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The History of the Coal Mining Industry and Mining Accidents in the World and Turkey

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Abstract

Three per thousand of the world's coal reserves and 2% of lignite reserves exist in Turkey. Coal mining is the highest ranking industry for accidents and deaths per capita. For this reason, continuous monitoring and more attention should be gıven to the mining industry. In this review, the basic statistical data related to Turkey's mining and mining disasters are summarized.

KEYWORDS: Coal, coal miner, mining accident

It is known that coal production and consumption, and thus its industry, started late in Turkey compared with that in some other countries. In Ottomans, prior to the discovery and usage of lignite and pit coal, charcoal was used. In the hope of finding natural coal reserves in Turkey, mariners were discharged, given small coal samples, and sent back to their home towns with orders to look for similar pieces. The first piece of Turkish coal was sent from Karadeniz Ereğli to Istanbul in 1822, but no attempts were made regarding the investigation and operation of this coal. In 1829, other pieces of coal were brought to Istanbul by Uzun Mehmet, discharged from the navy and native to Ereğli Kestaneci. This time, the discovery was taken into consideration, and the region was investigated. On concluding that coal deposits are present, Uzun Mehmet was assigned a salary for life, but he was murdered before he could benefit from this reward. Pit coal was discovered in the Zonguldak field in 1829, but operations started in 1848. The field was the richest mining region in the Middle East. However, the coal discovered was not properly utilized in this region for a long period of time. In the 19th century, with the discovery of ores such as pit coal and lignite, the area of mining in Anatolia expanded and became more important.

After the administration of the field was given to the Ministry of Finance by the decree of Sultan Abdülmecid, a healthy operation could not be achieved, and lots of challenges surfaced. In 1849, some English money changers in Galata leased the field for 30,000 kuruş per year in collaboration with certain people in the palace, and in 1869, with a new mining regulation, foreign nationals acquired the same rights in mining as Ottoman citizens. However, the English coal company was not quite successful in the field that it acquired in very favorable conditions, and the coal, which was produced with primitive methods, did not exceed 50,000 tons per year. Because of this low production, which was not even enough to meet the needs of the navy, the mining license of the company was revoked. In 1851, Englishmen acquired the field once again. With the start of the Crimean War (1853), the field was left in English control to provide the coal that the English and French navies needed. England operated the field on its own behalf until the end of the war (1856).

Between 1865 and 1908: During this period, the administration of the field was handed to the Ottoman Navy, but the pits were operated by English, Russian, Italian, German, and Belgian companies. The boundary of the field was determined, mapped, and a new railway was built, and the production rate steadily increased with technical advances. Despite these improvements, many pits were unable to pay for themselves, and mining companies ended up bankrupt. In the period between 1908 and 1920, the French-financed Ereğli Company was one of the leading business groups.

The Republican Government and Local Companies (1920–1940): In the period following the founding of the Turkish Republic in 1923, the government took the private sector under its wings in order to incentivize them in the development of the field to meet the increasing needs of the country. However, when it was revealed that the companies were reluctant to make investments, the government authorized İş Bank to invest in preparations for coal mining. This move resulted in

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the production of coal rising to 2,300,000 tons in a short span of time. Half of the total production was achieved by the French-financed Ereğli Company and half by Italian and Turkish-French companies. The first step toward nationalization was taken in 1936 when the Republican Government purchased the privileges of the French-financed Ereğli Company. These privileges were transferred to Etibank, a national bank, and "Ereğli Coals Management" was founded-the first national coal institution. Some companies belonging to the private sector continued their operating activities till 1940, but the entire coal field was nationalized in the same year because these companies were not making any capital investments for the development of coal production.

Etibank and General Directorate of Turkish Coal (1940–today): In order to establish the central management of coal and similar fuels, the General Directorate of Turkish Coal (GDTC) was founded in 1957. In 1983, to replace the Ereğli Coals Management Institution operating within GDTC, the Turkish Hard Coal Authority (THCA) General Directorate was founded, which consisted of Kozlu, Karadon, Armutçuk, Üzülmez, and Amasra businesses [1-3].

It is known that the operation of and search for lignite received due importance with the founding of our Republic in Turkey. In this context, Amasya-Çeltek, Yozgat-Yerköy, Kütahya-Tunçbilek-Değirimsaz, and Aydın-Nazilli-Girenez pits began to operate in 1927, and with the founding of the General Directorate of Mineral Research and Exploration in 1935 to study our underground resources, a programmed and scientific search for coal was initiated. The range of Neogene-aged units that can be suitable for coal formation reached approximately 110,000 km^2 in Turkey [4].

Today, 26% of the world's energy need is met with coal. Coal is produced in approximately 50 countries, and the biggest coal-producing countries are China, the USA, India, and Australia [5]. Turkey, on the other hand, owns 0.2% of the world's coal reserves and is the 4th among 35 countries in lignite production, and 44th among 50 countries in hard coal production. Hard coal constitutes 3% and lignite constitutes 97% of our total coal production [6]. In total, 0.0308% of hard coal reserves and 2% of lignite reserves of the world are in Turkey (Table 1).

Turkey stores approximately 1.7% of the world's total coal reserves and has an important position in lignite production. However, the fact that 79% of our lignite is below the 2500 kcal/kg heating value resulted in it being predominantly used in thermal power plants. Eighty-five percent of the approximately 105,000,000 tons of lignite production that occurred in recent years was consumed in thermal power plants. Forty-six percent of Turkey's lignite reserves are in the Afşin-Elbistan field. Other lignite fields are in Konya Karapınar, Eskişehir Alpu, Afyon Dinar, Tekirdağ Çerkezköy, Manisa Soma, Pınarhisar Vize, and Malatya. The most important hard coal reserves of Turkey are in Zonguldak and its vicinity [7].

The figures that are reported as public [Electricity Generation Corporation (EGC), GDTC, THCA] production include coals that are produced through private sector such as royalty-based system, service procurement, and outside purchase [6]. Apart from the hard coal production performed by THCA and its sub-contractors, private companies have also been producing coal since 2000. When the number of deaths due to accidents is examined by differentiating THCA and privately-operated pits, deaths per million tons of production are higher in privately-operated businesses. In the coal sector alone, between 1991 and 2008, 2,554 people lost their lives, and 13,087 people were permanently disabled due to occupational accidents and diseases [5].

Occupational Accidents in Mines

When the death rates in mining accidents are examined in a historical context, we see that in the USA, the number of mining accidents and deaths increased until the 1940s and decreased between 1940 and 1950, whereas death rates remained the same until the 1970s. In the 1970s, however, there was a sharper decrease in the number of both accidents and deaths [8]. Because of the increase in the number of accidents and deaths until the 1940s, beginning with 1940, legislations have been passed regarding coal mining occupational health and safety, and new technologies have been developed and popularized about the problems in pits and conditions that jeopardize occupational safety. Developments picked up pace beginning in 1960. As a result of these developments, death rates in the USA are observed to rapidly

Table 1. Coal reserves

Reserves	Hard Coal	Lignite	Unit
World	430.9	416.6	Billion tons
Turkey	1.330	8.695	Billion tons

Table 2. Distribution of production

	2004	2005	2006	2007	2008	Unit
EGC	13,807,468	24,959,522	27,372,717	34,871,446	38,140,044	Tons
GDTC	24,108,793	27,812,057	30,022,120	33,160,733	42,047,055	Tons
Private Sector	4,745,295	4,122,615	4,355,287	3,536,119	4,539,138	Tons
THCA	2,805,654	2,621,263	3,131,233	2,453,762	3,359,889	Tons
Total	45,467,210	59,515,457	64,881,337	74,022,060	88,086,126	Tons

EGC: Electric Generation Corporation; GDTC: General Directorate of Turkish Coal; THCA: Turkish Hard Coal Authority

Table 3. Major mining accidents in Turkey

Location	Date	Cause	Number of Deaths
THCA/Armutçuk/coal	March 7, 1983	Firedamp explosion	103
THCA/Kozlu/coal	April 10, 1983	Firedamp explosion	10
Yeni çeltek/Amasya/coal	July 14, 1983	Firedamp explosion	5
THCA/Kozlu/coal 8	January 31, 1987	Collapse	8
THCA/Amasya/coal	January 31, 1990	Firedamp explosion	5
Yeni çeltek/Amasya/coal	February 7, 1990	Firedamp explosion	68
THCA/Kozlu/coal	March 3, 1992	Firedamp explosion	263
Yozgat/Sorgun/coal	March 26, 1995	Firedamp explosion	37
Erzurum/Aşkale/coal	August 8, 2003	Firedamp explosion	8
Karaman/Ermenek/coal	November 22, 2003	Firedamp explosion	10
Çorum/Bayat/coal	August 9, 2004	Firedamp explosion	3
Kastamonu/Küre/metal	September 8, 2004	Fire	19
Kütahya/Gediz/coal	April 21, 2005	Firedamp explosion	18
Balıkesir/Dursunbey/coal	June 2, 2006	Firedamp explosion	17
Bursa/Mustafakemalpaşa/coal	December 10, 2009	Firedamp explosion	19
Balıkesir/Dursunbey/coal	February 25, 2010	Firedamp explosion	13
THCA/Karadon/coal	May 17, 2010	Firedamp explosion	30
Elbistan/coal	February 11, 2011	Landslide	11
Zonguldak/coal	January 8, 2013	Firedamp explosion	8

EGC: Electric Generation Corporation; GDTC: General Directorate of Turkish Coal; THCA: Turkish Hard Coal Authority. (6th reference is used)

decline, especially since 1970. In China, however, because of the rapid increase in the number of occupational accidents and deaths, it was decided in 2004 that pits should be renovated, and they were reconstructed between 2004 and 2006. Since 2004, a decrease in death rates is being observed in China as well [9]. Furthermore, small, inefficient, and disprofiting pits were shut down in China during the reconstruction. Based on the Chinese example of this practice, the necessity of reconstructing pits is overemphasized in the report of the specialization commission of the state planning organization (SPO), and it recommends a policy regarding improvement through the privatization or shutting down of pits that are small, that operate on old technology and ineffectively, and therefore, cause accidents more frequently [5,10,11].

According to ILO's occupational accident rates between 2003 and 2008, Turkey is in the third place in deadly occupational accidents after India and Russia. The occupational accident rate is approximately 1% in England, 2.5% in Germany, 3.5% in France, and 4% in Spain, whereas the rate is 9.5–10% in Turkey. When the accidents in the two biggest coal producers of the world, China and the USA, are examined, death rates per million tons of hard coal production in those two countries are lower than those in Turkey. It is particularly worrying that in 2008, the number of deaths per million tons in China is 1.27, whereas the same rate is 5 times higher in Turkey [6]. More than 3,000 people lost their lives in Turkey since 1941 in mining accidents. The accident with the most casualties took place on May 13, 2014 in the Soma district of Manisa where 301 people lost their lives [12]. Major mining accidents since 1983 can be seen in Table 3 [6].

Soma Coal Mine Disaster of May 13, 2014: It is the mining accident with the highest number of casualties in Turkey. A fire broke out because of an explosion, and many miners were trapped. In total, 301 miners lost their lives in this disaster. Three shifts worked in the pit where the accident occurred. Approximately 800 people worked in the shifts, and 3,000 worked in total. It is reported that 787 people were working in the shift when the accident took place. The open flame fire, which triggered the disaster, took place in the main air intake. The investigation commission on the scene determined that the cause that triggered the fire was not the transformer explosion. It is understood that the cause of the majority of deaths was carbon monoxide poisoning [12].

On October 8, 2014, in the second major accident that occurred within six months, 18 miners were trapped under water in a private coal mine in Karaman, Ermenek.

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