Mine Water Environ (2014) 33:372–375
DOI 10.1007/s10230-014-0301-9

IMWA INSIGHTS

Professor Dr. Walter Semmler: A German Mine Water Pioneer

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Abstract Prof. Dr. Walter Semmler (1903–1990) was a ground-breaking German hydrogeologist who conducted practical mine water research in Germany, mainly related to dewatering, but also on tracer tests and potential environmental impacts of mine water. In addition, his contributions to professional associations in Germany and the formation of water authorities in the Ruhr Coal Mining District was noteworthy.

Keywords Water Resources Management Office · Mine water management · Mining history

Introduction

In countries around the world, research on mine water has been published in the countries' respective languages. Consequently, this information is generally not available to colleagues that speak other languages, even though many fundamental innovations and groundbreaking results would be of international interest. For example, Essen/Germany hosted the first global congress dealing exclusively with mine water (Semmler 1964). The first published tracer test was performed in a mine in Saarland, Germany (Semmler 1937) and the first facilities for passive treatment of mine water were built in Othfresen, Germany (Kickuth 1977; Seidel 1966). The first publication on the successful use of lime to treat mine water (Schönaich-Carolath in Tarnowitz 1860) and the first known publication on mine water analysis were written in German (Heine 1837) and are hardly known internationally. To help address this gap, we introduce Walter Semmler, one of the first specialists to perform intensive mine water research in Germany.

Surface and underground mining is often impeded by water inflow, which can obstruct the operation of a mine and represent a potential danger for the miners. For this reason, water inflow and retention in mines have always been of great interest (Wolkersdorfer 2008). This is also true for coal mining in the German Ruhr. Initially, the individual mines and mining companies assumed responsibility for handling mine water problems, but starting in the 1920s, the active mines initiated the creation of the "Water Resources Management Office" (*Wasserwirtschaftsstelle*) to deal with the central collection of hydrological data and solving of mine water problems. Due to the difficult economic situation at the time, however, this institution was soon shut down. In 1951, thanks to his groundbreaking research and his specialized knowledge, Walter Semmler succeeded in bringing this "Water Resource Management Office" back to life.

Life and education

Walter Semmler (Fig. 1) was born in the Germany Ruhr and spent most of his professional life in this area

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Fig. 1 Walter Semmler (1903–1990, ©Westphalian Miners' Union Fund—Westfälische Berggewerkschaftskasse)

(Coldewey 2003). He was born on March 26th, 1903 in Essen-Stoppenberg, where he also spent his childhood and youth. He began his training as a miner in 1920, was promoted to head miner in 1926, obtained his university-entrance diploma as an external student in 1928, and studied science as a working student in Bonn. He earned his doctorate in 1930 with a research paper on the hydrogeological conditions in the north Eifel, Germany (Semmler 1931; Semmler s.a.).

Semmler shared his vast practical experience as a trainer at the mining school in Essen from 1931 to 1935 and as the director of the geological department of the mining school in Saarbrücken from 1935 to 1951. His investigations on mine water in the Saar-Lorraine Carboniferous rocks (Semmler 1951a) and on the mineral springs in the Saarland are also from this period (Semmler 1951b). In 1951, Walter Semmler returned to the Ruhr with the Westphalian Miners' Union Fund (*Westfälische Berggewerkschaftskasse, WBK*), initially at the mining school in Essen. There, he re-established the "Water Resource Management Office" and expanded it successively to form the Institute for Water Management and Hydrogeology at WBK. He directed this nationally recognized institution for coal mining until his retirement in 1969.

Mine water hydrologist

In 1957, Semmler was offered a professorship for hydrogeology and mine water management at the Technical University of Clausthal (at that time called "Bergakademie Clausthal"—Clausthal Mining Academy), which he kept until 1972. In 1960, he was given the title of honorary professor and in recognition of his hydrogeological contributions to the German coal mining sector, he was awarded the Grand Cross 1st class of the Federal Republic of Germany in 1969. Due to his years of service at the Technical University of Clausthal, he was named an honorary citizen of Clausthal-Zellerfeld in 1973.

Semmler organized the world's first mine water congress in Bochum/Germany in 1964 (Semmler 1964; Wolkersdorfer 2008), where 21 experts gave lectures on hydrogeological conditions in the most important West German mining areas as well as on tracer tests and the geochemistry of mine drainage water. Interestingly, none of the lectures addressed the effects of contaminated mine water on the environment.

Semmler also wrote countless expert reports and more than 100 water related publications on mining and geological investigations. He worked particularly on problems involving mine water inflows, whereby he collected extensive data on water inflow in the shaft installations in the Ruhr (Fig. 2) and weighted them according to the geological position of the mines (Fig. 3; Semmler 1955, 1956a, 1960). Furthermore, he gave his expert opinion for accidents involving sudden mine water inflows in surface and underground mines. He was the first to thoroughly investigate alleged environmental damage caused by mining, e.g. in the agricultural sector, which was a novelty at the time (Semmler 1960b). He was also interested in problems related to mass transport from tailings piles into the groundwater (Semmler 1958).

In the context of investigating mine water inflows, he was the first to use an artificial tracer, in 1937, choosing uranine (sodium fluoresceïn). He succeeded in demonstrating the hydraulic connection between a creek and underlying mine structures at the Victoria colliery, Püttlingen–Saar, Germany. Based on his results, the creek was hydraulically isolated from the mine structures, and the amount of water inflow was substantially reduced (Semmler 1937, 1953, 1956b; Semmler and Schmidt 1958).

Life as a teacher

Semmler also supervised more than 80 diploma theses and dissertations at various mining schools and at the Technical University of Clausthal. While employed at the Westphalian Miners' Union Fund, he started working on the "Hydrogeologische Karte des Rheinisch-Westfälischen Steinkohlenbezirks" (hydrogeological map of the Rhenish-Westphalian hard coal mining area, scale 1:10,000; Kötter 1964). This map, assessing mining activities and their effects, is unique worldwide in terms of its scale and therefore its content and accuracy. In addition, the first

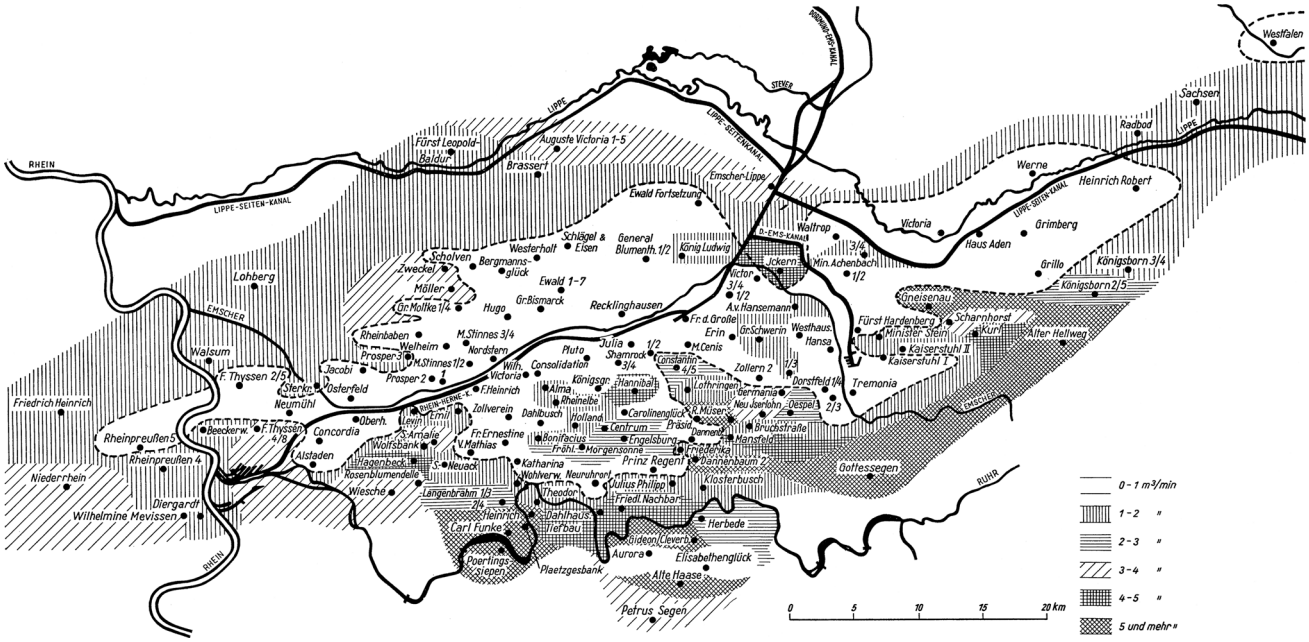

Fig. 2 Areas of equal water inflow in the Ruhr Coal Mining District in 1954, in m^3/min (from Semmler 1960; ©Verlag Glückauf GmbH, Essen)

Fig. 3 Ratio of the mined coal to the extracted water from mines taking account of the geological conditions in 1954 (from Semmler 1964; © http://www.schweizerbart.de)

sheets of the map series "Wassergewinnung und Lagerung von Abfallstoffen im Ruhrkohlenbezirk" (water extraction and storage of waste in the Ruhr Coal Mining District, scale 1:50,000) were published (Zayc 1969). This map series shows the conflict of interests between water management and waste management and served as planning criteria for modern waste management in the Ruhr.

Death

Walter Semmler died on April 15th, 1990, at 87. The Institute for Water Management and Hydrogeology at WBK, which he created, contributed to, and directed for many years, withstood the test of time and today is part of the DMT GmbH & Co. KG, Essen. The vast experience accumulated there in the fields of geology, hydrogeology, contaminated sites, and geotechnical engineering is still successfully applied, not only in Germany, but all over the world.

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