

OPENING OF A URANIUM-ORE QUARRY: A SERIOUS THREAT TO THE NATURTEJO GEOPARK

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1. Introduction

The uranium ore of Nisa, in the south of Naturtejo Geopark, is the most important one found in Portugal and has been causing strong controversy among the public opinion. The uranium price reached historical maxima in recent times with the increasing demand of countries such China and India and the projected building of 90 new nuclear plants all over the world. Moreover the fast increase of oil prices and the climate changes resulting from fossil fuel burning stimulate among EU energetic diversification and use of renewable sources of energy. The “Empresa de Desenvolvimento Mineiro” (EDM=Mining Development Enterprise) is the public institution that inherited more than 100 years of diversified geological resources exploitation and 175 abandoned private and public mines which oblige to heavy investments (118 million euros until 2013) to mitigate enormous environmental damages. Resulting from the generalize increase of the price of mineral resources, an unrecorded charm operation among public was set by EDM with the environmental qualifying of Urgeiriça uranium mines and few others. EDM is now preparing to be part of a joint-venture with one of 10 multinational companies interested to exploit uranium in Nisa. The application dossier for the international public competitive examination by invitation is now ready. This dossier obliges the starting payment of 5 million euros to Portuguese State for concession rights, the sharing of 25 to 40% of partnership capital to EDM, as well as the payment of 2,5 to 6,5% on the annual ore selling. This excuse will led to privatization in a good moment of EDM, the only entity in Portugal with responsibilities in environmental mitigation of mines.

The history of uranium mining in Portugal and the project for the Mining Enterprise of Nisa show the irrelevance of these mines to national economy or local development and the serious environmental and public health damages, with regional range and still unknown consequences for thousands of years. Recent integration of Geopark Naturtejo da Meseta Meridional composed by 6 municipalities including Nisa, under the Geoparks Network with the support of UNESCO, was officially declared by the coordination commission of the Centre Region as the umbrella for development based on Tourism. Naturtejo Geopark is now included in the National Strategic Plan for Tourism Development as 1st priority concerning Nature Tourism projects. Environmental degradation and lost of geodiversity by the opening of the Nisa gigantic uranium quarry will affect irremediably all the Geopark and the quality image of the remaining EGN.

2. Historical review of Uranium exploitation in Portugal and the importance of Nisa

In 2007 was celebrated 100 years on the discover of the first uranium-radium ore in Portugal. But already in 1905 studies were performed by Marie Curie on uranium minerals collected in Portugal. The most important uranium mine from Portugal, Urgeiriça (Viseu), opened in 1913, becoming the factory centre to prepare and export uranium. The exclusive interest for uranium ore starts in 1944, anticipating the nuclear holocaust in Japan. The destiny of Portuguese uranium is marked in 1949, with the signing of an agreement with the old allied England just before the beginning of the Cold War. In total, there were exploited 4370 tons of uranium oxides in 61 mines spread by the districts of Guarda, Viseu and Coimbra, the majority small mines being nowadays all closed and dangerously abandoned.

And what are the environmental impacts resulting from decades of uranium mining in Portugal?

- Existence of poor level ore, unprofitable uranium phosphates, as well as radioactive dust and muds;
- Percolation of acid waters contaminated with Radium (radioactive element) and heavy metals in quarries;
- Existence of enormous piles of chemical rejected, with 85% maximum of radioactive ore;
- Adulteration of the landscape by rock piles and giant quarry holes.

Nisa reservoir was discovered in 1957 and was never exploited due to economical impracticability despite of several attempts, the last one in 1999. The last uranium mine operating in Portugal closed the doors in the same year.

The lower prices trend during the last 30 years Portugal finished uranium production in 2001 and led to the bankruptcy of Empresa Nacional do Urânio (ENU= National Uranium Company) during the next year. Then, a study presented by Eng. Belarmino Silveira, former president of EDM and ENU, showed that “Considering size and contents of the Portuguese uranium reservoirs and the context of the international uranium market there is no justification to pursuit the ENU activity,(...), after equating the problem of environmental impact, the most important one is the radioactive impact”. Belarmino emphasizes still that “(...) there are good conditions for contamination of food chain which can be irreversible with time” (Silveira, 2001). By closing ENU remained 13 million tons of dangerous wastes near the town of Canas de Senhorim and the mining galleries of Urgeiriça were submerged during the abandonment process, allowing the local contamination of underground water.

Concerning public health surrounding the mines the radioactive pollution already occurs in a moderate range but with a fast aggravation, according to MinUrar project studies conducted by the Geological Survey and several Health institutions and presented in 2006 (Falcão *et al.*, 2006 and references there). Contamination can be made by air, water and food chain. The most capable agent to spread faster and longer radioactive elements from the mine hole is wind. Uranium insoluble compounds install in lungs by simple inhalation and radioactive emission develops cell mutation and cancer development. On the other hand, rock faults and fractures mineralized with uranium enable deep percolation of acidic waters contaminated with uranium soluble compounds. Their ingestion and travel through the human food chain cause a double risk of chemical and radioactive toxicity. For José Delgado Domingos, former Senior Professor of the Instituto Superior Técnico University, in a testimony presented in the book “Nuclear: the debate on the new energetic model for Portugal”, our country might be considered a world example of irresponsibility by the way uranium exploitation was performed without the accomplishment of EU or any environmental norms (Domingos, 2006). The ex-State Secretary of Environment Carlos Pimenta goes further saying that the legacy from those times is a case for Court (Publico newspaper, 18th January 2008).

However, after 2004 the uranium prices jumped to the historical 135 dollars per pound (about 453g) of uranium oxides (July 2007). Living a time of “fat cows”, EDM developed an innovative project for remedying the radioactive waste piles and muds from Urgeiriça trying to clean the image of environmental and public health degradation of past uranium mines. This project for confining and sealing radioactive wastes, as well as for neutralizing acid waters cost 60000000€ to Portugal, but was well considered by the inspectors of EURATOM. Despite of this effort, only 2 of more than 3 million tons of wastes were controlled in the Barragem Velha da Urgeiriça. There are still more than 60 mines and 10 million tons of radioactive wastes waiting for mitigation work with an estimated cost of 60 million euros, which by the way must be immediate, due not only to the impact seriousness, but also for their proximity with towns. According to Dr. Delfim de Carvalho, the Presidente da EDM, these works can “last for many years”.

3. The Mining Enterprise of Nisa

The biggest uranium reservoir of Portugal, with estimated reserves of 3080 tons is only an insignificant part of the world uranium production. Canadá and Austrália have together 52% of the annual production of Uranium and 1/3 of the known and exploitable reservoirs (in a total of 4,7 million tons). Nisa ore is distributed by 8 zones between Nisa and the Portuguese borderland, following the brecciated and weathered metamorphic aureole of Nisa Granite in the Neoproterozoic metasedimentary rocks for 5 km, being less than 400 m wide. Uranium occurs disseminated by the rocks as yellow, green or dark “dusty” minerals. These colors show diversified composition of uranium minerals in Nisa, such as Autunite, Torbernite, Sabugalitem, or the “Nisaite” here described during the seventies. The most relevant concession is only 2 km W from Nisa, between this town and Montes Claros village. It has an exploitable size of 33 soccer fields, almost all the area belonging to National Ecological and Agriculture Reserves. Despite of the high content in radioactive minerals, soils there act like a filter, enabling high natural radioactivity in this region to be lower than the health limits considered for inhabited areas.

In 1999 the project Mining Enterprise of Nisa was presented. This project, valid still today despite of economically unprofitable then, shows that mining exploitation will run for 6 to 10 years, creating 71 new direct jobs, very few of them for non-specialized workers such as the ones find in Nisa region. The quarry will be a gigantic open-sky hole, reaching 30 m deep, and being estimated the extraction of 6300000 tons of rock and 650 tons of uranium oxides with a total value of 53 million Euro by the present price (June 2009). In one year the estimated value of uranium oxide reserves in Nisa decreased in 16 million Euro due to the decreasing trend of U_3O_8 price. The estimated investment will be of 5000000€, with only 1000000€ for buildings and environment(!). The exploitation methods, contrary to the affirmed by EDM in the Environmental Impact Study, concerning experience and environmental best practices, consist in an open-sky quarry with rubbish piles. Such kind of large-size quarry enables the transport of mining-resulted dust by the wind, spreading radioactive compounds and exhalations of the dangerous Radon gas by a vast area. It is important to emphasize that, from the three radioactive ways resulting from the natural transformation of Uranium in Lead, the most persistent emissions are of γ radiation that reach the surface only through a mining quarry. Ore will be lixiviated with sulfuric acid and the resulting “liquors” will be transported to Urgeiriça, leading to the opening of the old washing factory complex. This mining process using large water resources substitutes the expensive operation of bulldozing responsible for important emissions of green-house gases to atmosphere. The resulting concentrates have less than 5% of Radium, Thorium and Polonium. This means that mine wastes reunite more than 95% of these unprofitable radioactive chemical elements. The Study considers the opening of a station for effluents cleaning. However, the fact that the waste piles cannot be rendered impermeable may lead to deep contamination of municipal underground water resources, including also Montes Claros dam and Nisa thermal springs. According to the Fonte Nova newspaper, presidents of S. Matias and Arez villages are very worried because location of the dam and municipal water springs are just downstream in the drainage area of the projected mine, conducting most probably to contamination of waters as it happens already in Urgeiriça and Cunha Baixa mines and confirmed by the MinUrar studies (Falcão *et al.*, 2006). Concluding, the uranium mine in Nisa will never be “the solution for the big problem Nature created in the region”, as pointed out recently by the president of EDM in an advertising supplement of Primeiro de Janeiro newspaper.

Uranium price recorded historical peaks never imagined in the last years, fueling 10 multinationals in the contest for the now most wanted Nisa vein. Nevertheless, the *UxC Nuclear Fuel Price Indicators* show that the uranium price swung like a pendulum, decreasing

almost 100 dollars in 1 year to 36,89 €/lb by 29th June. Nisa ore is valuing currently 53 million Euro but the market is very variable. It is also important to remember that, only in the year of 2006, the Neves-Corvo mines in the Iberian Pyrite Belt produced copper and zinc valuing 388 million Euro, being the most lucrative Portuguese mine. Based on INE, in 2005 the total lucrative amount of the Mining Industry in Portugal was 1096 million Euro, corresponding to 1% of the Country productiveness.

4. Geodiversity makes difference in the National Strategy for Tourism and is defended by local politicians and Nisa population

Geodiversity is outstanding at the Naturtejo Geopark! Granites and schists, quartzites and sandstones, greywackes, conglomerates or breccia: there so many types of rocks. Weird granite morphologies, beautiful deep valleys carved in schist and quartzites, gigantic faults and folds or fossils dated to 600 million years old; millenary cultures non-invasive to Nature, rock art, megaliths, sacred fountains and legendary rocks or troglodytic houses. There are plenty to dig out from the landscape puzzle of this particularly pleasant corner of Europe. This geodiversity is also the reason for biodiversity exuberance. Soils, orography and socio-political history made Naturtejo Geopark a unique place where species and traditions long lasts. It happened with the elephant *Elephas antiquus* in Vila Velha de Ródão 33500 years ago as still occurs with some of the most genuine Portuguese culture. Tejo Internacional Natural Park, close to Nisa, is a European-level sanctuary for endangered bird species and all the Natura 2000 sites from Nisa and Castelo Branco are just small ecological breaths in an injured Planet.

But in the present world, geodiversity can be also be a threat for the ecological effort in the sustainable survival of Human populations. Since the seventies Nisa suffers by anticipation with existence of the most important uranium ore in Portugal. In the near future, all this geological richness may mean one (possible more) gigantic scar(s) in the pristine landscape, with regional consequences for environment and public health. There will be profits to share between the State and one multinational for less than 10 years and a heavy heritage for decades of environmental degradation and expropriation of the people's right to their own cultural landscape. It will be a true *topocide* in Nisa, as defined by the anthropologist Paulo Castro Seixas (Seixas, 1999). A uranium quarry will lead to a rupture of socio-cultural (and environmental) integrity of the landscape, with its consequent annihilation. How much will be the real cost of this business to all the interested parts? Will 1 million Euro be sufficient to reestablish environmental and landscape conditions? Or may the State have to pay heavily again to confront EU demands, as it happens already in Urgeiriça and will be multiplied by almost 200 abandoned mines. What are the real gains for Nisa population and surrounding region necessarily affected by contamination of air, waters and...vision?

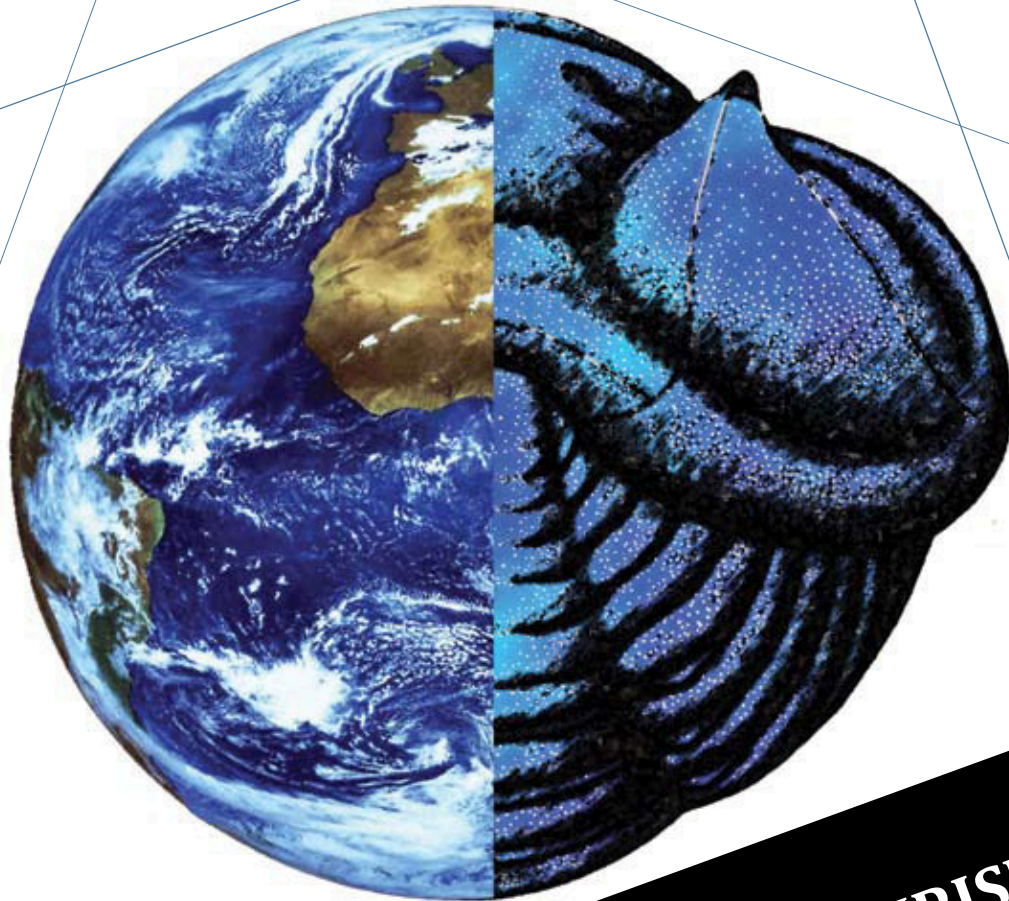
The possible opening of a uranium mine in Portugal can be fuel to fire the already started discussion on the building of a Nuclear Plant in Portugal (Rodrigues & Azevedo, 2006). In the present where solutions are needed to face the energetic crisis, and considering the strong dependency of Portugal on fossil fuels, it would be expectable to have a coherent politics of energy efficiency, still almost inexistent. On the other hand, there are immense potentialities for the implement of renewable energies in Nisa and Naturtejo Geopark. However, despite of abounding wind mill parks and dams in the territory, there is still a long way to develop solar potentialities and to profit from the forest biomass, as well as from biofuels and individual production of energy.

Local Agenda 21 developing for Nisa considers thermalism, traditional products and rural tourism as the best support for sustainable development under the umbrella of the label Naturtejo Geopark supported by UNESCO. The local politicians, farmers, associative delegates and general public from Nisa do not thrust in the Mining Enterprise of Nisa project which comes against the sustainable development strategy embraced in the last years.

Population created a movement (No for the Uranium from Nisa Movement) and associations (Associação Terra, Nisa.Com and Associação de Desenvolvimento de Nisa) to fight for their rights. In January 2008 the movement sent a petition to the President of the Republic Assembly. In February 2008 the Municipal Assembly of Nisa voted for a position against the Uranium exploitation in its territory. ProGEO-Portugal, the Portuguese delegation of the European Association for Protection of the Geological Heritage sent an official letter in May 2008 supporting the claims of Nisa and Naturtejo Geopark. The National Association for Nature Conservation - Quercus-organized with local NGOs and the ex-workers from Urgeiriça organized the National Workshop against Uranium Mining last September 2008 and several local information meetings. The investment in the new Iberian-class thermal complex is about to be opened in Fadagos a de Nisa, a financial effort of 9 million euros challenged by Nisa municipality that will create 80 direct and 300 indirect but healthy jobs for the population. There are many other sustainable projects being carried out for Nisa, in all the municipal area, through the Tourist development Plan of the Naturtejo Geopark, such as technological and interpretive centers and museums and protection of the geosites under national laws (e.g., the recently declared Portas de Ródão Natural Monument). The future of Nisa and its uranium, as well as the future of the Naturtejo Geopark projects, are waiting now and only for the Government final decision. It is not expected the attribution of mining concession before the end of 2009, and only after the Elections.

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