildungs-/Trainings-Komponente des Projekts

Die Bildungs-/Trainings-Komponente war eine der Hauptaktivitäten des Projekts und umfasste eine Schulung von Multiplikator*innen (Training of Trainers) für Fachkräfte aus dem Bergbausektor mit Beteiligung von internationalen Experten aus verschiedenen UNECE-Ländern. Die Trainingsteilnehmer waren Vertreter*innen der zuständigen Ministerien, der gesetzgebenden Behörden und des Privatsektors, die für Umweltschutz und Unternehmenssicherheit/Industriesicherheit zuständig sind, sowie Betreiber von Bergbauunternehmen.

Das theoretische Wissen wurde durch die praktische Anwendung der TMF-Methodik bei der Sichtprüfung direkt am TMF-Standort in der Region Lori in Armenien, vertieft.

Teilnehmer der Trainingsveranstaltungen waren internationale und nationale Experten, darunter die Mitglieder der Gemeinsamen Expertengruppe der UNECE für Wasser- und Industrieunfälle (JEG), Mitglieder des Projektbeirats, Vertreter der zuständigen armenischen und georgischen Behörden auf nationaler und regionaler Ebene sowie die zuständigen Personen/Spezialisten der Bergbauunternehmen.

Das Training wurde in Armenien mit der Beteiligung internationaler Experten aus mehr als 12 Ländern durchgeführt, darunter Rumänien, Serbien, Ungarn, Moldawien, Weißrussland, Kasachstan, Kirgisistan, Deutschland, Österreich, Schweden, Georgien und Armenien. Die Lehrmaterialien zum Training wurden von den Ukrainischen Trainern vorbereitet, die dann die positiven Trainingsresultate mit einer erfolgreichen Teilnahme-Bestätigung honorierten.

Auch der TMF-Betreiber, die Aktiengesellschaft „Akhtala Erzaufbereitung Kombinat“, wurde in das Training aktiv mit eingebunden und gewährleistete die Möglichkeit zur Organisation und Durchführung der praktischen Schulungen auf dem aktiven TMF-Gelände.

Diese Schulung bot den Teilnehmern aus verschiedenen Ländern die Grundlage, künftig ähnliche Kurse für die zuständigen Behörden in ihren Ländern durchzuführen.

Die durch die Inventaraufnahme und Kartierung der TMFs gewonnenen Erfahrungen sollen jetzt weiter genutzt werden, um einen Überblick über das TMF-Risiko in allen UNECE-Ländern zu erhalten.

Folgeaktivitäten umfassten auch zusätzliche regionale Trainingsveranstaltungen in Armenien und Georgien, bei denen die im zentralen Training erworbenen Kenntnisse eigenständig an weitere Mitarbeiter weiter gegeben wurden.

Drei regionale Trainingsveranstaltungen fanden 2019 statt: zwei in Armenien und eine in Georgien. Die Teilnehmer waren TMF-Betreiber, Angestellte der zuständigen Behörden oder Ministerien, die für die lokale Kontrolle im Bergbausektor in Armenien und Georgien verantwortlich sind.

Diese Trainingsveranstaltungen dienten der weiteren Verbesserung der TMF-Methodik aufgrund der Empfehlungen der Trainingsteilnehmer, um sie noch effektiver zu gestalten.

Parallel dazu arbeiteten die Experten an der Verbesserung der TMF-Methodik und der Checkliste, der TMF-Bestandsaufnahme, der Einstufung der Gefährdung durch Rückstände und der Kartierung.

Ein wichtiger Aspekt war auch, dass die TMF-Methodik zum ersten Mal an einem „verlassenen“ TMF-Standort angewendet wurde. Auf dieser Erfahrung konnte auch die TMF-Methodik bzw. die entsprechende Checkliste zur Inspektion geschlossener, rückgebauter oder aufgegebener TMFs vollständig überprüft und überarbeitet werden.

► Legislative Komponente des Projekts

Ein weiterer wichtiger Bestandteil des Projekts war die Unterstützung der Gesetzgebung im Bergbausektor in Georgien und Armenien.

Ein konsolidierter Bericht über das Management georgischer TMFs wurde mit den Empfehlungen für die notwendigen Maßnahmen zur normativen Regulierung des Sektors erstellt. Diese Analyse umfasste auch einige allgemeine Strategien für postsowjetische Länder.

Basierend auf den Projekterfahrungen in Armenien wurde das "Handbuch zur sicheren Verwaltung der TMFs" vollständig überarbeitet.

Alle diese Arbeiten wurden unter Berücksichtigung der nationalen und internationalen Anforderungen, der Gesetzesreformen in Armenien und Georgien in den letzten Jahren und der Ansätze der UNECE-Sicherheitsrichtlinien für TMFs durchgeführt.

► Komponente zur grenzüberschreitenden Zusammenarbeit

Um die grenzüberschreitende Zusammenarbeit zwischen Armenien und Georgien zu verbessern, wurde im Rahmen des Projekts eine Feldübung auf dem Gebiet einer aktiven TMF in Armenien durchgeführt. Die TMF befindet sich im Einzugsgebiet Debed und könnte bei einem Unfall schwere grenzüberschreitende Kontaminationen auslösen.

Die Hauptziele der Übung waren:

- Anwendung und Erprobung der UNECE-„Contingeny“-Checkliste für die Notfallplanung und die Bereitstellung von Empfehlungen zur Optimierung des armenisch-georgische Warnsystem bei möglichen grenzüberschreitenden Notfallsituationen durch TMF-Unfälle;
- Verbesserung der Zusammenarbeit zwischen Armenien und Georgien im grenzüberschreitenden Kontext, um die Effizienz der Informationsbereitstellung im Falle möglicher grenzüberschreitender Notsituationen zu erhöhen.

Während dieser Aktivität wurde die UNECE-Checkliste für die Notfallplanung getestet. Dies ermöglichte es, entsprechende Berichtsschritte und die Effizienz der UNECE-Checkliste für die Notfallplanung zu definieren und entsprechende Anpassungen und Änderungen vorzuschlagen.

Die vorgeschlagenen Empfehlungen können als Grundlage für die Änderung der nationalen Vorschriften zur internationalen Notfallplanung bei TMF-Unfällen dienen. Für Armenien und Georgien kann vor allem das internationale Warn- und Alarmsystem für den Kura Fluss wertvolle Anregungen geben.

► Ergebnisse

Die wichtigsten Ergebnisse des Projekts sind:

a. Ausgebildete nationale Trainer, die ihr erworbenes Wissen an andere Bergbauspezialisten in Armenien, Georgien und anderen UNECE-Ländern weitergeben können;

b. Test der TMF-Methodik in Armenien und Georgien und Gewinnen von Kenntnissen über effiziente Inspektionsverfahren basierend auf der TMF-Checkliste;

c. Verbesserung der TMF-Methodik auf der Grundlage von Empfehlungen der Trainingsteilnehmer.

d. TMF-Inventare und individuelle THI-Berechnungen für die im Training beteiligten Länder mit vergleichender Analyse; TMF-Kartierung.

e. Weitere nachhaltige Anwendung der TMF-Methodik in anderen UNECE-Ländern (z.B. Folgeprojekte in Kasachstan und Rumänien).

f. Test der TMF-Methodik an aufgegebenen TMFs und Aktualisierung der entsprechenden Checkliste.

g. Integrierte Analyse der rechtlichen und administrativen Situation in Georgien im TMF-Sektor und Empfehlungen für zukünftige Verbesserungen.

h. Verbesserung der nationalen Kapazitäten, verstärkte Notfallvorsorge und grenzüberschreitende Zusammenarbeit zwischen Armenien und Georgien.

i. Änderungen/Empfehlungen der UNECE-Checkliste für die Notfallplanung.

Die Projektergebnisse werden auch für andere UNECE-Länder von Nutzen sein, die mit ähnlichen Umweltproblemen aufgrund von Bergbauaktivitäten konfrontiert sind.

Die Projektergebnisse zeigten, dass ein nachhaltiger Weg zur Lösung der TMF-Probleme sehr wichtig ist und dass die TMF-Themen auf praktischer und legislativer Ebene angegangen werden müssen. Wichtig sind dabei die ersten Schritte. Die TMF-Methodik gibt hierfür eine Hilfestellung und zeigt auf wie das Sicherheitsniveau von TMF schrittweise verbessert werden kann.

Dieser Bericht enthält die Details aller Aktivitäten innerhalb des Projekts und die Ergebnisse/Resultate, aus denen hervorgeht, dass ein nachhaltiger Weg zur Lösung der TMF-Probleme sehr wichtig ist und dass die TMF-Themen auf praktischer und legislativer Ebene angegangen werden müssen.

Resume (in Russian)

► Предыстория проекта

Аварии на хвостохранилищах являются огромной проблемой во всем мире и регулярно приводят к крупным катастрофам.

Одним из последних примеров стала драматическая авария на хвостохранилище в Бразилии, в результате которой погибли сотни людей и произошло катастрофическое загрязнение бассейнов крупных рек. Другие катастрофы также хорошо известны в Европе, в частности, в водосборном бассейне Дуная: возле Колонтара в Венгрии и на Бая-Маре в Румынии. Аварии на хвостохранилищах представляют высокий риск для населенных пунктов и окружающей среды в непосредственной близости от хвостохранилищ и часто оказывают трансграничное воздействие.

Аварии на хвостохранилищах, особенно в странах с переходной экономикой, включая Армению и Грузию, могут приводить к катастрофам не только на местном, но и на общенациональном и трансграничном уровне.

Горнодобывающий сектор является одной из ведущих отраслей промышленности в Армении и в Грузии. По этой причине добычу полезных ископаемых следует регулировать эффективным государственным управлением на надежной правовой основе. Эти условия в обеих странах пока не выполнены.

В то же время, уже существует ряд международных предписаний. Конвенция ЕЭК ООН о трансграничном воздействии промышленных аварий обеспечивает правовую основу для стран в их усилиях по предотвращению промышленных аварий. Она также способствует расширению международного сотрудничества между соседними странами в случае чрезвычайных ситуаций.

Руководящие принципы и надлежащая практика обеспечения эксплуатационной безопасности хвостохранилищ (2008) были сформулированиы под эгидой Агентства по окружающей среды Германии (UBA). Разработанная на этой основе удобная для пользователя методологии безопасности хвостохранилищ является эффективным инструментом для обучения сотрудников как в органах управления, как и на горнодобывающих предприятиях.

Кроме того, предложенная система оценивания, основанная на индексе опасности, позволяет как правительствам, так и международным организациям делать быстрый обзор наиболее проблемных хвостохранилищ, при этом целенаправленно и эффективно использовать ограниченные финансовые и кадровые ресурсы для минимизации потенциальной опасности этиъх объектов.

Кроме этого, соответствующая картографическая оценка позволяет выполнять быстрый обзор участков с высоким риском, как на национальном уровне, так и во всем регионе ЕЭК ООН.

► Деятельность проекта

Армения и Грузия при финансовой поддержке Агентства по охране окружающей среды Германии получили возможность укрепить потенциал компетентных органов и горнодобывающих предприятий на национальном уровне путем получения дополнительных знаний по аспектам безопасности хвостохранилищ в рамках проекта «Содействие в повышении безопасности хвостохранилищ в Армении и в Грузии».

Данный проект был осуществлен в течение 2017-2019 гг. неправительственной организацией «Eco Peace» (Армения) в рамках Программы консультационной помощи в области охраны окружающей среды в странах Центральной и Восточной Европы, Кавказа и Центральной Азии при поддержке Федерального министерства окружающей среды, природы и безопасности

ядерных реакторов Германии. Проект координировался непосредственно Агентством по окружающей среде Германии при содействии консультативного совета проекта, совместной экспертной группы ЕЭК ООН, а также при поддержке Министерств окружающей среды и Министерств по чрезвычайным ситуациям Армении и Грузии.

Общей целью проекта являлось содействие развитию потенциала промышленных предприятий и ноу-хау компетентных органов в Армении и в Грузии по вопросам безопасности хвостохранилищ.

Долгосрочная цель проекта заключалась в создании устойчивой платформы для оценки и анализа методологии по безопасности хвостохранилищ, которая была успешно разработана Агентством по окружающей среде Германии в рамках предыдущих пилотных проектов, для обеспечения ее дальнейшего использования и совершенствования в других странах региона ЕЭК ООН.

Успешный опыт применения методологии по безопасности хвостохранилищ в Кавказском регионе, где расположены многочисленные хвостохранилища, позволил усовершенствовать данную методологию и сделать ее более эффективным рабочим инструментом для быстрого и продуктивного визуального осмотра таких объектов и для тщательной проверки соответствующей документации.

В соответствии с техническим заданием в рамках проекта были решены следующие основные / ключевые задачи:

- Выполнен анализ законодательной и административной ситуации в Грузии и в Армении сделаны предложения по её улучшению;
- Проведен тренинг по методике безопасности хвостохранилищ для тренеров/подготовка инструкторов, в Армении для специалистов горнодобывающего сектора и представителей компетентных органов из различных стран ЕЭК ООН;
- Выполнена инвентаризация и картографирование хвостохранилищ стран ЕЭК ООН, участвующих в тренинге для тренеров, который был проведен в Армении, со сравнительным анализом;
- Знания, полученные обученными армянскими и грузинскими инструкторами, переданы представителям компетентных органов, отвечающих за контроль безопасности хвостохранилищ на местах;
- Выполнен пересмотр / совершенствование методологии по оценке безопасности хвостохранилищ с учетом возможности проведения аналогичных учебных курсов в других странах региона ЕЭК ООН;
- Проведены полевые учения в бассейне трансграничной реки Дебед (с акцентом на возможные трансграничные чрезвычайные ситуации на хвостохранилище) с применением / тестированием Контрольного списка ЕЭК ООН для планирования действий в чрезвычайных ситуациях;
- Обсуждение с Совместной экспертной группой ЕЭК ООН и членами консультативного совета проекта позволили на основе международного опыта обеспечить профессиональное руководство и оценку проводимых мероприятий.

Мероприятия проекта включали стартовое совещание (декабрь 2017 года, Ереван, Армения); первое заседание Консультативного совета проекта (май 2018, Ереван, Армения); полевые

учения в трансграничном бассейне реки Дебед (июль 2018 года, Ахтала, Армения); тренинг для тренеров/обучение инструкторов, который был проведен в увязке с 18-ым совещанием Совместной экспертной группы ЕЭК ООН (UNECE JEG) по проблемам воды и промышленных аварий и со вторым заседанием консультативного совета проекта (сентябрь 2018 года, Цахкадзор, Армения); третье заседание Консультативного совета проекта (апрель 2019 г., Тбилиси, Грузия), два региональных тренинга в Армении (июль 2019 г., города Ахтала и Дастакерт, Армения), региональный тренинг в Грузии (август 2019 г., Казрети, Грузия) и заключительный семинар проекта в увязке с четвертым совещанием Консультативного совета проекта (сентябрь 2019 года, Батуми, Грузия). Параллельно были проведены работы по улучшению методологии по безопасности хвостохранилищ и контрольного списка, по инвентаризации и ранжированию хвостохранилищ по степени опасности и их картированию.

До и после каждого мероприятия было выполнено много работ, включающих: подготовку учебных материалов; сбор и анализ отзывов участников после каждого тренинга; обсуждение и согласование возможных поправок к методологии по безопасности хвостохранилищ для ее дальнейшей имплементации; разработка сценария полевых учений и применение контрольного списка ЕЭК ООН для планирования действий в чрезвычайных ситуациях; обсуждения и рекомендации относительно возможных изменений в данном контрольном списке и т. д.

► Образовательный компонент проекта

Образовательный компонент был одним из основных составляющих проекта и включал в себя подготовку инструкторов для специалистов горнодобывающей отрасли с участием международных экспертов из разных стран ЕЭК ООН. Участниками тренингов стали представители компетентных министерств, законодательных органов и частного сектора, отвечающие за экологическую и промышленную безопасность, а также операторы горнодобывающих компаний.

Теоретические знания были закреплены путем практического применения методологии во время визуального осмотра, который проходил непосредственно на участке хвостохранилища, расположенного в Лорийской области Армении.

Участниками тренингов стали международные и национальные эксперты, в том числе и члены Совместной экспертной группы ЕЭК ООН по проблемам воды и промышленных аварий, члены Консультативного совета проекта, представители компетентных органов Армении и Грузии на национальном и региональном уровне, а также ответственный персонал горнодобывающих компаний.

Тренинг проходил в Армении с участием международных экспертов, представляющих более 12-ти стран: Румынию, Сербию, Венгрию, Украину, Молдову, Беларусь, Казахстан, Кыргызстан, Германию, Австрию, Швецию, Грузию и Армению. Учебные материалы были подготовлены украинскими тренерами, которые выдавали сертификаты участникам, которые успешно завершили тренинг, обеспечивая положительные результаты.

Оператор хвостохранилища – ЗАО «Ахталинский горно-обогатительный комбинат», активно участвовал в тренинге и гарантировал возможность организации и проведения практической части тренинга на территории действующего хвостохранилища. Данный тренинг послужил основой для обученных участников из разных стран в дальнейшем проводить аналогичные курсы для компетентных органов в своих странах.

Опыт, накопленный в ходе инвентаризации и картировании хвостохранилищ, ближайшее время будет использован для обзорного анализа риска хвостохранилищ для всего региона ЕЭК ООН.

Последующие мероприятия также включали дополнительные региональные тренинги в Армении и Грузии, во время которых знания полученные в ходе основного тренинга были независимо переданы другим специалистам.

Три региональных тренингов были проведены в 2019 году -два в Армении и один в Грузии. Участниками были операторы, сотрудники компетентных органов / министерств, отвечающие за контроль безопасности в горнодобывающем секторе Армении и Грузии на местном уровне.

Эти тренинги послужили толчком для дальнейшего совершенствования методологии по безопасности хвостохранилищ на основе полученных рекомендаций от участников тренинга, что позволило сделать её более эффективной.

Важным аспектом стало то, что методология впервые была применена к заброшенному хвостохранилищу. На основе этого опыта методика для хвостохранилищ и соответствующий контрольный список для проверки закрытых, рекультивированных или заброшенных хвостохранилищ были полностью пересмотрены и обновлёны.

► Законодательный компонент проекта

Другим важным компонентом проекта была деятельность по содействию законодательства в горнодобывающей отрасли Грузии и Армении.

Был составлен сводный отчет об управлении грузинскими хвостохранилищами, где представлены необходимые действия, которые предложены проводить для нормативного регулирования в отрасли. Данный анализ включает также общие стратегии для пост-советских государств.

Исходя из опыта проекта в Армении, руководство об «Управлении хвостохранилищ, расположенных на территории Армении» было полностью пересмотрено и отредактировано.

Все эти работы были выполнены с учетом национальных и международных требований, законодательных реформ в Армении и в Грузии за последние годы, и руководящих принципов ЕЭК ООН по безопасности хвостохранилищ.

► Компонент трансграничного сотрудничества

В целях улучшения трансграничного сотрудничества между Арменией и Грузией, в рамках проекта в Армении были проведены полевые учения на территории действующего хвостохранилища. Оно расположено в бассейне реки Дебед и в случае аварии может привести к серьезному трансграничному загрязнению.

Основные цели учения были:

- применение и тестирование контрольного списка ЕЭК ООН для планирования действий в чрезвычайных ситуациях, и предоставление рекомендаций по оптимизации армяно-грузинской системы оповещения в случае возможных трансграничных чрезвычайных ситуаций на хвостохранилищах.
- Повышение уровня трансграничного сотрудничества между Арменией и Грузией по улучшению эффективности цепочки предоставления информации в случае возникновения чрезвычайных ситуаций с возможным трансграничным эффектом.

В ходе этой деятельности был протестирован контрольный список ЕЭК ООН для планирования действий в чрезвычайных ситуациях, что позволило определить соответствующие этапы отчетности и эффективность данного контрольного списка ЕЭК ООН, а также разработать предложения для его дальнейшего улучшения с соответствующими корректировками и изменениями.

Предлагаемые рекомендации могут послужить основой для внесения поправок в национальные правила, касающиеся международного планирования действий в чрезвычайных ситуациях при авариях на хвостохранилищах. Международная система предупреждения и оповещения для реки Кура может рассматриваться для Армении и Грузии как весьма полезная инициатива.

► Результаты

Основными результатами проекта являются:

a) Обученные национальные тренеры, которые могут передавать полученные знания другим сотрудникам горнодобывающей отрасли в Армении, Грузии и в других странах ЕЭК ООН.

b) Тестирование методологии по безопасности хвостохранилищ в Армении и Грузии, и полученые знания об эффективных процедурах проверки на основе контрольного списка для хвостохранилищ.

c) Усовершенствование методологии по безопасности хвостохранилищ на основе рекомендаций участников тренинга.

d) Инвентаризация хвостохранилищ и индивидуальные расчеты индекса опасности хвостохранилищ (THI) с сопоставительным анализом для стран-участников тренинга; картирование хвостохранилищ.

e) Дальнейшее устойчивое использование методологии по безопасности хвостохранилищ в других странах ЕЭК ООН (последующие проекты в Казахстане и Румынии).

f) Тестирование методологии хвостохранилища на заброшенном хвостохранилище и внесение изменений в соответствующий контрольный список.

g) Сводный анализ законодательной и административной ситуации в Грузии по вопросам хвостохранилищ и рекомендации по его дальнейшему улучшению.

h) Повышение потенциала на национальном уровне, повышение готовности к чрезвычайным ситуациям и трансграничного сотрудничества между Арменией и Грузией.

i) Поправки/рекомендации к контрольному списку ЕЭК ООН для планирования действий в чрезвычайных ситуациях.

Результаты данного проекта продемонстрировали важность поиска устойчивого пути к решению проблем, связанных с хвостохранилищами, и растущие потребности для решения этих проблем на практическом и законодательном уровнях. Первые шаги важны. Методология содействует этому и показывает, как можно постепенно повысить уровень безопасности хвостохранилищ.

Данный отчет включает подробности всех мероприятий, проведенных в рамках проекта и итоги / результаты, которые продемонстрировали важность поиска устойчивого пути к решению проблем, связанных с хвостохранилищами, и растущие потребности для решения этих проблем на практическом и законодательном уровнях.

1 Introduction

The failure of tailings management facilities is an enormous problem all over the world and regularly leads to major catastrophes.

Armenia and Georgia, with financial support of the German Environmental Agency, had the opportunity to strengthen the national capacities of competent authorities and mining enterprises by gaining additional knowledge to safety aspects of TMFs within the framework of the project on "Assistance in safety improvement of tailings management facilities (TMF) in Armenia and Georgia".

The project goal was to strengthen national capacities of competent authorities and mining companies in Caucasus, to improve the management of disasters and transboundary impact caused by accidents at TMFs. The main objective was to sustainably anchor the TMF methodology successfully developed by the UBA under previous pilot projects, in especially in the Ukraine, for further use in other UNECE countries. As part of the methodology the Tailings Hazard Index (THI) enables prioritizing a large number of TMFs nation- and UNECE-wide for detailed assessment under limited financial/personnel resources. THI allows also drawing up TMF inventories; the respective mapping allows an easy overview to high risk sites in whole UNECE region.

The successful experience of the application of the TMF methodology in Caucasus allowed improving the TMF methodology and making it as a more effective working tool for quick and efficient inspection.

The general information on the project is summarized below in Table 1.

Table 1: General information on project

Project title	Assistance in safety improvement of tailings management facilities (TMF) in Armenia and Georgia
Beneficiary	▪ Ministry of Emergency Situations of Armenia ▪ Ministry of Environment of Armenia ▪ Ministry of Territorial administration and infrastructure of Armenia ▪ Ministry of Environment Protection and Agriculture of Georgia ▪ Emergency Management Agency of the Ministry of Internal Affairs of Georgia ▪ Mining companies in Armenia and Georgia.
Duration	December 2017 - March 2020
Thematic area	Assistance to improving of the safety of tailings management facilities (TMFs) in Caucasus and in other UNECE countries
Main objectives	▪ Analysis of legislative and administrative situation in Georgia and Armenia; ▪ Training of trainers in Armenia for the mining sector specialists/responsible bodies from the different UNECE countries; ▪ Inventory and mapping of TMFs in the UNECE countries participating in the training-of-trainers held in Armenia with comparative analysis; ▪ Transfer of the knowledge acquired by trained Armenian and Georgian trainers to the representatives of competent authorities responsible for the local control of TMF safety; ▪ Revision/review of the TMF methodology taking into account the possibility of implementing similar training courses in the other countries of the UNECE region; ▪ Field training exercise in the basin of the transboundary Debed river (with the emphasis/focus on possible transboundary TMF-caused emergences) with the application/ testing of the UNECE Checklist for Contingency planning; ▪ Keeping a permanent contact and discussions with the UNECE Joint Expert Group of (JEG) and project advisory board members allowed providing the professional

	guidance and assessment of the activities throughout the whole project period based on the international experience.
Obtained results	▪ Trained national trainers who can transfer their gained knowledge to other personnel working in the mining sector in Armenia, Georgia and other UNECE countries. ▪ Tested TMF-methodology in Armenia and Georgia and gained knowledge on efficient inspection procedures based on the TMF checklist. ▪ Improved TMF methodology based on recommendations of training participants. ▪ TMF inventories and individual THI-Calculations for the countries participating in the training with comparative analysis; TMFs mapping. ▪ Further sustainable use of the TMF methodology in other UNECE countries (follow-up projects in Kazakhstan and Romania). ▪ Tested TMF-methodology at abandoned TMFs and respective amendments carried out. ▪ Integrated analysis of the legislative and administrative situation in Georgia on the TMF sector and recommendations for its future improvement. ▪ Improved national capacities; enhanced emergency preparedness and cross-border cooperation between Armenia and Georgia. ▪ Amendments/recommendations to the UNECE Checklist for Contingency Planning.
Key Project participants	► German Environment Agency (UBA; Project coordinator): ▪ Mr. Gerhard Winkelmann-Oei ▪ Ms. Dr. Sonja Otto ► "Eco Peace" NGO, Armenia ▪ Kristine Sahakyan ► RDFG NGO, Georgia ▪ Vano Grigolashvili ► International experts: ▪ Mr. Walter Reinhard (Germany) ▪ Mr. Adam Kovacs (ICPDR-Secretariat) ▪ Mr. Ferenc Madai (Hungry) ▪ Mr. Pavel Danihelka (Czech Republic) ▪ Mr. Zoltán Török (Romania) ▪ Ms. Claudia Kamke (UNECE TEIA Secretariat) ▪ Mr. Dušan Kostić (Republic of Serbia) ▪ Ms. Galyna Kovalchuk (Ukraine) ▪ Mr. Medetbek Omurbekov (Kyrgyz Republic) ▪ Ms. Tamara Abashkina (Russian Federation) ▪ Ms. Lubov Hertman (Belarus) ▪ Ms. Amanda Watts (Germany) ► National experts: representatives of the Ministry of Emergency Situations of Armenia, Ministry of Environment of Armenia, Ministry of Environment Protection and Agriculture of Georgia, Emergency Management Agency of the Ministry of Internal Affairs of Georgia, specialist from the mining sector companies of Armenia and Georgia. ► Ukrainian Project team: ▪ Mr. Dmitry Rudakov - head of the Ukrainian trainer team ▪ Mr. Dmitry Pikarenia - the second trainer ▪ Ms. Oleksandra Lohunova - the trainer team assistant

2 Project geographical context

The project implementation areas include Armenia and Georgia, in particular:

- The Khrami-Debed river basin, which includes Debed and Khrami basins in Armenia and Georgia respectively;
- Kvirila river basin in Imereti region of Georgia, which flows through the manganese mining city of Chiatura.

► Khrami-Debed River basin

The Debed River Basin is shared by Armenia (upstream) and Georgia (downstream), forming the Khrami-Debed River basin in the areas of the two countries.

The Khrami-Debed river basin covers the Lori region (marz) of Armenia, entirely, and the north-eastern part of the Tavoush marz, the Debed river basins and its tributaries, the Dzoraget, Pambak and Martsiget. In Georgia it covers the south-eastern part of the country, the Kvemo-Kartli administrative district, the Ktsiya-Khrami river basin and its tributaries: the Mashavera, Shulaverchay, Karbulakh, Korsuchay and Aslanka. The Bolnisi, Dmanisi, Tetritskaro and Tsalka districts entirely and Marneuli district partly are included in the basin of the Khrami river (see Figure 1.Khrami-Debed river basin).The total area of the Khrami-Debed watershed is 8340 sq. km. The area of the basin in Armenia is 3790 sq. km. where the relief is mountainous. The area of the basin in Georgia is 4550 sq. km., and the relief is complex, with valleys cut by numerous tributaries.

The major river in Armenia is the Debed, the total length of which is 178 km (the total catchment area is 4080 sq. km). The major river of the basin in Georgia is the Ktsia-Khrami (Khrami) river. The Khrami River is 201 km long and has a catchment area of 8340 sq. km. The Debed and Ktsia-Khrami rivers and their tributaries are used for household, irrigation, energy and industrial purposes. The potable water of the cities of Rustavi and Gardabani is supplied from the Khrami River.

During the USSR era this area had highly developed industry and agriculture. The Vanadzor chemical plant, Akhtala ore mining and processing enterprise, Alaverdi copper molybdenum enterprise, Toumanyan plant of fire-resistant materials, Spitak sugar-refinery, Ayrum and Bolnis tinned food factory, Bolnis and Dmanis dairy factories, Bolnis Poultry farm and wine distillery, Kazreti copper import industrial complex, Marneul leather processing and construction materials factory, Shulaver wool factory as well as leather and wool industries, dairy and meat industries and other enterprises were operating in the area.

After the USSR collapse almost all industries became non-operational, which reduced the pollution of water resources. At present a few mining industries are operating in the area, namely, “Teghut” CJSC, Alaverdi Copper Smelting Combine, “Akhtala ore-dressing combine” CJSC, “RMG Copper” JSC and “RMG Gold” Ltd. companies; these enterprises have a number of TMFs.

In recent years, water pollution caused by ore processing and enrichment industry could have been reduced. However, the hazards coming from tailings facilities remain a challenge, since there are both operating and inactive tailings. Enhancing national capacities and transboundary cooperation of competent authorities and industry in Armenia and Georgia becomes of utmost importance to enhance disaster resilience and emergency preparedness.

► Kvirila river basin

Kvirila is the left tributary of the Rioni River. The river emerges on the southern slopes of the Main Caucasian Range (South Ossetia) in the Rachin Ridge. The greater part of the river is located in the territory of Georgia and flows near the city of Kutaisi. The length of the river is 140 km; the catchment area is 3630 km^2.

The 100 years old Chiatura manganese ore deposit is located in the basin of the river, which results in river pollution with manganese ions.

The industrial city of Chiatura is located 220 km away from the capital Tbilisi, in the valley of the Kvirila river. Six manganese mines are the key attraction of Chiatura; they are situated throughout the neighbourhood of the city.

In the zone around Chiatura, the tailings of enrichment of manganese ores create a specific hillocky-hilly relief. The Kvirila river retains its specific grayish-black colour for many kilometres due to the high content of manganese. Though the Kvirila river is massively polluted by the mine waste waters from manganese ore production, the extent to which TMF leaks are responsible for this should be ascertained.

3 Activities performed to achieve project outputs

3.1 Kick-off meeting

The project kick-off meeting took place in December 2017, and was attended by a representative of the funding party, Georgian and Ukrainian experts, experts from different Ministries of Armenia (Ministry of Emergency Situations, Ministry of Environment, Ministry of Energy infrastructures and natural resources), as well as the representatives from mining sector enterprises. The meeting was interesting and fruitful, providing an atmosphere of mutual understanding and effective cooperation between all parties involved.

Figure 1: Project kick-off meeting in Armenia, 12-13.12.2017

Source: ["Eco Peace" NGO]

The meeting allowed all participants:

- to clarify the project essence and tasks;
- to establish direct communication among the project participants;

- to familiarize the participants with the safety of tailings in the context of global experience and European standards;
- to get necessary arrangements on further cooperation within the project.

It promoted enhancing the effectiveness of the further actions under the project.

The agenda, list of participants and the presentations of participants are available on the "Eco Peace" NGO web site (http://ecopeace.am/project_kick-off/).

The participants emphasized that the project could create a sustainable platform for the further activities in TMF safety field and assessed the project implementation as important both for Armenia and other UNECE countries.

The information on the activities planned under the project and on the kick-off meeting were disseminated through social media and published in the RA MES 911 newspaper.

A brief report on the project activities was submitted also to the Armenian and Georgian national focal-points of the UNECE Convention on the Transboundary Effects of Industrial Accidents".

After the kick-off meeting, as a part of preliminary preparatory works in the framework of the project, "Eco Peace" NGO officially applied to the Ministry of Emergency Situations on 19.01.2017 with the purpose of forming a professional group of experts, the members of which would be involved in the following activities under the project:

- Analysis of technical regulations relating to TMFs and basic laws and standards in force in the RA, comparing with the standards set by the UN ECE, and elaborating relevant recommendations if necessary.
- Support in the development of appropriate emergency scenario(s) in an industrial enterprise, the main purposes of which are: a) to check the effectiveness of the information delivery chain in case of emergency situations with transboundary impacts, that will be tested in the form of training exercise; b) application and testing of the UNECE Checklist for Contingency planning.
- Assessment of the possibility for the Republic of Armenia to use the TMFs assessment methodology developed by previously pilot project funded by German Environment Agency, revising and adaptation of the methodology based on the RA conditions and requirements applied in this field.

According to the official letter (N7/17.4/948-18, issued on 30.01.2018) by the Ministry of Emergency Situations of the RA, the RA MES expert group consisted of the following main specialists:

- Head of Regulations Development and Training Methods Department of RA MES "National Centre for Technical Safety" SNCO;
- Head of Civil Protection and Disaster Management Department of RA MES Rescue service;
- Chief of Man-made Emergency Division of RA MES Rescue service.

3.2 Analysis of the legislative and administrative situation (Working Package 1)

3.2.1 Analysis of the legislative and administrative situation in Georgia (WP 1.1)

The legislative project component in Georgia was implemented by RDFG in close cooperation with the relevant Ministries. RDFG, with an expert on legislation, prepared the consolidated report on "Analysis of existing legislation related to management of TMFs in Georgia" with recommendations of the necessary actions for normative regulation of the sector. This activity included also analysis of Georgian legislation compliance with the requirements of Directive 2006/21/EC on the management of wastes from extractive industries.

During the preparation of the document regarding the Georgian legislation analysis and recommendations, several activities were conducted during different stages of the project, in particular:

- Information was gathered on public legislation documents (laws, normative acts, provisions, etc.), other publications, and from governmental bodies, from whom RDFG requested information. During this activity, RDFG sent many request letters to relevant organizations, agencies, and companies.
- More than 35 legislative acts, as well as various data received from government bodies were reviewed and discussed within the activity on legislative analysis in Georgia in order to find information about the existing legislation related to TMF regulations. The analysis showed the weakness of Georgian legislation regarding the management and safety of the TMFs. Gaps in legislation were identified and specific recommendations provided.
- The team reviewed national legislation of Georgia that included provisions on environmental protection, civil (public) safety and crisis management, building codes and other relevant subjects. The legislative expert consultant also studied international laws, including the Convention on the Transboundary Effects of Industrial Accidents (not signed by Georgia), EU Association Agreement and directives 2006/21/EC, 2004/35/EC, 96/82/EC, etc.
- RDFG's legislative expert held consultative meetings with representatives of the Emergency Management Agency, Environmental Supervision Department and Waste and chemicals management services under the Ministry of Environment Protection and Agriculture of Georgia.

RDFG took steps to implement the legislative recommendations prepared within the framework of WP1.1. Based on meetings held in Georgia, RDFG began building a network of supporters and establishing the necessary contacts to review and implement the recommendations for Georgia developed by legislative experts. RDFG met with various government representatives to brief them on the project and share the legislative analysis and recommendations.

RDFG organized three consultation meetings with governmental bodies and other stakeholders in Tbilisi, Georgia. RDFG provided in advance the document on "Analysis of existing legislation related to management of TMFs in Georgia with relevant recommendations".

The purpose of the meetings were presentation of the goals and objectives of the project on "Assistance in safety improvement of tailings management facilities (TMF) in Armenia and Georgia", presentation and discussion of the developed document under this working package and providing recommendations and suggestions.

Figure 2: Consultation meetings in Georgia (Tbilisi)

Source: [RDFG]

Representatives of different government bodies and organizations were invited, working on harmonizing mining laws & regulations answering the environmental requirements determined under the EU Association Agreement. The consultation meetings were attended by the representatives of the Ministry of Environment Protection and Agriculture, the Ministry of Economy and Sustainable Development and Emergency Management Agency, as well as the representatives of the U.S. Forest Service and EU Waste Management Project (EU Technical Assistance for the Improvement of Waste Management Systems in Georgia).

Important topics discussed included the issue of implementing Directive 2006/21, problems related to the absence of TMF terminology in Georgian legislation and the issue of supervision of TMFs at the government level.

In addition to the recommendations made for Georgia, recommendations were also made for the countries of the former USSR. There are general regulations in the document as a recommendation for the former USSR countries. This document was presented and distributed among representatives of other countries of the former USSR, who participated in the project Advisory Board different meetings

(in total 4 AB meetings during the whole project activities). The document was also reviewed and commented by the Armenian party and the Ukrainian expert of the project Advisory Board.

The developed documents on "Analysis of existing legislation related to Tailing Management Facilities (MTFs) in Georgia with relevant recommendations" and "Recommendations for regulations of the national legislation of the former USSR countries on tailings management and safety measures" are available in the **Annex A.1** and **Annex A.2** of this report.

The final versions of both documents reflect all feedbacks, comments and remarks of the various experts.

Those documents were shared with the Environmental Protection and Natural Resources Committee of Georgian Parliament, Ministry of Environmental Protection and Agriculture of Georgia, LEPL National Agency of Mines, LEPL National Environmental Agency, Emergency Management Agency, Ministry of Internal Affairs of Georgia and all of the participants that were invited to the meetings within the framework of the project.

To ensure a coordinated approach, the project team collected information on similar projects/activities implemented in Georgia at the start of the project, as well as participated in a coordination meeting hosted by LEPL National Agency of Mines, where representatives of each project shared information on their work, identified areas of overlap and urgent decision points, and laid the groundwork for solid coordination going forward.

As a result of this activity the proposed recommendations for Georgia developed under this working package were taken into account during the development of the "Draft Law of Georgia on the Management of Waste from [Mineral Resources] Extractive Industries" (EU Waste Management project).

At present, the draft version of the law is under discussion by the relevant bodies of the government of Georgia.

The main results under the activities of this working package (WP 1.1) are:

1. *Development of the document on "Analysis of existing legislation related to Tailing Management Facilities (MTFs) in Georgia with relevant recommendations" in close cooperation with government bodies.*
2. *Consideration of the proposed recommendations in the development of the "Draft Law of Georgia on the Management of Extractive Industries [Mineral Resources] Wastes", which is currently being discussed by the relevant bodies of the Government of Georgia.*
3. *Development of the document on "Recommendations for regulations of the national legislation of the former USSR countries on tailings management and safety measures", which will be useful for the former USSR countries in case of implementation of the Directive 2006/21/EC of the European Parliament and of the Council.*

3.2.2 Analysis of the legislative and administrative situation in Armenia (WP 1.2)

With the framework of the project, the activities in this sector were focused on the implementation of works related to the legal field in mining industry, particularly TMFs in Armenia.

During discussions of the Armenian project team with the relevant experts from the RA Ministry of Emergency Situations, the importance of the advanced practices in the field of operation and safety of TMFs, in particular the recommendations of the UNECE and their applicability for Armenia was highlighted.

In this regard, experts of the Ministry proposed to make comparison between the following two documents and, if necessary, to provide proposals on the revision and improvement of the manual:

a. Manual on "Safe Management of the TMFs in the Territory of the Republic of Armenia" developed jointly by the RA Ministries of Nature Protection and Emergency Situations (2012);
b. UNECE "Safety guidelines and good practices for Tailings Management Facilities" (2014);

The project team implemented the following activities:

- Determination of the scope of legal documents subject to study relating to international treaties, agreements, conventions signed and ratified by Armenia, UNECE materials and manuals, existing legal acts of Armenia, technical regulations, construction norms and rules, including international, regional (interstate) norms and other technical and standardization documents.
- Detailed outlining the work structure in this direction.
- Studying the relevant legislative documents, based on which it updated the manual on “Safe Management of TMFs in the Territory of the Republic of Armenia” developed jointly by the Ministry of Nature Protection and the Ministry of Emergency Situations of the Republic of Armenia still in 2012.

During the project activities the "Manual on Safe Management of the TMFs in the Territory of the Republic of Armenia" was fully revised and re-edited. The development was based on the approaches in the UNECE "Safety guidelines and good practices for Tailings Management Facilities" as well as the legislative framework reforms in the Republic of Armenia over the past 10 years. As a result, a number of mining sector laws (laws, sub-legislative acts, government decisions, etc.) were repealed. At the same time, conditioned by the fact that the Republic of Armenia is bound by international conventions, agreements, treaties (Eurasian Economic Union) approximations additions and addenda were made in a number of laws, codes and other legal acts. Based on the entirely new edition of the Code on Subsoil of Armenia, and related to it, only in 2017 more than ten new sub-legislative acts, government decisions were adopted related to environmental protection, subsoil sector, waste sector, emergencies resulting from man-made and natural disasters. Besides, other normative technical documents, standards (European, international, regional and national) were adopted.

Based on the results of the study of legal documents and technical documents, the safety requirements and operating rules for TMFs in accordance with each item of this manual were elaborated in maximum possible details, renaming the manual as "Safety Requirements and Operation Rules for TMFs". A number of structural changes were also introduced in the structure of the manual.

The developed document was reviewed by the emergency and environmental experts of the project, as well as was sent to all relevant ministries (Ministry of Emergency Situations, Ministry of Nature Protection, Ministry of Energy infrastructures and natural resources) for the purpose of making appropriate recommendations, comments or amendments.

After final revision of the structural changes made therein and the finalized version was also discussed / agreed at a roundtable meeting with all stakeholders to get relevant suggestions and comments. The meeting was attended by the representatives from Ministry of Emergency Situations, Ministry of

Nature Protection, Ministry of Energy infrastructures and natural resources, as well as Ministry of Territorial Administration and Development of the RA.

During the discussion of the prepared document, all interested parties proposed, as a minimum requirement, printing of this manual and distribution among the interested parties, since it would be useful to them in the course of their daily work.

Figure 3: Round table with stakeholders in Armenia, 26.07.2018

Source: [“Eco Peace” NGO]

Official letters were received from all relevant ministries with positive opinions on the developed document.

In the official letter issued by the Ministry of Emergency Situations (N 7/17.4 / 12540-18, 18.10.2018) it was also mentioned that the developed document would be provided to the relevant subdivisions by the MES for the purpose of applying it during the inspection of TMFs safety requirements.

The content of the manual on "Safety Requirements and Exemplary Operation Rules for TMFs in the Territory of the Republic of Armenia" is presented below.

- Terms and definitions;
- Introduction;
- General provisions;
- Classification of TMFs and tailings;
- Equipping the TMFs with means of communication, signalling, lighting and power supply systems;
- Hydro transport system of pulp;
- Requirements for TMFs and documents required for operation;
- Safety requirements for TMF dams and embankments;
- Safety requirements for TMF’s water intake and spillway structures;
- Original monitoring of the TMF condition;
- Requirements for the introduction and safety of circulating water supply systems;
- Insurance of TMFs in terms of environmental and health issues;
- Classification of accidents at TMFs;
- Transboundary impact of TMFs;
- Conservation and reclamation of TMFs;

- Emergency action planning.

The "Manual on Safety Requirements and Exemplary Operation Rules for TMFs in the Territory of the Republic of Armenia" is available in Armenian language and presented in **Annex A.3** of this report, where the list of the studied legal documents of Armenia is provided also in English.

The main results under the activities of this working package (WP 1.2) are:

1. *Development of manual on "Safety Requirements and Exemplary Operation Rules for TMFs in the Territory of the Republic of Armenia" ant its using by the MES regional subdivisions for the purpose of the inspection of TMFs safety requirements.*

3.3 Compiling country-specific policy recommendations for Armenia and Georgia (Working Package 2)

3.3.1 Compiling country-specific policy recommendations for Armenia

3.3.1.1 Preparatory stage

One of the key actions of the project was conduction of field exercises in the territory of the active TMF of the Akhtala ore-dressing combine, located in the Debed river basin in order to improve cross-border cooperation between Armenia and Georgia.

The river Debed flows through the territory of the Lori region of Armenia, and forms the Khrami-Debed transboundary basin on the territory of Georgia along with the river Khrami.

The main goals of the exercise were:

c. Improvement of the level of Armenia-Georgia cooperation in the transboundary context in increasing the efficiency of information provision in case of possible transboundary emergency situations.
d. The application and testing of the UNECE Checklist for Contingency planning and providing recommendations for the well-functioning Armenian-Georgian alert system in case of possible transboundary emergency situations by TMF accidents.

Organization of the training exercise was planned with the development of an emergency scenario with corresponding cross-border impact. During this activity the UNECE Checklist for contingency planning also was planned to test.

For this purpose, official correspondence was held and meetings were organized with the management staff of two mining companies located in the Lori region of Armenia ("Teghut" CJSC and "Akhtala ore-dressing Combine" CJSC). The purpose of the main correspondences and meetings with the mining companies was to clarify the possibilities of providing the transboundary training exercise under the project in the active TMF territory. As during this works implementation period the "Teghout" CJSC temporary was in a non-operational state, all efforts were directed to "Akhtala ore-dressing Combine" CJSC.

Figure 4: Discussion of the issues with the beneficiaries (Akhtala, Armenia)

Source: ["Eco Peace" NGO]

As a project support partner, the RA Ministry of Emergency Situations was actively involved in the whole process of discussions on organizing the field training, and throughout the whole negotiation process. It means that the issues of organizing the field training exercise and training of trainers in Armenia was regulated at the governmental level.

Experts from the RA Ministry of Emergency Situations (including experts from the Lori regional Department of the MES), management staff, emergency and environmental specialists of the mining companies and Armenian project team participated in the discussions.

Figure 5: Site visits to the area of the Nahatak TMF (Akhtala, Armenia)

Source: [“Eco Peace” NGO]

Specialists of the RA Ministry of Emergency Situations conducted a visit to the area of the TMF, to study the site's possibilities for holding the training exercise on site and to discuss some nuances and details related to the field exercise. Within the framework of the field visit the involvement of technical equipment during the training, as well as possible places of their deployment in the TMF area were also considered.

The following preparatory actions were carried out:

- final agreement with the “Akhtala ore-dressing combine” CJSC management;
- development and selection of appropriate scenario(s), agreement with all stakeholders and interested parties and approval;

- Determination of units, state and non-governmental structures to engage them in field exercises, inform them and identify their specific functions and actions during the event;
- Application of the UNECE checklist for contingency planning, by the specialist from the Ministry of Emergency Situations of Armenia before holding the practical exercises;
- Conducting a round table with the participation of all stakeholders the day before the exercise, with a site visit to the territory of the TMF

3.3.1.2 Conducting the field training exercise in the territory of the active TMF in Armenia

The field training exercise was conducted on 4 July 2018.

Residents of the TMF affected area were informed in advance of all the details of the training exercise, for which loudspeakers were used during the community visits. One day before the event a round table (03.07.2018) was organized in Lori region of Armenia, with the participation of all the participants of the event to discuss the final issues related to the field training exercise.

Figure 6: Round table with the field exercise stakeholders, 03.07.2018 (Akhtala, Armenia)

Source: [“Eco Peace” NGO]

According to the scenario: a strong earthquake was registered in the Lori region after several days of heavy rains, as a result of which the “Nahatak” dam of the “Akhtala Ore-dressing Combine” CJSC’s TMF was damaged. There is a danger of collapse of the TMF dam, the matter in the tailing dam will flow into the Debed river basin, which can also lead to transboundary effect. Information about this should be sent to the authorities of the relevant affected country, i.e. neighbouring Georgia.

More than 35 participants were involved in the training exercise, in particular from:

- Employees of different departments of Rescue Service under MES RA, including the Lori Regional Unit, in the person of Regional Rescue Department’s Operative Group and Lori regional Firefighting Squad;
- Corresponding Departments of Lori Administrative center, who perform medical, environmental and urban development functions in case of similar major disasters;
- Police Department;
- “Akhtala ore-dressing combine” CJSC with appropriate personnel and necessary engineering techniques.

Within a short period of time notification through the following information transfer chain took place: “Akhtala ore-dressing combine” CJSC - Lori regional department of the MES - Crisis Management National Centre of Armenia - Crisis Management National Centre of Georgia“.

Measures for bringing the population protection system to the preparedness state were implemented.

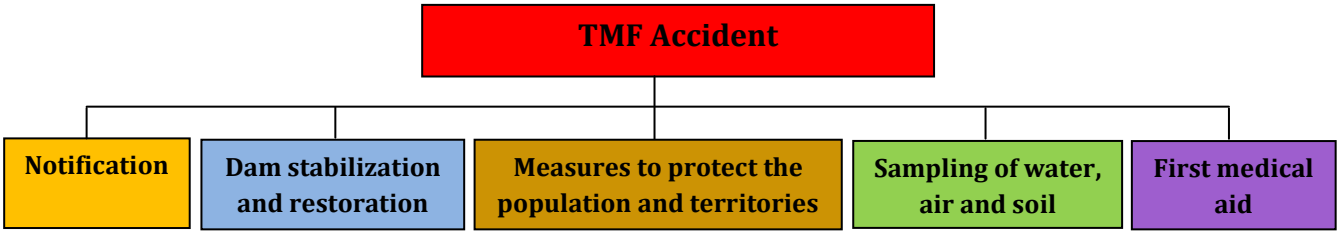
The management of the ore-dressing combine undertook the TMF stabilization and rehabilitation works by using appropriate engineering techniques.

Rescuers involved in the exercise carried out measures for the protection of population and areas, i.e. exploration, preventive measures and organization of accident-recovery activities.

Lori Administrative centre's Environmental Department staff conducted water, air and soil sampling activities to determine the degree of contamination of the affected area.

Lori Administrative centre's Healthcare department's employees were providing medical assistance to the combine's employee, who had noticed the outflow of the slug from the dam and after that his general condition sharply worsened.

Figure 7: Structure of the main actions during the field training exercise



At the end of the field exercise all participants summed up the results of the event at a round table, during which they exchanged ideas and opinions. Assessments on the effectiveness of exercises and activities carried out within it were done, deficiencies were mentioned, recommendations were made, to further increase the effectiveness of such events.

The following suggestions were made by the participants, which were reflected in the report prepared by the specialists from the Ministry of Emergency Situation involved in the field exercise, which was submitted to the relevant departments of the MES RA.

- Together with the relevant units of the affected country, develop plans for possible transboundary emergencies, including the principle of participation of the initial reaction forces in the alarm plan.
- Test the feasibility of the developed plans, conduct joint field and staff exercises with the initial reaction forces of the two countries.
- Development of standard forms of notification, agreeing them with the neighbouring Georgia and their further using for the notification of the affected country concerned.
- Plan Armenian-Georgian joint field exercises and staff training with the purpose of strengthening bilateral relations and increasing the level of mutual aid.
- For more efficient planning in the future, in the MES (in particular, in the Rescue Service), provide the availability of design documentation on hazardous production facilities at the catchment level, that can be integrated into the safety passport of hazardous production facilities as an annex.

All participating parties assessed the exercise as effective and positive.

The importance of such events was emphasized in the context of strengthening of disaster response capacity and transboundary cooperation. The importance of regular training exercises was highlighted as such events support and allow for the formation of an effective atmosphere of complimentarily between governing bodies, private and public sectors.

Figure 8: Field training exercise in the territory of the active TMF, 04.07.2018 (Akhtala, Armenia)

Source: ["Eco Peace" NGO]

Based on the need of checking and raising the efficiency of the ways of mutual notification on the emergency situations of transboundary impact nature in Armenia-Georgia format, and due to some changes in government structure of Georgia, an additional testing of the connection between Armenia and Georgia was conducted on September 11, 2019.

The test information was sent from the Crisis Management National Center (911 Center) under the Ministry of Emergencies of the Republic of Armenia to the Emergency Management Agency of Georgia

under the Ministry of Internal Affairs, having previously agreed with all details with the relevant responsible persons (see Table 1) from Georgia.

Testing information was provided by official e-mails of two countries.

Table 1: Contacts of responsible persons in Armenia and Georgia responsible for the testing

Name	Position	Organization	Contact Information	Official correspondence
Arsen Mkrtchyan	Deputy head of Crisis Management National Center of the Rescue Service	Ministry of Emergency Situations of Armenia	+374 93 48 32 94 arsen.mkrtchyan@mes.am	Address: 109/8 A. Mikoyan str., 0054 Yerevan, Armenia arsen.mkrtchyan@mes.am
Levan Gelashvili	Head of Planning and Preparedness Division Civil Protection Department	Ministry of Internal Affairs - Emergency Management Agency of Georgia	+995 577 415005 lgelashvili@es.gov.ge	Address: 7 Ingorokva St., Tbilisi 0114, Georgia cepgeorgia@mia.gov.ge
Mr. Shalva Kvinikhidze	Head of International Relations Division	Ministry of Internal Affairs - Emergency Management Agency of Georgia	+995 577414470 skvinikhidze@es.gov.ge	

3.3.1.3 Testing of the UNECE checklist for Contingency Planning and respective amendments for it further improvement

The project team implemented testing of the UNECE Checklist for Contingency Planning in case of emergencies with transboundary impacts and made recommendations on its further improvement / revision.

The UNECE Checklist was filled up by the corresponding specialists of MES RA in advance, before the practical exercises. This allowed to define respective reporting steps and the efficiency of the UNECE checklist for Contingency Planning, and to propose appropriate adjustments and changes.

The proposed recommendations are available in **Annex B.1** of this report and can serve a basis for the amendment of the national regulations regarding international contingency planning in case of TMF accidents. Here the previously proposed international warning and alarm system for Kura can serve an additional approach.

Details of proposals for further improvement of UNECE Checklist for contingency planning were presented during the 18th meeting of the Joint AD HOC Expert Group on water and industrial accidents, which took place in September 2018 in Armenia (7 September, Tsakhadzor), as well as in November 2019 in Hungary (4-5 November, Budapest) during UNECE "Seminar on accidental transboundary water pollution prevention - contingency planning, early warning, mitigation".

The main results under the activities of this working package (WP 2.1) are:

1. *Improved national capacities, enhanced emergency preparedness and cross-border cooperation between Armenia and Georgia;*
2. *The amendments/recommendations to the UNECE Checklist for Contingency Planning.*

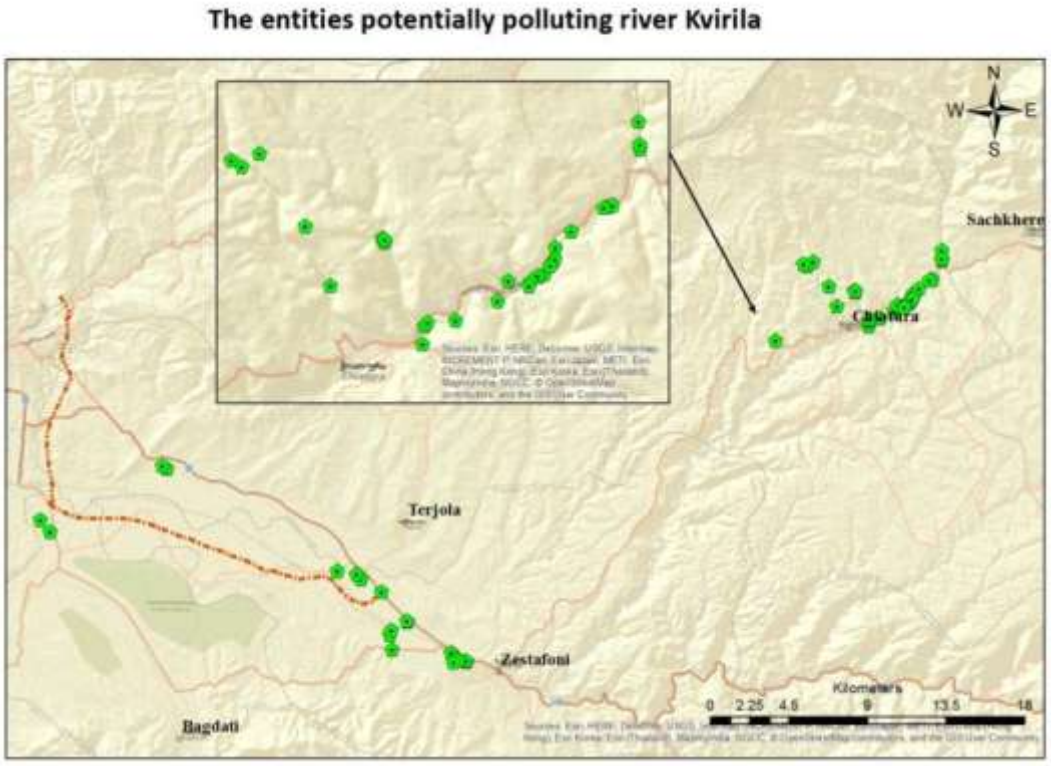
3.3.2 Compiling country-specific recommendations for Georgia

RDFG worked with project experts to prepare the document on "Analysis of Water Quality and Pollution of River Kvirila Related to Mineral Extraction in Imereti Region, the Chiatura Municipality."

An initial list of potentially polluting entities was compiled based on the environmental impact assessments submitted by the enterprises and permission documents from 2015-2017, for enterprises geographically located in the basin of the river Kvirila

RDFG also requested additional information from the Ministry of Environment Protection and Agriculture of Georgia. Requests were made to the list of companies holding environmental impact permits for the River Kvirila basin (active permissions, in line with the new and old legislation, for the River Kvirila basin on the territories of Sachkhere, Chiatura, Zestaponi and Terjola municipalities), as well as the results of water quality monitoring in 2017 in the basin of River Kvirila. The RDFG team collected more information based on the replies received from counterpart ministries and agencies. Based on the received information, the list of potentially polluting enterprises and map were updated.

Figure 9: The entities potentially polluting river Kvirila



Information from other sources was also considered, including information on the background conditions of the river (river water composition, level of pollution, pollution types) from the LEPL National Environment Agency of the Ministry of Environment Protection and Agriculture of Georgia, and information on the river's monitoring system. Also, statistical data on incidents on the Kvirila River registered by the Emergency Management Agency were collected, along with emergency plans for these territories/enterprises as available.

During the process of preparing the document, the project mining expert worked to synthesize information from different materials received from governmental bodies and other institutes or enterprises.

To describe the real situation regarding industrial zones, the expert evaluated Environmental Impact Assessment reports of manganese ore processing enterprises with an environmental operating permit. She also evaluated and compared the EIA reports of permit documents.

The final document on "Analysis of Water Quality and Pollution of River Kvirila Related to Mineral Extraction in Imereti Region, the Chiatura Municipality" (see **Annex B.2**) discusses the following issues:

- General Geographic Characteristics of Georgia;
- Overview of water resources of Georgia;
- General characteristics of the Chiatura Municipality, as a study region;
- Hydrological characteristics of the river Kvirila;
- Pollution of Kvirila river water and its Tributaries;
- Analysis of the causes of surface water pollution;
- Chiatura manganese deposits and manganese processing facilities - causes of natural and social problems;
- Ways of solving the natural and social environmental problems caused by mining-processing activities of mineral deposits.

RDFG presented the document on the pollution of the Kvirila river during the meeting with the first deputy chairperson of the environmental protection and natural resources committee of the Parliament of Georgia. In addition to the discussion of this document, they discussed also the results and recommendations of the legislative analysis related to the TMF management in Georgia.

The developed document on "Analysis of Water Quality and Pollution of River Kvirila Related to Mineral Extraction in Imereti Region, the Chiatura Municipality" was shared with the Environmental Protection and Natural Resources Committee of Georgian Parliament, Ministry of Environmental Protection and Agriculture of Georgia, LEPL National Agency of Mines, LEPL National Environmental Agency, Emergency Management Agency, Ministry of Internal Affairs of Georgia and with all participants invited to the meetings within the framework of the project.

It should be noted that although it will take time to effectively implement the proposed recommendations, they have been taken into account by state authorities.

According to the indicators of 2019, a positive dynamics in the quality of the Kvirilla river was recorded compared to the previous year. The results of the project, and the proposed recommendations, which are subject to gradual implementation, also have a share in the results obtained.

This was also noted during the final workshop of the project, by the chief specialist of the Monitoring Department of the Ministry of Environment and Agriculture of Georgia (LEPL National Agency for the Environment).

The main results under the activities of this working package are:

1. *Preparation of the report on "Analysis of Water Quality and Pollution of River Kvirila Related to Mineral Extraction in Imereti Region, the Chiatura Municipality" with recommendations for state authorities for solving the environmental problems caused by mining-processing activities in Chiatura.*

3.4 Preparatory actions for the trainings (Working Package 3)

3.4.1 TMF inventories

The data on the existing TMFs in Armenia and Georgia (with some technical parameters) were collected by the project team for the assessment of the tailings hazard in the project target countries.

The relevant data on 17 TMFs on the territory of Armenia were provided by the RA Ministry of Emergency Situations; these were the most recent data - as of 18.01.2018.

"Eco Peace" NGO team itself extracted the data on 6 TMFs from the World Bank Report on "Strategic assessment of the mining sector stability - Armenia", April 2016.

RDFG NGO requested the relevant data on the TMFs in Georgia from different sources, in particular:

- the information about tailings "Copper-pyrite tailing of the Madneuli"; "Barite tailing of the Madneuli" was provided by RMG LLC;
- the information about "Tailing of agglomerates" was provided by Georgian Manganese LLC;
- The information about tailings "Chiatura site 1 - Ghurgumela" and "Tkibuli 1 coal waste tailing site" was provided by the expert, and the source document was: OSCE Project "Inventory and Assessment of Hazardous Waste Hotspots in Armenia and Georgia (2016-2017)".

The collected data in Georgia were on five tailings owned and operated by three enterprises. There were difficulties in defining the actual number of the tailings in Georgia as the official definition of the term "tailing" in Georgia is absent and the terminology associated is not clearly defined. RDFG faced some difficulties during collecting information about them. RDFG NGO guided by the definition of the Convention on Transboundary Effects of Industrial Accidents and Directive 2006/21/EC.

The calculation results were presented separately for the project target countries (Armenia, Georgia,) to the Advisory Board (AB) and presented during the project AB first meeting.

After preliminary results of hazard assessment for Armenian and Georgian TMFs, the project team provided to Ukrainian expert team also maps of seismic hazard and flood risks for Armenia and Georgia, for using them for updating the hazard assessment results during the next steps of the project.

Beside the project target countries (Armenia, Georgia), the inventory of TMFs was completed for the countries participating in the training of trainers in Armenia: Belarus, Romania, Hungry, Serbia, Kyrgizstan, Kazakhstan. All the obtained and collected data were provided to Ukrainian experts.

Besides, the results of the TMF inventory, ranking tailings hazard with the basic Tailings Hazard Index (THI) and mapping for Ukraine in 2017 were integrated in this evaluation regarding the data availability. The most of data were provided by national experts; many of missing data were found in open sources.

It should be noted, that all collected data from different countries were periodically updated with received updated information from each country.

During this activitiy a synergism between other projects in this field was provided with assistance of the project team.

The project team created the database of about 770 TMFs of different hazard/risk. The database (in MS Excel) is provided in Annex C as a part of the report related to TMFs hazard evaluation results by countries and contains the following information on each object:

- Hazard ranking
- Name of the TMF site
- Industry scope
- Year of commissioning
- Location (region of location and address)
- Material stored
- Hazard class
- Capacity (Mil m^3)
- Geographic coordinates
- Value of Tailings Potential Hazard Index.

The table below shows the TMF data collected by countries.

Table 2: Results of TMF data collection for the countries

Country	Country code	Number of TMFs	Comments
Armenia	AM	23	Data provided by national experts
Belarus	BY	1	Data provided by national experts
Georgia	GE	5	Data provided by national experts
Hungary	HU	39	Provided by competent authorities within the ICPDR
Kyrgyzstan	KG	54	Data provided by competent authorities
Kazakhstan	KZ	121	Data provided by competent authorities
Romania	RO	152	Provided by competent authorities within the ICPDR
Serbia	RS	31[1]	Data provided by national experts
Ukraine	UA	344	Data were collected and evaluated within the UBA project in 2016-2017
Total		***770***	

Annex C of this report shows:

- Preliminary results of hazard assessment for Armenian and Georgian TMFs (with collected data on the existing TMFs and different geological processes' risk and natural hazard maps of Armenia and Georgia);
- TMFs hazard evaluation results by countries with overall data (in MS Excel) and TMF hazard analysis.

[1] Including those located in the DRB in Kosovo.

3.4.2 Mapping the TMFs

Within the framework of the project it was decided to create an interactive map of the locations of 770 TMFs. For creating the map, the following tasks were set that needed to be implemented:

- Visualization of TMFs with high THI index for different countries-participants;
- Mapping of the basic information for each TMF and for the whole country;
- Visual assessment of the proximity of the TMFs to the rivers and settlements;
- Making the maps easy and affordable to use.

To implement the tasks, several software products such as ArcGIS, Google Earth, Google Maps and Yandex Maps were analyzed.

By developing the map, the intention was to create an easy to use tool also for other people lacking specific knowledge on mapping and specific GIS software.

On the basis of the comparison the Google Maps service was selected as a main software.

The created map can be used offline and can was integrated to Google Map application as two maps available on the following links:

https://drive.google.com/open?id=1xEU5Iywy7AOATcpR1eGDZnshh7L3OBmg&usp=sharing

https://drive.google.com/open?id=1tojr5F2eVFFKd_djhQDzkLnThmF8drj0&usp=sharing

Only four parameters were initially used to create a TMF hazard map and to determine the location of TMFs:

1. The name of the TMF;
2. Region, city / district;
3. Latitude, longitude;
4. The volume of materials stored in TMF.

The created TMF hazard map additionally included the following information on each TMF: stored materials; tailing hazard class; status; maximum horizontal ground acceleration (if known); flood frequency (HQ-100, if known); dam material; dam crest width (if known); commissioning year; THI index.

On the left side of the map, there is a menu with two folders ("Hazard Map all countries" and "THI ranking, active and not active TMFs").

The "Hazard Map all countries" folder includes the maps for TMFs in Armenia, Georgia, Hungary, Kyrgyzstan, Kazakhstan, Romania, Ukraine and Serbia. Separate layers represent TMFs of each country for evaluation on the national level and all TMFs are sorted by name. TMFs for each country are displayed in particular colours.

The "THI ranking, inactive and active TMFs" folder includes five layers for the international level evaluation:

1. High level of hazard;
2. Medium level of hazard;
3. Low level of hazard;
4. Active TMFs;
5. Inactive TMFs.

Every layer has its own icon for easier identification.

The fixed thresholds for THI ranking were used to divide the total number of TMFs into 3 groups (layer 1-3) by their hazard level (high, medium and low level).

An example of the general view of the layers from "THI ranking, inactive and active TMFs" folder is shown on Figure 10.

Figure 10: General view of the layers "active" and "inactive" TMFs

In case there is no need for a visual representation of TMFs for some country it is easy to remove the tick next to the name of the country and then the data will not be displayed on the map. In order to view information on the TMF, the user needs to click on the name of the TMF.

Figure 11: An example of displaying information on the map using the example of the Nahatak TMF (Armenia): a) general view; b) view when zooming in the map

a)

b)

Thanks to this map it is easy to identify the location of TMFs and to estimate distances to settlements and rivers.

Information about details of the TMFs mapping is also available in **Annex C**, as a part to the TMF hazard assessment report for countries.

All rights to use the map belong to the German Environment Agency (UBA).

The experience gained by inventories and mapping of TMFs of the countries participating in the training will be further used getting an overview to the risk of TMF within all UNECE countries.

The main results under the activities of this working package (WP 3) are:

1. *TMF inventories of the training participating countries;*
2. *Individual THI-Calculations for training participating countries with comparing analysis;*
3. *TMFs mapping of the training participating countries.*

3.5 Training of trainers in Armenia (Working Package 4)

3.5.1 Preparatory works

For providing training of trainers in Armenia, the organizational activities of the project team included:

- Obtaining consultation, information, required agreements and permits from all the beneficiary parties (UBA, AB, JEG, relevant ministries, local government, industrial enterprise, etc.);
- obtaining the final agreement from "Akhtala ore-dressing combine" CJSC (Lori region, Armenia) for organizing the TMF site visit and conducting practical training on TMF methodology application to an operating TMF (with possibility of video shooting);
- final selection of training participants;
- assignment of project team responsible for technical and organizational issues;
- provision of logistics including hall rental, food, hotel, simultaneous translation, photo and video shooting, etc.;
- Preparation of educational materials and printing in sufficient quantity.

For more efficient organization of the training course the Ukrainian expert group conducted consultations with international organizations too, particularly with the relevant UNECE IAC's bodies, which allowed making a more purposeful training schedule and procedures, and educational materials.

All the necessary materials were disseminated electronically three week prior to the workshop, in particular:

- Agenda of the training and list of participants;
- Methodology for improving TMF safety (first updated version, August 2018);
- General information about mining enterprise and TMF site in Armenia;
- Educational Course "Safety of TMFs";
- Knowledge consolidation test on TMF safety.

In addition, the participants were provided with the link to the UNECE online training on industrial accidents:

- UNECE Safety Guidelines and Good Practices for Tailings Management Facilities;
- Reference Document on Best Available Techniques for Management of Tailings and Waste-Rock in Mining Activities.

During the preparatory works also a preliminary visit to the Akhtala ore-dressing combine was organized (May 25, 2018) with participation of the project team, Ukrainian experts and the representative of the financing party (Gerhard Winkelmann-Oei, UBA).

The purpose of the visit was to allow the Ukrainian experts, who would conduct the training courses in September, to get acquainted with the plant's technological processes and at the same time make a

visit to the TMF area in advance. It would allow them not only to have an idea of the entire production process, but also to organize and conduct the practical part of the training in the future as efficiently as possible.

The visit was quite interesting and effective, during which a tour to all production sites was organized, accompanied by the relevant specialists of the factory.

Figure 12: Preliminary visit to the "Akhtala Ore- dressing combine" CJSC (Armenia)

Source: ["Eco Peace" NGO]

3.5.2 Conducting training of trainers

A three-day international training course in Armenia for mining sector professionals was conducted with participation of international experts form different UNECE countries. The training participants were representatives of competent ministries, legislative bodies and private sector responsible for environmental and industrial safety and operators of industrial enterprises.

In terms of nomination and final selection of participants the project team collaborated with UBA, UNECE Secretariat, the project AB members, JEG experts and the relevant ministries' of project target countries.

As a result of discussions with the project team, the financing party and UNECE Secretariat, it was decided to hold 3 back-to-back events in Armenia scheduled in September 2018, i.e. training of trainers, project AB second meeting and JEG meeting.

The events were held on September 3-7, 2018, in particular:

a. Training of trainers: 4-6.09.2018;
b. Joint meeting of JEG and AB: 07.09.2018.

The JEG and project Advisory Board (AB) members expressed a desire to participate in training of trainers too.

As a results of providing back-to-back events, the total number of the participants during training of trainers was approximately 40 participants representing the following countries: Armenia, Georgia, Kazakhstan, Kyrgyzstan, Hungary, Serbia, Romania, Ukraine, Moldova, Belarus, Germany, Austria and Sweden.

Figure 13: Training of trainers participants, 3-6.09.2018 (Tsaghkadzor, Armenia)

Source: ["Eco Peace" NGO]

During the training, the first updated version of TMF safety assessment methodology (August, 2018) was used with the purpose to allow the mining operators and inspectors identifying safety deficiencies in tailing facilities and initiate corrective measures.

This training was intended to enable the trained professionals transfering the gained knowledge during the future national events. The training allowed to clarify the questions, to better understand the TMF methodology and prepare for future processes, for application of the gained knowledge at the national level and for its transfer to the representatives of the competent authorities responsible and local control over TMFs in 2019 (WP 5).

The expert group holding the training courses consisted of 2 Ukrainian experts who had invested their professional skills in the issues of tailings safety, development of the TMF checklist and methodology applying this methodology in Ukraine and 1 assistant.

Theoretical training (first day): The training included theoretical sessions devoted to the documentation of tailings management facilities, their risks and hazards, the specifics of visual inspection, safety evaluation, recommendations on how to apply the methodology and the checklist, as well as the details of the Tailing Hazard Index calculation.

The specialists holding the training were the Ukrainian experts who were trained already within a previous pilot project of the German Environment Agency.

The participants were trained also how to identify deficiencies during the site visit and develop a TMF safety improvement program, using short-, medium- and long-term measures from the measure catalogue. Besides, the information on the TMF site to be visited during the training was delivered (with short video about the plant technology and the TMF site), which facilitated filling in the TMF checklist during the practical part of the training.

Figure 14: Theoretical part of the training


Source: ["Eco Peace" NGO]

Practical training (second day): The theoretical knowledge was strengthened through practical application of the TMF methodology. Visual inspection was performed by three groups directly on the TMF site located in Lori region of Armenia.

The groups visited the most important TMF parts: main dam, drainage diversion ditch and secondary dam. Each group guided by one trainer in order to allow simultaneously seeing the most of critical TMF elements in limited period of time by all visitors. Each group was also accompanied by a representative of TMF operator for providing of additional comments.

During the TMF site visit, the trainees answered the checklist questions related to visual inspection of the TMF manually in paper form.

For the inspection of hard-to-reach places a drone-video was used.

Figure 15: Practical part of the training; TMF site visit




Source: ["Eco Peace" NGO]

Summing up the results (third day): The training continued in the next day, and the groups discussed the obtained data in separate rooms. The answers obtained on-site were entered into MS Excel form and each group summed up and represented the carried out works.

The results of the application of the methodology in the different parts of the inspected TMF showed that safety issues related to monitoring, dam stability and water management should be addressed as the first priority. Recommendations (short, medium and long-term) to improve the TMF safety at the site were made to address the deficiencies identified.

The groups recommended relevant measures for TMF operator to address revealed deficiencies for each inspected part.

At the same time the training results showed that the methodology needed further improvement in some parts to make it even more effective.

The training was closed with summing up of the results/outcomes of separate groups and collection of proposals and recommendations. Certificates were issued to the participants.

Figure 16: Summing up and closing

Source: [“Eco Peace” NGO]

A short video was recorded on the entire training course (theoretical part, visit to TMF, discussion in groups, issuance of certificates), which was shown during the inception workshop in Astana and the Tenth meeting of the Conference of the Parties in Geneva.

This training of trainers provided the basis for the trained participants from different countries to conduct similar courses in the future for the competent authorities in their countries.

At the same time this training served for further improvement of the TMF methodology used based on recommendations/feedbacks from training participants.

The report on training on trainers with safety evaluation of the visited TMF in Armenia (with assessment results by groups in MS Excel) and video on the entire training course are available in **Annex D**.

The main results under the activities of this working package are:

1. *The TMF-methodology tested in Armenia and knowledge gained on efficient inspection procedures based on the TMF checklist.*
2. *Trained national trainers to transfer gained knowledge to other mining sector specialists in Armenia, Georgia and other UNECE countries.*
3. *Improved TMF methodology based on recommendations of training participants.*
4. *Further sustainable use of the TMF methodology in other UNECE countries (follow-up projects in Kazakhstan and Romania).*

3.6 Regional training events in Armenia and Georgia (Working Package 5)

The follow up activities were regional trainings in Armenia and Georgia based on the experience gained during the training of trainers.

The training sessions in Armenia and Georgia were led by the group of national trainers, who were nominated by these two countries in 2018 and trained within the training of trainers held in Armenia.

Three similar events were held in 2019: 2 in Armenia and 1 in Georgia.

During those events the national trainers shared their knowledge and accumulated skills with the rest of the participants, and helped them fill out a checklist for the selected TMFs.

The second updated version (April 2019) of the TMF methodology, corresponding presentations on its use and excel templates were sent to all participants 3 weeks in advance.

Since the duration of each training was only 1 day, the theoretical part of the event was organized interactively and these 3 weeks were used for conducting of the theoretical part to view the TMF methodology and checklists.

To provide methodological support, analysis and discussion of incomprehensible/difficult to understand issues, the participants contacted the trainers and the Ukrainian project team via viber and e-mail, as well as in the form of a Skype conference.

All participants also received in advance the available results of detailed verification of documentation for selected facilities in Armenia and Georgia.

The selection of the TMFs for the practical training was based on several criteria:

- Availability of TMFs with various statuses.
- Time required for more or less complete preparation and application of the methodology and realistic value of the received assessment.
- Innovations to test the methodology and its possible update in the future.
- Minimal obstacles to enter the facility.

The TMF safety was been evaluated using Group B “Detailed evaluation” of the TMF Checklist and the evaluation procedure described in the TMF Methodology updated in April 2019.

The TMF safety methodology was applied to the TMFs sites as follows:

- **Nahatak TMF** (Lori region, Armenia) - the report comprises the results of visual inspection performed by three groups of training participants with application of the methodology and the check of TMF operator documentation performed by the NGO “Eco Peace” and the Ukrainian trainer team.
- **Dastakert TMF** (Syunik region, Armenia) - the report comprises only the results of visual inspection, because the TMF is abandoned and design document is not available. It was not possible for the project team and the training participants to obtain any real documents on this facility, since they were not present even in the governing bodies. Certain limited documentation was obtained anyhow, which, however, did not allow to fully utilize them for checking the documentation of this TMF.
- **TMF site of RMG Copper** (Kazreti, Georgia) - the report comprises the results of visual inspection performed by one group of training participants with application of the TMF

methodology and the check of TMF operator documentation performed by the RDFG and the Ukrainian trainer team.

Figure 17: TMFs site visits a) Dastakert, Armenia b) Kazreti, Georgia)

Source: ["Eco Peace" NGO, RDFG NGO] **(a)** **(b)**

The training was attended by the representatives of state and non-state agencies. The participants were operators, employees of the competent authorities or ministries responsible for the local control in the mining sector. To select participants, the project team collaborated with almost all government and non-government entities.

Participants, who were selected for the regional trainings in Armenia were from the following institutions:

- Ministry of Emergency situations and from Crisis Management Academy under MES RA;
- Faculty of Mining and Metallurgy of the National Polytechnic University of Armenia;
- Regional department of the Armenian rescue service and local self-government bodies of Lori and Syunik regions.
- Corresponding specialists from mining companies, in particular, Aktala ore-dressing combine" CJSC, "Zangezur Copper Molybdenum Combine" CJSC, Kapan copper-molybdenum combine ("Chaarat-Kapan" LLC); Ararat Gold Extraction Factory.
- Specialists from the Vallex Group of Companies, including those from the Metals and Mining Institute of Armenia, who are also part of the Vallex Group.
- Specialists from the private firms involved in designing hydraulic-engineering facilities.

Participants, who were selected for the regional trainings in Georgia were from the following institutions:

- Ministry of Environment Protection and Agriculture of Georgia,
- LEPL National Agency of Mines of the Ministry of Economy and Sustainable Development;
- Emergency Management Agency of the Ministry of Internal Affairs of Georgia;
- Emergency Management Agency of Georgia; Committee on Environmental Protection and Natural Resources of the Parliament of Georgia;
- Environmental Protection and Natural Resources Committee of the Parliament of Georgia;
- Corresponding specialists from mining companies, in particular, Rich Metals Group and LLC Georgian Manganese.

These trainings also served for further improvement of the methodology used.

The most important thing was that this methodology was applied to an abandoned TMF for the first time. As a result of these activities, the questionnaire on Inspection for closed, reclaimed or abandoned TMFs was fully reviewed and revised.

The appropriate trainings results were passed to Advisory Board and discussed during the next AB meeting, for the further making of recommendations for checklist revision based on these results.

The report on conducting and results of regional trainings was prepared by the project team with the support of Armenian and Georgian participants of the regional trainings.

This report and all materials (assessment results in MS Excel) related to this working package are available in **Annex E**.

The main results under the activities of this working package are:

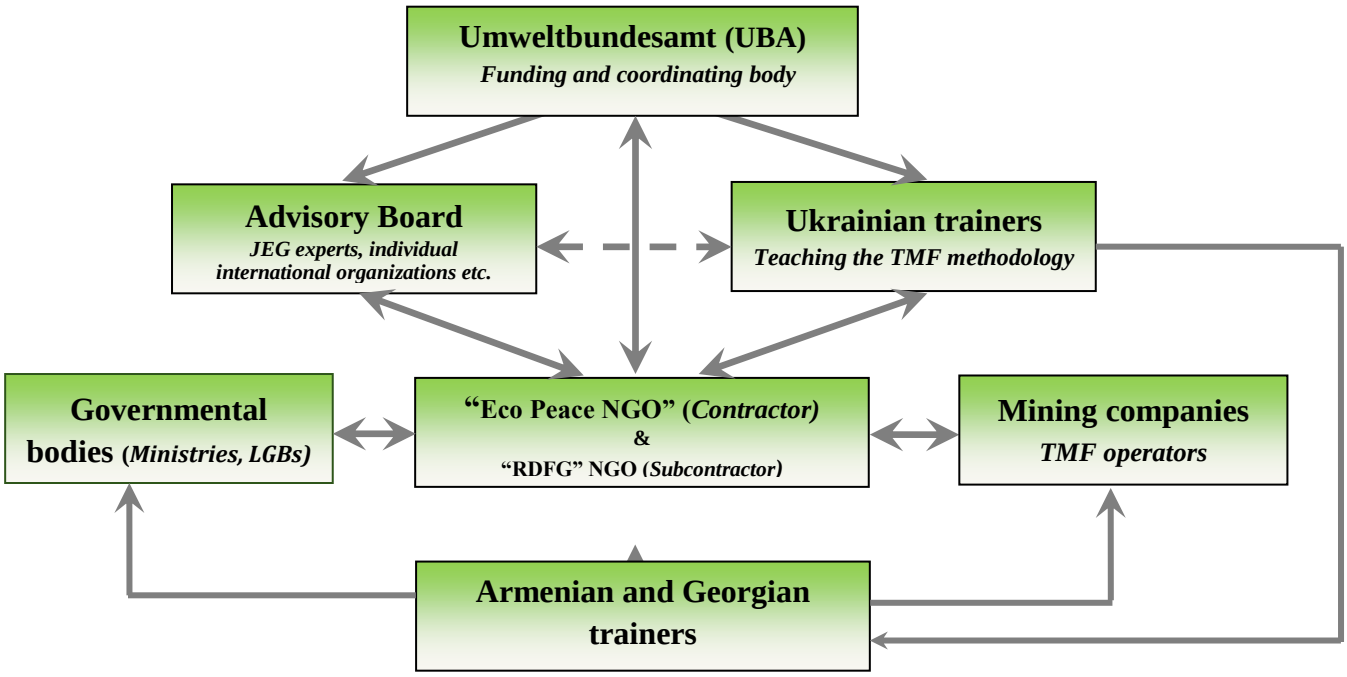
1. *The gained knowledge transferred to other mining sector specialists and state authorities responsible for the local control of TMF in Armenia and Georgia.*
2. *The TMF-methodology tested at abandoned TMFs and respective Amendments.*
3. *Further improved TMF methodology based on recommendations of regional training participants.*
4. *The TMF-methodology tested in Georgia.*

3.7 Establishing and involvement of an Advisory Board (Working Package 6)

The project team had the expert support of the project Advisory Board (AB) consisting of international experts from different UNECE countries (UNECE Joint Expert Group members and individual experts).

The organizational structure of interaction between the project parties including the Advisory Board is shown on Figure 18.

Figure 18: Interaction among the participant groups within the project



AB members were not fixed for the whole project duration as subject and content was different. It was decided individually for each AB meeting. For this purpose the project team collaborated with UBA and UNECE Secretariat for the nomination and selection of the AB members.

The objective of the AB was the professional guidance and assessment of the results obtained within this project based on international experience during the whole period of the project implementation.

The main purpose of the AB meetings was discussion of the project's current activities and the prepared documents, recommendations/amendments for the TMF methodology, UNECE Contingency planning checklist and other documents prepared in the framework of the project, the project's further steps, safety issues for TMFs in the UNECE region and follow-up activities in this sector.

The expert support of the international Advisory Board included the following three sectors of consultation, related to the project objectives and the TMF methodology:

a. Hazard Management: General preparations, prevention measures, alert or emergency plans;
b. Crisis Management: Measures when incident / catastrophe occurs, instruments;
c. After Care Management: Damage balances, follow-up actions.

The meetings of the Advisory Board held twice a year, enabling getting appropriate consultations. In total 4 meetings were held (two in Georgia, and two in Armenia), which supported to building of pilot platform for information exchange with other UNECE countries.

- The First meeting of the Advisory Board took place in Yerevan (Armenia), on May 22-26 2018.

- The Second meeting of the Advisory Board took place in Tsaghkadzor (Armenia), on September 7 back-to-back of other 2 events - international training of trainers and 18th JEG meeting.
- The Third meeting of the Advisory Board took place in Tbilisi (Georgia), on April 24-25 2019.
- The Forth meeting of the Advisory Board took place in Batumi (Georgia), on September 19, 2019 back-to-back of project final workshop.

All presentations, agendas and lists of participants of all AB meetings mentioned above are available on the provided links.

Figure 19: Project Advisory Board meetings in Armenia and Georgia

Source: ["Eco Peace" NGO]

Armenian and Georgian components of the project were implemented in close collaboration with the relevant Ministries of target countries, as well as private mining companies.

Along with international experts and the members of the project team, representatives from different Ministries and also from mining enterprises participated in the AB meetings.

All meetings took place in an interesting and constructive atmosphere, ensuring a stable platform for the successful implementation of activities within the framework of the project.

The main results under the activities of this working package (WP 6) are:

- Provided international expert support in form of regular consultation related to the project objectives and activities.
- Provided professional guidance and assessment of the results obtained within this project based on international experience.

3.8 Testing and revising the checklist (Working Package 7)

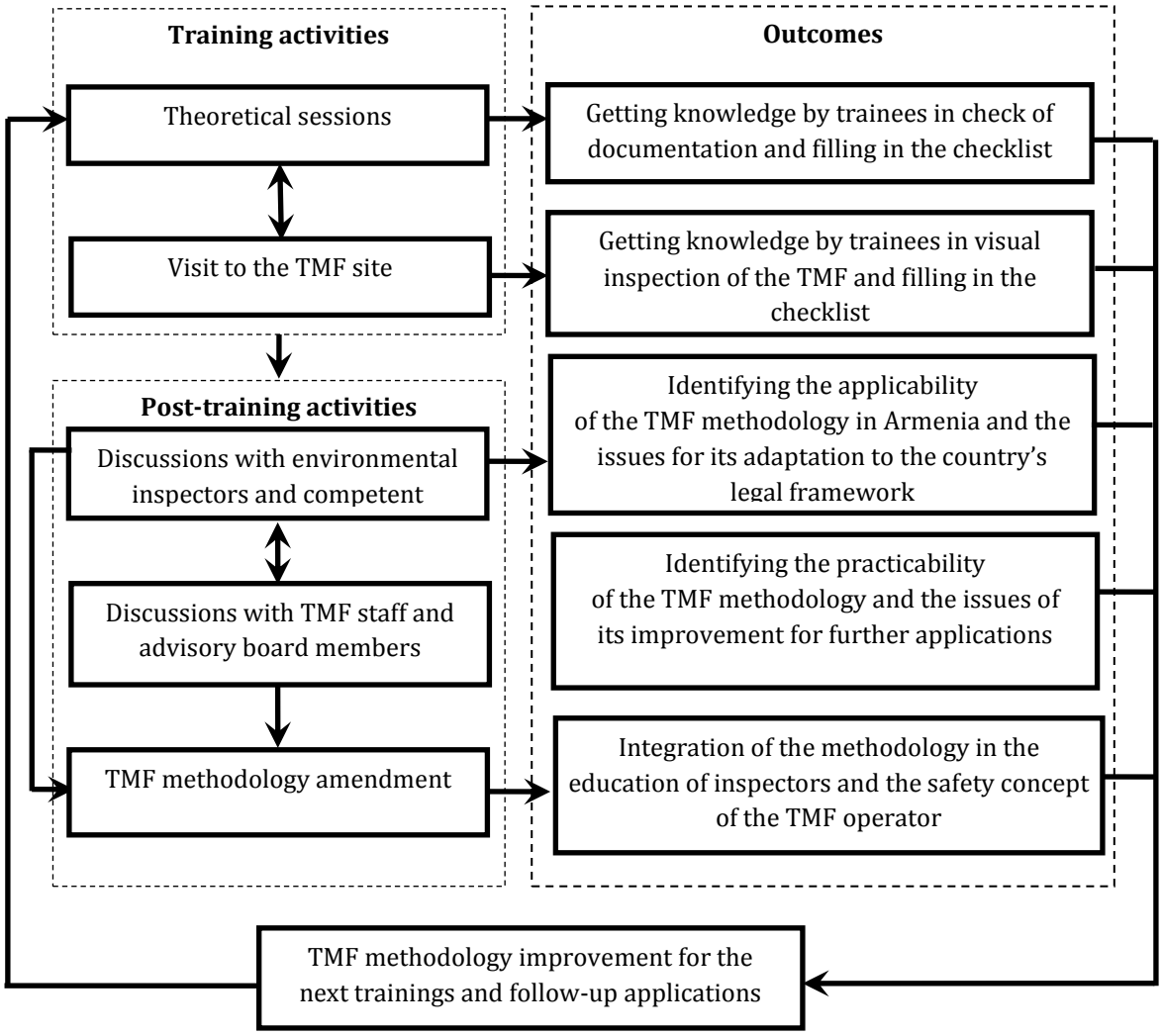
An important task of the project was to identify the applicability of the TMF Methodology to the evaluation of tailings safety and the correctness of the obtained results, to test and improve the TMF methodology and relevant checklist. During the project this task was implemented as follows.

- The feedback to the training of trainers including recommendations and proposals submitted by the participants was collected by the project team and the trainers, discussed during the AB meetings and reviewed.
- The feedback to the regional trainings in Armenia and Georgia including recommendations and proposals submitted by the participants were collected by the Armenian and Georgian project teams and the trainers, discussed during the AB meetings and reviewed.
- Based on all feedbacks and recommendations the proposals to amend and improve the TMF methodology were elaborated; special attention was paid to the optimization of the evaluation matrix, checklist for active and inactive TMFs, emergency planning issues and improving the action plan on checklist application.

Activities in the framework of the project facilitated proving the practicability, as well as the need of further improvement of the TMF Methodology.

The workflow for proving the TMF Methodology practicability is depicted below.

Figure 20: The workflow for proving the TMF Methodology practicability



The first updated version of the TMF methodology based on the recommendations from the first and second AB meetings was used during training of trainers (ToT) in Armenia.

The second updated version of the TMF methodology (English and Russian) based on recommendations from the ToT participants was discussed during the third AB meeting (April 2019, Georgia) and after that was used during the regional trainings in Armenia and Georgia (July-August, 2019).

The third updated version of the TMF methodology (English and Russian) based on recommendations from the regional trainings' participants was discussed during the fourth AB meeting (Batumi 2019, Georgia) and it is the final modified product related to the methodology in the framework of this project.

All updated versions of the TMF methodology were sent to the UNECE JEG experts, the AB members and other representatives from the UNECE countries.

The successful TMF Methodology experience in Caucasus, where numerous TMF sites are located allowed improving the methodology. The methodology was translated also in Armenian and Georgian.

The final updated version of the TMF methodology in framework of this project, as well as the review of the proposals submitted by the participants to improve the questions and recommendations of the Checklists, are provided in **Annex F**.

The main results under the activities of this working package (WP 7) are:

- Proven successful applicability of the TMF Methodology experience in Caucasus countries (Armenia, Georgia) to the evaluation of the tailings safety.
- The appropriate amendments made to the TMF methodology based on the practical trainings in the Caucasus.
- Supporting to the getting more adequate results during the TMF methodology follow-up applications in other countries having similar problems with mining waste.

3.9 Reporting (Working Package 8)

The following reporting documents were prepared in the different stages of the project, which are available as Annexes to this report:

1. The reports on the activities accomplished under the WP 1, which included:
   - "Analysis of existing legislation related to Tailing Management Facilities (MTFs) in Georgia with relevant recommendations" (English and Georgian).
   - "Recommendations for regulations of the national legislation of the former USSR countries on tailings management and safety measures" (English and Russian).
   - The "Manual on Safety Requirements and Exemplary Operation Rules for TMFs in the Territory of the Republic of Armenia" (Armenian).
2. The reports on the activities accomplished under the WP 2, which included;
   - Recommendations on further improvement / revision of UNECE Checklist for Contingency Planning for accidents affecting transboundary waters (English and Russian);
   - Analysis of water quality and pollution of river Kvirila related to mineral extraction in Imereti region, the Chiatura municipality (English and Russian).
3. The report on the activities accomplished under the WP 4, which included:
   - Report on safety evaluation of the TMF of “Akhtala ore-dressing combine” CJSC (Armenia) using the TMF methodology (English).
4. Report on “Inventory , THI hazard evaluation and mapping of TMFs by countries”
5. Report on conducting regional trainings in Armenia and Georgia with using of updated version of TMF methodology (English).
6. The updated version of the TMF methodology (English and Russian).

3.10 Final workshop (Working Package 8)

The project Final workshop was held on 17-19 September 2019 in Batumi (Georgia) aiming to discuss all the prepared documents along with the implemented activities during the project implementation period. This event was organized back-to-back of the project Advisory Board fourth meeting, which was the final meeting in the framework of this project.

The event was attended by the representatives from 11 different countries (Georgia, Germany, Armenia, Austria, Hungary, Romania, Serbia, Ukraine, Kirgizstan, Kazakhstan, Poland), including the the project team, representatives from UBA, relevant ministries of Armenia and Georgia, the public and NGO sectors, the representatives of the mining companies/TMF operator from Armenia, Georgia, Kyrgyzstan and Poland, as well as from international organizations (WB, ICPDR).

The objectives of the workshop were to discuss the following issues:

- Technical and organizational safety of TMFs
- Legal aspects of TMF Safety
- Other activities in the framework of the project related to the field of TMF-Safety
- The main results and challenges of the TMF methodology testing in the Caucasus
- Other on-going and planned activities on TMF safety in the UNECE region.

The presentations (the Agenda and the List of participants are also available on this link) during the workshop resulted in discussions on the activities implemented under the project, the project outcomes, further processes and possible cooperation in the field of TMF safety.

The participants presented a series of justified proposals on the discussed topics.

The Armenian and Georgian parties presented their suggestions for further improvement of the methodology based on the comments made by the regional trainings participants. The Armenian party presented a completely new and edited version of the C1 Group Questionnaire, which also took into account the presence of downstream settlements and the potential impacts of tailings on sensitive areas (e.g. protected areas, reservoirs, etc.).

During the meeting, the participants received information on the on-going and planned projects in a number of UNECE countries.

Besides, the WB representative provided information on the World Bank mining sector projects implemented in Armenia and Georgia at that time, including information regarding “Climate Smart Mining” project, as a result of which the participants received extensive information not only on the “Climate Smart Mining” project, but also on WB projects in Armenia, Georgia and Kyrgyzstan.
The participants listened to the Key-note lecture on General TMF safety and Land Use Planning by Polish colleagues, which was rather informative and included clear information on operation and management of “Żelazny Most” TMF in Poland, which is the largest TMF in the world.

The meeting was quite interesting for all parties and was held in a constructive atmosphere.

The participants highlighted the cooperative approach throughout the project implementation period at the level of sharing of experiences in different countries, possible involvement of experts, and the subsequent use of results.

Figure 21: Final workshop in Batumi (Georgia), 17-19.09.2019

Source: [“Eco Peace” NGO]

The participants stressed the importance of incorporating the results of this project in Armenia and Georgia in the application of similar projects in other countries and noted that the results of the project were positive and teachable, allowing to record that another step was taken towards solving the problem of TMF safety.

The agenda, list of participants, main statements of the Final Workshop included in the Minutes of meeting provided in **Annex G**.

3.11 Dissemination, public relations (Working Package 8)

At all stages of the project implementation a special attention was paid to the dissemination of the information about the works under the project and the obtained results.

Information leaflet highlighting the project activities was prepared and disseminated among the various stakeholders in the course of the project to provide relevant information and informing on the further steps. The information was periodically disseminated through the websites of the beneficiary ministries and the organizations implementing the project in Armenia and Georgia (http://ecopeace.am/; http://rdfg.ge/), as well as via mass media (newspapers, mass media, internet etc.).

The project activities/results were presented by the representatives of the participating countries (Armenia and Georgia) at the different national meetings with participation of competent authorities and different stakeholders, as well as at a number of international meetings/events, in particular:

- Sub-regional platform on Disaster Risk Reduction (DRR), 26-27 June 2018, Yerevan (Armenia);
- 18th meeting of the Joint Ad Hoc Expert Group on Water and Industrial Accidents, 7 September 2018, Tsaghkadzor (Armenia);
- Inception workshop under the UNECE project to strengthen the safety of mining operations, in particular tailings management facilities (TMFs), in Kazakhstan and beyond in Central Asia, 7-8 November 2018, Astana (Kazakhstan);
- Tenth meeting of the Conference of the Parties including risk assessment seminar, 4-6 December 2018, Geneva (Switzerland).
- UNECE Seminar on accidental transboundary water pollution prevention – contingency planning, early warning, mitigation (4-5 November 2019, Budapest, Hungary);
- UNECE Subregional workshop under the UNECE projects on improving mining/tailings safety in Kazakhstan, Tajikistan and beyond in Central Asia (20-21 November 2019, Amati, Kazakhstan).

Figure 22: Dissemination of the project activities, Geneva 2018

Source: [https://www.unece.org/index.php?id=46249]

A movie elaborating all actions implemented during the project was prepared, which will be disseminate among all stakeholders (see Annex H).

Annex H also contains photos in electronic format sorted by project events.

During all meetings the participants highly appreciated the project results, emphasized the significance of the project and the importance in terms of the exchange of experience in this area for future similar events with involvement of other UNECE countries.

Information about the activities carried out at different stages of the project is available in several languages at the following web sites:

Table 3: Web links to the information on project events

Language	Link
ENG	http://ecopeace.am/projects/ https://www.unece.org/index.php?id=50152 http://www.mnp.am/en/post/3421 https://rdfg.ge/2018/01/24/new-project-of-rdfg-in-the-field-of-environment-protection/ http://rdfg.ge/2018/07/16/presentation-of-the-results-of-the-first-phase-of-rdfg-project/ https://rdfg.ge/2018/10/05/under-the-rdfg-and-eco-peace-project-international-training-on-tailing-management-was-held-in-armenia/ http://rdfg.ge/2019/03/01/association-rural-development-for-future-georgia-rdfg-met-with-the-environmental-protection-and-natural-resources-committee-of-the-parliament-of-georgia-to-discuss-the-environmental-issues/ http://rdfg.ge/2019/04/25/on-april-24-25-2019-the-advisory-board-third-meeting-of-the-project-on-tailing-safety-in-armenia-and-georgia-was-held/ http://rdfg.ge/conferences/regional-training-in-georgia-on-methodology-for-improving-tmf-safety/ http://rdfg.ge/conferences/the-final-conference-within-the-transboundary-project-assistance-in-safety-improvement-of-tailings-management-facilities-tmf-in-armenia-and-georgia-was-held/
ARM	http://www.mes.am/hy/news/item/2018/07/04/859/ http://www.mnp.am/am/post/3421 https://armtimes.com/hy/article/140942 https://armenpress.am/arm/news/939917.html https://factor.am/82212.html http://armgeonews.com/archives/6077 https://911tert.am/2017/12/23/%D5%A1%D5%B6%D5%BE%D5%BF%D5%A1%D5%B6%D5%A3%D5%B8%D6%82%D5%A9%D5%B5%D5%A1%D5%B6-%D5%A2%D5%A1%D6%80%D5%A5%D5%AC%D5%A1%D5%BE%D5%B8%D6%82%D5%B4/ https://www.pastinfo.am/hy/news/2018/07/04/%D4%B4%D5%A1%D5%B7%D5%BF%D5%A1%D5%B5%D5%AB%D5%B6-%D5%BE%D5%A1%D6%80%D5%AA%D5%A1%D5%B6%D6%84-%D4%B1%D5%AD%D5%A9%D5%A1%D5%AC%D5%A1%D5%B5%D5%AB-%D5%AF%D5%B8%D5%B4%D5%A2%D5%AB%D5%B6%D5%A1%D5%BF%D5%B8%D6%82%D5%B4/716681 http://cmsa.am/2017/12/19/%D5%B0%D5%A1%D5%B6%D5%A4%D5%AB%D5%BA%D5%B8%D6%82%D5%B4%D5%9D-%D5%BA%D5%B8%D5%B9%D5%A1%D5%B4%D5%A2%D5%A1%D6%80%D5%B6%D5%A5%D6%80%D5%AB-%D5%A1%D5%B6%D5%BE%D5%BF%D5%A1%D5%B6%D5%A3%D5%B8%D6%82%D5%A9%D5%B5/ http://cmsa.am/2018/07/08/%D5%A4%D5%A1%D5%B7%D5%BF%D5%A1%D5%B5%D5%AB%D5%B6-%D5%BE%D5%A1%D6%80%D5%AA%D5%A1%D5%B6%D6%84-%D5%A1%D5%AD%D5%A9%D5%A1%D5%AC%D5%A1%D5%B5%D5%AB-%D5%AF%D5%B8%D5%B4%D5%A2%D5%AB%D5%B6%D5%A1%D5%BF%D5%B8/ https://web.facebook.com/cmsa.academy/posts/2213382588888972
GEO	https://rdfg.ge/ka/2018/01/24/rdfg-%E1%83%A1-%E1%83%90%E1%83%AE%E1%83%90%E1%83%9A%E1%83%98-%E1%83%9E%E1%83%A0%E1%83%9D%E1%83%94%E1%83%A5%E1%83%A2%E1%83%98-%E1%83%92%E1%83%90%E1%83%A0%E1%83%94%E1%83%9B%E1%83%9D%E1%83%A1-%E1%83%93/ https://rdfg.ge/ka/2018/10/05/rdfg-%E1%83%98%E1%83%A1%E1%83%90-%E1%83%93%E1%83%90-eco-peace-%E1%83%98%E1%83%A1-%E1%83%9E%E1%83%A0%E1%83%9D%E1%83%94%E1%83%A5%E1%83%A2%E1%83%98%E1%83%A1-%E1%83%A4%E1%83%90%E1%83%A0%E1%83%92%E1%83%9A/
RUS	http://www.mnp.am/ru/post/3421

4 Project outputs

The project outputs achieved during the project term are as follows:

- Analyzed legislative and administrative situation in Georgia with relevant recommendations related to TMF sector in close cooperation with government bodies.. Consideration of the proposed recommendations in the development of the "Draft Law of Georgia on the Management of Extractive Industries [Mineral Resources] Wastes", which is currently being discussed by the relevant bodies of the Government of Georgia.
- Developed manual on "Safety Requirements and Exemplary Operation Rules for TMFs in the Territory of the Republic of Armenia" in close cooperation with government bodies and it's using by the MES regional subdivisions in Armenia for the purpose of the inspection of TMFs safety requirements.
- Improved national capacities, enhanced emergency preparedness and cross-border cooperation between Armenia and Georgia;
- The amendments/recommendations to the UNECE Checklist for Contingency Planning available.
- Prepared report on "Analysis of Water Quality and Pollution of River Kvirila Related to Mineral Extraction in Imereti Region, the Chiatura Municipality" with recommendations for state authorities for solving the environmental problems caused by mining-processing activities in Chiatura (including the list of potentially polluting enterprises of riv. Kvirila).
- Trained national trainers to transfer gained knowledge to other mining sector specialists in Armenia, Georgia and other UNECE countries.
- The TMF-methodology tested in Armenia and Georgia; knowledge gained on efficient inspection procedures based on the TMF checklist.
- The TMF-methodology tested at abandoned TMFs and respective Amendments available.
- TMFs database / TMF inventories of the training participating countries with Individual THI-Calculations (ranking tailings hazard) for each country and comparing analysis; TMFs mapping implemented.
- Updated TMF methodology, which was recommended to Armenian and Georgian state authorities for its further application as a tool for the TMFs control; availability of TMF methodology in English, Russia, Armenian and Georgian languages;
- Provided professional guidance and assessment of the results obtained within this project based on international experience.
- Further sustainable use of the TMF methodology in other UNECE countries (follow-up projects in Kazakhstan and Romania).
- Prepared movie about all project activities.

For more details please see Annexes to this report.

All project results were handed over by the project team to all stakeholders (governmental bodies and mining companies) in Armenia and Georgia, in particular:

- Ministry of Emergency Situations of Armenia;
- Ministry of Environment of Armenia;

- Ministry of Territorial administration and infrastructure of Armenia;
- Ministry of Environment Protection and Agriculture of Georgia;
- Emergency Management Agency of the Ministry of Internal Affairs of Georgia;
- Mining enterprises in Armenia and Georgia.

An important fact is that the specialists nominated by all the above mentioned ministries were directly involved in the work carried out throughout the project. This allowed the government agencies to be directly informed about the project steps, issues raised during its implementation, and to have a clearer picture of what to do next. It can be stated that such an approach ensured the continuity of the project, as the target countries (Armenia and Georgia) clearly outlined the further actions that will need to be taken after the end of the project (e.g., further adaptation and then approval of the TMF methodology and TMF checklist at the national lavel, as a tool for the TMFs control; implementation of the suggested recommendations to expand cross-border cooperation between Armenia and Georgia at the national level in the future, after finalization of structural changes of the Governments of the two countries, etc.).

At the same time the Armenian version of the TMF methodology, as well as the manual on "Safety Requirements and Exemplary Operation Rules for TMFs in the Territory of the Republic of Armenia" now is applied during the inspection of TMFs safety requirements by the responsible personnel of the subdivisions of the Ministry of Emergency Situations (MES) of Armenia, as a tool for the everyday working process. The Armenian version of the TMF methodology now is applied during the inspection of TMFs safety requirements by the mining companies participating in the different trainings conducted in the framework of the project, as well as by the specialists from the mining faculty of the National Polytechnic University of Armenia during practical trainings with students.

In the near future it is planned to heighten the status of the TMF methodology in Armenia, which was also stated by the MES representative during the final workshop of the project.

It should be noted that in the beginning of February 2020, the Public Council to Minister of Emergency Situations of Armenia was formed. The Public Council included 18 persons, mainly representatives of non-governmental organizations related to the field of emergency situations, one of which was “Eco Peace” NGO represented by the head of NGO Mrs. Kristine Sahakyan.

On 7 February 2020 the 1st meeting of the public council to the Minister of ES took place. Draft Decisions of the Government of the Republic of Armenia on the RA Laws on “Disaster Risk Management and Population Protection” were included in the Agenda. An interesting discussion and exchange of opinions took place in a working atmosphere, including also issues related to TMF sector: This can be considered as a step taken by the “Eco Peace” NGO to ensure further continuation of the project in Armenia, related to which there are already clear arrangements.

5 Project sustainability

Updated TMF Methodology and checklist: Through the active cooperative work of the project team and the national experts, the AB members, the Ukrainian experts, and competent authorities the TMF Methodology was thoroughly revised and reviewed.

The improvements covered the visual inspection procedure with added criteria to give the answer, the revised checklist for active TMF sites, fully revised checklist for inactive TMF sites, as well as the updated evaluation matrix with the enhanced role of visual inspection and the introduction of critical questions, which minimizes inspector subjectivity, and, generally, more credibility and reliability of visual inspection results.

As a result of the trainings, the site-visit procedure including visual survey of the TMF and the checklist for inactive sites were optimized.

Further adaptation of the TMF methodology and the TMF checklist for national supervisory bodies and then its approval and further use in Armenia and Georgia (as well in other UNECE countries) will assist in the sustainable solution of this issue as a tool for the TMFs control.

TMF inventory, hazard ranking and mapping: National experts from the participating countries (Armenia, Georgia, Hungary, Kazakhstan, Kyrgyzstan, Romania, and Serbia) provided the most of the required TMF data for database creation, ranking TMF hazard and mapping TMFs.

In course of the project accomplishment, the existing national TMF databases were harmonized, the data were checked and corrected, the missing data were found from open sources. The ranking method was updated and used for generation of national and international TMF databases ranked according to tailings hazard, which allows prioritizing safety measures. Based on these inventories and ranking results the TMFs were mapped for the project participating countries in modern software tools that can be used by national competent authorities.

The experience gained by inventories and mapping of TMFs will be further used getting an overview to the risk of TMF within all UNECE countries.

Capacity building: During the training-for-trainers and regional trainings in Armenia and Georgia national experts gained excellent experience and up-to-date knowledge on TMF checklist application as a tool for TMF control.

The TMF methodology has been recommended by the project team for the use in practice in Armenia and Georgia.

These activities largely fostered capacity building in the project target countries, anchoring the methodology and it's dissemination in the other UNECE countries. Training participants from different countries actively applied the methodology on site, which facilitated methodology internationalization and further dissemination (follow-up activities in Romania and Kazakhstan).

At the same time the Armenian version of the TMF methodology, as well as the manual on "Safety Requirements and Exemplary Operation Rules for TMFs in the Territory of the Republic of Armenia" now is applied during the inspection of TMFs safety requirements by the responsible personnel of the subdivisions of the Ministry of Emergency Situations (MES) of Armenia, as the tool for the everyday working process as well as by the specialists from the mining faculty of the National polytechnic university of Armenia during practical trainings with students.

The methodology is also used by mining operators in Armenia and Georgia participating in the different trainings conducted in the framework of the project.

The Georgian version of the TMF methodology was recommended to state authorities for its further application in Georgia.

In the near future it is planned to heighten the status of the TMF methodology in Armenia, which was also stated by the MES representative during the final workshop of the project.

Strengthening transboundary cooperation: Conducted simulation exercise relied on timely communication and rapid response in transboundary emergency situations.

The proposed recommendations will support for the further improvement of national capacities, enhanced emergency preparedness and cross-border cooperation between competent authorities Armenia and Georgia on TMF accident prevention, preparedness and response;

Tested UNECE Checklist for Contingency Planning and the proposed recommendations can be the basis for the amendment of the national regulations regarding international contingency planning in case of TMF accidents. Here the previously proposed international warning and alarm system for Kura can serve an additional approach.

Collaboration between stakeholders/recipients and project team: The TMF operators were quite cooperative during preparation and conducting of the trainings; they provided available data, documents, and personal guidance to facilitate the trainings in both Armenia and Georgia. Preparations to the trainings and site visits fostered better understanding of mining sector experts and TMF personnel of the methodology, its potential, and advantages.

Competent authorities and involved national experts from mining sector very positively assessed the applicability of the methodology and made sound recommendations and remarks on its improvement and further implementation.

Many AB members made valuable inputs and proposals to the TMF methodology improvement within fruitful teamwork, thus having greatly contributed to the project outcome.

The project demonstrated the good example of cooperative work in a friendly manner among all project participants, which contributed significantly to the project outputs, which can be successfully applied in similar projects in other UNECE countries.

6 Lessons learned

The accomplished project demonstrated:

- Good practice regarding international cooperation and at the same time the needs to foster cooperation between other UNECE countries.
- Emphasized the need to foster cross-border cooperation between competent authorities of neighboring countries.
- Importance of finding a sustainable way to the solution of the TMF problems and need to address the TMF issue on the practical and legislative levels, which is very important also for the cross-border cooperation between competent authorities of TMF-accident prevention, preparedness and response.
- Projects are more effective if implemented with the synergy of activities running in parallel in the countries facing similar problems; this approach amalgamates the participants involved from different countries and amplifies the project output at the same or slightly increased investments.
- The project goals were achieved mostly through the efficient common work of the project team and all involved experts; thus, the follow-up activities should include the project team that has already the experience of efficient common team work.

7 List of Annexes

The Annexes to this report include reports prepared during the activities within each working package in details and other related documents and materials that can be used by users depending of their interest.

Annexes are numbered in the order mentioned in the Final report.

The public version of the Final report includes Annexes A-F (project products).

Annex A. Analysis of the legislative and administrative situation

A.1. Report on "Analysis of existing legislation related to Tailing Management Facilities (MTFs) in Georgia with relevant recommendations" (English, Georgian)

A.2. General Recommendations for regulations of the national legislation of the former USSR countries on tailings management and safety measures (English, Russian)

A.3. Manual on "Safety Requirements and Exemplary Operation Rules for TMFs in the Territory of the Republic of Armenia" (Armenian)

Annex B. Compiling country-specific policy recommendations

B.1. Recommendations for Armenia and amendments on further improvement of UNECE Checklist for Contingency Planning

B.2. Document on "Analysis of water quality and pollution of river Kvirila related to mineral extraction in Imereti region, the Chiatura municipality" (English, Russian)

B.2.1. List of potentially polluting enterprises in Kvirila river basin and the surrounding area

Annex C. Inventory, THI hazard evaluation and mapping of TMFs by countries

C.1. Preliminary results of hazard assessment for Armenian and Georgian TMFs

C.2. Report on Inventory and mapping of TMFs by countries

C.2.1. TMFs hazard evaluation results by countries (MS Excel)

Annex D. Training of trainers in Armenia

D.1. Report on "Nahatak" TMF safety evaluation based on training of trainers results

D.1.1. Assessment results by groups (MS Excel)

Annex E. Regional training events in Armenia and Georgia

E.1. Report on conducting regional trainings in Armenia and Georgia

E.1.1. Assessment results for Akhtala TMFs in Armenia (MS Excel)

E.1.2. Assessment results for Dastakert TMF in Armenia (MS Excel)

E.1.3. Assessment results for RMG Copper TMF in Georgia (MS Excel)

Annex F. Methodology for improving TMF safety

F.1. Methodology for improving TMF safety (English, Russian, Armenian, Georgian versions)

F.1.1. Template for calculation of the TMF safety level (English, Russian)

F.1.2. Proposals submitted by the participants to improve the TMF Methodology in different stages of the project

Annex G. Documents / materials of various meetings (Agendas, Lists of participants, etc.)

Annex H. Photos and videos

I.1. Photos from all project events

I.2. Movie on the entire activities of the project (long and short versions)

Annex I. Final report summary