

RIGOROUS RISK ASSESSMENT AS A TOOL FOR PREVENTION OF ACCIDENTS OF TAILINGS PONDS

DŮSLEDNÉ HODNOCENÍ RIZIK JAKO NÁSTROJ K PŘEDCHÁZENÍ MIMOŘÁDNÝM UDÁLOSTEM NA ODKALIŠTÍCH

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Abstract

The contribution informs briefly about the storage of waste from mining and processing minerals, particularly in a tailings pond. Tailings ponds may pose a hazard to the environment and human health and may even endanger human life, as presented by some extraordinary events (accidents) that have occurred recently in Europe. Legislative solutions to their safe operation are presented in terms of current legislation and also in terms of new European and Czech legislation. This contribution is supplemented by the information related to this issue, such as the information on BAT.

Abstrakt

Příspěvek stručně informuje o ukládání odpadů z těžby a úpravy nerostů, zejména na odkaliště. Odkaliště mohou představovat určité nebezpečí pro životní prostředí i pro zdraví lidí a mohou i ohrozit životy, jak je prezentováno na některých mimořádných událostech (haváriích), ke kterým nedávno v Evropě došlo. Legislativní řešení jejich bezpečného provozu je prezentováno z pohledu stávajících platných předpisů a také z pohledu nové evropské a české legislativy. Příspěvek doplňují informace s touto problematikou související, jako je využití informací o BAT.

Key words: mining waste, tailings pond, storage site, water management structures, risk assessment, Best Available Techniques

FOREWORD

Mining activities are one of mankind's oldest industrial activities. As a consequence now larger amounts of residues result from these activities, mainly because the often unwanted topsoil and overburden have to be removed to gain access to the mineral resources. In many cases, the amount of overburden and waste-rock that have to be transported is many times higher than the tonnage of extracted minerals. Mechanical and chemical processes are used to extract the desired product during the exploitation of deposits and produce a waste stream known as tailings. The amount of waste generated depends on the content of the desirable mineral in the deposit, its grade and the efficiency of mineral processing. This process of product extraction is never 100% efficient, nor is it possible to reclaim all reusable and expended processing reagents and chemicals. The unrecoverable and uneconomic minerals, chemicals, organics and process water are discharged, normally as slurry, to final storage sites commonly known as a Tailings Facilities. Such Tailings Facilities for mining wastes in slurry form (a mixture of particles and water) are sedimentation ponds or tailings ponds.

1 PRESENT LEGISLATION

Tailings pond is a natural or man-made space on the Earth's surface and it is used for permanent or temporary storage of hydraulically mostly deposited sludge (waste). A system of dams is part of a tailings pond according to ČSN 75 3310. Tailings ponds as buildings used for the purpose pursued by the Act No. 254/2001 Coll., on Waters, and changes to some acts (the Water Act), in particular, the impoundments and seizure (including water contained, chemically bound or detained in the stored material) are always water management

structures (hereinafter referred to as „WMS“) within the meaning of Article 55 paragraph 1 letter (h) of the Water Act. WMS - tailings ponds as buildings above all systems of dams, including basic, raising and multiple dams and functional facilities, areas of a tailings pond and discharge devices allowing a permanent or temporary storage of saturated material are under the provisions of Article 2 of the Decree No. 23/2007 Coll., defining the details of water management structures, registered in the Land Registry of the Czech Republic. Technical requirements for the construction of a tailings pond as a WMS are stipulated in Articles 3, 4, 5 and Article 15 of the Decree No. 590/2002 Coll., on the technical requirements for water management structures, as amended later.

The manner of transport of materials into the pond, or the fact that the storage was closed in the past, and other materials into the tailings pond has not been deposited yet is not decisive for the character of a tailings pond as WMS. However, it is important that such tailings pond operated at all times under the Water Act served its purpose. A tailings pond is under these conditions a WMS, even if there is no permission to treat water under Article 8 of the Water Act.

In case of doubt whether a WMS is involved or not, the water management authority with the respective territorial jurisdiction shall decide the issue.

The owners of WMSs – tailings ponds are required to observe the general obligations of the owners of WMSs listed in Article 59 paragraph 1 of the Water Act. These obligations include, for example according to Article 59 paragraph 1 letter (b) of the Water Act to maintain the WMS in a proper condition so as to avoid endangering the safety of people, property and other protected interests. The water management authority shall take decision pursuant to Article 61 paragraph 5 of the Water Act on the obligation to ensure the technical and safety supervision (hereinafter referred to as ”TSS“) of WMS. The owner of a WMS is obliged to ensure the TSS at his own account. The definition of WMS under TSS is subjected to the provisions contained in Article 3 of the Decree No. 471/2001 Coll., on technical and safety supervision of water management structures (the so-called ”designated water managements structures“).

TSS is carried out on the basis of Article 5 of the Decree No. 471/2001 Coll. at the preparation stage, at the stage of construction or reconstruction, the stage of verification, stage of operation and continuous operation (continuous operation means the period during which the tailings pond is a WMS).

Only a qualified person authorized by the Ministry of Agriculture (hereinafter referred to as ”MA“) may carry out the TSS over tailings ponds as WMSs of the categories I, II and III based on the provisions of Article 61 paragraph 9 of the Water Act. The TSS has to be carried out throughout the duration of a tailings pond as WMS, already during its preparation - Article 5 of the Decree No. 471/2001 Coll. It is always necessary to perform the TSS taking into account any specific local conditions and circumstances.

The manner of operation of a tailings pond is not decisive for ending the TSS, but the hydrostatic load of dam system water or saturated material and the safety and stability of the dam system or the reclamation of a tailings pond as a whole are crucial.

If a tailings pond was permitted as a WMS and it is operated under the Water Act, fulfills the purposes set out in the building permit, such tailings pond is the WMS until its closure (termination).

In the event that the tailings pond did not lost its character of a WMS and there is the public interest, in particular the threat to the quality of surface water or groundwater and the threat of further damage, and if the person responsible do not properly implement these obligations and has failed to remedy within the prescribed time, the water authority pursuant to the provisions of Article 59 paragraph 5 of the Water Act shall take decision that another person will take over the operation or maintenance of such pond dam for the appropriate period of time. The operation and maintenance, is then performed by such designated person at the expense of those who were obliged to do so.

Tailings ponds are raised in several stages as mining activities proceed and the tailings content in the impoundment increases. Numerous methods of constructing tailings pond embankments, as well as, placing tailings into the tailings pond exist. For tailings ponds physical stability is of crucial importance, as a failure could lead to significant consequences due to the immediate impact of any material transported out of the facility as a result of the failure and the resulting short, medium and long-term effects. Any mining waste, including inert waste, may cause an environmental impact due to the formation of high levels of suspended material in the receiving waters or by forming a layer on top of downstream land due to a failure.

It is important to acknowledge that tailing dams are unique compared to water retention dams, because they are forever. There are many different criteria that need to be considered before choosing a design of dam. It can be e.g.

- terrain and dam location
- surface hydrology
- size of dike
- closure options

- grain size distribution
- environmental concerns

As mentioned above, a very important factor to consider is physical stability of dams. There are some forces, as a hydraulic force, tailings force, uplift force, natural force, seismic force and back fill force and of course the very weight of the dam construction effecting the dams. Dam failures as well as incidents related to the stability of the tailings dam may be caused by several factors (BREF 2009), some of which are mentioned below e.g.:

- inadequate foundations
- overtopping of dams
- frost heave and thaw weakening
- seepage
- internal erosion
- external erosion
- changes in geotechnical properties of the dam over time

It is not so important, how a risk location is designated, whether as a tailings pond, sludge pond, sludge field, sludge treatment, storage space, sedimentation tank, etc. (Picture 1). It is always important that their operations take place in a certain legal regime. Nobody cannot get rid of the responsibility for damage caused by the operation, such as sludge treatment requirements as defined in Article 36 of the Act No. 44/1988 Coll., on the Protection and Use of Mineral Resources (Mining Act), as amended later, noting that the sludge field is nowhere defined, as in the same paragraph there is also mentioned the treatment of minerals is an integral part of the activities associated with the waste management for mining and processing, which are requirements of the Mining Act with respect to mining claims determined in its entirety for these structures.



Pic. 1 Subaerial tailings discharge (after processing of kaolin)

Accidents of some tailings ponds in Europe can confirm the above mentioned theory. Pictures of damaged dams in Alnacoraz, Spain, (Jordan,G, 2004) in Baia Mare, Romania or recently in Kolontaru, Hungary have been seen around the world.

From the report of the International Task Force for Assessing the Baia Mare accident it can be seen that there is usually a combination of reasons for failures of tailings dams. In this case the accident was in summary caused by:

- use of an inappropriate design
- acceptance of that design by the permitting authorities
- inadequate monitoring and dam construction, operation and maintenance

Failures of two larger dams – the above mentioned in Baia Mare and the copper operations near Seville were the main reasons for the formulation of the Directive 2006/21/EU.

Although the accident in Hungary near the town of Ajka (Picture 2) was not caused by the operations of facilities related to mining activities, there was used such equipment to store the sludge from metallurgical operations which was similar to that one used to store mining wastes, and the course of the accident and its consequences were similar to those that occurred during mining activities.



Pic. 2 Dykes accident in Kolontár

Wastes from the treatment of minerals, which are uniformly labeled throughout the European Union as tailings, can be stored in the Czech Republic only as provided by applicable law and its implementing Decrees. These structures were built in accordance with the applicable regulations and in particular the Decree No. 51/1989 Coll., on safety and occupational health and safety in the treatment of minerals, as amended later, imposing requirements for safe operations of heaps and tailings ponds. These requirements were determined by the supervisory authority and the formulation of these requirements was based on the experience of mining inspectors and the evaluation of requirements of previous legislation.

The decrees of the Ministry of Industry from 1947 and 1948 issued under the Act No. 57/1928 Coll., on the establishment and scope of mining authorities, were among the first regulations governing health and occupational safety in processing plants, i.e. the Decree No. 420 of 4th April 1947, on the mining - police regulations on transport, walking and driving in the mining sites and the Decree No. 2391 of 10 July 1948 on machinery and equipment for surface mining sites.

The Edict of the Central Bureau of Mines ref. No. 5000/1958 for prospecting, exploration and mining of ore and non-ore deposits, issued pursuant to Article 57 paragraph 1 letter (d) and paragraph 2 of the Act 41/1957 Coll., especially the part 17 of this Edict, was a new regulation that contained requirements for possessing minerals on a wider scale. The part 17 cut down more detailed requirements for storage, mills and grinders, as well as requirements focused on kaolin, where filter presses were indicated as dangerous, such hydrocyclones as well, even though this simple device is more interesting in terms of technological requirements for quality than for safe operation. A great deal of attention was paid to rotary furnaces and shaft kilns.

In 1971, the Czech Mining Authority (hereinafter referred as „CMA“) issued the Edict No. 1/1971, which repealed the Decrees of 1947 and 1948. This Edict contained in Part 14 the requirements for processing plants and coke ovens and the additional requirements have been split into other parts of this Edict, such as requirements on the heaps and dumps that are included in Part 6, Section II.

The statistics incidents demonstrated how adequate are still the requirements for safe operation of heaps and tailings ponds. No heap accident occurred during the whole period 1987 – 2009. Regarding the tailings ponds, there is just one accident in Zlaté Hory. This accident occurred on 12 December 1987 at a tailings pond No. 03 in Zlaté Hory, of the organization Rudne doly Jeseník (Picture 3).

We know now 2 major causes of this accident: Technological indiscipline and a decrease in temperature (from 6 to -14° C). The disposal of slurries using hydrocyclones was stopped on 12 Dcemeber 1987 and the pipe were used. After some time all works were stopped and slurries were again discharged, but anybody did not think about freezing slurries on the sediments. New slurries were not placed in the centre of the tailings pond, but close to the dam. The material reached the dam followed by the dam erosion and disruption. Around 1400 m³ of flotation tailings escaped into the local stream. Remedial works were carried out, the dam was backfilled, and the creek was cleaned. No one reported any damage; no fishes lived in this creek. The value of insoluble substances decreased within a few days at the creek border with Poland from 1700mg/liter to 177mg/liter. Rehabilitation works have resulted in costs of about 80 thousand Czech Crowns.



Pic. 3 Dam failure in Zlaté Hory

Current situation in Zlaté Hory - there is currently free surface water level in the tailings pond. A total of 7 million m³ of sludge after the extraction of ore containing Cu, Zn, Pb, Ag was discharged into tailings pond. The height difference from top to toe of the pond is now 60 m. A new bypass channel was built with a capacity for very heavy rains, all the leachate is drained into a collection point. The tailings pond is monitored as for both the vertical and horizontal movements; the levels of water wells are also monitored. The tailings pond is made of grass restoration area of 22 hectares and with regard to the use of geotextile seal, and species were chosen in order their root system could not affect their performance. Birch and alder are the best trees for these conditions.

Vertical holes showed that the zone of saturation is in a sufficient depth of 8 m to 16 m, the borehole depth of 32 meters was anhydrous due to the low permeability of fine-grained sediments deposited. The pH values ranged from 7.2 to 7.8. The composition of sediments - 78% SiO₂, 7.7% Fe, 6% S, 5.6% Al₂O₃, 1.5% CaO.

Changes in levels of certain metals in pore water depthward:

Mn - a decrease of 15.6 mg/l to 1.66 mg/l.

Mg - from a depth of 15 m drop to almost zero

Furthermore, the chemistry of soils was evaluated.

Pb - downward trend to the values of 22 ppm

Cu – dropped from the highest value of over 6000 ppm to the value of around 54 ppm

Zn - the values from 2280 ppm to values of around 60 ppm

As - a steady decline in the value of 4.4 ppm.

No extraordinary steps in the operation of tailings ponds based on the evaluation of the accident in Zlaté Hory have been taken by the authorities of the State Mining Administration (hereinafter referred to as "SMA").

2 NEW LEGISLATION

Responding to emergencies of tailings ponds in Europe, the development of the European Parliament and Council Directive 2006/21/EC on waste from the extractive industries (OJ L 101/25 of April 21, 2009) was implemented, which was introduced into Czech law by the Act No. 157/2009 Coll., on the management of mining waste, and amending certain acts. Commission decisions are further documents that were prepared by the European Commission (hereinafter the "EC") for the management of extractive waste, which were gradually implemented by the Decrees No. 428/2009 Coll. and No. 429/2009 Coll.

Requirements of the Act No. 157/2009 Coll., and Decrees No. 429/2009 Coll. and 428/2009 Coll., will apply mostly from 1 May 2012 with regard to the transitional provisions of Article 23 paragraph 2 of the Act No. 157/2009 Coll.

The Act No.157/2009 Coll. was set so as to provide the public sufficient time to familiarize with the new legislation, particularly in connection with the transitional provisions, namely Articles 23 and 24 of the Act No.157/2009 Coll. (Kaňka,J, Šouša,L,Urbanc,V,2010).

The Act No. 157/2009 Coll. laid down the requirements for mining waste storage sites (hereinafter referred to as „MWS“). MWSs are heaps and tailings ponds, except for the treatment of uranium tailings. All MWS must be classified into categories. The operator works out the data for classification into categories. The Decree No. 429/2009 Coll. stipulates detailed conditions for the MWS classification. The basis for the categorization results from a risk assessment or opinion of the authorized person (for a pond). A risk assessor, who has passed the test at the CMA may work out the risk assessment pursuant to the Decree No. 298/2005 Coll. Risk assessors are listed on the website of SMA. The Decree No. 429/2009 Coll. stipulates further conditions for the classification in Articles 4 to 10 with limits for the classification due to malfunctions or incorrect operation and limits for hazardous waste or hazardous chemical substances and preparations.

The MWS with an inert mineral waste can be classified in the category I when meets conditions set out in Article 4 of the Decree No. 429/2009 Coll. Articles 2 and 3 of the Decree No. 429/2009 Coll. regulate detailed requirements on the way to evaluate the characteristics of mining waste, which includes the information on activities involving the mining waste produced, bearing the characteristics of deposits and behavior of mining waste. This Decree also contains requirements for the inert mining waste.

The operational documentation and records for the operation of heaps and tailings must be maintained under Articles 5 and 21 of the Decree No. 51/1989 Coll. The requirements for operational documentation such as requirements for the report are completed according to the Act No. 157/2009 Coll. This report will be sent to the relevant Regional Mining Authority (hereinafter referred as to „RMA“) twice a year. The operational documentation must be now kept under Article 5 of the Decree No 51/1989 Coll. for a year after the closure of MWS. The Act No. 157/2009 Coll. has the stringent requirements - 5 years and 10 years for MWS Category I with respect to any additional negative effect on health or the environment, but only with regard to the records of inspections and monitoring.

The permit of the MWS operation is similar proceedings as for the mining permit or permit for an activity carried out by mining methods. Only the appropriate operator proposes the system of checks and surveillance (monitoring) of MWS.

The operator has to ask for the closure of MWS. This stage means that the disposal of mining waste was completed and in accordance with the approved plan for remediation and reclamation the final phase will be performed ending with a new decision on the declaration that MWS is finally closed. Monitoring and inspections are carried out by this time at the MWS. The requirement of Article 6 of the Decree No. 51/1989 Coll., on the safe and usable condition, applies to all facilities for inspection measuring equipment.

Tailings ponds are equipped with drainage systems which should detect not only the precipitation, but also any leachate that may occur below the dam. Leachate consists of water passing through the tailings dam caused by its leak. No one can affect the amount of leachate resulting from rainfall. However, the quality of water before discharge into public streams can be affected. The permission for water treatment is required for the discharge of waste water (including leachate) into surface and ground water. This permission is issued by the relevant water-management authority in accordance with the Water Act.

The Act No.157/2009 Act and Directive 2006/21/EC do not allow even one state the seepage directly into surface water or groundwater that could possibly affect adversely their quality. This situation is not allowed even in the event of an accident or incorrect operation or malfunction.

The leachate from inert extractive wastes should not impair the quality of water or soil. RMA can decide with the approval of the water-management authority on the basis of a risk assessment that the collection and treatment of leachate is not necessary or it has been established that WMS poses no potential hazard to soil, groundwater or surface water, and the requirements set out in Article 12 of the Act No. 157/2009 Coll. may be reduced or waived accordingly.

Appendix 3 to the Government Order No. 61/2003 Coll., on indicators and values of surface water and waste water, “Essentials permission to discharge waste water into surface water and sewerage systems and sensitive areas”, as amended later, regulates the relevant reference values for discharging.

The provisions of Article 14 of the Act No. 157/2009 Coll. shall apply only to MWS, which pose an environmental or serious threat to human health and are classified in the category I. The principles of prevention

are described in Article 5 of the Decree No.428/2009 Coll. The obligation to prepare emergency plans required by the Act No. 157/2009 Coll. is fully consistent with the requirements of Article 18 of the Decree No. 51/1989 Coll. The emergency plan must be lucid, brief, and comprehensive and must be supplemented or amended so that it corresponds to the actual state of affairs. In cases where an emergency leads to a danger for workers in a neighboring mine or quarry, the emergency plan must also be discussed with the factory manager of such mine or quarry. The information for the regional office on the measures in the event of a serious accident is based on the requirements of Article 4 of the Decree. No.428/2009 Coll. The information for the public, which must be updated every three years, is detailed in Article 14 paragraph 5 of the Act No.157/2009 Coll. It is a legal obligation which the operator of MWS category I must meet every three years despite whether or not it was a MWS place of a serious accident. If selected dangerous chemical substances or chemical products under a special act are placed in a MWS, the procedure for processing emergency plan in accordance with the Decree No. 450/2005 Coll. is required for the use of harmful substances and the emergency response plan, the manner and extent of reporting accidents, disposal and elimination of their harmful effects.

The Act No. 157/2009 Coll. requires to carry out risk assessments every year. This is an internal matter of the operator. The operator has no obligation to send RMA the information about it.

Heaps and tailings ponds created in the exploration, extraction, treatment, or storage of minerals or the extraction, treatment and storage of peat, in order to ensure the legal status of existing dumps and tailings generated prior to the commencement of this Act, are considered to be MWS under this Act, provided that it is not excavation void with mining waste deposited. Heaps and tailings ponds, established and operated in mining activities, as well as heaps or ponds, which are operated in the mining activities carried out by mining methods depositing mining wastes are also from August 1, 2009 considered to be MWSs and shall be so designated in the relevant operational documentation.

All MWSs must be classified as the category I or II, if the predicted consequences of a short- or long-term failure due to loss of structural integrity, or due to incorrect operation of MWS could lead to serious danger for human health or serious danger for the environment. In establishing the potential of loss of life or danger for human health or the environment, the specific evaluations of the extent of the potential impacts shall be considered in the context of the source –pathway– receptor chain. Article 4 paragraph 1 of the Decree No. 429/2009 Coll. presents limits for the classification of MWSs. Article 5 paragraph 4 of the Decree No.429/2009 Coll. defines the serious potential danger for the environment and Article 5 paragraph 2 of the Decree No. 429/2009 Coll. defines the serious potential of loss of life.

Risk assessments may be carried out only by persons who have passed the CMA exam and are presented on the website. The Decree No 298/2005 Coll. regulates the requirements for professional qualifications of risk assessors.

The **Decree No. 428/2009 Coll.**, to implement certain provisions of the Act on the management of mining waste, was introduced on the basis of authorization under Article 11 paragraph 4 of the Act No. 157/2009 Coll. implementing the Commission Decision 2009/335/ES of 20 April 2009 on technical guidelines for the establishment of financial guarantee. The Decree No. 428/2009 Coll. specifies the particulars of individual report, such as the information on the results of the operation, monitoring, compliance with conditions, remediation and reclamation works, etc. The operator has this information over the whole operation available and other tasks therefore are not needed. The report must include the written and graphic information on the results of the monitoring and operation of MWS for the entire period from the commencement of operations until the date of the report. Article 5 of this Decree is important from the viewpoint of safe operation of tailings ponds, as requires developing the assessment of risk that MWS presents to human health or the environment for preventing major accidents. The requirements regarding such risk assessment refer to the requirements of Article 14 of the Act No. 167/2008 Coll. and the requirements of Article 4, paragraph 2 and Article 14 of the Act No. 157/2009 Coll.

The Decree No. 429/2009 Coll., establishing the elements of the plan for the management of mining waste, including the assessment of its properties and certain other details of the act on the management of mining waste, which implements the requirements of the Commission Decision 2009/337/EC of 20 April 2009 on the definition of the criteria for the classification of waste facilities, Commission Decision 2009/359/EC of 30 April 2009 completing the definition of inert waste and Commission Decision 2009/360/EC of 30 April 2009 completing the technical requirements for waste characterisation, is based on the statutory authorization in the Act No. 157/2009 Coll. and contains, inter alia, the requirements for risk assessment.

3 BEST AVAILABLE TECHNIQUES

The operators of MWSs have to meet the requirements of Article 3 of the Act No. 157/2009 Coll., as to the best available techniques (hereinafter referred to as „BAT“) since 1 August 2009.

In the Czech Republic primarily the Ministry of Industry and Trade (hereinafter referred to as „MIT“) is responsible for the system of the exchange of information on BAT pursuant to the Government Order No. 63/2003 Coll. According to Article 1 paragraph 3 of this Order, technical working groups (hereinafter referred to as „TG“) are established. Around 29 TGs operate in the Czech Republic. The TGs provide the preparation of documents for the relevant European technical working group to monitor the development of the best available techniques in the field in the Czech Republic, EU or international organizations, involve the BREF document translators and provide the professional translation and editing of professional presentation design, including the assessment of the clarity and technical terms used. The reference document on best available techniques for the management of tailings and waste-rock in mining activities is important from the perspective of the risk assessment of tailings ponds (EU 2009). In 2004, the TG, which deals with mining wastes and waste rock, had translated and published on the website of the MIT the reference document on best available techniques for the management of tailings and waste-rock in mining activities containing 517 pages of information about common processes and techniques, applied processes and techniques, techniques to consider in the determination of BAT, BAT for the management of tailings and waste-rock in mining activities etc. The section 2.4 deals with the tailings and waste-rock management. The detailed information about tailings dams are in the subsection 2.4.2. The risk assessment for Swedish tailings ponds is presented in point 4.2.3.1. The section 4.4 concerns the accident prevention. Chapter 5 contents BSAT for the management of mining waste. There is highlighted in the whole material the importance of risk assessment methods and selection of BAT. It is undisputable that the correct functioning of TGs is given by receiving current information on BAT for all mining organizations and that the replacement of old equipment would clearly not comply with health and safety policy, but thanks to better technology should be guaranteed even greater security and thus a lower risk level.

4 DOCUMENTS UNDER WAY

There is a large number of abandoned MWSs in the Czech Republic, which are derived historically from past centuries. Such abandoned MWSs must be evaluated in terms of their impact on the environment and health and therefore should be similarly defined in the Mining Act, such as old mine workings.

The abandoned and closed MWSs (Article 11 of the Act No.157/2009 Coll.) with a negative impact on the environment or health will be listed in the register according to Article 17 paragraph 4 of the Act No.157/2009 Coll. This obligation is in accordance with the Directive 2006/21/EC. Under that provision, the Ministry of Environment in collaboration with the CMA is required to determine the presence of closed and abandoned MWS that have or could have a serious negative impact on the environment or human health. All heaps and tailings ponds created in the extraction of minerals or treatment prior to 1 August 2009 are considered under the transitional provisions of Article 23 of the Act No. 157/2009 Coll. to be MWSs. The MWSs with potential hazard must be included in the registry, and it must be published by 1 May 2012. This procedure should therefore detect with high probability such heaps and tailings ponds, where is a danger for the environment and health. The work on this registry has been initiated. When the Act No. 157/2009 Coll. was prepared, the explanatory memorandum stated that the registry in Geofond had 4147 registered objects like MWSs in 2007, and it is estimated that from the total population of around 8500 objects the selection of about 400 for further considerations for inclusion in the registry will be made. It is expected that for these 400 objects four wells to a depth of around 50m and 10 complete sample analysis will be performed, the cost of a building would be about CZK 215 thousand (almost EUR 7 thousand) and total costs covered by the state budget about CZK 86 million (EUR 2.8 million). Currently the Ministry of Environment and the CMA try to find a way to cover such costs from EU funds.

The procedure under the Act No. 167/2008 Coll. is one way how to evaluate the MWSs in terms of risks. This Act imposes certain obligations, but from the perspective of current and background information it is necessary to wait for the requirements of a new Government Order to implement the Act No.167/2008 Coll. The Act No.157/2009 Coll. has however similar requirements concerning the risk assessment and its implementing and so has the Decree No.429/2009 Coll. This Decree imposes in Article 4, paragraph 3 the MWSs shall be classified on the basis of risk assessment in particular categories. Thus we come again to the importance of risk assessment, namely for the MWSs, which, as already mentioned, can be tailings ponds. The question is, what the evaluation will be based on. There are several sources. One of the most affordable is to use the existing GeoScience Engineering

information compiled by the BAT. But it must be taken into account that the Reference Document on Best Available Techniques for the Management of Tailings and Waste-Rock in Mining Activities was approved by the European Commission in January 2009, but it had been developed in 2004.

The idea to develop a unified methodology presented in the form of the Project of the CMA No. 13 in 2001 was right. As is clear from the experience gained so far, to develop a similar methodology for the processing plants, including dumps and tailings would be appropriate and desirable, even by reason that there is a large number of methods for risk assessment, which are now commercially available, but as for an independent and objective assessment of the issue their large number brings damage rather than benefit. However, it is important what form the document should have in respect of liabilities. To prepare such a document it would be appropriate to establish a working group of experts, CMA, trade unions, professional associations, in addition, the work group to participate as experts from the VSB- Technical University of Ostrava, etc.

Other supporting tool has been developed on behalf of CEN TC 292/WG 8 as one of the deliverables in accordance with mandate M 395 by the European Commission to CEN for the development of standardized methods relating to the characterisation of mining wastes. This supporting tool is the „Overall guidance document on characterization of mining wastes“ (hereinafter referred as „OGD“). The final version of the OGD will be sent to the European Commission and to the Technical Advisory Committee (hereinafter referred to as „TAC“) established by Article 18 of the Directive 75/442/EEC. The TAC should take decision on the final legal form of this document (N 148) valid in the framework of the European Community. Chapter four describes the Environmental Issues related to mining waste. Not only the acid/neutral rock drainage process and alkaline drainage issues, but in addition, the physical issues of dam failure and particle transport are described in this chapter. The environmental issues vary from sector to sector and within each sector depend on the mineralogy of the material, the type of processing, the size of operation and the location for depositing the mining wastes of four categories, i.e. tailings, especially slurries.

5 CONCLUSION

The Czech Republic does not underestimate the issues associated with the operation of tailings dams. As the public was informed recently, the Fire and Rescue Service staff checked selected tailings ponds in the Czech Republic after the accident in Hungary. Also, bodies of the SMA together with other relevant authorities continuously care to avoid the similar events mentioned above in the Czech Republic.

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RESUMÉ

Báňskou činností vzniká velké množství odpadů. Některé odpady jsou ukládány na odvaly, jiné v podobě kalů na odkaliště. Odkaliště je vždy vodním dílem ve smyslu ustanovení § 55 odst. 1 písm. h) zákona č. 254/2001 Sb., o vodách a o změně některých zákonů (dále jen „vodní zákon“). Technické požadavky pro stavbu odkaliště jako vodního díla stanoví vyhláška č. 590/2002 Sb., o technických požadavcích pro vodní díla, ve znění pozdějších předpisů, v ustanoveních § 3 až 5 a § 15 V pochybnostech o tom, zda jde v konkrétním případě odkaliště o vodní dílo, rozhodne na základě ustanovení § 55 odst. 3 vodního zákona místně příslušný vodoprávní úřad. Nad vodními díly je nutno provádět technickobezpečnostní dohled (TBD).

V případě, že dojde k ukončení provozu odkaliště, je třeba, aby vodoprávní úřad až do doby uvedení vodního díla do bezpečného stavu sledoval výkon TBD. Po ukončení provozu odkaliště kromě výkonu TBD, který je zaměřen výhradně na sledování bezpečnosti a stability hrázového systému, zajistí vlastník díla sledování rozsahu ovlivňování povrchových a podzemních vod výluhy z uložených materiálů; četnosti a délka období, po kterou je nezbytné (v případě úplné rekultivace odkaliště) monitorovat případný vliv na podzemní a povrchové vody se pak musí odvíjet od druhu a rozsahu znečištění těchto vod, a v neposlední řadě podle specifických místních podmínek. Odkaliště jsou budována po etapách podle zvyšujících se požadavků na úložný prostor v odkališti. Pro odkaliště je důležitá fyzikální stabilita, neboť při poruše stability dojde k následnému významnému ovlivnění okolí materiálem, který při poruše unikne a to má za následek krátkodobé, střednědobé nebo dlouhodobé dopady na okolí. Havárie odkališť, ke kterým v Evropě došlo, zvýšily zájem veřejnosti o potenciálním nebezpečí, které havárie hrází představují. Požadavky na bezpečný provoz odvalů a odkališť řešila zejména vyhláška č. 51/1989 Sb., o bezpečnosti a ochraně zdraví při práci a bezpečnosti provozu při úpravě nerostů, ve znění pozdějších předpisů. Jak dostatečné byly požadavky na bezpečný provoz odvalů a odkališť svědčí i statistika mimořádných událostí, ze které vyplývá jednoznačně, že u odvalů nedošlo za celé sledované období k žádné mimořádné události a pokud se týká odkališť byla to pouze havárie ve Zlatých Horách. K této havárii došlo 12.12.1987 u odkaliště č. 03 závodu Zlaté Hory organizace RD Jeseník n.p. Jeseník. Technologickou nekázní a poklesem teplot (ze 6 na -14 C) došlo k odstavení napouštění pomocí hydrocyklonů a použito se potrubí. Po určité době se plavilo znovu, ale nebylo zvaženo to, že materiál může namrznout a voda se přes namrzlý materiál dostala až k hrázi a potom došlo k erozi a narušení hráze. Uniklo asi 1400 m³ flotačních hlušin do místního potoka. Byly provedeny nápravné práce, hráz byla zasypana, potok byl vyčištěn. Nikdo neohlásil žádnou škodu, v potoce nežily ryby. Během několika dní poklesla hodnota NL v hraničním potoce do Polska z 1700mg/l na 177mg/l. Sanační práce si vyžádaly náklady ve výši asi 80 tis Kčs. Na základě vyhodnocení havárie ve Zlatých Horách nebyly ze strany SBS přijaty mimořádné kroky k zajištění vyšší bezpečnosti provozu odkališť. Reakcí na mimořádné události odkališť v Evropě bylo až vypracování směrnice Evropského parlamentu a Rady 2006/21/ES o nakládání s odpady z těžebního průmyslu, která byla zavedena do českého práva zákonem č. 157/2009 Sb., o nakládání s těžebním odpadem a o změně některých zákonů. Další dokumenty, které Evropská komise pro nakládání s těžebními odpady připravila, byla řada Rozhodnutí EK, které byly postupně zavedeny vyhláškami č. 428/2009 Sb. a č. 429/2009 Sb. Požadavky jak zákona č. 157/2009 Sb., tak i vyhlášek č. 428/2009Sb.a 429/2009 Sb. však v převážné míře budou uplatněny až od 1. května 2012. Zákon č. 157/2009 Sb. stanoví požadavky na úložná místa. Těmi se rozumí i odkaliště za podmínky, že nejde o vytěžený prostor s uloženým těžebním odpadem. Nejen odvaly a odkaliště, zřízené a provozované při hornické činnosti, ale i odvaly nebo odkaliště, které jsou provozovány při činnosti prováděné hornickým způsobem a je na ně ukládán těžební odpad s tím, že po ukončení těžební činnosti zůstanou jako součást krajiny, jsou navíc od 1.8.2009 považovány za úložná místa a musí být takto označeny i v příslušné provozní dokumentaci. Všechna úložná místa musí být zařazena do kategorií. Podklady pro zařazení do kategorie vychází z hodnocení rizik nebo posudku pověřené osoby (u odkaliště). Hodnocení rizik mohou provádět za současného právního stavu hodnotitelé rizik, kteří složili zkoušku na ČBÚ podle vyhl. č. 298/2005 Sb. a jsou uvedeni na webových stránkách SBS. Bližší podmínky pro zařazení potom stanoví vyhláška č. 429/2009 Sb. v § 4 až 10, kde jsou limity pro zařazování dané selháním nebo chybnou manipulací a limity pro obsah nebezpečného odpadu nebo nebezpečných chemických látek a přípravků. Zákon č. 157/2009 Sb. ukládá provádět hodnocení rizik každý rok. Jedná se o vnitřní záležitost provozovatele, kterou neoznamuje kontrolním orgánům. Pro hodnocení rizik však chybí jednotná metodiku - jaká byla např. v Projektu ČBÚ č. 13 v roce 2001. Jak vyplývá z dosud získaných zkušeností, vypracovat obdobnou metodiku pro úpravěnské provozy včetně odvalů a odkališť by bylo účelné a žádoucí a to i z pohledu velkého množství nabízených metod pro hodnocení rizik. Pro přípravu takového dokumentu by bylo nezbytné vytvořit pracovní skupinu složenou z odborníků SBS, zástupců odborových organizací, profesních svazů a dále by se na práci skupiny měli podílet i odborníci z Vysoké školy báňské. S účinností zákona č.157/2009 Sb. musí provozovatelé úložných míst plnit požadavky § 3 zákona, pokud se týká nejlepších dostupných technik (BAT). V České republice je za systém výměny informací o BAT zodpovědné primárně Ministerstvo průmyslu a obchodu. Pro různé činnosti byly vypracovány referenční dokumenty tzv. BREFy. Z pohledu hodnocení rizika, které představují zejména odkaliště, mají význam BREFy související s touto problematikou, zejména pro nakládání s hlušinou.