Estonian Journal of Earth Sciences, 2008, **57**, 2, 111–122 doi: 10.3176/earth.2008.2.07

Uranium exploration, non-governmental organizations, and local communities. The origin, anatomy, and consequences of a new challenge in Finland

Toni Eerola

Namura Finland Oy, c/o Asianajotoimisto Jukka Kallio Oy, Pohjoisesplanadi 37 A, 00100 Helsinki, Finland; toni_eerola@namura.fi

Received 28 December 2007, accepted 11 March 2008

Abstract. The advent of global warming has returned nuclear power to the agenda. Many countries, including Finland, have decided to construct more nuclear power plants. They will need uranium, and its price is rising in the international market. A new uranium exploration boom is going on. Finland is politically and economically stable, with good infrastructure and basic geodata, attracting foreign companies to explore the promising uranium showings of the country. However, this has triggered an extensive anti-uranium campaign in northern, eastern, and southern, but not in central Finland, which is related to anti-nuclear movement, green and leftist parties, and environmental non-governmental organizations (NGOs). The resistance, created mainly by lack of public awareness of geology and mining, surprised mining companies, the geological community, and the Ministry of Trade and Industry, who found themselves in a completely new situation. Here we will examine the origin, anatomy, and consequences of this challenge and how to deal with it. The picture presented herewithin is based on author's active participation in uranium exploration in Finland, discussions with other geologists and activists, following the issue in newspapers, web-pages, reviews, and participating in NGO meetings.

Key words: uranium, exploration, environment, non-governmental organizations, public awareness, geology, Finland.

INTRODUCTION

During the 1990s, multinational companies started to perceive the increase in environmental consciousness, which has led to opposition to mining (Moody 1992; Eerola 1996a and references therein). The current mining boom was beginning in Finland. At the same time, weak public awareness of geosciences was noticed world-wide (Eerola & Öhberg 1995; Eerola 1996a and references therein).

Eerola (1996a, p. 112; author's translation) wrote: "The interest shown by foreign companies in Finland would probably increase mining activities in the country. This will probably create challenges for the dissemination of information and environmentally responsible mining in order to dissipate sentimental prejudices and to combine divergent interests." This is exactly what is happening now.

The phenomenon of global warming related to the use of fossil fuels has brought nuclear power once again into the agenda of economic policy. Many countries, including Finland, are deciding whether or not to construct more nuclear power plants. They will need uranium, and its price has risen in the international market (Anonymous 2006). A new uranium exploration boom is going on (Äikäs 2006; Tontti 2006).

Finland has small, but promising uranium showings (Äikäs 2006; Fig. 1). The country is politically and economically stable, with a good infrastructure and geological database. Its Precambrian bedrock is similar and of the same age as that of the great uranium producers, Canada and Australia. This attracted foreign mining companies to uranium exploration in Finland (Tontti 2006). Yet, the companies were not prepared for the strong resistance that sprung up against exploration, the so-called *uranium fuss* (Myllykangas 2007), which has already been noticed abroad (Moon 2008).

The most abundant literature on the subject has been produced by the movement against uranium exploration, including several articles in newspapers, web pages and reviews that are referred to below. Litmanen (2008) and Sarpo (2008) analyse the origin of this phenomenon from a sociological and activist's quite uncritical point of view. For Litmanen (2008), it is a typical example of the "*Not in my backyard*" (Nimby) attitude, but with wider implications. The sectors related to mining have treated the issue by short comments and interviews in some articles (e.g. Äikäs 2006; Forstén 2006, 2008; Tontti 2006; Salo 2007), but has not been deeply examined by the mining industry yet.

The present article analyses critically the origin, anatomy, and consequences of this challenge from a geologist's perspective. It suggests how mining companies and geologists should deal with the problem and also presents some predictions on what can happen if this controversy is not resolved.

Fig. 1. Map of uranium showings of Finland. Square – showing, diamond – drilled deposit, triangle – mapped deposit, overturned hammers – closed mine. GTK's web-based open access mineral resource database: www.gtk.fi

The picture presented herein is based on the active participation of the author in uranium exploration in Finland, discussions with other geologists and activists, and following the issue in the national medias, non-governmental organizations' (NGOs) web-pages, reviews and participating in NGOs' meetings.

URANIUM SHOWINGS AND THEIR EXPLORATION IN FINLAND

In Finland, uranium showings are related to Archaean and Palaeoproterozoic rocks (Äikäs 2006). In northern and eastern Finland, uranium mineralization is mainly found with Palaeoproterozoic quartzites and conglomerates (Piirainen 1968; Vanhanen 2001; Äikäs 2006). Metaphosphorite and metalimestone-related uranium showings are common in central and western Finland (Äikäs 1980). They form a belt running from Kuopio to Kokkola (Fig. 1). However, there are some exceptions, such as the Lemmetty and Paskonkallio showings that are related to pegmatites and granitic gneisses. The uranium showings of southern Finland are exclusively related to Svecofennian (1.9–1.8 Ga) migmatites, granites, and pegmatites, although the ages of mineralizations are significatively younger (Äikäs 2006).

Uranium exploration was carried out by domestic, state-owned operators from the 1950s to the mid-1980s (Äikäs 2006; Tontti 2006) with the aim of responding to a demand from local nuclear plants. In the 1950s–1970s uranium was explored by Atomienergi Oy, Outokumpu Oy, and Rautaruukki Oy. The first discoveries in eastern and southern Finland were at Paukkajanvaara in Eno and Lakeakallio in Askola, which were developed to a pilot plant stage with test mining and concentration facilities. During 1958–1961 a total of 41 t of uranium was produced (Äikäs 2006). The other, very promising prospect is the Nuottijärvi showing at Paltamo. Its reserves are estimated at 1000 t, with 0.04% U. Other promising prospects are Kouvervaara at Kuusamo and Kesänkitunturi-Äkäslompolo in western Lapland.

Around 1975, the responsibility for uranium exploration shifted to the Geological Survey (GTK). Up to the mid-1980s, the GTK carried out an intensive field programme of checking airborne radiometric anomalies, detected by its systematic airborne geophysical surveys. Several new prospects were found and investigated, such as Kapusta-Hepo near Kuhmo. The results of exploration within the Finnish uranium provinces are briefly described in OECD (2006).

At the end of the 1980s, the price of uranium dropped considerably and the exploration for it ended in Finland. The uranium exploration unit of the GTK was dismantled. In 2005, the spot price of uranium started to rise in the international market and the exploration started again (Äikäs 2006; Tontti 2006). Currently the work is being carried out almost exclusively by private foreign companies (Tontti 2006).

During the previous period, there was no opposition to uranium exploration. However, the current situation shows that something happened during the 1990s. These processes will be examined in the next sections.

THE GENERAL ANATOMY OF NGOs AND THEIR RELATIONSHIP WITH GEOLOGY

Non-governmental organizations are at the fore-front of the international environmental debate. The increasing environmental awareness, which can be seen in the current concern with global warming, is in a great part due to various campaigns carried out by NGOs. They are part of a cultural change and express a growing environmental consciousness that has emerged since the 1960s (e.g. Capra 1983; Harvey 1989; Giddens 1990). Non-governmental organizations are a new social force which became stronger with the globalization process during the 1990s (Lindholm 2005). The deforestation of the Amazon, climate change, and the deterioration of the ozone layer are some of the factors that have made people develop an interest in environmental questions. After the collapse of communism, environmental issues have also offered for the left a suitable, green, and "modern" way to continue to oppose capitalism and globalization (Eerola 2003; Lindholm 2005). The globalization offered them an opportunity to unify their forces around social, political, and environmental issues that are inter-related (Vakil 1997; Eerola 2003; Lindholm 2005). They know how to raise funds and use the media, publicity, and modern communication technologies in very efficient ways. They also exert pressure and lobby decision-makers, companies, and international organizations for promotion of social and environmental reforms (Van Rooy 1997).

Although many environmental NGOs practices are often somewhat excessive, at the same time they have become increasingly specialized, professionalized, and disradicalized (Chartier & Deléage 1998). According to Chartier & Deléage (1998), some of the major NGOs can be considered as multinational protest enterprises managed by "yuppie-activists".

Non-governmental organizations have a fundamental role in many environmental projects, especially in developing countries (e.g. Mäkelä 1999; Eerola 2003). Researchers in many fields work with them in multi-disciplinary projects all around the world. This has also created an increasing demand for environmental geology services, which geological institutions can execute. Thus, more job opportunities have been provided for geologists. In fact, during the 1990s, opportunities for cooperation between geologists and NGOs appeared in Earth heritage conservation (see references in Eerola 2003). Some regional geological societies can also be called NGOs (Cutler 1996) and they work together with other environmental organizations in projects related to geological conservation and eco-geotourism (Carlson & Harley 1996; Eerola 2003 and reference therein).

However, many geologists have a negative attitude towards environmental activists and vice versa. Frequently, their interests are in conflict, especially when related to exploration and mining in nature conservation and aboriginal areas (e.g. Moody 1992, 2007; Eerola 1996a). Mining activity has also a history of bad practices that reflects on its current reputation, now increasingly recognized by the industry itself (Moody 1992, 2007; Eerola 1996a and references therein; Moon & Evans 2006; Moon & Whateley 2006; Becker 2008).

Growth of the global economy, and especially that of China, has increased the demand for natural resources. It is reflected in the increase in exploration and mining operations all over the world. This increased activity is raising reactions among general public, aboriginal people, and NGOs. In the current scenario, one of the greatest problems is that the general public, decision-makers, and

environmental activists have little, if any knowledge on geology, mineral exploration, and mining (see references in Eerola & Öhberg 1995 and Eerola 1996a; Kaljo 2007). Indeed, in high-tech societies such as Finland, people seem to not know or recognize that most of our day-to-day used materials come from geological natural resources, especially in urban areas (Forstén 2006, 2008; see Grundström 2007 for a perfect example). This generates many of the prejudices, misunderstandings, and controversies related to this field. The current attention given to NGOs has encouraged many activists to pose as experts, although with no appropriate knowledge in that specific subject. This is clearly evidenced in the climate change debate and especially in issues related to mining and mineral exploration. Indeed, according to Becker (2008), NGOs are one of the major challenges faced by the uranium exploration and mining.

URANIUM VS. NGOs: THE ORIGIN OF CONTROVERSY IN FINLAND

The mining industry has been in a recession during almost all of the last 20 years in Finland. Earlier, mineral exploration and mining were carried out by domestic, state-owned companies, such as Outokumpu Oy. During this recession, people in certain areas became unfamiliar with mineral exploration and mining, especially close to major urban centres. Environmental consciousness increased, and the accident of Tchernobyl happened in that period.

The current, increased need for natural resources and a consequent exploration boom, mostly carried out by foreign companies, has surprised many in a negative way. This has created an urgent need for information on geology, exploration, and mining in an accessible mode for the general public and decision-makers.

In 2005, the local people were not informed that foreign companies came to Finland and applied for claims and claim reservations for uranium. Although this is not required by the current mining legislation, it was a mistake. When local communities became aware of these applications, the lack of information on related issues created fear, and local resistance (Litmanen 2008; Sarpo 2008). Uranium is seen only as a threat, because of its central role in the news in the form of nuclear and uranium weapons and accidents in power plants (Litmanen 2008). The opposition increased due to applications in nature conservation and high population density areas. Environmental activists and policy-makers conducted this local resistance for locally-based, organized movements (see Litmanen 2008; Sarpo 2008). The media started to follow their activities, generally based on false information and according to the activists' partial and contentious views (Forstén 2006; see also the Finnish websites www.eiuraanikaivostakuusamoon.com/7, www.uraanitieto.tormunet.fi/lehdet.htm, and www.uraaniton.org/sivu/?page_id=22).

Anti-uranium movements were born in northeastern (Koillismaa), eastern (North Karelia), and southern (Uusimaa) Finland. Their origin and characteristics are given by Litmanen (2008). For some reason, such movements were not formed in central and western Finland, which shows no resistance to mining activities (Forstén 2006) and uranium exploration (Eerola 2007).

The local anti-uranium organizations formed a nation-wide coalition that is related to the anti-globalization and anti-nuclear movements, green and leftist parties, Finnish and international environmental organizations, feminist and pacifist organizations, and even fishermen associations (Litmanen 2008). The movement has also received support from the former anti-nature conservation sectors, such as landowners, local conservative policy-makers, and tourism entrepreneurs (Eerola 2007). This is a typical example of how a diversity of interests can be interlinked under one umbrella in a post-modern, globalized world (Vakil 1997; Eerola 2003; Litmanen 2008).

In their campaign against globalization and foreign companies, the local opposition has based their activities on a nationalistic-populistic rhetoric, in which the companies are seen as threats for sovereignity and national ownership of natural resources (e.g. Kaarakainen 2006; Grundström 2007; Kela 2007; Laitinen 2007; VTV 2007; Litmanen 2008; Sarpo 2008, and oral presentations by M. Aho, M. Saarnisto, and P. Tiusanen at the Meeting of the Antiuranium Movement at Koli, Finland, 04.08.2007, see http://uraanitieto.tormunet.fi/esitykset/koli2007_esitykset.htm). However, at the same time, the anti-uranium movement does not trust the Finnish authorities and institutions (see Flöjt et al. 2007; Grundström 2007; Laitinen 2007; Litmanen 2008). This is a clear controversy, revealing a pseudo-patriotic discourse as a demagogic appeal for emotions (see also Sarpo 2008).

It is fine to note that citizens have organized themselves to defend their environment and interests. There is a genuine concern about the environment, but also an impetus driven by ignorance, emotions, economic interests (e.g. tourism, property speculation, agriculture; see Kaarakainen 2006), and political passions (e.g. ideologies, elections; Sarpo 2008). Based on these issues, conspiracy theories have been created on "secret mining projects" in which national authorities are involved in exploration with foreign mining companies (e.g. Flöjt et al. 2007; Laitinen 2007; Sarpo 2008). Even the Quaternary, interpretative trail and geological site mappings made by the GTK have been confused with

uranium exploration (Flöjt et al. 2007). According to Lindholm (2005, p. 131), conspiracy theories are typical of the Finnish movement against globalization.

Activists, landowners, entrepreneurs, municipalities, and even local environmental authorities have appealed for higher court rulings against the exploration licenses given by the Ministry of Trade and Industry (see www.eiuraanikaivostakuusamoon.com/8), and before its decision, no exploration can be conducted in these areas, except for geological mapping and geophysical surveys. Those rights are guaranteed by the "every man's law" and §3 of the Mining Act. However, some organizations wish to restrict even this secular right in the Mining Act reform (SLL 2007). If approved, this would be a clear retrocession in the Nordic legislation and can even complicate the collection of minerals by laymen, a popular hobby in Finland that has led to a discovery of several ore deposits (Eerola 1996b; Nenonen 2007).

The task of the Ministry of Trade and Industry is to promote and manage mining activity. However, this new situation has also surprised the ministry and its role has been somewhat controversial (Myllykangas 2007; Salo 2007; VTV 2007; Litmanen 2008; Sarpo 2008). This has caused more confusion and misunderstanding both in the mining industry and NGOs. For this reason, the ministry has been strongly criticized by both sectors (e.g. Kaarakainen 2006; Grundström 2007; Laitinen 2007; Salo 2007; VTV 2007; Forstén 2008; Litmanen 2008; Sarpo 2008) and all of them are now expecting much from the Mining Act reform (see Myllykangas 2007; VTV 2007; Litmanen 2008).

Although Finland can be proud of its high educational level and there have been efforts in geological education of the general public (see Eerola & Öhberg 1995; Eerola 1996b), one of the reasons for this conflict is the citizens' and decision-makers' lack of awareness of geology and mining in general (Eerola 1996a, 2007; see also Kaljo 2007). For examples on decision-makers' attitudes with uranium exploration, see Hautala (2006) and discussion on the website www.eiuraanikaivostakuusamoon.com/8 (also oral presentation by P. Tiusanen at the Meeting of the Antiuranium Movement at Koli, 04.08.2007). It is not clear for many people what the words ore, soil, bedrock, showing, exploration, claim reservation, claim, and mine actually mean (e.g. Hautala 2006; Kaarakainen 2006; Flöjt et al. 2007; VTV 2007; Litmanen 2008; Sarpo 2008; see also www.eiuraanikaivostakuusamoon.com/8). They are all mixed together and poorly understood. Actually, the terminological confusion is one of the causes of the conflict. This creates much of the false information, misunderstandings, and controversies proclaimed by activists (Forstén 2006). According to the views disseminated by activists, uranium mines will be established directly, without the required investigations, approvals, and environmental studies (see, e.g., Litmanen 2008). Despite a clear lack of knowledge of geology and exploration, some activists have assumed the role of "experts" in these issues. People are being alarmed with unsubstantiated statements by these self-proclaimed "experts". Sarpo (2008) shows how they can manipulate people by framing the supposed problem in an appealing format.

The environmental organizations usually present the worst international examples of irresponsible uranium mining practiced by some companies in developing countries (e.g. Rajala 2007). The Malawian activist R. Mwangondo described them as "uranium cowboys" in the anti-uranium seminar Nuclear Energy and Uranium Against the Wind, held in Helsinki in 2007. In fact, their actions are an example of how uranium exploration and mining should not be made, without any care for the environment and local communities (see Moody 1992, 2007; Rajala 2007). For this reason, there is a belief that uranium exploration will automatically lead to a huge open pit that destroys everything around it, contaminating groundwater, irradiating, and destroying the landscape and any hopes for tourism by municipalities. Because of this, the anti-uranium movement wishes to stop exploration activities at the very start (see Litmanen 2008; Sarpo 2008), not considering that one in a thousand exploration campaigns can actually lead to a mine. This is a completely different issue with its license application procedure. In fact, their opposition comes from an overall view of uranium and the entire cycle of nuclear energy, including the exploration for uranium to its final use as a fuel, and its disposal as a nuclear waste, not to mention its use in weapons (Becker 2008; Litmanen 2008).

According to O. Äikäs (pers. comm. 2007), geologists working with uranium exploration were formerly considered as heroes; now they are judged like criminals by some sectors of the public opinion. The most surprising thing is that there are also geologists (mostly Quaternary) who are against uranium exploration (see Kela 2007). Therefore, the situation is very different from that of the 1950s–1980s, when uranium was explored for in Finland. The world has changed and public awareness of geology and mining has not accompanied the general rise of environmental consciousness. Or is this "consciousness" exacerbated by ideology, nationalism, and fanatism? In fact, similar characteristics have also been found in other local environmental conflicts in Finland by Sevola (oral presentation by P. Sevola at Annual Meeting of Finnish Geographers, 2007). Unfortunately, the contribution of those geologists cannot be seen in the movement's discourse. It is expected that their participation will add expertise and consequently, a better sense of proportion and reasonability.

The situation in uranium exploration has started to be reflected in all fields related to exploration and affects geological mapping and research as well. An anti-geology and anti-mining attitude is being created (Grundström 2007; Laitinen 2007; Luhta 2007; VTV 2007), although activists have several times stated that they do not oppose other mining activities (e.g. Kaarakainen 2006; Litmanen 2008). One of the results is a recent report (VTV 2007) that attacked mining industry and claimed the closing of the GTK's Mineral Exploration Department. Its discourse is surprisingly coincident with that used against the issue of uranium exploration, including its numerous controversies. In this scenario, Äikäs (2006, p. 11; author's translation) wrote: "It seems that the next years in mineral exploration will be very interesting and increasingly challenging."

HOW TO DEAL WITH THAT SITUATION?

In order to manage this situation, the key-words are openness and information. Local communities should be respected, not only in Finland, but everywhere, and not only because of the current, more environmentally sensitive situation, but always. Contact and discussions with local people show them that they are being considered, are respected, and must be kept informed. This has already been observed by some of the foreign mining companies, but a little bit too late. It should have been done before any application for claim reservations and claims. Currently, the local people, landowners, municipality leaders, and newspapers have been informed about exploration activities, i.e. what the company and its geologists wish and intend to do in the region. It is only reasonable to assume that an exploration company should spend time explaining to local people what they are actually doing. Such a policy would undoubtedly save time and prevent problems developing later (Eerola 2001, 2007). Often people do not know that they live in a uranium-rich area, or that its exploration has been practiced there before. Municipalities and their residents should be informed of that fact so that it can be taken into account in urban planning and construction (Äikäs 1988).

Radiation measurements in areas surrounding houses and courtyards reassure people, especially if low levels

Fig. 2. Participants and audience of the uranium seminar at Koli, Finland, 04.08.2007: on the right, session's chairman Markku Aho, and sitting, from left to right, Pentti Tiusanen, vice-president of the parliament's environmental commission, Tapani Veistola, Nature Conservation Secretary from the Finnish Nature Conservation Association, Hannu Haapa, activist from Nummi-Pusula, and Professor of Quaternary Geology Matti Saarnisto. Photo by the author. (See the programme and presentations: http://uraanitieto.tormunet.fi/esitykset/koli2007_esitykset.htm).

of radiations are detected at those places. People should also be advised to perform radon surveys in wells and within residences. Radon surveys carried out by mining companies can be beneficial to municipalities, since these can identify possible risks for future residential areas and construction sites.

Beyond the local people, NGOs should be encouraged to hold meetings with geologists, or geologists can participate in events organized by them, opening the possibility of constructive dialogue. An example of this kind of event was the uranium meeting held in August 2007 at Koli, eastern Finland (Fig. 2). However, many geologists are of the opinion that debates with activists are not fruitful, because they do not believe, accept or understand technical facts given by professionals (e.g. Tontti 2008). They have their own "truth", learned from NGOs' reports and articles.

Therefore, contacting and informing the local municipal administrations, landowners, and newspapers should be seen as fundamental and of the utmost importance. Mining companies have to play an active role in this process, instead of NGOs that know very well how to spread information in a negative way and in which they have the first initiative. In this sense, unnecessary scaring of people by activists should be considered as an irresponsible activity. However, during the last few months, the media's sensationalism on this issue has decreased. Now it also pays attention to what the mining sector has to say.

Besides that, it is reasonable to appoint for legal issues. Although it may sound unfair and unpleasant, according to the current Mining Act, landowners have no right to the soil or bedrock beneath the surface. These are the property of the state and only the state can give licenses for their exploration and development if the necessary requirements are fulfilled. Indeed, this is one of the reasons why there are pressures to reform the current Mining Act (e.g. Grundström 2007; Kela 2007; Laitinen 2007; VTV 2007; Litmanen 2008; Sarpo 2008).

In all public relations it is a good policy to give basic information on geology, mineral exploration, and mining activity. The author even considers it a professional duty. The weak public awareness of geology is our own fault. Geologists do very little to disseminate geoscientific information. Correcting prejudices, false information, and misunderstandings that are currently circulating should be a fundamental part of a uranium geologist's and, why not, every geologist's mandate.

It is also positive to show the effects of previous uranium exploration campaigns in Finland and their lack of environmental impacts (Mustonen et al. 2007). They did not destroy the countryside image at that time, either. Several examples of current, well managed, and environmentally responsible uranium exploration campaigns and mining activities are found in Canada and Australia, which should be mentioned (Becker 2008).

If possible, claim requests and exploration activities should be avoided in densely populated and nature conservation areas. Mining companies should also support local eco- and geotourism initiatives that have been observed to be informative for the public and positive for the general image of mining companies (Doss & Doss 1995). Local people and companies should be contracted for services related to exploration activities, increasing the local participation.

Irresponsible and illegal mineral exploration and mining are an embarrassment to the entire mining industry and create adverse publicity for the whole sector. This is why they should be largely condemned in public. In fact, environmentally (and socially) responsible exploration and mining are a competitive advantage (Juusela 1994).

Many of those actions were suggested by Moore (2007) before the starting of mineral exploration. According to Moon & Evans (2006), concerns of local inhabitants must be addressed from an early stage if mine development is to be successful. The purpose of these actions is to decrease the environmental impact, create good relationships with local people, and make a good impression on local administration and authorities (Moon & Whateley 2006; Moore 2007). Such actions are very helpful and necessary in the current world-wide scenario, and should also be vigorously applied in Finland. This is especially recommended when dealing with uranium exploration (Merasty & O'Connor 2007; also oral presentation by M. Saxon at the 6th Fenno-scandian Exploration and Mining Conference, Rovaniemi, 2007). The "business as usual" does not work anymore.

However, Moody (1992, 2007) sees these efforts as only attempts to clean up the image of mining activity as part of its publicity campaign. He does not believe that mining companies have any good intentions. What he forgets is that a generation and mentality shift has occurred also in the mining industry, with new socially and environmentally oriented attitudes and values.

(POSSIBLE) CONSEQUENCES

The opposition to uranium exploration has already produced some consequences covering all sectors related to geology, and others can be expected. Depending of the point of view, some of them are positive, others negative.

Positive consequences:

- public debate on geology, mining, and the environment;
- debate on natural geogenic problems related to uranium, such as radon;
- opportunity for citizens and NGOs to learn about geology and exploration;
- opportunity to show that the issue is not so simple, dramatic, and exciting as some wish it to be;
- opportunity to change ideas between geologists and activists and try to understand their different viewpoints and ways of thinking;
- geologists and mining companies are taking local communities, the environment, and public relations more into account;
- the Mining Act reform.

Negative consequences:

- significant delay of the planned exploration programmes;
- large companies with greater resources are favoured in a long-term waiting for permits;
- possible increase in the conflict between geologists and environmental activists;
- the situation is dead-locked and can be difficult to resolve in some regions;
- reflects on everything related to geology;
- requests for closing of the GTK's Mineral Exploration Department;
- exposure of anti-geology and anti-mining attitudes;
- increases the simplistic public image of geologists related only to mining and exploration (see Luhta 2007);
- possible deterioration of the image of geology and geologists in the public eye;
- opposition and difficulties to obtain exploration licenses create uncertainty for fuel supply and rise the price of uranium (Anonymous 2006);
- Finland can be seen as unattractive for mineral investments;
- possible retreat of foreign companies and loss of investments.

CONCLUSIONS

Exploration for uranium is facing opposition in Finland. The organized, nationwide resistance towards mineral exploration and mining is a completely new phenomenon in this country. It is a typical example of a "Nimby"-type conflict, but with a far larger, global background (Litmanen 2008). The challenge has surprised mining companies, the Ministry of Trade and Industry, and the geological community. Several reasons have been identified as its causes, reflecting strong and profound changes that have occurred in the world during a few decades:

1. history of bad practices in mining (although not in Finland);
2. long recession of Finnish mining industry;
3. rise of environmental consciousness;
4. climate change;
5. uranium seen only as a threat;
6. exploration boom that is mainly carried out by private foreign companies, instead of national, state-owned companies, as it was before;
7. lack of public awareness of geology and mineral exploration;
8. lack of an active information policy about mining and uranium exploration.

Other causes are suggested by Sarpo (2008). The picture presented herewith is in conflict with that of Litmanen (2008) and Sarpo (2008), where the anti-uranium movement describes itself as based on verifiable truthful aspects, proven events, and facts based on natural sciences. Instead, the articles and reports produced by the movement and referred to herein show more emotion than information. This attitude is even demonstrated by decision-makers. In fact, according to Sarpo (2008), emotions are one of the most important mobilization forces and have largely been used by the movement in its propaganda.

The number, importance, and influence of NGOs has increased. Many times environmental activists have more influence on the public opinion than geologists. This has created a challenge for exploration and mining, therefore, there is an immediate need for a major social and political involvement of geologists in our changing society (Hlad 1999; Eerola 2003). The strategy to deal with the situation includes openness and direct contact with local communities, municipality leaders, newspapers, and NGOs. The main task in this "soft strategy" is the dissemination of correct information on mineral exploration activities and avoiding prejudices. Hitzman (2007) states that there is an urgent need for scientists and engineers who possess the skills required to mediate between the technical world of mining and the social context in which mining takes place. Hlad (1999) has also noticed its difficulty regarding geological education and geoconservation.

The conflict has positive and negative consequences, which are reflected over all sectors related to geology and mining. Recent requests for closing the GTK's Mineral Exploration Department (VTV 2007) are one of its symptoms, showing similarity with the political attack by Republicans on the U.S. Geological Survey

and Bureau of Mines during the 1990s (Schiffries 1994; Rossbacher 1995), which resulted in the closing of the latter (Anonymous 1995).

In the worst scenario, obstacles for exploration, such as huge delays in permit licensing, can make Finland unattractive for further mineral investments. Foreign companies can retreat and move their investments offshore and to other targets. It seems that this is exactly what the anti-uranium movement wishes. In this scenario, it is unnecessary to promote Finland as a "mining-friendly" country. However, the situation favours big companies with more resources to answer for the resistance with publicity and for a long-term waiting for permits. It is supposed that the favouring of large companies is not the aim of a movement that opposes large multinational companies, neo-liberalism, and globalization, neither that of the Finnish government.

In any case, the anti-uranium movements seem to lose this battle – exploration claims will be licensed if their requirements are satisfied, such as the recent concessions of Kouvervaara near Kuusamo and of Eno and Kontionlahti, Northern Karelia. However, mineral exploration can be practiced there with the force of law, but without the locals' support. Some have even said that anything can be done to obstruct this work at Kuusamo (M. Flöjt pers. comm. 2007; A. Jäkäläniemi pers. comm. 2008) and that civil disobedience can be expected (O. Jäkäläniemi pers. comm. 2008).

In this sense, activists are losing their time and resources. If they oppose uranium mines, it would be more reasonable to save their efforts for the moment when the uranium mine is actually being planned and a mining license is applied for. Any of the companies is doing this at the moment. It is even more desirable that at that time the citizens, authorities, and companies should pay attention to the possible environmental impacts and how to minimize them. However, we are a long way from that; neither has the exploration begun yet. Therefore it is premature to even talk about uranium mines in Finland. Activists are too "optimistic".

There is a history of cooperation between NGOs, local communities, and experts of many different fields, mostly in conservation, natural resource management, and ecotourism (e.g. Carlson & Harley 1996; Eisto et al. 1999; Mäkelä 1999; Ashman 2001; Eerola 2003 and references therein). The cooperation between environmental NGOs and geologists is also an alternative to be experimented in exploration and mining (Moody 1992; Litmanen 2008). This might avoid unnecessary prejudices on each part, creating a sense of reasonability for them and avoiding excesses from both sides (Eerola 1996a, 2003). However, although some examples were presented by Moody (2007), he has strongly criticized such initiatives. There are no cases, nor has such cooperation been suggested yet in Finland. However, it is possible that the positions of the parts are too inflamed and opposite for the cooperation to occur. The conflict might have gone too far. But it is something that should be suggested. At least local companies and work-force are suggested to be used in exploration operations.

Because of the climate change we are facing great challenges and decisions. Litmanen (2008) states that the local quest for uranium in Finland reflects a larger, global problem for humanity due to controversies imposed by the development and geopolitical disputes over limited energy resources. Despite its local nature, this resistance is part of a complex struggle over natural resources, land use, economy, and jobs in a globalized world (Ballard & Banks 2003).

Nuclear power is seen as one of the alternatives to reduce dependence on fossil fuels and their greenhouse gas emissions. It cannot be ignored in the current scenario. However, should the nuclear power be abandoned if Finland cannot produce its own uranium? In this case, how will the current and future energy requirements be satisfied? If Finland decides to continue with nuclear energy, from where the uranium required for its power plants would be obtained? From problematic developing countries? These are the questions that the activists have not answered yet. In fact, there are no clear answers to these questions at the moment.

Another alternative, together with the development and use of renewable energy sources, and increasing the energy consumption efficiency and its saving, is to create conditions for well managed uranium production controlled by authorities, in accordance with the principles of sustainable development, if showings are suitable for that. In the current scenario of global change, every country, including Finland, should know its potential to produce uranium for energy production. The knowledge of uranium-bearing areas is also important for health, construction, and urban planning. However, their investigation must be allowed in the first place.

According to Eerola (1996a, p. 113; author's translation), "the question of public awareness of the geosciences is a relevant and global issue for all people working within the field of the environmental, mining, and geological research. Its role is fundamental in providing the public, decision-makers, and entrepreneurs with correct information on all aspects related to geology, mineral exploration, mining, and their professionals. Mining companies and national geological institutions have an important role to play in this issue in order to avoid prejudices and unnecessary conflicts." After a decade from these words, it is now a more urgent issue than ever.

ACKNOWLEDGEMENTS

Invitations and possibility of participation in the events organized by the anti-uranium movement are greatly acknowledged. The ideas of the author on the subject were benefitted by discussions with Mika Flöjt, Tuomo Tormulainen, Dr Tapio Litmanen, Prof. Matti Saarnisto, Maija Sarpo, Olli Äikäs, W. Gennen McDowell, Osmo Kaipainen, Dr Pekka Nurmi, Pekka Kiviniemi, and several other colleagues and activists. Comments by Olli Äikäs, Dr Hannu Mäkitie, Pekka Kiviniemi, Dr Pekka Nurmi, and W. Gennen McDowell on early versions of the manuscript helped enormously its elaboration. W. Gennen McDowell advised for a better use of the English language. The final version was greatly improved by comments and constructive criticism by Dr Tapio Litmanen and an anonymous referee.

REFERENCES

Äikäs, O. 1980. Uraniferous phosphorite and apatite-bearing gneisses in the Proterozoic Finland. In *Proceedings of International Uranium Symposium on the Pine Creek Geosyncline*, pp. 675–681. IAEA, Vienna.

Äikäs, O. 1988. Uraanimalmiaiheiden arviointia: Puutosmäki ja etelä-Kallaveden saaret Vehmersalmella ja Kuopiossa [Evaluation of uranium showings: Puutosmäki and islands of Kallavesi at Vehmersalmi and Kuopio]. *GTKn Tutkimusraportti M19/3244/-88/2/60*, 11 pp. + appendices [in Finnish].

Äikäs, O. 2006. Uraaninetsintä havahtui Ruususen unesta nykypäivään [The uranium exploration woke up from dreams to the present]. *Materia*, **3**, 8–13 [in Finnish].

[Anonymous]. 1995. Killing a valuable mining support system. *Engineering & Mining Journal*, **6**, 1B–1D.

[Anonymous]. 2006. Uncertainty drives uranium spot prices higher. *Engineering and Mining Journal*, **207**, 72.

Ashman, D. 2001. Civil society collaboration with business: bringing empowerment back in. *World Development*, **29**, 1097–1113.

Ballard, C. & Banks, G. 2003. Resource wars: the anthropology of mining. *Annual Review of Anthropology*, **42**, 152–174.

Becker, E. 2008. Uranium mining. Big rewards, but big challenges too. *Resource World*, **6**, 9–10.

Capra, F. 1983. *The Turning Point: Science, Society and the Rising Culture*. Bantam Books, New York, 445 pp.

Carlson, G. & Harley, M. 1996. Shifting the focus: a framework for community participation in earth heritage conservation in urban areas. In *Geology on Your Doorstep. Urban Geology in Earth Heritage Conservation* (Bennett, M. R., Doyle, P., Larwood, J. G. & Prosser, C. D., eds), pp. 194–200. Geological Society, London.

Chartier, D. & Deléage, J.-P. 1998. The international environmental NGOs: from the revolutionary alternative to the pragmatism of reform. *Environmental Politics*, **7**, 3, 26–41.

Cutler, A. 1996. The role of the regional geological society in urban geological conservation. In *Geology on Your Doorstep. Urban Geology in Earth Heritage Conservation* (Bennett, M. R., Doyle, P., Larwood, J. G. & Prosser, C. D., eds), pp. 201–206. Geological Society, London.

Doss, P. K. & Doss, H. J. 1995. Enhanced Earth science research and public education in the national park system. *GSA Today*, **11**, 216–218.

Eerola, T. 1996a. Kaivostoiminta ja geotieteistä tiedottaminen [Mining and the public awareness of geosciences]. *Geologi*, **48**, 111–113 [in Finnish, with English summary].

Eerola, T. 1996b. Kansannäytetoiminta ja geotieteiden kansantajuistaminen [The amateur prospecting campaign and the public awareness of geosciences]. *Geologi*, **48**, 135–137 [in Finnish, with English summary].

Eerola, T. 2001. Paikalliset asukkaat geologisten kohteiden suojelijoina ja hoitajina Mäntsälässä [Conservation and management of geological sites by local inhabitants in Mäntsälä, Southern Finland]. *Terra*, **113**, 105–114 [in Finnish, with English summary].

Eerola, T. 2003. ”Ekohörhöistä savupiippugeologeihin” – Geologia, ympäristö ja kansalaisjärjestöt muuttuvassa yhteiskunnassa [Geology, environment and NGOs in a changing society]. *Geologi*, **55**, 153–158 [in Finnish, with English summary].

Eerola, T. 2007. Kaivostoiminta, ympäristö ja geologian imago [Mining, the environment, and the public image of geology]. *Materia*, **2**, 46–47 [in Finnish].

Eerola, T. & Öhberg, J. 1995. Some methods used in public geological education. In *Geological Survey of Finland Current Research* (Autio, S., ed.), *Geological Survey of Finland, Espoo, Special Paper*, **20**, 59–71.

Eisto, I., Hokkanen, T., Öhman, M. & Repola, A. 1999. Local involvement and economic dimensions in biosphere activities. *Publications of the Academy of Finland*, **7/99**, 1–365.

Flöjt, M., Iso-Heiko, J., Kinnunen, J., Niikkonen, J., Kouri, A., Jokelainen, T. & Saarnio, S. 2007. GTKn maaperäkartoittajat kartoittavat myös uraania [The GTK’s Quaternary mappers are mapping also uranium]. *Koillissanomat*, 4.6.2007 [in Finnish].

Forstén, B.-E. 2006. Puurot ja vellit ojennukseen [Order for confusion]. *Materia*, **2/2006**, 17–19 [in Finnish].

Forstén, B.-E. 2008. Kaivosmies on huolestunut [A miner is concerned]. *Materia*, **1/2008**, 11 [in Finnish].

Giddens, A. 1990. *The Consequences of Modernity*. Polity-Press-Basil Blackwell, London, 177 pp.

Grundström, E. 2007. Suomen järjettömin toimiala [The most unreasonable economic activity of Finland]. *Vihreä Lanka*, **47**, 1 [in Finnish].

Harvey, D. 1989. *A Condition of Postmodernity. An Enquiry Into the Origins of Cultural Change*. Basil Blackwell Ltd., Oxford, 349 pp.

Hautala, H. 2006. Uraani halkeaa [Uranium breaks up]. *Turun Sanomat*, 24.2.2006 [in Finnish].

Hitzman, M. W. 2007. Mining of the future and implications for mineral exploration. In *Sixth Fennoscandian Exploration and Mining, Abstracts and Final Programme*, pp. 25–26. Rovaniemi, Lapinliitto.

Hlad, B. 1999. Geoconservation and environmental education. In *The II International Symposium on the Conservation of Our Geological Heritage/World Heritage* (Gisotti, G. & Zarlenga, F., eds), *Memorie Descrittive Della Carta Geologica D'Italia*, **LIV**, 481–484.

Juusela, J. 1994. Kantaako vuoriteollisuutemme ympäristövastuunsa? [Does our mining industry carry its environmental responsibility?]. *Vuoriteollisuus – Bergshanteringen*, **52**, 11–14 [in Finnish].

Kaarakainen, T. 2006. Rikas, rakas uraani [Rich and loved uranium]. *Voima*, **8** (http://www.voima.fi/content/view/full/1833? PHPSESSID=) [in Finnish].

Kaljo, D. 2007. Learned societies, their international cooperation, and sustainable use of minerals promote development of human society. *Estonian Journal of Earth Sciences*, **56**, 129–130.

Kela, J. 2007. Geologian professori tuohtui uraanirallista [A professor of geology got upset with the uranium rally]. *Kaleva*, 19.10.2007 [in Finnish].

Laitinen, J. 2007. Tervetuloa, uraanikaivos! [Welcome uranium mine!]. *Vihreä Lanka*, **27**, 1–4 [in Finnish].

Lindholm, A. 2005. *Maailmanparantajat. Globalisaatiokriittinen liike Suomessa* [*Healing the world. The critical movement on globalization in Finland*]. Gaudeamus, Helsinki, 238 pp. [in Finnish].

Litmanen, T. 2008. Uraanikaivoksien vastustaminen [Against uranium mines. The normality of NIMBYs in frameworks of geopolitics and economic systems]. In *Ei minun pihalleni! Paikalliset kiistat tilasta* [*Not in my backyard! Local conflicts on space*] (Koponen, T., Peltonen, L. & Litmanen, T., eds), pp. 234–244. Gaudeamus, Helsinki [in Finnish].

Luhta, V. 2007. Geologinen suhteettomuudentaju [The geological sense of unproportionality]. *Suomen Luonto*, **7**, 35 [in Finnish].

Mäkelä, M. 1999. *Community-Based Environmental Protection and Natural Resources Management*. Department for International Cooperation, Ministry of Foreign Affairs of Finland, Helsinki, 151 pp.

Merasty, G. & O'Connor, T. 2007. Sustainability in the Canadian uranium industry. In *Sixth Fennoscandian Exploration and Mining, Abstracts and Final Programme*, pp. 48–49. Rovaniemi, Lapinliitto.

Moody, R. 1992. *The Gulliver Files. Mines, People and Land – a Global Battleground*. Minewatch, London, 894 pp.

Moody, R. 2007. *Rocks and Hard Places. The Globalisation of Mining*. Zed Books, London, 256 pp.

Moon, C. 2008. Fast-paced exploration. *Mining Journal Exploration Supplement*, 29.2.2008, 11–16.

Moon, C. J. & Evans, A. M. 2006. Ore, mineral economics and mineral exploration. In *Introduction to Mineral Exploration*, 2nd ed. (Moon, C. J., Whateley, M. K. G. & Evans, A., eds), pp. 3–18. Blackwell Publishing, Hong Kong.

Moon, C. J. & Whateley, M. K. G. 2006. Reconnaissance exploration. In *Introduction to Mineral Exploration*, 2nd ed. (Moon, C. J., Whateley, M. K. G. & Evans, A., eds), pp. 52–69. Blackwell Publishing, Hong Kong.

Moore, P. 2007. Green fields. Management in action – Early exploration. *Mining Magazine*, **2**, 30–36.

Mustonen, R., Ikäheimo, T., Kurttio, P., Vesterbacka, P., Nikkarinen, M., Tenhola, M. & Äikäs, O. 2007. *Uraanimalmin koelouhinnan ja -rikastuksen ympäristövaikutukset (URAKKA). Säteilyturvakeskuksen ja Geologian tutkimuskeskuksen projektiryhmän loppuraportti ympäristöministerölle* [*Environmental impact of test mining and enrichment of uranium. The final report of the Project Group of the Finnish Center for Radiation Security and Geological Survey of Finland for the Ministry of Environment*]. Helsinki, GTK, STUK, 42 pp. [in Finnish].

Myllykangas, M. 2007. *Uudistuva kaivoslaki ja kaivoshankkeiden ensivaiheeseen sovellettava kuulemis- ja osallistumismenettely* [*The reforming Mining Law and procedures for audition and participation at the first stage of mining projects*]. Lapin yliopisto, oikeustieteellinen tiedekunta, Rovaniemi, Graduation work, 114 pp. [in Finnish].

Nenonen, J. 2007. Kansannäytetoiminta [The layman's sample campaign]. *Materia*, **2/2007**, 21 [in Finnish].

[OECD] Organisation for Economic Co-operation and Development. 2006. *Uranium 2005 – Resources, Production and Demand*. A joint report by the OECD Nuclear Energy Agency and the International Atomic Energy Agency, 388 pp.

Piirainen, T. 1968. Die petrologie un die Uranlägerstatten des Koli-Kaltimogebiets in Finnischen Nordkarelien. *Bulletin des Commentaires Geológiques Finlande*, **237**, 1–99.

Rajala, A. 2007. *Rikastettu vai köyhdytetty? Ympäristötarinoita etelän kaivoksista* [*Enriched or impoverished? Environmental stories on mines of the South*]. Siemenpuun teemajulkaisu, **1**, 75 pp. [in Finnish].

Rossbacher, L. A. 1995. Geology is under attack. *Geotimes*, **2**, 68.

Salo, U. J. 2007. Vuosisatojen aikainen malminetsinnän edistäminen muuttumassa estämiseksi [The secular

promotion of mineral exploration is transforming into its obstruction]. *Materia*, **3**, 6–7 [in Finnish].

Sarpo, M. 2008. *Kehystäminen Uraaniton.org-kansalaisliikkeen mobilisaatiossa* [*Framing in the mobilization of the Uraaniton.org civil society movement*]. Ympäristönsuojelutieteen pro gradu-työ. Bio- ja ympäristötieteiden laitos, Helsingin yliopisto, 83 pp. [in Finnish].

Schiffries, C. M. 1994. Congress threatens to abolish U.S. Geological Survey and U.S. Bureau of Mines. *Geotimes*, **4**, 10.

[SLL] Suomen luonnonsuojeluliitto. 2007. Lehdistötiedote: Ammattimainen malminetsintä erotettava jokamiehenoikeuksista [Press release: A professional mineral exploration should be distinguished in the every man's law]. www.sll.fi/tiedotus/tiedotteet/liitto/2007/malminetsintä%jokamiehenoikeudet. Published in all main Finnish newspapers in 07.09.2007 [in Finnish].

Tontti, M. 2006. Uraaninetsintä Suomessa – tausta ja nykytilanne [Uranium exploration in Finland – background and the current situation]. *Energiakatsaus*, **2**, 9–11 [in Finnish].

Tontti, M. 2008. Kommentti uraaninetsinnästä [Comment on uranium exploration]. *Geologi*, **60**, 21 [in Finnish].

Vakil, A. C. 1997. Confronting the classification problem: toward a taxonomy of NGOs. *World Development*, **25**, 2057–2070.

Vanhanen, E. 2001. Geology, mineralogy and geochemistry of the Fe-Cu-Au(U) deposits in the paleoproterozoic Kuusamo Schist Belt, northeastern Finland. *Geological Survey of Finland Bulletin*, **399**, 1–229.

Van Rooy, A. 1997. The frontiers of influence: NGO lobbying at the 1974 World Food Conference, the 1992 Earth Summit and beyond. *World Development*, **25**, 93–114.

[VTV] Valtiontalouden tarkastusvirasto. 2007. Valtio etsintä ja kaivostoiminnan edistäjänä [The state as promotor of mineral exploration and mining]. *Valtiontalouden tarkastusviraston toimintatarkastuskertomus*, **174/2007** (Dnro. 425/54/05), 1–149 [in Finnish].

Uraaniuuringud, valitsusvälised organisatsioonid ja kohalikud kogukonnad. Uue väljakutse teke, anatoomia ja tagajärjed Soomes

Toni Eerola

Globaalne soojenemine on toonud päevakorda tuumaenergia. Paljud riigid, sh ka Soome, on otsustanud ehitada uusi tuumaelektrijaamu, aga need vajavad uraani, mille hind tõuseb rahvusvahelisel turul. Hoogu on läinud uraaniuuringud. Soomes on paljulubavaid uraaniilminguid. Soome on poliitiliselt ja majanduslikult stabiilne, hea infrastruktuuri ning heade geoloogiliste alusandmetega, mis teeb uraaniilmingute uurimise välisfirmadele atraktiivseks, kuid samas on sellele tekkinud ka tugev vastuseis Soome põhja-, ida- ja lõunaosas, kuid mitte keskosas. Vastuseis seondub tuumavastase liikumise, roheliste ja vasakpoolsete parteide ning valitsusväliste organisatsioonidega. See on üllatanud kaevandusettevõtteid, geolooge ning ka kaubandus- ja tööstusministeeriumi, kes on osutunud uues olukorras olevaks. Vastuseisu peamiseks põhjuseks on avaliku info puudumine geoloogia ja mäenduse alal. Artiklis on käsitletud selle probleemistiku teket, sisu ja tagajärgi ning viise, kuidas selles olukorras tegutseda. Esitatud ülevaade põhineb autori kogemustel, mis on saadud uraaniuuringutel osalemisel, arutlustel teiste geoloogide ja liikumiste aktivistidega ning mitmesuguste väljaannete materjalidega tutvumisel.