Law, Economic Policy, and Private Enterprise: The Case of the Early Ruhr Mining Region, 1766-1865

Manfred D. Jankowski
Loyola University of Chicago

1. Introduction.

During the century from 1766 to 1865 the Ruhr mining region, the modern heart of the Rhenish-Westphalian industrial region, expanded with development of the coal field, moving from the south to the north and northwest. The oldest and southern-most area is around the Ruhr valley and most of it is south of the river. Here coal mining of sorts had taken place for hundreds of years. It was easy to mine and often required no more than a shovel and a strong back. Until the turn of the nineteenth century most of the coal mines were in or near the Ruhr valley. Immediately to the north of the valley is the Hellweg ridge. In this area shaft mining penetrating the water-bearing layer, chiefly in the vicinity of Essen and Bochum, began in the 1830's. Eventually the iron industry also settled here. In an economic sense, the early Ruhr industrial area was much larger than the coal mining region which, of course, was its heart. It included important industrial areas and coal markets. In the north it was bounded by the River Lippe and in

* This article is based on a nearly completed manuscript. *Public Policy and Economic Growth*: The Case of the Early Ruhr Industrial Region, 1766-1865. I appreciate the financial assistance of Loyola University of Chicago, allowing research in Germany in 1970, microfilming, data processing and computing. I also am most grateful for the generous Grant-in-Aid (D.A.A.D. 1971) from the Federal Republic of Germany permitting the completion of my work in archives in Münster, Düsseldorf, Dortmund and the Mining Library in Essen. I also wish to acknowledge the important earlier stimulus from the Economic History Program of the University of Wisconsin and its then director and my dissertation advisor Rondo E. Cameron. Finally, I am indebted to Peter McMenamin for the data processing and to Tom McGowan for his editorial assistance.

the west is followed the Rhine valley and incorporated the textile areas in Cleve and Meurs on the left bank of the river. In the south it extended from Dusseldorf to the textile cities of Barmen and Elberfeld in the Wupper valley. In the east it stretched to the Unna region with its salt mining and processing operations.

In the period under discussion, state intervention in the Ruhr industrial region had a significant impact on its development.[1] Specifically, changes in mining and other laws and their administration affected the Ruhr region and its mining industry. In turn, changes in the regional economy, transportation, technology, business organization, and entrepreneurial activities affected law and state policy. Between 1766 and 1865 state policy moved from one of strong control over mining and related industries with severely restricted private enterprise to one of free enterprise with a minimum of state regulation. During most of this period Prussian policy toward the Ruhr and its mining industry was characterized by what is called the *Direktionsprinzip*. This was both a legal system and an economic policy. For the Prussian part of the Ruhr, the *Direktionsprinzip*, in its narrow sense, referred to and was defined in the 1766 Revised Cleve-Mark Codification. But in a wider sense the term designates the government's overall economic policy toward the Ruhr and its mining industry.[2]

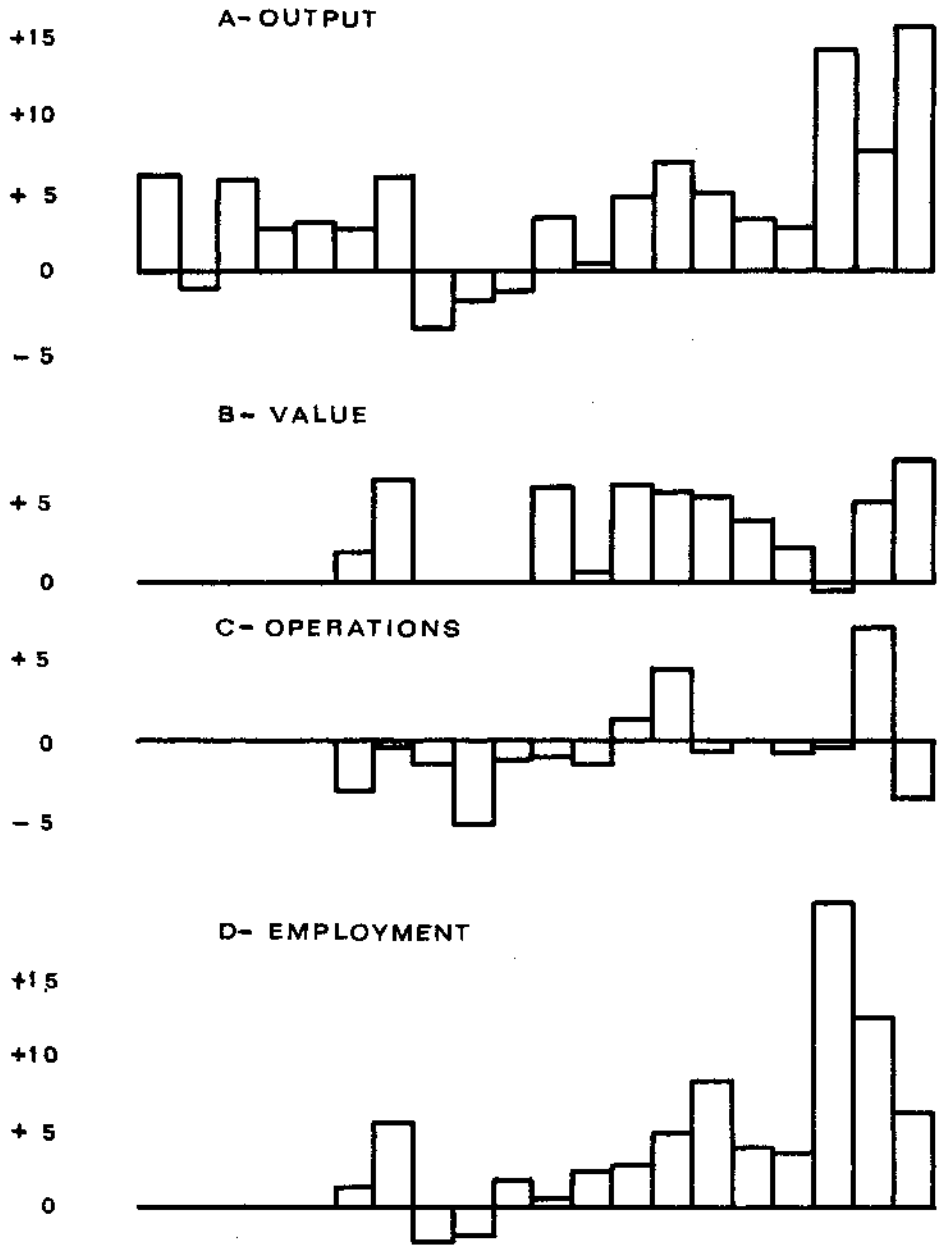
The period from 1766 to 1815 saw the full legal and economic implementation of the *Direktionsprinzip*. The state utilized it as the basis for a

---

1 Politically, the major part of the Ruhr region fell to Prussia by the Peace of Westphalia in 1648, but the entire Rhenish-Westphalian region remained geographically separated from the rest of Prussia until 1866. Until 1803, when Prussia acquired the ecclesiastical territories of Essen and Werden, these two territories separated Prussia's two largest and most valuable possessions in western Germany: The Duchy of Cleve and the County of Mark. Except for the period of French occupation from 1807 to 1815, the Ruhr region was permanently unified under Prussia after 1803.

2 The history of the mining law and the *Direktionsprinzip* is intimately related to political developments in the Germanies. The *Direktionsprinzip*, to which much of German and Prussian mining was subject from the seventeenth to the mid-nineteenth centuries, was the result of a historical evolution extending back to feudal times. There has been much controversy as to the origin, development, legal interpretation, and application of the German medieval mining law. A few of the more important interpretations and legal histories are: ADOLF ZYCHA, *Das Recht des ältesten deutschen Bergbaues bis zum 13. Jahrhundert* (Berlin, 1899); ADOLPH ARNDT, *Bergbau und Bergbaupolitik* (Leipzig, 1894) and *Zur Geschichte und Theorie des Bergregals und der Bergbaufreiheit* (Freiburg, 1916); HEINRICH ACHENBACH, *Das gemeine deutsche Bergrecht in Verbindung mit* dem preussischen Bergrecht (Bonn, 1871); C. J. B. KARSTEN, *Uber den Ursprung des Bergregals in Deutschland* (Berlin, 1844); R. MÜLLER-ERZBACH, *Das Bergrecht Preussens* (Stuttgart, 1916); M. SCHULZ-BRIESEN, *Der Preussische Staatsbergbau von seinen Anfängen bis zum Ende des 19. Jahrhunderts* (1933, located in the Essen Mining Library 3158a); GERHARD BOLDT, *Staat und Bergbau* (München & Berlin, 1950); WOLFRAM FISCHER, *Die Stellung der Preussischen Bergrechtsreform von 1851-1865 in der Wirtschafts- und Sozialgeschichte des 19. Jahrhunderts*, « Zeitschrift für die Gesamte Staatswissenschaft » (Tübingen, 1961).

1765-1864, OUTPUT, VALUE, NUMBER OF OPERATIONS, EMPLOYMENT:
FIVE YEARS AVERAGE ANNUAL PERCENTAGE CHANGES



co-ordinated economic policy encompassing the entire territories, and emphasized the development of policies, programs, and actions to move the region from where it was toward pre-determined economic objectives. The period between 1815 and 1851 was characterized by tension created between the state policy and actual economic and social conditions. The following period from 1851 to 1865 introduced a series of reforms culminating in the General Prussian Mining Codification of 1865.[3] It freed private enterprise and limited the state's power to inspection and policing functions.

2. Implementantion of the «Direktionsprinzip».

The Revised-Mark Mining Codification of April 29, 1766, essentially remaining in force until 1851, introduced the state controls in the following manner:

> « Experience confirms that it is to the disadvantage of these interested in mining when the establishment and operation of a mining company is left to them alone. Most owners must rely on inexperienced workers, supervisors, and foremen who often mislead them to unnecessary operations. These operations frequently result in money losses, misunderstandings between company and workers, general disorder, and bad reputation of our mining enterprises. Henceforth, all mining operations will be conducted under the direction of the state mining office ».[4]

The actual implementation of the codification was delayed until the early 1780's when, under the leadership of the capable Freiherr vom Stein, an administrative structure emerged which remained nearly unchanged until 1851.

For most of the second half of the eighteenth century the highest mining administrators were also the leading political officials in the western territories. From 1780 to 1803, the Ruhr region was fortunate in having a most dynamic mining and political administrator in Stein.[5] He can be credited

---

[3] In 1851, 12 mining codifications, some even dating back to the sixteenth century were still in force in Prussia. These codifications are contained in Hermann Brassert, *Berg-Ordnungen der Preussischen Lande* (Köln, 1858); included are those affecting the Ruhr: Jülich-Berg of 1766, Kur-Köln of 1669, Cleve-Mark of 1766, and the section of the Allgemeine Landrecht of 1790/92 dealing with mining, and the Code des Mines of 1810.

[4] The Cleve-Mark Mining Codification of 1766, Article 29, para. 1. Hereafter, we will not footnote references to the content of this codification when it is obvious from the text itself.

[5] In 1780, Freiherr vom Stein was appointed to examine the navigational facilities of the Ruhr River and on February 16, 1784, at the age of 25, Oberbergrath, the highest mining official for Prussia's western territories — a position he held until December, 1798. In 1788, he was also named the chief administrator-inspector for all industrial activities in the Mark. In addition, in 1793 he became president of the Mark Chamber and in 1796, senior president of the chamber of all western provinces. In October 1804 he

with the effective application of state controls as prescribed in the 1766 codification and the establishment of a comprehensive mining administration. Under Stein, the *Direktionsprinzip* became the most meaningful and integrated part of his general economic policy for the western territories and reached its fullest extent by the end of the eighteenth century.

Stein and his good friend Friederich W. von Reden were both *protégés* of the very able and energetic Minister von Heinitz. Heinitz had already appointed young Reden as head of mining and industrial activities in all of Silesia.[6] When Stein was similarly appointed by Heinitz in the County of Mark, he was guided by Reden's success in Silesia. Both were influenced by Heinitz and in many ways carried out his ideas. In addition Stein and Reden kept up an active friendship and frequently helped each other with their common problems.

Minister Heinitz was one of the first to actively promote the economic unification of the scattered western territories by improving transportation. To carry out his ideas he placed Stein in charge of highway and road construction. As mining administrator, Stein was also responsible for the sale of coal. Consequently, improving land and river transport became one of his major objectives. Under his supervision two major highways linking the Ruhr with other important regions and the rest of Prussia were completed. Stein became so enthusiastic that he even granted a personal loan for their construction when state funds ran low and his friend Reden sent him two road construction experts.[7] Stein redirected one of the highways so as to connect more conveniently the Mark coal region with the Wupper valley textile centers of Barmen and Elberfeld. In another instance, he was able to reach an agreement with the Abbot of Essen allowing the highway to pass through the Essen area. Under his direction many secondary roads, commonly

---

was called to Berlin as minister of commerce. There is relatively little written about Stein as mining administrator: E. BOTZENHART, *Freiherr vom Stein* (Stuttgart, 1957) contains a collection of archival documents including those referring to Stein's activities as mining administrator; E. BURISCH, *Der Freiherr vom Stein als Bergmann in der Mark*, « Der Märker » (1954); W. SERLO, *Des Freiherrn vom Stein Verdienste um die Bergwirtschaft*, « Zeitschrift für Berg-, Hütten-, und Salinenwesen » (1931), hereafter cited as « ZBHS »; G. PERTZ, *Aus Steins Leben* (Berlin, 1856); M. LEHMANN, *Freiherr vom Stein* (Leipzig, 1902-05).

[6] NORMAN J. POUNDS, *The Upper Silesian Industrial Region*, « Slavic and East European Series », XI (1958); H. FECHNER, *Geschichte des Schlesischen Berg- und Hüttenwesen in der Zeit Friedrichs des Grossen, Friederich Wilhelms II, und Friederich Wilhelms III, 1741-1806*, « ZBHS » (1900, 1901, 1902); G. FELSCH, *Die Wirtschaftspolitik des Preussischen Staates bei der Gründung der Oberschlesischen Kohlen- und Eisenindustrie (1741-1871)* (Berlin, 1919); W. HENDERSON, *The State and the Industrial Revolution in Prussia, 1740-1870* (Liverpool, 1958); R. VON CARNALL, *Das Denkmal des Ministers Grafen von der Reden bei Königshütte*, « ZBHS » (1854), pp. 201-224.

[7] Stein at times loaned as much as 10,000 thalers from his own wealth to continue the road network. PERTZ, *Aus Stein's Leben*, p. 44.

known as coal roads, were built; among them was a vital road linking the territories of Mark and Cleve.

Since Stein was also in charge of Ruhr river navigation, he actively promoted its improvement. By the 1780's some locks had been built in the Mark, but those in the non-Prussian part of the river were constructed only under Stein's persistent urging. By 1792 all seventeen locks were completed. In addition, as early as 1780, Stein had already conceived of the idea for a large coal depot at Ruhrort at the juncture of the Ruhr and Rhine river which was in Prussian hands. Under Stein, the port's facilities were expanded and the coal depot built. This port also came under his supervision, providing another means to control coal and other traffic on the Ruhr river. The money collected from tolls and dues went into the Ruhrort Coal Fund which was used for upkeep of the river and a source of money for other transportation projects. The free navigation of the Ruhr and its linkage with the Rhine was a pre-requisite for the economic growth of the entire region.

Stein also became chairman of the Mark tax reform commission. The inequities of the tax system benefitted the rural areas at the expense of the towns and incorporated communities. The existing system decreased state revenue by allowing manufacturing establishments to seek a lower tax base outside of city limits. As a result industrial establishments were scattered in the rural countryside and urbanization was retarded. Despite improved transportation, numerous internal tariffs and levies severely hindered economic unification of the western territories. By April of 1796, Heinitz and Stein were successful in abolishing most of the internal levies creating a relatively free market area.

Most of Stein's energy was focussed on developing the Mark coal industry. Minister Heinitz had specifically instructed him to enforce the codification, collect taxes, stop wasteful exploitation, discourage litigations among mine owners, expand the Mark coal market, and create an effective mining administration. To achieve these aims and enforce the existing laws, Stein demanded, and was granted by the king and Heinitz, increased administrative power to execute his reforms. These centered on the direct administrative and managerial supervision of each operation, administering prices and wages, and raising the level of skill of the labor force. He successfully gained control over the private company's business management and introduced a unified and comprehensive auditing, accounting, and bookkeeping system administered by the mining office. He even recruited a trained accountant from Clausthal to set up the system. Stein also tried to upgrade the skills of miners and their efficiency. He sent some young miners for training to other regions, including Silesia. He created a uniform wage system based on skill and determined by the mining office. Only fully trained pick miners could work directly on the coal face and were paid the highest wages. Mine foremen and managers were only selected from their ranks. In general, only experienced

miners were allowed to register in the miners' guild. His reforms did not come about without considerable opposition from the entire mining community. Here Stein showed his immense energy, ingenuity, and persistency, and if necessary, his willingness to use force.

Even after these reforms, Stein found the biggest obstacles to the continuous healthy growth of the industry the smallness of operations, the difficulty of coal transport to the river, and lack of water-pumping equipment.[8] All were contributing to the rising cost of mining. In 1795, 24 operations selling most of their output via the Ruhr river averaged only 700 tons with the largest having an output of 2,500. Their combined cost of production for the coal destined to the river was 12,400 old thalers, to this was added transport cost to the river of 5,150 and taxes and other fees of 3,100 thalers.[9] Stein particularly complained about the widespread ignorance of machines and backward mining techniques. Most coal was still obtained from shallow open workings, drifts, or tunnels put into the hillside. There existed only a few relatively shallow shafts, yet groundwater had already become a major problem. It increased as the more easily accessible coal was depleted. As an incentive to individuals or companies, coal found in drainage tunnels fell under special and more favorable tax treatment. Stein also went to England in both 1786 and 1787 to inform himself about new techniques, especially in the use of steam-engines for pumping water, however, he was unsuccessful in introducing them. They were too costly for the small Mark operations.

Stein could point to considerable accomplishments during his tenure as Mark mining director from 1784 to 1799. It took the first four to five years to institute his basic reforms and see their impact reflected in the data which his office kept from 1788 onward. Between 1784 and 1800, output more than doubled from 111,000 to 231,000 tons, while employment rose by 310 from 1,240 in 1789 to 1,550 in 1800.[10] Stein was able to increase mine

---

[8] Staatsarchiv Münster, Oberbergamt Dortmund Akten, A/478., Inspection tours by Stein of Mark mines. Hereafter, all documents in the Oberbergamt collection at the Münster archive will be cited as OBD plus their referral number with a short English title description. This archive is by far the most important place for research on the early Ruhr mining region. It possesses the central mining office records for the entire Ruhr, including those for the earlier period of the Mark.

[9] Cost of production, income, and profits for 24 mines selling their coal via the Ruhr River, OBD, B/84a.

[10] General annual Ruhr statistics on coal production, income, number of mines, workers, and prices are based on the following two sources: REUSS, *Mitteilungen aus der Geschichte des Königlichen Oberbergamtes zu Dortmund und des niederrheinisch-westfälischen Bergbaues*, « Festschrift zur Feier des 100 jährigen Bestehens des königlichen Oberbergamtes zu Dortmund, 25. Juni 1892 » (Berlin, 1892), it is also reprinted in « ZBHS » (1892), pp. 309-422; *Die Entwicklung des niederrheinischen-westfälischen Steinkohlenbergbaues in der Zweiten Hälfte des 19. Jahrhunderts*, ed. Verein für bergbauliche Interessen im Oberbergamtsbezirk Dortmund, 12 vols. (Berlin, 1902-05), the economic development information and statistics are contained in vols. X, XI, XII.

size mostly through encouraging consolidation and imposing stricter entrance controls into the industry. From 1789 to 1800 the number of operations dropped by 26 from 184 to 158, workers per mine rose from seven to ten, output per operation doubled from 727 to 1,460 tons. Finally, productivity per worker climbed by nearly one-half from 107 to 154 tons. Of course, the growth of the industry was helped by favorable market conditions and improved transportation. The price per ton of coal increased between 1792 and 1800 by 24 per cent. Unfortunately, Stein's political appointments to the presidencies of the Mark in 1793 and of all western provinces in 1796 left him increasingly less time for the mining administration. Principally his latter position finally forced him to relinquish his mining directorship on December 10, 1789.

3. Administration: Bureaucracy and Labor Force.

The effective implementation of the general mining policy in Prussia and in the Ruhr involved the establishment of an elaborate bureaucratic administration and a complex system of regulation directing all aspects of the mining industry. By the 1780's the basic framework and function had emerged. Jurisdictional problems and some further organizational changes occurred, but the essential structure remained until the early 1850's. The Ruhr headquarters at Dortmund, and after 1815 its two regional offices at Bochum and Essen administered the mining codification, collected taxes, controlled field concessions, regulated activities of all mining operations, and administered justice. It was responsible for the supply of a labor force and its health and welfare. The Ruhr mining authority established prices, wages, distributed profits, and collected the money from shareholders to cover the cost of operating when a deficit occurred. It controlled the accounting and business records and approved a technical plan for each operation. Of course, the actual execution of these functions was delegated to specific officials in the administration.[11]

The area of each regional office was subdivided into smaller districts of about a dozen or so operations. The head of such a district was charged with carrying out the actual work. This official was assisted by two specialists possessing practical business and technical knowledge. One of these, the technical expert or engineer, provided instructions for the actual operation,

---

11 The structure and functions of the mining administration are discussed in greater detail in: H. Achenbach, *Geschichte der Cleve-Märkischen Bergesetzgebung*, « ZBHS » (1869); Reuss, *Mitteilungen*; Hans Krampe, *Der Staatseinfluss auf den Ruhrkohlenbergbau in der Zeit von 1800 bis 1865* (Köln, 1959). Of course, the 1766 Cleve-Mark codification itself and its many subsequent instructions were the basis for the administration.

set wages, constantly inspected mines and reported his findings. The health of the industry depended on this technical expert, he was the main executive for the entire state control system. The other specialist supervised the non-technical aspects, the business management, including the bookkeeping and accounting work. He kept a monthly journal and collected taxes. He was involved in all matters dealing with the mining property and the internal problems of the private mining company. In 1839, there was a reorganization of the districts created, and three or four grouped into a consulting unit.

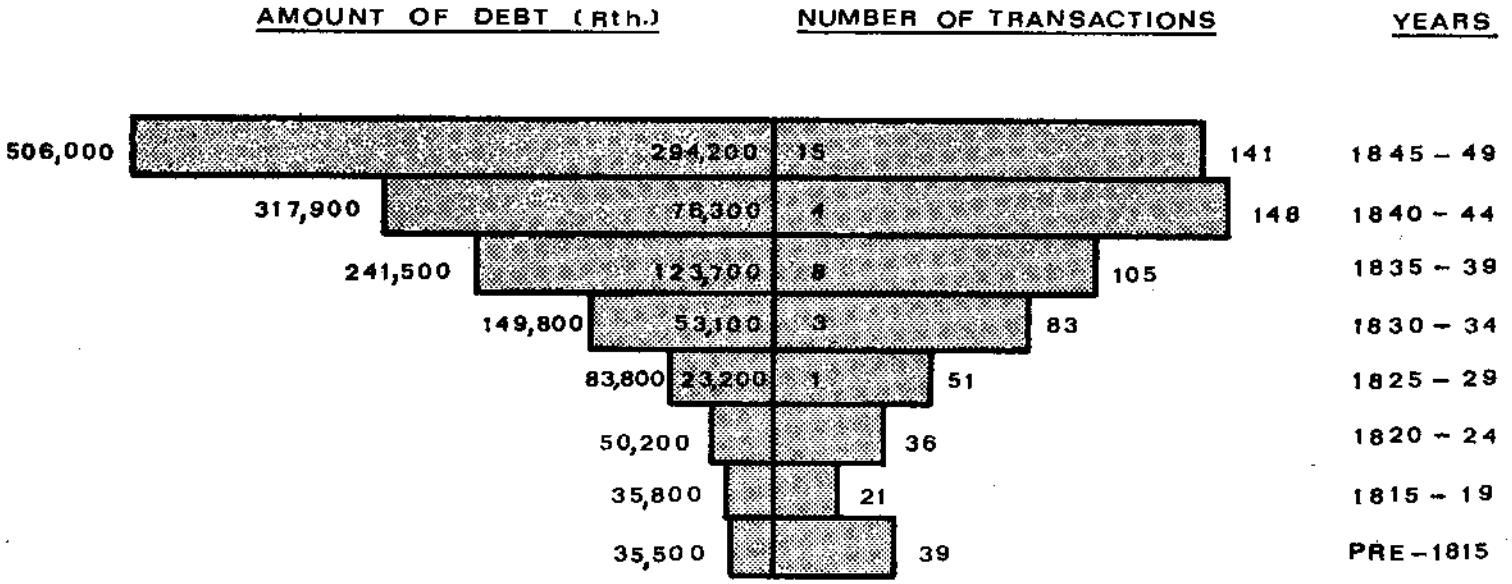
These district officials prepared the plan of operation for each mine. This technical plan evaluated the operation's location in relation to transportation routes and nearest markets, recommended working procedures, and pointed to possible water and ventilation problems. It estimated expected output, costs, profits, and if it was a new mine, delays before production would begin. No operation was allowed without such a plan and the district officials were charged with its enforcement. If the plan required new shafts, tunnels, buying new materials or equipment resulting in increased costs, the shareholders of the private company were obligated to provide the necessary funds. They could influence a change in the plan if the costs were too unreasonably burdensome.

At the bottom of the mining administration, in charge of the individual operation and privately owned company, were two individuals who were employed and their wages determined by the administration, but paid by the private company. One was the operation's foreman who was to have practical knowledge and experience, the other was the business manager who kept records. Small operations only had a foreman, but gradually, as the size of the operations increased, the business manager also became necessary. Both individuals were to work in the interest of the privately owned operation while being loyal to the state.

In 1792, when, under Stein, the new Mark mining headquarters in Dortmund was established, it employed 36 officials, 16 worked in the mining office and 20 were technical and business field supervisors. In addition, each of the 154 operations had at least one foreman and perhaps collectively another 20 to 30 business managers representing the mining office.[12] The total labor force numbered 1,200. As the industry grew, so also did the administrative bureaucracy, developing its own tradition and philosophy. Yet, as will be shown later, this bureaucracy became increasingly incapable of supervising the industry in accordance with the complex mining law. In the entire Ruhr by 1838 about 130 officials were in charge of 209 operations with an output of nearly one million tons and an employment of more than 8,100 workers. The Mark officials alone had increased from 36 in 1792 to 70 in 1838, 12 were medical personnel, 35 in the field, and the remaining

12 Reuss, *Mitteilungen*, « ZBHS », pp. 326-29.

1790's-1850, RUHR (MARK) MINING DEBT: AMOUNT AND NUMBER OF TRANSACTIONS*



* Figures within the shaded area represent the amount and number of transactions involving more than 10,000 Reichsthaler per transaction.

Source: Debt Book.

23 in the office.[13] These officials were in charge of 147 operations with an employment of 4,800 workers and also carried out the rest of the administration's duties in the Mark.

A closer look at the 58 Mark officials, excluding the medical personnel, reveals that by 1838 their average time in the employ of the administration was already 17 years, and the average number of years in their present position about ten. Their average age was slightly over 41 years and almost one-fourth had entered the mining bureaucracy during the French rule between 1807 and 1815. Another interesting aspect of their background was that nearly one fourth came from outside the Ruhr, mostly from Silesia and Saxony. The father's occupation of one-half of the 58 had already been in mining. Finally, their dependents, including wives, numbered 228 with only four being bachelors.

Mining officials as civil servants represented the interests of the state, and as administrators and technical experts brought order, rational, and technical expertise into Ruhr mining. In addition, the 1766 codification specifically authorized them to participate as private entrepreneurs on their own account. Legally, it was limited to one-fourth ownership in an operation and they were instructed to avoid situations where a conflict of interest could arise.

When Stein took office in 1784 and again in 1796, he demanded an accounting of ownership by officials. He wanted to discourage precisely those situations where interests obviously conflicted. He was successful with the lower echelon officials, mostly those in direct charge of the operations. As the table shows in 1784/86, 18 higher officials were shareholders in 197 operations, claims, or types of mining property. Of course, many owned shares in the same operations and in some cases several together owned the entire property. Notably, the two senior technical officials, Heintzmann and Wünnenberg, frequently owned shares in the same operations. By far the largest

1784-86, TYPE AND NUMBER OF ACQUISITIONS BY MINING OFFICIALS

Type of Acquisition	Heintzmann	Wünnenberg	Müser	Others	Totals
Present from owners	24	16	11	30	81
Present from other officials	5	3	—	4	12
Inherited/dowry	1	8	—	2	11
Claim from the Start	2	9	—	8	19
Bought	17	4	8	23	52
Unknown	4	4	—	14	22
Totals	53	44	19	81	197

Source: OBD, A-88.

[13] Mining administration personnel, 1814-50, OBD, A/63.

number of shares were received as outright presents from owners or from other officials. Also officials acquired shares through inheritance and dowries of their wives, but they also bought shares and actively participated from the start.

Owners obviously valued the partnership of senior officials who could contribute their influence and technical knowledge. A closer view of the type of mining property owned by officials reveals that they were shareholders in 125 fields of which only 27 were actually operating mines and another 18 were temporarily out of operation lacking a market. They owned shares in another 33 operations requiring preparatory work, 23 of these were working on tunnels and the rest awaited their completion to gain access or drainage. Seven other properties were claims being worked on. The remaining 40 fields were without activities. Officials also profited from sales of their shares. In 1784/86, district official Müser had paid only 33 old thalers for his shares in 19 fields, many of them being donations from owners. When he sold most of those same shares in 1793, he pocketed 4,701 thalers. For instance, the 21 shares in mine Conrad Wilhelm, which he had earlier received as a present, he now sold for 100 thalers; he also had acquired 32 shares in mine Friederich for only 25 thalers, but sold them now for 800 thalers.[14]

Gradually all participation by officials was discouraged and the number of shares shrank to a token ownership of two to four shares in each operation. Yet, in 1831, senior administrator Heintzmann still owned between one to four shares in 61 Essen and 63 Mark operations, and 32 in one Werden mine. He also participated in 22 claims. The administrator Hardt also owned between one to two shares in 46 operations. Another 21 officials were shareholders in at least one operation each.[15]

Establishing a permanent and experienced labor force, the basis for any efficient and orderly operation, was another aim of the state mining authority. During the second half of the eighteenth century, the state had created a small but permanent core of professional miners. The inflow of trained miners from non-Prussian areas such as Saxony, Thuringia, and even the Belgian mining region was encouraged. In 1755, out of 688 miners, 57 had come from outside the Country of Mark.[16] By the 1770's a sizeable mining community had come into existence and under Stein increased to 1,200 by 1788. In 1803, before the coal areas of Essen and Werden fell to Prussia, employment had already reached 1,550. Between 1815 and 1850, the work force more than quadrupled to 12,700. Finally, on the basis of 3.5 dependents per mine

---

14 Officials as shareholders in mining operations, 1784-1848, OBD, A/88, A/79, A/494.

15 Officials as owners, 1814-32, OBD, B/61.1.

16 Hans Spethmann, *Das Ruhrgebiet* (Berlin, 1933), p. 159; Reuss, *Mitteilungen*, pp. 322, 386, 387.

worker, the mining community increased from nearly 11,000 in 1815 to about 58,000 in 1850.[17]

Mining was hard, dirty, and dangerous work, and early coal mining occurred in out of the way places in the rural countryside. Here the mining community presented a foreign element. To attract and keep miners, special privileges had traditionally been granted. In the Ruhr under the 1766 codification, miners were exempted from military service (at least until 1812), and also from many village or town excise taxes and other feudal dues. They came directly under state protection and jurisdiction of the mining authority. All aspects of the miner's life, from employment to life outside his work, were regulated. Miners in fact became a separate social and economic class. They registered in an official journal whereupon they became members of the miners, guild or union, entitling them to the union's fund benefits. The fund itself was formed in 1767 and supervised by the mining office.[18] Its benefits were considerable and highly progressive for the times. They included sickness and accident compensations, disability, and survivors' pensions. Both the size of contribution and coverage varied between 1767 and 1851.[19] The private mining company, the mining office, and the workers themselves, contributed to the fund's income. The company at times, was taxed 120th of the coal sales. The workers paid one day's wages per month and other fees.

While the fund had a deficit at times, notably in the 1780's, it gradually accumulated a surplus. In 1823 it was more than 4,000 thalers from an income of 19,240 and in 1824, its income was 18,310 with a surplus of almost 1,300 thalers. When the fund showed excessive accumulations the sick-pay period was extended and disability benefits and survivors' pensions were increased. These payments became an important issue during the second quarter of the nineteenth century. Mining had become more dangerous because it involved extensive tunneling at greater depth and deeper shafts. Accidents and deaths increased. In the Mark region between 1841 and 1852, 118 accidental deaths occurred from an average yearly labor force of about 6,000. Eighty-four had died in the tunnels, at the coal face, and in the shafts. In 1852, 15 out of 7,550. In all of Prussian mining 98 had died from accidents from a labor force of 62,300.[20]

---

[17] Otto Hue, *Die Bergarbeiter*, 2 vols. (Stuttgart, 1910/13) is a most useful general study on mine workers.

[18] Wagner, «Corpus iuris metallici» (Leipzig, 1791), pp. 1263-67 contains, *Generalprivilegien für die Bergleute im Herzogtum Cleve, Fürstentum Meurs und der Grafschaft Mark vom 16. Mai 1767*, and *Instruktion zur Errichtung und Führung der Knappschafts-Kasse... vom 16. Mai 1767*. «Reglement für Bergleute, 30. April 1781», Article 1, para. 9 (Mining Library Essen, 8394 a 2, photo copy).

[19] A short history of the miners fund can be found in Reuss, *Mitteilungen*, pp. 395-412.

[20] Accidental deaths in the Ruhr mining industry, OBD, A/107 and A/111.

With the development of the industry, specialization of the labor force increased. At the beginning of the century, there were only a few differentiated functions. In addition to the managerial or foreman position, there was the pick miner working at the coal face, the haulier, and if a shaft existed those engaged in pulling up the coal. Mining was still seasonal, with the summer months having the lowest activity. Consequently, the labor force had a fairly large component of part-time workers, including women. The latter, mostly on a per day basis, were used for lifting coal out of shafts. Some of them had as many as four relatives working in the same mine. Nearly all the women were married and were wives of miners working in the same operation. Wages varied not only from month to month but also from mine to mine for the same job. Pick-miners' wages were the most stable and ranged between 100 and 120 thalers per year. The normal work shift varied between 10 and 17 hours. Craftsmen, like carpenters and masons, were still outside of the administration's hired labor force and had comparatively high incomes. For instance in 1801, a self-employed mason, C. Hildesheim, made a yearly income of 468 thalers, or three times that of a foreman and four times that of the pick miner.[21]

As extensive tunneling and new technologies were used greater specialization occurred and a corresponding wage differential resulted. The use of the steam-engine for both lifting and water pumping and the use of above- and under-ground iron rail systems added a large number of positions. For example, in 1843, the mine Sellerbock, one of the largest operations in the Ruhr, had at least 50 different job classifications with corresponding wages. The positions involving the new technologies were among the best paid. The machine supervisor had the highest yearly income of more than 200 thalers. The foreman in charge of the lifting machines received 180. On the other hand the pick miner had a wage of only 120 and most of the haulers earned less than 100 thalers.[22]

The administration also encouraged improvement in the actual operation by allowing the introduction of iron rail haulage systems. In 1825, the mining entrepreneur Friederich Harkort was already emphasizing the importance of railways. Some mining officials listened to him and between 1828-30 constructed the Palmersche Railway, the first narrow gauge horse drawn railway in the Ruhr.[23] Initially, the cost of such systems was prohibitive and

---

[21] « Monthly Mining Reports » for 1801 (for one district), OBD, A/202. This report was unusually informative about the miners temselves, citing their names, positions, and wages.

[22] Wages for mine workers, 1830-57, OBD (New) No. 1385; includes the wages and positions for the mine Sellerbeck in 1843.

[23] The Palmersche Railway, 1826/27, OBD, A/130; W. Blome, *Friedrich Harkort als Pionier des Eisenbahwesens* (Diss. Münster, 1922).

only some of the larger operations built them.[24] In addition, the administration feared that indiscriminate building would cause a rise in coal prices by increasing operating costs. Yet during the 1830's the use of the railways rapidly spread. By 1836 in the Mark alone, 20 operations had a combined above and underground track length of about 15 km which had cost more that 110,000 thalers.[25]

The mining administration also was interested in reducing the cost of mining. Timber was an essential mining material, used for re-inforcements and construction of haulage systems. By the early nineteenth century it had become one of the most costly items in mining. In the Mark the price of one cubic foot jumped from 28 Pfennige in 1821 to 46 in 1831, and 102 in 1841. During the 1840's the cost of timber was about ten per cent of the value of output in the Mark. The total expenditure had tripled between 1824 and 1841 from 48,000 to 144,000 thalers. In Essen alone it amounted to 77,500 thalers in 1841. The mining administration constantly urged the re-use of lumber from abandoned operations and the use of stone or iron. It even experimented with chemically treated or tarred wood for longer durability.[26]

In the course of the first half of the nineteenth century tension developed between the state and private enterprise. Friction was created by the growing industry and generally changing economic conditions in the Ruhr, and by the unwillingness of the state to adopt a more flexible and timely policy toward new demands. As a result, while the mining administration continued to uphold the old restrictive system, an increasingly dynamic private enterprise tried to change or circumvent it.

After 1815, Prussia administratively re-organized its western territories dividing them into the two provinces of Rhineland and Westphalia. Politically, the Ruhr administration was now no longer in the hands of only one official. Stein, as the highest political and mining administrator had been able to co-ordinate mining, transportation, and political objectives. Ludwig von Vinke, the president of Westphalia from 1815 to 1848, under whose jurisdiction the Mark mining area fell, had no authority over mining and little over transportation.[27] In addition, Berlin no longer supported the Ruhr as it had in the previous century. Consequently, the state mining policy ceased to serve as the guide for a general Ruhr economic program. It was relegated

---

[24] The construction of rails by the Baaker mines, 1827-49, OBD, A/131; the construction of rails in the Muttenthal, OBD, A/132; descriptions of major coal railways in the Mark, OBD (New) No. 603.

[25] Essen and Mark Iron rails, 1831-51, OBD, B/84.4-.8; *Verwaltungsübersichten, Betriebs- und Haushaltssachen: General Berichte, 1827-43*, OBD, Fot. 428, vols. 1-9 (author possesses microfilm); hereafter cited as « Annual Reports ».

[26] Use and re-use of timber in the Mark, OBD, A/97 and B/87.5.

[27] HENDERSON, *Industrial Revolution*, pp. 46-57.

to a limited mining policy, and many in the community felt the time had come to withdraw the state's tutelage of the industry.

Private enterprise pressured the state to reform at least some aspects of the regulatory system. In the case of transportation, private interests had in the 1830's successfully initiated railroad construction, eventually forcing the state to adopt a new attitude toward this innovation. In mining a similar and related process occurred. During the 1840's but primarily in the early 1850's, the state did change its policy and extensive reforms resulted. In the meantime, tension and frequently open conflict remained. While the administration was able to assert itself in some areas, in others, it was forced to relinquish control or allow lenient interpretations and enforcement. The healthy annual rate of growth of 4.2 per cent in the 36 years between 1815 and 1850, was essentially a tribute to private ingenuity and enterprise. As the table shows,

1815-49, FIVE YEARS AVERAGES OF MINES, OUTPUT, AND WORKERS

Years	A	B	C	D	E
1815-19	150	414,000	2,500	20	3.5
1820-24	150	426,000	2,800	24	.2
1825-29	166	476,000	2,900	24	4.8
1830-34	195	668,000	3,400	26	7.1
1835-39	204	880,000	4,300	36	5.0
1840-44	217	1,098,000	5,100	44	3.2
1845-49	218	1,356,000	6,200	52	2.7

A. Number of mines.
B. Output in tons.
C. Average output per mine.
D. Workers per mine.
E. Average annual percentage change in output.

Source: Based on REUSS, *Mitteilungen*.

If the averages for the five-year periods between 1815-19 and 1845-49 are compared, production more than tripled, and output and workers per operation increased by two and one-half times.[28] Yet, as we will see later, these figures do not adequately reflect the changes in the structure of the industry caused by the larger output produced by shaft mines and the new methods and technologies used after 1830.

[28] Data derived from REUSS, pp. 386-87.

4. Private Enterprise: Capital Formation and Taxes.

The major business organization under the system of state controls was the privately constituted mining company. For centuries it had been the traditional organization in the mining of precious metal and other valuable minerals. Gradually it developed different characteristics and a complicated legal structure. In the Ruhr region the company and its specific social, economic, and legal nature was the product of the state control system as embodied in the 1766 codification. The *Direktionsprinzip* as a general state policy had as the principle aim the development of the Ruhr mining industry. To achieve this the state encouraged the growth of a mature entrepreneurial class capable of operating the industry. At least in the second half of the eighteenth century the absence of such a class had been given as a major reason for introducing direct controls of the operations. Ideally, the state and private enterprise were partners and pooled resources.[29] The state provided qualified personnel and private enterprise provided the necessary capital from a dependable return on mining investment and profits.

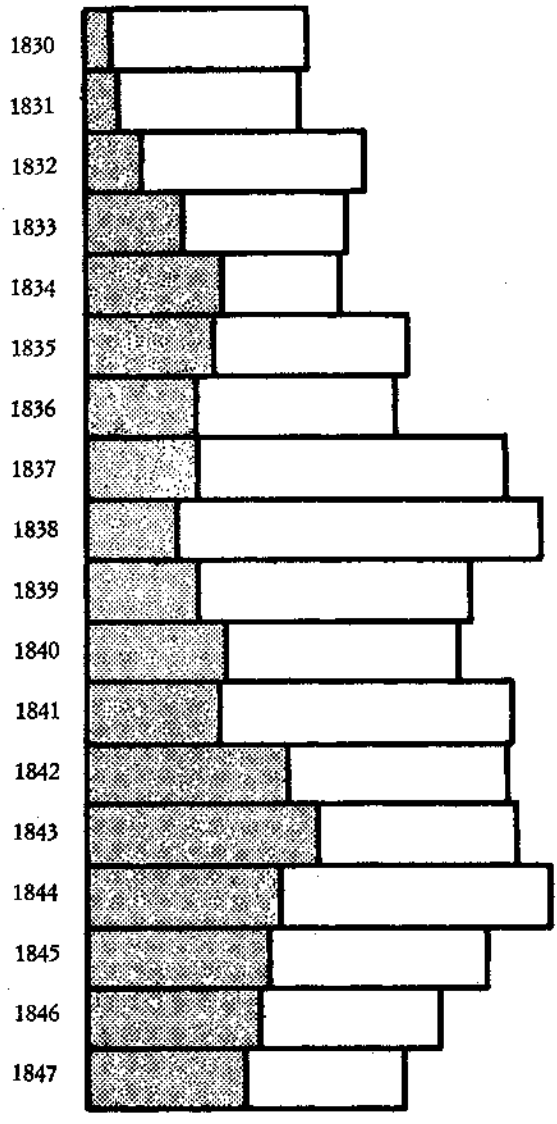
Decision making both within the company and among its shareholders concerning the actual mining operation was severely limited by these state controls. The company and its owners provided the capital and took considerable risk, but were explicitly prohibited by law from managing the operation. As pointed out earlier, the mining authority managed the operation through its officials. Ideally, these officials were to manage it in the best interests of the owners and they were required to consult with them when large costs and other major decisions concerning the operation were incurred during normal working. This latter requirement guaranteed the capital for continuous operation and made possible an orderly exploitation of coal. At least, this was the administration's argument and objective. Finally, all decisions resulting in major costs, debts, discontinuance of the operation, and its sale demanded a unanimous approval by the shareholders.

Ownership in the company was divided into 128 shares and up to eight free shares. Free shares were traditionally exempt from any legal and financial obligation imposed on the rest. Normally two were held each by the state, the church, the school system, and sometimes the miners' guild. The share itself was a concept from medieval times when their number tended to equal the number of persons participating in the operation. A share was legally treated as immobile property, like a piece of land or a house. A shareholder could demand his exact physical share of the output as practised in the Essen region until 1837 when it was prohibited. A shareholder could sell his share, mortgage or use it as a general security for his private loans. The privately created debt on shares became part of the debts of the entire company. In

---

[29] Boldt, *Staatsbergbau*, p. 3.

1830-1847, ANNUAL MARK PROFITS AND LOSSES: QUANTITY (RTH.) AND NUMBER OF OPERATIONS *



1830	18,000 (36) -	174,000 (83)
1831	23,000 (44) -	171,000 (77)
1832	42,000 (48) -	224,000 (82)
1833	75,000 (56) -	209,000 (76)
1834	108,000 (62) -	206,000 (71)
1835	97,000 (57) -	256,000 (77)
1836	83,000 (46) -	246,000 (86)
1837	84,000 (54) -	335,000 (93)
1838	72,000 (53) -	368,000 (94)
1839	87,000 (57) -	305,000 (93)
1840	112,000 (51) -	297,000 (97)
1841	106,000 (54) -	341,000 (94)
1842	160,000 (66) -	339,000 (85)
1843	185,000 (54) -	343,000 (96)
1844	150,000 (56) -	374,000 (100)
1845	147,000 (54) -	322,000 (111)
1846	136,000 (56) -	281,000 (106)
1847	123,000 (71) -	250,000 (82)

* Shaded area: Losses which include outlays to start operations and for machines and tunneling or shaft work of existing operations.

Source: « Monthly Mining Reports, 1830-47 ».

turn the debt made by the company became part of the debts of the shareholders. When a share was sold the new owner also inherited the debt of the previous owner. Finally, the company and its owners were not protected by limited liability, but were totally liable.[30]

Capital formation obviously is a prerequisite for economic growth. Under the state administration, current income and profits were to cover most necessary investments in the operation. Borrowing by shareholders or the company itself was discouraged. Between 1816 and 1842, on the average slightly more than one-half of the Ruhr operations made a profit.[31] Yet taking the Mark and Essen regions separately, in proportion to their total number of operations, the profitable Mark mines far exceeded those in the Essen area. Here, the easily accessible coal layers had already been exploited and the cost of operation had increased much earlier than in the Mark. In 1816, from a total of 103 Mark mines, 88 had made a profit, in Essen only 30 from 70 operations. In 1842, from 151 mines in the Mark, 85 were profitable, in the Essen area only 23 from 61 showed a profit. The table below gives the annual profits and losses from all Mark operations between 1830 and 1847, computed on the basis of monthly reports.[32] As the table shows, the total profits were slightly more than five million, losses 1.8 million, and net profit of more then 3.2 million thalers. The ten operations with the highest profit in each year accounted for nearly 2.5 million and continuously averaged about one-half of the total. The profit profile becomes even more lop-sided when the three mines Glückauf, Hasenwinkel & Himmelskrone, and Trappe are isloated. These alone made a combined profit of nearly one million thalers between 1830 and 1847. The annual losses which increased most rapidly during the 1830's, but were largest in the following decade, reflect the rising investment demand in starting an operation, adding new facilities, and introducing new technologies. Shaft construction, steam engines used for water pumping and lifting, above and underground rail systems, and other machines were new but necessary costs. In the Essen region where most of the larger scale shaft mines were started, annual losses exceeded profits in both 1836 and 1842, and during this same period for the entire Ruhr, losses amounted to 1.4 million thalers. Capital for these investments and the financing of the losses were not solely covered from profits but increasingly from loans.

---

30 W. Däbritz, *Entstehung und Aufbau des rheinisch-westfälischen Industriebezirks*, « Beiträge zur Geschichte der Technik und Industrie » (Berlin, 1911), pp. 13-108; R. Klostermann, *Bemerkungen über die Mobilisierung der Kuxe*, « ZBHS » (1861), pp. 316-23.

31 « Annual Reports », 1835-42.

32 The profits and losses were computed on the basis of monthly mining reports for all 259 Mark mines operating at one time or another for the 18 years from 1830 to 1847, including those not showing an output. These reports give production, sales, and profits and losses for each mine (author possesses microfilm). Hereafter cited as « Monthly Mining Reports ».

1830-47, ANNUAL PROFIT AND LOSSES IN THE MARK REGION
(*in 1,000 thalers*)

Years	Total		Net	Ten operations with highest	
	Profit	Losses		Profit	Losses
1830	174	18	156	90	13
1831	171	23	148	85	15
1832	224	42	182	111	31
1833	209	75	134	101	56
1834	206	108	98	108	64
1835	256	97	159	141	76
1836	246	83	163	129	56
1837	335	84	251	162	62
1838	368	72	296	198	42
1839	305	87	218	150	57
1840	297	112	185	145	67
1841	341	106	235	163	75
1842	339	160	179	170	114
1843	343	185	158	173	134
1844	374	150	224	172	114
1845	322	147	175	144	112
1846	281	136	145	144	91
1847	250	123	127	129	79
Totals	5,041	1,808	3,233	2,515	1,278

Source: « Monthly Mining Reports », 1830-47.

The mining office functioned as a local clearing house, all transactions involving shares were carefully entered into a journal kept by the office.[33] The value assigned to a share reflected the limited local market, which was dominated by those directly involved in Ruhr mining and knowledgeable about local conditions. The mining property, for most of the period under discussion, was locally owned and mining activity, for the most part, locally financed. The owner's residence most frequently corresponded to that of the creditor's. Only by the second quarter of the nineteenth century did outside interests infiltrate the Ruhr mining region, and then, significantly, the larger the loans were, the more distant from the region was the creditor's residence.

33 The entry into this journal included the mine's name, number of shares and amount of money involved, time and frequently reason for transaction. It also listed the shareholder's name, his residence, and occupation; in most cases the same information was given for the creditor. Berghypothekenbuch, OBD, B/56, in 3 vols. and supplements (author possesses microfilm). The transactions in the « debt book » are given for Mark operations from the 1790's to the 1850's, however, some Essen operations were also included. Hereafter, this journal will be cited as « Debt Book ».

The industry's demand for capital increasingly exceeded the capacity of its self-financing regional system under the state controls.[34]

During the first half of the nineteenth century debts to the industry and its owners dramatically increased from about 36,000 between 1815-19 to 150,000 between 1830-34, to over one-half million between 1845.49. In the period between 1835 and 1849, the debt amounted to more than one million thalers. Not only had the number and amount of debts increased,

1790's TO 1859, AMOUNT AND FREQUENCY OF LOANS IN THE MARK *

Years	No. of Loans	Total Debt	Below 5,000	Between 5-10,000	Above 10,000
Pre-1814	39	36,000	30,000	6,000	—
1815-19	21	36,000	27,000	9,000	—
1820-24	36	50,000	42,000	8,000	—
1835-39	51	83,000	46,000	14,000	23,000
1830-34	83	150,000	65,000	32,000	53,000
1825-29	105	242,000	83,000	35,000	123,000
1840-44	148	317,000	162,000	79,000	76,000
1845-49	141	507,000	139,000	74,000	294,000
Totals	624	1,421,000	624,000	257,000	569,000

* Data is based on the «Mark Debt Book», yet many transactions are included from the Essen region.

but as the table below shows the largest portion came from outside the Ruhr region. Between 1824 and 1854, 39 creditors, nearly all residing outside the region, lent a total of 815,000 thalers. From these, 12 merchant and banking houses lent between 1837-53, about 329,000 thalers.[35] The residence of the largest creditors were north of the Ruhr in Münster, in the east they centered around Soest, and south of the mining region, the Wupper valley cities of Barmen and Elberfeld dominated. In the Rhine valley the cities of Düsseldorf, but principally Cologne with its banking houses, granted the largest loans.

As the need for capital increased, the special mining taxes became a serious source of conflict between the state and private enterprise. A dominant goal of state policy was to derive a profitable income from its mineral rights.[36] One method was direct ownership of mining and related operations which

[34] W. Däbritz, *Finanzprobleme aus der Entstehungszeit des rheinischwestfälischen Industriereviers*, «Glückauf» (1922), pp. 1355-76, and Däbritz, *Entstehung und Aufbau*, pp. 21-27.

[35] «Debt Book». The following lent the largest amounts: A Schaffhausen of Cologne 50,000 thalers in 1837 and 60,000 in 1849; H & J Kersten in Elberfeld, owned by the von der Heydt family, 60,000 in 1847; the Metz Brothers in Münster 40,000 in 1853; S. Oppenheimer in Cologne 15,000 thalers in 1841.

[36] Achenbach, *Geschichte*; Däbritz, *Finanzprobleme*; R. von Carnall, «Die Bergwerke in Preussen und deren Besteurungen» (Berlin, 1850).

1790's TO 1850, OWNERS, CREDITORS, AND AMOUNT OF DEBT BY RESIDENCE

Area of Residence	Number of		Total Debt	Above 3,000
	Owners	Creditors		
A. Ruhr valley	78	85	131,000	65,000
North of valley	27	48	75,000	35,000
South of valley	23	34	46,000	15,000
Unknown	16	10	17,000	10,000
B. North of mining region	14	56	255,000	232,000
South of mining region	35	104	210,000	155,000
East of mining region	15	33	150,000	135,000
C. Rhine valley region	2	22	188,000	176,000
Other German cities	1	8	15,000	10,000
Foreign	2	3	38,000	37,000
Totals	213	403	1,125,000	870,000

Source: « Debt Book ».

would guarantee the supply of certain essential raw materials. The disadvantage was that the state took all the risk, supplied the capital, and paid for the cost of mining administration. A preferred alternative was a guaranteed tax income. In this case, as in the Ruhr, the participation of an active, but regulated, private enterprise was necessary.

Principally in the eastern provinces, the king made use of his historically inherited mineral rights, and in addition as landowner, was able to exploit the minerals on his own account. State ownership dominated in Upper Silesia. In the western territories the state was unwilling to engage in large-scale ownership. Of course, the Saar was an exception, and even in the Ruhr the state deviated from its general policy. Significantly, the state owned the largest salt works in the Unna region, Koenigsborn and Neusalzwerk, but the In the western territories the state was unwilling to engage in large-scale also operated four coal mines; and in the Ruhr, it owned the mine Friederica and a small number of shares in three others. By 1827, the state had sold all of its interests in these coal mining operations.[37]

The direct state income in the Ruhr consisted mostly of the « tenth » and free shares. Mining taxes had also a special historical development, they used to represent the state's share in the output of an operation. Consequently, the tenth was one-tenth of output, but in the 1766 codification it was transformed into one-tenth of sales income, computed on the state established price. The two free shares were, of course, exempted from all financial and legal obligations. The revenue from the tenth and the free

[37] State owned mines, OBD (New) No. 1230; REUSS, *Mitteilungen*, p. 349.

shares amounted to 11 to 12 per cent of sales' income and most was paid into the specially created Mining Tenth Treasury in Berlin. The rest of the taxes extracted from the industry defrayed the cost of the mining administration and were disbursed to the Mining Company Fund and the Miners Fund. The mining revenue also was used as a convenient source to subsidize other regional funds. In 1799, total Mark sales' income amounted to nearly 200,000 thalers and taxes were close to 20 per cent. In the same year, revenue from the tenth and the free shares accounted for nearly 25,000 thalers. From this 16,500 was sent to Berlin and 4,000 remained at the mining office. The rest was used to supplement other funds including the Miners Fund, Mark Domain Treasury (salaries), Ruhr River Fund (upkeep, salaries), Mining Registration Office (salaries), Mark Highway Fund, and others.[38]

The cost of the Ruhr mining administration itself was transferred directly to the private sector. A special fund, the above mentioned Mark Mining Company Fund, was created.[39] Its income consisted of a whole host of levies and fees. One tax specifically provided for the salaries of the mining personnel and general upkeep of the mining office. A property tax was paid by all mines. This regular quarterly assessment indicated not only ownership. but in the case of non-operational mines, the intention of keeping the concession. The major portion of another levy consisted of fees at the various stages before gaining a field concession. Between 1751 and 1814, the cost of administration rapidly increased from only 1,700 to 8,400 in 1784, and it had climbed to 11,700 thalers by the end of 1814. Yet the Mining Company Fund also had accumulated a surplus of 58,000 thalers by 1815. In the same year, the government in Berlin arbitrarily claimed 29,000 thalers of the fund's surplus. Both the surplus and the fund's management by the mining office were a constant source of conflict between mine owners and administration. The owners demanded a voice in its management, but were repeatedly denied it. In 1851, when the tax reform law abolished the income sources of both Essen and Mark mining funds, these had accumulated an excess of 52,000 and 116,000 thalers respectively. Even the Mining Aid Fund, which had been financed from the remaining 29,000 thalers of the Mark fund's surplus, had itself an excess of 50,000 thalers.[40] All this tax revenue had been extracted from an industry faced with ever increasing costs of operation and need for capital.

From 1766 to 1851 the taxes collected from the Ruhr mining industry ranged between 14 and 20 per cent of sales income, seven to eleven per cent went to Berlin, four to seven per cent to the Mining Company Fund, and below one per cent to the Miners Fund. As already mentioned, in 1799

---

38 Tax revenue and expenditure, 1799-1802, OBD, C/520.

39 REUSS, *Mitteilungen* contains a short history of the mining company and mining aid funds, pp. 413-22.

40 REUSS, p. 419.

taxes were nearly 20 per cent. In 1816, the mine Heinrich had an income of 4,475, paid 764 thalers or 17.7 per cent in taxes and had a profit of nearly the same amount.[41] The 162 Mark operations averaging a profit between 1836 and 1842 paid more than 14 per cent taxes and had a net income after taxes of 26.2 per cent.[42] In 1836, all Mark operations had a combined income of 944,900 and were assessed 154,245 thalers in taxes or 16.32 per cent.[43] This left a net income after taxes and cost of operation of about 23 per cent. From the total tax revenue 95,300 was collected by Berlin, slightly more than 51,000 by the Mining Company Fund, 6,860 by the Miners Fund, the rest of more than 1,000 thalers were special feudal dues. From another point of view, taxes accounted for 41.3 per cent of net income were viewed by contemporaries in direct relation to profits.

For mining entrepreneurs taxes had become the greatest financial deterrent to the development of the industry. They inhibited large-scale shaft mining by frustrating the need for capital. They reduced profits and dampened private initiative. For instance, during the first half of the 1830's, nine shaft operations had sunk deeper shafts, replaced and added steam-engines, and increased their underground tunneling and rail system. These preparations cost money and, consequently, they still showed a deficit in 1836. They had received no tax breaks and it could be argued that the deficit was entirely due to the high taxes. From a combined sales income of 238,000 thalers, 218,500 were operating costs and 37,500, or nearly 16 per cent, had to be paid in taxes. This caused a deficit of 18,000 thalers. By 1842 they had recovered and in the same year showed a profit of 95,000, but also a tax bill of 65,100 or nearly 15 per cent of sales.[44] In 1842, Graf Beust started production after being one of the first operations to have sunk a shaft through the water-bearing secondary rock layer in May, 1840. In 1842, its investment and cost of operation was 86,000 thalers against a relatively small income of 32,000 and an output of only 14,000 tons. Yet it paid 4,500 thalers in taxes or more than 14 per cent.[45]

Between 1843 and 1847, the Essen region, where most of the deeper shaft mines were located, had the highest operating costs and taxes of any region in Prussia. As the table shows, it had also the lowest net income and profits. Taxes were felt as a real burden, constituting nearly two-thirds of net income. Certainly, the state did well, from all of Prussian mining it had collected 1.3 million thalers while private enterprise had only received

---

41 E. Hilke, *Die geschichtliche Entwicklung der Gewerkschaft Zeche Heinrich* (Essen, 1934), p. 110.

42 « Annual Reports », 1836-42.

43 « Annual Reports » for 1836 includes an unusually comprehensive survey of income, cost, taxes, profit and losses for all Mark mines.

44 « Annual Reports », 1835-42.

45 *Ibid.*, 1842.

1843-47, AVERAGE TAXES AND INCOME IN MAJOR PRUSSIAN MINING REGIONS *

(Five-year averages in 1,000 thalers)

Regions	A	B	C	D	E	F	G	H
Upper Silesia	1,568	956	447	175	60.5	11.1	28.4	28.1
Lower Silesia	654	499	80	75	76.3	11.5	12.2	48.0
Mark (Ruhr)	1,425	1,096	126	195	77.0	13.1	9.9	58.6
Essen (Ruhr)	939	733	71	135	78.2	14.3	7.1	65.5
Total Prussia	7,157	5,140	1,303	714	72.0	10.0	18.2	35.4

A. Sales income.
B. Cost of operation.
C. Total taxes.
D. Net income.
E. % Cost of operation.
F. % Taxes.
G. % Net income.
H. % Taxes of net income.

* Not all regions are included but they are part of the total for Prussia.

Source: CARNALL, *Die Bergwerke in Preussen und deren Besteurung*, pp. 65-66.

714,000 in profits.[46] Little economic rationale existed for the continued collection of the tenth and other special fees as no other industry was burdened by them. By the 1840's conditions had significantly changed, making the tax policy outmoded and a deterrent to the growing industry. Yet it was not reformed until the passage of the new tax in 1851.

5. PRODUCTION CONTROL AND THE INDUSTRY'S STRUCTURE.

The mining administration's control of production directly affected the structure and growth of the industry. Its purpose, as formulated in the 1766 codification and subsequent instructions, was to adjust the industry's output in accordance with apparent market demand. To control production, the number of firms and their size had to be regulated. To achieve this, entrance into and exit from the industry was carefully supervised. The entry of an operation was the most strictly controlled aspect of the state's regulatory system, and also had the most far reaching consequences on the industry's development. Ideally, the administration guaranteed a mine, once in operation, a continuous output along with a cost recovering and profitable income. The hurdles to entry consisted of four basic steps, each requiring a legal permission: Prospecting, claiming a field, granting a concession, and starting the operation.

Prospecting was the expressed right of any individual, but the actual preparatory work demanded a permit. The state encouraged prospecting,

[46] R. von Carnall, the later editor of the prestigious mining journal, « ZBHS », himself a high ranking mining official in Berlin, was a most outspoken opponent of the tax system under the *Direktionsprinzip*. CARNALL, *Die Bergwerke*, pp. 65-66.

since only through discovery and eventual exploitation could it derive an income from its mineral rights. Yet even here, the state administration was interested in order, and discouraged speculation by defining the area and limiting its size. A ministerial directive in 1822 prohibited permits for additional fields unless they were separated from each other by a certain distance. Even relatives were disallowed permits within this distance.[47] As a result fields tended to remain small, prolonging the existence of numerous small operations at a time when larger-scale operations were feasible and economically necessary.

After discovering coal, the interested party could claim the field, then the mining office investigated whether the coal was worthy of being worked. The law demanded that the claimant literally uncover the coal to the eye under the surveillance of a district official. In areas where the coal seams were near the surface this requirement was fairly easy to meet. As coal had to be sought deeper, even under water-bearing layers, proving its existence became difficult and costly, and the work, capital, and risk were hardly in proportion to the potential gain. At most the party was assured a field concession, but not necessarily the operation. Results from drillings were not accepted until 1853.[48] The administration wanted to pressure owners into exhaustive exploitation of fields and encourage only entrepreneurs with the most capital with long range commitments to enter Ruhr mining. Once conditions for the claim had been met, the claimant received a field concession. The size of this field, even the state administration recognized, had become inappropriate for the new production methods and their costs. To accommodate these new conditions, the law of July 1, 1821, allowed larger fields. Unfortunately, it was unclear in its application and even resulted in legal disputes within the mining administration, preventing its effective use until 1836.[49]

To start an actual operation legal permission was necessary. It provided the authorities with a direct method to regulate the number of firms and thereby the industry's output. In 1783, a directive temporarily prohibited granting operating permission for new or re-opened mines until existing ones were covering their costs. In 1803, when Essen and Werden fell to Prussia, the state reaffirmed its right to permit the start of an operation. Once again, in 1821, instructions from Berlin restricted new operations until existing ones could not fill market demand.[50] In general, the entry procedures

---

47 OBD, A/68nn.

48 The « Ministerial Order of November 2, 1853 » allowed the results of drillings to satisfy the requirement for a claim.

49 K. Oberste-Brinke, *Die Vierung and ewige Teufe der Langenfelder nach dem preussischen Gesetz vom 1. Juli 1821*, « Glückauf » (1941), pp. 649-51 contains law of 1821: Boldt, p. 6; Brassert, *Die Materialien des Gesetzes über die Verleihung des Bergwerkseigenthums vom 1. Juli 1821*, « ZBHS » (1861), pp. 493-506.

reflected the fear of the state administration of losing control and its almost pathological obsession with security and stability.

The mining administration also enforced continuous operation. The codification demanded payments from owners when normal operation necessitated it and income from did not cover costs. Clearly, the mining company was coerced into operating until the cost of continued mining was too great or the coal was exhaused. The latter, of course, was the administration's aim. Consolidation of fields was made difficult by the various entrance requirements, consolidation of operating firms involved legal and practical problems. The codification itself did not provide procedures, and the biggest obstacle was the legal structure of the company demanding approval by all shareholders.

During the first half of the nineteenth century, the state and its administration may have wanted to maintain its policy objectives, but the coal industry's structure and future growth were compellingly determined by geology. A coal mine had to be located where nature put the coal, not where the operator, consumer, or a state administration would have liked it. Moreover, geology did not make coal measures uniform, either in quality, thickness of seam, or accessibility. Primarily depth below the surface determinated the kind of operation — open pit, slope, drift, or shaft mining. All these variations in the geology of the coal reserve and the way it could be combined in industrial uses with other resources influenced the industry's location, structure, and growth potential.

A major characteristic of the geological nature of the Ruhr coal field is that the coal is found at progressively increasing depth from the south to the north; and the depth increases more rapidly in the western part, the Essen area, than the eastern part, the Mark. Another characteristic is that the coal eventually lies under waterbearing secondary rocks. This was the case of the coking coal for the iron and steel industry. The effect of these features was that, as mining moved northwards the initial and continued costs of operations rose. In addition mining activity also moved away from one of its traditional transportation routes, the Ruhr river. This was to have a major impact on the transportation development both internal to the industry and for the region as a whole. As long as mining was in the southern fringe of the coal region near the Ruhr river and its side valleys, access to the coal and transportation to major markets was fairly easy. In addition the cost of extraction was relatively small and constant. By the beginning of the nineteenth century most of the convenient areas were being exhausted. New operations were either forced to tap more difficult layers in the hilly parts of the Ruhr valley region or move northwards. In both cases shaft construction

---

50 *Instruktionen für das Cleve-Meurs-Märkische Bergamt zu Wetter, 24. Mai 1783*, in REUSS, « Mitteilungen », pp. 317-18; Patent wegen Verwaltung des Bergregals in... Essen-Werden, 12. April 1803, OBD, A/522; Oberberghauptmannschaftliches Rescript an das Oberbergamt 29. September 1821, OBD, A/68.3.

became necessary. Out of 259 mines operating between 1830 and 1847 in the Mark, more than one-half were located north of the river, and 70 per cent of the mines averaging an output of more than 6,000 tons were also there. By the end of the 1830's, a locational shift of the industry had definitely occurred, affecting all aspects of its future development.[51]

The 1766 codification simply could not have foreseen these new conditions, requiring new methods and technologies. The administration rightly feared that these new developments would affect the industry's structure and its control over it. For most of the first half of the century, the administration still appeared to be guided by the notion that the most suitable operating units compatible with its policy were relatively small firms of similar structure and employing similar techniques. Shaft mining presented a problem. It was advanced by the initiative of a small group of profit seeking and farsighted entrepreneurs and came into existence, so it could be argued, despite the administration. In all steps in the acquisition of property, the shaft mine appeared to be, intentionally or not, discriminated against. Claiming a field was made difficult and costly. It demanded the sinking of a shaft to prove the existence of coal to the eye. The concession, the surveying, and the field size made shaft mining less appealing. Finally, the actual operation could still be denied, even after all entry conditions had been fulfilled.

The case of the shaft mine Schoelerpad reflects not only the conflict between private enterprise and state policy, but also affords an insight into the reasoning behind the state controls.[52] From 1816 to 1826, Schoelerpad was continually refused permission to start its operation although it possessed the required field concession. The mining authority gave the following reasons. Schoelerpad's field concession did not automatically entitle it to operate and the law of 1807, guaranteeing freedom of occupation, explicitly excluded mining. In the same locality, Saelzer-Neuak had a shaft operation already supplying the local market. It would also lose a large share of its non-local Cleve market, since it was located one-half hour farther up the Ruhr river than Schoelerpad. Consequently, it would be unable to recover operation costs and previously accrued debts. Finally, the administration believed the consumer would not benefit from the resulting competition. A price rise would surely follow because both mines would strive for an income that covered costs. The possibility of a lower price and market expansion was not considered.

For ten years Schoelerpad fought back. It took its case to the senior president of Westphalia, von Vinke; the retired minister of state, vom Stein;

---

51 Computed from data in « Monthly Mining Reports ».

52 A. PRYM, *Staatswirtschaft und Privatunternehmung in der Geschichte des Ruhrbergbaues* (Essen, 1950), pp. 84-85; KLOSTERMANN, *Lehrbuch*, p. 41, gives the cabinet order concerning Schölerpad: H. SPETHMANN, *Der Tiefbau der Zeche Schölerpad im Kampf gegen das Direktionsprinzip*, « Bergfreiheit » (1952).

and even to the king himself; all to no avail. A cabinet order of 1826, specifically directed to Schoelerpad, but with general policy implications, again re-affirmed the administration's right to grant the privilege of starting an operation. Yet the king also pointed out that Saelzer-Neuak, for that matter any other mine, should not automatically be permitted a monopoly by prohibiting neighboring operations. During the 1830's Schoelerpad became one of the largest operations in the Ruhr. Between 1836 and 1842, it averaged an output which placed it third in the Essen region after Saelzer-Neuak and the shaft mine Gewalt.[53]

Franz Haniel was the first entrepreneur to risk construction of shafts penetrating the water-bearing layer.[54] With his first shaft, Franz, 1832-34, he failed. He was successful with shaft Kronprinz, 1835-38, at a cost of 60,000 thalers. The Essen office discouraged him from bringing it into operation. Haniel argued that coal prices were high and demand from the iron works, Gute Hoffnungshütte, had not been supplied. Essen declared that the increased prices were only temporarily caused by the recent Dutch exports and that the iron works were well supplied. Haniel was an owner of these works and could give numerous instances when they had been inadequately supplied with high quality coal. Higher quality coal used in iron processing was one of Haniel's major reasons for undertaking the rather risky and costly ventures in the first place. Finally, when the mining office granted permission, it demanded immediate payment of surveying dues amounting to 3,660 thalers.[55] In general, permission was granted on persistent demand, but only after a considerable delay.

Shaft mining required a new technology and resulted in a corresponding rise in costs. The steam-engine became the necessary complement for the shaft operation.[56] It was used for pumping water and later for lifting in the shafts. At first many of the shaft operations did not have to penetrate the water-bearing layer but did have to cope with ground water. In 1803, Franz Dinnendahl manufactured the first Ruhr-made steam-engine and delivered it for the price of 2,400 thalers to the mine Vollmond which had to borrow the money from the Miners Fund. Before 1815, there were about a dozen small engines pumping water and lifting coal. Nine were in the Essen-Werden region where most of the early shaft mining took place. Their initial cost ranged from 2,500 to 12,500 thalers and their operating cost between 1811-14 ranged from 1,500 to 15,000 thalers per engine. Five of the nine ventures accumulated large losses. Between 1805 and 1827, the mine Nottenkaemperbank had operating losses of 13,000 and Wasserschneppe totalled losses of

---

53 Data derived from « Annual Reports », 1836-42.

54 Hans Spethmann, *Die ersten Mergelzechen im Ruhrgebiet* (Essen, 1947).

55 *Ibid.*, pp. 25-27.

56 H. Fischer and S. von Weiher, *Die Anfänge des Dampfmaschinenbetriebes im Ruhrbergbau,* « Bergfreiheit » (1951).

36,000 thalers between 1814 and 1821, but Kunstwerk and Caroline had large profits. Soon these early steam-engines were too weak and during the 1820's were replaced by more powerful ones. Kunstwerk replaced its 1813 engine with a stronger one in 1822 and the latter again in 1827. The same held true for Sellerbeck and Gewalt which also sunk a new 104-meter shaft.[57]

During the 1830's the number of shaft mines and steam-engines in the Ruhr increased dramatically In 1828 there existed only 9 shaft operations using 14 engines, 11 years later the 42 shaft mines operated 70 engines. From 1836 to 1839, in the Mark alone, the number of shaft operations using steam-engines jumped dramatically from only seven with eight engines to 23 mines with 31 engines.[58] Due to the geological nature of the coal reserve, the Essen area was forced to use shafts and handle water problems much earlier; only in the 1830's did the Mark increasingly face a similar situation. The opening of the Holland market provided the incentive for many of the new shaft operations. In fact, between 1830 and 1835, the entire structure of the industry was dramatically affected when Ruhr coal was allowed tariff free into the Dutch market. The Belgian revolution had occurred and Holland did not normalize its relationship with Belgium until 1835. Significantly, between the start of shaft construction, general preparation for operation, and the actual time of output, there was frequently a lag of three to five years. Consequently, many mines only came into operation in the second half of the 1830's when less favourable market conditions existed. In any case, shaft mining and its companion, the steam-engine, were well established by the 1840's. By 1850, there were 123 steam-engines.

Finally, shaft mining demanded a highly dynamic entrepreneurial class. Early shaft mining, as already pointed out, was not only costly and hazardous but financially uncertain. Some made large profits, others incurred large losses and had to shut down. In addition, the mining administration certainly did not encourage it, and no tax incentives were given. Between 1832 and 1848, 16 shafts or operations penetrating water were undertaken by about a dozen entrepreneurs.[59] These men had not only to be farsighted, and willing to take chances, but also had to possess capital and influence. All were long established and well experienced mining entrepreneurs. Haniel, Stinnes, Harkort, Waldhausen, and Butenberg had money. Von Vinke, von Eicken, von Romberg, and Honigmann had influence. Von Eicken and Honigmann were retired mining officials. Von Vinke was the president of Westphalia and von Romberg was a high provincial official. After only a few years, most of these operations had become among the largest in the Ruhr. The

---

57 REUSS, pp. 367-69.

58 « Annual Reports », 1827-42; Steamengines in the Westphalian region, 1816-67, five volumes: OBD, B/86.1 to. 3, B/86a, B/86.17; Steamengines, 1836-42; OBD, C/38.

59 SPETHMANN, *Mergelzechen*; Von Vinke and von Romberg, shares in mining operations, 1836-47, OBD, C/27.

mines owned by the Stinnes family, Victoria Mathias and Graf Beust, were the third and fourth largest in the Ruhr. The mines Helen & Amalie, Franziska Tiefbau, V. Präsident, Carolus Magnus, and Wolfsbank were by 1850 the 8th, 12th, 16th, 25th, and 32nd largest.[60]

The shaft operations penetrating water marked the beginning of a new era in Ruhr mining. Consequently, during the 1840's, the administration reluctantly relaxed its control over the structure of the industry. This new type of operation with its increased output and corresponding demand for larger and frequently more distant markets had destroyed the small-scale mining nurtured by state administration. The typical operation through the first half of the nineteenth century was still small and averaged an output of between 1,000 and 6,000 tons. Yet by 1838, from the 178 firms actually producing, 52 averaged more than 6,000 and six of these had each an output ranging between 25,000 and 45,000 tons.[61] Between 1830 and 1847, the largest mines, all engaged in some form of shaft mining, averaged about one-third of Ruhr production.[62] The shaft operation Gewalt averaged an output of over 30,000 tons between 1836 and 1842, and by 1850 it was the largest Ruhr mine producing 84,000 tons and employing 356.[63] While even in 1850, 60 per cent of all operations only averaged 1,500 tons, the ten largest shared 40 per cent of total output and the 40 largest 87 per cent. Nearly all of the 40 were engaged in some form of shaft mining, but only seven had penetrated the water-bearing layer.[64]

6. Price Control and the Market.

As part of the general policy the mining administration also tried to provide a market for each operating firm and for the industry's output. To guarantee a market share for each operation, price controls were introduced. Of course, these were also to assure a relatively constant balance between state income from taxes and profits. The basic philosophy underlying the administration's price policy regarded competition as harmful, and price competition as disastrous. Low prices were expected to drive out operations, and high prices decrease the market for the entire industry. The eigtheenth century economic experience reinforced the belief that market expansion was both theoretically and practically difficult. The market tended to be viewed as a constant unit to be divided among operating firms. The conversion from wood to coal consumers and the inadequate transport system presented

---

60 *Bergwerke in Preussen*, section in « ZBHS », vol. I.
61 « Annual Reports », 1838.
62 *Ibid.*, 1836-42; « Monthly Mining Reports », 1830-47.
63 « Annual Reports », 1836-42.
64 Data derived from « Entwicklung », vol. X, p. 53.

formidable obstacles to market expansion. Furthermore, the Ruhr itself did not yet have a large industrial base for coal consumption. Both the largest industrial users and population centers were located outside the mining region.

The basic guide for the price and tax policy was the law of October 26, 1755, incorporated into the 1766 codification and repeatedly reaffirmed. It was still in force in the Westphalian part of the region in 1851 when it was abolished. Under this law, the mining authority established prices in such a manner that competitive firms could operate next to each other. The price for each operation accounted for differences in the quality of coal, geographical location, market access, cost of operation, and a reasonable profit. Ideally, locational and market advantages or disadvantages were to be cancelled out. Until 1830, the actual price determination was handled by the district officials. They had the best view of local conditions, supervising only a small number of mines. They established a specific pithead price for each operation.

The largest price variation was caused by a coal mine's location and access to the market. A mine's output, even the same coal seam, could have several different prices, solely due to location in relation to the nearest transport system, distance, and type of market. These differences, chiefly those reflected in the transport cost, again were to be cancelled out by a lower or higher pit-head price. In the early period, to keep direct control over coal sales, the administration demanded that sales and immediate cash payments take place at the mine site. Normally buyers provided their own transport. The local domestic consumer, the blacksmith or small industrial establishment, transported their own coal and were free to choose from several mines in the same vicinity. Sale to more distant markets was somewhat more complicated. It was handled by professional transporters using horses as draught or pack animals. Professionals also shipped coal on Ruhr river barges down to the Rhine valley markets. In this case, they also had to pass through the Ruhr and Rhine river port of Ruhrort which was under state supervision. Still all sales and cash transactions were to occur at the mine. Consequently, during the eighteenth century a small number of mines in the same locality used the same means of transport and supplied the same market. Given this situation, the mining authority could easily act as a general sales and price regulator, since it was capable of viewing the general production, sales, transportation, and market conditions.

Gradually during the first half of the nineteenth century, these sales and price controls began to fail and the major reason for maintaining them appeared to be the control over the collection of taxes based on the established prices. By the 1830's, changes in the industry's structure, transportation, and markets forced the mining authority to adopt a different method of price determination. The two regional offices at a general yearly meeting with mining company representatives established annual prices. This new practice

could have produced realistic market prices. The private representatives, in many instances performing a dual function as owners and coal dealers, were better informed about actual market conditions than a small group of officials, however competent. The administration itself realized that it could not determine a price of every operation and still fulfill its other functions. The advice of the company's representatives became an indispensable part of the price control system, but here also lay its ultimate weakness. The government prices were increasingly determined by the very people it was to regulate, who, of course, protected their own best interests. Soon these hearings created the impression of a yearly bargaining session between administration and owners.[65]

Immediately, conflicting interests complicated the annual price determining procedure. The majority tended to influence the price, but it frequently represented small operations facing mostly a local market. For example, in the 1837 price meeting in Essen, the majority favored and received a small but significant price increase for more distant consumers.[66] The minority strongly opposed it, owning shaft mines producing the largest output and heavily dependent on the export market. Exports faced different prices and different markets. Export prices were established not by the state but by relatively free market competition. These prices fluctuated not only within a given year but also from market to market. At Cologne they tended to be somewhat higher than in Holland. Here Ruhr coal competed with cheaper Belgian and British coal. Even within the larger Ruhr industrial area prices differed and changed within a year. The large enterprises sold in all these markets, yet the mechanism allowing deviations from the annual prices was cumbersome and inappropriate to quick market responses. As a result, chiefly the larger ventures found loop-holes in the price and sales mechanism and manipulated the annual hearings in their favour.

The high taxes, computed on the basis of the official price, also contributed to the failure to establish realistic prices. These were felt by most owners

---

[65] Ludwig Müller, *Über die gesetzliche Notwendigkeit und die Vorteile des gemeinsamen Kohlenverkaufs zu amtlich festgesetzten Preisen auf den Ruhrdebitszechen im Essen-Werdenschen, im Gesensatz zu der bisherigen Naturaltheilung und der Veräusserung zu willkürlichen Preisen* (Bonn, 1838), Part II is a supplement, *Nachtrag und Aktenstücke zu der gedruckten Mitteilung des Gewerken Ludwig Müller...* (Bonn, 1840). A printed copy in OBD, C/43 and another in Mining Library Essen. Müller, a disgruntled mining entrepreneur, gives an interesting account of the general price hearing and subsequent malpractices. By his own admission he was angered by felloy shareholders who had several times deprived him of his rightful share of profits. His self-appointed mission was to inform the rest of the world, at least the mining authorities, of the many fraudulent practices. He collected documented evidence, wrote numerous letters, and even published at his own expense pamphlets of his shameful findings (including the two above).

[66] *Ibid.*, pp. 14-17.

as a serious financial burden. During a period of generally rising prices, the private representatives frequently used the annual hearings to establish a lower official price than the actual market price. For instance, during the Essen price meeting on November 6, 1839, the representatives applied for prices far below current market prices, as they had done in the past. The market price in 1839 for good quality coal ranged between six and one-half to seven and one-half Silbergroschen per Scheffel, but at the hearing the price of only five Silbergroschen was sanctioned for the coming year. This price incidentally was also entered into the official records at Berlin.[67]

Those owners who also were coal dealers found other ways of circumventing the official prices and make a profit. The mine Langenbrahm had already sold its entire 1839 output in advance at the lower price set in the previous 1838 meeting to its own shareholders. These also happened to be coal dealers and transporters, George Stinnes, Neustein, who was also a representative at the annual hearing, the brothers Schweger, brothers-in-law to Neustein, and the brothers Maurits & Smith. In turn these men had sold their output at the current higher market price. Many other owners conveniently used the hearings to set sales prices by common verbal or even written agreements. The mine V. Kapellenbank even defended the discrepancy between the official or tax-based price and their higher price before the mining officials. It declared that the difference or profit was a repayment for effort and risk in marketing the coal.[68] This argument pointed to the important role of owners as coal dealers and transporters and not just as producers. Unlike the mining administrations they saw their activities as an integrated part of ownership. Finally, for most operations the official price served as a guide below which in the long run it was unprofitable to sell. After all, taxes were computed on the basis of this price, and they were cutting into profit margins. Consequently, the price hearings between 1830 and 1850, under the influence of the private representatives, probably, on the average, established a lower price than the actual market price.

Most officials in Berlin and in the provinces favoured reform. The finance Minister von Bodelschwingh, who was also the highest mining administrator during the 1830's although interested in a high state revenue, opposed the state regulated prices. Other officials in the regional mining administration like von Oynhausen in Silesia still wanted to keep the old system. He argued in a bureaucratic manner that price controls were a necessary means to maintain order and should not be weakened but rather appropriately used.[69]

---

67 *Ibid.*, p. 19.

68 *Ibid.*, p. 20; Another way of circumventing the sales' controls was the practice of giving discounts to favoured customers. See KRAMPE, pp. 99-100.

69 CARNALL, *Bergwerke*, pp. 50-51; Von Oeynhausen an von Milicki, 18 Dezember, 1843, OBD, C/42.

Yet on the contrary, the continuation of this system encouraged circumvention and the breakdown of one of the administration's most cherished goals, law and order.

In addition, the orderly and efficient administration depended in a large measure on the ability to enforce the mining law, but this increasingly complex law and its application began to create immense administrative problems. Prussian mining law was unclear and highly fragmented. After 1815 in Prussia there existed 12 different mining codifications and in the Ruhr alone three codifications along with a host of special feudal privileges.[70] The legal confusion had increased with the addition of new territories. In 1803, Essen and Werden fell to Prussia and after 1815 other small territories including the princely domain of Broich had come under Prussian control. Each had their own mining tradition different from the Prussian parts of the Ruhr which were predominantly under the 1766 codification. Of course, the Ruhr mining authority tried to bring all of these new areas under its comprehensive controls. Yet in some cases political considerations allowed special privileges to remain; in others, such as the Essen area tradition was a most powerful and persistent opponent of the Prussian mining law.

Another cause for the legal and administrative confusion resulted from the complicated regulations themselves. By far the most debilitating regulations were the entrance procedures into the industry. These nearly caused a complete administrative breakdown in parts of the Ruhr. All types of unprocessed applications had gradually accumulated, but in the years between 1830-34 mining enjoyed a boom and new applications were coming in by the hundreds. Profitable speculation was also going on with the older ones, requiring constant reprocessing. In 1832, the following applications needed processing: 237 prospecting permits, 206 claims, 106 claims waiting for official inspection, and about 1,500 existing applications of all types, some dating prior to 1800. From all these, only four were immediately acted on, resulting in the granting of three field concessions.[71]

The law of 1821, at least in part, contributed to this chaos. It allowed an increase in the size and depth of fields, but was badly formulated and its uncertain technical aspects hindered its application. In addition, how could there be any further prospecting and claiming under the wider provisions of this law when the following conditions existed. In 1832, in an area of two and a half square miles in the Mark, there existed 91 drainage tunnels

---

70 BRASSERT, *Berg-Ordnungen*; Widersetzlichkeit verschiedener Gewerke gegen die im Jahre 1803 im Essen-Werdenschen geschehenen Einrichtung der Verwaltung des Bergwerksregal, 1803-1806, OBD, B/11; Most of the long legal battles involved the refusal to pay taxes, chiefly the « tenth », 1828-1837, OBD, B/55n, r, l, m.

71 Coal export to Holland, 1812-1838, OBD, A/466; REUSS, p. 62; OBERSTE-BRINK, *Die Vierung...*, « Glückauf », contains a reprint of the entire report of Jan. 26, 1833 by BERGMEISTER HONIGMANN, pp. 651-53.

with the right to mine coal in them, and 917 single field concessions ont of which only 137 were mines in operation.[72] Consolidation was in order, but as already discussed the mining law and principally the entrance procedures themselves hindered it. To avoid further confusion, the cabinet order of June 4, 1835, prohibited new claims in two major districts in the Mark where the number of fields made it difficult to recognize the remaining free areas.[73] First, all old claims had to be settled. It essentially served as a stop-gap measure rather than the required reform. This suspension was not lifted until January 1853. Finally, adding to this confusion was the turnover of mines entering and leaving the industry which was quite frequent in proportion to those operating continuously. Between 1830 and 1847, in the Mark alone ont of 259 mines operating at one time or another only 68 fell into the permanent category, while 150 entered, some even twice, and 109 existed from the industry.[74] Clearly reform of the entire legal system was desirable.

7. Reform and the Market Economy

Between 1826 and 1851, several mining law revisions were attempted.[75] The need for a new and unified general Prussian mining codification was admitted by all concerned, but sharp differences surfaced on the future role of the state. Some proposals wanted to maintain the present role, others like that of 1836 contemplated a drastic reduction of state authority to more supervisory and police functions (its essential features were eventually incorporated into the 1865 general codification).[76] All agreed to reduce or abolish the special mining taxes. Seven reform proposals were prepared before 1851 and all failed. Finally, in 1851 a major reform did take place. It did not result in an immediate and total revision of the old system, but through a series of laws abolished its basic principles.

Between 1851 and 1861, four major laws reduced state controls to a minimum. They essentially changed the relationship between the private mining company and the state administration and ushered in a new era of

---

[72] *Ibid.*, p. 652.

[73] *Ibid.*, pp. 652-53.

[74] Based on « Monthly Mining Reports », 1830-47.

[75] Brassert, *Die Bergrechtsreform in Preussen*, « Z. I. Bergrecht » (1862), pp. 234-253, gives a short history of the attempts to revise the mining code from 1826 to 1851. Brassert was also the editor of the above mentioned journal and is generally recognized as the father of the General Prussian Mining Codification of 1865. Carnall, *Übersicht*, contains in a rough form the December 1848 revision. See also, *Technische Bürokratie und Unternehmer im Prinzipienstreit um das Berggesetz*, « Z. f. Bergrecht » (1865), pp. 293.

[76] Gutachten verschiedener Beamten über den Entwurf des neuen Berggesetzes, 1837, printed OBD, B/50a.

private enterprise, allowing market forces to be the basic regulator of the industry. These laws were the shareholder law and its companion tax law of May 12, 1851; the freedom of contract law of May 21, 1860, and the law of June 10, 1861 abolishing the regional offices.[77] Their introduction (notably the first two) created new conflicts. Now pressure for continuing reform came from the state's highest mining official, Minister of Commerce, August von der Heydt.[78] The conflict was between the minister himself as a reformer and the mining administration's bureaucracy. The latter feared the loss of power and wanted to retain more authority than the law or the minister would permit. As late as 1856, Heydt still instructed Dortmund that difficulties in administering the reform laws of 1851 should be solved in an imaginative, benevolent and considerate manner, using administrative methods.[79] The minister had repeatedly emphasized that it was not the letter of the law rather the spirit which should prevail.

The two laws of 1851 reformed the most burdensome controls and answered the major demands of the reform movement. The shareholder law was the cornerstone of the reform. It fundamentally changed the basic principles of the 1766 codification by transferring controls of production, sales, and management of the operation from the state administration to the private company and its shareholders. It freed private decision-making and made the company a viable economic organization. At first glance, the response to the shareholder law was not as immediate as expected. By the end of 1852 only 30 mines had assumed self-management, but nearly all of them were shaft operations and 17 of them were the largest in Ruhr producing more than one half of the industry's output.[80] The rest were still reluctant to assume the responsibility and cost of self-management. The law did drive out some of the small and inefficient mines which could not afford a special manager. The number of mines dropped from 198 in 1850 to 178 in 1852.[81] However, the law had also liberalized consolidation and to compete with the large operations smaller ones joined together. As a contemporary put it, only through concentration of capital and labor into larger operations could

---

77 All the reform laws between 1851 and 1865 and the many subsequent instructions can be conveniently found in the first 12 volumes of « ZBHS »: The shareholder law of May 12, 1851, vol. I (1854), pp. 24-28; the tax law of the same day, vol. I, pp. 15-17; the laws of 1860 and 1861, vol. VIII, p. 217-220 and vol. IX, pp. 222-224, respectively.

78 Several ministerial instructions were specifically directed to the Dortmund mining headquarters: May 30, 1852, « ZBHS », I, pp. 36-38; Feb. 15, 1853, « ZBHS », I, pp. 39-40; April 2, 1856, « ZBHS », IV, pp. 50-51.

79 Instruction of April 2, 1856 (see 78).

80 « Entwicklung », vol. X, pp. 33-34; KRAMPE, p. 70; HEINRICH ACHENBACH, *Über das Bergregal und Berghoheitsrecht in Preussen*, « ZBHS », XIII, p. 76.

81 *Bergwerke in Preussen*, « ZBHS », I; REUSS, p. 387.

general costs be reduced, prices lowered, and shareholders still make larger profits.[82]

The tax law of 1851 reduced the long contested tenth to the twentieth, or five per cent of sales income. In all, 24 other special mining taxes were abolished, instead a « supervisional » tax, less than one per cent of sales, was instituted. The law provided instant relief and needed capital. In 1850 taxes amounted to about 1.3 million thalers or more than 13 per cent of sales, in 1852 they had dropped to less than 158,000 or about six per cent of sales.[83] The twentieth or five per cent of sales was further reduced by one per cent in each year after 1861. In 1865 all remaining special taxes were abolished by the new mining codification and by the end of the year total taxes amounted to only 1.9 per cent of sales. Yet the rapid growth of the industry still allowed the state in 1866 to collect a million thalers in taxes.[84]

The shareholder and tax laws did not immediately increase prices as the opponents of the reform had argued. Rather for all mining products prices actually decreased in 1852. When they did increase between 1853 and 1857, it was for different reasons. During this boom period, the rapid rise in production and sales were at least partly caused by the new transportation medium, the railroad. More important coal was increasingly used in the growing metal industries. This in turn caused a strong demand for the more expensive coal types, coking coal was only produced by the deeper shaft operations. In addition rising prices of competing fuels, wood and imported coal, benefitted the Ruhr coal. In general the entire period, 1851-65, was one of decreasing prices.

In 1860 and 1861, two other laws completed the major reforms.[85] The law of 1860 reinforced the shareholder law and clearly stated the supervisory function of the mining administration. It retained supervisory power over technical aspects of mining, safety of operation and surface, and the protection of the life and health of miners. A technical plan of operation had to comply with the existing safety standards and was strictly enforced. The law also drastically changed the traditional relationship between the company and its workers by establishing contractual freedom. The mining office no longer participated in hiring and firing, or in the determination of wages or salaries. The state did reserve the right to control the qualification of the technical and business personnel. Finally the law of 1861 defined the function of the mining headquarters. It re-organized Prussia into four mining districts, each with its headquarters, and abolished all subordinate regional offices. In the Ruhr the Essen and Bochum offices were discontinued, with the headquarters remaining at Dortmund. These laws, together with a host of other directives

---

82 R. von Carnall, as editor of « ZBHS », I, p. 66.
83 « ZBHS », XII, pp. 267-75. See also note 80.
84 The law of May 22, 1861, « ZBHS », IX, p. 206.
85 See note 77.

between 1851 and 1865, became the foundation for the General Prussian Mining Codification of June 24, 1865.[86]

The new laws for the first time allowed private enterprise a range of economic decisions which had not been possible under the old state controls. This development was further strengthened by a general upswing in economic activity during the 1850's. While the reform was timely for direct participation by private enterprise in the economic boom, the industry and the region also experienced the full impact of its first major depression. The largest boom was in the three years between 1854 and 1856, while the depression started in 1857 and was most severe between 1860 and 1862. In both instances the industry did remarkably well in responding to the rapidly changing economic conditions.

During the entire period between 1851-65 coal production increased constantly except for a slight drop in 1859.[87] The annual growth rate for the entire one-hundred years, 1766 to 1865, was little more than five per cent, but during this period it averaged more than 12 per cent. Total production rose from nearly 1.7 milloin tons in 1850 to 9.2 million in 1865. Output had doubled in the first five years after 1850, an unprecedented occurrence. In general, until 1858, the industry responded to increases in demand by increasing employment and the number of operations. Average productivity per worker actually declined for a few years. The continued rise in production during the depression was caused by the entrance into the industry of large-scale operations. A time lag existed, the larger operations, mostly part of joint stock companies, had been formed during the boom period. These new operations not only increased production but also further decreased prices. During the boom, prices had been increasing, thereafter, they began to constantly decline.

The average enterprise in 1850 had an output of 8,400 tons and employed 64 workers. In 1865 it was nearly 40,000 tons with an average employment of 184. Average output per worker was only 131 tons in 1850, by 1865 it was 215 tons. While in the early 1850's the largest mines had outputs ranging between 50,000 to 100,000 tons, the typical new operation by the late 1850's exceeded 100,000 tons and employed 500 to 600 workers. In 1864, there were nine mines producing more than 130,000, four of these produced more than 200,000 tons each.[88]

---

[86] The General Prussian Mining Codification of June 24, 1865, « ZBHS », XIII, pp. 29-65. The state did maintain some important controls over the industry. A technical plan of operation had to be approved by the mining office according to existing safety standards. The technical personnel employed by the private company had to pass a written examination given by the mining office to qualify for their positions.

[87] The statistical information for the period 1851-65 was derived from sections entitled, *Bergwerke in Preussen*, « ZBHS », vols. I-XIII, and Reuss, pp. 367-68.

[8] « Entwicklung », vol. X, p. 53; *Bergwerke*, « ZBHS », vols. I-XIII.

In 1850, the eight largest operations, each with outputs over 50,000 tons shared 30 per cent of the total Ruhr production. In 1865 there were 55 operations with an output of over 50,000 tons sharing 67 per cent of the total with the eight largest having a combined output equivalent to that of the entire industry in 1850.[89] The new firms in the 1850's operated on fields at least three times the size of the old ones and many had added coal washing, sorting and coking operations. The operations clearly had also become more efficient, they had the highest productivity per worker. Productivity for all operations rose and gradually for the entire industry it converged to the same level. Nearly all operations had adopted similar methods and technologies. The use of machines and steamengines increased rapidly. In 1850 there were 123 engines, by 1865 their number had risen to 462. The average horsepower per mine more than doubled from 53 in 1850 to 120 in 1865.[90]

In summary, between 1851-65 the Ruhr mining industry experienced the reform of the old system and its most rapid economic growth. Political and economic pressures had forced the state to withdraw its tutelage and direction of the industry. The General Prussian Mining Codification of June 24, 1865 officially ended a century of state controls. Basically it contained the content and objectives of the previous reform laws. It maintained a minimum of controls to protect the public and to assure safety and a standard of technical efficiency in the industry As a final comment, it is interestnig that under Freiherr vom Stein, considered a liberal reformer, the system of state controls was fully implemented and that 70 years later, August von der Heydt, another liberal reformer, was chiefly responsible for abolishing it.

---

[89] *Ibid.*

[90] REUSS, pp. 367-368; OBD, B/86a and B/86.17.