Final Covering and Diversion of Runoff from Wismut’s Uranium Tailings Ponds at Seelingstädt (Germany) - Status Achieved from Concepts to Realization

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Abstract

From 1960 to 1990 the former Soviet-German Wismut company milled uranium ore and processed a total of about 110,000 t of uranium at the Seelingstädt mill in Thuringia, Germany. In total about 104 million m³ of mill tailings were disposed into tailings ponds Trünzig and Culmitzsch. Since 1990 both tailings ponds have been dry-decommissioned in situ. The Trünzig tailings pond is being final covered and vegetated while the Culmitzsch tailings pond is currently being interim covered and re-contoured. In 2010 Wismut filed an application for a planning approval under water law for connecting the surface runoff from the Trünzig tailings pond to the receiving streams. In addition Wismut prepared a conceptual design for implementing the runoff from the Culmitzsch tailings pond into the regional catchment area. The paper presents the actual remediation status achieved for final covering, vegetation and runoff diversion from concepts to realization and provides an outlook to future permitting procedures and remediation at the sites foreseen to be completed by 2022.

Introduction

From 1960 to 1990 the former Soviet-German Wismut company milled uranium ore and processed a total of about 110,000 t of uranium at the Seelingstädt mill in Thuringia, Germany. In total about 104 million m³ of mill tailings were disposed into Trünzig tailings pond from 1960 to 1967 and into Culmitzsch tailings pond from 1967 to 1990. The location of the tailings ponds and the mill site are presented with the map in Figure 1. Since the mid 1990’s both tailings ponds have been dry-decommissioned in situ. To date the Trünzig tailings pond, covering ca. 117 ha and enclosing ca. 19 million m³ of tailings, has been interim covered, nearly completely re-contoured, partly final covered and vegetated. According to the requirements set by the permitting authorities Wismut has to preserve the hydrological situation given downstream in the receiving streams before remediation (1990) with respect to flood water flow resulting from the 100 year precipitation event. In 2010 Wismut filed an application to the Thuringian water authority for a planning approval under water law for connecting the surface runoff from the Trünzig tailings pond to the receiving streams. To date two of four of the respective main ditches for diversion of runoff have been built from the pond to the receiving streams. The third ditch is currently being constructed and shall be completed in 2011. Wismut is currently preparing a second application under water law to the Saxonian water authority for a planning approval to construct a runoff retention basin in the receiving stream Finkenbach creek east of the Trünzig tailings pond. This basin is located across the borderline in Saxony thus resulting in a separate permitting procedure.
To date the Culmitzsch tailings pond, covering ca. 243 ha pond area and enclosing ca. 85 million m³ of tailings has been partly interim covered and re-contoured. Final covering and vegetation including hydraulics constructions and roads is foreseen to be completed by ca. 2022. In 2010 Wismut prepared a conceptual design for implementing the runoff from the Culmitzsch tailings pond into the regional catchment area. This conceptual planning includes an evaluation of different options and identified a preferred option for positioning of the runoff ditches with respect to the need of runoff retention basins. The permitting authorities approved the results of this conceptual planning and agreed in 2011 to continue accordingly with the overall-design of the runoff diversion system.

Further more Wismut has already nearly completed the remediation of the former Seelingstädt mill site located nearby the tailings ponds. In 2006 Wismut filed an application for planning approval under water law to divert the runoff from the former mill site to the receiving streams into the Lokhaldebach creek a tributary creek of the Lerchenbach creek (see Figure 1). The Lerchenbach creek flows into the Culmitzschbach creek, which will be the main receiving stream for the surface runoff from both the entire Trünzig tailings pond and the southern part of the Culmitzsch tailings pond. This permitting procedure initialized in 2006 intensive discussions between Wismut and the permitting authorities on the future overall-conception for diversion of runoff from the tailings ponds and the mill site into the receiving streams. Recently we received the draft of the permit under water law which is currently under discussion.

The paper presents the actual remediation status achieved for final covering, vegetation and runoff diversion from concepts to realization and provides an outlook to future permitting procedures and remediation at the sites foreseen to be completed by 2022.

**Site Characterization**

The locations of the tailings ponds and of the Seelingstädt mill and the respective regional catchment areas are presented with Figure 1. The Trünzig tailings pond and the southern smaller part of the Culmitzsch tailings pond are located in the hydrological catchment area of the Culmitzsch/Pöltschbach creek, called in the following just Culmitzschbach creek. The Culmitzschbach creek is classified as a river of second order with some feeder rivers like the Finkenbach creek. The Culmitzschbach creek flows into the river Weisse Elster. The respective catchment area is 40.8 km² including the area of the Trünzig tailings pond and the southern part of the Culmitzsch tailings pond. The entire length of the creek is about 11 km. The preferential land use in the catchment area is agriculture covering 75 percent plus 15 percent used as forest land and 10 percent residential areas. The major part of the Culmitzsch tailings pond is located within the regional catchment area of the Fuchsbach creek. Both the Culmitzschbach creek and the Fuchsbach creek are flowing into the river Weisse Elster shown on the left hand side of Figure 1. The Fuchsbach creek is a river of second order with some feeder rivers. The respective catchment area of the Fuchsbach creek is 33.8 km² (including the area of the Culmitzsch tailings pond and the surrounding waste dumps). The entire length of this creek is ca. 10.7 km. The preferential land use in the catchment area is comparable with the land use in the catchment area of the Culmitzschbach creek.

The situation in 1991/92 is presented with the aerial photos on Figure 2, 3 and 4. Figure 2 provides an aerial view from East to West over the Seelingstädt mill to the Culmitzsch tailings pond in the background. Figure 3 shows the Culmitzsch tailings pond in 1991 (view from NW to SE). Figure 4 presents the Trünzig tailings pond in 1992 (view from NE to SW).
Figure 1: Locations of Wismut’s sites nearby Seelingstädt within the regional catchment area

Figure 2: Seelingstädt mill with Culmitzsch tailings pond in 1992
Figure 3: Culmitzsch tailings pond A and B in 1991 (Aerial view to SE)

Figure 4: Trünzig tailings pond in 1992 (Aerial view to SW)

The tailings ponds were constructed in former open pits. The uranium open pit mining nearby Trünzig lasted from 1948 till 1957. One layer of uranium-rich grey mudstone or siltstone respectively was mined as uranium ore. The ore layer was part of nearly horizontally bedded sedimentary rock layers of Permian age situated in a half-graben. The Permian rocks are underlain by Ordovician shales folded in the Variscan orogenesis. The Permian sedimentary rocks at the Trünzig tailings pond consist from bottom to top of a base conglomerate, mudstone, siltstone and sandstone layers (in particular the “Culmitzsch sandstone”) overlain by a thin layer of weathered dolomite residues, a weathered mudstone and an additional thick sandstone layer of lower triassic age. A geological cross section is
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The Culmitzsch tailings pond is located northwest of the Trünzig tailings pond (left side on Figure 5). The geological cross section is oriented NW-SE parallel to the general groundwater flow directions. It shows the tailings embankments, internal waste rock dumps and the major geological layers.

Figure 5: Geological cross section NW-SE across the tailings ponds

Due to open pit mining the overburden materials were relocated from open pits at Trünzig onto the waste rock dumps called Westhalde, Osthalde, Nordhalde and on waste rock dumps located inside the open pit. Four waste rock dams were erected from 1957 till 1960 enclosing two partial ponds. The dams include the West dam, East dam, Carbonate main dam and the separating dam. The separating dam has a vertical sealing wall in the dam centre. Tailings disposal lasted from 1960 till 1967 including the erection of the autostable tailings dam called North dam. Tailings from acid leaching were disposed into the northern partial pond A after being neutralized while tailings from soda-alkaline leaching were disposed into the southern pond B.

The Culmitzsch uranium open pit was mined out from 1957 till 1967. Two layers of grey mudstone or siltstone respectively were mined as uranium rich strata. The ore layers were part of nearly horizontally bedded sedimentary rock layers of Permian age situated in a half-graben. The up to 70 m thick Permian rocks are underlain by Ordovician shales folded in the Variscian orogenesis. The Permian sedimentary rocks consist from bottom to top of a base conglomerate, mudstone, siltstone and sandstone layers (in particular the “Culmitzsch sandstone”) overlain by a thin layer of weathered dolomite residues, a weathered mudstone and a sandstone layer of lower triassic age (see Figure 4). Due to open pit mining overburden materials were relocated onto the waste rock dumps called Lokhalde, Waldhalde, Jashalde, Südwesthalde and the “Innenkippen”, the waste rock dumps located inside the open pit. Three waste rock dams were erected from 1963 till 1966 enclosing two partial ponds. The dams include the north dam, the south and southeast dam and the separating dam. The separating dam has a vertical sealing wall in the dam centre. Tailings disposal lasted from 1967 till 1990.

Tailings from acid leaching were discharged into the southern partial pond Culmitzsch A applying the centerline method along the southern tailings beaches. Tailings from soda-alkaline leaching were disposed from the northern perimeter into the northern partial pond B. According to the historic discharge regime sandy tailings beaches settled near the discharge spots while fine tailings settled more distant below water table. For both the Trünzig and the Culmitzsch tailings pond the hydraulic regime in the permeable surrounding or underlying geological layers, in particular in the main aquifer

Figure 5:

**LEGEND**
- Tailings
- Dam
- Rock dump
- Groundwater flow direction
- Aquitard (shale: Obere Rote / Graue Folge)
- Aquifer (schist: Ordovizium)
- Aquitard (shale: Untere Rote / Graue Folge)
- Aquifer (sediments: Quartär)
- Aquifer (sandstone: Culmitzscher Sandstein)
- Fault
layer Culmitzsch sandstone, is closely connected with the hydraulic conditions in the permeable sandy tailings. This led to significant contaminant seepage during and after the operational phase.

**Tailings Remediation**

The remediation has to ensure the safe long-term storage of the tailings reducing the additional equivalent dose to the population from all pathways to less than 1 mSv/year (Sv = Sievert). Requirements for waste water discharge into the receiving streams were set by the authorities of Thuringia.

Dry-remediation in situ started with first securing measures against acute risks in 1991. The remediation of the Trünzig tailing pond shall be completed by 2013. The remediation of the Culmitzsch tailings pond is foreseen to last till 2022. Measures against acute risks comprised, among others, the (re-)construction of catchment systems to collect the entire seepage and runoff from the tailings ponds and construction of a water treatment plant as well as the installation of a monitoring system to track the impacts of the tailings ponds before, during and after remediation. The preferred option for remediation of the tailings ponds was agreed by the authorities in 1995 and encloses the following fundamental remedial steps:

- Expelling of pond water, collection of seepage and runoff including water treatment before being discharged into the receiving streams
- Interim covering of remaining air-exposed (fine) tailings surfaces to create a trafficable working platform for further remedial works
- Reshaping of dams to grant sufficient seismic dam stability to the long term and re-contouring of the pond surfaces with respect to the functionality and erosion stability of the final cover and landscaping aspects
- Final covering including construction of water diversion systems, access roads and vegetation with respect to (restricted) re-use of the covered surface.
- Construction of a runoff diversion system including runoff retention basins, if needed, downstream of the respective tailings pond.

Figure 6 shows an aerial view on the Trünzig tailings pond in 2011 (view to SW), which shows the current realized final cover and vegetated areas on the tailings pond and its surroundings dams in the foreground and the still ongoing re-contouring in the background. The Culmitzschbach valley is located in the foreground (north of the Trünzig tailings pond), the Finkenbach valley on the left hand side of Figure 6.

Figure 7 provides an aerial view on the Culmitzsch tailings pond (view to SE) which shows the remedial progress achieved in 2011. In the foreground one can see the Fuchsbach valley in which the Fuchsbach creek will be the main receiving stream for diversion of surface runoff from the major part of the entire Culmitzsch tailings pond. In the foreground the North dam and the tailings area has already been re-contoured. On the left hand side one can see the ongoing relocation of the Waldhalde waste rock dump. The waste rock material is being relocated onto the northern partial pond B for re-contouring. In the background one can see the ongoing interim covering in the centre of the southern partial pond. In addition the reshaping of the south dam, located in the background, has already begun.

The re-contouring of the Trünzig tailings pond was designed by 1999. The entire final cover was designed by 2002. The remedial designs for the Trünzig tailings ponds and the framework conception for the overall re-contouring of the Culmitzsch tailings pond were based on the evaluation of the technical, economical and environmental benefit following the German regulation (VOAS 1984) with
respect to guaranteeing geotechnical stability of the entire re-contoured tailings pond including the dams; minimizing the volumes of soils and radioactively contaminated materials to be removed and creating a landscape and vegetation adapted to the surrounding landscape. The conceptual re-contouring design included, among other aspects, the fixing of outlet points, positions and gradients of trenches for diverting runoff and modeling of the optimum surface contour needing the minimum fill volume to build the re-contoured surface. In addition the framework conception for re-contouring was prepared taking into account the hydrologic modelling of the runoff of the entire catchment area and hydraulic modelling of the flood levels and flooded areas along the receiving creeks. The first framework conception for re-contouring of the Culmitzsch tailings pond was prepared by Wismut in 2004 and accepted by the mining authority in early 2006.

Figure 6: Trünzig tailings pond in 2011 (aerial view from NE to SW)

Figure 7: Culmitzsch tailings pond in 2011 (aerial view from NW to SE)
Figure 6 shows the actual remediation status of the Trünzig tailings pond in 2011. The re-contouring of the dams and ponds is nearly completed. The final cover placement is ongoing and foreseen to be completed by 2012. The water diversion system has already partly been constructed. On the left hand side one can see several ponds constructed as compensatory measures according to requirements set by the authorities under environmental law.

Figure 7 shows the actual status of the re-contouring works of the Culmitzsch tailings pond. Interim covering of pond A (in the background) shall be completed by 2012. The north dam (in the foreground) was reshaped in 2007/8. The respective excavated waste rock materials were relocated on the northern tailings beaches in pond B (in the foreground). Since 2008 the northern part of the waste rock dump Waldhalde (in the foreground) is being relocated onto the fine tailings zone of pond B (Figure 7, in the foreground). Fine tailings consolidation is enhanced by re-contouring combined with the use of deep vertical wick drains. The surface contour of the pond areas was optimized based on modeling of the time-dependent tailings consolidation with respect to the designed re-contoured surface and the time dependent loading of the tailings surfaces during (future) re-contouring works. The Lokhalde waste dump (Figure 7, on the left hand side) dump east of the tailings ponds will be completely relocated. According to the framework conception for the Culmitzsch tailings pond to date round about 18 million m³ of mixed-grained waste dump materials may be needed and will be available on site for the remaining remediation of both the Trünzig and the Culmitzsch tailings pond.

Final covering

The final cover design for Trünzig tailings pond was completely permitted by 2006. The final cover design depends on the underlying tailings types. On sandy tailings beach zones (in foreground in Figure 6) the final cover consists of about a 2 m thick storage layer including a compacted bottom lift (0.5 m) above a compacted interim cover of 1 m thickness. The final cover material consists of waste dump material (mixed-grained soil) from the Lokhalde waste dump located in the vicinity of the Culmitzsch tailings pond (Figure 7, left side). On fine tailings zones the functionality of the final cover shall be granted by a minimum 2.5 m thick layer consisting of mixed-grained waste dump material (from Lokhalde waste dump (see Figure 7) and from the East waste dump (Figure 6, left hand side). Among other requirements the final cover shall grant erosion stability of the surfaces and shall provide sufficient plant available water during growing seasons. The final covering will be completed by 2012.

Currently the design of the entire final cover is being designed by our contractor C & E Consulting and Engineering GmbH (Chemnitz, Germany) in collaboration with the Engineering Division of Wismut. The final cover design will be based on conceptual site modeling on contaminant transport from the sources (tailings) to the receiving streams. Wismut plans to file the respective applications for final covering of the entire Culmitzsch tailings pond in 2012. Beforehand the preferred final cover design will be developed and discussed with the authorities taking into account the overall water management of the entire during and after closure and with regard to the long term. For evaluating the optimum final cover design with respect to the underlying tailings types and hydrological as well as hydrogeological conditions it was agreed by the authorities in early 2011, that Wismut may take credit from measures, to be designed together with the final cover design and to be realized beforehand, to improve the water management system of the sites (Culmitzsch TP, Trünzig TP and mill site) accordingly. The measure will be evaluated using the site model of contaminant transport. At the current state of design works we assume that the final design of the final cover on Culmitzsch tailings pond will be similar to the final cover already constructed on the Trünzig tailings pond. Nevertheless we expect some relevant deviations in the design, particularly along the steep slopes between tailings beaches and fine tailing zones in the pond centers of the Culmitzsch tailings pond.
Vegetation and landscaping

Based on a detailed ecological survey of the entire site the landscape planning and vegetation of the Trünzig tailings pond and its surrounding dams and waste rock dumps was designed and is currently being realized with respect to balancing ecological intervention measures and compensatory measures as well as public interests. The landscaping plan for Trünzig tailings pond was approved in the past and is currently being realized. The earthworks for re-contouring of the Culmitzsch tailings pond were designed with respect to the results of the ecological surveys. Currently the accompanying landscaping plan for remediation of the entire Culmitzsch tailings pond is being finalized. All ecological intervention measures are balanced by compensatory measures. Some of the needed compensatory measures including open grassland and lakes are foreseen to be realized about 10 km distant to the north in the Ronneburg mining area. In addition the construction supervision of all earthworks at the sites is accompanied by an ecological construction monitoring prescribing in detail the preserving or compensatory measures to be taken during ongoing construction works.

After initial establishment of grass for granting erosion protection afforestation is planned for the final cover on tailings beaches of both tailings ponds in order to assist for controlling the percolation rate. On fine tailings areas grassland will be established. Currently it is discussed with the authorities to allow for an establishment of trees on certain parts of those areas on Trünzig tailings pond. Figure 8 presents the generalized vegetation plan and the plan for land-use for the long term status (after establishment of vegetation). The plan also indicates the vegetated areas already realized to date.

Conception for Diversion of Runoff

For the entire Trünzig tailings pond the ditches for diversion of runoff on the pond area were planned based on the detailed design for re-contouring and final covering. The runoff from the borderline of tailings pond is diverted via constructed ditches to the two receiving streams Finkenbach creek (East) and Culmitzschbach creek (North). The conception encloses four main ditches for diversion of runoff from the borderline of the tailings pond to the receiving streams. These are the so-called “Diversion ditch Northwest”, “Diversion ditch North”, “Diversion ditch Eastern Dams” and the “Diversion ditch Southeast” including a runoff retention basin planned for downstream on Saxonian territory in the Finkenbach creek. The ditches are to divert the runoff from the remediated tailings pond to the Culmitzschbach creek and Finkenbach creek safely in the long term. For hydraulic stability the surface of the ditches have been or will be reinforced with gravel or stones, locally with concrete along steep slopes. Along flat reaches grass has been or will be established at the trench bottom. The runoff to the East is diverted via ditches through six pools. The water diversion system at the Eastern dams was erected before as a compensation measure for nature conservation. The runoff ditch to the north was erected beforehand as well. The respective catchment areas are already connected with the receiving streams.

One fundamental requirement set by the permitting authorities of Thuringia for the conception for diversion of runoff is to preserve the hydrological situation given downstream in the receiving streams (Culmitzschbach creek and Finkenbach creek) before remediation (1990) with respect to flood water flow resulting from the 100 year precipitation event. For this a hydrological modeling of the surface runoff was prepared for the catchment area of the Culmitzschbach creek. The hydrological modeling was carried out for the state before remediation (1990) and two states after remediation - an interim state with only grass-vegetation on the remediated areas and the long term state with establishment of grown-up trees (see Figure 2) - with respect to flood water flow resulting from the 100 year precipitation event. The results of the hydrological modeling at selected points are listed in Table 1.
Figure 8: Conceptual landscaping plan showing the planned after-use including vegetation
Table 1: Runoff at selected points of the streams with respect to flood water flow resulting from the 100 year precipitation event (without runoff retention basin)

<table>
<thead>
<tr>
<th>selected points of the streams</th>
<th>runoff [m³/s] state before remediation (1990)</th>
<th>runoff [m³/s] interim state after remediation</th>
<th>runoff [m³/s] long term state after remediation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finkenbach creek before confluence with Culmitzsch/ Pöltischbach creek</td>
<td>9.3</td>
<td>10.0</td>
<td>9.9</td>
</tr>
<tr>
<td>Culmitzsch/ Pöltischbach creek before confluence with the river Weiße Elster</td>
<td>37</td>
<td>37</td>
<td>36</td>
</tr>
</tbody>
</table>

The results in Table 1 show that the hydrological situation before remediation (1990) could be preserved for the Culmitzschbach creek. In the Finkenbach creek the runoff will be increased after remediation. Therefore a runoff retention basin has been planned to be constructed in the Finkenbach valley to control runoff from the southern part of the tailings pond into the Finkenbach creek in the long term. The planned runoff retention basin shall reduce the runoff in the Finkenbach creek to 8.9 m³/s for the two states after remediation, thus preserving the hydrological situation before remediation (1990) for the Finkenbach creek in accordance with the requirements set by the authorities. In 2010 Wismut filed an application for plan approval under water law for construction of the runoff ditches from the borderline of the tailings pond to the receiving streams and for diversion of runoff. In April 2011 Wismut filed an amendment to this application. The plan approval procedure is currently discussed with the authorities. Wismut is currently filing a separate application for plan approval under water law for the construction of the runoff retention basin, which is located in Saxony.

For the Culmitzsch tailings pond the preservation of the hydrological situation given downstream in the receiving streams before remediation (1990) with respect to flood water flow resulting from the 100 year precipitation event was also given by the permitting authorities of Thuringia for the for the conception for diversion of runoff. In addition the ditches for diversion of runoff fixed by the framework conception for re-contouring beforehand shall grant a stable runoff from the tailings pond and shall divert the runoff into the Fuchsbach creek downstream of the Wolfersdorf village. A hydrological modeling was also carried out for the state before remediation (1990) and two states after remediation - an interim state with only grass-vegetation on the remediated areas and the long term state with establishment of grown-up trees - with respect to flood water flow resulting from the 100 year precipitation event. The results of the hydrological modeling at selected points are listed in Table 2. The results in Table 2 show that the hydrological situation before remediation (1990) could be not preserved for the Fuchsbach creek without runoff retention basins. The runoff will be increased after both remediation states downstream in the receiving streams of the Culmitzsch tailings pond. Therefore runoff retention basins will be planned to be constructed north and west of the Culmitzsch tailings pond to control runoff from the tailings pond into the Fuchsbach creek in the long term. The planned runoff retention basin shall reduce the runoff in the Fuchsbach creek in the two states after remediation.
Table 2: Runoff at selected points of the Fuchsbach creek with respect to flood water flow resulting from the 100 year precipitation event

<table>
<thead>
<tr>
<th>selected points of the streams</th>
<th>runoff [m³/s] state before remediation (1990)</th>
<th>runoff [m³/s] interim state after remediation</th>
<th>runoff [m³/s] long term state after remediation</th>
<th>runoff [m³/s] interim state after remediation</th>
<th>runoff [m³/s] long term state after remediation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuchsbach creek west of Wolfersdorf</td>
<td>16.8</td>
<td>21.0</td>
<td>18.7</td>
<td>16.6</td>
<td>16.4</td>
</tr>
<tr>
<td>Fuchsbach creek before confluence with Weisse Elster river</td>
<td>27.9</td>
<td>31.9</td>
<td>29.8</td>
<td>27.7</td>
<td>27.5</td>
</tr>
</tbody>
</table>

While preparing the conceptual planning for the entire system for diverting the surface runoff we are to optimize the system with respect to minimizing the size and number of runoff retention basins as possible. Further aspect to be taken into account are avoid the use of foreign land, to avoid contact with contaminated area with regard to radiation protection and environmental law. All ecological intervention measures are to be balanced with compensatory measures. And last but not least the costs are to be reduced as much as possible.

**Outlook**

For Trünzig tailings pond we are expecting to receive a first partial permit for the NW ditch in 2011. This ditch would connect the catchment area of the entire northern partial pond to the Culmitzschbach creek. It is planned to construct the remaining parts of the NW ditch in 2011. The planning approval procedure for the erection of the runoff retention basin in the Finkenbach valley shall start in summer 2011. The situation will be complicated, because Wismut will have to handle two separate but interconnected planning approval procedures in Thuringia and Saxony for the diversion of runoff from the Trünzig tailings pond by 2013. For Culmitzsch tailings pond re-contouring works are foreseen to be continued till 2018. By this time surface runoff from the southern part of the Culmitzsch tailings pond can be connected to the receiving stream, the Culmitzschbach creek. Final covering and vegetation will last till ca. 2022. Currently we prepare a conceptual design for connecting the runoff from the major part of the Culmitzsch tailings pond to the Fuchsbach creek north of the site. Wismut plans for filing an application for planning approval under water law for the entire Culmitzsch tailings pond by the end of 2012.