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STATE RESERVOIR
ADMINISTRATION

THE STATE RESERVOIR ADMINISTRATION OF SAXONY

Function – Organization – Projects

Free State of Saxony

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FOREWORD

The first water reservoirs in Saxony were built as early as 500 years ago. The mining industry was booming. Man-made trenches supplied the mines with water, where it was primarily used for washing ore and in hammer mills. This led to such things as the water storage network for mining (Revierwasserlaufanstalt) in Freiberg and the Galgenteich reservoir system in Altenberg.

Industrialization came to Saxony at the end of the 19th century. The population grew – and with it the need for water. Many dams arose from this demand. Building development became especially concentrated in the river valleys, forcing people more and more to protect themselves and their property from floods. Such things as flood control reservoirs were constructed for this purpose.

Next to North Rhine-Westphalia, Saxony has the most dams in Germany. Its 23 drinking water dams are able to bridge extended dry periods. Saxony also has 33 process water dams as well as more than 80 additional reservoirs. In order to ensure effective operation and management of the Free State's facilities, the State Reservoir Administration of Saxony was founded in 1992 as the first public enterprise in Saxony. Since 1994 the State Reservoir Administration of Saxony has also overseen maintenance of the state's rivers, streams and flood protection dykes.

Since the flood of August 2002, flood protection in Saxony has enjoyed an especially high priority. After the flood, the State Reservoir Administration of Saxony was faced with the challenge of repairing 18,000 cases of damage to more than 3,000 kilometers of Order I watercourses and 12,000 kilometers of Order II watercourses as well as about 130 levee breaches. This enormous project is well into the advanced stages. Concurrently, flood protection concepts are being implemented. This is a job that will surely span across two decades to be continued by the following generation.

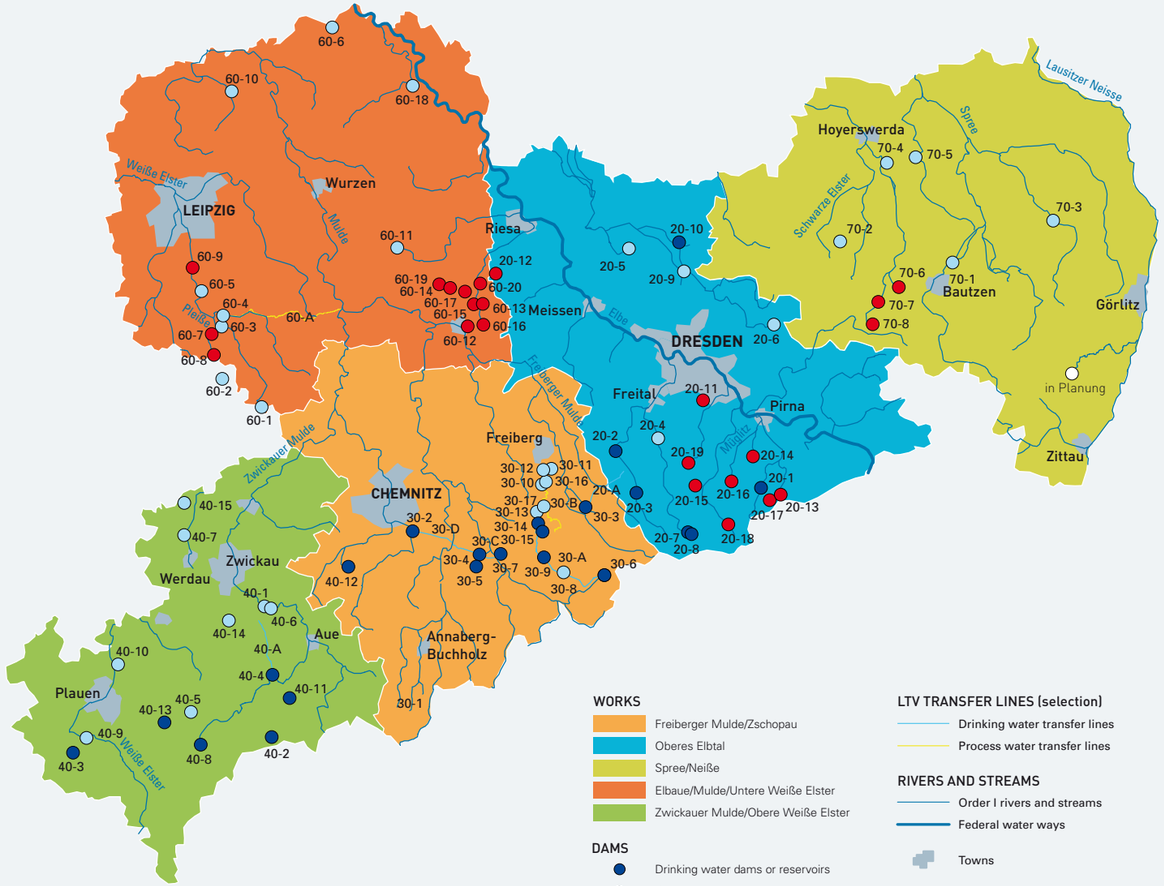
Ulrich Kraus
Managing Director

STEWARDSHIP OF SAXONY'S WATERS

Function of the State Reservoir Administration of Saxony

The State Reservoir Administration of Saxony was founded in 1992 as the first public enterprise in the Free State of Saxony. It is a part of the Saxon State Ministry for Environment and Agriculture and carries out numerous sovereign duties. These include raw water supply, watercourse maintenance and flood protection. The duties of the State Reservoir Administration of Saxony are defined in the Saxon Water Ordinance. The State Reservoir Administration of Saxony is provided a budget by the Saxon state government to perform these duties. Income from the regional water suppliers covers the costs for raw water supply. The State Reservoir Administration of Saxony employs around 700 people.

STATE RESERVOIR ADMINISTRATION OF SAXONY



WORKS
- Freiberger Mulde/Zschopau
- Oberes Elbtal
- Spree/Neiße
- Elbaue/Mulde/Untere Weiße Elster
- Zwickauer Mulde/Obere Weiße Elster

DAMS
- Drinking water dams or reservoirs
- Process water dams or reservoirs
- Flood control reservoirs
- Flood control reservoirs (planned)

LTV TRANSFER LINES (selection)
- Drinking water transfer lines
- Process water transfer lines

RIVERS AND STREAMS
- Order I rivers and streams
- Federal water ways

Towns

Publisher: State Reservoir Administration of Saxony (LTV). Source of technical data: Saxon State Office for the Environment and Geology and State Reservoir Administration Saxony. Updated: 2007

Overview of the dams, reservoirs and flood control reservoirs

WORKS OBERES ELBTAL

20-1 TS Gottleuba
20-2 TS Klingenberg
20-3 TS Lehnmühle
20-4 TS Malter
20-5 TS Nauleis
20-6 TS Wallroda
20-7 SP Altenberg
20-8 SP Großer Galgenteich
20-9 SP Radeburg I
20-10 SP Radeburg II
20-11 TS Kauscha
20-12 SP Staucha
20-13 HRB Buschbach
20-14 HRB Friedrichswalde/Ottendorf
20-15 HRB Glashütte
20-16 HRB Liebstadt
20-17 HRB Mordgrundbach
20-18 HRB Lauenstein
20-19 HRB Reinhardtsgrimma

WORKS FREIBERGER MULDE/ZSCHOPAU

30-1 TS Cranzahl
30-2 TS Einsiedel
30-3 TS Lichtenberg
30-4 TS Neunzehnhain I
30-5 TS Neunzehnhain II
30-6 TS Rauschenbach
30-7 TS Saidenbach
30-8 RWA Dittmannsdorfer Teich
30-9 RWA Dörnthaler Teich
30-10 RWA Erzengler Teich
30-11 RWA Hüttenteich
30-12 RWA Konstantinteich
30-13 RWA Mittlerer Großhartmannsdorfer Teich
30-14 RWA Oberer Großhartmannsdorfer Teich
30-15 RWA Obersaidaer Teich
30-16 RWA Rothbächer Teich
30-17 RWA Unterer Großhartmannsdorfer Teich

WORKS ZWICKAUER MULDE/OBERE WEISSE ELSTER

40-1 TS Amselbach
40-2 TS Carlsfeld
40-3 TS Dröda
40-4 TS Eibenstock
40-5 TS Falkenstein
40-6 TS Klingerbach
40-7 TS Koberbach
40-8 TS Muldenberg
40-9 TS Pirk
40-10 TS Pöhl
40-11 TS Sosa
40-12 TS Stollberg
40-13 TS Werda
40-14 TS Wolfersgrün
40-15 SP Crimmitschau

WORKS ELBAUE/MULDE/UNTERE WEISSE ELSTER

60-1 TS Schömbach
60-2 TS Windischleuba
60-3 SP Lobstädt
60-4 SP Witznitz
60-5 SP Rötha
60-6 TS Trossin
60-7 SP Borna
60-8 HRB Regis-Serbitz
60-9 HRB Stöhna
60-10 TS Schadebach II
60-11 TS Döllnitzsee
60-12 HRB Amselgrundbach
60-13 HRB Baderitz/Lüttewitz
60-14 HRB Kiebitz-Obersteina
60-15 HRB Möbertitz
60-16 HRB Mochau
60-17 HRB Noschkowitz
60-18 SP Großer Teich Torgau
60-19 HRB Schrebitz
60-20 HRB Zschochau

WORKS SPREE/NEISSE

70-1 TS Bautzen
70-2 TS Nebelschütz
70-3 TS Quitzdorf
70-4 SP Knappenrode
70-5 SP Lohsa I
70-6 HRB Goeda
70-7 HRB Karlsdorf
70-8 HRB Schmölln
HRB Rennersdorf (planned)

TS = dam
SP = reservoir
HRB = Flood control reservoir
RWA = Water storage network for mining (Revierwasserlaufanstalt)

Carlsfeld dam

Raw water supply
Almost half of Saxony's drinking water comes from reservoirs. The State Reservoir Administration of Saxony operates 23 drinking water dams with an overall storage capacity of 236 million cubic meters. It is responsible for the planning, construction and maintenance of all state dams providing water for drinking and processing. Many of Saxony's dams are linked together through a network system. If one reservoir experiences a shortage, the raw water can be supplied to the waterworks through a system of pipes, galleries, rivers and streams, ditches and ponds from another reservoir. Thus the water supply can be balanced during prolonged dry periods.

The 33 process water dams are used for low water aggradation and provide water for industrial use. Many of the process water reservoirs are also used for tourism. Some of the reservoirs such as Pöhl, Pirk, Malter and Bautzen are designated EU bathing spots. Dams shape the landscape and, in many cases, serve as a form of nature conservation.

Watercourse maintenance
An essential task of the State Reservoir Administration of Saxony is the constant upkeep of the Order I watercourses and transboundary waters. This includes in particular the development and maintenance of the banks and embankments, state-owned flood protection dykes and hydro-engineering facilities.

The European Water Framework Directive (WFD) states that all rivers must allow for the passage of migratory fish. In keeping with this, The State Reservoir Administration of Saxony has implemented a consistency program. This includes keeping watercourses which are populated by migratory fish free of weirs and installing fish ladders.

Flood protection
The flood of August 2002 caused around 9,400 cases of damage to Order I watercourses and about 8,900 cases of damage to Order II watercourses. The State Reservoir Administration of Saxony began cleanup operations shortly after the flood subsided. Flood protection concepts were immediately established for all state-owned watercourses in Saxony. The concepts contain 1,600 flood protection measures. These were prioritized so that the State Reservoir Administration of Saxony could begin right away with the most urgent construction projects. It will take several decades to implement all of the measures and will extend across generations. In order to inform all land owners of the effects a flood could have on their property, the State Reservoir Administration of Saxony has prepared danger zone maps. They are displayed in the communities and are updated as necessary.

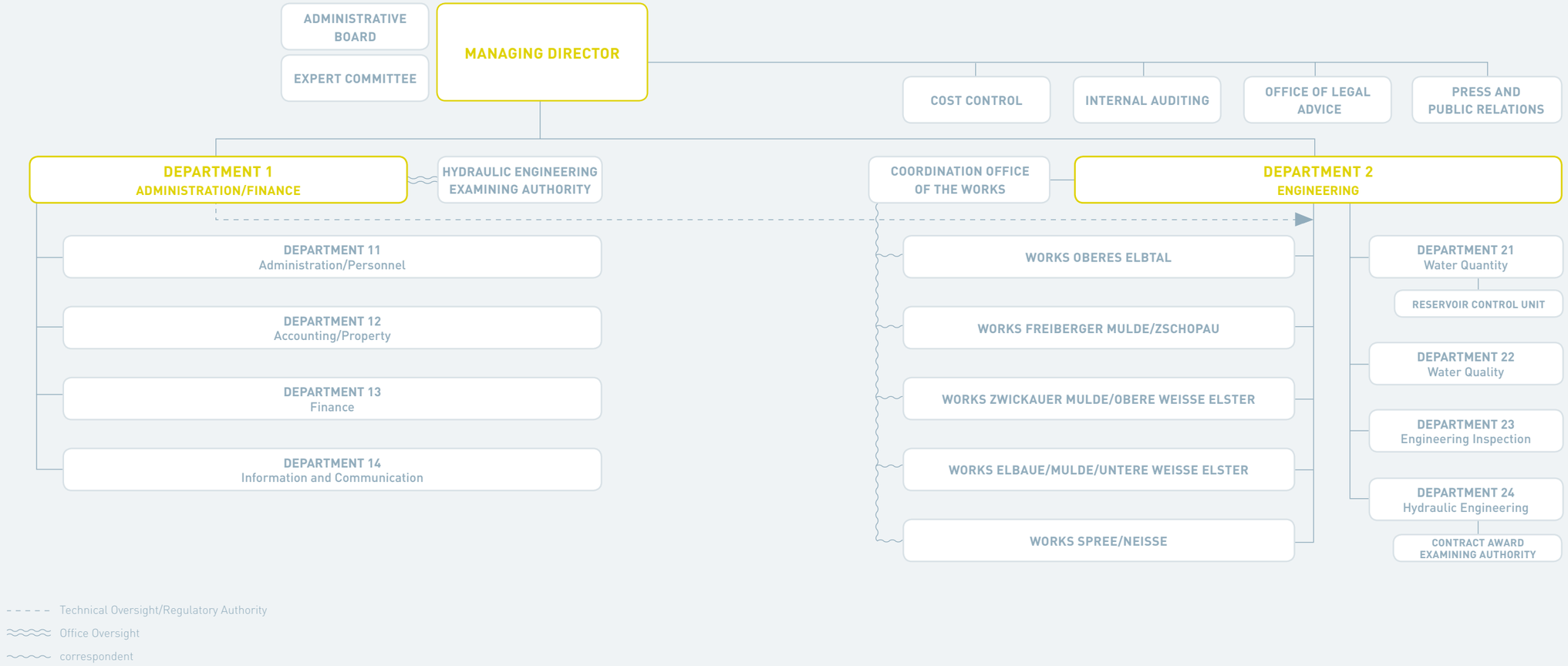
Flood protection is especially effective wherever the rivers' courses and banks are natural, thus leading to an increased use of bioengineering designs. In this way the State Reservoir Administration of Saxony – wherever possible – secures the banks and embankments with trees and bushes adapted to the surroundings as well as enclosed areas of grass. The natural river courses formed by the flood will remain intact outside of residential and commercial areas. Bioengineering is, however, limited in heavily developed locations and in hilly areas.

Nearly all of the dams belonging to the State Reservoir Administration of Saxony also function as flood protection. Most of the dams have a fixed flood control storage reserved exclusively for collecting flood water. In cases where additional flooding is likely, the flood control storages can be enlarged to a certain extent. ~

The State Reservoir Administration of Saxony is responsible for:

- ~ 137 dams including pre-dams and basins with about 600 million cubic meters of overall storage capacity,
- ~ 4 raw water transfer lines for drinking water purposes,
- ~ 1 process water transfer line system,
- ~ 1 man-made trench and water gallery system,
- ~ 186 weirs,
- ~ around 400 additional water management facilities of the Free State of Saxony such as water drawing machines, pumping stations or water gauges,
- ~ around 3,000 km of Order I rivers and streams,
- ~ around 300 km of transboundary waters to Poland and the Czech Republic,
- ~ around 650 km of flood protection dykes.

ORGANIZATION OF THE STATE RESERVOIR ADMINISTRATION OF SAXONY



THE NERVE CENTER OF THE STATE RESERVOIR ADMINISTRATION OF SAXONY: HEADQUARTERS IN PIRNA

The State Reservoir Administration of Saxony has its headquarters in Pirna not far from Dresden. It is run as a public enterprise by a managing director, who is supported by an administrative board. He also receives advice and counsel from a committee of experts. The headquarters is home to the offices of the director, administration and finance as well as engineering. It focuses on inter-departmental projects:

~ **Department 1: Administration/Finance**
Department 1 handles all essential operational and personnel management activities. This includes the departments of Administration and Personnel, Accounting and Property, Finance, Information and Communication and the Hydraulic Engineering Examining Authority. The Independent Examining Authority ensures that projects of the State Reservoir Administration of Saxony not requiring approval are implemented according to the rules and guidelines.

~ **Department 2: Engineering**
Department 2 fulfills the essential technical duties. The department for Water Quantity, for example, deals in part with jobs pertaining to hydrology and reservoir management. The department for Water Quality deals with the quality of the water in the reservoirs and their feeders. The department for Engineering Inspection handles the safety inspection of all structures, and the department for Hydraulic Engineering is responsible for the planning and expert supervision of construction projects.

The offices of Legal Advice, Cost Control, Internal Auditing and Press and Public Relations report to the director.

Five works located in the Saxon regions belong to the department of Engineering in the State Reservoir Administration of Saxony. They are divided into river and dam management divisions. The areas of responsibility for these works each extend across several administrative districts. They perform on-site jobs at the dams, rivers and streams. ~

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ON-SITE EXPERTISE: THE REGIONAL WORKS

Oberes Elbtal

The Oberes Elbtal works plan, build, operate and maintain water management facilities in the administrative districts of Meißen, Riesa-Großenhain, Sächsische Schweiz, Weißeritzkreis, in the city of Dresden and parts of the district of Kamenz. The flood protection facilities on the rivers Elbe, Weißeritz, Müglitz and others belong to this as well.

The works are responsible for more than 100 facilities, including the Klingenberg, Lehnmühle, Gottleuba and Malter dams. They also supervise the flood control reservoirs of Lauenstein and Glashütte as well as the Radeburg I and II reservoirs. The works are divided into the dam management divisions Gottleuba, Weißeritz, Müglitztal and Radeburg and the river management divisions Dresden, Gottleuba and Riesa. ~

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Gottleuba dam

The Oberes Elbtal works supervise:

~ dams with
  – around 86 million cubic meters of overall storage capacity and
  – around 32.5 million cubic meters of flood control storage capacity,
~ around 594 kilometers of Order I watercourses,
~ around 101 kilometers of flood protection dykes,
~ around 21 kilometers of transboundary waters,
~ the flood protection equipment storage in Radeburg.

Neunzehnhain I dam

Freiberger Mulde/Zschopau

Water has been dammed in the district administered by the Freiberger Mulde/Zschopau works since the 16th century for silver ore mining. In the 19th century the rising industry demanded water. A then-revolutionary system of drinking water reservoirs was created in the mountain region of the Mittleres Erzgebirge. This historical legacy is still used today.

The Freiberger Mulde/Zschopau works are in Lengefeld in the mountain region of the Mittleres Erzgebirge. They cover the administrative districts of Annaberg, Freiberg, Mittleres Erzgebirge, Mittweida and Stollberg as well as the city of Chemnitz. They are subdivided into the dam management divisions Neunzehnhain/Einsiedel, Revierwasserlaufanstalt Freiberg, Lichtenberg, Rauschenbach, Cranzahl and Saidenbach as well as the river management divisions Annaberg, Chemnitz and Dörnthal. ~

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The Freiberger Mulde/Zschopau works supervise:

~ dams with
  – around 64.5 million cubic meters of overall storage capacity and
  – around 8 million cubic meters of flood control storage capacity,
~ around 540 kilometers of Order I watercourses,
~ around 27 kilometers of flood protection dykes,
~ around 90 kilometers of transboundary waters,
~ the flood protection equipment storage in Chemnitz.

Zwickauer Mulde/Obere Weiße Elster

The Zwickauer Mulde/Obere Weiße Elster works oversee a total of 14 dams. Seven of them are drinking water dams and represent a vital source of the water supply in Saxony. They include the reservoirs Eibenstock, Carlsfeld, Muldenberg and Sosa.

The works' headquarters are in Neidhardtsthal near Aue. The administrative districts of Aue-Schwarzenberg, Chemnitzer Land, Vogtlandkreis and Zwickauer Land as well as the cities of Plauen and Zwickau are their area of influence. The works include the dam management divisions Dröda, Eibenstock, Muldenberg/Falkenstein, Pöhl, Sosa/Carlsfeld, Koberbach, Pirk, Stollberg and Werda and the river management divisions Neidhardtsthal, Plauen and Zwickau. ~

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The Zwickauer Mulde/Obere Weiße Elster works supervise:

- ~ dams with
  - – around 210 million cubic meters of overall storage capacity and
  - – around 49 million cubic meters of flood control storage capacity,
- ~ around 422 kilometers of Order I watercourses,
- ~ around 61 kilometers of flood protection dykes,
- ~ around 13 kilometers of transboundary waters.

Carlsfeld dam

Bautzen dam

Spree/Neiße

The Spree/Neiße works, with headquarters in Bautzen, maintain large process water reservoirs in East Saxony – for example, the Bautzen and Quitzdorf dams. They are also responsible for more than 170 weirs. In order to improve the watercourse structure and the ecological continuity, several of these weirs are being retrofitted or rebuilt. The works also include the mine lakes Knappenrode and Lohsa I.

The works supervise hydraulic-engineering facilities, Order I rivers and streams and transboundary waters in the administrative districts of Kamenz, Löbau-Zittau and Niederschlesischer Oberlausitzkreis as well as in the cities of Görlitz and Hoyerswerda. The works are divided into the dam management divisions Bautzen, Lohsa/Knappenroda and Quitzdorf and the river management divisions Bautzen, Görlitz and Hoyerswerda. ~

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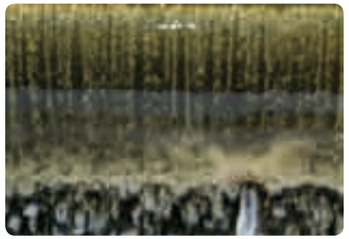
The Spree/Neiße works supervise:

~ dams with
  – around 87 million cubic meters of overall storage capacity and
  – around and 20 million cubic meters of flood control storage capacity,
~ around 800 kilometers Order I watercourses,
~ around 170 kilometers of flood protection dykes,
~ around 130 kilometers of transboundary waters,
~ the flood protection equipment storage in Lohsa.

Elbaue/Mulde/Untere Weiße Elster

The Elbaue/Mulde/Untere Weiße Elster works, with headquarters in Rötha near Leipzig, operates in the administrative districts Delitzsch, Döbeln, Leipziger Land, Muldentalkreis, Torgau-Oschatz and the city of Leipzig. The works include the dam management divisions Windischleuba/Borna, Witznitz/Rötha/Sermuth, Jahna-Döllnitz and Schömbach as well as the river management divisions Bad Düben, Borna, Grimma, Leipzig and Torgau.

In the 1960s, a system was constructed in the south of Leipzig to supply the local industries with process water and to serve as flood protection. The Wyhra-Pleiße dam and storage system still has the same functions today. It consists of two dams, four water reservoirs and two flood control storages as well as the Sermuth pumping station with its water transfer trough. In recent years, the works have assumed numerous other flood protection facilities – for example, in the Jahna river area. ~



The weir "Palmgarten" in Leipzig

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The Elbaue/Mulde/Untere Weiße Elster works supervise:

- ~ dams with
  - – around 158 million cubic meters of overall storage capacity and
  - – around 76 million cubic meters of flood control storage capacity,
- ~ around 729 kilometers of Order I watercourses,
- ~ around 322 kilometers of flood protection dykes,
- ~ the flood protection equipment storage in Trebsen.

FLOOD PROTECTION AND DRINKING WATER SUPPLY – TWO EXAMPLES

Torgau-Repitz

Comprehensive flood protection for the city of Torgau

The flood of August 2002 made it all too clear that the city of Torgau is highly vulnerable to floods. Immediately afterwards, the State Reservoir Administration of Saxony began to analyze the dykes and develop a flood protection concept. It soon became apparent that the dykes were permeable at several locations and no longer met modern technological standards. A thorough overhaul was necessary. The city was also to receive two new traverse dykes on the Weinske river.

Implementation of the flood protection measures in Torgau began two years later. Renovation of the dyke system from Glacis to Polbitz was also completed in the same year. The dyke system from Kranichau to Hafen Torgau and restoration of the already existing Weinske dykes were completed in the following year. The dykes were raised and widened, steep slopes leveled and dike support paths built, among other modifications. Large parts of Torgau and the surrounding area are now protected from the kind of flooding which statistically occurs once every one hundred years (HQ100).

Construction of the new inland dyke on the Weinske river was completed in September 2005. It protects vital commercial and industrial facilities such as the Torgau plate glass factory as well as several residential areas. The remaining flood protection measures were begun in 2006, for example the construction of the second Weinske dyke. This will primarily serve as flood protection for the North of Torgau. ~

Elbe dyke in Torgau (top left and right)
Torgau with inland dyke (bottom left)

Construction of gallery with tunnel boring machine

Complex overhaul of the Klingenberg dam

The drinking water dam in Klingenberg in the mountain region of the Erzgebirge operated uninterrupted for almost 100 years. Now "Dresden's water glass" must be completely renovated. The flood from August 2002 left its mark as well. The spillways received heavy damages and the pre-dam was totally destroyed. Renovation of the Klingenberg dam will include state-of-the-art technology. It will receive a new inspection gallery, which will be blasted into the masonry dam. Gauges such as pendulum lines will be installed, allowing measurements of any changes to the dam.

In order to empty the reservoir for renovation work, a temporary water supply must be set up. The Klingenberg dam, together with the Lehnmühle and Rauschenbach dams, supplies the entire Weißeritz district, the city of Freital and 60 percent of the city of Dresden with drinking water. During construction work, they will be supplied entirely from the Lehnmühle and Rauschenbach dams. In preparation for this, a three-kilometer-long tunnel was drilled through the rock to redirect the water past the Klingenberg dam on its way to the waterworks.

After renovation work, the tunnel will be used as a spillway. It can take up to 30,000 liters per second and redirect them past the reservoir. Both the gallery and the two million cubic meters of flood control capacity will serve an important function for the reservoir flood protection. The renovation should be completed in 2011 and cost around 60 million euro. ~

Construction of pre-dam