Mining and water in Germany – Legal framework and technical aspects

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A. LEGAL FRAMEWORK

Germany has tried to establish a legal system that balances the interests of

- raw material and energy politics and
- environmental and water protection aspects

The term mine water, however, is not defined in German law. There is no legal definition for it. This is why there is no specific “mine water law” or specified legal provisions for mine water discharge. In the common sense of the word, mine water for us means ground water that is generated during the mining process. It is therefore treated like ground water that is affected by mining processes.

I. During the mining phase

1. Federal Mining Law

According to the German system mine water is first of all covered by the legal basis for all mining activities in Germany, the Federal Mining Law ("BundesBergGesetz dt. august 13th, 1989, last amended on august 21st, 2002). This federal mining law is the basis for all directives and administrative acts applying to the mining industry. It covers all mining activities from the exploration phase to the production and processing of mineral resources up to the after-care phase and the reutilisation process for abandoned areas. The obvious advantage for us is that we have only one authority for permits that is familiar with the dynamics and the site specific situations in the mining industry, that is the mining authority ("Bergbehörde").

Mine water activities are treated and judged as follows, during the different stages of mining operations:
For mining operations in Germany we need the so-called mine management plans ("Betriebspläne").

There are relatively general so-called frame plans covering mining activities for appr. 20 years ("Rahmenbetriebsplan"), plans for the next 2 years ("Hauptbetriebsplan") and detailed plans for every technically separatable mining activity ("Sonderbetriebsplan"). The shorter the ranges of these plans are the more specific they become.

Frame plans can only be approved by the mining authorities ("Bergamt") if it is made sure that the environment is not unduly affected and that avoidable impairments connected with mining are kept to the neccessary minimum. This has to be stated by the so-called environmental assessment study ("Umweltverträglichkeitsstudie") as the most important part of the frame plan. One of the most important environmental aspects is of course water.
In general, water related aspects shall be concentrated within the admission of the frame plan. However, if the frame plan covers a different range of time or if a different geographical range has to be looked upon this concentration is of course not possible. No matter which pocedure has been chosen - the general mining plan or the "isolated" water permission - the permission has to be given on the basis of German water law and other relevant legislation. The way we get to the water permission is in other words only a matter of procedure and not of material legal requirements.

2. Water Management Act (Wasserhaushaltsgesetz)

In addition to the Federal Mining Law there are several laws that either the mining authorities or other relevant authorities have to take into account. When it comes to mining and water the most important law is the German Water Resource Act ("Wasserhaushaltsgesetz" dt. nov. 1996, last amended august 2002.). This last amendment implements the EC-Water-Framework -Directive 2000/60/EC. One of the most important aims of the directive is to achieve a status for all waters that can be qualified as "good". Therefore a comprehensive state water control was installed: all usage of water including ground water is subject to prior state control. Water usage in general has to be authorized by the water authority - or in our case the mining - authorities. Only ground water usages on a minimum scale for private, gardening or farming matters do not require prior authorization.

For the mining industry this means:

- the extraction, transportation to the surface and/or the piping / draining off of ground water
- the discharge of raised mine waters into ground water or surface waters
- the damming-up, lowering or diversion of ground water

are subject to prior authorization. This authorization may only be refused if the proposed usage is expected to contradict public interests. This is definitely the case if public water supplies are expected to be endangered. In other words: an authorization will not be given unless it is made sure that there will be no impairment. If there is any concern that an impairment might be possible the authorization will be refused. If it is possible this concern may be invalidated by collateral clauses, appropriate measures or supplementary orders or limitatons. Material or elementary requirements, however, are not imposed by the Water Management Act - which is quite logical because the concern of an impairment is a sufficient reason for a refusal. The authorities of course have internal guidelines to standardize their range of possible judgements. In this context it might be of interest that decisions by the mining authorities acting as water authorities have to be made in agreement with the general water authorities. This means that there is no exceptional position for the mining industry.

In former times licenses were issued which were irrevocable and unlimited. These, however, turned out to be too unflexible for today`s environmental challenges. If an authorisation is given today it is therefore generally given as a permit which is revocable and given for a limited time.

The installation and the operation of pipelines for the transportation of potentially water polluting materials - for example to regulate the in-coming tide - as well as the installation and the operation of pumping plants are also subject to authorisations.

Environmental legislation in Europe and especially in Germany gets stricter all the time which is why nowadays, mine water management is no longer looked upon as an integral and substantial part of mining activities (which are of course subject to the mining plans) but - under certain circumstances - as a procedure of it`s own. In 2001 the EU Guideline on Environmental Assessment Procedures and other EU environmental guidelines, which have recently been transformed into German law , stated that an isolated environmental assessment procedure has to be made for the extraction, transportation and the piping of mine waters when a limit of 10 Mio. cubic metres p.a. is exceeded. Different projects by the same company that are closely related to each other and that in common exceed this limit have to be considered as one project. Since our company - the German Hard Coal Mining Co. DSK - operates 9 mines with mine water projects that interact the company sure enough exceeds these limits. However, certain mine projects can, and in our opinion have to, be looked upon as isolated projects with no relation to each other. It is thus our opinion that our several projects - when looked upon one by one - do not exceed these limits. This is why we think that we do not need an isolated Environmental Assessment Procedure for our company's mine water management.

The EU is currently also working on a Ground Water Directive; however, details or even a draft of this directive have not been released. As a consequence we do not know yet what will have to be transformed into German law.

3. State water legislation (Landeswassergesetze)

Germany is a federal republic. In certain areas, one of them being the environmental area, states are entitled to define the general terms of federal legislation. States are therefore entitled to define the general terms of the above mentioned Water Management Act. However, as there are not many such general terms in our Water Management Act, relevant state definitions are practically non existant. The most important difference these days is that the EU Water Framework Directive has not in all German states been implemented into state legislation yet. This, however, does not result in any material problems either since the dominating factor in our water permissions is of course the Water Management Act

4. Waste Water Legislation (Abwasserrecht)

There is quite a broad range of waste water legislation in Germany, all of it being federal law. Since the federal law on waste water includes standards, limiting values, test procedures and periods, charges and taxes etc., there is no need for further state legislation.

However, as long as mine water is substantially untreated it is not considered as waste water. There is a judgement of our Federal Administrative Court dating from 1992 that states this very clearly and that has not yet been revised (BVerwG 8C55/90 dt. 27.11.1992). As long as we meet the requirement that mine water is not being used and is substantially unused and substantially unchanged we don`t have to take waste water requirements into consideration.

Mine water that is used and substantially changed, in other words polluted does have to meet these waste water requirements. There is a wide range of quality standards and limits, as for example for chloride.

II. After mining operations

Once mining sites are abandoned and mining operations finally cease the mining operator has the legal obligation to present the so-called mine closure plan ("Abschlussbetriebsplan") to the mining authority. This plan has to describe the whole range of measures for the closing down process - a time schedule for tearing down the buildings, for securing pits and shafts and for the treatment of pollutions of ground, air, water etc. The plan therefore has to make sure that the mine to be closed is no risk to the environment or the public. This has to take the re-utilisation of the mining area into account. In other words: the mining authorities`control will only end when no more dangers from the decomissioned mine can be expected, not even to the public. However, we only have to create a situation for public usage that presents no risk to the public or the environment. This can be a public green or forest. If higher standards have to be met for a proposed development for a housing area or comparable use it is the investor`s responsibility to create a site that meets the applicable legal standards. It is the common opinion of both the mining authorities and the German hard coal mining industry that the mining company in this case may hand over the money neccessary for controlling pollution and creating

a public green area, that is for the necessary measures for the acceptance of the mine closure plan and that the investor then may invest it into paving or other measures that prevent a danger to the public that may be created by possible contact with contaminated grounds.

If the ground water is being polluted from the former mining site we have to control this pollution and restore environmentally acceptable standards. The technical solutions for this are certainly numerous. They are subject to a large amount of acts, guidelines etc. However, base sealings that prevent the seepage of chemicals into the ground water will always previously have to be furnished by the mining company.

Since mine water may present a hazard to our staff working in other mines or to the public because of damage caused to the surface we generally have to go on pumping this mine water forever. There have been tests with a so-called controlled rise of the mining water in the Aachen area, however, this has not had any effect on our general obligation to go on pumping.

Once it is made sure that the former mining site presents no hazard to the environment and the public the mining authority will release the site from it`s surveillance. This, however, only means that as of this date the general supervising authority will now control the site. All legal requirements will now be handled by this authority instead of the mining authorities. If problems should arise, the offender - that is the former owner of the mine or the person that committed the acts leading to the pollution - will be made responsible for securing or safeguarding measures. If an offender is no longer in existence or cannot be identified, the state will have to step in - which the State of course tries to avoid or at least postpone for as long as possible because funds are poor.

B. TECHNICAL AND GEOGRAPHICAL ASPECTS

I. Geographical Aspects

1. The deposit

In 1969 Ruhrkohle Aktiengesellschaft - (the hard coal branch is today called German Hard Coal Mining Co (DSK)) - was established from 25 independent companies (50 mines). Today the DSK manages 9 mines, 7 mines in the Ruhr area, and 2 mines in the Saar area. The Ruhr coal-deposit extends over 70 miles from west to east and over 25 miles from south to north. In the south the deposit is delimited by the river Ruhr, in the west by the river Rhine and in the north by the river Lippe.

There is no overlying rock above the Ruhr coal measures in the south. To the north of the river Ruhr the overlying rock begins to dip north and in the area of the producing mines the overlying rock has a thickness between 400 and 600 meters.
Another river named Emscher runs in the middle of the coal-deposit from east to west. For the last 100 years this river has undergone changes from human activities.

2. The landscape and the water management

The three rivers Emscher, Ruhr and Lippe are used for water management purposes. Lippe and Ruhr (in the north and south of the area) are used for the production of drinking-water and the Emscher in the middle of the area is used to drain off the waste water to three clarification plants which serve nearly 6 million people.

The river Emscher has been under reconstruction for the last ten years and it will be another 10 years before reconstruction is finished. The separation of waste water and surface water will cost 6 billion Euro.

Mine water will be discharged in these three rivers and in the Rhine from the coal mines, the quantity of discharged water being 95 million m³ in 2002.
The amounts of the different areas can be broken up as follows:

Ruhr: 40 Mio. m³,
Emscher: 25 Mio. m³,
Lippe: 18 Mio. m³ and
Rhine: 12 Mio. m³.

II. Active mines

Every mine has its own dewatering with a pumping shaft and a mine drainage gallery. In the mine drainage gallery are sedimentation basins where the water can stay for a minimum of 4 hours.

In 2002 the 7 mines in the Ruhr area pumped 21 Mio. M^3 of mine water. For these mining operations we need management plans, in which activities in the mine are described.

The following points are being considered in the mining plans:

1. safety
2. economic efficiency
3. hydrogeological coherence
4. circumstances in the mine (connections between two mines, water inflow, overflow points, for example)
5. relevant aspects of mining law and water legislation

The mine management plan, which can only be approved by the mining authority has to contain

- the minimum and maximum rate of pumping installations,
- the maximum rate of water per year and per day,
- the place where the main water drain flows into the river,
- the number of mine water tests (specimen) per year
- the chemical composition of the mine water.

The 7 producing mines drain the mine water into the rivers Lippe, Emscher and Rhine, with chloride concentrations of 10.000 mg/litre up to 60.000 mg/litre.

The above mentioned maximum concentrations of chloride are only to be found in the north of the Ruhr hard coal area where the overlying rock has a thickness of up to 600 meters.

III. Closing phase

In the last 10 years from 1993 – 2003, 10 mines and several dewatering stations were closed. Most of these were situated in the Emschermulde area, a special part of the Ruhr hard coal area described above. All the mines existing today were consolidated with neighbouring mines in former times. These mines had produced for over 80 years from depths ranging from 300 meters to 1.200 meters. They have a lot of interconnections and drifts at different levels, so after a long planning process of 6 months it was decided that the pumps of these mines would be turned off.

An overflow concept was developed so that 8 pumping shafts could be closed. Until 2006 the mine water will be allowed to rise up to -960 meters. From this point the mine water will overflow into the pumping shaft “Zollverein”.

From 2000 to 2006 the mine-water drainage will be reduced from 43 mio. M^3 to 25 mio. m^3. During the planning phase the drifts (roads) were inspected and measuring devices planned in the shafts which are back filled with concrete. The planners had also to consider all aspects relating to the surface.

Close to the city of Dortmund there are some old closed mines, which had only a single connection to the producing mines. A dam (plug) was built, which can dam up a water level from 1.000 m. The dam has a length of 50 meters and is built with a special concrete. It is designed like a cork for champagne, so that the stress is directed vertically to the surrounding solid rock. In the closing phase, old subsurface maps were checked to see if there are interconnections between mines or closed areas where the mine water can overflow.

The temperature of the mine water rises with depth. New standards in the water act limit the temperature to 28°C if the water is to be discharged a river.
It is not possible to use this thermal energy economically.

IV. The old inactive area

The old inactive mining area is situated in the south of the German hard rock area. Mining started there 200 years ago. The German hard coal mining Co. DSK is the owner of three pumping shafts located near the river Ruhr where 40 Mio. m^3 per annum are pumped to the surface.

Rainfall communicates directly with the mine water in these old mines because there is no overlying rock. The average rainfall In the Ruhr area is approximately 870 mm/m^2 a year. In the planning phase these circumstances had to be considered.

Here we have the largest pumping installations which were put into operation more than 40 years ago. Drainage of mine water into the river takes place continuously 24 hours a day.

The pumping level is situated at 200 m and the mineralisation of the mine water is low (chloride concentration in between 212 mg/l and 1.500 mg/l). The German hard coal mining Company DSK manages 20 mine water installations in active and inactive areas. All of these need a permit from the mining authority. Until 2006 nine of these 20 installations need new permits, three of them are in the submission phase, the others are in preparation.