ENVIRONMENTAL IMPACTS OF IRON ORE MINE HANNUKAINEN BASED ON THE OFFICIALS' PERSPECTIVE

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Final Thesis

December 2013

Environmental Engineering

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ABSTRACT

Tampere University of Applied Sciences
Degree Programme in Environmental Engineering

MELLA, INKA:

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Final Thesis 96 pages
December 2013

The aim of the final thesis was to research how the Finnish officials see and experience the environmental impacts of mines, and more specially the Hannukainen mine. The results from the research interviews were compared with the statements from the Hannukainen mine environmental impact assessment and mining legislation. The interviews on the officials' perspective still remains as the most important research tool and comparison with the statements and legislation´s role was to give the officials perspectives something to compare them with. In the framework of the topic also the following themes were discussed: the officials´ understanding on their roles and resources in their work, how they respond to the media accusations concerning environmental hazards and mines, and how they see the today's mining know-how and politics.

The method was theme interview structured according to different themes for conversation. The target group of the interviews was the officials that work with the environment permissions, mining permissions and monitoring of those permissions. In practice the officials are from Center for Economic Development (ELY), Finnish Safety and Chemical agency (Tukes) and Regional State Administrative Agencies (AVI).

According to the interviews the officials see that the Hannukainen mining project is challenging project in sensitive and complex environment. According to the EIA report statements the operator has not yet demonstrated in the process that it is fully aware of these conditions. According to the officials in Tukes, iron ore mining itself should be

well-know and very conventional process that should not bring any surprises if best environmental practices are used as the Environmental Protection Act (§4) requires. This research also emphasized the lack of resources in the agencies and the importance of the mining company´s good understanding of its operations, conditions and surrounding environment. Also resent discussion of bias problems in the media has difficult the officials´ working on the changing field of mining.

Key words: Mining project, Hannukainen, interview, research, environmental impacts

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1 INTRODUCTION

Recently media has been writing about the environmental problems caused by mining industry. Sometimes the scapegoat has been the official giving the environmental permission, the mining permission or the one monitoring the compliance of the permissions. Lately also the mining company itself has collected the accusations of polluting. Who is the one to be blamed and how are these environmental catastrophes possible in today's high-technology society?

It seems like mines get permission to mine where they want and they promise everything will go well. Eventually news headlines states that accident had happened and surrounding nature is polluted. This seems to have happened with Talvivaara, Raahe mine, Kittilä mine and the list can go on. (Lapin Kansa, 14.11.2012; Yle news, 10.5.2013)

Now Northland Resources S.A. is planning to start mining activities in Hannukainen, Kolari, Lappland. The location is ten kilometers from a NATURA-2000 protected national park and the waste waters of the mine will run eventually to protected Muonio-Tornio River which is in excelled natural stage and happens to be the only natural stage river in Finland and also part of Natura series (fsgk, 2013). The mining area is surrounded by three smaller rivers, Kuer River, Valkea River and Äkäs River, that are also in excellent condition. These rivers eventually run to Tornio-Muonio River too. TheTornio-Muonio River is an important salmon breeding river and Äkäs River is important sea trout breeding river. The area of Hannukainen has also other sensitive habitats, bird and vegetation communities around it. Adding the vulnerability of the area and recent news together raises concern on the environment immediately.

As there does not seem to be any clear answer to this mining catastrophe picture, I am interested in knowing who it is to blame, how it is possible these accidents have happened, what is the mining policy in Finland and what will happen in Hannukainen. I focus my research on the scapegoats of the media: officials. They are the ones implementing and interpreting the Law in Finland. Aim of the research is to find out how the officials see the environmental impacts of mining and specifically iron ore mining in Hannukainen, and their own role in regulating those impacts.

2 RESEARCH OBJECTIVES

2.1 Aim of the Research

Summer 2012 I had part of my practical training in Kolari Forest Research Center (Metla) participating in the data collection and data recording of DILACOMI mining research project. DILACOMI (Metla, 2012) is joint project together with University of Lapland, Metla and University of Oulu. It consists of subprojects under the coordination of University of Lapland. The project started in the begging of the year 2011 and will last in the end of the year 2013. DILACOMI, Different Land-Uses and Local Communities in Mining Projects -project studies how mining activity is affecting the social sustainability and welfare of the operational areas and local communities. It is also targeted to research industries reconciliation, the regulatory of the mining legislation and society impacts. The target mines of the research are the gold mine of Suurkuusikko Kittilä and planned iron ore mine in Hannukainen Kolari. The project will produce information about the condition framework of sustainability and about the best practices for municipalities, industries, officials and experts. (Metla, 2012)

The DILACOMI project in Metla focuses how the nature and wilderness based tourisms and mining industry can be reconciled together in the areas, which are important to tourism and economically sensitive. In other words it studies the social effects of the mining. (Jokinen, 2013) This was why I am interested in my research to be focused on environmental effects so that I would get information to fill DILACOMI project. It is also interesting to have the officials' perspective written on paper now before the Hannukainen mine, and for example after five years or some other period similar research can be repeated and seen if the general opinion has changed.

In Metla´s mining research project the target groups was the local tourists, local people, leisure time real estate owners and reindeer herders (Jokinen, 2013, 6). Similar target group for researching the environmental impacts could bring misunderstandings as the environmental impacts are not commonly know by people. As Jokinen and Tyrvänen (2013, 16) write the impacts of new mining projects on the environment are unclear and tourists reaction on environmental changes is difficult to evaluate. Still according Jokinen and Tyrvänen(2013, 7) research; Tourists see that mines' main impacts 82,5% will on environment. Then comes the closeness of wilderness, nature experiences and

nature use of local people. Environment and nature usage worries tourists when comes to mine operations.

The officials' are the ones who should know best what can happen and what it will do the nature. Their opinion should be more based on knowledge and expertise than tourists and lay peoples´.

This research is aiming to find out the officials perspective about mining and the Hannukainen project specifically. In order to make any conclusion of the officials' perspective I wanted to have some background information about mining in general, mining related legislation, Hannukainen mining project and about the environmental impact assessment process of the Hannukainen mine. These topics are been explained before the actual research of officials perspectives.

2.2 Research Question

This study focuses on how officials see and experience the environmental impacts management of the mines, especially the Hannukainen mine.

In the framework of this issue I also want to research how officials see their roles and resources in their work, how they will answer to the media accusations concerning environmental hazards and mines, and how they see where the today's mining know-how and politics lies.

2.3 Materials and Methods

2.3.1 Data

The target group of the interviews was the officials that work with the environment permissions, mining permissions and monitoring of those permissions. This means practically that the officials are from Center for Economic Development (ELY), Finnish Safety and Chemical agency (Tukes) and Regional State Administrative Agencies (AVI).

Administrative Agencies (AVI) gives the environmental permission to the mine according to the Environmental protection Law (Ympäristönsuojelulaki 86/2000, 2§).

Center for Economic Development (ELY) then monitors that the mine follows the guideline set in the environmental permission. AVI and ELY-center are also involved in the EIA procedure. (Ympäristö, 2013)

Finnish Safety and Chemical agency (Tukes) work as the mining official according to the Mining law (Kaivoslaki 621/2011, 4§) and monitors the mining permission. Mining official solves the permit applications according to the Mining Act and keeps mining register updated. Tukes monitors mining activities according to the Mining Act by reports, information questionnaires and supervisory visit to the locations. Tukes also does monitoring trough different initiatives. (Tukes, 2013)

Data consists of six people: one from AVI, two from TUKES and three from ELY-center. To each person from the group of six, I held own individual interview.

I found the contact information of the possible officials for the interviews from the web pages of the agencies. I sent e-mail and asked if they would like to participate this research and at the same time to my final thesis. This way I got four informants. I recruited the fifth and sixth informants using snowball technique as I asked if the informants knew anyone who would be suitable for the research interview.

All the interviews were arranged in Rovaniemi, in the officials´ own offices face-to-face. I tried to propose Skype-interview but the officials answered that they are prohibited to use Skype at their office computers. I managed to get the interviews set so that for six interview I had to make three trips to Rovaniemi. I did those on 15.3.2013, 10.5.2013 and 15.5.2013. All interviews were recorded with digital recorder and later the data was transcribed.

2.3.2 Theme Interview as Research tool

When we are researching people, why not use the benefit that the research group of people would tell themselves about the facts that are concerning them, writes Hirsjärvi and Hurme in the book Research interview (Tutkimushaastattelu 2000, 34). This is good point as I needed the opinion of the officials and who would know it better than the officials themselves. Still Hirsjärvi and Hurme (2000, 34) continues that any research method should not be chosen without discussing its suitability to problem-solving.

The problem-solving tool should be efficient to bring answers, economical as my research is at my own expense, and also accurate so the results can be reliable and conclusions can be made. I basically had two options; questionnaire or interview.

There are many benefits of interview as research tool. To start, it emphasis the person interviewed in the research and his/her opinions. It makes the informant in the interview the active party. Informant can change the direction of the interview by his or her answers. This is also helpful to me when the subject of the answers is less known. I do not need to guess the possible answers and this way the informant has more room to tell who things really are without tying to fit the answer to some options made. Interview also leaves space to correct he misunderstandings in both ways. If informant does not understand the questions he or she can easily ask for further explanation for the question. This works also in the other way so that if the answer of the informant is not clear to interviewer, further extra questions can be asked to clear the answer. This could not be possible in questionnaire for example. In questionnaire the understanding of the questions is on the informant's shoulders and also the understanding of the answers on the researcher's shoulders. Furthers questions cannot be made and misunderstandings cannot be corrected. Interview is somehow also good tool to get sensitive information. During the interview sensitive topics can be walked through some way unnoticed without making too big deal about them among other topics. Questionnaire thought is as good framework also for sensitive topics. In questionnaire the informants can see themselves as more anonym and this makes it easier to answer sensitive questions. (Hirsjärvi and Hurme, 2000, 35)

Even though interview has many benefits it can also hide problems. Hirsjärvi and Hurme (2000, 35) had listed some of them. Successful data collection during the

interview requires skills and experience from the interviewer, even education of the right role and tasks of interviewer. This added pressure for me, as I am not experienced interviewer, and these interviews are my first ones. There is literature about the subject, and I became familiar with the book "Interview -Research, situations and communication" (Ruusuvuori & Tiittula, 2005). It gave good advise about the role of the interviewer, and how the interview is all about the informant's perspective, and how irritating interventions of the interviewer can make the informant unfocused on the topic of the answers and even sabotage otherwise good interview. Learning from the literature, still cannot be compared to the skills learned in practice.

Interviews also take time and money. Arranging the interviews by contacting possible informants takes time as not everybody want take part in the research and the ones that do have their own schedules to work with. It takes time and patience to have finally arranged interview written in the calendar. To meet the informant in person and having the actual interview, it takes time. The length of the interview totally depends of the informant. Then transcribing only one interview of one or two hours can take several days of work. The money comes in the picture when getting the recorder and travelling from Raattama to Rovaniemi, some 250 kilometers in one direction only. I happened to be lucky though and borough recorder from Kolari Metla.

Hirsjärvi and Hurme (2000, 35) also points out a serious problem of interviews. The interviews can contain lots of errors. The errors can be made from the informants and interviewer behalf. In the spoken language the facts are not always so straight. Also if the informant for some reason gives only socially desirable answers the reliability of the interview can deteriorate. For some informants just the recorder on the table can make them freeze up and only give socially acceptable answer. Especially if the informants have had some problems with media, just the site of recorder can make them suspicious about the reliability of their anonymous in the interview. These errors add the difficulty in analyzing and reporting of the interview data. There does not exist any readymade models for that when it comes to nonstructural interviews. Questionnaires are in this case in ahead. Questionnaire data is easy to process and statistical analysis can be made also easily.

When it comes to questionnaires, their popularity in data and information collection has changed people's perspective to them. Questionnaires are commonly used and people

often receive some questionnaire to fill. This has made people less willing to fill the questionnaires. In fact, according to researcher Mikko Jokinen, only 30 percent from the send questionnaires return filled. As my target group of people is small, less than ten people, I cannot afford that only 30 present of them will give me answer. I need an answer from all of them, and longer the better. With the questionnaire there is also the risk that the person filling it is not motivated and gives inadequate answers. In the face to face interview the interviewer can motivate the informant to give as full as possible answers.

To make some conclusions, I chose interview to be my tool of research basically based on the fact that the topic of the interview is not so familiar to me, that I could be guessing the answers options of the informants. I rather want to hear all that they have to say, more widely the better. As I am not expert on the mining field and they are, I am sure we will have some communication problems understanding to questions and answers. I do not want this kind of fact adding errors in the research. This is why I studied the mining industry generally, mining related legislation and the Hannukainen mining project separately also in the starting this thesis.

Hirsjärvi and Hurme (2000, 42) clear the concept of the interview interestingly writing that interview reminds discussion in many ways. They both have verbal and non-verbal communication. Both parties are affecting one another, and in both situations the members are face to face. Still one fact separates them from each other. Interview aims to collecting information, and this way is planned goal-aiming activity (Hirsjärvi & Hurme, 2000, 42).

Research interviews can essentially differ from each other. The range of research interview is confusing and is not consistent. Hirsjärvi and Hurme (2000, 43) divide research interviews in three categories; structured interviews, unstructured interviews and semi-structured interviews.

In structured interview all the question forms and the order of the presentation are determined beforehand. Often structured interviews are telephone interviews. The benefit of it is that the interview is easy to do, but if the structure is not well formed with wide range of different option choices the result might reflect more the interviewer than the informant.

Unstructured interview is the opposite if the structured interview. In unstructured interview there are only some open questions, and interviewer will form the next question depending on answer of the informant. Unstructured interviews can resemble discussions, where the aim is to get the informant reconstruct their experience about the aim subject of the research. In unstructured interview the definition of subject is quite loose and the topics covering the interview depend on the informant. (Hirsjärvi and Hurme, 2000, 46)

The semi-structured interview can be seen as the intermediate form of the structured interview and the unstructured interview. There does not exist only one definition for this interview type. As Hirsjärvi and Hurme (2000, 47) have referred several experts, one can see that in semi-structured interview the set of questions are same to all but their presentation order can change with different informants or the order of the words in the questions can only change or then the answers to the questions are not tainted in some set answer choices.

My tool of research in this final thesis research is semi-structured interview, or more clearly theme interview. Theme interview is name for semi-structure interview that uses different themes for conversation topics. (Hirsjärvi and Hurme, 2000, 48) These themes are same in every interview but their order can change. As my target of the interview is to get all experiences, ideas, beliefs and feeling out from the informants, theme interview works in this research. My knowledge of the topics is not that wide as the informants, so it is impossible for me to set some answer groups. Theme interview emphasis the individual's experiences and definitions of situations, and that is what this research is aiming to get.

I have prepared questions in each theme but the questions are not going to be presented from word to word similarly in each interview. I rather want to concentrate in forming relaxed ambience and make sure that the informant understands my point. Informant can answer freely so that there is not prepared quite lines for their answers. I want to have each official's full perspective, rather than have confirmation to my own speculations. If necessary, I will present follow-up questions to get deeper information.

2.3.2.1 Themes of the interview

In the beginning of the interview I am interested to get clarification to the basic facts. I want the informant start answering with easy questions. This will relax the situation and makes it easier to continue with more harder and sensitive questions. The themes of the question can be sensitive because the same topics have been in media recently, so I want to pay a tension to the forming of the questions and to their presentation. I do not want to sound provocative with them. I want to build up trust between me, the interviewer and the informant during the interview so that it would be easier to answer to some hard questions. I will emphasis in the beginning of each interview that all the interview material will be used only in my final thesis research purposes, and that I will not mention any names in my final thesis. Each person only represents their agency.

Theme 1: Roles and the implementation

First theme is about the role of the agency and the role of the official described by the officials themselves. It can be that the role definition includes some tasks that are not mentioned in the law or else were.

This theme also includes the goal of the agencies activities and how it is implemented. Where and how they aim with their role and is this task achieved? Do they perform directly or indirectly? Do they visit the actual mine or if they relay in mining companies information?

Last subject under this theme is the level of cooperation inside the agency, between different agencies and between the mining companies. I am interested in how the information travels between the agencies on the same field and between the mining companies. This is interesting to know to research the level of transparency on the field.

Theme 2: Possibilities and resources

Second theme is still about the agencies internal functions. This way I stay still in easier theme. The theme is about operation possibilities. With the operation possibilities I mean the level of the expertise, resources for education and specialization and evaluation if the resources are sufficient to meet the goals. With this I want to see if there is shortage of resources affecting the monitoring and drawing permissions. The

field of mining is constantly living and this inquires lots reeducation and constant learning to keep up with the mining companies.

This theme also includes questions about the sanctions that the agency can give to the operator that does not follow the permission. I want to hear how far the officials' power goes. What are the tools that they can use if something happens and permission guideline are crossed. This is interesting since the media has been accusing officials for letting these environmental pollutions to happen. Now they can revile how far they official go.

Theme 3: Conflict of interest

The media has been accusing the officials also for being impartial. Third theme is about that. In Raahe there were conversations in media since official had been working with Raahe mine subjects in agency and later went to work in to the Raahe mine. (Yle news, 10.5.2012) I want to hear what officials have to say about this accusation and wether it is even truth. I also want to hear how they monitor bias if that would happen. Is there some internal supervision or is each official responsible of their own actions.

Theme 4: After Talvivaara and Raahe cases

This theme is about Talvivaara and Raahe cases. I want the official to tell how their coworkers have successed in the middle of the resent environmental catastrophes. How it is possible that the plans and calculations of the mines went that much wrong that these accidents happened and who is responsible for that. This will give straight answers to the media´s resent accusations. I want to hear who it has been working as official while the accusations drop on your neck. I also want to hear if there have happened some changes to prevent or reduce similar accidents in the future. If nothing has been done similar actions will be happening also in the future.

Theme 5: Level of technical expertise

Theme number five is technical theme. As it has been seen that mining companies calculations does not always meet the reality. I want to hear what the officials have to say about that. Do the mining companies have the needed technical expertise?

Theme 6: Hannukainen mining project

This theme is about Hannukainen Mining project. I want to hear if they have been participating in the project and can they list pros and cons about the project. How the Environmental Impact Assessment process has been progressing? I want to hear what they have to say about the sensitive nature areas around the becoming mining area. What kind of collisions they evaluate that could be coming.

Theme 7: General perspectives of mining

Final theme is about the mining politics and the general perspective. This includes the multinational ownership that seems to be common among mining companies. There are only few companies that are even partly Finnish-owned. I want to hear what the officials know and think about these companies operating in Finland. Do they know about their reputation in abroad? Does there exist monopoly companies in the world that also operate in Finland? I also want to know if Finnish officials know how officials operate in abroad. Do they co-operate and is there something to be learned from abroad? If the companies come from abroad, maybe the officials abroad have some special methods or practices that could be applied in Finland. Last question is how the official would develop their agency's operations to be even more efficient and effective in the future. This is interesting because it will also tell what they are today lacking in their agency and their internal functions.

3 DESCRIPTION OF THE MINING INDUSTRY

The roots of the mining industry in Finland go back in to the history until 1560´s when the first iron ore mine started in South-Finland. Today over one thousand mines later we are living in a new period of mining boom. The core of the mining industry lies deep in the bedrock; in the ores and the minerals. The ores and minerals mined in Finland can be divided in to metals and industrial minerals. Metals are the noble and basic metals such as iron, gold, chrome, copper, nickel and zinc. Industrial minerals include all minerals and rock types used in industrial purposes expect the metals and mineral fuels: limestone, talc, apatite, kaolin, wollastonite and rare earth elements. (Kauppila, Räisänen and Myllyoja, 2011, 9; GTK, 2013)

The key of successful mining operations is profitable deposit. The utilization of deposit depends on its composition, extent and geographical location as well as the permit issues trough out the life cycle of the mine. Mining operations are extensive, long-term and require large investments. These facts emphasize the importance of the world market prices, balance of the production costs and the local and national political atmosphere. (GTK,2013; Uusisuo, 2012, 8)

The mining industry produces raw materials to several other industries, such as metal, chemistry, paper industries and agriculture. The minerals are also needed in the industrial production of food, drinking water, electronics, cosmetics and receptacles. The industrial rocks are crushed and grinned to be used in cement and rock wool. In other words, mining products are widely used in almost all aspects of modern world. (GTK,2013 & Uusisuo, 2012, 8; Kauppila, et al., 2011, 9)

Finnish mineral and metal deposits are very important for Europe as they increase the self-sufficiency of the European mineral and metal production. Finland is one of the biggest industrial metal producers in Europe. The mining metal production has been in rapid increase in Finland after the 2009 depression and the future of the industry is estimated to still continue increasing. This means development in the technology and metal processing industry in Finland and most importantly development in the national economy. This economy boost does not only come from the direct employment of the

mining but also with the huge indirect employment. Operating mine is pumping money to the surroundings. (Kauppila, et al., 2011,9)

The operating metal ore mines and the new becoming mining projects are mainly located in North and East Finland and the industrial mineral mines in South and East Finland. Figure 1 shows the currently valid permits and permit applications in September 2012. (Uusisuo, 2012, 23)

The so called junior companies with foreign ownerships mainly do the exploration work nowadays. They are only registered in Finland or they have cooperation organization in Finland. In the foreign junior companies the number of personnel is mainly under ten. Also the Geological Survey of Finland does exploration work in Finland. The Geological Survey of Finland hands over the located ore deposits to the Ministry of Employment and the Economy. The Ministry of Employment and the Economy will later sell the deposits in tendering. The actual mining operations are done by the Finnish subsidiaries and branches of the foreign stock exchange listed companies. There are currently 40-50 exploration organizations, twelve operating metal ore mines (2012), 31 operating industrial mineral mines (2011) and 10-15 planned new mines or enlargement operations on operating mines (2012). Only two of these are mainly Finnish owned: the chrome mine in Kemi and multi-metal mine in Talvivaara. (Uusisuo, 2013, 8-9; 18-22)

In the modern world where the global population is expanding, living standards are rising and urbanization is increasing, are demands for mining products also increasing. The consumption of mining products is increasing the demand and also their price. This together with the technological development makes it possible to start profitable mines around less productive deposits. In Finland this has caused sharp increase in the metal ore mining production after the depression since 2009. According to Raahenseudun Teknologiakeskus Oy (2013, 4) especially Nordic regions are going to be important in mining industries in 2020s because of the large investment project, energy projects and mining projects in the region. Figure 2 shows all planned investments until 2020 in North Scandinavia and Murmansk region. Rautakoski (2013) estimates that until the year 2020 the total investments on these areas will be 70-120 mrd euro of which the share of the mining industry will be only 18,5 mrd euro. (Raahenseudun Teknologiakeskus Oy, 2013, 4-6 & Kauppila, et al., 2011, 9)

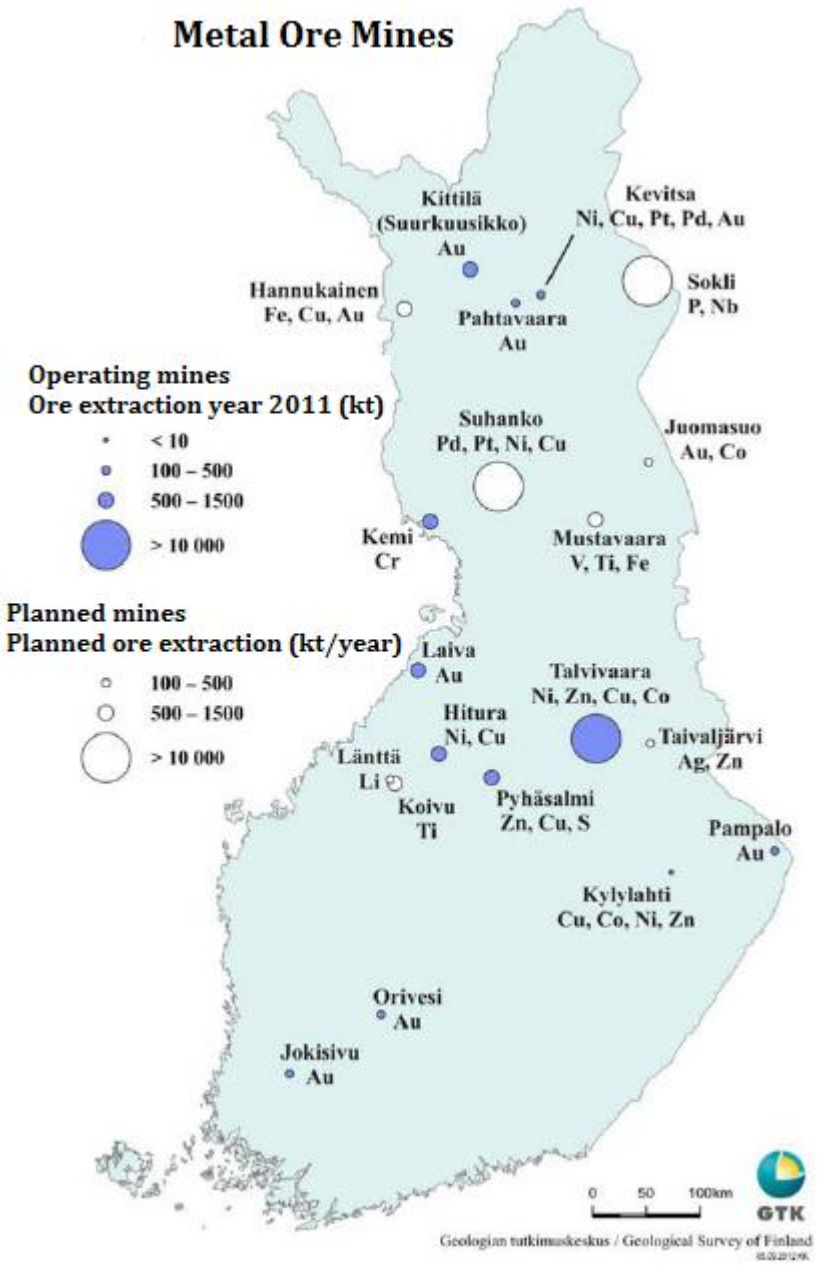

Figure 1. Metal ore mines in Finland (Uusisuo, 2012, 25)

Geologically Finland is located in Fennoscandian shield, which is the largest exposed area of Precambrian rocks in Europe and shares many similarities with the ancient shields in Canada, Australia and South Africa. All these are globally significant for their mineral resources. (Lahtinen, Hölttä, et al., 2011, 1). The mineral resources make the Fennoscandian Shield an important European metal resource. It is estimated to contain similar mineral and metal reserves as in Canada and Australia, but as Finland it is not as extensively researched it offers good future possibilities. The increasing world demand, rising prices and new processing technologies have turned some otherwise unprofitable resources into economically profitable resources.

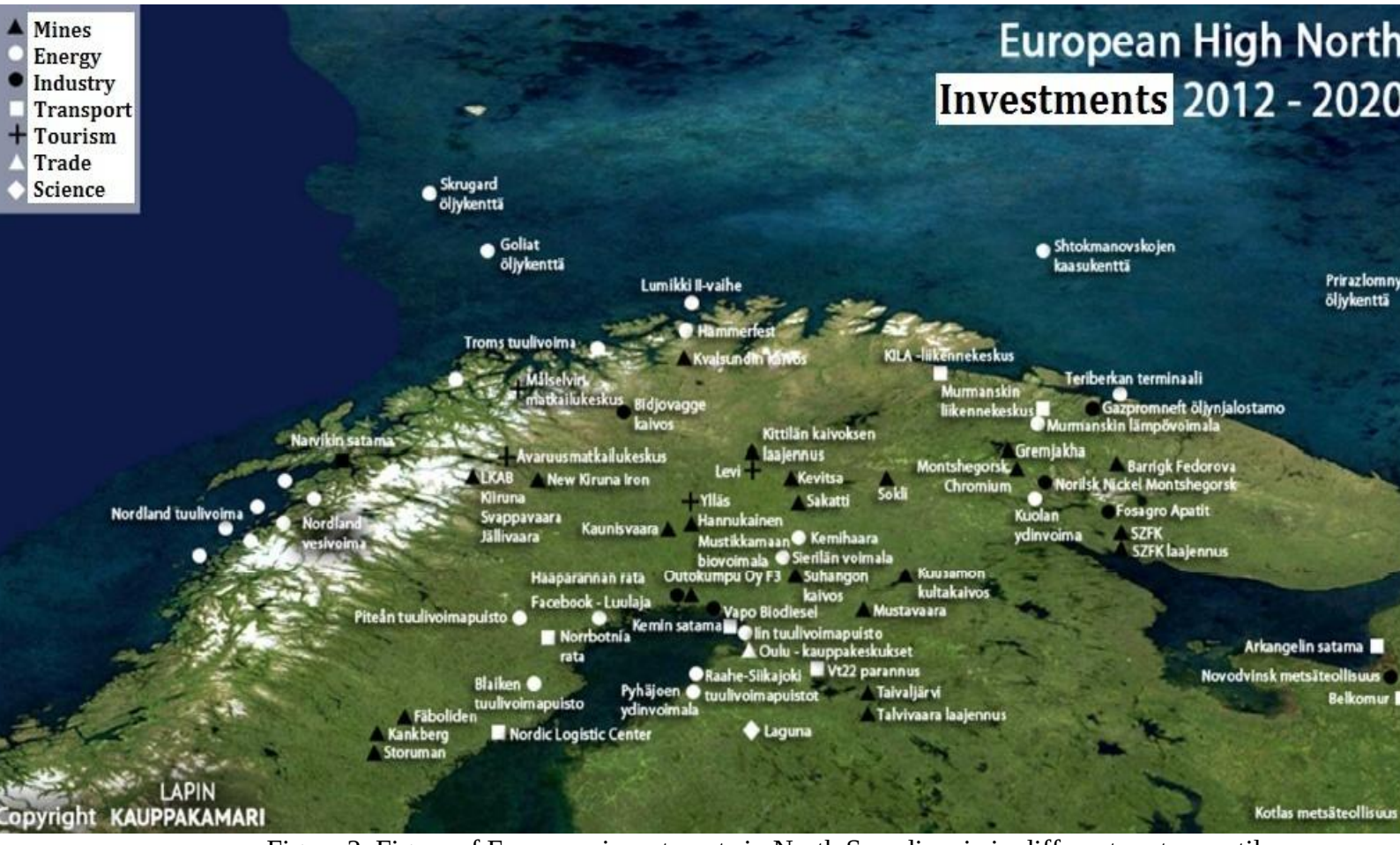

Figure 2. Figure of European investments in North Scandinavia in different sectors until the year 2020. (Rautajoki, 2012, 6)

Figure 3 shows the metallogenic zones in Finland, which cover almost the whole country. Comparing the figure 3 with figure 1, many reserves are still not used in mining, but probably under exploration. (Kauppila, et al., 2011,9; Raahenseudun Teknologiakeskus Oy, 2013, 4-6; GTK, 2013; Lahtinen, Hölttä, et al., 2011, 3)

The life cycle of a mine includes four main phases: exploration, construction of the mine, production and closing the mine. The exploration work for finding profitable deposit can last from years until decades and it includes high risks as only a small percentage of exploration sites lead into mining later. After profitable deposit is found, starts the assessment and permit processes which can take many years. Building the mine takes a year or two and run-up phase to achieve the full capacity depending on the mine from months to years. The life time of the mine is dependent of the deposit reserves around the mine. If new deposits are found the estimated life time is prolonged. After the deposits are used the mine is closed. With right aftercare the area is made harmless to the human health and nature. This phase can last from years to decades depending on the mine. (Uusisuo, 2012, 9; Kauppila, et al., 2011,12)

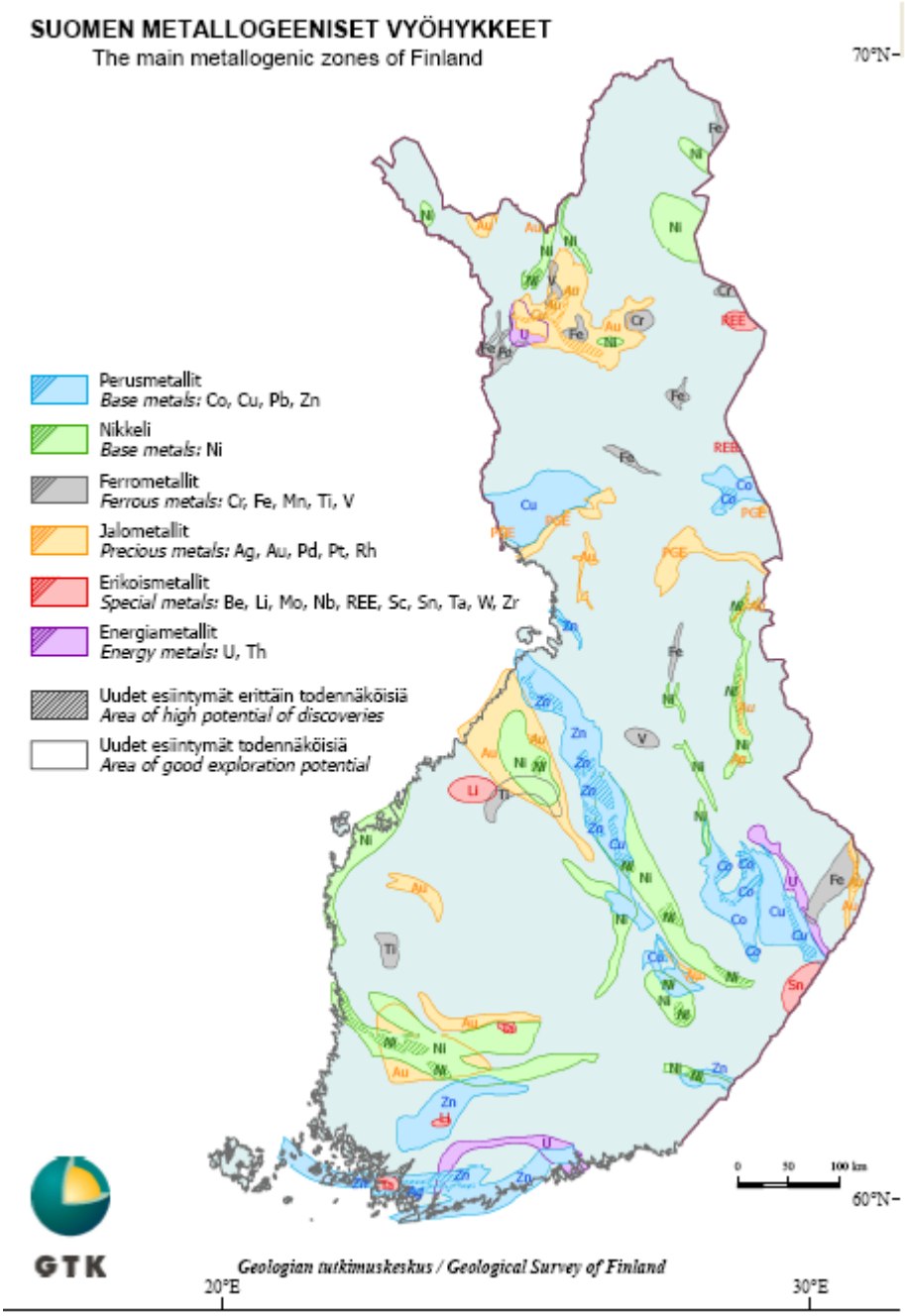

Figure 3. The main metallogenic zone sin Finland. (GTK, 2013)

4 MINING LEGISLATION

Mining operations are strictly regulated right from the very beginning to the end, and they always enquires permits (Mining Act, 621/2011, §16). Figure 4, describes the proceeding of the planning and permit procedure in different phases of the mine and how different officials are present. According to the Mining Act (621/2011) the research activities for exploration require Exploration permit and the usage of the mining minerals and metals mining permit. According to the Environmental Protection Act (86/2000) the mining area, the mining processing area and the waste area of mining wastes needs to have environmental permit. According to Act on Environmental Impact Assessment Procedure (468/1994) the environment impact assessment (EIA) procedure is applied to activities that may have significant adverse environmental impact. According Nature Conservation Act (1096/1996) any extra disturbance caused to the protected wildlife needs permit. According to Water Act (587/2011) all actions concerning water bodies and the groundwater enquires water permit. All the extractive waste handling of the mining operations is prescribed in the Degree of Extractive Waste by Council of State (379/2008) and these degree alterations. According to the Dam Safety Act (494/2009) all dams in underground and earthy mining needs to be constructed, maintained and used with secured safety. According to The Land use and Building Act (132/1999) during the construction of the mine the area needs to have detailed land use plans and permits. According to the Radiation Act (592/1991) all health and other impact caused by the radiation should be limited and prevented. (Kauppila, et al., 2011, 40-41; Mining Act (621/2011))

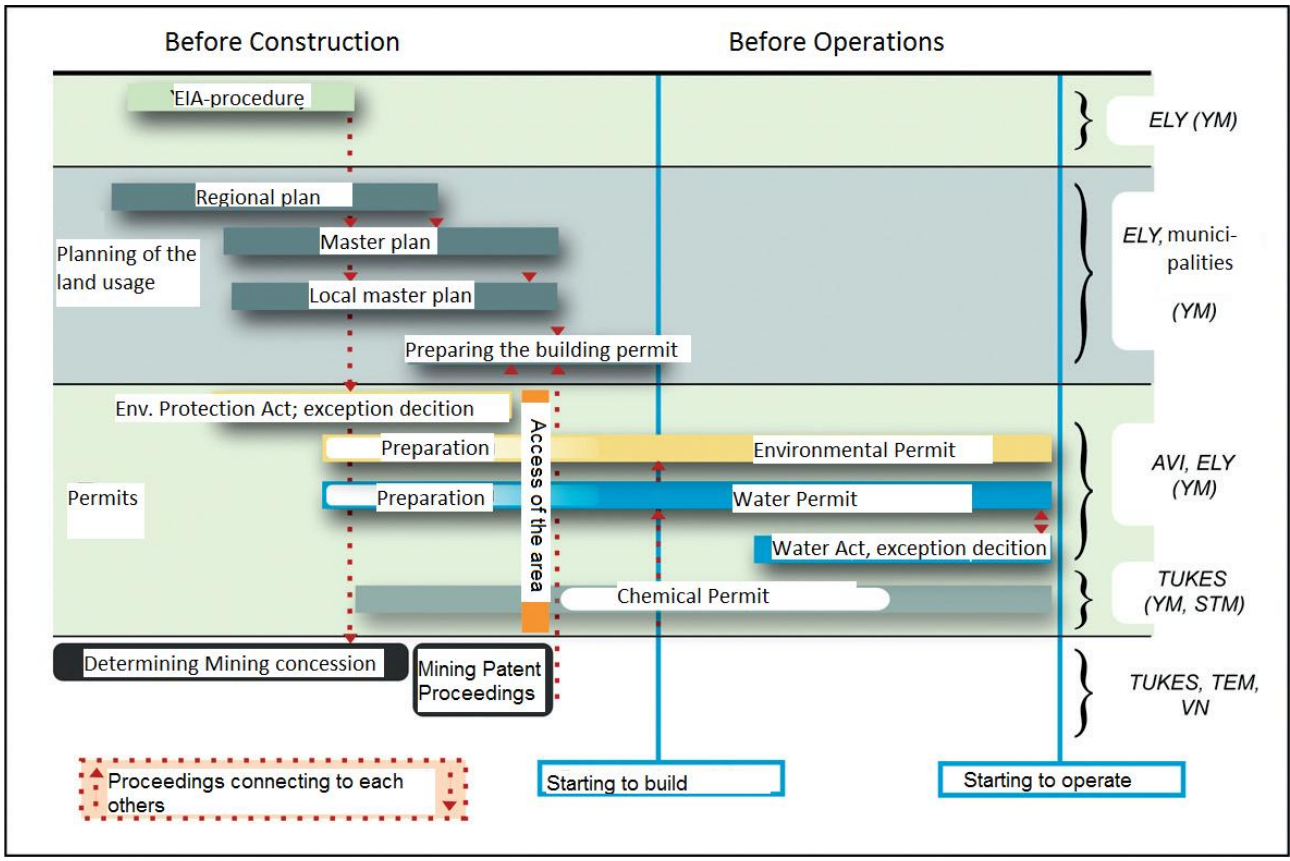

Figure 4. Figure of the Proceeding of the planning and permit procedures and how the different officials are present (Ympäristö, 2013).

The permit processes involves many officials such as Finnish Safety and Chemical Agency (Tukes), Centre for Economic Development, Transport and the Environment (Ely-centre), Regional state Administrative Agencies (AVI) and the municipality. Forest Services and the Ministry of the Environment (YM) come involved in to the process if the mining project is located in an area belonging to the Nature 2000 network or other nature conservation areas. Mining projects producing uranium and thorium will be handled by the Finnish Government. (Rissanen & Peronius, 2012, 35)

The new Mining Act (621/2011) of Finland came in force on 1.7.2011. The new act replaced the old Mining Act (503/1965) from year 1965. The new mining official is the Finnish Safety and Chemicals agency (Tukes). Due the new act Tukes opened new unit for handling the permits in Rovaniemi. Now the permits are handled in Rovaniemi and Helsinki units. Mining official solves the permit applications according to the Mining Act and also monitors the mining operations. (Finnish Safety and Chemical Agency,2013) Regional state Administrative Agencies (AVI) gives the Environmental

permit and Centre for Economic Development, Transport and the Environment (Ely-centre) and the environmental official of the municipality are the monitoring agencies of the environmental permit. They are also involved in the EIA process. (Ympäristö, 2013)

The motivation for renewing the old act was to secure the mining and exploration conditions so that they can be more economically, ecologically and socially sustainable. The new act wants to focus on basic rights of the citizens, security of the living conditions, opportunities to influence of the municipality and to the land owners rights. The aim of renewing the mining agency was to make the administrative procedures more focused and functioning and focused on the proactive monitoring of Mining Act.(Uusisuo,2012, 11-12; Rissanen & Peronius, 2012, 36-37)

The Mining Act lays down conditions of the exploration and exploitation of a deposit containing mining minerals, the proceedings for establishment of a mining area, gold panning in an area owned by the State and the termination of related operation (Mining Act (§2/621/2011)). The aim of the Mining Act is to promote mining operations and to organize the land usage of the mining area and exploration work in a socially, financially and ecologically sustainable manner according to Mining Act section 1.

According to the Mining Act section 7, prospecting is considered as everyman's right. In order to find mining minerals, everyone has right, even on private property, to conduct geological measurements and make observations and to take minor samples, provided that this does not cause any inconvenience or disturbance (prospecting work) (Mining Act, §7). This is different when comparing with other industries. They cannot just enter others properties to operate without any permits. This is possible with mining prospecting work, with of course some limitations on the areas such as cemeteries, areas used by the defensive forces, a traffic routes, area within 150 meters of a building intended for residential or work use or any adjoining private yard or area within 50 meters from public building or utility and high voltage power lines and transformer stations are included in the prohibited areas. On these limited areas still the prospecting work is possible to carry out with the consent of the official or institution competent in the matter, or the relevant holder of rights except in the areas of cemetery. (Mining Act, §7)

Exploration needs an exploration permit granted by the mining official, only if it cannot be carried out as prospecting work according to section 7 of the Mining Act (621/2011),

or the property owner has not given consent to it, or exploration could cause any harm to people´s health or general safety and in case exploration could damage other industrial or commercial activity or deteriorate values related to the landscape or nature protection. (Tukes) Exploration of a deposit containing uranium or thorium requires always exploration permit. (Mining Act, §9; Kauppila, et al, 2011, 42-43)

In the mining world applies role fast eats slow. In the other words, the party which has first applied the exploration permit has priority for it (Mining Act, §34). An exploration permit does not authorize exploitation of the deposit. The exploration permit mainly equals with the claim right according to the old Mining Act (503/1965). The permit holder of the exploration area can do investigation in order to prepare for the mining activities and build and transfer temporary contractions and equipment necessary for exploration activity.(Mining Act, §10, §32, §34)

The mining permit is always required when establishing a mine and undertaking mining activity (Mining Act, §16). A mining permit entitles the holder to exploit the mining minerals found in mining area, the organic and inorganic surface materials, excess rock and tailings generated as by-product of mining activities and other materials belonging to the bedrock and soil of the mining area. The mining permit also entitles its holder to perform exploration within the mining area. (Mining Act, §17)

The mining permit holder is obliged to ensure that mining activities do not cause damage to the health of people or danger to public safety. Moreover mining activities must not cause significant harm to public or private interest, or not, in relation to the overall costs of the mining operations, reasonably avoidable infringement of public or private interest. The permit holder must not do excavation or exploration so that mining minerals are obviously wasted. Also the permit holder has to make sure that current excavation operations do not endanger the potential future use and future excavation work at the mine and deposit. (Mining Act, §18)

Prerequisites for granting a mining permit are that the deposit is exploitable in terms of size, ore content, and technical characteristics. The size and ore content of the deposit can be considered sufficient if the profit from the utilization of the deposit meets the operational costs and this way guarantees enquired profit for the invested capital. Most important technical characteristics are those of excavation and ore dressing. (Mining Act, §47, §49)

A mining permit must not be granted if there is good cause to doubt, for reasons that have emerged in connection with the handling of the application, whether the applicant meets the prerequisites. Furthermore, if the applicant has not any apparent intention to see to the commencement of mining activity or if the applicant has previously fundamentally neglected obligations based on Mining Act, the permit must not be granted. In addition a permit must not be granted if the mining activity causes danger to public safety, causes highly significant detrimental environmental impacts, or substantially weakens the living conditions and industrial conditions of the locality, and the said danger or impacts cannot be remedied through permit regulations.(Mining Act, §47)

The granted mining permit is valid until future notice and the regulations are reviewed at maximum interval of 10 years. A mining permit can also be granted for fixed term with justified reasons. Fixed-term permit is valid for the maximum interval of 10 years. The extension can be granted until future notice or for the maximum 10 years at the time. (Mining Act, §62, §63)

A mining permit shall expire at the end of the designated fixed term. The permit official shall decide that the mining permit will expire if the permit holder has not, within the time limit specified in the permit initiated mining activity or such preparatory work as indicates that the permit holder is seriously aiming at actual mining operations. The permit expires also if mining activities have been interrupted because of a factor dependent on the permit holder continuously for a minimum of five years, or mining activities have actually ended. However, the permit official may postpone the expiry of the mining permit, twice at the most, and specify a new deadline for commencing mining activity, or for continuing operations. The expiry of a permit can be postponed for a maximum of 10 years in all. (Mining Act, §68)

The mining permit holder shall deposit collateral, for the purpose of termination and after-care measures of mining operations. The amount of the collateral should be sufficient in view of the nature and extent of mining activity, the permit regulations issued for the activity, and collateral demanded by virtue of other legislation. The permit official shall determine the type and quantity of collateral for the permit. The mining permit holder is also obliged to submit an annual report to the mining official on

the extent and results of the exploitation of the deposit and to inform of any essential changes in the information on mineral resources. Within two years of the termination of mining activity, the mining operator shall restore the mining area into a condition complying with public safety due restoration, cleaning, and landscaping. The permit holder also needs to deliver the mining official the general and geological documentation concerning the mining area. (Mining Act, § 18, §108, §109, §143, §145)

5 ENVIRONMENTAL PROTECTION LEGISLATION

Mining activities are normally large scale projects, with many processes that may cause environmental pollution and generate waste. This is why The Environmental Protection Act (86/2000) and complementing Environmental Protection Degree (169/2000) are applied to mines among many other types of industries. (Environmental Protection Act (86/2000), §29)

Environmental protection Act (86/2000) is a general Act for preventing the pollution of the environment and applies to activities that lead or may lead to environmental pollution. The Act is also applied to activities that produce waste and waste disposal. (Government Bill 273/2009; Environmental Protection Act 86/2000, §2)

According to the Environmental Protection Act section 28, environmental permit is required for activities that pose a threat of environmental pollution. Activities subject to a permit are prescribed in more detail by Environmental Protection Degree section 1 and they include mining, mechanized gold excavation, ore or mineral concentration plants (169/2000, paragraph 7 subparagraphs a and b).

The environmental permit gives regulations for the purpose of preventing pollution. The regulations concern emissions, wastes, reduction of waste production and harmfulness, and measures to be taken after cessation of operations, such as remediation of the area and prevention of emissions. Operators engaged in waste treatment shall provide a financial guarantee in order to secure the appropriate waste management. (86/2000, §43, §43a)

According to the Environmental Protection Act section 5, operator must have sufficient knowledge of their activities´ environmental impact and risks and of way to reduce harmful effects. If the activities cause or may directly result in environmental pollution, the operator must take the appropriate action without delay in order to prevent pollution, or, if pollution has already resulted, must take action to reduce it to a minimum. These obligations concern exploration and mining operations. This is important section in the Environmental Protection Act as it clearly moves the responsibility to the mining operator's shoulders.

The environmental impact assessment (EIA) procedure is applied to activities that may have significant adverse environmental impact as defined in the Act on Environmental Impact Assessment Procedure (468/1994) section 4. Mining activities usuly may have

this sort of significant adverse environmental impact due the special features of Finland´s nature and environment. Typical mining project requiring an EIA procedure is a mine in which the amount of removed material from excavation, ore dressing and handling exceed 550 000 tons per year or the open pit is larger than 25 hectares. Also smaller projects can require EIA procedures if they can cause significant environmental pollution. (EIA Act 468/1994, section 4; Kauppila, et al., 2011, 48)

EIA procedure is regulated in Act on Environmental Impact Assessment Procedure (468/1994) and in Government Bill (713/2006). The aim of the EIA procedure is to further the assessment of environmental impact and consistent consideration of these impacts in planning and decision-making, and at the same time increase the information available to citizens and their opportunities to participate (Environmental Impact Assessment Procedure, section 1).

In section 2 of the Act (468/1994) environmental impacts are defined widely as direct or indirect effect of a activity on human health, living conditions, amenity, living conditions , organisms, biological diversity, community structure and landscape, cultural heritage and utilization of natural resources. The social impact assessment is one of the key topics in EIA procedure.

No decisions concerning the mining project are made in the EIA procedure. EIA procedure only collects information that can be later used in decision making. For example EIA procedure produces information that is used in environmental permit procedure. Trough out the EIA procedure also the local people receive information and can have their word heard also. (Kauppila, et al., 2011, 47)

The EIA procedure has two phases; preparation of the environmental impact assessment programme (EIA- programme) and completing the environmental impact assessment report (EIA-report). The assessment procedure starts when developer (mining operator) submits the assessment programme to the coordination official. This programme is a plan of the mining operator how the environmental impacts are going to be investigated and the assessment implemented. The assessment programme includes the introduction of the project, the implementation options of the project, the schedule, the permits and plans that the project enquires, environment of the area, plan of the citizen participation and the procedures that the EIA is based on. Coordination official provides its opinion on the assessment programme. In the opinion the coordination official emphases on the

appropriateness of programme so that it is following the EIA Act (468/1994). (The Act (468/1994)§ 2, §8, §9; Kauppila, et al., 2011, 47)

Based on the assessment programme and the opinions of the coordination official, the mining operator compiles the assessment report. The report includes description of the mining project with different implementation plans and the surrounding environment, public participation results and the methods used environmental pollution reduction methods and possible accident situations. The coordination official gives opinion on the assessment report based on the appropriateness of the public participation, variety of alternative methods, pollution mitigation potentials. (The Act (468/1994) §10; Kauppila, et al., 2011, 47)

According to the EIA Act (468/1994, section 7) the EIA procedures should be completed before any actions relevant in terms of environmental impacts are taken to implement the project. The assessment report and the opinion from the coordination official are attached to the needed permit applications such as environmental permit application, application for mining right and mining concession. (The Act 468/1994, §7; Kauppila, et al., 2011, 47)

Natura assessment procedure can be implemented together with EIA procedure or as separate procedure. Natura assessment is required if the mine either individually or in combination with other projects and plans, "*is likely to have significant adverse effect on the ecological value of a site included in… the Natura 2000 network… for the purpose of protecting this ecological value".* (Nature Conservation act 1096/1996, §65) The Natura assessment is needed weather the mining site is going to be located inside the Natura-area or the mining site is going to be outside but still having effect on the Natura-area. (Kauppinen, et al., 2011, 48) The planner or implementer of the project is required to conduct an appropriate assessment of its impact (Nature Conservation Act 1096/1996, §65). Mining projects that are requiring EIA procedures located near Natura- areas normally also required Natura assessment. (Kauppila, et al., 2011, 47)

Natura 2000 is one of the most important EU networks of nature protection areas. It is established under the 1992 Habitats Directive (ETY/ 92/43) that is complementing the 1979 Birds Directive (EEC/79/409). The Habitats Directive is designed to protect the most threatened habitats and species in Europe. Under the Birds Directive, areas which are vital for breeding, feeding, wintering and migration for rare and vulnerable birds

were established as Special Protection Areas (SPAs) for birds. Similarly under the Habitats Directive, Special Areas for Conservation (SACs) for the habitat and species were created to protect and manage rare and vulnerable animals, plants and habitats. SPAs and SACs together construct the Natura 2000 network. (European Commission MEMO, 2003, 1; Natura 2000 network, 2013)

The aim of Natura 2000 is to encourage the maintenance of biodiversity by ensuring the protection of the selected nature types and species. Natura 2000 network wants to meet the targets of sustainable development and also take into account the economic, social, cultural and regional requirements. Various criteria are used in the selection of areas for the Natura 2000 network, such as the size of the area, population of protected species in the area, ecological quality of the area and the area of protected habitats types inside the whole area. The member state will determine the areas selected in the end to the Natura 2000 network. Some examples of protected habitats are wetlands, meadows and vast expanses of estuaries, and areas benefiting golden eagle, otters and lynx. (European Commission MEMO, 2003, 1-2; Natura 2000 network, 2013; Natura-alueiden suojelukäyttö, 2000, 10; Habitats Directive 92/43/ETY)

The aim of this Natura assessment is to ensure that the impacts of the project to the Natura protection targets are properly assessed before the permit procedures. The project should not have negative impact on the protection criteria applied on this specific Natura site. (Kauppinen, et al., 2011, 48)

The Natura assessment is handled before environmental permit handling in Ely-center given to the owner of the Natura site, which is most commonly the Forest Service. These officials give their statements according to the Nature conservation Act, section 65. The official cannot grand the permit if the Natura assessment gives result that the project operation will have significantly adverse impact on the protection values of area included in the Natura programme. This can be altered only if the Finnish Government states that the project must "*be carried out for imperative reasons of overriding public interest"* and there are no alternative solutions. (Nature Conservation Act 1096/1996, §66)

If the final decision will decrease the Natura 2000 network by discontinuing the protection of the area or by lowering the protection on its provisions, the Ministry of the

Environment must start immediate actions to compensate these lost areas with new protection areas. (Nature Conservation Act 1096/1996, §69)

Additionally exploration and mining works can require multiple permits for derogations from the preservation and conservation regulations according to the Nature Conservation Act 1096/1996, §15. Nature Conservation Act 1096/1996 includes many protection and conservation regulations and orders but the most vital protection regulations in the Act (1096/1996) are protection of species, protection of species and habitats under the Habitats (92/43/ETY) and Birds Directive (79/409/ETY) of European Union and protection of natural habitats. (Kauppinen, et al., 2011, 49-53)

The Nature Conservation Act 1096/1996 is full of different kind of regulation for protected species and their habitats. Even though it is important that mining operator takes all of the species mentioned in the Nature Conservation Act in to consideration when planning their project, still only some special species and protected habitat types really need the permit of derogation from the Ely-center. (Kauppinen, et al., 2011, 49)

The officials of the environmental issues are the Centre for Economic Development, Transport and the Environment (Ely-centre) and Regional state Administrative Agencies (AVI). AVI grants the environmental permit and Ely-center monitors that the permit conditions are respected. The Forest Services and the Ministry of the Environment (YM) are involved in to the process if the mining project is located in Natura- areas or other nature conservation areas. Ely-centers also supervise and monitor the EIA procedures. (Rissanen & Peronius, 2012, 35; Ely-center, 2013)

According to the Environmental Protection Act (86/2000) the permit issues are handled in the regional state administrative agencies of South-Finland, East-Finland, West-Finland, Inner-Finland and North-Finland. Ely-centers monitors the environmental permits granted by AVI and ensure that public interest is taken into account in environmental issues. (Regional state Administrative Agencies, 2013;ELY-center, 2013)

6 OTHER LEGISLATIONS

The mining activities can include construction in water area, conducting process water from the water body, drainage of water body areas and rationing of water area. All these activities require permit according to the Water Act chapter 3 section 2. If the activities on the water area are part of the regular activities in the mining operations, the water permit should be applied together with environmental permit.

The permit discretion of water permit differs from environmental permit. The mining projects must not *harm general public health or safety, cause significant harmful changes to environmental conditions or water conditions, or lower the local living and economic conditions* (Water Act 587/2011, chapter 3, section 4) Also the benefits of the project to private and general sector needs to bigger than the losses. This means that the permit application has to include comprehensive profitability calculations together with estimations of the harms. (Kauppinen, et al., 2011, 56)

The Water Act includes also special conservation order for some small water bodies (ibid, chapter 2, section 11). The endangering of these small water bodies in natural stages is forbidden by the law. The permit official can in singular cases grant derogation if the protection targets of these small water bodies are not endangered due the activity.

The permit official for the Water Act related permits is the Regional State Administrative Agencies (AVI). The Economic Development, Traffic and Environmental Center (Ely-center) and the environmental protection official of municipality are the supervisory officials. (Waste Act 587/2011, Chapter 1,§7)

According to the Environmental Protection Act (86/2000, section 43a, 103a and 103b) and the extractive waste degree (379/2008, section 3), any action that produce extractive waste must have appropriate waste management plan. The plan must aim at minimizing the amount of extractive waste and reducing the harmfulness of it. Also the utilization of the waste and the safety must be emphasized. The area for the extractive waste must be implemented so that in long term any environmental pollution and hazards can be prevented. The extractive waste information must be included to the environmental permit application. (Kauppinen, et al., 2011, 56)

Both underground and earthy dams are needed in mining activities.The underground dams are mostly used for damming up the fill-up material of the quarry, and the earthy

dams then to dam up water and sludge from the mining area. Dams are also used for storing the ore dressing sands and clarifying the process water. The Dam Safety Act 494/2009 aims at securing the safety of constructing, maintaining and using dams, and also reducing the possible hazards caused by the dam. (ibid, §1)

The Dam Safety Act was renewed in year 2009. The earthy dams are in the scope of application of the new Dam Safety Act. The mining safety orders of the old Mining Act (503/1965) and decisions of Ministry of Trade and Industry on safety regulation of mines apply to underground dams. (HE 273/2009, 16)

According to the Land Use and Building Act section 25 mining operation areas must be designed in the regional plan. The order about the land planning and usage must be applied in the exploration, mining and gold panning. (ibid, section 3) Constructing a building requires building permit (ibid, §125). (HE 273/2009, 13; Kauppinen, et al., 2011, 57)

Mining project often need even more detailed planning. The need of having the local master plan or local detailed plan depends on the local regional planning situation, location of the mine, the conditions of the location and the size and impacts of the mine. (Kauppinen, et al., 2011, 57) According to the section 35 of Land Use and Building Act*," the purpose of the local master plan is to provide general guidance regarding the community structure and land use of a municipality or a part thereof, and to integrate functions. The local master plan presents the principles of targeted development and indicates the areas required as a foundation for detailed planning, other planning and building, and other land use. "*The regional council draws the regional plan and keeps it up-dated (ibid, section 27).

According to the Land Use and Building Act (132/1999) section 50, "*local detailed plan is drawn up for the purpose of detailed organization of land use, building and development, with the aim of designating areas necessary for different purposes and of steering building and other land use, as required by local conditions."* The local detailed plan is useful for the mine as reconciling different functions on the mining area and it is also required if the construction work causes environmental harms. (Kauppinen, et al., 2011, 58). The municipality draws the both local master plan and the local detailed plan.

In Finland the naturally occurring radon causes the highest radiation burden. Radon arises constantly from the soil and bedrock, as well as from all sort of mineral rocks. Radon is noble gas producing alpha radiation. It is created as degradation product of uranium, thorium and actinium. The radon generated from uranium has the longest half-time. It is hard to predict which areas have high radon concentrations, but some radon is present in all the country. Some areas that have typically high radon concentrations are esker areas, gravel and sandy soil formations and all underground facilities. (Metla customer magazine Metsän tutkimus, 2006, 12; Suomen radon hallinta, 2013)

In mining operations when excavating soil, radon is released to the atmosphere. This exposes people to ionizing radiation when inhaled. The mining operator is responsible for radiation safety of the mine. (HE 273/2009, 17) the Radiation Act explains the recognition and supervision of the radiation exposure of natural radiation, for example caused by exploration or mining. The tool to reduce the exposure of radon is sufficient ventilation. In open quarry mines natural ventilation is enough but in underground mines, the staff practically gets exposed to radon more than in normal conditions even with good ventilation. (HE 273/2009, 17)

The supervisory official of the Radiation is Radiation and Nuclear safety Center (STUK). (Radiation Act, chapter 14). STUK has right to ask the operator clarify the safety circumstances of the operations. In the worst case the STUK has right to interrupt the operation until the safety requirements are at the needed level.

7 IRON ORE MINE OF HANNUKAINEN

The iron ore deposit of Hannukainen is located in the municipality of Kolari (Figure 4) in Lapland approximately 25 kilometers North-East from the town center of Kolari (Figure 4). Hannukainen is an iron oxide-copper-gold deposit. There was mining activities in the area of Hannukainen in late 1970s and 80s when the companies Rautaruukki Oy and Outokumpu Oy where mining iron ore. Northland Mines Oy is now investigating how to start new mining activities on the area. (Hannukainen mining project, 2013)

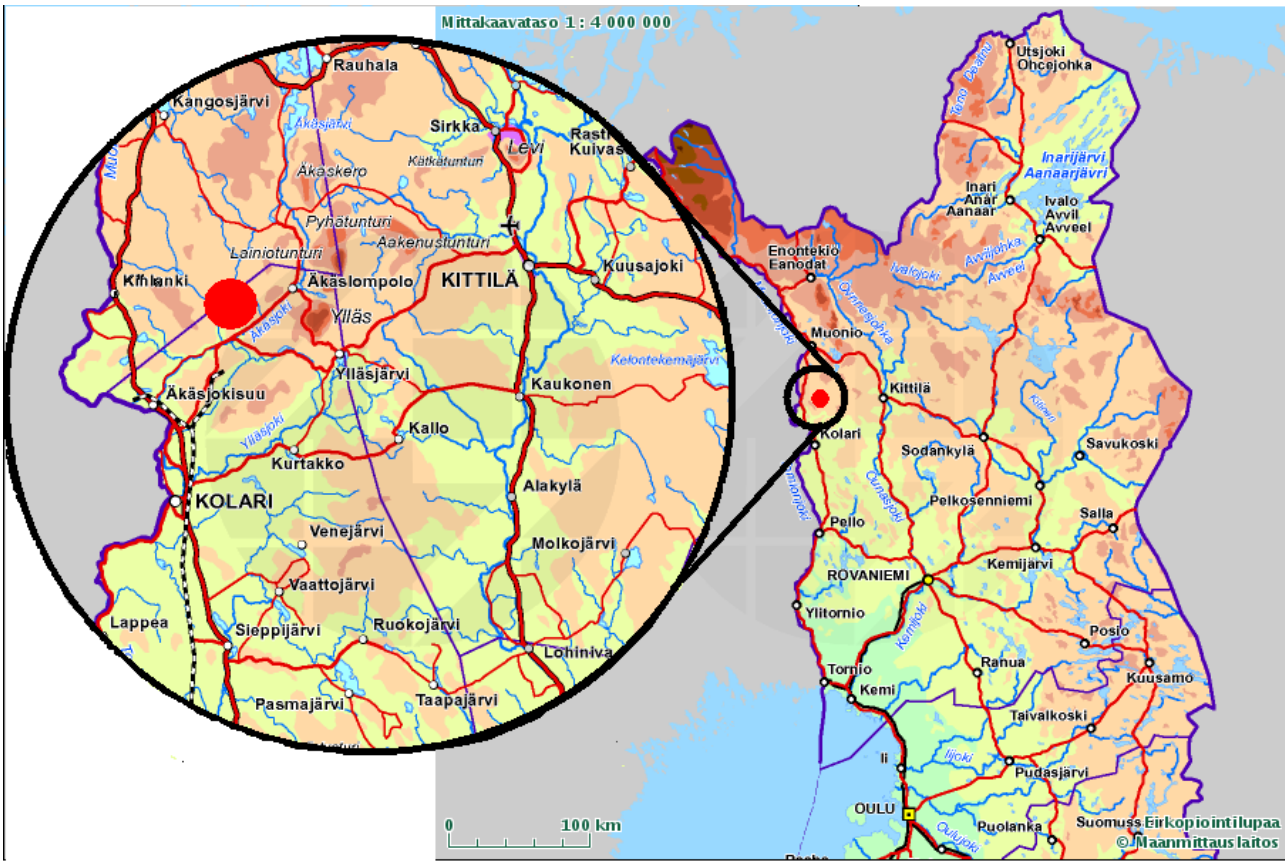

Figure 5. Figure of Hannukainen Mine location in Hannukainen in Kolari municipality. (Karttapaikka, 2013)

Northland Resources S.A. is European company aiming to exploration and development of mining. It is operating in North Sweden and North Finland, in the municipalities of Pajala and Kolari (Figure 5). The company is aiming to become significant high quality iron enrichment and other iron products producer. Northland Mines Oy is in charge of the operational activities of the corporate in Finland.

In Sweden the Nortland has iron ore mine project of Kaunisvaara. Kaunisvaara is located in the municipality of Pajala in North Sweden. The final profitability calculations finished in October of 2010 and it was shown to be technically and financially viable. The Kaunisvaara project includes opening tree mines and production of high quality iron enrichment out of the iron ores from these mines. The construction work of the open quarry of Tapuli and Kainisvaara concentrator started in the beginning of 2011 and the production started in the end of 2012. (Hannukainen mining project, 2013)

Figure 6. Figure of Northland mining projects (Seppänen, 2013, 4)

TheHannukainen mining project includes two quarries Hannukainen and Kuertvitikko. There are two old open pits on the Hannukainen area; Laurinoja and Kuervaara. These were operating on the 70s and 80s. The ore was dressed in the concentrator in Rautuvaara. There is the old ore dressing pool in Rautuvaara too. The deposit of

Kuertvitikko is located 2,5 kilometers North from Hannukainen and that deposit was never utilized. (Ympäristö, 2013)

The estimation of the life expectancy of the Hannukainen mine is 17 years. The production is planned start in Hannukainen open quarry in 2016 and last until 2034. The open quarry of Kuertvitikko is estimated to be on operation on years 2024-2030. (Hannukainen mining project, 2013)

7.1 The Phase of the Project

The preliminary profitability estimation of the Hannukainen project was completed on June, 2010. It showed that the project was technically and financially viable. The final profitability calculations were started on January 2011 and it is estimated to be finished by the end of the year 2013 but be delayed as the EIA procedure was delayed about eight months too. The Environmental Impact Assessment procedure and the land use planning of the project are on the process at the same. (Hannukainen mining project, 2013) The EIA report of Hannukainen mine was submitted to Ely-center in the end of August, 2013. The first deadline for the report was the end of the year 2012. Opinions and statements were to be given on the EIA report by the 25th of November, 2013 and Ely-center will give its final statement by the 24th of January. After the EIA process has been completed the environmental permit process can start. This is important permit as it defines the amount of the funding the mine will need. Figure 7 shows approximately the state of Hannukainen mine permit and planning processes. The EIA procedure is required to apply for the further permits. (Ympäristö,2013; Hannukaisen mining project, 2013)

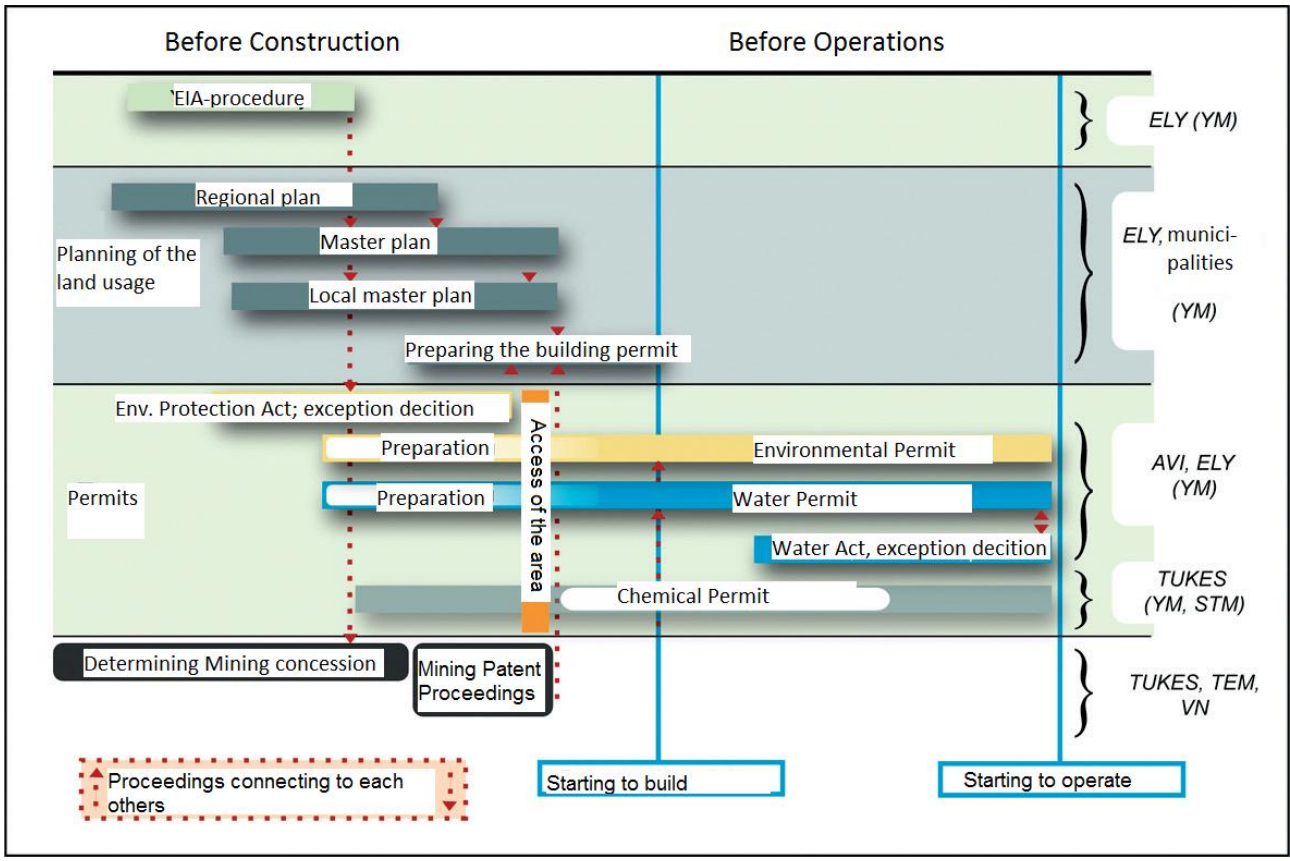

Figure 7. Different steps of the permit and planning proceeding (Ympäristö, 2013).

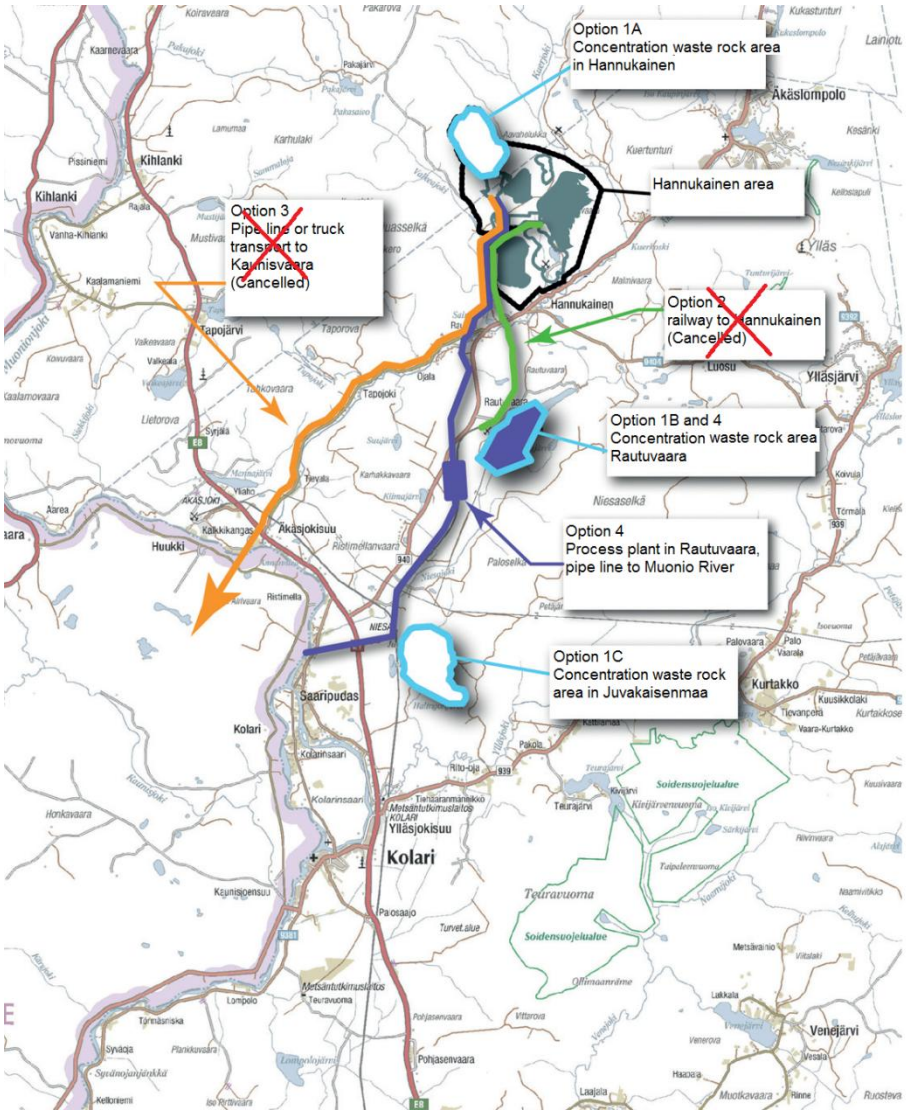

Figure 8. Figure of the different options of the mining project (EIA report, Northland Mines Oy, 2013, 5)

7.2 The Environmental Impact Assessment

The EIA report of Hannukainen (2013, 6) includes reviews of the following operation options:

Option 0: The project will not be fulfilled.

Option 1A: Concentration plant and the concentration waste rock area will both be located in Hannukainen. Excess waters will be leaded to Nies River.

Option 1B: Concentration plant will be located in Hannukainen but the concentration waste rock area in Rautuvaara. Excess waters will be leaded to Nies River.

Option 1C: Concentration plant will be located in Hannukainen but the concentration waste rock area in Juvakaisenmaa. Excess waters will be leaded to Nies River.

Option 4: Concentration plant and the concentration waste rockl area will both be located in Rautuvaara. Excess waters will be lead to Muonio River.

In all the options the waste rock areas, ore crushing, water management pools, pumping station and other infrastructure with service buildings and social premises will be located in Hannukainen. Also in the options 1A-1C the concentration plant is located in Hannukainen and the enrichment is pumped through pipe to Rautuvaara. There the ore will be dried, stored and loaded to trains and trucks. In the Option 4 the concentration plant is placed in Rautuvaara and the crushed ore is transported through conveyor belt from Hannukainen to Rautuvaara. In the option 4 the ore will be dried, stored and loaded in Rautuvaara. Depending of the option, the concentration side rock area will be located to Hannukainen (option 1A), Rautuvaara (option 1B, 4) or to Juvasenvaara (option 1C).

The total production of the mine is estimated to be 100-115 Mt of ore. The annual production is estimated to be 6-7 Mt of ore. The production products are iron ore enrichment (2-2,5 Mt/a) and gold-copper ore enrichment (50000-60000 t/a). Iron ore enrichment will be transported via trains from Rautuvaara to the harbors of Kemi, Raahe or Kokkola. The gold-copper ore enrichment will be possible transported via trucks to Jällivaara, Skellefteån or Harjavalta.

The waste rock will be produced trough out the hole production 370-435 Mt and the enrichment waster rock estimate 64 Mt. The area that the waste rocks require is about 670-700 hectares and the area for the enrichment waster rocks 450-830 hectares.

The mining is going to be open pit mining. The size of the Hannukainen open pit is going to be about 2,5 kilometers long , 1,8 kilometers wide and 250-350 meters deep. The size of the Kuertvikko open pit is going to be 1,2 kilometers long, 0,7 kilometers wide and 110 meters deep.

In the concentration plant the crushed ore is grinned in to fine powder, and the enriched in flotation and magnetic separation processes. These processes enable the separation of different minerals (iron, gold, copper). Before the transporting the enrichments are dried at the concentration plant. Before the railway line between Kolari and Rautuvaara can be used it must be repaired.

In the options 1A-1C the raw water for the concentration process at the drier seasons is pumped from the Nies River. In the option 4 there will not be any need for extra raw water. The excess water will be pumped to the Nies River (options 1A-1C) or the Muonio River (option 4).

(EIA report, Northland Mines Oy, 2013)

7.2.1 The Environmental Impacts

7.2.1.1 Landscape

The mining projects are very large scale projects and can be visible kilometers away from their location. Hannukainen mining project area is partly visible ten to fifteen kilometers away from the top of the hills and fells. The project area is partly visible also from the west slope of the tourist center of Ylläs fell. According to the EIA report of the Hannukainen mine there is are no landscape areas classified as valuable in the vicinity of the mine. (ibid, 2013, 399) Still close to the mining area there are nature protection areas which have landscape values as part of their protection values. One criterion of the national parks is the importance of the park as natural sight. Some parts of the Pallas-

Ylläs fells national park are located only less than eight kilometers from the Hannukainen mining area (Figure 11). Also Pakasaivo area is mentioned in the report to be a valuable area to the Sami culture landscape. This area still does not have concise definition. (ibid, 2013, 579)

The EIA report evaluates the impact of the mine to the surrounding landscapes as moderate (ibid, 2013, 399). According to the report the visibility of the mine in the environment is limited, and it can hardly been distinguished from the nearby environment and from the more far away it is only visible from the highest points, as the west slope of the Ylläs fell. The landscape changes occur mostly in the construction phase. These changes in the landscape are present also in the operation phase. In the closing phase of the mine the project area is landscaped and returned into stage corresponding to natural stage. The impacts to the landscape are largest in the project option 1A, where the concentration gravel pool is located to Hannukainen. In the options 1B and 4 the concentration gravel pool is located in the already existing concentration area in Rautuvaara. This means that the landscaping effects are going to be minor. In the option 1C the landscaping impacts are the smallest as the Juvakaisenmaa concentration gravel pool is located far from the residential area. This area cannot be seen either form the Ylläs or any other high point in the surrounding area. (EIA report, Northland Mines Oy, 2013, 399-412)

7.2.1.2 Soil and Bedrock

The drilling and explosions in the construction and operation phase, removal of the topsoil and other soil layers, and building of the infrastructure cause impacts to the soil and bedrock. The impacts to the soil and bedrock at the closing phase are caused by the landscaping and demolishing the infrastructure. According to the EIA report the impact area of the soil removal is locally, regionally and nationally relatively small, even the amounts of the soil and bedrock removed from the area are huge (ibid, 2013, 413). The sensitivity of the impact area is estimated to be low, as the bedrock and soil formation on the area are typical and they are not protected. Based on the scale of the impacts and on the sensitivity of the soil and bedrock, all the impacts to the soil and bedrock of all

the project options are estimated to be minor. (EIA report, Northland Mines Oy, 2013, 413-416)

7.2.1.3 Aquatic Ecosystems

According to the EIA report (2013, 165) of the Hannukainen mine, the groundwater areas inside the Hannukainen area and around it are mostly class Ⅰ Ⅰ Ⅰ groundwater areas. This means that more research is required to find out whether they are suitable for drinking water or whether they are contaminated. This does not necessarily mean that the class Ⅰ Ⅰ Ⅰ groundwater is not suitable for drinking water but that the groundwater is not researched yet. Aavakainen and Saivo lake groundwater areas are classified as class Ⅰ Ⅰ. This means that they are suitable to be used as drinking water source. The groundwater areas of the Hannukainen area will be researched and there has emerged need to research the classes of the groundwater more specifically. (EIA report, Northland Mines Oy, 2013, 164-171)

The soil in Hannukainen area consists mainly of sand and gravel layers and moraine (ibid, 2013, 164). The hydraulic conductivity of the said and gravel layered soil is good or very good. The hydraulic conductivity of moraine is moderate. The waters formed at the project area run to the surrounding rivers; Äkäs River, Valkea River and Kuer River. The quality of the soil and bedrock affects the quality of the groundwater. This is especially in the area of the old open pit of Kuervaara. Also the old waste rock area affects the groundwater quality. (EIA report, Northland Mines Oy, 2013, 164-171)

The impacts of mining to the groundwater are evaluated in the EIA report (2013, 464) as quantitative and qualitative impacts. The quantitative impacts are caused by the drainage of the pits and the qualitative impacts by the operations of the waste rock area and the concentration gravel area. The report estimates that the groundwater areas are mostly unused and too small for to be used as water supply. It is estimated in the report that groundwater areas classifield as class ll will not be impacted by the project. Two class lll groundwater areas in the Hannukainen open pit area are going to have intense impact in all the operation options. During the operation phase the impact will be quantitative as the level of the groundwater lowers, and after the operations the impact will be qualitative. In the project options 1A-1C the groundwater area inside the Hannukainen area is going to be affected qualitatively during the operations and after

the operations. In the project option 4 quantity of the groundwater is going to be affected only in limited scale during the operation phase. The report estimates the impacts to the groundwater in all options to be moderate. (EIA report, Northland Mines Oy, 2013, 462-475)

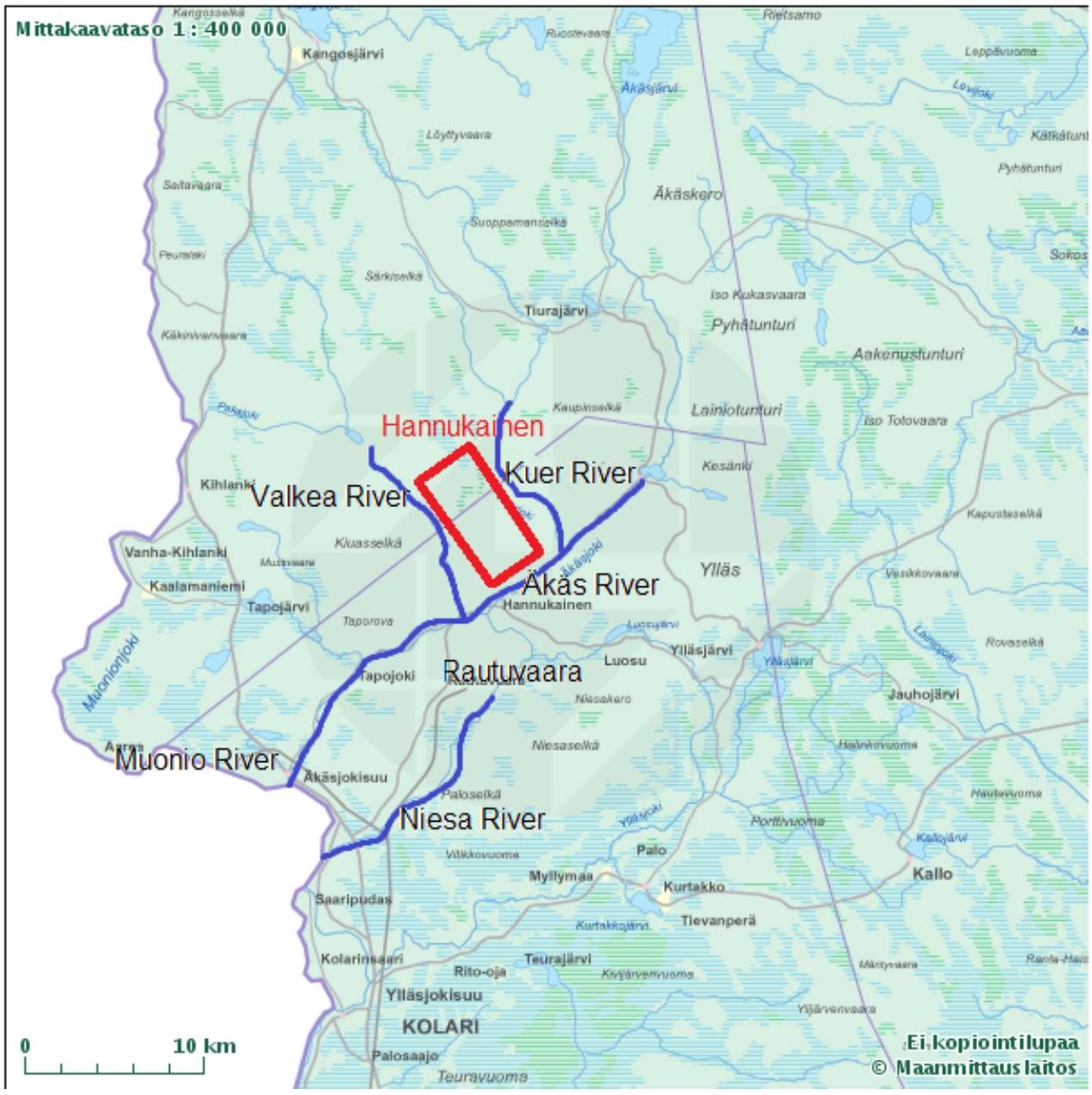

Figure 9. Figure of the rivers around the Hannukainen mining area (Karttapaikka, 2013).

The Hannukainen mining area is surrounded by three Rivers. In South there is Äkäs River, in West there is Valkea River and in East there is Kuer River. They all are side rivers of Tornio-Muonio River running 20 kilometers downstream. This river network has high ecological status with its salmon populations. Tornio-Muonio River also forms the border between Finalnd and Sweden. The Rautuvaara area is located next to the Niesa River. During the earlier mining activities in Rautuvaara the waters from the Rautuvaara were lead to run to Äkäs River. (EIA report, Northland Mines Oy, 2013, 173-213)

The impacts on the surface water bodies depend of the project option. According to the EIA report the option 4 is most favorable, if not counting the impacts that it has to the Muonio River. All the options have more and less the same impacts to the Muonio River. In the area where the discharge pipe leads to Muonio River there can be from moderate to significant impacts. In the downstream from the pipe the impact is evaluated as minor or insignificant. The report evaluates the impacts to Äkäs River as minor in all project options, except option 1A where the impact is estimated to be moderate. The impact on Kuer River is estimated to be minor too. Only in options 1A-1C there are moderate impacts from the residue impacts of the waste rock areas on Kuer River after the mine has already closed. In the option 1A there can be significant impact to Valkea River throughout the whole mining operations. The option 1B-1C causes moderate impact to the Valkea River during the operations and after them. The option 4 causes minor impacts to Valkea River during and after the operations. In the option 1A-1C the residue waters from the Hannukainen area cause intense impact to Niesa River. This causes significant impact during the operation of the mine. In the option 4 the qualitative impact to the Niesa River is not as intense but the quantitative impact is still moderate. Only the option 1C is going to have impact on the Ylläs River and this impact is estimated to be moderate throughout the operations. In all options water is leaded to Muonio River and the impacts are estimated to be the same in all options. In the discharge point in the river and its mixing zone of 500mters the impact is estimated to be significant in the option 4, but moderate in the options 1A-1C. Over two kilometers from the discharge point the impacts are estimated to be minor or insignificant in all opinions. (EIA report, Northland Mines Oy, 2013, 472-526)

Äkäs River is one of the most important spawning areas of the sea trout (*Salmo trutta trutta*) populations in Tornio-Muonio River. Äkäs River and its side rivers also have its

own local brook trout (*Salmo trutta fario*) populations. There are significant salmon cub production areas also in Äkäs River. Both the sea trout and the brook trout reproduce naturally also in Kuer River and Valkea River. The trout production is very weak in Tornio-Muonio River and Äkäs River and the sea trout species are extremely endangered. Äkäs River is also significant place for recreational fishing. (EIA report, Northland Mines Oy, 2013, 222-231)

Tornio River is the biggest river in the Baltic Sea with naturally reproducing salmon (*Atlantic salmon*) population and sea trout populations. Additionally economically significant fish species as grayling, whitefish, northern pike, European perch and burbot occur in Tornio River, as well as harvestable European river lamprey population. Each year Game and Fisheries Research Center does fish population research on the Tornio River mainly to monitor the stage of the population of the salmon and sea trout. Not like in Sweden in Finland salmon is not protected fish in Finnish Natura areas. Still salmon is mentioned to be the indicator of good water quality. (EIA report, Northland Mines Oy, 2013, 222-231)

The EIA report evaluates the impacts on the fish populations to be same scale as the impacts to the water quality (ibid, 2013, 476).

The Hannukainen Mining area has many international, national and local protection areas located near less than 15 kilometers from the mining area. The international protection areas and also Natura areas are Tornio-Muonio River area (Figure 10). The Tornio-Muonio River Natura area is located in the municipalities of Enontekiö, Kittilä, Kolari, Muonio, Pello, Tornio and Ylitornio. The Natura area consists of the Tornio-Muonio River water catchment area and the waters in it. It does not include the soil areas. The protection area is located in the border and the part of the waters in the Natura area belongs to Swedish water areas. The Natura area in the Swedish side is Torne och Kalix älvsystem Nature area. It consists of the water catchment areas of the Torne and Kalix Rivers. The Natura area is protected according to the Habitat Directive (SCI). Tornio-Muonio River is also protected by the Water Directive (=vesipuitedirektiivi). 100% of the Natura area of the Tornio-Muonio River area is part of nature type; natural stage river trails of Fennoscandia. The officials of Finland have classified the stage of the river as good. (EIA report, Northland Mines Oy, 2013, 235-236)

Äkäs River goes through the project area and runs to Muonio River. Also Nies River runs from the project area to the Muonio River. The water quality of the river network is excellent and only in the lower parts of the Tornio River the water quality is little bit eutrophic. Tornio River is important river for the migrate fish species. The water area of the Tornio-Muonio River including the Kalix River waters is the only waterbody in Finland that has not been tamed for hydro power use. (EIA report, Northland Mines Oy, 2013, 235-236)

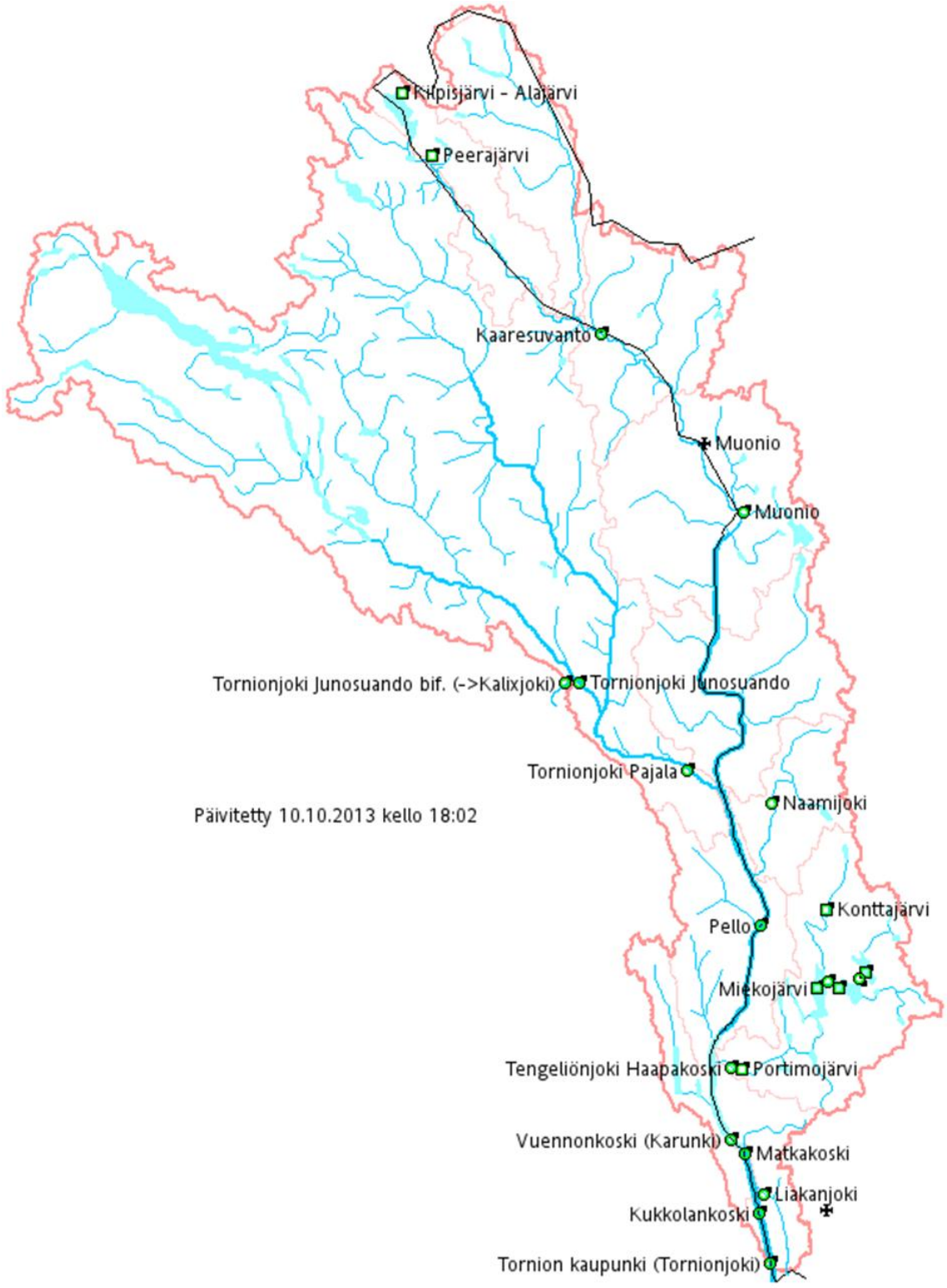

Figure 10. Figure of the water catchment area of Tornio-Muonio River. (Ympäristö, 2013)

7.2.1.4 Vegetation and Fauna

The project area has typical Northern coniferous zone habitats, vegetation and fauna. The protection status of the species on the area varies from vital and common to endangered. (ibid, 2013, 233) The most common forest type in the area is dry boreal forest. Between the forests there are mire areas. The numerous springs and wetlands on the area are supporting the living environment with small eutrophic mire types and valuable living habitats. Natural state springs are protected by the Water Act (§11). The most significant protected plant species on the area are orchid and Lapland buttercup. (EIA report, Northland Mines Oy, 2013, 234)

In addition to the common mammal species such as fox and hare also protected species like otter and Northern bat occur in the area. In Finland bats are classified as protected species by the Nature Conservation Act (§49). Otter is not classified as endangered species but as species under supervision. The bird population is diverse. There are many birds that are endangered or mentioned in the Bird Directive appendix 1. Many nesting birds and migratory birds are gathering to the Rautuvaara area. This makes Rautuvaara area important bird area in the municipality of Kolari. Also three birds of prey have their territory in the mining area. (EIA report, Northland Mines Oy, 2013, 264-270)

From the view point of biodiversity there is no significant difference between different options. All of them are going to destroy valuable and sensitive nature types equally. The impacts of the project on the endangered nature types are evaluated as significant and the impacts on the natural springs are evaluated as moderate. There is not much variation between the project options when it comes to the destruction of the significant plant species either. Option 1B has impact to larger number of plant species than other options. In the option 4 there will be much less impact to the water quality of the Niesa River which prevents the impact to the Lapland buttercup. In all the options the impacts to the orchid and fen sedge are estimated to be significant. (EIA report, Northland Mines Oy, 2013, 528)

The impacts to the mammal species are estimated to be minor expect the impact to otter that are estimated to be moderate. In the option 1A the impacts on the birds are estimated to be more favorable than the impacts caused by the options 1B, 1C or 4. This is because the Rautuvaara area is important bird environment. The impacts on the bird

populations are estimated to be from minor to moderate. Those vegetation environments that are going to have direct impact from the infrastructure are going to be destroyed permanently. Detailed planning of the traffic way can reduce the impact on the valuable habitats. After the mine is closed it is estimated that the area will recover to its natural stage and the diversity of the living environments and species are estimated to be comparable with the surrounding areas. Only the wooded mire sites and undisturbed springs will not recover to state before the mine. Also the impact on the otter will continue after mine is closed. (EIA report, Northland Mines Oy, 2013, 545-559)

The Natura area of Niesaselkä is located about two kilometers from Rautuvaara (Figure 11). Niesaselkä is also protected as old-growth forest site. The forest in the area is 150-200 years old coniferous forest, which consists especially much goat willow species. There also some old aspen areas. In the table 1 can be seen all the national protection sites near the mining area. They are also visible in the figure 11. (EIA report, Northland Mines Oy, 2013, 567)

According to the EIA report (2013, 11) the impact assessment on the nearby Natura areas (Tornio-Muonio River Natura area, Torne och Kalix älvsystem Natura area and Niesasekä Natura area)is not done as a part of the environmental impact assessment but separately as own Natura assessment process. According to the EIA report tha nature assessment will focus only on the option on which the company will apply for the environmental permit. (EIA report, Northland Mines Oy, 2013, 11)

Area	Type	Class	Distance from Hannukainen /km	Distance from Rautuvaara/km
Kiuasselkä	Old-growth forest protection program	National	2,0	3,5
Pakasaivo esker area	Esker protection program	National	1,6	8,5
Varkaankuru Herb-rich forest	Herb-rich forest protection program	National	4,4	4,2
Pahtajärvi	Old-growth forest protection program	National	4,9	13,5
Ylläs-Pallas	National Park Natura area Old-growth forest protection program Mire protection program	National and international	7,1	7,1

Table 1. Table of the Protection areas near Hannukainen mine and their distance from the Hannukainen mining area and Rautuvaara (EIA report, Northland Mines Oy, 2013, 239)

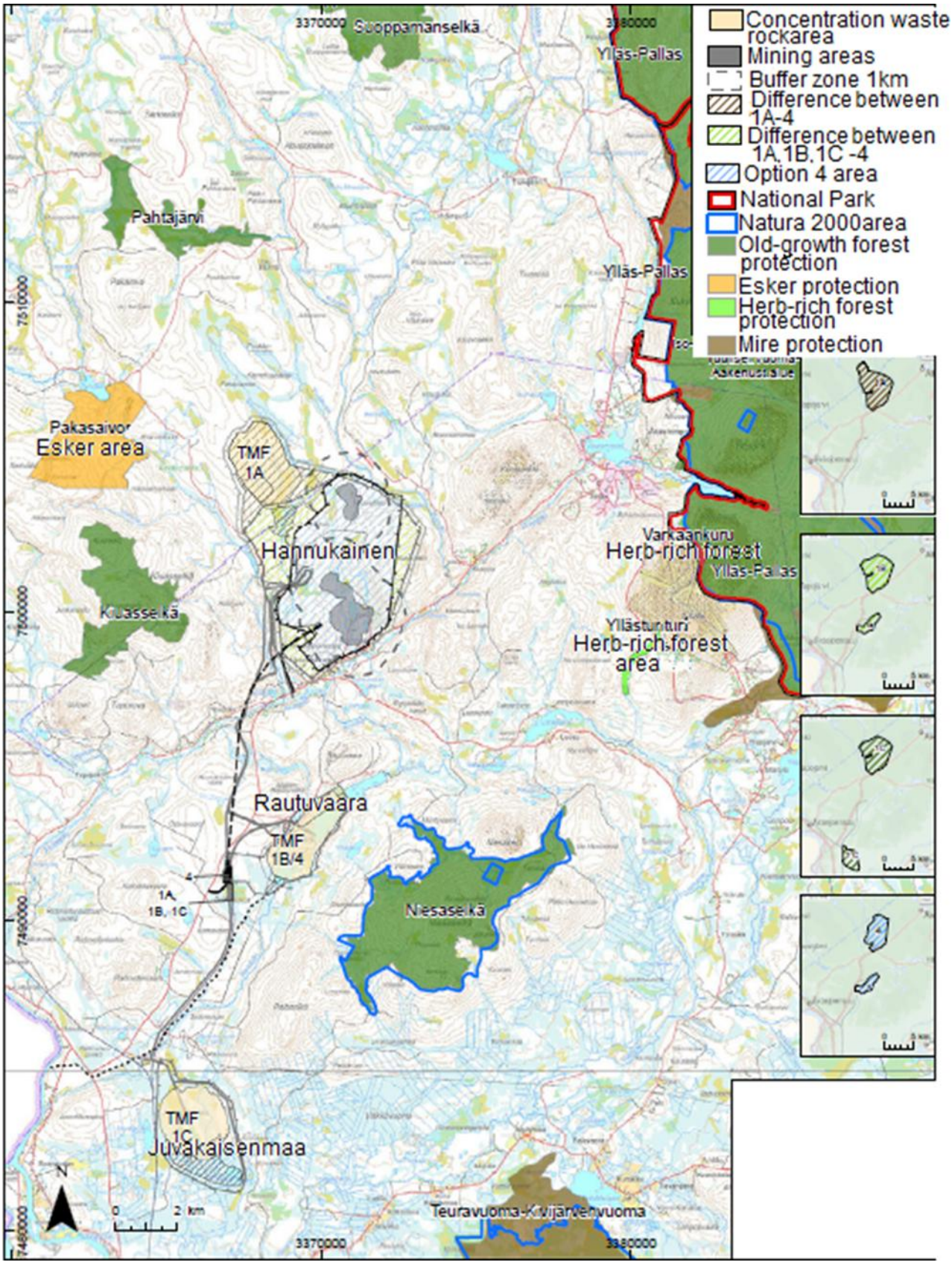

Figure 11. Figure of the protection areas near the Hannukainen mining area (EIA report, Northland Mines Oy, 2013, 240)

7.2.1.5 Climate and Air Quality

The project is located 100 kilometers above the Arctic Circle. This means that the winters are long and cold and the snow covers the soil from October to May. In the spring the snow melts fast when the soil is still frozen and this causes local floods. The average temperature of the year is 0 degrees. The average temperature and the annual rain amounts have slightly been rising. (EIA report, Northland Mines Oy, 2013, 138)

Generally the air quality on the project area is good. There are not significant emission sources in the municipality of Kolari despite of the traffic emission. According to the EIA report research the emissions of the mining activities that ended in 1990s are still present especially in Rautuvaara. (EIA report, Northland Mines Oy, 2013, 143)

The GHG emission sources are explosions, traffic, transportation and energy production. The option 1A-1C are estimated to produce GHG emission 0,17-0,26% of the total level of Finland in 21th century. In the option 4the emission are 0,13-0,24%. Comparing the emission with other industry emissions during the same period they are in option 1A-1C 1,15-1,75% and in option 4 0,89-1,6%. The lower emissions in option 4 are due to the use of different explosion fuel, power plant fuel and transportation amounts needed. (EIA report, Northland Mines Oy, 2013, 432-439)

The air quality is going to be affected by dust too. According to the EIA report (2013, 417) the emissions are estimated from minor to moderate in the construction and closing phases. During the operation phase the impacts are estimated as significant during the worst case, if dust prevention methods are not used. When the dust prevention methods are in use the impact can be estimated as moderate. Different project options do not have significant difference in the dust emissions since the dust mostly comes from the Hannukainen area. Dust emissions of option 1C still can be evaluated as most significant since the concentration gravel pool is located most far apart from the rest of the mining areas and the dust impact area is larger. (EIA report, Northland Mines Oy, 2013, 417-431)

7.2.1.6 Noise and Vibration

Noise and vibration are also sources of emissions in the mining area. Currently there is not any noise or vibration sources on the area except traffic. In all the project options during the operation phase the noise emission impacts are evaluated as moderate, and during the construction and closing phases as minor. In option 4 the noise emission near the conveyor line are estimated to be slightly higher than in other project options, which do not include conveyor belt. In the option 4 the construction of the industry area in Rautuvaara will not cause noise impacts to the local housing or to recreation paths and areas according to the EIA report. (EIA report, Northland Mines Oy, 2013, 440-445; 454-461)

The vibration emissions are caused by the explosions. The frequency, intensities and the vibration are the highest during the operation phase of the mine. In the construction phase there are less explosions and in the closing phase even less than that. Other causes of the vibration in the project are traffic and the heavy machinery. According to the EIA report (2013, 454) calculations the vibration will not cause harm to the building constructions or significant harm to the pits. Outside the buffer zone the vibration will not cause impact to the building to the safety. The report also estimates that the vibration from the traffic and machines will be minor. This is way the vibration impacts are estimated to be minor in all project options. (EIA report, Northland Mines Oy, 2013, 454-461)

7.2.1.7 Uranium

The report presents that the uranium concentration in the Finnish bedrock is averagely 4mg/kg, and in Hannukainen mining area averagely 10mg/kg. This is evaluated as relatively small amount since uranium ore is classified as mineral after at least 1000mg/kg concentrations. According to the EIA report (2013, Hannukainen will not be uranium mine and the uranium will not be separated from the waste rock. Since the uranium is deluding from the soil and bedrock there are naturally some concentrations of uranium in the waters too. The measured concentrations from the surface waters and mushrooms are very small, under the World Health Organization limit 15µg/l. (EIA report, Northland Mines Oy, 2013, 132)

8 STATEMENTS TO THE ENVIRONMENTAL IMPACT ASSESSMENT

The Environmental Impact Assessment process is still ongoing as this thesis is written. The first deadline for the EIA report was January 2013 and then March 2013. Finally it game to Ely-center in August. Since it so short period when the report was left to Ely-center, statements from the report are not yet published. The final statement of Ely-center has deadline in 24th of January. I could not find from the internet the statements of the municipalities' neither. They were sent to Ely-center in 25th of November. The statements that I could find from the internet were from the Finnish-Swedish transboundary river commission (fsgk), the Nature conservation association of Lapland (SLL) and the Village association of Äkäslompolo.

The Finnish-Swedish transboundary river commission focused in its statement to the Muonio River water quality and on the effects on the salmon and trout populations and the whole ecosystem of the Tornio-Muonio River. The Nature conservation district of Lapland focused on emphasizing the poor quality of the report and its transparency. The statement of the Village association of Äkäslompolo focuses on the social impacts of the Hannuikainen mine and the association is supporting the statements of the fsgk and SLL. I will only concentrate on the opinions that cover the environmental impacts of the mining project.

All the statements are strongly criticizing the quality of the Hannukainen mine EIA report. They note that even though it is almost 3000 pages in total that does not mean that it would be covering all the aspects and done in good quality. (SLL statement, 2013, 1; Village association of Äkäslompolo statement, 2013, 2; fsgk statement, 2013, 1) According to both the SLL and Village association of Äkäslompolo the EIA report is unclear, vague and inadequate. (SLL statement, 2012, 1; Village association of Äkäslompolo statement, 2013, 2) They claim that the report is repeating same things and sometimes the arguments are overruling each other's so that it is hard to understand which the actual fact is. The information is also scattered in the EIA report so that it is hard to understand the whole picture. (SLL statement, 2012, 1; Village association of Äkäslompolo statement, 2013, 2) The Village association of Äkäslompolo also accuses the report of making mining favorable assumptions without any arguments or with very loose arguments (ibid, 2013, 2). The fsgk criticizes the consults that have made the

report. According to the fsgk their knowledge of the local conditions is very limited. (ibid, 2013, 1)

SLL notes some interesting points in its statement from the EIA report and from the mining process itself that question the motives and transparency of the company. To start the report does not cover for the base structures of all the different operation areas. Only the base structure of the concentration gravel area is presented and even that is lacking exact information. (ibid, 2013, 1-2) SLL makes conclusions that only that concentration gravel area is planned to block the waters from passing the base structures. The EIA report does not cover exact maps of the different options or mining processes. One huge lack was too that the report does not give good picture of the waste management system: where and how much the water is taken and where and in what amount the water is then in the end lead to. (ibid, 2013, 2) SLL also criticizes that the EIA report for not listing the permits that the mine has already been applying or the planning projects that are ongoing (ibid, 2013, 2). SLL notes that the Hannukainen mine has started in 2011 the process of the general master plan of the area even though the EIA report is still not ready and they do not know whether the project is feasible. (ibid, 2013, 2) SLL concludes that the mining company does not see the EIA process as important but more like a formality. (ibid, 2013, 1) Where the transparency of the Hannukainen mine is questioned, is when there is not listed all the participants of the EIA report. According to SLL Lapin Vesitutkimus Oy, which conducted the nature research, is not mentioned at all. SLL notes that this same firm did also the EIA report of Talvivaara and was at the same time one of the investors in Talvivaara. Now the firm is in court for that. (SLL statement, 2013, 1)

All the statements were noted that the impacts on the water quality were not investigated enough. There were no impact assessment of the combined effect of both Kaunisvaara mine and Hannukainen mine, as they both lead their excess waters to Muonio River. (SLL statement, 2013, 2; Village association of Äkäslompolo statement, 2013, 9-10; fsgk statement, 2013, 1-3) Fsgk emphasis that he water quality of the Muonio River needs to remain good, as that is also the aim of the Natura series and Water directive (vesipuitdirektiivi). Fsgk also criticizes the method the consults were using in the modelling of the pollution in the rivers. According to fsgk this sort of modelling is not suitable for rivers that have already existing excellent water quality. (fsgl statement, 2013, 2-3) Village association of Äkäslompolo criticizes the estimations

of the EIA report as it notes that the impact on Kuer River is in option 1B-1C moderate but then in Äkäs River minor. They are still small rivers connected to each other's. Village association of Äkäslompolo notes that all the options 1A-1C should be abandoned because of their impacts to the water bodies. (ibid, 2013, 9)

Both fsgk and SLL wonders that the EIA report does not cover for the ecotoxicology of the uranium, thorium and mercury in the water ecosystems. The report notes that in acidic conditions uranium and mercury can dissolve to waters and stay in the sediment of the bottom of the rivers. Still this is not investigated more thoroughly that how does this affect the water ecosystem and the fish populations. Thorium was only mentioned not analyzed at all according to SLL. (SLL statement, 2013, 2 ; fsgk statement, 2013, 3-4)

All the statements also note that the water balance of the project does not cover situations like annual spring foods that are normal on the area. Similarly the summer droughts were not part of the report. Due the global warming summers have become drier than earlier. SLL points out that the EIA report should cover plans for situations of water scarcity for mining. The impact assessment on rivers should be assessed in drier than normal conditions too. The report neither covered estimations how the long cold periods affect the water balance of the mine. (SLL statement, 2013, 2; Village association of Äkäslompolo statement, 2013, 9; fsgk statement, 2013, 1-2)

Fsgk notes very strongly that the EIA report has not evaluated well enough the impacts of the mine to the salmon and sea trout populations. The fish populations for example are not even in the criteria list of the place of the excess water pipe in the Muonio River. (ibid, 2013, 1-2) The endangered sea trout population and the salmon population should absolutely be high criteria when planning where to place the excess water pipe. Also the evaluation of the other aquadic life was done very loosely. According to the Village association of Äkäslompolo, the EIA report cannot just make assumption that the effects of the aquatic life are corresponding with the effects to the water quality. This is something that should have own specific researches. (Village association of Äkäslompolo statement, 2013, 9; fsgk statement, 2013, 2)

SLL and Village association of Äkäslompolo both also agree that the nature research of the EIA report been done poor. Their studies do not give needed information of the protection level of different nature types and species in Finland. SLL stresses that especially mires were presented unclearly and misleadingly. The endangered animals were neither investigated well enough. The nature report of the EIA report showed in practice that the area does not have populations of freshwater pearl mussels, northern bats or beavers, and otters were estimated to be very few in the area. According to the sll the local people on the area still tell that there is in several places freshwater pearl mussels, northern bats, beavers and otters. Especially beaver were not even mentioned in the EIA report even though it is endangered species. The bird survey did not cover for the owls and was done only for one year which according to sll will not give any specific answers. (Village association of Äkäslompolo statement, 2013, 9; SLL statement, 2013, 2)

Both the SLL (2013, 2) and village association of Äkäslompolo (2013, 7-8) also had some notes of the dust estimations of the EIA report. Village association of Äkäslompolo notes that the dust estimations do not include local climate. Inversions form often at winter, which change the estimated dust landing area further away from the mine. The area is also having remarkable topographical variations which can cause the dust clouds to travel in unexpected areas. This should be important to add to the EIA report. (Village association of Äkäslompolo, 2013, 7-8) SLL (2013, 2) also notes that the report should cover dust models separately for each season of the year, as the conditions are very different in each season. The report has also forgotten that dust from the explosions will finally land to the ground and to the rivers causing eutrophication in the long run. The report neither covers the dust impact on the mushroom, lichen nor mosses in the area. (Village association of Äkäslompolo, 2013, 7-8; SLL statement, 2013, 2)

Both the SLL and village association of Äkäslompolo find the noise analysis of the EIA report inadequate. SLL notes that also noise models should be made separately to each season from the same reasons the dust models. The noise impact assessment should also cover for the impact of the noise to the birds and animals on their breeding season, especially on the very sensitive species. (SLL statement, 2013, 2-3) Village association of Äkäslompolo is worried as they do not trust the EIA report result that the noise will have not harm to the surrounding area. The village of Äkäslompolo has reputation of

having wilderness environment and the silence as important part of the wilderness. Village association of Äkäslompolo is also worried what will happen if explosions and air pressure waves are the future in the village. (ibid, 2013, 8)

SLL has also an interesting note to the GHG emission evaluation of the EIA report. The report only evaluates the GHG emissions caused by transport, explosions and energy facilities. The report did not cover GHG emissions released when the top soil layer of mining area is peeled of and the trees of the area are cut. Typical hectare of peatland can contain 4000 tons of carbon dioxide. Also trees store carbon dioxide. These calculations did not exist in the EIA report. (SLL statement, 2013, 2)

It can be concluded that the EIA report should be improved on accuracy and clarity. Many surveys vital to the area were missing completely. It is interesting to see how the statements are answered and what will be the statement of the Ely-center in 24th of January.

9 ANALYSIS

I started the analysis by getting familiar with the interview analysis by reading Ruusuvuori, Nikander & Hyvärinen´s (2010) book on interview analysis. According to the book there are many ways to approach the interview material depending on the interview material and the purpose of the research.

I started the analysis by getting familiar with the interview material. I preliminarily organized and grouped the material. Actually I started this process already when I held the interviews and later when I was transcribing the interviews. I started noticing that certain topics rose from the interviews: such as resources, bias problems and cooperation. On the first reading times of the material, I made notes and mind map of ideas for the final analysis. Mind map helped structuring the content of the interviews and finding out how the different topics were connected to each other (Figure 12).

After I was familiar with the material I started to categorize the interview text into the preliminary themes and groups. I coded the original interview text according to the themes by marking each interview part with the theme topic and subtopic. I also created own files for each theme and subtheme and copy-pasted the interview parts of the certain theme in to the different theme files. This way I could later easily read all the interview material about the certain theme topic together. I found out that there were some new perspectives to the themes in addition to those which I had in the interview questions. Some of the themes remained the same but some did not.

Figure 12 shows how the topics in the interview are structured and linked to each other. At this point I was not thinking so much for the final analysis but more playing with the bigger and smaller topics and seeing how they would fit together. Figure 13 is mind map of the content of the interviews in more structured way. In Figure 13 I have listed subtopics under the main topics. This is more compatible with the actual analysis structure.

After the interview material was sorted by themes, I took a look how the number of answers divided between different themes. According to the Ruusuvuori, et al (2010, 83) if some theme or concept is repeated in the interview it is justified to sort all the interview material connected to that theme as own material.

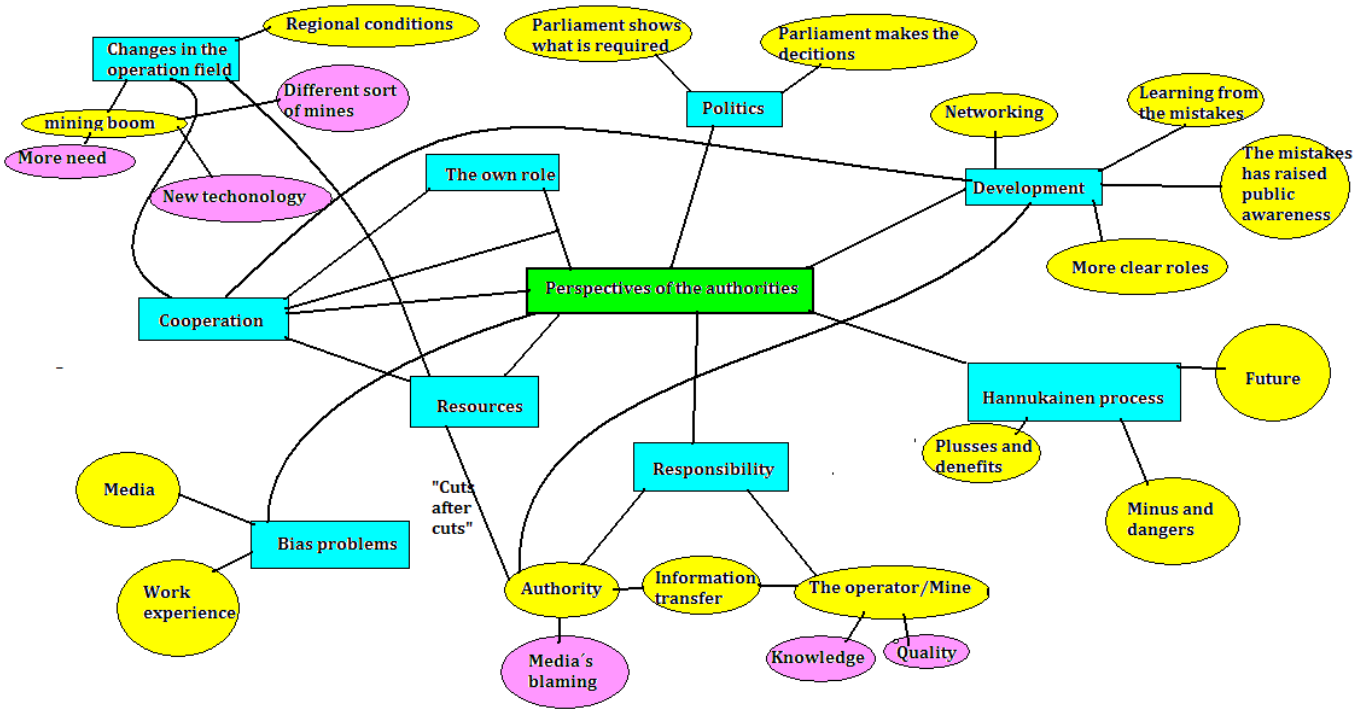

Figure 12. Figure of the mind map, where I structured the content of the interviews.

The theme "Role and the implementation" remained the same as in the interview question themes but the subtheme "cooperation" rose from the material to be researched as important theme. It seemed so relevant that I removed it from the role-theme into its own theme as there were relatively many and long extracts of the interviews concerning this topic. I wanted to research this topic separately from the "Role"-theme.

I kept the themes "Resources", "Hannukainen mining project" and "Bias problems" same as in the questions, but I added subtopics to specify these themes. I added four subtopics to the theme "Resources": "Lack of resources", "Need of education" , "Work experience" and "Operation field changes". The theme "Operation field changes" came up when talking about resources. Still the material of the subtopic does not justify for the separation as an own topic, and the message about the subtopic becomes more clear when it is discussed together with the resources theme. I divided the theme "Hannukainen mining project" into two subtopics: "Pros" and "Cons". This draw to "pros" and "cons" was simple to make from the interviews as the officials mostly discussed the topic by evaluating the pros and cons of the project. The theme "Bias problems" became the second biggest theme according to the number of extracts. I divided the theme into two subtopics; "Media" and "Work experience". The theme

“Can environmental problems be prevented” was eventually deleted from the topics as it is more part of the conclusions and can be discussed in that chapter.

I decided to merge the themes “After Talvivaara and Raahe cases” and “Level of technical experiences” into a new theme “Who has the responsibility?” The answers of these two themes all culminated around this very question. I thought it is interesting to study this question as own theme and see how the opinions vary. This theme was also the biggest theme with highest number is extracts. I divided the theme into two subtopics “Operator” and “official”. The “Official” subtopic was still divided to sub subtopics as ”Blame of media”, “Responsibility”, “Success” and “Failures”.

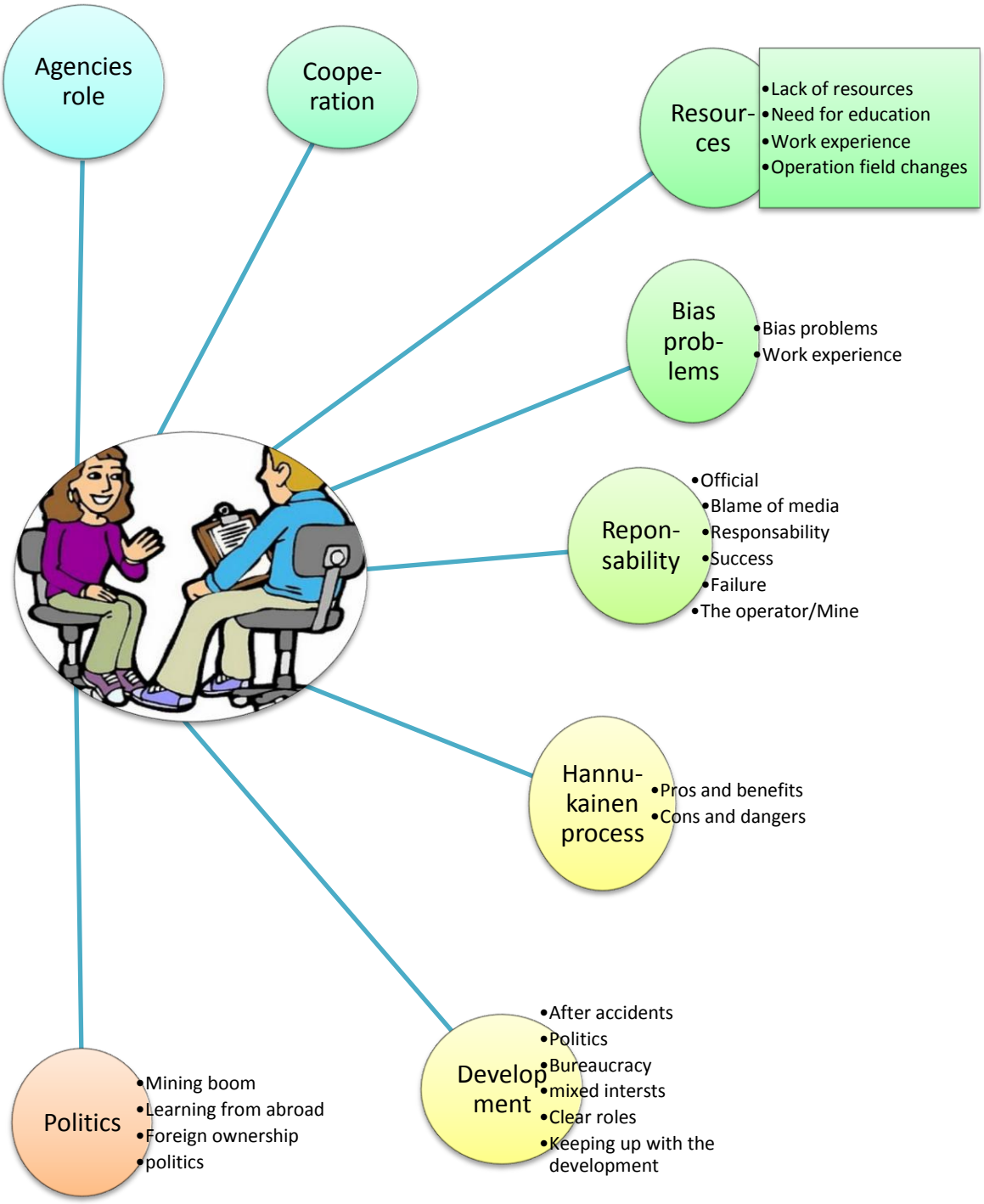

Figure 13. Mind map showing the structure of the contents of the interviews.

I divided the theme "General perspective of mining "into two themes; "Politics" and "Future development". Both of the themes included many perspectives which were simple to categorize into different subtopics. I divided the "Politics" theme into "Mining boom", "learning from abroad", "Foreign ownership" and "Politics". The "Future

development" theme included subthemes as "after the accidents", "politics", "bureaucracy", "mixed interests", "clear roles" and "Keeping up with the development".

In the analysis I will use coded names from the informants to protect their identity. All the names are invented and are not the officials' real names. Officials from Tukes have names starting with letter T, Official from AVI has name starting with letter A and officials from Ely-center have names starting with letter E. This way it is easier to track which official is from which agency.

9.1 Role of the Agency

9.1.1 Tukes

According to the Mining Act, Finnish Safety and Chemical Agency (Tukes) is the mining official solving the permit applications and monitoring the mining operations. According to informants from the Tukes Tuukka and Tuomo the roles of the employees are divided according to these duties. They have about 15 people working with the permit application processes and 2 with the monitoring. Their duties also involve permit applications and monitoring of chemical industry.

Permit process also involves nowadays more interaction right in the beginning of the mining process.

"…now I have even got to the detailed plan meetings. Right here in the Kolari area, Sokli area and other mine areas when the mine is about to come to the area." (Tuomo)

"…nyt olen päässyt kaavakokouksiinkin. Ihan tää Kolari alue, Sokli, muut kaivokset siinä vaiheessa kun ne alkaa alla tulossa se kaivos." (Tuomo)

According to Tuomo Tukes is involved right in the beginning of the mining process. First in the regional planning, as referred above, and then in the EIA procedure in which Tukes gives statements. Later Tukes also gives statements on the environmental permit application process to AVI. Tukes is handling itself mining safety permits, mining permits and permits according to the Chemical and Safety Act. In these procedures Tukes is the one asking for statements from other agencies.

According to the Tukes official Tuukka, Tukes´s work focuses on the permit application. Also the employee resource division (15 people in permit and 2 in monitoring) implies this. The monitoring work of Tukes consists mainly of visiting the mines. Visits are done first when the mine opens within the framework of mining permit and mining safety permit, and then according to the new Mining Act once a every year or less often depending on the mined mineral. Tuomo emphasizes that in Finland there are about twenty metal ore mines and then more than fifty other mines (e.g. soapstone mines). With these less complex mines as soapstone mines visits can be made less often (e.g. in every two years). Tukes also makes visits to the mine within the framework of chemical permit once a year and to the explosive factories and storages every other year or in five years, depending on the size of the factory or storage. (Tuomo)

One important perspective that the monitoring official is interested in on the visit is that are all the mined minerals utilized. It is important that not only the most valuable minerals are used but also the others. No minerals should be wasted. The development of technology can make some now unworthy minerals useful in the future. Also important part of the monitoring in Tukes is to monitor how the after-measures are done when the mining activities end. (Tuukka)

The Act only states that Tukes is the mining official and is responsible for the monitoring and for the permit procedures. The interviews opened this picture by introducing how Tukes is involved in the mining process right from the beginning with planning meetings, statements to EIA procedure and environmental permit and in the mining visits.

9.1.2 AVI

Regional State Administrative Agencies (AVI) handles the environmental permit applications and the water permit applications. AVI is also involved in the EIA process (Ympäristö, 2013) .

Permit application process starts with checking the correctness of the application. Is it made according to the Acts and Degrees, and if it is not AVI asks for more information. After this the application is publicly announced for 30 days. During this time legal officials give their statements and local and public people their opinions. Then AVI will ask for more details from the applicant using the feedback and statements into. The

applicant needs to answer all the statements and opinions. After this the application goes to the decision making.

According to Aaro from the AVI of Lapland the environmental permit is normally granted for 10 years for medium size process with stabilized functions. After ten years the permit is checked if some changes are to be done. After the permit has been granted, Ely-center is responsible for the monitoring. AVI does not follow the mining operations in any way. When the permit expiries and needs to be checked AVI does not know anything how has the operations gone in the mine. (Aaro)

"But in here the documentation is based on facts that the applicant presents and what changes do we get from the statements and opinions and of course what information have you got yourself. " (Aaro)

"Mutta meillä perustuu se dokumentaatio siihen että mitä se hakija esittää ja mitä saa lausunnoissa muutoksia ja mielipiteitä ja mitä tietenkin itse on saanut ongittua tietoon." (Aaro)

As Aaro explains all the information is based on the applications and the opinions of others.

The interviews mainly opened to door how the AVI is handling the permit applications. It did not bring any hidden roles. This is maybe because there does not exist ones.

9.1.3 Ely-center

The Centre for Economic Development, Transport and the Environment (Ely-center) is the monitoring agency of the environmental permit and is also involving in the EIA process (Ympäristö, 2013). As explained by Eero, AVI grants the environmental permit and Ely-center then monitors that the operators are following the permit.

The monitoring is based on annual visits to the mine and by contacting the mining operator. If something exceptional happens the visits are done more often. If limits set in the permit are exceeded, Ely-center gives notice to the mine and asks for report of the accident. In the worst case Ely-center can interrupt the operations.

”In the end, in Talvivaara the operations needed to be interrupted. …, but here in Lapland it has not been needed. But some things have been that we have had to intervene, some dam leaks.” (Eero)

“Talvivaarassahan sitten tapahtui niin, että se toiminta keskeytettiin siinä. …, mutta ei täällä Lapissa ole semmosia vielä tarvinnut. Mutta jotakin on ollut semmosia että on joutunut puuttumaan, semmosia patovuotoja.”(Eero)

The whole Ely-center contains the traffic unit, economic unit and the environmental unit. These units can have conflicting interests. Generally Ely-center´s role is to improve development and to be the public trustee. Still in the transport unit and economy unit the role is to develop infrastructure and employment. In the environmental unit the perspective is very strongly to the environment, nature, environmental safety and the public living conditions. Sometimes these interests can conflict with each other’s. (Elli)

Elli also continues the describing the role of Ely-center as advisory.

“And here is also very must advisory role, and that comes from the law, that is good to remember…that kind of guiding and advisory role is quite important and in my opinion important in developing the operations because the know-how should be found and those experiences can be found everywhere and this way things can be taken forward.”(Elli)

“Ja täällä on hyvin paljon myöskin semmoinen neuvova rooli että se on ihan lakisääteisestikin että se on ihan hyvä muistaa…semmoinen ohjaava ja neuvova rooli on aika tärkeä ja se on itse asiassa minun mielestä aika tärkeä just tämmöisten toimintojen kehittämisessä koska niin sitä tietotaitoa pitäisi löytyä ja niitä kokemuksia löytyy joka puolelta ja pystytään sitten viemään niitä asioita eteenpäin.” (Elli)

The interview mainly opened to window to Ely-center to see that the agency itself has a contradictory situation as the units have different interests. The interviews also brought out that Ely-center has important guiding role aiming to development of the operations.

9.2 Cooperation

The cooperation in the agencies is most intensive during the permit processes. Agencies requests and delivers statements to one another and negotiate with each other. Tukes is interested to get opinions to the mining permit from AVI as it grants the environmental permit and Ely-center as it has the information about nature conservation and traffic. When AVI is handling the environmental permit it cooperates with Ely-center closely as Ely-center will be monitoring the becoming permit. Similarly, when Ely-center is monitoring the environmental permit, the cooperation with AVI never stops. The two agencies transfer information constantly on personal level, but also in different negotiations and in the statements that they give to one another. In Tukes the cooperation also means that persons from Ely-center and AVI are asked to join the visits to the mines.

"There does not exist that kind of person or instance that would know all things in the world, but rather it is very much cooperation that is needed between the experts."(Elli)

"Ei ole olemassa sellaista tahoa tai ihmistä tai instanssia joka kaiken asian maailmassa tietäisi vaan se on todella paljon sitä yhteistyötä siinä jota tarvitaan todella asiantuntijoiden kanssa." (Elli)

According to Elli cooperation between the experts is vital for keeping the officials up dated. She also continues that this is also way of transfering all the information to the operator, the mining company. She emphasizes that the information must come from cooperation. There is not one organization that would have all the information. The mining operations are complex with different technologies and also the environment need to be understood on the local level. This knowledge is only received trough net-working and cooperation between different experts.

Also other officials highlight the importance of the cooperation. The interviews in AVI and Tukes revealed an interesting observation. After all the environmental problems in Talvivaara the agencies have increased the cooperation of experts: between agencies and with one another inside the same agency. Especially in mining related permit processes more experts are contacted every time for example from the Geological Survey of Finland, the National Institute for Health and Welfare and Radiation and the

Nuclear Safety Official. This procedure of consulting other experts extensively is not common among other projects than mines.

As the operator or the mine is the one applying the permits, it is also very important link in the cooperation. Each permit process requires a certain amount of communication with the operator during the permit process. On top of this there is change of information between the agencies and the mining operator trough e-mails and telephones. Still there is room for more communication between the mine and agency;

"But when it comes to cooperation, I think it would be good if the it would be on the personal level and on the telephone level, meaning that we would call to one another openly if there is something on the mind. That I think is vital." (Tuomo)

"Mut sillai se yhteistyö niin minusta olis hyvä jos se olis henkilötasolla ja puhelintasolla, et avoimesti soiteltais kun jotakin on mielessä ja oltais avoimia, niin se on minusta oleellista." (Tuomo)

This personal level cooperation between the mine and the agency would increase the possibility of the agency to become involved already in the planning and starting phases of the different operations or changes in the mine. More transparent communication would also increase the information both in the mine and in the agency. Elli emphasizes, that the mine needs to have the widest knowledge of its operations and their effects but also the agency should know what they are demanding from the operators. What are the operations or processes that are producing emissions? With cooperation the widest information can be reached on both sides, in the mine and the agency.

Before the interviews my understanding about the cooperation of the different agencies was based on the Acts and the home pages of the agencies. That was mainly giving and asking for statements. The interviews gave information that the cooperation is on the personal level. This information is changed and passed forward for everyone's benefit. The officials also sensed that the cooperation is important to receive the needed level of information (new technologies, local conditions). The Talvivaara case has increased the amount of cooperation and for example in mining processes and environmental permit process extremely wide range of experts from different facilities are consulted. The

cooperation also happens between the official and operator but this cooperation could increase and be more on the personal level.

9.3 Resources

The informants' opinions on the resources of the agencies were similar. They simply lack resources to do their work. The resources of the State Administration are scarce. They have lack of competent staff, budget saving targets and productivity programs every day on their shoulders. Aaro described the situation in his agency that they have this year 336 cases pending, and with their resources they can finish 200 to 250 cases. This means that each year the work load keeps piling up more and more. Elli, in turn described the current situation as follow,

"In the worst case there has really been situation that people say that they do not know if they have time to do things. You get folders after folders on your desk with strict deadlines. Then you only look at them and think that do you really have time to also read the folders or prepare for the monitoring visits, or to something else. These preparations do not come from the magic hat. They really require possibility and resources to be become familiar with." (Elli)

"Pahimmassa vaiheessa ollut oikeasti sellanen tilanne että ihmiset sanoo että ei tiedä ehtiikö edes. Sinä saat niin kun mappeja mapin perään pöydälle ja kaikkilla on aikataulut paukutettu tuohon ja sit katsoo vaan että niin, mun pitäis joskus ehtiä ehtiä käydä nää mapit läpikin, tai valmistautua valvontoihin tai tarkastuskierroksiin tai jotain muuta, että ei niitä hihasta ravistella. Kyllä niihin pitää olla mahdollisuus ja resursseja oikeesti perehtyä." (Elli)

After cuttings one person is expected to do many persons´ works, but under the pressure many staff members have got burn-out or left to a sick leave. Elli hopes that this has woken up the head of the State Administration. Staff does their best under the circumstances but is still accused that things are not done well or the staff is only slacks.

What makes it even harder to manage the inadequate resources, is that the operation field of the agencies keeps changing constantly. According to Elli only 15 years ago

everybody believed that in the future there will hardly be any mines in Finland. Today there are more than 40 operating mines and 10-15 planned new mines (Elli). This is the mining boom today, but in 10 years the boom will be on something else. This way the field is constantly changing. The new or existing mines are not an easy to work with as each mine is different. Each mine has its own processes and its own surrounding environment with its boundary conditions. If some technique applies to one mine it can be inapplicable in the case of another mine. This adds stress on the officials.

As the agencies´ field of operation is ever-changing, so are the agencies themselves. All the agencies as they are set today are relatively young. Ely-center used to do both the permits and monitoring earlier until 2010. After that Ely-center has only the monitoring and AVI has the permit processes. Also Tukes´s present organization structure is only two years old. Einari described the situation as follows,

"This has kind of being change after change all the time. If I could wish myself I hope there would be even one peaceful year. The functions could stabilize and get functioning, so that we would not have to all the time change and change. " (Einari)

"Tavallaan ollut muutosta muutoksen perään koko aika, että jos itse saisi toivoa niin jos tähän tulisi edes pikkunen tämmöinen rauhan vuosi. Pystyisi toimintaa saamaan vakiinnuttua ja saataisi toiminnat kuntoon, ettei koko ajan vaan muututa ja muututa." (Einari)

The changes in the operation field always add the pressure to officials. The existing resources do not let staff to seek education and training to keep up with the development. Sometimes training for the newest technologies can found abroad only. There should be possibility for that as the officials should have enough knowledge be able to trust the reports from the mines, even though they do not make the actual reports about the details of the mines. In AVI there has even been a trend that mining companies do not invest on good reports and application, but send incomplete applications, and then purposely wait for the AVI´s clarification request expecting to get a complete list of matters to be researched. The mines do not understand that they are the ones in responsible for everything.

The resent discussing about environmental problems and mines has even added the pressure in the officials´ work. Eero recalled that he needs to be even more accurate but

still keep his head cool so that he does not get too stressed. According to Elli the reason for the sad news about mines has been lack of the officials´ resources. All parties of the society do not understand that premonitoring is time consuming and demands a lot of resources. If for example EIA procedure or environmental permit process is conducted hastily that will backfire later. According to Aaro in AVI this can be seen in the Talvivaara case, as they have to constantly redo all the paperwork as the situation in changing and changing. This uses enormous amount of resources from all the other 336 pending cases. As Elli continues, the only way to build environmentally friendly mine is to invest in the premonitoring. This is the way to prevent the accidents in the future and yet accidents will always happen, even if the world would be invented again.

9.4 Bias Problems

The bias problems rose to the news in spring 2012 as Raahe gold mine started getting problems only less than year of full production. The needed size of the waste water pool had been severely underestimated in Raahe mine, which caused the pool to fill up in few months, even though it was supposed to be big enough for two years waters. (Yle news, 13.3.12) Finally the Regional State Administrative Agency of North Finland (AVI) gave a temporary permission to lead the waste waters straight to the nature for the summer, even though Ely-center criticized this option in their statement because of the content of the waste waters with sulfates and other impurities. In the end the AVI of North Finland was investigated for been suspected of making decisions according to the Raahe mine´s wishes. The reason for suspicion was that the Raahe gold mine had hired official from the AVI for their environmental manager and he had been making decisions for the mine only two months before that hiring. (Yle news, 13.3.12 and 10.5.12)

All the interviewed officials felt that discussion about conflict of interest in media has gone to wrong direction. Media had been blaming officials for going to work at the mine on leave of absence of their post and then coming back to their post. According to the officials media has been making this sound like the official would be corrupted and

would later on make only ultra-positive decision on mines and that the officials who go to work to the mines do it only for money.

According to the officials the truth is different. Currently they all are lacking knowledge in the agencies. New mines use new technologies, but there is no-one in the agencies who would know about them in practice. According to Aaro they have recently been searching for Environmental counsel with specific experience in mines and geology. They did not receive many applications because there is a not peole who would have both the required work experience and the legal expertise to work in the agency. Elli also emphasis that, in Europe it is always required for the official to have working experience on the field to be able to monitor or write permits. Aaro continues,

"I think it is beneficial to all and even reasonable for legal protection that we would know as much as possible of those activities that we are writing the permits and solving the permit applications." (Aaro)

"Kyllä se minun mielestä on kaikkien edunmukaista ja jopa oikeusturvan kannaltakin järkevää että tiedettäisi mahdollisimman paljon siitä toiminnasta mille lupia kirjoitetaan tai joiden lupa-asioita ratkotaan. " (Aaro)

At the moment the agencies are living in paradox, because the media has been playing with "the conflict of interest" theme and accusing the officials of bias. This has caused that nobody wants to go for leave of absence to work in the mine. Even the mines are no longer offering this opportunity as they have notised that it causes too much negative publicity. Before the media attention there were attitude in the agencies that if mine asks somebody to come on leave of absence for a year to work as environmental manager to the mine, the person was obligated to response. This was because the agencies are always requiring things and now the mine needs help for somebody to do as the agency requires. Now the only way to get knowledge is trough long education, but that does not bring the knowledge and experience that you learn when actually work in the field. Tuukka explains the importance of the working experience:

"I have been myself working at Outokumpu for 12 years and … I think it is better if person has working experience because that way he understands situations much better. Mining facts are quite complex and if there comes a person how has not even ever

visited mines or worked in them, I think is it extremely hard to come to work in here as official." (Tuukka)

"Minähän olen itse ollut Outokummulla 12 vuotta ja … kyllä se minun mielestä olis parempi että olis kokemusta koska sillalailla ymmärtää paljon paremmin nämä asiat. Että kaivosasiat on aika monimutkaisia ja jos siihen tulee semmoinen ihminen joka ei ole edes koskaan käynyt kaivoksissa tai ollut töissä niin kyllä se on tosi vaikee tulla tähän tämmöseen työhön." (Tuukka)

The paradox emerges from the public media as it is accusing the officials for not making strict enough permits and at the same time taking away the only tool to get deeper understanding and knowledge to be able to improve the permits. Aaro compares the situation to construction industry: does anybody think that building houses before becoming a construction supervisor is bad for his current job. No they do not. But if you work as an official and then one day you grab on the mines door, after that you and your whole agency is polluted.

According to the officials media and even some politicians have been collecting points and feasting on about the bias topic. At the practical level none of their accusations could be practically true. All the officials work under office responsibility and incapacity regulations. In the situations of any conflicting interest, e.g. when somebody would come from the mine back to the agency, he would be objected from any tasks that involve work related to that mine. According to Elli: "That is common sense and how things are always done in the agency." I personally met this as I asked one official to join my Final thesis interview about Hannukainen mine and he replied that he will not participate as he is objected from all Hannukainen mine related subjects. According to Elli the officials are very proud of their bias and will not work in any subjects that they have any connections with.

Another common accusation of the media is that the person who has once worked in the mine has afterwards positive attitude toward the mines, which affects the work as an official. Tuukka explained the impossibility of the idea:

"It does not matter if you have positive or negative attitude because all is based on law. There is no such a place that your own feeling would have affect or your ultra-positive attitude would give favorable decisions. This is not possible. …Decisions are based on

the law. That is also the security for yourself that you are right as long as you follow the law and make decisions according to it. There is not more you can do." (Tuukka)

"Sillä ei ole merkitystä onko sulla itellä suhtautuminen myönteinen vai kielteinen koska kaikki perustuu lakipykäliin eli siinä ei oo yhtään kohtaa semmonta että minusta tuntuu että nyt on näin tai että pystyisit sillä omalla ultrapositiivisella suhtautumisella antamaan myönteisiä päätöksiä niin se ei oo mahdollista. ...Päätökset perustuu lakiin. Se on myöskin itselle se turva että sä oot oikeessa kunhan vaan noudatat ja teet sen mukaan niitä päätöksiä. Et sä voi enempää tehä." (Tuukka)

Official Aaro works in the same Regional State Administrate of North Finland as the official that went to work for the Raahe mine. He was surprised by the logic of the media. The media accused the official that he had made favorable decision about the Raahe mine environmental permit simply because he would soon go to work on the mine and then it would be cheaper to pollute more as the permit is so loose with the limits. Aaro reminds that all their decisions are also proved by the Administrative Court of Vaasa and the Supreme Court. That would make these organizations as loose as the AVI official. Aaro also emphasized that only a fool would ever write loose permit for himself, because they know just how big and expensive the environmental problems can get. No starting mine has extra money for that kind of surprises. He continues that it is better to write as strict as strict permit as possible as the strictness of the permit also determines the economy of the mine. The mine will use as much money as needed to fulfill the permit requirements. Aaro claims that media purposefully does not want to see this fact.

9.5 Who has the Responsibility?

The conversation in media about environmental problems in the Talvivaara mine and problems with estimating waste waters in Raahe have raised questions about the responsibilities in hazards. Is the one making the mistake responsible or the one who gave the permit for the operations or the one monitoring them? According to the officials in the media, the blame has been on them, accusing them of making permits that allow environmental problems and not monitoring well enough the operations.

All the officials admit that the official is a very easy target to blame. Elli used to say: “If official is not guilty for anything, something has been done wrong”. Allt he interviewed officials said that they have been following the conversation in media with plenty of compassion to the officials who have been blamed on. They say that nowadays they have to concentrate more on their statements and especially if the statement goes to the media. Aaro gave examples where his words had been used meaning different things than he had tried to communicate. He had even read news with straight quotes from him. Only he had never said those things. All the officials admit that even the most reliable media cannot be trusted, as they really try to find information between lines and even make false claims. Eero has observed that before the environmental problems became, the media was blaming officials for being too strict and making mine operations too difficult with long permit procedures and frequent monitoring visits. Now the media´s opinion has changed completely and the officials are blamed to be too sloppy.

All the officials emphasize that the official is operating with the information he or she receives. It is important to understand that the official does not have any extra resources to check the correctness of the information it receives from the mining company. Aaro highlights that the official needs to know something about the industry it is monitoring or writing permits to, but not that deep information that he could plan the whole mining processes. Einari notes that the official need to trust the mining companies own estimations, as the official does not have the resources to recalculate everything. Elli also clears that,

”It is good to remember that we have penalties for giving false information or misleading the official. It is quite big thing in the end, and it is seen as crime.” (Elli)

“On hyvä muistaa sekin että meillä on sanktiot siitä jos viranomaiselle annetaan väärää tietoa tai harhautetaan. Se on aika kova juttu kuitenkin, että joka siihen syyllistyy niin syyllistyy rikokseen.” (Elli)

According to all the officials and according to the Finnish laws, the operator has full responsibility of all the operations in the mining area. The responsibility on the operations never changes on the officials shoulders. Aaro emphasises that in Finland people have not really internalized that according to the Environmental Protection Act (§5), mine has the obligation to be generally aware of all the operations and conditions.

The mine has to know all the emissions, environmental impacts and processes. The mine is the one responsible of the adequacy and correctness of the permit applications. Aaro speculates that in the Talvivaara case these responsibility-questions have been mixed both unintentionally and intentionally.

The mine not only has the responsibility to be aware of the operation and conditions, but also to operate using the latest information in the processes, for example to prevent emissions and any kind of wasting usable minerals. The mine also has the obligation to immediately inform if something happens in the mining area. The operator has to react and start needed procedures but also inform the officials about the happened. The monitoring authorizes still remark that the environmental permit is actually an emission permit. Einari continues that there is no industrial activity that would not produce any emissions. If official gives environmental permit it always allows some emissions. This makes it important for the mining company and also the official to understand the surrounding environment and its boundary conditions.

The officials emphasizes that the mining operator has to be thoroughly familiar with the overall conditions and processes. The mine should always be prepared to identify different situation and to be able to prevent possible accidents. Elli gives example,

"Water balances are that kind of subject that as long as I have been in mining unit and seen this, I have many times said that water balances are underestimated. The one of the most important questions in the mine are that are the water balances correct. ... The mines do not have the money today to make that mistake." (Elli)

"Vesitaseet on sellanen asia että niin kauan kuin mä täällä kaivospuolella oon ollut ja nähnyt sitä niin mä oon useaan kertaan todennut ja sanonut sitä että ... vesitaseet on aliarvioitu. Kaivoksen yks keskeinen kysymys on se että vesitaseet saadaan oikein. ... Ei kaivoksilla oo varaa siihen(virhe) tänä päivänä enää." (Elli)

The example emphasis well that to be able to avoid accidents that can be very expensive and complex to fix later the mine needs to really know the local conditions and be expert of its own operations.

Generally the interviewed officials still feel that in Finland there are good operation principles among mines. They emphasise the importance of transparency between officials and mines. This has been working with old mines and they hope that this

tradition would be thought to the new mines too. Tuomo clears his experience of the subject,

“When I came to work with mines about 7 years ago, I thought that here is easy going atmosphere. We talk and we are quite transparent. But with these new mines, I would not trust so much about the level they are telling about things.” (Tuomo)

“Kun mä tulin tähän varmaan 7 vuotta sitten kaivoksille, mä tykkäsin et kaivoksilla on semmonen lepposa ilmapiiri. Puhutaan ja ollaan aika avoimia, mutta sit nää uudet varsinkin niin en mä nyt ihan luottaiskaan että mikä on se taso millä ne kertoo asiansa.” (Tuomo)

Tuomo continues that he has noticed that sometimes he suspects the mine´s will to organize all the processes and facilities. Does the mine really want use the latest information and best experts or is the less good, good enough. Do they estimate that they are operating for 5 to 10 years or ten times longer? The officials emphasize that the work quality of the consults that do all the estimations and permit applications to the mine is vital as the officials needs to base their actions on the consults estimations. The mines need to understand this importance.

9.6 Politics

Lately there has also been conversation about the fact that almost all the mining companies are foreign owned. Is this ethical, as all the profits goes to the mother country of the mining company and Finland only gets the tax payments of the salaries paid to Finnish workers.

According to Tuukka the central key of the Mining Act has been already for 290 years that who reserves the right first gets the right. No matter in which country does the company or person come from. Earlier there were Finnish mining companies, but after 1990s depression many of them were closed or sold. Eero estimates that it was a mistake to close and sell the Finnish owned companies as for example Pyhäsalmi mine started making huge profits right after it was sold to the Canadians. Eero continues that he feels that Finland sold this and other mines very cheap, and he points out to Sweden and Norwegian where there are still government owned mines.

Tuukka notes that mining operations are too expensive for Government to compete in the markets as it takes sometimes 100 milloins before nothing even happens.

"Finland simply do not have money for that." (Tuukka)

"Suomessa ei kerta kaikkiaan riitä rahat." (Tuukka)

Aaro also points out that in today's business world the company should be able to make profit without Government support. Mining industry is not the only industry in Finland that operates with foreign money nowadays. Also forestry and peat industry has a lot of foreign money involved. He continues that the Finnish Government can always own the mining company shares. Elli notes that,

"If we think that how has these different companies been operating in the area, I cannot really say that foreign companies would have been any better than Finnish ones. Talvivaara is Finnish owned. Many people forget about that." (Elli)

"Jos ajatellaan sitä että miten nää eri yhtiöt sitten on toiminut täällä alueella niin en mä nyt tiiä onko ne ulkomaalaiset yhtiöt ollut sen huonompia kuin suomalaisetkaan. Talvivaarahan on suomalaissomisteinen. Moni unohtaa sen." (Elli)

In the end all the officials agree that the Government and the Parliament are the places where the roles of the mining playground should be decided. They make the decisions on who does what and how. Tuomo remarks that the Finnish Government should have a stronger grip on the field, as we have in Finland ideal bedrock for mineral deposits and the deposits are not going anywhere. There should not be any hurry to exploit them all, as the mine is going to be exploiting the deposit for some ten years only.

9.7 Future Development

The officials feel that changes will appear to the mining official field, because the recent negative news from the mining industry has waked up the people and also the Government and the Parliament. Elli notes that this results from the resources being only cut and cut.

Maintenance of the professional skills is one of the key facts that all the officials mentioned, when it come to future development of the agencies. The maintenance of skills has been possible for the official by going to work in the mining companyburing a leave of absence, and come back without any hysteria and negative feedback of it. This has been the key tool for the officials in learning new information and technologies. Aaro refers to European standards in agencies demanding the official of have at least five years of working experience in the industry which they are monitoring or writing permits to.

Ely-center and Tukes officials would also like to have organized visits to mines abroad. Einari explains the wish following,

"...Also Finnish could go to visit those mines, so we would not have to invent the wheel again, if others have clear picture how things go. We could go there and get the information and make new networks." (Einari)

"...siihen kaivokseen pääsis myöskin suomalaiset tutustumaan ja ei tarttis tavallaan täällä keksiä pyörää uudentaa jos toisilla on jo selvät hommat miten menee niin sieltä vois kyllä hakea sitä oppia ja luoda niitä verkostoja." (Einari)

Officials feel that the maintenance of the skills has to include more education, to be able to keep up with the new acts, regulations and technologies. This can be very challenging as the resources and the working time are already limited. Where to find the time to learn new things or browse through the old methods that have been forgotten?

One common way of getting more resources to the actual work is to simplify the administration. Pointless bureaucracy seems to take increasing amount of time from the actual work. If the bureaucracy could be decreased more resources could go for the education for example. In Regional State Administrative Agency there were already steps to better direction. According to Aaro, they are taking a new electronic permit system into use. That decreases the amount of paper work by having all the facts and documents in electronic form. This will decrease the work amount significantly and release more time for the actual permit process.

According to Tuukka and Tuomo in Tukes there is also some problems with the clarity of roles of the agencies as the work field of Tukes, AVI and Ely-center partly overlap especially and practically the environmental field. According to Tuukka all the

environmental sector work could be transferred to AVI and Ely-center, as they are the agencies with the most environmental professional expertise. Tuomo though thinks that it is good that the work fields partly overlap each other's but not that much that two agencies are doing to same work.

The Ely-center officials all think that Ely-center is difficult as it contains departments from economy, traffic and environment. Summarized the economy department wants to increase the employment, traffic department wants to build roads and the environmental department is the one how requires these two departments plans to have all environmental sectors taken into account. According to Elli, there have even been cases in which the other two departments have been pushing the environmental department to have certain decisions. All the officials feel that it is important to maintain the independence of the environmental department so that the officials can do their work without any pressure from inside the agency.

9.8 Hannukainen Mining Project

The Hannukainen mining process is now at the stage where the mine has finished it EIA report. The report is now being read at Ely-center and Ely-center will give its statement on it by the 24th of January. Also other parties could comment and give statements of the EIA report by the 25th of November.

Not all of informants where familiar with the whole process of the Hannukainen mining project. Einari could not comment anything as he did not have any exact knowledge of the process. Elli was not professionally connected with the mining project but knew the process through personal information. Eero knew the EIA process as he was the contact person in the EIA process in Ely-center. Aaro also knew some facts in beforehand as he will most probably be granting the environmental permit to the mine. Both Tuukka and Tuomo were familiar with the mines mining technology related facts.

Both in Ely-center and Tukes the officials estimated the Hannukainen mining process to be very conventional and also very well-known process. This means that the process should not bring any surprises to the environment or to the technology. Tuukka noted that this sort of iron mining has existed in Finland as long as the mining in Finland

started. Everybody in the field should have the knowledge of the operations and the chemical properties, so that any hysteria should be avoided (Tuukka).

All the officials complimented the mining operator of having good social relations to the local communities and parties straight from the beginning. The mine had openly talked about the project and its effects to the local parties. The mine had created several small groups to assess the social impacts. They have had many negotiations and these negotiations still continue. Elli analyses the importance of the transparency;

"If we imagine that a mine would come to the area and tell that it would not have any negative impacts. The mine would be lying. I think that it is no point to make facts prettier, but the point is to find the least harmful options. … Then we only need to weight the options, and measure how damages the most." (Elli)

"Jos ajatellaan että joku kaivos tulee alueelle ja väittää että siitä ei oo negatiivisia vaikutuksia, niin sehän valehtelee. Musta on ihan turha ruveta kaunistelemaan asioita. Että sehän on tarkoituksena löytää ne mahdollisimman vähän haitalliset ja haittaavat vaihtoehdot. … Sitten on vaan punnittava että ketä haittaa eniten." (Elli)

Aaro told from his own experience, as he had worked six years ago in Kittilä mine as environmental manager. He stresses that mine usually should use more creativity when in the mitigation of the social impacts. It is important to understand that there are always some suffering groups and other benefitting groups, and normally these two groups are separated groups.

The officials estimated that the biggest challenges of the Hannukainen mining project are due to the challenging regional conditions. The becoming mining area is located near local housing, vacation cottages and tourism activities. The Mining area also is naturally in the reindeer herding region. Most importantly still the mine is located near complex water bodies (see page 44). The waste waters of the mine will run eventually to the Tornio-Muonio River, which is together with its water catchment area Natura-area, and also very sensitive area. The quality of the water in the river is currently good, natural state. Also the groundwater issues under the mining area are complex. All of the officials hope that the mine seriously focuses on these important topics in the EIA report, and that the mine would implement the very best environmental practices. Aaro predicts the becoming environmental permit process as follows,

"Big project, challenging project and most probably we will estimate the permit conditions extremely closely meaning that they are in a bigger role than they would be in a smaller project." (Aaro)

"Iso hanke, Haastava hanke ja varmaan luvan myöntämisen edellytyksiä tarkastellaan poikkeuksellisen tarkasti, siis että ne nousevat isompaan rooliin kuin pienemmissä kaivoshankkeissa." (Aaro)

One perspective which the officials also brought up was the need to ensure proper after measures when the mining has eventually ended. All mining actives are in the end temporary. Local people have been living in the area before the mine and they should be entitled to have similar conditions after the mine. It is important that the mine has good landscaping and after care plans and also money deposits for that.

The officials estimate that the municipality seriusly promotes the mine as they advertise the municipality as tourism and mining village. Eero notes that in Finland all the businesses has similar right to operate, and if the business really want something in some area, they will get it in there.

Tuomo had interesting comment about the Hannukainen mine as he pointed that the company behind Hannukainen mine, the Northland is also operating in Pajala, Sweden. How much will the mines be operating independently or will the mine already operating in Sweden be controlling Hannukainen. Tuomo had earlier in the interview given an example of the Raahe mine, where the mine had first hired Finnish consult which seemed to be professional and have the regional information needed. Later the Raahe mine, however, changed the consult to Swedish consult which did not have similar knowledge of legislation concerning mining in Finland. Tuomo was wondering why they did business with Swedish in Finland, even though the Finnish would have the best knowledge and experience here. He pointed out that maybe this kind of example would fit to the Hannukainen mine. Does the Swedish mother company set the guidelines or can the Hannukainen mine make its own estimations?

10 DISCUSSION

Theme of this final thesis was to study authority opinions concerning environmental impacts and management of the Hannukainen iron-ore mine. This final thesis is also uses other tool as the mining legislation, the Environmental Impact Assessment of Hannukainen mine report and the statements on the EIA report. The officials' perspective still remains as the most important tool in this thesis and the other tools are just to give the officials perspectives something to compare them with.

The officials estimated that the biggest challenge to the Hannukainen mining project will come from the regional conditions. The mine is located near the local housing, vacation housing and tourism activities. The mining area is also in the reindeer herding region. Most importantly the mine is located in the middle of complex water bodies as the excess waters are run to the Tornio-Muonio River and the groundwater issues underneath the mining area are very complex. This makes the officials wish that in the EIA report would focus on these important topics, and that the mine would start already in the beginning to implement bets environmental practices.

The Hannukainen mine EIA report and all the statement yet speak the same language. The mining area is surrounded by sensitive rivers and nature conservation areas. Most of them are also Natura- areas. There is also sensitive and endangered mammal population (otter, beaver and northern bat), fish populations (salmon, sea trout),vegetation and bird populations (owl, eagle). The statements on the EIA report though did not speak for the mining company to be really focusing to this topic. The statements were all having the same criticism that the nature surveys had been done inadequately, unclearly or they were not done at all. The impacts on Tornio-Muonio River that also the officials mentioned as sensitive and important was according to the statements of the EIA report for example surveyed inadequately and the impact assessment did not cover for the sensitive fish populations. The statements speak that the EIA report could have done better so that the regional conditions are more taken into consideration.

The informants from ELY-center note that if the premonitory procedures (EIA and Environmental permit procedures) are not done well, that will backfire later. The only way of building environmentally friendly mine is to do the premonitory phase well.

Officials also note that mine cannot afford to make mistakes that will later cause huge environmental problems.

Officials all wanted to emphasis that according to the law, mining operator has the full responsibility of all its operations in the mining area. This fact has maybe been bending in the resent media, but it does not make any less true. According to the Environmental Protection Act (§1), the aim of the act is to prevent the pollution of the environment. In the section 4 of the Act is listed the general principles of how to do so: prevention, minimization of the harms, precaution, carefulness, best availed technology and the best environmental practices. According to the section 5 of the Act the operator is obligated to be generally aware of all the operations and their environmental impacts, risks and the reduction possibilities of these impacts and risks. The operator has the first responsibility to follow this legislation. Officials agree with this; the operator needs to know its emissions, environmental impacts and processes.

In the previous legislative perspective when the EIA report statements are sending a message that the Hannukainen mine really does not know all the environmental impacts and risks that it is going to have, or it underestimates them. Officials stresses that environmental permit is at the same time emission permit. This makes it very important that the operator knows its emissions and understands the surrounding environment and its boundary conditions. Always when there are industrial activities there is emissions. There is no point to claim that no emissions are going to come when everybody knows that the reality is different.

In the interviews the level of transparency was criticized in the new mines especially. He noted that the level of the work was sometimes not that good, and that make him suspect that what might be the life expectancy of the mine. In the beginning the surveys and research that are done to the mine are mostly in the consults hands. This level of the consults work should be good, as the officials needs to trust the consults reports. Officials do not have the resources or the knowledge to redo all the reports and make the calculations again. The lack of resources rose from the interviews as real problem.

As this is the case and the reality, it raises worries if the Hannukainen EIA report would be trusted as fact with its lacking and inadequate information on vital and important matters. Of Couse, the Hannukainen EIA report is not final yet as the operator still needs to give answers to all the statements and make corrections to the EIA report

according to them. But this kind of playing with that idea adds understanding to the importance of good consult work.

The officials all noted that the negative news from the resent mining problems has raised the awareness in public, among officials and also in the government. Officials note that this has started even more intensive cooperation between the experts and officials and official from AVI estimated that the environmental permit conditions of the Hannukainen mine are going to be estimated extremely closely.

Hannukainen mining project is big project in sensitive and complex environment. According to the EIA report statements the operator has not yet demonstrated in the process that it is fully aware of these conditions. According to the officials in Tukes, iron ore mining itself should be well-know and very conventional process that should no bring any surprises. It is left to see in the future whether the mine will use the best environmental practices and emphasis on the sensitivity of the environment.

11 REFERENCES

Anitta Salmi. Lapin Kansa. Dated 27.9.2013. Hannukainen yva-selostus valmis lausunnoille ”Ei haittaa matkailulle”. <http://www.lapinkansa.fi/Lappi/1194841746586/artikkeli/hannukaisen+yva-selostus+valmis+lausunnoille+ei+haittaa+matkailulle+.html>. (Accessed 7.10.2013)

Council of State Degree of Extractive Waste (379/2008). 2008. Finlex® Valtioneuvoston asetus kaivannasijätteistä. web publication. The juridical material achieve of Ministry of justice [Edita Publishing Oy]. <http://www.finlex.fi/fi/laki/alkup/2008/20080379 >. (Accessed 5.10.2013)

Dam Safety Act (496/2009). 2009. Finlex®. web publication. The juridical material achieve of Ministry of justice [Edita Publishing Oy]. <http://www.finlex.fi/fi/laki/ajantasa/2009/20090494?search[type]=pika&search[pika]=patoturvallisuuslaki>. (Accessed 5.10.2013)

DILACOMI project [University of Lappland]. < ulapland.fi/Dilacomi >. (Accessed 20.10.2012)

Eero Vapa. Kuukkeli. Kaivoksen kannattavuus ratkeaa tammikuussa. <http://www.kuukkeli.com/3juttu1912.html>. (Accessed 7.10.2013)

Eero Vapa. Kuukkeli. Kaivostietoa Hannukaisesta. <http://www.kuukkeli.com/uut2frame.html>. (Accessed 7.10.2013)

European Commission. MEMO on commission strategy to protect Europe´s most important wildlife areas-frequently asked questions NATURA 2000. 2003. [Web publication] <http://ec.europa.eu/environment/nature/info/pubs/docs/nat2000/2003_memo_natura.pdf>. (Accessed 30.9.2013)

European Commission. Natura 2000 alueiden suojelu ja käyttö. Luontodirektiivin 92/43/ETY 6 artiklan säädökset. 2000. [Web publication]. <http://ec.europa.eu/environment/nature/natura2000/management/docs/art6/provision_of_art6_fi.pdf>. (Accessed 30.9.2013)

Environmental Impact Assessment program of Hannukainen. 2013. [Pötry Finland Oy]. <http://www.ymparisto.fi/fi-FI/Asiointi_ja_luvat/Ymparistovaikutusten_arviointi/YVAhankkeet/Hannukaisen_rautakaivoshanke_Kolari>. (Accessed 6.10.2013)

Environmental Protection Act (Ympäristönsuojelulaki 86/2000). 2000. Finlex®-Environmetal protection act[web publication]. The juridical material achieve of Ministry of justice [Edita Publishing Oy]. <http://www.finlex.fi/fi/laki/alkup/2000/20000086 >. (Accessed 17.7.2013).

Environmental Protection Degree (169/2000). 2000. Finlex®-Environmetal protection act[web publication]. The juridical material achieve of Ministry of justice [Edita Publishing Oy]. < http://www.finlex.fi/fi/laki/kaannokset/2000/en20000169.pdf >. (Accessed 17.7.2013).

Finnish Safety and Chemical agency Tukes. Gold panning, ore prospecting and mining. < http://www.tukes.fi/fi/Toimialat/Kaivokset/ >. (Accessed 18.9.2013)

Geologian tutkimuskeskus GTK. Metallit. <http://www.gtk.fi/geologia/luonnonvarat/metallit/>. (Accessed 15.9.2013)

Geologian tutkimuskeskus GTK. Metallogeeniset vyöhykkeet. <http://www.gtk.fi/export/sites/fi/geologia/luonnonvarat/kartat/GTK_metallogeeniset_vyohykkeet.pdf >. (Accessed 15.9.2013)

Geologian tutkimuskeskus GTK. Mineral resources and exploration.

< http://new.gtk.fi/mineral_resources/exploration.html >. (Accessed 15.9.2013)

Geologian tutkimuskeskus GTK.Teollisuusmineraalit. <http://www.gtk.fi/geologia/luonnonvarat/teollisuusmineraalit/>. (Accessed 15.9.2013)

Government Bill for Mining Act and Acts connected to Mining Act (Hallituksen esitys Eduskunnalle kaivoslaiksi ja eräiksi siihen liittyviksi laeiksi HE (273/2009). 2009. Finlex ® Government Bill [web publication]. The juridical material achieve of Ministry of justice [Edita Publishing Oy]. <http://www.finlex.fi/fi/esitykset/he/2009/20090273#id1942949 >. (Accessed 26.9.2013).

Government Bill (Hallituksen esitys 273/2009). 2009. Finlex®-Government Bill to the mining law and some related laws for the parliament. The juridical material achieve of Ministry of justice [Edita Publishing Oy]. http://www.finlex.fi/fi/esitykset/he/2009/20090273#id1935656. (Accessed 20.7.2013)

Johanna Ruusuvuori & Liisa Tiittula. 2005. Haastattelu. Tutkimus, tilanteet ja vuorovaikutus. Tampere: Vastapaino.

Johanna Ruusuvuori, Pirjo Nikander & Matti Hyvärinen. 2010. Haastaatelun analyysi. Tampere: Vastapaino.

Katri Seppänen. Northland Mines Oy. Hannukaisen kaivoshankkeen ympäristövaikutusten arvionti. <http://www.pidalappisiistina.fi/uploads/files/Northland_Pida_Lappi_Siistina_20130208.pdf>. (Accessed 9.12.2013)

Land Use and Building Act (132/1999). 1999. Finlex®. web publication. The juridical material achieve of Ministry of justice [Edita Publishing Oy]. <http://www.finlex.fi/fi/laki/kaannokset/1999/en19990132.pdf>. (Accessed 5.10.2013)

Lapin Luonnonsuojelu piiri ry. Lausunto Hannukaisen kaivoshankkeen YVA-selostuksesta. 9.12.2013. <http://www.sll.fi/lappi/edunvalvonta/lausunto-hannukaisen-yva-selostuksesta>. (Accessed 13.12.2013)

Lapin Kansa. Lapissa kolme 1-riskiluokan allasta. 14.11.2012.

Maija uusisuo. 2012. Toimialaraportit. Kaivosteollisuus. [TEM ja ELY-keskus]. <http://www.temtoimialapalvelu.fi/files/1605/Kaivosteollisuus2012_web.pdf > (Accessed 6.9.2013)

Metsän tutkimus. Metlan asiakaslehti Nro 1/2006. Säteily ja cesium pähkinän kuoressa. <http://www.metla.fi/asiakaslehti/2006/metsantutkimus2006-1.pdf>. (Accessed 16.11.13)

Metla. Integration of nature-based economies and mining projects located close to tourist destinations in Lapland – Dilacomi-project. <http://www.metla.fi/hanke/7451/index-en.htm>. (Accessed 3.11.2012)

Mikko Jokinen and Liisa Tyrväinen. 2013. Can we predict with tourist opinions? [Finnish forest Research Institute Metla]. <http://www.metla.fi/hanke/7451/index.htm>. (Accessed 11.7.2013)

Mikko Jokinen. 2013. Nature values, nature-based livelihoods and mining. Best environmental practices in the mining sector in the Barents regions. [Finnish forest Research Institute Metla]. <http://www.metla.fi/hanke/7451/index.htm>. (Accessed 11.7.2013)

Mining Act (Kaivoslaki 621/2011). 2011. Finlex®- Mining law [web publication]. The juridical material achieve of Ministry of justice [Edita Publishing Oy]. <http://www.finlex.fi/fi/laki/alkup/2011/20110621>. (Accessed 17.6.2013).

Mining Act (kaivoslaki 621/2011) & Governmet Bill (Hallituksen esitys 273/2009). 2011. Finlex ®- News about the new mining law [web publication]. The juridical material achieve of Ministry of justice [Edita Publishing Oy]. <http://www.finlex.fi/fi/uutiset/208>. (Accessed 17.7.2013).

National Land Survey of Finland. Karttapaikka. <http://kansalaisen.karttapaikka.fi/kartanhaku/osoitehaku.html?e=395643&n=7480848 &scal e=800000&tool=siirra&width=600&height=600&lang=fi>. (Accessed 7.10.2013)

Natura 2000 networking programme. Official webpage of Natura 2000 network. [Managed by the European Commission by Eurosite]. <http://www.natura.org/about.html>. (Accessed 1.10.2013)

Nature Conservation Act (1096/1996). 1996. Finlex® web publication. The juridical material achieve of Ministry of justice [Edita Publishing Oy]. <http://www.finlex.fi/fi/laki/ajantasa/1996/19961096?search[type]=pika&search[pika]= luonnonsuojelulaki >. (Accessed 29.9.2013)

Nature Conservation Degree (160/1997). 1997. Finlex® web publication. The juridical material achieve of Ministry of justice [Edita Publishing Oy]. < http://www.finlex.fi/fi/laki/kaannokset/1997/en19970160.pdf >. (Accessed 3.10.2013)

Nordland Mines Oy. Hannukainen mine project. <http://www.hannukaisenkaivos.fi/index.html>. (Accessed 6.10.2013)

Nordland Mines Oy. Hannukainen mine project. <http://www.hannukaisenkaivos.fi/images/ilmakuvassa.jpg>. (Accessed 20.11.2013)

Outi Airaksinen & Krister Karttunen. 2001. Naura 2000- luontotyyppi opas[Suomen ympäristökeskus]. <http://www.vyh.fi/palvelut/julkaisu/elektro/yo46/yo46.htm>. (Accessed 23.5.2013)

Figure of the interview.< http://chezsams.blogspot.fi/2011/03/tv-interview.html>. (Accessed 16.11.13)

Päivi Kauppila, Maija Liisa Räisänen ja Sari Myllyoja. 2011. Metallimalmikaivostoiminnan parhaat ympäristökäytännöt. [Suomen ympäristökeskus]. <https://helda.helsinki.fi/bitstream/handle/10138/37056/SY_29_11_Metallimalmikaivostoiminta_LR.PDF?sequence=1 > (Accessed 6.9.2013)

Raahenseudun Teknologiakeskus Oy. 2013. Selvitys tulevien kaivoshankkeiden tarjoamista liiketoimintamahdollisuuksista Raahen seutukunnan metalliyrityksille. <http://www.prometal.fi/wp-content/uploads/2013/04/1303-Kaivosselvitys-2013.pdf >. (Accessed 15.9.2013)

Regional State Administrative Agencies. Environment. <http://www.avi.fi/web/avi/ymparisto;jsessionid=DB9727B29A9AFE4D639776D0B616FEB9#.UkAfzSd58wo>.(Accessed 23.9.2013)

R. Lahtinen, P. Hölttä, A. Kontinen, T. Niiranen, M. Nironen, K. Saalmann and P. Sorjonen-Ward. 2011. Tectonic and metallogenic evolution of the fennoscandian shield: key questions with emphasis on finland. [Geological Survey of Finland]. <http://arkisto.gtk.fi/sp/sp49/sp49_lahtinen.pdf >.(Accessed 11.11.2013)

Sirkka Hirsjärvi ja Helena Hurme. 2000. Tutkimushaastattelu. Teema haastattelun teoria ja käytäntö. Helsinki: Yliopistopaino.

State Environment Administration (Valtion ympäristö hallinto). Vesistöennusteet: Torniojoen vesistöalue. <http://wwwi2.ymparisto.fi/i2/67/>. (Accessed 10.10.2013)

Suomalais-Ruotsalainen rajajokikommissio. Lausunto Northlandin Hannukaisen kaivoksen YVA:sta 25.11.2013. <http://www.fsgk.se/Hannukainen_kaivoshanke_yva-selostuslausunto_25112013.pdf> (Accessed 27.11.2013)

Suomen radon hallinta. Radon info. [Suomen radon hallinta Oy]. <http://www.suomenradonhallinta.fi/radon-info>. (Accessed 15.11.13)

Tiina Rissanen & Antti Peronius. 2013. Suomen kaivostoiminnan toimialakatsaus 2012. Sarja B. Raportit ja selvitykset 3/2013. [Kemi- Tornion ammattikorkeakoulu]. <https://publications.theseus.fi/bitstream/handle/10024/56212/rissanen%20peronius%20B%203%202013.pdf?sequence=1 > (Accessed 6.9.2013)

Timo Rautajoki. 2012. Miksi Barentsin alue kiinnostaa? Presentation in Theme seminar of the possibilities of Barents Region in Kalajoki 5.11.2012. [Lapin Kauppakamari] <http://www.barents-transport.fi/files/Rautajoki.pdf >. (Accessed 15.9.2013)

The Centre of Economical Development, traffic and Environment. Environmental protection. <http://www.ely-keskus.fi/web/ely/ymparistonsuojelu#.UkAlyid58wo>. (Accessed 23.9.2013)

The Centre of Economic, Traffic and Environment. Environmental impact assessment. <http://www.ely-keskus.fi/web/ely/ymparistovaikutusten-arviointi#.UkAeQid58wo>. (Accessed 23.9.2013)

The Environmental Impact Assessment report of Hannukainen Iron Mine, Northland Mines Oy, 2013. < http://www.hannukaisenkaivos.fi/YVA-selostus.htm >. (Accessed 1.10.2013)

The 1994 Habitats Directive 92/43/ETY on the conservation of natural habitats and of wild fauna and flora. EUR-Lex. [Web publication managed by the publication office]. <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31992L0043:EN:html >. (Accessed 30.9.2013)

Water Act (587/2011). 2011. Finlex ® web publication. The juridical material achieve of Ministry of justice [Edita Publishing Oy]. <http://www.finlex.fi/fi/laki/ajantasa/2011/20110587 >. (Accessed 4.10.2013)

Yle Uutiset. Raahen kulta kaivos joutuu moneen syyniin. 10.5.2012. <http://yle.fi/uutiset/raahen_kultakaivos_joutuu_moneen_syyniin/6090493> (Accessed 23.1.13)

Yle Uutiset. Raahen kultakaivos saa laskea jätevesiä luontoon. 10.5.2012.

<http://yle.fi/uutiset/raahen_kultakaivos_saa_laskea_jatevesia_luontoon/6088008> (Accessed 31.1.2013)

Yle Uutiset. Raahen kulta kaivos haluaa laskea jätevesiään ympäristöön. 13.3.2012.

<http://yle.fi/uutiset/raahen_kultakaivos_haluaa_laskea_jatevesiaan_ymparistoon/5071905> (Accessed 31.1.2013)

Yle Uutiset. Rajajokikomissio arvostelee Hannukaisen kaivoksen YVA-selostusta. 27.11.2013.

<http://yle.fi/uutiset/rajajokikomissio_arvostelee_hannukaisen_kaivoksen_yva-ohjelmaa/6956018> (Accessed 27.11.2013)

Ympäristö. Ympäristöhallinnon yleinen verkkopalvelu. <http://www.ymparisto.fi/download/noname/%7BFAC30B3A-2B92-430E-9347-AC80B3B50242%7D/77581 >. (Accessed 9.12.2013)

Ympäristö. Ympäristöhallinon yleinen verkkopalvelu. Ympäristölupien valvonta. <http://www.ymparisto.fi/fi-FI/Asiointi_ja_luvat/Luvat_ilmoitukset_ja_rekisterointi/Ymparistolupa/Valvonta>. (Accessed 18.9.2013)

Ympäristö. Ympäristöhallinon yleinen verkkopalvelu. Hannukaisen rautakaivoshanke, Kolari. <http://www.ymparisto.fi/fi-FI/asiointi_ja_luvat/Ymparistovaikutusten_arviointi/YVAhankkeet/Hannukaisen_rautakaivoshanke_Kolari>. (Accessed 8.10.2013)

Äkäslompolon kyläyhdistys. YVA-lausunto Hannukaisen kaivoshankkeesta. 29.11.2013. <http://www.äkäslompolo.fi/etusivu.html>. (Accessed 13.12.2013)

12 APPENDIX

Interview with official 1, Eero, in ELY-center. 15.3.2013. Rovaniemi

Interview with official 2, Einari, in ELY-center. 15.3.2013. Rovaniemi

Interview with official 3, Elli, in ELY-center. 15.3.2013. Rovaniemi

Interview with official 4, Aaro, in AVI. 10.5.2013. Rovaniemi

Interview with official 5, Tuukka, in TUKES. 15.5.2013. Rovaniemi

Interview with official 6, Tuomo, in TUKES. 15.5.2013. Rovaniemi

13 ACKNOWLEDGEMENTS

I want to thank Kolari Forest Research Institute and my Final thesis supervisor Mikko Jokinen for the Final thesis topic, guidance and help. I also want to thank my Final thesis supervisor teacher Eveliina Asikainen for all the help and guidance so that I could finally finish this project.