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Environmental Regulation of Mine Waters in the European Union

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EXTENDED SUMMARY

All German mining and mine water related objects are regulated on the basis of European Policies and national legislation. The country has a comprehensive regulatory framework related to mining activities and water as well as environmental issues. On the basis of this legal system the environmental impacts of mining are minimised and they ensure the proper use of the mine water at any time, both during the mining operations and during the close down as well as aftercare phases. When the impairments are unavoidable, the regulations ensure to re-establish the balance between the several sectors.

The relevant authority for mining issues, water, and environmental related objectives deduced from this context are the responsible mining authorities. All decisions are resulted on basis of a horizontal (vertical) cooperation network with authorities responsible for water and environmental issues at local and regional level, as well as social groups.

Many abandoned German mines, even though they are covered by the legislative regulations, are polluting the environment and therefore a commonly agreed solution for those sites must be found. To guarantee that all relevant decision makers have the same scientific and legislative knowledge, the education of mining students or employees should be adapted and advanced training be offered. Furthermore, projects which investigate cheap and innovative methods to treat mine water should be encouraged and supported by all relevant stake-holders and authorities on national and international level (e.g. ERMITE).

From Germany's official point of view, there is no need for action or further regulations concerning the water generated and used by the mining industry, since the existing statutory provisions and regulations for active mines and future enterprises are sufficient.

D3 INSTITUTIONAL RESEARCH

GERMANY

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1 INTRODUCTION

All German mining and mine water related objects are regulated on the basis of European Policies and national legislation. In this context a major issue are the interactions of the concerned institutions within the administrative structure and how this legislation is currently applied in the practical management of mine waters. Based on the results of the discussions with the stakeholders and the national workshops related to water management, the objective of the present analysis is to outline and provide an understanding of the institutional dynamics of water regulation and management in Germany.

The structure of the report is divided into the following parts: the first part is addressed to introduce the institutions involved in the German stakeholder network. Thereafter, the relevant national legislation for mining and mine water is briefly described. A subsequent analysis will demonstrate the institutional relationships between the responsible authorities concerning the mine water and mining related objects, the discharge of mine water, the determination of limited values ("standards") as well as the mine closure procedure. In addition, for a better understanding of the institutional dynamics of mine water management, the permits and regulation procedures are delineated in three diagrams. Furthermore, mine water discharges not under the control of the mining authority ("abandoned" and "closed" mines) are listed and discussed briefly.

Finally, the interactions and impacts of new EU policies concerning mine water management on the already existing German regulatory framework will be given. In particular, the impact of the Water Framework Directive on the German institutional setup and the implementation in the German legislation will be analysed. Referring to a possible forthcoming mining waste directive its impact on the mine water regulation and management in Germany is discussed.

2 STAKEHOLDERS

The German stakeholder network includes experts from mining and environmental authorities, representatives from the mining industries and mining associations, as well as participants from environmental research centres and SMEs (Small & Medium enterprises). In the subsequent table 1 the representatives are listed.

Tab. 1: Participants in the German stakeholder network outside of the Freiberg University of Mining and Technology in the German stakeholder network.

Mining Industries	Deutsche Steinkohle AG (DSK)	Lausitzer Braunkohle Aktiengesellschaft (LAUBAG)	Mitteldeutsche Braunkohle mbH (MIBRAG)	RWE Rheinbraun AG
Mining Associations	Wirtschaftsvereinigung Bergbau e.V. (WVB)	Gesellschaft für Bergbau, Metallurgie, Rohstoff- und Umwelttechnik (GDMB)		
Mining Authorities	Landesbergamt Brandenburg	Bezirksregierung Arnsberg – Abteilung 8 "Bergbau und Energie in NRW"		
(Environmental) Authorities	Sächsisches Landesamt für Umwelt und Geologie (LfUG)	Bundesumweltministerium – Referat WA I 3	Steuerungs- und Budgetausschuss für die Braunkohlesanierung – Geschäftsstelle (GS StuBA)	
Environmental Research Centres; Universities	Umweltforschungszentrum Halle-Leipzig (UFZ)	Swiss Federal Institute of Technology		
SMEs (Small & Medium Enterprises)	BBG Bauberatung Geokunststoffe GmbH & Co.KG	Hydroisotop-Piewak GmbH	Deutsche Montan Technologie GmbH (DMT)	

3 MAIN LEGISLATION

The legal basis for all mining activities in Germany is the Federal Mining Law ("Bundesberggesetz", BBergG as of 13th August 1980 last amended on 21st August 2002). It comprises the acts and directives applied to the mining industry, taking into account the dynamics and site specific situations of mining. The law covers exploration activities, production and processing of mineral resources as well as the after-care phase and the reutilisation process for areas which are no longer used for mining. Apart from that, additional legal provisions, related to water and environmental issues, also apply to the mining industry. The most important permits for using water during the different phases of mining are regulated by the German Water Resource Act ("Wasserhaushaltsgesetz", WHG as of 12th November 1996 last amended on 19th August 2002), by the State Water Resources Acts, and by the Waste Water Directive ("Abwasserverordnung", AbwV as of 9th February 1999 last amended on 15th October 2002). All German water legislation has already been amended to include the demands of the Water Framework Directive (Directive 2000/60/EC) or is underway to be amended. Since 1990, environmental issues are regulated by the Environmental Impact Assessment Act ("Umweltverträglichkeitsprüfung bergbaulicher Vorhaben" as of 13th July 1990). This environmental impact assessment is carried out as early as possible as part of the general Mine Management Plan procedure (according to BBergG).

Water plays an important role in almost all mining processes. The legal system ensures that besides the aims of the raw material and energy policy the aspects related to environmental and water protection are met, although no special "mine water law" or fixed mine water discharge limits exist in Germany. Generally, most of the types of water are summarily referred to as "mine water" in the process of mining, while in Germany numerous different terms exist for the water that is generated during raw material production and processing, depending on the actual kind of use (WOLKERSDORFER & HASCHE 2001).

4 INSTITUTIONAL MAPS

4.1 Permits for Mining and Water use during Mining Operations

All mining activities are regulated by mine management plans. The permits for mining related subjects, based on the regulations of the mining law, in conjunction with the other applicable laws ensure that the environment will not be unduly affected and that avoidable impairments can be kept to the necessary minimum. The relevant authorities for all mining issues are the regional mining authorities ("Bergamt"). While the permits are formally given by the responsible mining authority, all decisions are based on cooperation with the authorities responsible for water and the environment at the local and regional levels (Fig. 1). For water which is used during the different mining phases, the authorities will take their decisions in the permitting procedure on the basis of the water law and the relevant regulations (REINHARDT 1999).

Limits for mine water discharges into rivers or lakes are usually set up as case-to-case decisions by the responsible mining authority in consultations with the authorities responsible for water and the environment. Those limits are usually based on different recommendations e.g. guidelines published by the Working Group of the Federal States on water problems ("Länderarbeitsgemeinschaft Wasser", LAWA) but no fixed general mine water limits exist in Germany. Waste water from industrial facilities like lignite processing and power generation is legally treated according to the AbwV.

The licensing conditions are subject to permanent controls by the responsible authorities. This will be partly ensured by extensive monitoring programs for environmental protection. Regular checks on the operating procedures and the operational equipment will ensure that today's generally accepted practice is always adhered, too.

Differing regulation procedures are applied to in the lignite mining industry (Fig. 2) where Regional "Brown Coal Plans" are the basis for the lignite mining activities. This lignite plan is part of a regional development plan, where the objectives of regional development and state planning are defined. The lignite plan is prepared by the responsible Regional Planning Association in cooperation with the local environmental authorities. Representatives of the communities, the region and other social groups work together with the responsible authorities during the permission procedure for the lignite plan. Therein, the political, economical and ecological as well as the environmental targets are described in a broader matter. During this procedure the citizens, NGOs, the environmental associations, and the authorities have many possibilities to influence the planning. This interaction helps to minimise the environmental impact during the mining operation and during the mine closure phase. Subsequently, the lignite plan is approved by the

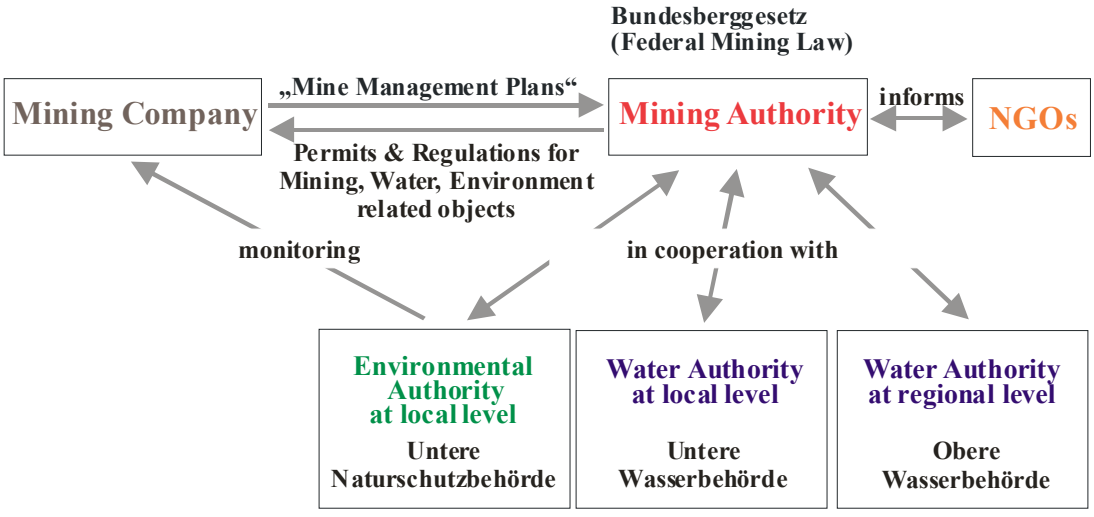

Fig. 1: Simplified scheme for the institutional relationship for the application of permits for mining operations (except lignite mining).

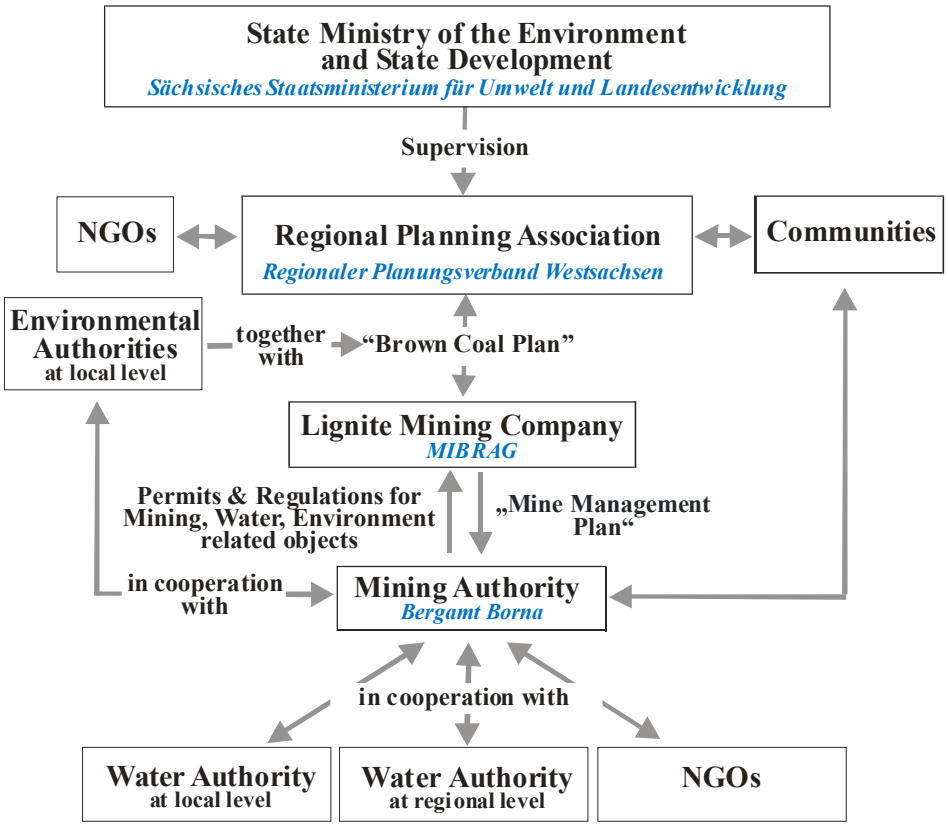

Fig. 2: Simplified scheme for institutional interaction for legislative regulation in lignite mining in Germany exemplified by an open pit lignite mine in Saxony.

competent authority (e.g. the Saxon State Ministry for the Environment and State Development). Besides this, the same procedure as already described above for normal mining operations applies for permits in lignite mining, too.

When the mining operations ceases, the mining operator has the statutory obligation to recultivate the land surface that was used for mining purposes. All measures for the closing down process contained in the "Mine Closure Plan" have to be permitted by the responsible Mining Authority (Fig. 3). These measures must ensure that the closed down mine is not a risk to the environment and other sectors. The mining authority in cooperation with the responsible environmental authority is conducted regular checks on the measures of the closure procedure. The supervision by the mining authority will only come to the end, when no dangers can be expected to derive from the closed mine.

4.2 Mine water discharges not governed by the mining control authority

Mines that are not governed by the mining control authority are mines that were closed before the BBergG came into force or mines that are closed in accordance with § 69(2) BBergG ("Bergwerke die nicht der Bergaufsicht unterliegen"). Those mines are usually referred to as abandoned or closed mines, but other terms are in use, too (UNITED NATIONS ENVIRONMENT PROGRAMME; CHILEAN COPPER COMMISSION 2001).

The current situation in Germany as mentioned above shows that German legislation, also derived from the European Directives, regulates all environmentally relevant matters during the operating phase as well as during the mine closure and after-care phases in an extensive and sufficient manner.

Should at some indefinite future date, contrary to expectations, the former mining facilities and areas, especially areas used for underground mining, constitute a risk after the mining authority has been released from its supervision, § 58 BBergG becomes effective. In cases where no responsible owner can be made legally obligable for mining induced damages ("Bergschaden") according to article § 114 BBergG article § 122 BBergG ("Bergschadensausfallkasse") comes in

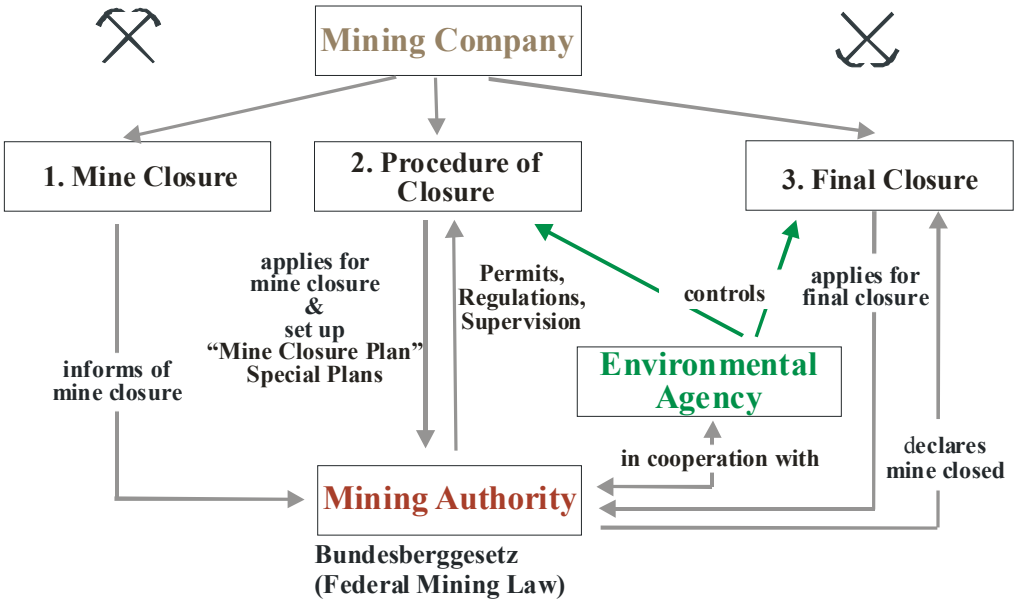

Fig. 3: Simplified scheme for a mine closure procedure.

force. These fundamental regulations based on the mining law thus contain lasting and strict obligations concerning the closure of mining companies in Germany.

Nevertheless, there are numerous untreated mine water discharges and drainage water effluents at German mine sites that pollute surface water on a local or regional scale. These are cases, where the authorities were or are not able to regulate mine water discharges because the mines are abandoned or were properly closed in accordance with former laws (Tab. 2). Those cases are e.g. poly-sulphide underground mines within the Freiberg/Saxony area, mercury mines in the Saar-Nahe-Basin, or the Mechernich/Eifel lead-zinc mining area which are finally disused before commencement of the German Federal Mining Law (ANONYM 1995; WIEBER 2002). The environmental impact in the Freiberg region is caused by heavy metal leaching of heaps and tailings and acid mine drainage (BAACKE 2000). The mine water is characterised by low pH values and high contents of heavy metals, arsenic, and aluminium. In the recent years several research projects have investigated geochemical processes and the heavy metal transport within the underground mine.

The Lead-Zinc mine Mechernich/Eifel was closed in 1957 caused by an economic change. The low metal content in the sandstone were only extracted economical by an expanded mining area. The plumbiferous sand as a product of the ore processing was deposited in tailings and heaps. Erosion processes of wind and water distributed the plumbiferous sand within an area of several square kilometres (SCHALICH et al. 1986). Furthermore, mine water outflow from the Burgfeyer Stollen with high contents of zinc, cadmium, and nickel discharges into the Veybach and river Erft. Every year large amounts of zinc (25 tonnes) and of nickel (12 tonnes) pollute the river Erft (CHRISTOFFELS & SCHINDLER 1996; LUA NRW 2002, pp.74—76, p. 201). Furthermore, numerous mine water discharges are not treated according to the existing environmental regulations. Reasons are, that no one is declared to be responsible or declares himself responsible, or the discharge is not seen to be of risk to the environment or people.

An example for a mine not governed by the mining control authority is the Fluorspar mine Hohenwarte/Harz. In 1985, economic reasons caused the closure of the Hohenwarte fluorspar mine near Gernrode. Despite poor water quality and still under the GDR Mining Law (BergG DDR) the mine was closed with the requirement to use the mine's drainage adit as a water reservoir. After the end of utilisation the Hohenwarte fluorspar mine should finally be closed. As a result of the German reunification the former mine owner has disappeared, thus the mine belongs to the Federal State Saxony-Anhalt now. The discharged mine water is characterised by a high conductivity and content of sulphur, iron, manganese, and zinc, and causes a decrease of the water quality of the neighbouring river (TAMME 2001). Despite discussions among the authorities and owners involved since several years now, no solution is found as yet.

Tab. 2: Examples for mine water discharges not governed by the Mining Control Authority (without order). Usually only one adit per mining area is listed.

name of the adit or mine	mine site
Ernst-August-Stollen /Harz	Oberharzer mining area
Burgfeyer Stollen	Grube Mechernich/Eifel
Rothschönberger Stollen	Grube Freiberg
Langer Stollen	Grube „Jeremias Glück“ (Saalfelder Feengrotten; however: § 129 BBergG)
Karls-Glück-Stollen	Grube „Schmittenstollen“, Lemberg
Elias-Stollen	Grube Königsberg near Wolfenstein
Stollen Fachbach	Grube Mühlenbach near Arenberg
Stollen Altena I	Grube Dahle near Dahle
Babarastollen	Silberberg near Bodenmais
Vereinigungsstollen	Zeche Morgenstern near Witten-Bommern
St. Johannes Erbstollen	Zeche Johannes Erbstollen near Witten/Ruhr
Husitenstollen	Sächsische Schweiz
Kronprinz-Friedrich-Wilhelm Erbstollen	Grube Stahlberg Müsen
Adelheid-Stollen	Grube Holzappel
Stollen Niederpöbel	Schmiedeberg/Erzgebirge
St. Christoph-Stollen	Bärenhecke/Erzgebirge
Königlich Verträglicher Gesellschafts-Stollen	Halsbrücke (Freiberg mining area)
Zeche Johann	Sprockhövel
Zeche Schelle & Haverbank	Sprockhövel
Karlstollen	Limberg near Bad Iburg
4. Sohle	Wiesloch-Leimen
“Seydel-Stollen”	Liegau-Augustusbad
van Huylscher Stollen	Hunsrück Area
Schwefel-Stollen	near Alexisbad/Harz

5 EUROPEAN LEGISLATION INTERACTION AND IMPACTS

The Water Policy in the European Union to date consists of about 30 directives which directly or indirectly influence the water management. New European Framework policy will potentially help to solve problems related to water and mining and the use of them on the basis of a sustainable development at an international level. This is also the case with the Water Framework Directive, so a broadly based system of regulations for water protections is available. New EU polices are and have to be implemented in the German legislation system. With respect to the implementation of the EU Water Framework Directive into the Member States' regulations river catchment management plans are compiled independently from administrative boundaries and in cooperation with relevant Member States within the same river catchment area (SMUL 2002). In the German water management legislation on a catchment scale required by the Water Framework Directive new principles and methodologies will be adopted to the already existing water management. The implementation is managed by the Working Group of the Federal States on water problems (LAWA) in cooperation with the Federal Environmental Ministry (BMU). The transposition of the Water Framework Directive will be accomplished by amendments of the German Water Resource Act, the water laws in the individual federal states and by various decrees, until the end of December 2003 (LAWA 2001).

With the adoption of the amended water law on the national level as of 19th August 2002 (German Water Resource Act), the transposition of the 16 water laws at state level are starting now. Moreover, the LAWA group has compiled a working paper that could help the responsible water management authorities to implement the Water Framework Directive (LAWA 2002).

The previous discussions on a national level showed that the German water legislation already contains the permits, grants, and assent procedures required by the Water Framework Directive. Therefore no new concession regulations for the water management are necessary (LAWA 2002). Nevertheless, the water law in the future will also contain water-related requirements, i.e. for industry and agriculture. It will also play a very important role for the permitting process of mining activities (BUNDESMINISTERIUM FÜR UMWELT, NATURSCHUTZ UND REAKTORSICHERHEIT 2001).

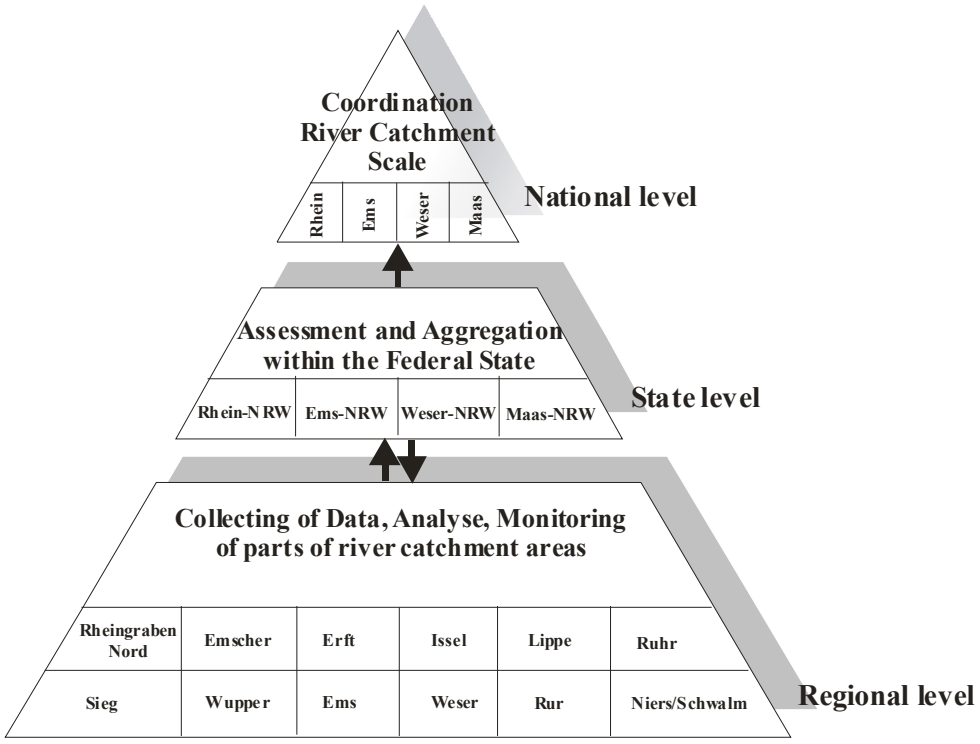

Fig. 4: Interaction of institutions regarding implementation of the Water Framework Directive in the German legislation exemplified by North Rhine-Westphalia (modified after FRIEDRICH 2001).

One major issue in this context of the implementation concept is how to build up the water administration within the existing German administrative structure prescribed by the Water Framework Directive, and which power should be delegated to these authorities (LAWA 2001).

For water management coordination in catchment areas where the hydrological boundaries are within two or more Federal States a coordination committee is built up (Fig. 4). Within a Federal State the water management is reorganised, i.e. a co-operation with concerned authorities at a broader level will take place. In the first step the structure of the water authorities are transposed. The administrative structure depending on the conceptual tasks is divided into several working groups at state and regional level. Leading authorities for the implementation process of the EU Water Framework Directive at state level are the State Ministries of Environment and at regional level the water authorities and environmental agencies (BAUMGART, IRMER & PATT 2001). At state level a working group for the synchronisation between the several parts of a river catchment area is built up where representatives of water authorities at state level and water associations are involved. Responsible authorities in the respective part of the river catchment area are the environmental agencies at regional level in cooperation with representatives of water associations, communities, districts, and local working groups (FRIEDRICH 2001).

Germany, in principle, welcomes the changes in the current version of the proposed draft of a mining waste directive albeit some regulations might cause a long and detailed set of rules which require separate approval for each individual mining activity and thus seriously impair the competitiveness of the whole mining industry. Concerning mine water, BMWI (2002a, b) states, that no further directive is necessary and that mine water issues can be regulated by the decrees of the Water Framework Directive.

According to several stakeholders, there is no need for action or further regulations concerning the water generated and used by the mining industry, since the existing statutory provisions and regulations for active mines and future enterprises are sufficient enough.

6 CONCLUSIONS

The results of this report show that Germany has a comprehensive regulatory framework related to mining activities and water as well as environmental issues. On the basis of this legal system the environmental impacts of mining are minimised and they ensure the proper use of the mine water at any time, both during the mining operations and during the close down as well as after-care phases. When the impairments are unavoidable, the regulations ensure to re-establish the balance between the several sectors. This is due to the fact that the provisions and regulations of the mining law as well as the relevant statutes are being complied with at any time.

The relevant authority for mining issues, water, and environmental related objectives deduced from this context are the responsible mining authorities. All decisions are resulted on basis of a horizontal (vertical) cooperation network with authorities responsible for water and environmental issues at local and regional level, as well as social groups.

However, a European Legislative Framework could potentially help to solve problems related to closed and abandoned mines and could provide managerial guidelines to realistic site specific standards on a case-to-case base. From the authors' point of view, many abandoned German mines, even though they are covered by the legislative regulations, are polluting the environment and therefore a commonly agreed solution for those sites must be found (tab. 2).

To guarantee that all relevant decision makers have the same scientific and legislative knowledge, the education of mining students or employees should be adapted and advanced training be offered (as already undertaken in Saxony). Furthermore, projects which investigate cheap and innovative methods to treat mine water should be encouraged and supported by all relevant stake-holders and authorities on national and international level (e.g. ERMITE).

From Germany's official point of view, there is no need for action or further regulations concerning the water generated and used by the mining industry, since the existing statutory provisions and regulations for active mines and future enterprises are sufficient.

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