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**Improving the safety of tailings management facilities
in Kyrgyzstan (February 2022)**

POLICY RECOMMENDATIONS



Tailings management facility of the Altynken mine
(Source: Oleksandra Riedl)



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TABLE OF CONTENT

TABLE OF CONTENT	2
BACKGROUND TO THE TMF PROJECT	3
INTRODUCTION	4
1. EDUCATION ON AND INTEGRATING OF THE CHECKLIST METHODOLOGY....	5
2. INVENTORY OF TMFS	6
3. LAND USE PLANNING ASPECTS.....	7
4. ALERT SYSTEM.....	10
5. CADASTRE SYSTEM.....	11
Annex 1.....	12
Annex 2.....	13



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BACKGROUND TO THE TMF PROJECT

The advisory assistance project „Improving the safety of tailings management facilities in Kyrgyzstan“, coordinated by the German Environment Agency and financed by the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety aims at strengthening the management capacity of the facility operators and authority inspectors working at/on mining tailings management facilities (TMFs) in Central Asia. Its objective is to raise awareness to safety deficiencies and could be used by competent authorities and TMF operators to improve the safety level of TMFs. Moreover, also land use planning issues are in the scope of the project. By identifying risk zones (sanitary zones, vulnerable areas, for people living in risk zones), early warning can be provided, and for the protection of the environment, proposals are made to establish an early warning and early alarm system for river catchments that may have potential transboundary impacts on neighboring country

In the framework of the project, the TMF Checklist for safety evaluation of individual TMFs has been acknowledged by all participants, tested, proofed and recommended as a sound practical tool to raise the safety of TMFs. With this method Kyrgyzstan has now tools and experience and would be now able to re-establish a high safety level towards TMF in their national regulatory system and a sustainable education in especially of TMF- inspectors. The project team together with the representatives of competent authorities (CA) has developed the policy recommendations for the Kirgiz Republic to ensure sustainable use of project results and ensure the safety of TMFs in the future.



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INTRODUCTION

Over the past years, the problem of environmental protection and sustainable development continues to occupy one of the first places in the list of global priorities of the international community. At the same time, mineral production is expected to skyrocket in the coming decades, including a corresponding increase in the number of TMFs, as smart and advanced technologies will spike demand for certain metals and gold. Thus, society may also face a growing risk of TMFs failures, with potential casualties and environmental damage, if TMFs safety is not adequately ensured, i.e. in line with strict requirements and respective measures that considers climate change. Unfortunately we might have to face up to 1% of all TMFs are going to have a dramatic failure as analysis of the past historical accidents demonstrates (<https://www.umweltbundesamt.de/en/topics/sustainability-strategies-international/cooperation-eeca-centraleastern-european-states/project-database-advisory-assistance-programme/capacity-development-to-improve-safety-conditions>). The devastating impacts of such disasters, including in a transboundary context, have been demonstrated by major industrial accidents within and beyond the United Nations Economic Commission for Europe (UNECE) region over the past decades.

To fight these consequences, it is clearly necessary to raise the safety level of TMF worldwide.

As acknowledged international TMF safety standards were missing the German Federal Environment Agency (FEA/UBA) developed, together with the UNECE TEIA Convention the Safety guidelines and good practices for tailings management facilities (https://unece.org/DAM/env/documents/2014/TEIA/Publications/1326665_ECE_TM_F_Publication.pdf). Even more, to support the implementation of the TMF Safety Guidelines, the FEA worked out the so-called TMF Safety Methodology consisting of a Checklist to screen the actual safety situation of TMFs and a Tailings Hazard and Risk Index to assess the actual hazard and risk of TMFs (THI vs. TRI) in a regional, national and international scope.

In the following years German Federal Environment Agency (FEA) analysed nearly 1000 TMFs located in the UNECE region, for which adequate safety conditions and measures have to be put in place and offered training and learning exercises to support countries in implementing advanced safety procedures at TMFs in their country.

To complete the picture the actual activity in TMF Safety in Kyrgyzstan is trying to add missing interlinkages to the TMF Safety Methodology, in especially the:

- Education and integrating of the Checklist Methodology;
- inventory of TMFs;
- land use planning aspects;
- alert system;
- cadaster system.

Based on these results of the project new policy recommendations were proposed and discussed with the representatives of competent authorities and international experts.



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1. EDUCATION ON AND INTEGRATING OF THE CHECKLIST METHODOLOGY

Introduction

To address the rising concerns about TMF safety, the UNECE published the Safety Guidelines and Good Practices for Tailings Management Facilities (Safety Guidelines, UNECE, 2014). These include recommendations to operators for the safe design of TMFs as well as recommendations to authorities on the legal basis to cover issuing permits for the safe operation of TMFs. The UNECE has called on governments of its signatory states and TMF operators to include these safety guidelines into national regulations and technical standards and for their subsequent implementation. The UBA has developed the TMF Methodology, which is based to a high degree on the UNECE TMF Safety Guidelines and consists of three main parts that can help to address actual TMF safety problems.

Problem statement

Proper control of TMF safety requires their regular inspections, performed according to national regulations, taking into account international safety requirements by offering engineering solutions for sustainable mining and environmental restoration.

During the project, a «training of trainers» has been carried out, during which representatives of CA and operators of TMFs were trained in the use of the TMF checklist.

But as the experience of previous projects shows, trainings and education should take place on an ongoing basis to achieve a sustainable result.

Recommended solution

It is proposed to establish an Interdepartmental Working Group (IWG) in charge of implementing the TMF Methodology and the TMF Checklist within the Kyrgyz regulatory framework.

The Working Group may include as an option

- the representatives of the Ministry of Emergency Situations of the Kyrgyz Republic;
- the representatives of the Ministry of Natural Resources, Environment and Technical Supervision of the Kyrgyz Republic;
- representative of the Ministry of Health of the Kyrgyz Republic.

It is recommended to name the Ministry of Natural Resources, Environment and Technical Supervision of the Kyrgyz Republic the authority which may take up the task of dealing with the TMF Methodology and the TMF Checklist further.

The TMF methodology can be used as the basis for respective national and regional training programs. It is proposed to establish a center of training for TMF operators which will directly utilize the results of the project and will use the TMF methodology as a basis for training. This center will ensure the quality and sustainability of safety education to inspectors and also will be a center of excellence keeping Kyrgyz technology and standards on a high international level. (the project partners -commit to supporting followup project activities in the future)

The Industrial Safety Regulatory Office and Mining and Technical Supervision Authority under the Ministry of Natural Resources, Environment and Technical Supervision of the Kyrgyz Republic has been recommended to be responsible for the organisation of the center of education of inspectors and TMF operators.



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2. INVENTORY OF TMFs

Introduction

Taking inventory and updating the database of TMFs is an important part of ensuring their safety. Keeping data up to date is an important and necessary task that needs to be done on a regular basis. In addition, there should be a clear separation of TMFs from other hazardous facilities.

Problem statement

At present, various state bodies maintain their registers of TMFs and there is clearly a need for harmonization and the establishment of a comprehensive electronic database, accessible to the interested agencies.

As of now, TMFs are still not listed in a separate section of the state register of hazardous production facilities. Such a separate section will make it easier to keep an inventory, make timely changes, and will help to improve the safety of the TMFs.

The regulations on the registration of facilities in the state register of hazardous production facilities have not been modified since 2017.

The last inventory of TMFs in the Kyrgyz Republic contains 92 entries for TMFs and waste heaps, but this number not been updated since the 1990s. Most of the information contained in this inventory is already outdated and does not meet modern standards. According to the data, which had been provided in the year 2020, only 56 of the 92 facilities are TMFs.

Recommended solution

It is recommended to consider making amendments and additions to the regulation on the registration of facilities in the state register of hazardous production facilities and maintaining the state register, approved by the Government of the Kyrgyz Republic of June 8, 2017, No. 356, in order to list the TMFs in a separate sub section or a separate list as facilities representing the greatest risks.

It is further recommended to harmonize existing TMF registers and to create a single, comprehensive and up to date database.

The list of 60 TMFs which has been compiled within the framework of the project and reviewed by representatives of the Ministry of Natural Resources, Environment and Technical Supervision of the Kyrgyz Republic, shall be supplemented further in the future.

It is recommended to entrust the task of separating the TMFs into a separate section of the register of hazardous facilities to the Industrial Safety Regulatory Office and Mining and Technical Supervision Authority (State Inspection) under the Ministry of Natural Resources, Environment and Technical Supervision of the Kyrgyz Republic.



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3. LAND USE PLANNING ASPECTS

Introduction

Environmental pollution, because of improper mining activities, smelting and waste disposal practices has occurred and is still occurring around the world. Environmental impact assessments and environmental protection are essential parts of modern mining operations. These aspects become increasingly important because waste produced by the mining industry is significant in volume and diverse in composition when compared to waste from other industries

The UNECE TMF Safety Guidelines address the need considerations regarding land-use planning (LUP) aspects to be taken into account when evaluating the optimum siting of new TMFs, as well as the need to carry out an environmental impact assessment and a risk assessment prior to construction.

The TMF Methodology which was developed, tested and fine-tuned in several projects in UNECE countries contains the Tailings Risk Index (TRI) which takes into account the total hazard potential to the population and the environment on surrounding territory with lower altitude than the TMF, potentially being exposed in case of an accident.

This general assessment is limited to a distance of 10 km, as historical analysis of failures demonstrates that the effects are limited to population within this distance.

Any LUP within an area up to 10 km must be based on a specific and detailed risk assessment for each individual TMF.

The same is true for potential environmental threats. Within the TRI assessment only water bodies within an area of 10 Km were considered.

Problem statement

The Industrial Accidents Convention does require that parties exchange information, consult each other and undertake cooperative measures. Data on industrial safety (TMF) generated and exchanged under article 15 of the Convention is recommended to be used to address environmental and health risks in land-use planning and siting decisions, e.g., in SEA and EIA environmental reports.

In order to protect the population and the environment of potential TMF failures, it is necessary that relevant authorities follow specific licensing procedures, and take the risk zones in the vicinity of the respective TMF into account.

All TMFs in Kyrgyzstan have already been evaluated and ranked according to the TRI index and the TMF Methodology.

However, it is necessary to define risk zones also closer to a TMF as the potential hazard is increasing exponentially with decreasing distance to a TMF.

When selecting location, designing and operating TMFs, Kyrgyz government agencies and authorities are guided by the "Sanitary-Epidemiological Rules and Standards, Sanitary protection zones and sanitary classification of enterprises, structures, and other facilities", approved by the Resolution of the Government of the Kyrgyz Republic dated April 11, 2016, No. 201. (SanPin, 2016). This resolution was approved with regards to the implementation of Article 22-1 of the Law "On Public Health" promulgated by the Government of the Kyrgyz Republic.

This document contains the basic TMF design rules and standards for the sanitary protection zones of industrial facilities and enterprises.



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Another document in force that regulates the size of water protection zones of water bodies (rivers, canals, lakes, ponds), i.e. the distance from rivers, canals, reservoirs, within which the placement of any industrial production and other hazardous objects and structures is not allowed, is the “Regulation on water protection zones and strips of water bodies in the Kyrgyz Republic”, which was approved by the Government of the Kyrgyz Republic dated July 7, 1995 N 271

But due to the fact that the San-Pin regulation does not specifically mention TMFs, it is rather difficult to apply an appropriate hazard class to new tailings management facilities.

Recommended solution

a) Risk zones

It is necessary to define risk zones also nearer to a TMF as the potential hazard is rising exponentially with decreasing distance to the TMF.

A pragmatic practical approach could be to define risk zones as follows:

- Zone A - up to 1 Km
- Zone B - 1 to 5 km
- Zone C - 5 to 10 km
- Zone D - beyond 10km

Considering the increased risk near TMFs, it is proposed to assess the need for the following restrictions: to define a zone of risk around the TMFs (along the valley, gorge, along the riverbeds), which includes the potentially affected area in case of a TMF failure. After such an assessment of the proposed risk zone, it is necessary to set limits depending on the assessment of the state and environmental conditions. Also, the topography of the area that is located on a lower altitude than the TMF should be considered.

According to the higher risk in the vicinity of the TMFs the following restrictions are proposed:

Zone	Distance, m	The new planned TMF
A	< 1000	No waterbodies, to build infrastructure facilities used by people is not allowed
B	1000 - 5000	No waterbodies, not allowed to build residential educational or medical institutions, placement of recreational centres, tent camps, parking for hunters, fishermen and tourists
C	5000 - 10000	placement of stadiums, national parks and airports, shopping centers, other objects with a mass presence of people is not allowed
D	>10000	No restrictions

This is a proposal which can be adjusted according to individual risk assessment, to established safety measures or other individual factors.

The proposed risk zones can also be used to evaluate the safety of the existing TMFs.

It is recommended to consider the following measures:

Zone	Restrictions	Recommendation for existing TMF
A	No waterbodies, buildings with infrastructure (except technical	For waterbody: build additional protection dams. An alert system is required.



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and Nuclear Safety

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	buildings) used by people are not allowed	For buildings: develop a plan to move them to a safer area. The territory of the TMF should be fenced off with barbed wire and identification signs and illuminated billboards should be placed in the risk zone, notifying of the possible grave and immediate danger.
B	No waterbodies, not allowed to build residential educational or medical institutions, placement of recreational centres, tent camps, parking for hunters, fishermen and tourists	For waterbodies: automatic monitoring stations are needed, dependent to protective measures For buildings: the construction of a protective wall or a ditch is required, which can protect the population, and especially children, in the case of an accident at TMF.
C	placement of stadiums, national parks and airports, shopping centers, other objects with a mass presence of people is not allowed	develop an emergency evacuation plan, establish a communication system between operators and representatives of the airport, stadium or park

b) Sanitary protection zones for Kyrgyzstan

Kyrgyzstan should amend the “Sanitary-Epidemiological Rules and Standards, Sanitary protection zones and sanitary classification of enterprises, structures and other facilities” regulation, approved by the Resolution of the Government of the Kyrgyz Republic dated April 11, 2016 No. 201. and “Regulation on water protection zones and strips of water bodies in the Kyrgyz Republic”, which was approved by the Government of the Kyrgyz Republic dated July 7, 1995 N 271.

It is recommended:

- to adjust the sizes of the sanitary and water protection zones according to the proposed sizes of the risk zones, as well as to take into account the recommended restrictions for these zones.
- To consider amending the existing regulation of sanitary zones, namely, by adding the term “tailings management facilities” to Section 3 on "Extraction of ore and non-metallic minerals" of the “Sanitary-Epidemiological Rules And Standards” regulation.

The Ministry of Natural Resources, Environment and Technical Supervision of the Kyrgyz Republic is recommended as an authority which may take up the task dealing with the procedure for amending the aforementioned documents.



4. ALERT SYSTEM

Introduction

With the risk zones proposed so far in especially the risk to the population can be somehow regulated.

However, for an environmental threat another approach should be implemented as rivers provide an active propagation for TMF contamination.

There can be additional dams for the protection of water bodies, however in the worst case also a transboundary contamination has to be taken into account.

This is realistic as there are six transboundary rivers originating in the country. No rivers flow into the Kyrgyz Republic. The Syr Darya River basin: called the Naryn River before it reaches the Fergana valley, the Syr Darya flows to Tajikistan and Uzbekistan. In Uzbekistan, the Syr Darya receives the Chatkal, a tributary which originates in the Kyrgyz Republic. The Chu, Talas and Assa rivers which are flowing to neighbouring Kazakhstan.

The south-eastern river basins: These consist of small catchment areas draining to China. The main rivers are the Aksay, Sary Jaz and Kek Suu, and are situated at high elevations.

Problem statement

At the moment, a national emergency response plan exists, but there is no detailed algorithm of actions for the competent authorities.

Especially, neither an International Alert Center is defined, nor specific regulations for taking threshold values from TMF failures into consideration.

The solution could be the establishment of an International Alert System to cover river catchment areas. The transboundary warning and alert system could, for example, be based on the Danube Accident Emergency Warning System (AEWS).

Recommended solution

To deal with transboundary contaminations by potential failures of TMFs, Kyrgyzstan has to develop a functioning International Alert-System based on the Danube Accident Emergency Warning System (AEWS).

The main elements of this strategy might be to define centres responsible for communication the necessary information and for TMF failures to take into account specific threshold levels (see table 1) in order to activate the Kyrgyz Alert-System in time and accordingly warning neighbouring countries and initiate emergency response measures.

Table 1. Specific threshold levels

	River flow rates ³ < 1000 m / s	River low rates ³ > 1000 m / s
Tailings waste (in TMF)	≥ 1 00.000	≥ 10 00.000
Radioactive waste	1250 gigabequerels (Gbg)	1250 gigabequerels (Gbg)

The Ministry of Emergency Situations of the Kyrgyz Republic is recommended as an authority which may take up the task dealing with these tasks.



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5. CADASTRE SYSTEM

Introduction

It is necessary that Competent Authorities (CA) must have an accurate and actual overview to all national mining activities. The worldwide trend is to create a separate cadastre for mining. The reasons for this separation are: the relatively short- term nature of the mining rights, the mining laws relating exclusively to the right of exploiting minerals and are not modifying the property right; the boundaries of these rights are not linked to the limits of the property rights; the need for independence of decisionmaking regarding minerals and mining.

Problem statement

Historically mining and property cadastres in Kyrgyzstan have been treated separately. Traditionally, the lease was referenced on the cadastral unit to show the part of the plot of land that is subject to the lease. Nowadays, GIS technology provides a platform to integrate mineral and property cadastres – thereby showing the complete legal situation in situ, including surface and subsurface public rights and restrictions.

Recommended solution

For updating the Mining Cadastre system (Register) it is recommended to put the Industrial Safety Regulatory Office and Mining and Technical Supervision Authority under the Ministry of Natural Resources, Environment and Technical Supervision of the Kyrgyz Republic in charge for the regular updating and maintenance of the register in a uniform structure in accordance with Articles 9, 10, 11 of the Law of the Kyrgyz Republic “On tailing waste heaps and mining waste heaps”.

Within the project activities a very detailed inventory of Kyrgyz TMFs was elaborated based on to consultation with national experts and internet research. This inventory, which contains a list of 60 TMFs could be the basis for an advanced national TMF Cadastre system.

As a basis for an advanced national Cadastre System, the Questionnaires for active (see Annex1) and closed (see Annex 2) TMFs may be used. These Questionnaires were developed within the framework of the project and contain questions which in future can be easily integrated into the Cadastre system.

The Ministry of Natural Resources, Environment and Technical Supervision of the Kyrgyz Republic may be responsible for the use and adaptation of the Questionnaire to the conditions of the country by changing them in accordance with the requirements of the legislation.



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Annex 1

Questionnaire for active TMFs

1. mining cadastre registration number;
2. The Company's full name - the owner of the TMF, citizenship and contacts of the holder or a party to an agreement on mining. Geographic and administrative location of the facility;
3. date of issuance and expiry of a license or permit license agreements;
4. description of the license (permit) including the rights to the extraction of minerals, also including, where relevant, areas for the extraction (study) of minerals or mineral resources for which a license or permit was issued;
5. cadastral coordinates defining the mineral right area including any updates as a result of enlargement or relinquishment;
6. duplicate licenses, agreements, permits or mineral agreements, including all conditions;
7. The size of TMF (area, volume, storage capacity);
8. The status of the TMF (active, suspended, filling completed);
9. If suspended – for how long and the planned schedule for recultivation/reopening;
10. THI and TRI calculated according to the TMF Checklist Methodology;
11. information about the failures that have occurred, as a result of which damage to any settlements, water resources and other natural resources. Brief description of failures and incidents;
12. information on acts of inspections, instructions, conditions, permits, documents having the right of the holder or the party to a mineral agreement from the authorized state authority of the Kyrgyz Republic;
13. information on reports, messages, notifications, other documents received by the authorized state authority of the Kyrgyz Republic from the holder or the party to a mineral agreement;
14. information on the environmental reports from of the holder or the party to a mineral agreement;
15. information on payments of established taxes and payments, including fees for suspend licenses for the right to use subsoil, environmental fees, claims for damage caused;
16. other information as may be required.



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Annex 2

Questionnaire for closed and rehabilitated TMFs

1. mining cadastre registration number;
2. The Company's full name - the owner of the TMF, citizenship and contacts of the holder or a party to an agreement on mining. Geographic and administrative location of the facility;
3. date of issuance and expiry of a license or permit license agreements;
4. The size of TMF (area, volume, storage capacity);
5. The status of the TMF (active, suspended, filling completed);
6. a brief history of the TMF;
7. availability of rehabilitating TMFs project, expert opinions on the rehabilitation project, a brief description of rehabilitation measures (design solutions) with accompanying multimedia recordings (photographs);
8. the status of the rehabilitation works, the acceptance certificates;
9. names and contacts of the design organization and that organizations providing the rehabilitation work;
10. the volume of the rehabilitation account, the schedule and dates for debiting funds from the rehabilitation account for providing rehabilitation work;
11. full name, holder's contacts, manager of the lands restored after rehabilitation;
12. THI and TRI calculated according to the TMF Checklist Methodology;
13. information about the failures that have occurred, as a result of which damage to any settlements, water resources and other natural resources. Brief description of failures and incidents;
14. other information as may be required.