

TOURISTIC AND MEDICAL FACILITIES IN ROMANIAN SALT MINE CAVITIES

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Abstract: The Romanian salt mines are located between low altitude hills, of 500-700 m, in an gentle continental climate, having the main climatic parameters less pronounced than we find in the fields and mountain regions, with a relaxing bio-climate, tranquilizer-apatetic, sparing, with a great number of thermal comfort average days. As a consequence of salt mining activities huge cavities were created, which by shape and aspect are representing real points of touristic attraction and a new kind of services was linked with the valorisation of these cavities in the rock salt massifs, representing real "saline palaces". Considering the admission of the saline treatment efficiency, mostly in pulmonary diseases, the development of speleo-therapy in Romania is presently in continuous development. If, initially, the saline micro-climate did not exceed the volume of a surgery room, resorting to speleo-therapy procedures the characteristic eco-system

elements are increased, the micro-organisms concentration grows and the micro-flora is modified. It should be noted that in the old mining rooms the micro-climate parameters are having peculiar values, such as 12°C temperature, about 50% of air humidity and an atmosphere charged with saline aerosols, with recognized therapeutical effects on human body's health. The above-mentioned properties lead to setting-up in time in some abandoned exploitation rooms, located in stable areas of the mining field, of zones dedicated to various purposes: such as: touristic tracks; medical treatment facilities, especially for lung diseases; professional athletes training facilities; halidoms; museums; etc. The paper presents views from several Romanian salt mines, whose underground spaces, resulted after salt mining activities, are having presently touristic or medical purposes, such as: Salina Slănic Prahova, Salina Praid, Salina Ocna Dej.

Key words: mine, salt, tourism, medical.

INTRODUCTION

From a geographic point of view, the presently active salt mines in Romania are nearly evenly distributed on the national territory (figure 1).

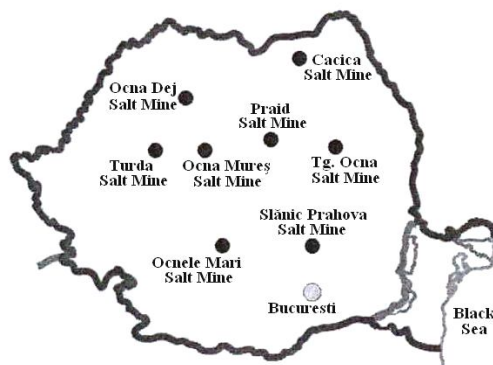


Figure 1: Map of the Romanian salt mines.

During the time, the rock salt mining in Romania was especially carried out employing dry mining methods (deposits located at Slănic Prahova, Praid, Ocna Dej, Tg. Ocna, Ocnele Mari), but at the end of the 18th century there were also applied, simultaneously, mining methods based on salt dissolution (Ocna Mureș, Ocnele Mari, Cacica, Tg. Ocna).

The brine quantity extracted at Ocna Mureș, for example, had increased with time from 45 m³/day to 500 m³/day. Afterwards, the salt solution started to be extracted at Cacica salt mine too, after opening the first wells field. The rock salt deposit from Ocnele Mari was mined out through dissolution wells in several well fields, the wells being drilled starting from the surface, the extracted solution being processed then as raw material for the soda-based and other chemical products in Govora industrial platform.

Due to the fact that the salt exploitation through dissolution lead to floods, as a consequence of soil erosion and caving processes, nowadays this mining method was reduced as frequency, the dry mining being almost generalized.

MATERIAL AND METHODS

Initially, the salt mines were developed in a bell shape, but the flooding and caving hazards related to this shape lead to the extension of the mining method with big trapezoidiform rooms. This mining method was firstly put in practice in year 1846 at Ocnele Mari salt mine, and afterwards at Slănic Prahova and Tg. Ocna salt mines.

The opening of these deposits was achieved using vertical shafts, or cross adits (figure 2 and figure 3).

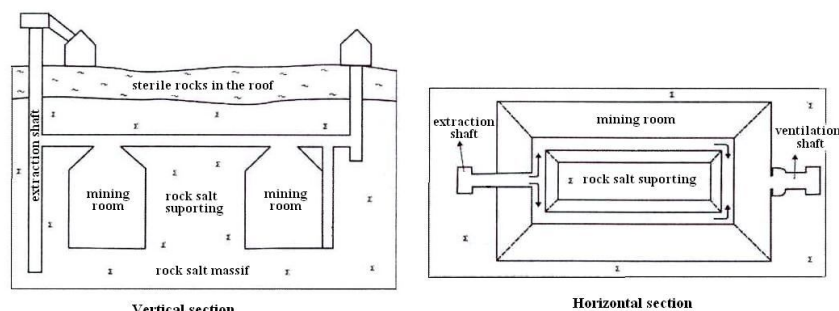


Figure 2: Deposit opening with vertical shafts.

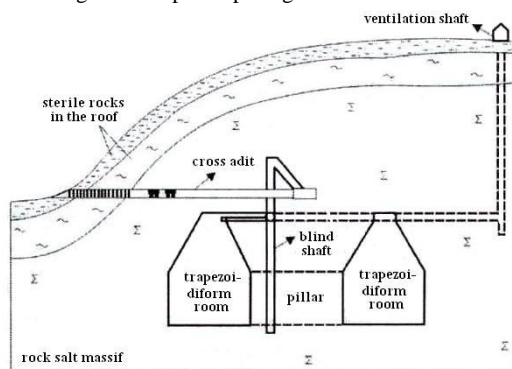


Figure 3: Deposit opening with cross adits.

This kind of structure's sizes are given below:

- room width at the roof: 12 m;
- room width at the bottom: 35 m;
- room height: 36 m;
- inclination of room walls: 60°;
- pillars dip between rooms: 50 m;
- pillars width: 24 m;
- pillars height: 36 m;
- protection floor beam thickness: 65 m.

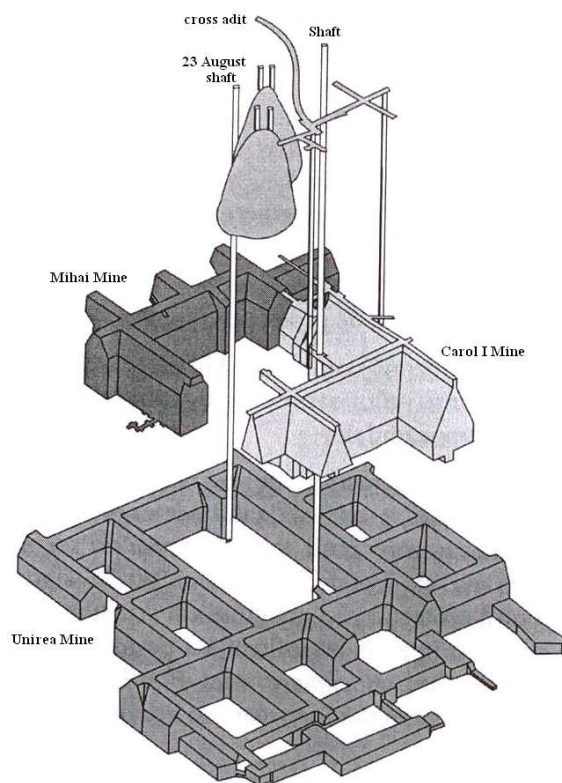


Figure 4: The "Minele vechi" complex – Slanic Prahova.

After the deposit's opening workings were finished, the next stage followed, namely the development of compartments of the mining field in levels/horizons, sub-levels, mining blocks, slices, according to the selected mining method.

Figure 5 illustrates the preparative workings for dry salt mining at Târgu Ocna salt mine, where the main ventilation circuit is based on loop 1 – 2, developed starting from the main opening working.

In figure 6 there is diagrammatically represented another preparation method for mining, employed at Cantacuzino-Slănic Prahova salt mine, solution based on ventilation shafts.

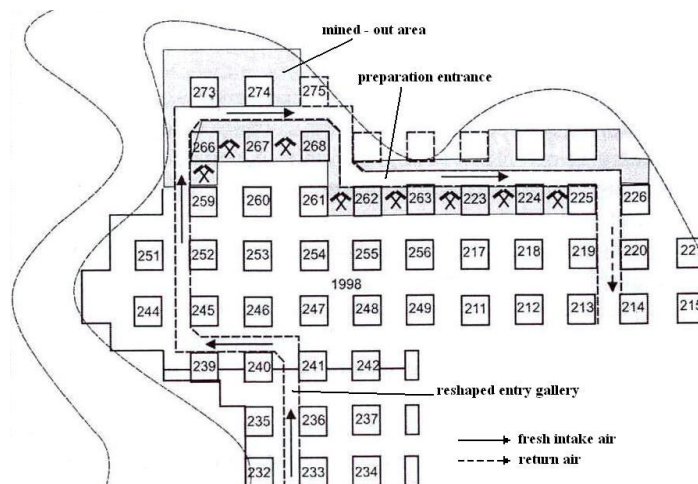


Figure 5: Preparation for mine workings at Târgu Ocna salt mine.

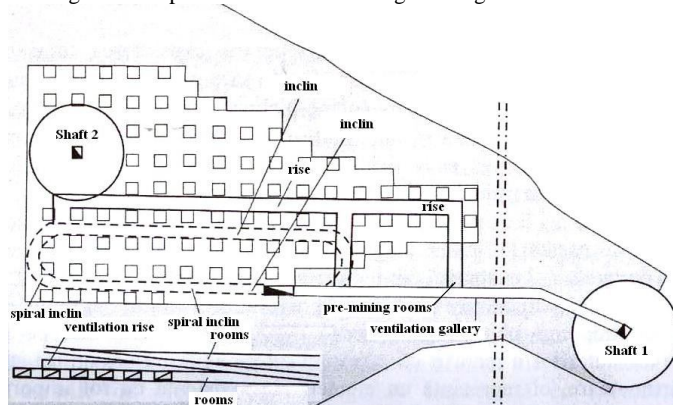


Figure 6: Preparation for mine workings at Slanic Prahova salt mine

RESULTS AND DISCUSSIONS

While the Romanian salt mines are generally located between hills having low altitudes, of 500 – 700 m, with a moderate continental climat, with less pronounced values of the climate parameters if compared to those registered in planes and mountain areas, with a sparing, sedative, relaxing bio-climate and having a high number of days with thermal comfort, they can serve for touristic purposes.

Consecutively to the underground salt mining processes, huge cavities have developed, which through their aspect and shape are real touristic grip points, and a quite new kind of services was connected to the valorization of these cavities, mined in the rock salt massif, which are representing real „saline palace courts”.

There should be noted the very specific micro-climate parameters in the old mining rooms, respectively the constant temperature of about 12°C, the air moisture content of about 50% and an underground atmosphere charged with saline aerosols, exerting a well – known therapeutical effect on the human body.

The salt mine's micro – climate is characterized by constant thermal, humidity, pressure and air velocity values lower than 1 m/s inside the rooms and 0.3 – 0.4 m/s nearby the ventilation shafts; also, there can be present a slight cooling effect induced by the thermal discomfort, a low stress level due to relatively low temperatures and dehydration effect induced by the diminished water vapour content. The aero – ionization in the small ions field is average, the positive ions are prevailing. The concentration of ions is higher and the negative ions are prevailing in the other field. The aerosols particles concentration is high, with a 80-95% percentage of particles under 3 microns, so with acces into the lung alveoles in the lungs.

Because it is widely known and recognized the efficiency of treatment in salt mines, especially in pulmonary diseases, the development of speleo – therapy is extremely actual nowadays in Romania. The medical Romanian research carried out in the last few decades of the 20th century are allowing the more and more efficient use of the natural therapeutic factor – saline micro – climate – for the the prophylaxis, treatment and recovery in respiratory, dermatological, imunological and other diseases.

It was considered that the saline environment is therapeutical through his constant thermo – hygro – pressure climate, without atmospheric air streams and pollutant agents, with a minimum concentration of micro – organisms, so being characterized by anti – bacterial properties and having a treatment specific mechanism. This one has a determined self – purification period, but with an important quantity of sodium chlorate aerosols, in the conditions of an average to high aero – ionization.

The results of complex researches allow to allocate to a speleo – therapeutical treatment anti – inflammatory, hipo – sensibilization, activation of homeo – static mechanisms effect, which in turn provides a higher resistance to micro – organisms, different allergic agents and other positive helath effects.

If, first time, the saline micro – climate did not exceed the size of a surgery room, through the speleo – therapeutic procedures are allowing to increase the micro – organisms concentration, also changing the micro – flora composition. These remarks are requiring a proper exploitation of these locations and suitable timely monitoring, in order to prevent their pollution.

The above – mentionned properties have lead to development with time, in the old abandoned mining rooms, of spaces aiming for different purposes, such as: tourism; medical care, particularly for respiratory diseases; training facilities for athletes; churches and chappels, rooms for galas and other ancillary activities, museums.

An ancient mining tradition required, long time ago, that when a new mine was opened, to build in the underground a chappel or a small church. So, at Ocna Dej salt mine such a church was designed and built at about 80 m under the surface level, at mine's level +188,5 m. The church was opened for public acces in 2000 (figure 7).

At Târgu Ocna salt mine operates a sanitarium, having 10 962 m² in surface area and 200 available places. It is built in the mined – out rooms from IInd level of Pilot mine, located at a depth of 130 m and dedicated to touristic activities and spa climatic – therapeutic treatment. There are, also, provided spaces for table-tennis, bowling games, resting and lecture rooms, playing spaces for children, etc. There also provides excelent conditions for accomodation and lounge.

The museum of salt, having a 45 m², is located at the Ist level of Pilot mine, before the main acces in the sanitarium. The visitors can here admire beautiful salt samples and gather informations about salt deposit's genesis and evolution of mining.

Slănic Prahova salt mine is located at about 100 km from Bucharest, in the central – northern side of Prahova region, in a beautiful landscape, a hilly area covered by broadleaf

forests. The acces in the area is done both by the railway track Bucureşti-Ploieşti-Slănic, and by the national route DN 1 Bucureşti-Ploieşti.

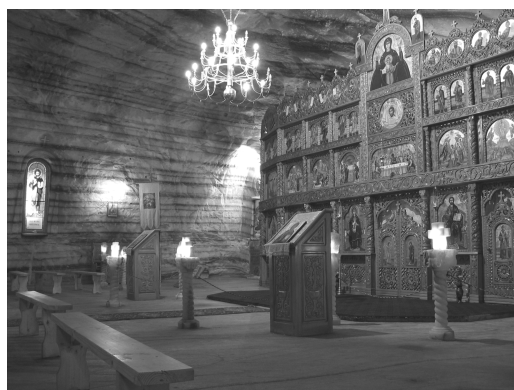


Figure 7: View of the church from Ocna Dej salt mine.

Within the saline, the Unirea salt mine, with a 78,360 m² of surface area, is provided with a sanitarium for asthma sick people treatment, facilities for table-tennis, volleyball, handball courts and playing courts for children.

The salt mine was opened in 1912 and consists in 14 trapezoidiform rooms, having the following characteristics: opening at the floor- 12m; wall dip – 60 degrees; opening at the bottom – 37 m and height - 66 m.

The treatment facility is equipped with modern apparatus for respiratory system chronic diseases treatment: bronchitis asthma, cronic bronchitis, respiratory system infections, etc. The complex recovery treatment is provided by: saline micro – climate, aerosols, respiration in positive intermitent pressure, electro – therapy (MDF, short length waves, ultra – sounds, Solux), kineto – therapy.

Apart from the reumathic, neurologic and post – traumathic pathology, the hyper – concentrated salt waters in the lakes in the area are adressing to metabolic and nutritional, dermathologic and endocrinous diseases.



Figure 8: Inside view of Turda salt mine.

The salt mine of Turda (figure 8) is opened for public acces, since 1992, as touristic and curative objective. The temperature inside is comprized between 10-12°C, the relative humidity between 75-80%, and the maximum air velocity is 0,2 m/s. Inside there exists a spa facility. Here can be visited the Franz Josef gallery, the Rudolf mine (80 m length, 50 m width and 40 m height), the Terezia mine (112 m height) and Ghizela mine. Inside the salt mine, mini – golf, bowling or boating can be practiced.

Ocnele Mari salt mine is located at 225 meters above the sea level and has a surface area of 10,000 m². Inside, there is a church, a museum, pubs, football, basket- ball courts and playing courts for children. Different respiratory diseases are treated inside the salt mine.

The Praid salt mine (figure 9) is located in Praid basin, in the eastern area of Transilvania, in Ghurghiu mountains, having a triangle shape, oriented towards the south direction in Corund village, on the salty structure.

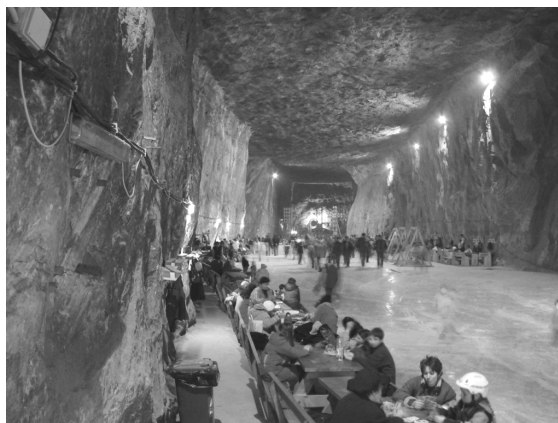


Figure 9: View inside the Praid salt mine.

It detains an underground treatment facility, with a 9,400 m² of surface area, bowling, chappel. A particular attraction consists in the wine cellar (fig. 10), located at 100 m depth from the surface level. It has a special wine collection, with 275 kinds of wine from six european countries, from 25 wine producers.



Figure 10: The wine cellar from Praid salt mine.

CONCLUSIONS

The Romanian salt mines are disposing of adequate treatment conditions in the underground, providing sick people's protection through the facilities existing in different treatment locations, acces or recreational spaces. Adding to this therapeutical factor the external environment, wealthy in salt lakes, mud deposits and salty clays, sparing bio – climate, the hilly landscape with rich broadleaf vegetation, natural or historical monuments, the nearby loated spa's, then the values expressed in therapy, rest and entertainment of salt mines are significantly increased.

The studies carried out on patients from several such medical care centers have confirmed the efficiency of speleo – therapy for about 60-90% of people suffering of bronchitis asthma, which is outlined by the following facts: important dispnea reduction, asthma crisis vanishing or seltening; simplified asthma crisis mitigation and drug quantity reduction; more rare and lower doses of cortico – steroids on a period comprized between 6 months and a few years; about 10 – 30% of the people with bronchitis asthma did not appealed their family doctor or specialist after the treatment.

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