J. Hermann's studies on salt production in the Urals in late 18th century

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ABSTRACT: The article highlights the activities of the Austrian mining engineer and statistics Johann von Herrmann (1755–1815), associated with the study of salt production in the Urals in the late 18th century. After the invitation to the Russia, a young engineer at the age of 27 years was sent to the Pyshminsky steel factory for inspection of state-owned industrial factories. Herrmann went to Ural several times, and the materials he collected during his first stay there in 1784–1795 were transferred to the academic archive. Thanks to this, we have invaluable information about the state of the Ural factories. One of the objects of study was salt production, concentrated in the Solikamsk district (Perm governorship). Archival papers of Herrmann contain information about the organization of salterns, the staff of employees and workers, the costs of organizing and maintaining salterns, the volume of products, methods of delivery to other governorates, etc.

1 INTRODUCTION

Benedict Franz Johann von Herrmann (1755–1815), an Austrian mining engineer and statistician, was invited to Russia in 1782 at the age of 27 and was elected a corresponding member of the Imperial Academy of Sciences in the same year. As a mineralogist and mining engineer, Johann von Herrmann took up in the Academy of Sciences the issue of statistical study of the productive forces of the Russian Empire, developed methods of statistical analysis and collected information about industrial enterprises.

1783, Hermann was sent to the Urals, and in 1784 he was appointed director of the state-owned Pyshminsky steel factory, which opened its production in 1785 (Tulisov 2001: 397). Hermann collected in the Urals statistical data on state-owned enterprises and on the largest private factories (Bondar 2018: 1043–1049). Subsequently, the results of these and future studies were presented by Hermann in numerous papers, published in Russian and German (Penzin 1989: 63–67). Therefore, the Academy of Sciences elected him its honorary foreign member already in 1786; 1790 became he an ordinary academician in the Department of Mineralogy. As an academician, Hermann supervised the geological study of the Urals and Siberia, as well as empirical research in this region.

Thus, he sent to the Academy of Sciences the results of meteorological observations, which were reported in the Academy on October 21st, 1790, January 12th, 1792 (meteorological observations from Pyshminsk for July, August and September 1791), June 11th, 1792 (extract from meteorological observations in Pyshminsk in 1791) (SPbB ARAS, f. 1, l. 1, fl. 41: 60 rev., fl. 43: 2, 38). On March 24th, 1788, the Academy was informed about the sending of a paleontological find by Hermann for the Cabinet of Natural History (“he sent a curious bone found in the gold mines of Berezov”) (SPbB ARAS, f. 1, l. 1, fl. 39: 19). The protocol record of March 1st, 1790 reports that the Academy received from Hermann a collection of more than a hundred stones from the mines of the Ural mountains. On March 26th, 1792, it was reported that the Academy received a complete collection of Ural stones with a catalog. Protocol data for January 17th, 1793 report a new parcel from Hermann – a box with minerals from Perm (SPbB ARAS, f. 1, l. 1, fl. 41: 15 rev., 60 rev., fl. 43: 20, fl. 44: 5).

In 1795, Hermann expressed his intention to return to St. Petersburg and take his place in the Academy (SPbB ARAS, f. 1, l. 1, fl. 46: 9). He arrived to the capital and made at the academic meeting on March 14th, 1796 a report *On the current situation of the Siberian gold, silver, copper and iron factories and salt mines...* (SPbB ARAS, f. 1, l. 1, fl. 47: 20 rev.–21). Hermann continued in St. Petersburg to collect and process statistical data and was again sent to the Urals soon, receiving at the end of 1801 the appointment of the head of the Yekaterinburg mining administration (SPbB ARAS, f. V, l. 1–G, fl. 13: 169).

He continued in the Urals to maintain scientific relations with the Academy and organized, as before, meteorological observations. On December 1st, 1802, at a meeting of the Conference, it was reported about the sending by Hermann the first results of the observations (SPbB ARAS, f. 1, l. 1, fl. 53: 103). Hermann's weather observations in the Urals were repeatedly read out at the future academic meetings (SPbB ARAS, f. 1, l. 1, fl. 55: 43–44, fl. 58: 19, fl. 59: 101 rev., fl. 63: 79 rev.). In the protocols (July 11th, 1804), there is also a mention of sending by Hermann to the Academy Ural minerals; systematization and cataloging of these minerals for the Conference archive was entrusted to academician V. M. Severgin (SPbB ARAS, f. 1, l. 1, fl. 55: 82).

1801 (before leaving for the Urals), Hermann transferred to the academic archive all his statistical and graphic material, that was collected by him during his previous stay in the Urals and during his work in St. Petersburg. These documents formed the personal fond of academician Johann von Hermann and are stored today in the St. Petersburg Branch of the Archive of the Russian Academy of Sciences (fond 27). It gives us possibility to find in academic papers an information on Russian economic history at the end of the 18th century – about mining, iron-production, copper-factories, about the state of roads, the population, the prices of basic products and goods, etc. One of the studied by Hermann issues was the status of salt production and sales of salt.

2 REGIONS – SALT SUPPLIERS IN THE RUSSIAN EMPIRE

Salt trade in Russia (as in many countries of the world) was a source of the state income and an object of the state monopoly. Salt production was allowed to private individuals. The first positions in the 18th century were held by the Stroganov family, but the state owned large salt-producing enterprises, too, as in Staraya Russa, Orenburg and Perm governorates (Makhrova 2015).

One of the documents of Hermann's fond (SPbB ARAS, f. 1, l. 1, fl. 87: 12–17) gives information for 1783 – which of the governorates of the Russian Empire “what salt is satisfied”. The governorates of Azov, Astrakhan, Vologda, Irkutsk, Kolyvan and Tobolsk had their own salt; this part of the document does not specify the Perm and Ufa governorates, these governorates used their own salt, too, and it is described in the document below. We find in the *Complete collection of laws of the Russian Empire* a list of places where salterns worked in this time; the document of Hermann's fond does not contradict this list (PSZRI 1830: 15174). Imported salt was supplied to three governorates (the list of provinces – consumers of salt was established by the *Charter on Salt* issued by Catherine II in 1781): Vyborg, Revel, and Riga. For other governorates, the document provides such information. Perm salt was used by two capital cities – St. Petersburg and Moscow, as well as Tver, Novgorod, Smolensk, Vladimir, Kaluga, Pskov, Polotsk, Mogilev and Vyatka. It should be noted that the list of governorates – consumers of Perm salt is repeated in various documents: the same governorates are named in another document of Hermann's fond (SPbB ARAS, f. 1, l. 1, fl. 87: 59); the same list is given in the book of Bogdanov (Bogdanov 2014: 93), who quotes documents of the State Archive of the Perm Region. Iletsk salt (from Ufa governorate) was supplied to the Nizhny Novgorod and partially Kazan governorates. The document also names Olonetsk salt (*олонецкая соль*), which may be an error, it should be about salt from the lake Elton (near Pallasovka, near the border with Kazakhstan). Elton salt (*елтонская соль*) – so it is listed in the same document below. This salt was supplied to the governorates of Penza, Kostroma, Tula, Tambov, Saratov, Yaroslavl, Ryazan, Voronezh, Simbirsk, Kazan, Kursk, Oryol, Kharkov, partially Kiev, Chernigov, Novgorod.

3 PERM REGION AND SOLIKAMSK STATISTICS IN HERMANN PAPERS

The largest supplier of salt, which supplied both capitals, was the Perm governorate, or rather, in the years of Catherine II – the Perm namestnichestvo (*Пермское наместничество; Perm viceroyalty*). It was a newly created administrative-territorial entity. The decree on the creation was signed on January 27th, 1781 (SPbB ARAS, f. 27, l. 1, fl. 128: 12–21), and official celebrations were held in October 1781 (SPbB ARAS, f. 27, l. 1, fl. 128: 51–57 rev.)

A chronicle of official events can also be found in the papers of Hermann. This document mentions the names of local industrialists who made donations for the celebrations. First of all, these are the salt producers Stroganovs: Earl Alexander Sergeyevich Stroganov, who donated 1000 rubles (and 300 rubles each year for the construction of schools), and Baron Alexander Nikolayevich Stroganov, who contributed 500 rubles (and 100 rubles each year for schools). Representatives of the Demidovs family were also included in this list: Alexander Grigoryevich Demidov (donated 1000 rubles) and his cousin Nikita Nikitich Demidov (donated 2000 rubles) (SPbB ARAS, f. 27, l. 1, fl. 128: 57–57 rev.).

The namestnichestvo was divided into two regions (oblast; *область*) – Perm region and Yekaterinburg region. 1781, Yekaterinburg has received the status of a city and its name in honor of the Empress. Perm received the status of a city in November 1780. If the Yekaterinburg region was of paramount importance in the organization of metallurgical industry, then the Perm region had absolute primacy in the issue of salt production. Perm region was divided into 8 district (uyezd; *уезд*), one of the district town of Perm region was Solikamsk, at that time – Sol' Kamskaya (that means “Kama salt”). The city got its name for a reason: it emerged in place of the salterns on the banks of the river Usolka – a tributary of the river Kama. This is enshrined in the city's coat, that was approved 1783 (this day, the coats of all district towns of the Perm namestnichestvo were approved). We can read about the Solikamsk coat in the document *Description of the coats of district towns of the Perm governorate* (SPbB ARAS, f. 27, l. 1, fl. 128: 64–65 rev.; cf. PSZRI 1830: 15.786): “There is a salt well in the golden field, with a lowered into it bucket for removing salt and with salt streams on it”.

The data collected by Hermann gives us some information about Solikamsk itself. The Hermann's fond contains a demonstrative document, that was compiled according to the data of 1792 – *A brief list of state and private factories in the Perm namestnichestvo, the population, state revenues etc.* (SPbB ARAS, f. 27, l. 1, fl. 128: 40).

How we find out, there were 11 stone and 609 wooden houses in 1792 in Solikamsk (for comparison, there were 6 stone houses and 681 wooden houses in Perm). There were 25 villages with churches (*село*) and 774 villages in the Solikamsk district (there were 15 villages with churches and 537 villages in Perm district). There were 10 stone churches and 1 monastery in Solikamsk city (2 stone churches and 1 wooden church – in Perm city); there were 14 stone churches and 23 wooden ones in all Solikamsk district (3 stone churches and 12 wooden ones – in Perm district).

4 SALT PRODUCTION IN SOLIKAMSK. STATISTICS OF HERMANN PAPERS

The industrial situation in Solikamsk was in 1792 as follows. In terms of the number of metallurgical factories, Solikamsk district looked modest: 1 state-owned copper smelter and 2 private ironworks. The picture is completely different for salt factories: there were 9 private salt factories in Solikamsk itself, while 22 state-owned and 89 private ones in the district. There were no salt factories in other districts of the Perm region at all. This document gives us information about the volume of salt production in the entire Solikamsk region. These 120 salt works of Solikamsk district produced in 1792 5,039,759 pounds of salt, i.e. 80,636,144 kg. The salt revenue of the Perm region was 194,663 rubles 23 7/8 kopecks that year (SPbB ARAS, f. 27, l. 1, fl. 128: 40).

For comparison, we present data from the same document for the second state-owned trade – the sale of wine. In 1792, there were 6 drinking houses in Solikamsk itself and 27 in the district; they sold a total of 18,305 6/8 buckets of wine, i.e. about 225,151 liters. In Perm, with

exactly the same number of drinking houses in the city, three times as much wine was sold. In general, the drinking income significantly exceeded the salt income and was 611,119 rubles 50 kopecks that year.

We also have in Hermann's papers indicators of the dynamics of revenue growth from the sale of salt and wine in the Perm namestnichestvo from 1783 to 1795. It is important to keep in mind that Hermann arrived in the Urals at a difficult time for the salt industry. Researchers (beginning with historians of the early 20th century) note the crisis periods in the history of the Ural state salt production of the second half of 18th century (Kharitonova 1971 & other works of the author). In June 1782 Catherine II issued a decree "On the multiplication of salt production in the Perm namestnichestvo", that ordered to increase the production of salt in state-owned saltern (PSZRI 1830: 15.421). However, salt production decreased by 9 % that year, and by 12% – the following year (Bogdanov 2014: 94). This raised concerns about the supply of salt to the other 11 provinces. We cited above the document of 1783 with the information on the distribution of salt by governorates (SPbB ARAS, f. 1, l. 1, fl. 87: 12–17). There are specific details in the document: "It is required for these 31 governorates according to the average consumption for two years: of Elton salt – 9,101,657 poods 36 pounds, Perm salt – 8,917,354 poods, Iletsk salt – 1,700,927 poods 8 pounds; in fact, there is of all these salts by January 1st, 1783 in the provincial stores: of Elton salt – 4,318,731 poods 1 pound, Perm salt – 4,388,467 poods 20 pound, Iletsk salt – 1,126,914 poods 26 pounds. Therefore, as for the Perm salt, contracts were signed with private producers for the supply of 3,518,000 poods in 1783 and of 3,578,000 poods in 1784; but the Perm state chamber (*Пермская казенная палата*) writes that up to 1,200,000 can be boiled annually in state-owned factories, and the state chamber promises to add since 1786, when the pipes are cleared, up to 700,000 poods. <...>".

There is a special list among the Hermann's papers, that shows "how much wine and salt were sold in the Perm namestnichestvo from 1783 to 1794 and what was the amount of salt sale" (table 1). We see positive dynamics to 1794. Herewith, drinking income regularly exceeded salt income by more than 3.5 times. There are the data for the extreme two years below (SPbB ARAS, f. 27, l. 1, fl. 128: 47).

Hermann's papers also contain substantial information about the organization of salt production. On arrival in the Urals, he apparently sent out a questionnaire; the answers from three respondents (from whom exactly the answers were received – it is not obvious) were preserved in the fond (one of the questionnaires was signed Hermann on May 4th, 1784).

As a result, we have information on the organization of the technological process (SPbB ARAS, f. 27, l. 1, fl. 87: 33–35, 47 rev.–48, 61–67). Generally, the description does not contradict what we know about the production process of salt boiling, which remained unchanged until the beginning of the 20th century (Logunov & al. 1995, Chivtaev 2017: 71–93). There is also information on the expenses of salt factories for different items. The document informs, that the construction of one pipe for lifting salt solution required 606 rubles 70 kopecks per year. As this tube must be 35 sazhen [1 sazhen (*сажень*) = 7 feet] deep or even deeper and it is possible to pass in the solid and stony ground just for 5 or 6 years, so the establishment of a new pipe costs 3640 rubles 20 kopecks (SPbB ARAS, f. 27, l. 1, fl. 87: 31–31 rev.). An alternative calculation is also proposed – how much money is required to clean the old

Table 1. Revenue from the sale of salt and wine in the Perm namestnichestvo in 1783 and 1794.

Year	Salt income	Wine income
1783	131,775 rubles 60 kopecks	494,494 rubles 49 3/4 kopecks
1794*	223,408 rubles 89 kopecks	695,073 rubles 25 kopecks

* For the sale of salt, there are also data for 1795 – 214,995 rubles 62 kopecks. There aren't indicators for the sale of wine in 1795, because, as the document explains, the sale of wine was transferred to farmers, who must pay the Senate 612,897 rubles 85 kopecks annually.

pipe; the result is 289 rubles 67 1/2 kopecks (SPbB ARAS, f. 27, l. 1, fl. 87: 32–33 rev.). We have also a calculation of expenses for the annual maintenance of one saltern (for firewood and supplies, but without workers) – 2112 rubles 12 3/4 kopecks (SPbB ARAS, f. 27, l. 1, fl. 87: 35 rev.–38), for the maintenance of various industrial buildings and other expenses – 59 rubles 15 1/2 kopecks (SPbB ARAS, f. 27, l. 1, fl. 87: 39–43).

Interesting information is contained in the list of servants and workers of salterns. We learn that 24 salterns were serviced by 43 “higher” officials, including a warden, his assistants and clerks; this team has cost 2485 rubles per year, 100 rubles was allocated for office expenses. So, maintenance of one saltern was had 107 rubles 71 kopecks (SPbB ARAS, f. 27, l. 1, fl. 87: 43 rev.–44). There was also a staff of servants and clerks who performed the functions of external supply, service, communication, etc.; their maintenance, according to the document, cost for one saltern on average 149 rubles 75 kopecks per year (SPbB ARAS, f. 27, l. 1, fl. 87: 44 rev.–46). Taxes cost 109 rubles 2 1/2 kopecks per year. Thus, as the document says, the maintenance of one saltern cost 3247 rubles 59 1/4 kopecks (SPbB ARAS, f. 27, l. 1, fl. 87: 46 vol.–47).

The same document gives information about productivity of the salterns: each saltern was supposed to produce 50,000 poods of salt per year; in fact, 47,000 poods were produced. So, the cost price of each pood, taking into account all costs, was 5–7 kopecks (SPbB ARAS, f. 27, l. 1, fl. 87: 46 rev.–47). At the same time, it is known that by a decree of November 15th, 1783 the purchase price of salt for Solikamsk industrialists was 9 kopecks (PSZRI 1830: 15.880); the price increased in the following years (Bogdanov 2014: 96).

There is data on the volume of salt production at the separate factories for 1782–1783. On the state-owned Dedyukhinsky salterns produced 910,142–1,140,000 poods. Private salt factories produced the following volume of production: count Alexander Sergeyevich Stroganov’s 16 salterns in Usolye and Lenva produced 700,000–850,000 poods, baron Alexander Nikolaevich Stroganov’s 12 salterns in Usolye and Lenva – 630,000–640,000 poods, Vsevolod Alekseyevich Vsevolozhsky’s 10 salterns in Usolye and Lenva – 450,000 poods, princess Anna Alexandrovna Golitsyna’s (Mikhail Mikhailovich Golitsyn’s wife) 14 salterns in Usolye, Lenva and Chusovsky Gorodki – 530,000–535,000 poods, princess Varvara Alexandrovna Shakhovskaya’s (Boris Grigoryevich Shakhovsky’s wife) 16 salterns in Usolye and Lenva – 620,000 poods, Ivan [Lazarevich] Lazarev’s 9 salterns in Usolye and Lenva – 420,000 poods, Alexey [Fedorovich] Turchaninov’s 4 salterns in Solikamsk – 120,000 poods, merchant Maxim [Grigoryevich] Surovtsev’s in Solikamsk 3 salterns – 45,000–49,000 poods (SPbB ARAS, f. 27, l. 1, fl. 87: 58–58 rev.). Generally, the productivity of Solikamsk factories is known from a large number of other documents and is well represented in the book by M. V. Bogdanov (Bogdanov 2014).

Detailed information about the functioning of salt factories can be obtained from other documents: a document entitled “Report of Perm namestnichestvo to the State chamber on an Expedition for salt affairs from the Perm state-owned Dedyukhin salterns report” (SPbB ARAS, f. 27, l. 1, fl. 87: 49); daily record for the half of December (year is not specified), reflecting the amount of boiled salt and spent firewood in several salt factories (SPbB ARAS, f. 27, l. 1, fl. 87: 49 rev.–50); papers with the title “Brief about the state of salterns in Usolye and other places near the Kama river...” (SPbB ARAS, f. 27, l. 1, fl. 87: 52–57); statistical data on the salterns of baron Alexander Stroganov (SPbB ARAS, f. 27, l. 1, fl. 87: 60).

5 SALT TRADING

What were the means of salt delivery to remote provinces? Delivery of salt, as well as other heavy goods, was carried out by water until the 20th century. The main waterway of the Perm namestnichestvo was the Kama, a tributary of which is the Usolka river, where Solikamsk was located. One of Hermann’s documents reports, that for 10 governorates (i.e. all where Perm salt was supplied, except for Perm itself, as well as the neighboring Vyatka governorate) “<...> Perm salt from state-owned and private factories is sent every year after the release of rivers from ice in ships in caravans to Nizhny Novgorod, served there in stores and from there is already transported to the provinces” (SPbB ARAS, f. 27, l. 1, fl. 128: 48). In 1783, the price

for transportation to Nizhny Novgorod for Solikamsk industrialists was set – 6 kopecks per pood, but the price had increased in 1788, and on March 24th, 1788 a decision was made to set up warehouses at the mouth of the Kama river. But this salt delivery arrangement proved ineffective and in 1792 it was returned to the previous practice of salt delivering to Nizhny Novgorod (Bogdanov 2014: 94–96). As for the neighboring Vyatka governorate, salt was sent there directly from Perm by road. The length of the postal route from Perm to the borders of the Vyatka province was 130 versts, i. e. nearly 148 km (SPbB ARAS, f. 27, l. 1, fl. 128: 22 rev.).

No information was found in Hermann's papers about the purchase price for salt – the price that the state paid to salt producers. This is quite understandable: Hermann collected documents of the Perm namestnichestvo, the central administrative acts could be missing in his collection. At the same time, the purchase price for Perm salt for the 18th century is well known from state administrative documents (Bogdanov 2014: 96).

However, documents from the Hermann's fond contain information on the price of salt that was on sale: 1783–1790 – 35 kopecks per pood (this is slightly more than two kopecks per kilogram), 1791–1795 – 40 kopecks per pood (2.5 kopecks per kilogram) (SPbB ARAS, f. 27, l. 1, fl. 128: 47). For comparison, prices for basic food products in Solikamsk district in 1785: rye – 1.25 kopecks per 1 liter; wheat – 1.9 kopecks per 1 liter, barley – 1.19 kopecks per 1 liter, oats – 0.76 kopecks per 1 liter, wine – 3 rubles per bucket (24 kopecks per 1 liter) (SPbB ARAS, f. 27, l. 1, fl. 128: 41–43).

6 CONCLUSION

The first systematized data on this issue were presented by Hermann in a work that he dedicated to Ekaterina Dashkova and which was reported to the Academy of Sciences on February 11th, 1788 (SPbB ARAS, f. 1, l. 1, fl. 39: 10) – *Description of Perm salt factories, with suggestions for their correction (Beschreibung der Permischen Salzwerke, mit Vorschlägen zu ihrer Verbesserung)*. At the same time, documents with later information are stored in the archive fond. It was collected by Herman after the completion of the named work, and therefore offer new historical materials.

Hermann appeared in the Urals at a rather significant time. Catherine II, having come to the throne, thoroughly engaged in the “salt” business and on June 16th, 1781 issued a new *Charter on Salt*, which completed the new organization of the state salt trade. Although Hermann was not yet in the Urals at this time, the documents he collected start from this year. Hermann's papers reflect the subsequent crisis years and further time; the latest data relate to 1795 (when Hermann left the Urals), i.e. the time of the end of the Empress reign and, accordingly, of the subsequent state changes. The data presented in Hermann's papers reflect an important time for the Perm salt industry during the second half of the reign of Catherine II.

It is important that the information in Hermann's papers does not differ from the statistical data of other official documents of the time. Information about the presence of its own salt in the governorates of the Russian Empire is identical, as well as information about which province is supplied with which salt. The figures for the volume of salt production in the Perm namestnichestvo are close: the provided above information from Hermann's papers (SPbB ARAS, f. 27, l. 1, fl. 87: 58–58 rev.) is comparable to the information, that is provided in other documents of the time and collected in Bogdanov's book (Bogdanov 2014: 95). There are also many copies of Imperial decrees and official orders for the Perm namestnichestvo in Hermann's documents. All this speaks in favor of the objectivity of the by Hermann collected information and the possibility to use it as a full-fledged source on the history of salt production in the last two decades of the 18th century. It is important that these documents reflect repeatedly the known problems of the industry in 1783.

We will not find in the documents of the Hermann's fond fundamentally new information about the equipment of salterns. It was, in general, the same throughout the Empire and did not change in principle for several centuries. On the technical side, the salt works is well described in the known works (Logunov & al. 1995, Bogdanov 2014, Chivtaev 2017). At the same time, the documents of the Hermann's fond provide important information about the volume of

production and allow us to determine the place of the Perm namestnichestvo (Solikamsky district) in the general economic picture of salt production in Russia at the end of the 18th century. Even more valuable are the rare data that allow us to determine the cost of construction and maintenance of salterns, and hence – the prime cost of salt, and to obtain justification for both the purchase price and the sale price for salt. All this makes the documents of Hermann's fond a valuable source for the economic history of the reign of Catherine II, in particular – for the history of the Perm salt industry, that was just partially reflected in the work of Herm himself in 1789.

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