Environmental Disasters as the Drivers for Policy Change

Case Study: Talvivaara Mine

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Abstract

Environmental disasters can become defining moments in environmental policy. They have the potency to cause significant changes in existing governmental policies and practices. This master's thesis purpose is to study how the disaster of Talvivaara mine has impacted the policy change in the context of the Finnish mining sector.

The subject is approached with the theories of risk society, reflexive modernization and the model of event-related policy change. The case's policy process is examined, while taking into account the wider societal conditions.

A detailed case description reveals how the case conflict developed, where and what kind of action was taken. Furthermore, series of expert interviews were conducted, providing more information and opinions about the actions and reactions that the disaster caused.

The research finds that the policy process was affected by the type of the disaster, the substantial group mobilization, and the strong role of the NGOs and media in the discussions. The case caused changes in environmental regulation, the image of mining has suffered, and the public's trust in authorities has decreased. In consequence, the authorities have become more cautious and the public interest and participation in mining issues has increased due to increased fears and changed risk perceptions. Overall, the case has had a major impact on the societal governance of the Finnish mining sector.

The research suggests that a disaster can cause positive policy change but the limitations of a single case study may not allow drawing very broad conclusions outside the specific political and societal conditions.

Keywords

Disaster, environmental conflict, policy change, risk, mining

Preface

My personal interest in this topic came from some of the big environmental disasters that have been featured heavily on the news in the recent years. There was the Deepwater Horizon (BP) oil spill in 2010 and about a year later, the still going Fukushima nuclear disaster. The Fukushima incident touched me personally, as I was living relatively close to the danger zone when the crisis begun, hoping that the winds would stay favorable. Back here in the Finnish scale, Talvivaara mine has been constantly on the news, struggling with continuous environmental problems since its operations begun in 2008.

This flood of bad news had me thinking: how do we as a society respond to these kinds of disasters? Do we learn anything from them, or do we just continue with our old ways, accepting the disasters as a necessary evil of the development? As an individual, one may feel quite helpless and powerless in front of such big events, which also never seem to have clear culprits behind them.

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1 INTRODUCTION

1.1 Background

Environmental disasters can become important events in our individual lives and in the collective memory of a nation. Even eras can be named after them as we may, for example, refer to time before and after the Chernobyl accident. At some point of our lives, almost all of us can expect to be directly or indirectly affected some way by a natural disaster, a major industrial or technological accident. Such events often also become landmark cases in environmental policy.

Big environmental disasters have the potency to cause significant changes in existing governmental policies and practices. For instance, the Three Mile Island and the more recent Fukushima's nuclear accidents induced major changes in several states' energy policy. Suddenly, nuclear energy was not seen as a safe option as before. After events like these, the public is likely to demand safer and more sustainable policies from the decision-makers, which creates a window of opportunity for change.

Number of scholars of the policy process have touched the importance of events in public policy making. John Kingdon describes *focusing events* in his book Agendas, Alternatives and Public Policies (1995), that cause many people – bureaucrats, elected officials, and the general public – to pay greater attention to the problems revealed by these events. Other students of the policy process, such as Cobb and Elder (1983), Baumgarter and Jones (1993) and Light (1982) also cite the importance of sudden, vivid events in stimulating greater interest in a problem and possibly inducing policy change. Furthermore, Thomas Birkland develops the idea with theoretical and empirical research in his book After Disaster (1997), supporting the statement that focusing events indeed influence public policy-making process. In Lessons of Disaster (2006), Birkland continues, explaining how we can understand policy change as the result of learning processes in the policy process.

The literature commonly makes a distinction between natural and technological disasters, which you could also call self-produced, 'manufactured risks', as Anthony Giddens (1994) does. Whereas natural disasters have been found to produce therapeutic response in which communities unite in efforts to help victims, repair damage and reestablish life as it was before the disaster struck, technologically induced disasters have a corrosive effect on community life (Freudenburg 1997; Kroll-Smith, Couch & Levine 2002). Birkland (1997)

also recognizes that there are different ways the society reacts depending on the nature of the disaster. If the disaster is seen as an "act of God", such as natural disaster or freak accident, our attention turns to what we can do to help the victims. However, if the disaster is seen as a result of human failings – poor design, operator error, "corporate greed", or "governmental neglect" – our attention turns to the voluntary acceptance of responsibility for an event or to the more coercive process of fixing blame (Birkland 1997: 2). Action is taken, all in hopes of "learning something from this incident" to ensure that something similar does not happen again. However, a concrete policy change with positive outcomes can be hard to achieve. An action may be taken in a rush in an attempt to please the public, without proper learning behind it.

In this master's thesis, I focus on environmental disasters caused, or at least greatly enhanced, by man-made actions (or in some cases inaction). This distinction is not always clear as some disasters, such as Fukushima, can be perceived as natural (tsunami caused by the earthquake) or technological disaster (failure of the protective systems) depending on the point of view. However, I am interested in disasters which have been created by men in the pursuit of techno-economic prosperity, which would include Fukushima into the latter category, assuming the existing risks were accepted when the technology was introduced. This kind of definition is in effect closer to Faulkner's (2001: 137) definition of crises which in his words are "induced by the actions or inactions of an organization", whereas disasters result from "induced natural phenomena or external human action" to which government or organizations can simply respond.

I approach the subject with the theories of risk society and reflexive modernization. These theories attempt to explain the contemporary society by using the concepts of increased risk and reflexivity that the industrial development has brought us with its unforeseen side effects. The theories can help us understand the conditions that enable these risks to come into existence and how the society reacts to them. What is often common in these cases of "self-produced disasters", is the acknowledged and often accepted levels of risk involved in the different stages of the projects. The actors or the decision makers have to convince the public on the safety of the project. However, the risks of contemporary society can be often so complex that only a minor part of the population will understand them completely. Moreover, as the traditional safety institutions keep failing time after time, they begin to lose their public trust. Action may have to be taken via some other route. Public interest and pressure groups form alliances and attempt to take the matters into their own hands.

Finally, I will modify Birkland's (2006) model of event-related policy change, tying the aforementioned theories into it, to make more specific observations about the policy process of the case study of my research, which is introduced in the following section.

1.2 Environmental Disaster of Talvivaara

When looking at the history of Finland, it is hard to find major examples of environmental disasters that have become focusing events at the national level. In fact, Finland has so far managed to avoid these kind of sudden catastrophic incidents (YLE 16.7.2014). Most of the occurred environmental problems have been related to harmful substances that have polluted the environment over long periods of time. Locally, we can find cases like the timber mill of Penttilä in Joensuu, which polluted 50 hectares of land during its operations over 100 years and resulted in the country's largest single soil cleansing operation with a 15 million price tag on it. However, the case caused no national movements or significant policy changes even if it may have been a major issue at the regional level. In the mining sector, we have several minor incidents like the 2012 case of Pahtavaara goldmine, where 500 cubic meters of contaminated water leaked from the mine's enrichment pool to the environment. Once again, the impacts were deemed local and temporary and the case caused no wider reaction.

The case study of this master's thesis is the recent environmental disaster of Talvivaara mine, commonly referred just as Talvivaara. Talvivaara has been called Finland's worst environmental disaster in the 2000s (e.g. HS 9.11.2012) and even the worst environmental disaster in the whole Finnish history (e.g. Verkkomedia.org 12.11.2012). Talvivaara has struggled with continuous problems from the establishment of the mine, but the main origins of the environmental disaster and the wider conflict are in the several leaks that occurred in the mine's gypsum ponds. The most significant leak happened in November 2012, when hundreds of thousands of liters of contaminated liquid escaped to the surrounding waterways. In addition to the leaks, there was a major issue related to the plans to mine uranium as a by-product from the mine. Talvivaara had not informed about these plans publicly beforehand, which caused a big response when they finally came out. Overall, Talvivaara received great amount of negative publicity and today the name seems to be the first thing on any Finn's mind when the topic of mining is brought up. At the time of writing this, the case is still alive and continues staying on the news regularly.

Even though there are varying opinions about Talvivaara's true impact to the environment, there is no question that the case has become a major event for the whole mining sector of

Finland. The case has sparked heated discussion in the public, and not only about the specific incident, but also about the risks of mining in general. The governmental institutions' legitimacy has been questioned and there have been accusations of cover-ups and scaremongering. Environmental groups have organized demonstrations, the authorities have changed their guidelines, stress tests for mines have been commenced and the case may still have further implications to the pending environmental legislation. The case may very well become a defining moment for environmental policy and mining in Finland.

1.3 Research Questions and Objectives

This master's thesis' object is to study environmental disasters' impact on policy change. The research problem can be defined with a question: in what way do environmental disasters work as the drivers for policy change? The object will be studied through the case study of Talvivaara mine's environmental disaster. The focus is on the environmental aspects of governance, but also in the economic and social aspects which are often inseparable from each other. A key feature for this study is how the changing societal conditions of the contemporary society are present in the policy process.

The following more specific questions concerning the case study will guide this research:

1. What were the main factors influencing the learning and policy processes initiated by Talvivaara?
2. What kind of societal reactions has the case produced?
3. How has the case impacted the societal governance of the Finnish mining sector?

To clarify the first question, these factors could be related to issues such as did the type of the disaster affect the process, did certain actors have a strong role in the process, what issues generally affected the followed discussion and did the discussion even play a role in the conducted measures? To be able to answer the above questions sufficiently, one research task is describing the events of Talvivaara in detail. This will reveal how the discussions developed as the conflict grew larger and when and what kind of action was taken.

I will begin this master's thesis by covering the theoretical framework and the related key concepts. I move from the grand theories of risk society and reflexive modernization towards the more practical applications of reflexive governance and to the model of event-related policy change. Second, I present the research data and methodology. The data consists of official documents and expert interviews. The documents demonstrate the concrete measures

that have been taken and work as background material for the interviews and the conflict description. The interviews provide opinions and information about the impacts and the conducted measures. The interview data is analyzed utilizing thematic analysis and later, the information gained from the case description and the interviews is interpreted through the theoretical framework. Third, I will describe the history of the Talvivaara case and the origin of the environmental conflict in detail. Fourth, I will present the results and finally, I will end the master's thesis with the conclusions and discussion.

2 THEORETICAL FRAMEWORK

Environmental disasters have always had a big role in environmental sociology and policy. The theory of risk society is a social analysis of the contemporary period, ecological crisis being a central part of it. In its view, the development has brought us manufactured risks which cause increasing amount of social concerns. It can be argued that environmental disasters play a significant role in creating these concerns. In consequence, these social concerns may lead to a state of reflexive modernization which focuses on preventive measures to decrease the levels of risk. While majority of the literature regarding disasters focuses on disasters of natural origin, the focus here, like in the risk literature in general, is on technological hazards facing the more developed industrial countries and the conditions of late modernity in which they find themselves.

In this chapter, I will first open the theoretical background, explaining how the utilized theories fit in the wider field of theoretical developments in environmental sociology. Second, I cover the theories of risk society and reflexive modernization. Following these sections, I will attempt to bind them into the context of disasters and to the case study by recapping the important features for this research. Third, I move to the concepts of policy process and learning, with the focus on event-related policy change. Finally, the model is then tied together with the aforementioned theories, creating a framework for the analysis.

2.1 Theoretical Background

There is a debate among social theorists as to whether or not the process of modernity is yet complete and whether or not we have moved into postmodernity. Sociologists, such as Beck, Giddens and Lash, see that there are too many aspects of the differentiation of modern society which have not yet been resolved for us to declare we have succeeded in progressing to another phase. Instead, they argue that modernization should be seen to continue into the contemporary era, which is then better considered as a radical state of late modernity. (Beck 1992; 1994; Giddens 1994; & Lash 1994.) This distinction is significant because unlike postmodernism, the view of late modernity acknowledges the Enlightenment project, its associated concepts, such as grand narratives of progress, linear unfolding of history, and traditional concepts of reason and rationality. Late modernity sees that we can discover objective knowledge and use it to better society.

The theory of re-modernization sees that our political and social systems have new rules, and the task of social science is to understand and explain them. Postmodern theorists see the issue as the de-structuration of society and the de-conceptualization of social science, whereas for re-modernization it is a matter of re-structuration and re-conceptualization (Beck, Bonss, & Lau 2003: 2). The goal of the latter is to construe the new rules even as they are coming into existence. This approach attempts to strengthen social science rather than bid farewell to the science as some postmodern quarters like to think (Ibid: 3). It could be said that the introduction of the theory of reflexive modernization had two purposes: to reassess sociology as science of the present and to provide a counterbalance to the postmodernist paradigm offering re-constructive view alongside deconstruction.

In the past few decades, we have seen clear theoretical developments in environmental sociology regarding its focus (Picou & Marshal 2002: 293). Growing number of human-generated environmental risks, emerging from the environmental pollution and the depletion of natural resources, have turned the interest towards the concept of risk. Two macro-level theories, risk society and ecological modernization theory, have framed much of the global environmental political discourse over this time (Ibid: 294). The main contradiction between these two theories centers on the potential role of modern technology for either overcoming environmental crises (ecological modernization) or aggravating the extant environmental problems (risk society) (Ibid: 301). However, some common characteristics can be found between these perspectives. These can be also found in several recently developed middle-range theories, such as ecological-symbolic theory, resource-dependency theory, and ecosystem management approach (Picou & Marshal 2002). First, they suggest that modern societies are striving to enhance rational decision-making by expanding participation in environmental discourse. Second, they recognize that traditional science is partially responsible for many of the environmental problems we face today. Third, they address issues of public trust and skepticism regarding science, organizational mission, and institutional dependency. However, whereas risk society theory sees that without systemic change, promoting economic growth and environmental protection is futile because of the structural contradictions between the two, ecological modernization argues that it is possible to change the system within, through technological innovation, institutional adaptation, and superindustrialization (Ibid: 307). Perhaps for this reason, ecological modernization has been embraced in principle and practice by policymakers, as it can be implemented without addressing the politically contentious issue of structure of the existing political system. Both

of these macro-level theories appear to be best applicable to advanced welfare states where the material needs are met via wealth redistribution through taxation and social security (Ibid: 308).

There are different views on how the theories of risk society and reflexive modernization are connected together. Some see them part of a one grand theory, while others like to see reflexive modernization more distinct or as an extension to the concept of risk society. Perhaps most commonly and how I am here interpreting it, it is seen that societies become reflexive as a consequence of risk society among other features which are caused by the ongoing societal change. Here I have decided to open the theories separately for the sake of clarity, while focusing on the parts that are important in the context of my research. While the theories contain many different features, I will focus on the aspects that are central in the context of my case study.

Both risk society and reflexive modernization incorporate ideas about social constructionism and expertise into their very fabric. Social constructionism examines how social realities and meanings are constructed. The methodology sees that our social reality is being constructed in social, linguistic interaction. Social constructionism emphasizes the significance of language, because it has the essential role in constructing our reality. From the point of social constructionism, many things that we take for granted (e.g. the countryside or the suburb) can be demonstrated to be socially produced. They own a certain history and they have become the established way to see and organize the reality. The idea is that when you examine the established phenomenon's social origin and history, their nature and relation to the social power structures becomes easier to understand. (Häkli 1999: 133-138.)

2.2 Risk Society

German sociologist Ulrich Beck came up with the concept of risk society in the mid-1980s and term went to receive great popularity during the 1990s. When Beck's main work, 'Risk Society: Towards New Modernity' was published in 1986 (translated to English in 1992), the timing could not have been more fitting. The cloud of Chernobyl was spreading over Europe and when the French translation appeared, the catastrophe had just struck in Toulouse and New York. As Bruno Latour wrote in the preface to the second edition of the French translation of Beck's work: "Who still needs proof that we have well and truly entered the risk society?" (Boudia & Jas 2007: 318). Beck's work enjoyed great success and he inspired and stimulated the development of a body of work that took up the idea of risk society.

The concept is based on the fundamental idea that development's negative side effects have grown larger than the welfare it has brought us. The social production of wealth is systematically accompanied by the social production of risks. The risks are unforeseen consequences of the industrialization and the new technologies that have emerged with it. We are no longer exclusively concerned with making nature useful or releasing mankind from its traditional constrains, but also and especially with problems resulting from techno-economic development itself (Beck 1992: 19). Even though we are not yet necessarily living in a risk society, there is a transition on the way: wealth distributing society is changing into risk distributing society (Jokinen 2008: 17).

For a long time, these new, emerging risks were largely dismissed as the new technology brought more wealth and better living conditions. However, these manufactured risks have grown more serious and more tangled into the structures of the world society, that they can even threaten the very existence of the human species. In the welfare states of the West, the struggle against scarcity has lost its urgency as the main objective overshadowing everything else. Instead, it has been replaced with other problems related to abundance, such as obesity. (Beck 1992: 20.)

Undoubtedly, the preindustrial society had its own dangers, such as epidemics, floods and earthquakes, which Beck calls natural hazards. Certainly there were also accepted personal risks for people who were looking to discover new continents. However, these risks were seen as part of fate or as the consequence of deviant behavior: caused by some external powers, such as gods or demons, or by the individual choices that the people made (Beck & Holzer 2007: 4).

The difference is that industrialization brought us manufactured risks that are explicitly human-made. These risks are the results of the societal, usually technology-based pursuit of legitimate and valued objectives. The risks of risk society are based on decisions, and more specifically, on the decisions that focus on techno-economic advantages and opportunities and accept hazards as the dark side of progress. These risks differ from other hazards and dangers by their 'normal', 'peaceful', and often systematic origin in the centers of rationality and prosperity (Beck & Holzer 2007: 4). Finally, they differ from preindustrial natural disasters by their origin in decision-making, which is primarily conducted by organizations and corporate actors and only rarely by individuals (Ibid). Now we have global risks that arise for all of humanity from nuclear technology, chemical industry, gene technology and climate

change. In Beck's view, this kind of risks have begun to dominate the risk society, which is increasingly occupied with debating, preventing and managing risks that it itself has produced (Beck 2006: 332).

Another major difference is that if risks were before detectable with your nose and your eyes, now they are often invisible, hiding under complex physical and chemical formulas (Beck 1992: 21). In the past, the dangers were largely the result of undersupply of hygienic technology, but today, they have their basis in industrial overproduction. Today even natural hazards appear less random than they used to, as we have the ability to prepare for them with various ways, such as planning and structural arrangements. If the risks of the classical industrial society were at least in principle calculable or avoidable for an individual, in the risk society, they do not care about the temporal, local or social borders. Risks are no longer tied to their place of origin – the industrial plant (Ibid: 22). The new global problems demand global solutions. Thus, according to Beck, we should be talking about global risk society instead (Beck & Holzer 2007).

Beck (2006: 334-335) argues that the perceptions of global risk are characterized by three features. First, global risks are no longer limited to one geographical location or space, they are in principle omnipresent. The new risks, such as climate change, do not respect man-made borders such as states or even continents. Second, the risks have become in principle incalculable. The risks have a long latency period so that their effect over time cannot be reliably determined or limited. The risks have also become so complex with their long chains of effect that it is hard to reliably outline the causes and consequences. For example, it is impossible to know how many people were (and will be) really affected by the accidents such as Chernobyl and Fukushima. The accidents can outlast generations: the affected may even include those who are not yet alive at the time or in the location where the accident took place (Beck 1992: 22). Third, risks have become non-compensable. If previously accidents could occur as long as they were compensable, now the global risks may have even irreversible consequences. This breaks the logic of compensation and it is replaced by the principle of precaution through prevention. It also leads to us trying to anticipate and prevent risks whose existence has not been proven yet. (Beck 2006: 334.)

As the big environmental disasters become unavoidable with individual actions, the risks change the society's traditional class and layer formations radically. As Beck has put it famously: "poverty is hierarchic, smog is democratic" (Beck 1992: 36). When it comes to

water supply or the air we breathe, everybody – regardless of class – is affected. This will have an equalizing effect in the end. However, Beck understands that in some ways, the risks may actually strengthen the class society, as the educated and the rich have better knowledge and resources to avoid them. The worldwide equalization of risk positions does create new inequalities, especially when risk positions and class positions overlap (Ibid: 41-42). This can be seen, for example, when hazardous industries are transferred to the low-wage countries of the third world, where the battle against hunger allows the acceptance of the new risks. In a world risk society, powerful actors (e.g. Western governments or powerful economic actors) are able to maximize risks for others while minimizing them for themselves (Beck 2006: 333). Risk is a socially constructed phenomenon, in which some people have a greater capacity to define than others. However, the 'boomerang effect' may eventually strike back those wealthy countries, when the risks return via the food chain.

Beck (2006: 332) emphasizes that the distinction between risk and catastrophe should be made clear as it has been misunderstood by many of his critics. Risk is not a catastrophe – it means the anticipation of catastrophe. Risks exist in the permanent state of virtuality and become real only when they happen. Risks are events that we anticipate, such as further terrorist attacks, floods or nuclear disasters. It is irrelevant if the World of today is safer if we anticipate these hazards: that anticipation alone produces the compulsion to act.

In Beck's view, another major feature of the late modern risk society is the public's growing skepticism of social institutions and scientific expertise. The new complex risks of the late modernity can be identified and investigated only by using the tools of science, which makes scientific expertise and institutions responsible for all the debates about risk (Beck 1992: 4). Moreover, the governments and experts are unable to manage these risk incidents and to provide the public with relevant information. As the key institutions of modernity (science and expert systems, the state, commerce and the international system and the military) which are supposed to guarantee rationality and security fail, this perception begins to fade. The growing awareness that they are ineffective, or even counter-productive, undermines their power. The institutions are no longer seen as the instruments of risk management, but also as a source of risk (Beck 2006: 338). However, the individual who is unable to understand these complex risks, which often are not even detectable with your own senses, is incapable to escape the power of definition of expert systems, whose judgment he cannot, but is forced to trust (Ibid: 336).

Beck argues that sciences have become entirely incapable of reacting adequately to civilizational risks, since they are prominently involved in the origin and growth of those very risks. Instead, the sciences become the legitimating patrons of a global industrial pollution and contamination of air, water, foodstuffs, etc., as well as the related generalized sickness and death of plants, animals and people (Beck 1992: 59). The first priority of techno-scientific curiosity is utility for productivity and the hazards connected with it are considered only later and often not at all (Ibid: 60). The risks associated with the effort to increase productivity are neglected. This leads to situation where the victims can complain and complain, but they are not taken seriously before their claims are 'scientifically proven'. Until that, the arising problems are nothing but latent side effects and unproven connections.

Another issue with this kind of scientific rationality comes in the form of causal denial of risks. If the recognition of a risk is denied on the basis of an 'unclear' state of information, this means that the necessary counteractions are neglected and the danger grows (Beck 1992: 62). Thus, insisting on the purity of the scientific analysis, can actually lead to the pollution and other harm. With the modernized risks, it may be very difficult or almost impossible to proof undeniably that, for example, the pollutants or chemicals are causing the specific damage. In addition, the illnesses or other negative effects have usually a number of possible causes, meaning, the polluter can always refer to the imperfect evidential value. (Beck 1992: 62-63.) Finally, risk scientists have a way to justify the pollution by referring to 'acceptable levels' of pollution. This way they permit the emission of toxins and legitimate it to just that limited degree (Ibid: 64). As Beck states: "Acceptable values may indeed prevent the very worst from happening, but they are at the same time 'blank checks' to poison nature and mankind *a bit* … Acceptable values make possible a permanent ration of collective standardized poisoning" (Ibid). Furthermore, by permitting toxicity, another battle over definitions arises. Which toxins are included in the decree and which can be freely introduced into circulation, without any restraints?

Relationship between nature and society has to be thought again due to the industrially forced degradation of the ecological and natural foundations of life. This means that nature can no longer be understood outside of society, or society outside of nature (Beck 1992: 80). The societalization of nature leads to the societalization of the destruction and threats to nature. The industrial production leads to the deteriorating of nature which then causes global social, economic and medical threats to people – with completely new sorts of challenges to the

social and political institutions of highly industrialized global society (Ibid). The origins of environmental problems are thoroughly social problems.

Whereas class society was dominated by the idea of equality and welfare, risk society is dominated by the idea of safety. As Beck (1992: 49) puts it: "The dream of class society is that everyone wants and ought to have a share of the pie. The utopia of the risk society is that everyone should be spared from poisoning". Insecurity has replaced scarcity. The key institutions of modernity lose their power as they are unable to manage the new risk incidents. In risk society, the society becomes more reflexive as self-criticism of society intensifies. Society acts to change itself.

2.3 Reflexive Modernization

Whereas the concept of risk society is more of Beck's own development, the theory of reflexive modernization has been more of a co-effort by group of sociologists, such as Scott Lash and especially Anthony Giddens. Beck's and Giddens' view share many similarities, but there are also some differences in their approach to reflexivity. In this section, I will first focus on Beck's interpretation and then move to Giddens, who focuses more on how the reflexivity affects the individual, as the traditional structures no longer guide how the person acts. Finally, I touch briefly on how reflexive modernization has been developed towards the concepts of governance.

The concept of reflexive modernization or reflexive modernity means as its simplest, the notion that we are moving into a third stage of social development within modernity (Aiken 2000: 4). First the traditional society (pre-modernity) was supplanted by the industrial society (first modernity), during which we saw the emergence of classes, wealth accumulation, rapid scientific advance and the arrival of capitalist society. In the concept's view, we are now experiencing the consequences of a shift from the industrial society to the next phase (second modernity), which is the period of reflexive modernity – the modernization of modern society. (Beck, Bonss, & Lau 2003: 1.)

2.3.1 Beck's Reflexive Modernization

Many of the modern society's principles and institutions are crumbling. Even the role of the nation-state, which has been closely identified with the society, is changing (Beck et al. 2003). In his book, World Risk Society, Beck (1999: 2) lists the five elements that are undermining the modernization and modernity. These are globalization, individualization,

gender revolution, underemployment, and global risks. These processes are inconsequential when considered in isolation, but collectively significant. Each process challenges the spatio-political "simple, linear, industrial modernization based on nation state" (ibid). Each detracts from the traditional socio-political institutions on which industrial society relies for its reproduction, and each sets in motion consequences that increase the exposure of individuals and society as a whole to risk (Jarvis 2007: 25).

One central aspect of reflexive modernization is the proliferation of 'sub-politics'. The term is used by Beck (1996: 18) to refer to politics outside and beyond the representative institutions of the political system of nation states. Even though voter participation in elections is on the decline, more and more people take up political issues outside the formal politics. This can happen individually or in associations, movements and protest groups. The lack of interest in formal politics does not mean that there is less political action in the late modernity. In Beck's (1994: 17-19) view, we are looking for politics in the wrong places and using the wrong concepts. The process of reflexive modernization re-politicizes the areas outside the traditional sphere of politics in the face of new challenges. The concepts of the political and the non-political become blurred and require a systematic revision (Beck 1992: 185). According to Beck: "the loss of governmental powers of structuration and enforcement is not the expression of political failure, but the product of established democracy and the welfare state, in which the citizens are able to utilize all the media of public and legal control and consultation for the protection of their interests and rights" (Ibid).

Beck argues that the basic premises of modernity, such as progress, technological rationalization and the domination of nature, cannot be taken with certainty anymore. They can be now challenged and therefore become subject to political struggles. The techno-economic sphere can no longer be considered as non-political but neither completely political, as it continues being shielded by its own constitution against parliamentary demands for legitimation. Instead, it falls somewhere between them. The main characteristic difference of sub-politics to politics is that it does not need to legitimize itself by way of democratic procedures. (Beck 1992: 186.)

Sub-politics differs from politics (policy, polity and politics) in that agents outside the political or corporatist system are allowed to appear on the stage of social design (Beck 1994: 22). Furthermore, not only social and collective agents but also individuals compete with the latter and each other for the emerging shaping power of the political. Sub-politics means

shaping society from below, which viewed from above, results in the loss of power (Ibid: 23). This means growing opportunities to have a voice. Central rule approach, which had previously run without much resistance, loses its power. The 'instrument of power' in sub-politics is 'congestion'. The various groups and levels of decision-making and participation can mobilize the means of the constitutional state against each other (Ibid). However, this may paralyze the whole process as neither side gets their will through. That is the backside of sub-political activation.

In the time of ambivalence of risk society, factories and research institutes encounter resistance of the immediately affected population groups. Administrations on all levels find that, what they are planning to benefit all, has a negative effect on others, which causes opposition (Beck 1994: 29). The experts in industrial plants are convinced that they have worked out these plans rationally, to the best of their knowledge and abilities, in accordance with 'the public good'. In this, however, they miss the onset of ambivalence and attempt to fight it with the old ways, which do not seem to work anymore (Ibid). The positives and negatives of the potentially dangerous and burdensome production or infrastructure plans can never be completely justly distributed. In addition, the conventional instrument of political consultation, the expert opinion, fails accordingly. The interplay between opinion and counter-opinion just hardens the fronts (Ibid).

The traditional monopoly of expertise and administrations cannot be seen as knowing what is always right and wrong. More different kind of groups have to be allowed to participate into decision-making to fit the new social standards of relevance. There has to be also more transparency so the negotiations have to be taken outside the closed doors. Finally, the norms for this process must be agreed on and sanctioned: self-legislation and self-obligation. The negotiation forums of this type do not necessarily guarantee success, but they can urge prevention and precaution and work towards a symmetry of unavoidable sacrifices. They also reveal the true winners and losers and make them public and thereby improve the preconditions for political action. (Beck 1994: 29-30.)

As the risks grow greater, they lose their techno-economic objective constraints. Legally responsible, governmental monitoring agencies and a risk-sensitive media publicity sphere begin to reach for their part in the plant management (Beck 1992: 186). The direction of development and the results of technological transformation become fit for discourse and

subject to legitimation. Thus, business and techno-scientific action acquire a new political and moral dimension that had previously seemed alien to techno-economic activity (Ibid).

The politic power is moving from the official political arenas of parliament, government and political administration towards the grey area of corporatism. The influence of interest and pressure groups extends to the decisions of the state executive and to 'will formation' of the political parties (Beck 1992: 188). New political culture is formed as the centralized political system loses its power. At the same time, the formula of 'technical progress equals to social progress' loses its prevailing status.

There are several opinions on how the modern state's role is changing. Others say it is withering away, while others claim it is more urgent than ever. Beck combines these ideas as he sees that while the state is withering away, it is also reinventing itself to deal with the new global tasks (Beck 1994: 38). The ability to self-organize has become the core of today's politics. Today's state is full of different kind of interest and minority groups (and not just the old ones, such as the trade unions and the churches), from the athletes and the terrorists to the motorists and the conservationists. The authoritarian decision and action state gives way to the negotiation state, which arranges stages and conversations and directs the show (Beck 1994: 39). In Beck's view, the ability of the modern state to negotiate is presumably even more important than its one-sided hierarchical ability to act, which is becoming more and more problematic (Ibid). The state of the late modernity is withering away as a consequence of the self-organization and the sub-politicization of society.

2.3.2 Giddens' Post-Traditional Society

Anthony Giddens's approach to risk and the resulting reflexivity has many similarities with Beck. They both see that the new kind of risks emerge from modernization and globalization. Risks are also qualitatively different in late modern societies, as they have greater impact across space and time. They both claim that risk expert discourses have been undermined by concerns about risk. Finally, they both are interested in how the risk and uncertainty of late modern societies increase its reflexivity. However, whereas Beck claims that increased risk reflexivity is the outcome of a greater number of risks and hazards being produced, Giddens sees that risks are merely thought to be greater because human subjectivity is now more sensitive to risk. Giddens also emphasizes self-reflexivity more, while Beck focuses on our reflexive critiques of the social and institutional side. (Lupton 2013: 97-98.)

Giddens approaches the late modernity from the perspective of individuals and traditions. He sees that the modern society was built on traditions, which were used to legitimate the new power structures. According to Giddens (1994: 91-92), even the most advanced premodern civilizations remained resolutely traditional. Moreover, a collaboration between modernity and tradition was crucial in the earlier phases of modern social development. During this phase, risk was still calculable in relation to external influences. However, this phase came to its end with reflexive modernization. During reflexive modernization, tradition assumes a different character.

In essence, Giddens (1994: 95-97) argues that tradition has brought us a framework for action that can go largely unquestioned. Tradition brings stability, safety and the ability for people to create a self-identity against a stable background. However, globalization has brought new cultures and ideas, which question the traditional ways of life. In Giddens's view, this causes cultures to go through a process of detraditionalization, where the daily life is less informed by "tradition for the sake of tradition". This detraditionalization affects several areas of our life, including the traditional ways of political engagement.

In the time of manufactured risk, which also refers to situations which we have very little historical experience of confronting, risk must be included more and more into the person's thinking (Giddens 2003: 26). Furthermore, as manufactured risk expands, there is new "riskiness to the risk" (Ibid: 28). This means that the new risks involved with such issues as Chernobyl or climate change become impossible to calculate.

New moral political climate emerges, where accusations of scaremongering and cover-ups take the stage (Ibid: 29-30). For example, if a governmental official or scientific expert takes a given risk seriously, he must publicly stand behind it. In addition, it must be widely publicized because people must be persuaded that the risk is real. However, if the risk turns out to be minimal, those involved will be accused of scaremongering. On the contrary, if the authorities decide that the risk is not very great and the events turn out otherwise, those involved will be accused of cover-up. Another layer of complexity is added from the fact that scaremongering may be necessary to reduce risks we face. However, if it is successful, it appears to be just that – scaremongering.

This sort of paradox becomes routine in contemporary society and we are not able to know beforehand when we are scaremongering and when we are not (Ibid: 30-31). If before lay people took opinions from experts, now they must be more active with science and

technology. They cannot accept their findings because the scientists themselves so often disagree with one another. Decisions must be taken in conflicting and changeable scientific and technological information. In the end, we are all caught up in risk management. Governments cannot pretend that they have no part in this and neither can ordinary individuals ignore these new risks, as they have to make constant consumer decisions, such as avoiding GMOs or not. These risks, and the dilemmas surrounding them have entered deeply into our lives (Ibid: 34).

Giddens also sees a change in the role of experts and expertise in the modern context. He sees the rise of expertise as a key part of modernity. While traditional authority got much of its authority from the traditional status, in modern times, rational-legal authority rests upon a belief in the legality of enacted rules and the right of those elevated to authority under such rules to issue commands (Giddens 1994: 83). Personal loyalty is downplayed as compared to due process of law or formal procedure.

Furthermore, comparing tradition with expertise reveals some major differences (Giddens 1994: 84). First, expertise is disembedding, it is non-local and decentered. Second, expertise is not tied to formulaic truth, but to a belief in the corrigibility of knowledge, a belief that depends upon a methodical skepticism. Third, the accumulation of expert knowledge involves essential processes of specialization. Fourth, trust in experts cannot readily be generated by means of esoteric wisdom. Fifth, expertise interacts with growing institutional reflexivity, such that there are regular processes of loss and reappropriation of everyday skills and knowledge. Expertise is in principle devoid of local attachments. Anyone anywhere can achieve the expert status, which runs entirely counter to the nature of guardians of tradition (Ibid).

These differences cause the trust relations between experts and laypersons to change in its nature. It is becoming increasingly difficult for a layperson to trust in these expert systems which seem to contradict each other (Ibid: 87). Expertise has lost a good deal of the aura of authority it once had. All this promotes uncertainty, as we never know whether the knowledge we have will be revised.

2.3.3 Reflexive Governance

The theory of reflexive governance can be seen as an application of Beck's ideas to practices of societal and political governance (Sairinen 2009: 145). The theory has two different but related meanings. First, reflexive governance can be seen as the condition of governance. This

refers to how modernity deals with its own implications and side effects, the mechanism by which modern societies grow in cycles of producing problems and solutions to these problems that produce new problems (Voss & Kemp 2006: 6). This leads to continuous questioning of the governance's ability to control and direct when faced by for example surprising and large environmental problems (Sairinen 2009: 146). Problems are solved by creating new problems or aggravating the reasons behind the problem. This can be also called first-order reflexivity.

On the other hand, reflexive governance can be understood as self-correcting and anticipating (second-order reflexivity) (Ibid). This means the development of self-critical and self-assertive strategies, processes and institutions. The aim is to address the reasons behind the visible problems. Such governance measures can include integrated transdisciplinary knowledge production, searching for alternatives and experimenting, strategies and institutions which adapt to uncertainty and complexity, anticipation of long-term effects, continuous improvement, interactive objective definition and implementation, cooperative policy networks, user perspective, and continuous institutional learning. In this latter form, reflexive governance challenges the existing institutional terms of reference and knowledge production models to regenerate very radically (Ibid). It interrupts the automatism of executing problem-solving routines, it transcends particular rationalities, and breaks the vicious circle of first-order reflexivity (Voss & Kemp 2006: 6).

In practice, governance arrangements that include these reflexive strategies usually evolve from repeated attempts at grappling with very specific problems rather than from the theoretical recognition of reflexivity (Ibid: 421). For example, cooperative policy networks are a response to the interference of actor strategies that may spoil policy implementation. These experiences can lead into adapting of cognitive concepts and institutional arrangements so that they transcend the boundaries of closed-up problem solving routines. New principles such as precaution, participation and learning reflect the possibility of unintended feedback and error of any rigorous analysis and strategy by translating it into fruitful interaction with dynamic contexts of real world implementation (Ibid: 422).

2.4 Risk Society and Reflexive Modernization in Context

As the theory of risk society and its popularity was born largely from environmental and technological hazards, it naturally seems to describe many of the conditions around disasters well. The following parallels with the theory and the case of Talvivaara can be also found from several big disaster cases around the World. At the wider context, it could be seen that

the new technology introduced with the Talvivaara mine and the risks involved were accepted in a techno-economic pursuit of prosperity. While Beck often speaks in global context, I attempt to adopt his ideas also in the national scale. However, globalization is prominently present in mining business. The international investors and global price fluctuations of the mined minerals have significant impact on the operations. The global supply and demand determines largely the profitability of the mine. The changing mineral prices may bring additional pressure to the company's decision making. Furthermore, mining minerals often go through a long chain of refinement processes before the final products hit the market. This means numerous companies are directly affected by the mine's operations, not to forget the hundreds of subcontractors that are working in the production chain.

While Beck talks about the new inequalities that the new risks can create in global context, we may see some parallels also at the state level. The high rates of unemployment in the rural areas may allow acceptance of new risks, just as the less developed countries have been more willing to accept polluting industries in the past. For example, traditionally in Finland mining has been often seen as one of the only options to bring more jobs to the rural areas.

Many risks of contemporary mining, including Talvivaara, match Beck's description of the new complex risks in a sense that they are invisible, incalculable, and they are not completely bound on the place of their origin. First, they are invisible, hiding under complex physical and chemical formulas. Even though Talvivaara's leaking water itself may have been easy to spot, the main risks caused by the heavy metals and the sulfate effluents are much harder to detect. Second, these contaminated waters may also spread to wide areas through the waterways. Even if the main impacts in cases like this can be expected to hit the local environment, areas much further away may be affected via the food chain. Third, the damage is at least partly incalculable, due to the long latency period. Finally, it is hard to outline the causes and consequences, because the risks are so complex with their long chains of effect.

Beck also discusses how the new global risks are often non-compensable. At the state level, the high price of the damage to the environment caused by the disaster, may force the whole society take part in the compensation process. If the disaster is perceived to be the fault of a company, it may be hard for the society to accept the payer's role. At the state level, events such as Talvivaara may be large enough to break the logic of compensation, which may be replaced with the principle of precaution through prevention.

Even though the risks related to mining, or to some other specific industry, may not have increased due to an environmental accident at a mine or other industrial disaster, the anticipation of further risks may create a compulsion to act. This fits Beck's distinction between risks and catastrophes. It is irrelevant if the World of today is safer than before, if the contradicting perception exists. In a mining case, this perception could appear as, for example, increased fears and opposition of mining in general.

A disaster case may also illustrate what Beck calls the public's growing skepticism of social institutions and expertise. This could result from the public institutions' inability to manage the risks and from a failure to provide the public with relevant information. In contemporary society, the public has the opportunity to get information about a disaster from multiple sources, which may provide different views on how the events progressed or what were the reasons for the incident. The situational understanding of the authorities may differ significantly from the media's point of view, which is also often able to present their information significantly faster than the governmental institutions. This conflicting information may cause skepticism, which in consequence may end up undermining the institutions' power, as Beck argues.

Finally, a disaster case may illustrate Beck's criticism of the scientific system. The numerous different possible causes of the damage, can make proving the source very difficult. The polluter can always refer to imperfect evidential value. For instance, a mining company could utilize this strategy to deny its role with the problems witnessed in the surrounding environment. In this context, Beck also discusses the acceptable values and how they permit the emission of toxins and legitimate it to that limited degree. In Finland, the mining industry has been traditionally relying on environmental permits, which allow certain amount of discharge waters to be released into the surrounding waterways. The environmental damages, which source is again difficult to prove indisputable, may cause the public to question these limits.

While the above features of risk society can help us understand the context of environmental disasters, reflexive modernization may help to explain the societal reactions to such incidents. At the core of the theory, Beck and Giddens talk about how the society becomes reflexive as it becomes concerned with the problems caused by the development of industrial society and the risks that are produced as a consequence of the modernity. Environmental disasters, caused by manufactured risk, are some of the most extreme examples of these problems and

they may promote also the most significant reactions. Dealing with disasters like Fukushima, Exxon Valdez and even Talvivaara is taking significant time from the society.

Beck talks about the emergence of sub-politics and how political action is moving outside the formal politics. This can happen individually or in associations, movements and protest groups. The lack of interest in formal politics does not mean that there is less political action in the late modernity. Disasters can have a big role promoting this action. Citizen movements can emerge and they can organize effectively, coordinating demonstrations and communicating the citizens' opinions and fears via various ways. Local, national and even global environmental groups can provide another way to take action. These groups can use the media, legal control and consultation to drive their interests. They can also introduce new political and moral dimensions to the business and techno-economic activity. Furthermore, their influence can extend to the decisions of the state executive and to 'will formation" of the political parties. All this could be interpreted as the centralized ruling system losing its power, as Beck argues.

Both Beck and Giddens discuss the changing role of experts and expertise. Traditional monopoly of expertise and administrations cannot be seen as knowing what is always right and wrong anymore. Incidents like Talvivaara, can make it increasingly hard for the laypeople to trust these expert systems, which also seem to contradict each other more and more. A complex disaster can be interpreted from multiple perspectives. The different parties (authorities, NGOs, companies, etc.) can provide their own views, all utilizing their own experts.

With connection to the above, Giddens talks about how the accusations of scaremongering and cover-ups take up the stage in the new moral political climate. The paradox that sometimes scaremongering is needed to prevent a risk, causes a situation where we are not able to know beforehand when we are scaremongering and when we are not. The introduction of new, complex and potentially dangerous technologies are often accompanied with this routine. The industry in question may blame the opponents for exaggerating the related risks. On the other hand, if the risk becomes reality, the accusations of cover-ups are present in the discussion. If we look at some of the biggest manufactured disasters in the recent history, it is hard to find a case where there has not been at least some claims of cover-ups.

Today, more different kind of groups have to be allowed to participate into decision-making to fit the new social standards of relevance. There are also demands for more transparency.

However, as Beck states, the negotiation forums of this type do not necessarily guarantee success but they can urge prevention and precaution and work towards symmetry of unavoidable sacrifices. They also reveal the true winners and losers and make them public and thereby improve the preconditions for political action. As demonstrated later (chapter 2.5), disasters increase the public attention paid to a policy problem. In Beck's view, the formula of technical progress equals to social progress, begins to lose its prevailing status.

In Beck's view, the state is changing into negotiation state, which arranges stages and conversations and directs the show. A disaster may encourage the state to start experimenting with new approaches, emphasizing cooperation and better communication to solve and prevent the illustrated problems from happening again. This may result in reflexive governance strategies, such as cooperative policy networks, which usually evolve from repeated attempts at grappling with a very specific problems.

2.5 Learning from Disasters

While the theories of risk society and reflexive modernization may help us to see the research subject's broader societal context, they are perhaps too 'grand' for making more specific observations of a single case. Risk society may help to explain the underlying social conditions for the disaster and the wider societal response to it may be explained by the reflexivity in reflexive modernization. However, with Thomas Birkland's event-related policy change model, we are able to make more practical observations from the policy process of the case. Birkland's model also brings us back to the original question in this research – how do environmental disasters affect policy change?

In the book 'Lessons of Disaster: Policy Change after Catastrophic Events', Thomas Birkland (2006) expands on his previous work, studying the dynamics of policy change after sudden events known as focusing events. In his previous book 'After Disaster', Birkland (1997) came to the conclusion that disasters and accidents indeed cause a clear increase in attention paid to a policy problem. He also concluded that there is an interaction between the event, the nature of the event (e.g. human versus natural), and the composition of the community of actors who address the policy issues or problems revealed by the disaster. In Lessons of Disaster, Birkland considers whether and to what extent policy change – not just agenda change – follows a disaster. Birkland (2006: 2) calls the policy change that can be plausibly linked to a particular event 'event-related policy change'.

2.5.1 Key Concepts

Before moving further, some key concepts should be defined briefly. After all, there are many contradicting definitions of focusing events, disasters, crisis and catastrophes in the literature. To avoid confusion, it should be repeated again that the kind of events I have been referring as environmental disasters (which are caused or at least greatly enhanced by man-made actions) are closer to Faulkner's (2001) definition of crises than disasters.

Birkland (1997: 22) defines *potential focusing event* as "an event that is sudden, relatively rare, can be reasonably defined as harmful or revealing the possibility of greater potential future harms, inflicts harms or suggests potential harms that are or could be concentrated on a definable geographical or community of interest, and that is known to policy makers and the public virtually simultaneously". This kind of definition takes into account that there may be many events in the public domain that do not become focusing event, for example because of the remote location of the incident.

Crisis, *disasters* and *catastrophes* are three types of focusing events (see figure 1). Faulkner (2001: 137) argues that crisis are sometimes "induced by the actions or inactions of an organization", while disasters result from "induced natural phenomena or external human action" to which government or organizations can simply respond. Crises and disasters also differ in scale. Birkland (2006: 3) uses an example of the "Swiss Canyon Incident", where flash flooding killed hikers in the narrow watercourse. Even though this was partly caused by a natural factor, it is not a disaster because of its small scale and especially because it was the result of the tour operator's carelessness. Birkland also includes events, such as the September

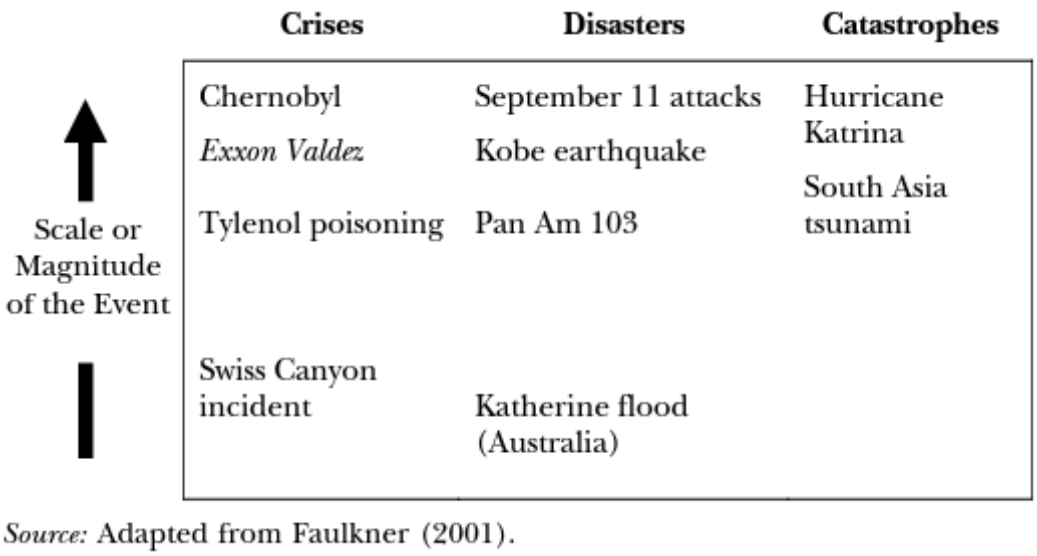

FIGURE 1: Crises, Disasters, and Catastrophes. Birkland's (2006: 3) adaptation of Faulkner's categorization.

11 attacks in the disaster category because "one cannot say that the actions of any one firm or organization caused or led directly to these disasters" (Birkland 2006: 4). Catastrophes are more profound than disasters because they affect much broader area, rendering local and neighboring governments unable to answer because they too are affected by them (Ibid).

The distinction between these focusing events can be useful, but the line between disasters, crisis and catastrophes can be ambiguous. Birkland (2006: 4) states that it will be always in the interest of some participants in policy debate to depict an event as a crisis triggered by willful action or gross human error. "Blame fixing is a key feature of causal stories; these stories are important in both agenda setting and in laying the ground work for the selection of alternative policy directions" (Ibid).

A policy domain is the actual subject of policy over which participants in policymaking compete and compromise. *The policy community* consists of the individuals acting on behalf of groups that are actively involved in policymaking in a particular domain. Domains prone to disasters are policy domains that are the most sensitive to policy change in the wake of disaster. These domains usually do not draw much attention before a sudden event gives issues priority on the agenda. (Birkland 2006: 7.) Efforts to learn and to change policy are likely to be accelerated in the wake of major events. However, if the disaster happens in domains prone to disaster, learning may be more difficult because these large events generally happen infrequently. This low-probability/high-consequence combination can be challenging, particularly when policymakers are confronted to do something, and when action, regardless of its value, may be more politically advantageous than cautious and ultimately more effective deliberation (Ibid: 7-8).

Birkland (2006: 8) defines the learning process as the process by which participants use information and knowledge to develop, test and refine their beliefs. Busenberg (2001: 173) puts it as "the institutional arrangements and political events that shape individual learning". This process is central to Birkland's theory of event-related policy change. The participants may alter their views as they learn more about the policy problem, the potential solutions and the arguments they can make to advance their preferred policies. As their beliefs are altered, we can say that the participants in policymaking are engaged in learning (Birkland 2006: 9). In the end, the goal of social policy learning is to affect change in some tangible way and the most tangible evidence of policy change is new legislation and regulation (Ibid). It must be

assumed that there is some degree of rationality among political actors within political institutions for this learning process to take in place.

Part of the difficulty in explaining how we learn from disasters lies in the difficulty of developing a model of learning (Ibid: 11). Birkland (2006: 15) goes through several types of learning, but concludes that no one type of learning can account for the full range of learning that can occur after disaster. However, Birkland recognizes that Peter May's depiction of learning from policy failures provides a link between disasters and policy failure. In his article, May (1992) provides three kinds of learning that spring up from policy failures. First, instrumental policy learning, which centers on learning from implementation tools and techniques. This is relatively easy to demonstrate by pointing out changing legislation or regulation. Second, social policy learning, which involves learning about the social construction of a policy or program. This can help to understand the underlying causal theory of public problem, leading to better policy responses. Third, political learning, which consists of learning about "strategy for advocating a given policy idea or problem", leading potentially to "more sophisticated advocacy of a political idea or problem" (May 1992: 339).

Ideally, learning leads to better policies. However, policymakers and their supporters may support policy change that is not objectively related to the actual problem revealed by the given event (Birkland 2006: 17). May (1992) calls this kind of mimicking or copying policy without assessment "superstitious instrumental learning". It too may lead to positive policy outcomes but by accident rather than by design.

2.5.2 Event-Related Policy Change

Birkland's (2006) model of event-related policy learning (figure 2) helps to generate propositions about what we might see in the policy process in domains prone to disaster. These propositions suggest the data needed to understand a given event. Birkland (2006: 17-20) lays six of them. First, most if not all participants in a policy domain want to address or solve the problems revealed by a focusing event, but the proposed solutions are likely to vary with the interests and motivations of these participants. Second, few events will gain the most attention. Third, group mobilization is linked in time to a particular focusing event, i.e. the activities of the groups will become more evident in the news. Fourth, group mobilization will be accompanied by an increase in discussion of policy ideas, such as theories and potential solutions to the problem. Fifth, there is a relationship between ideas and policy change. Change is more likely when ideas become more prominent after events than when they do

not. Policy change can also occur without ideas, but they are usually not a result of careful debate and therefore does not result from learning. Sixth, learning can decay over time. If a long enough period is between focusing events, the policymakers may "forget" the lessons they learned.

Figure 2 depicts Birkland's model of event-related policy learning. It shows the likeliness of learning and policy change, depending where the actions occur. The model also suggest that learning without policy change is possible and that policy change may result from mimicking or "superstitious learning". Birkland (2006: 21) states that whether learning occurred is a qualitative judgment that must be made within context of each case study. Finally, even if no policy change occurs, the event can lead to accumulated experience which may promote learning in the future.

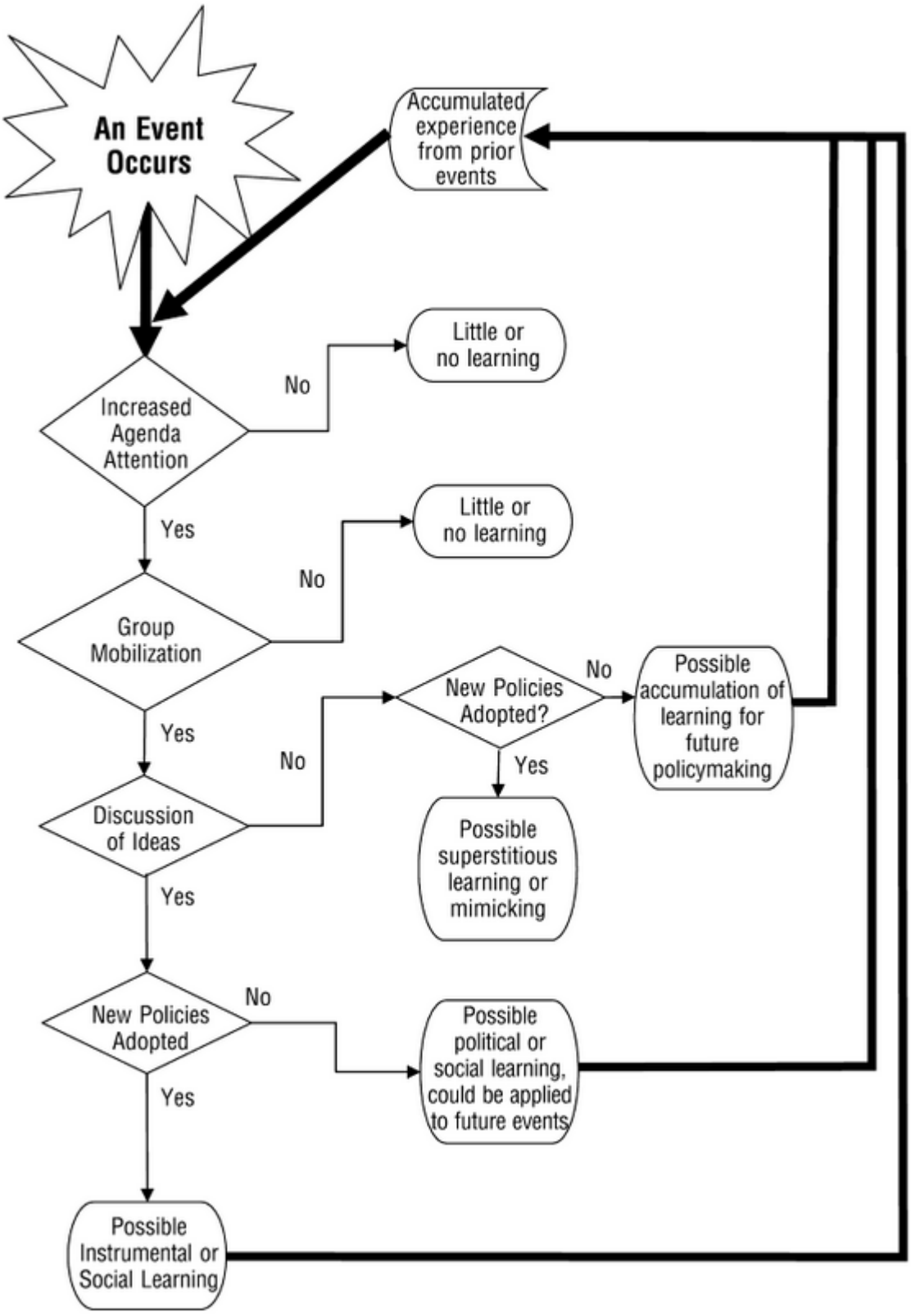

FIGURE 2: A Model of Event-Related Policy Learning (Birkland 2006)

In the beginning of the process, an event happens and the first crucial step for it is to gain attention. The size and importance of an event are socially constructed, but the event has to come first and it has to be large enough to attract attention (Birkland 2006: 162). According to the model, without attention, the event will most likely not cause group or policymaker mobilization. If mobilization does not occur it restrains learning, because learning requires competition between advocacy coalitions, as each side tries to marshal evidence and knowledge about the policy process and about political tactics to advance its goals. Group mobilization does not necessarily mean broad-based citizens' movements, but also relatively small groups of experts and advocates.

When group mobilization occurs, we should expect discussion of ideas in various forums about the reasons for the event and whether the existing policy can address the problems revealed by the event. If a policy is shown to have failed, the discussion will include policies that seek to remedy the failure and prevent reoccurrence. Birkland (2006: 23) states "it is at this stage that we may see considerable evidence of learning". If there is a change without such discussion, it is possible that mimicking or "superstitious learning" is at work. However, if we can draw a link between ideas, an event, and increased attention to ideas and new policies, then we have strong evidence of instrumental policy learning, and possibly some evidence of social policy learning and political learning (Ibid).

While the model is a useful way to categorize and ordering the various aspects of learning from focusing events, the model suffers from the usual problems of any model ordered temporally, as Birkland recognizes (Ibid: 171). The model assumes that each stage must follow the previous one, before the following can occur. However, the reality is often not as straightforward and this should be taken into account in the analysis.

2.6 Framework for Analysis

To tie the whole chapter together, in this section, I will attempt to combine Birkland's model of event-related policy change with the theories of risk society and reflexive modernization. This will provide a framework for the analysis of the case study, specifying what concepts are being used from the broad theoretical framework and how they guide me to gather data and ask questions from it. Combining these theories, which provide perspectives from different theoretical levels, creates some challenges and I will comment how this worked in the final discussion.

First, we can look how the whole policy process of the case study has followed the model of event-related policy change, which was opened in the previous section. This will give a basic structure for analyzing the case. We can examine if the case has followed the different steps and establish links between them. This will provide several dimensions that can be examined more carefully. While the ultimate focus of this research is in the impacts of the disaster, the steps leading to these impacts help to understand the underlying context. The preceding steps are important, especially if we follow the assumptions of the event-related policy change model, which presumes these steps are required for policy change, and especially for policy change with positive outcomes.

We can begin by examining the incident itself that triggers this process. As we have learned, the type of the disaster, who's fault was it (human vs. natural), the policy domain where it happened and previous similar incidents, play a critical role in the societal response. These issues are connected to the attention the disaster has received. Second, we can examine the group mobilization, which and what kind of groups, NGOs, citizen movements, experts, etc. activated and how broad the mobilization was overall. Third, we can analyze the followed discussions, how they progressed and what were the key features or prominent issues, and which actors had a strong role driving them. Fourth, we can attempt to establish links between the discussions and the policy change. If this link is established, we may conclude if learning has occurred. Whereas, instrumental learning is easier to demonstrate from tangible changes in e.g. environmental regulation, social learning requires more of a qualitative judgement that has to be made within the context of the case. However, this could be demonstrated with changed attitudes and other societal reactions that may be evident in the data.

As the model of event-related policy change describes the policy process in rather oversimplified manner, it does not allow us to take into account any broader societal conditions on its own. Thus, I will attempt to bind it to a wider context by looking how the previously opened key features of risk society and reflexive modernization are present in the above steps. This may allow us to see how the changing societal conditions can affect or are present in the policy process. We can understand the whole policy process to be happening inside these conditions, where the risks have been accepted in a techno-economic pursuit of prosperity, where dealing with the developments negative side effects have become the main concern of the society, where dealing with them is taking considerable time and may eventually promote reflexivity.

This in mind, we can look how the following concepts drawn from the grand theories are present in the previously opened steps. We can examine if the disaster demonstrates the new types of complex risks of risk society. We can examine if there is evidence of sub-politics and the growing influence of interest groups. Furthermore, the case may demonstrate the changing role of the nation state and how there are increasing demands for participation and transparency. We can examine if the discussions include claims of scaremongering and cover-ups, and if there is evidence of skepticism of expertise and institutions. Finally, we can examine if the disaster has increased the anticipation of further risks. We can also look deeper into the conducted measures and see if they have features of reflexive governance.

3 RESEARCH DATA AND METHODOLOGY

Research method can be defined as the actions, procedures and practices which are used for collecting and analyzing the data (Pihlaja 2004: 140). Traditionally research methods have been divided into two general approaches: qualitative and quantitative. While the quantitative approach tends to approximate phenomenon from a larger number of individuals using survey methods, qualitative approach is focused on understanding a phenomenon from a closer perspective. This research is qualitative in its nature.

Qualitative research is a method of inquiry, which contains numerous different traditions, approaches and data collection and analysis methods for studying human behavior and the reasons that govern such behavior. Thus, giving it a specific definition is rather difficult. In essence, qualitative research aims to understand the studied phenomenon by studying its significance or purpose comprehensively, trying to get a deeper understanding of it.

3.1 Case Study

Case study itself is not a true method, but instead, it usually contains several different methods. Thus, it is justifiable to call it a research practice or a research strategy, which can include various data sets and methods (Laine, Bamberg & Jokinen 2007: 9). All empirical studies use cases. However, in a case study the case is understood differently than in a quantitative research, where the case is seen as a unit. In a case study, the subject is usually a course of events or a phenomenon (Ibid). Case study studies a small group of cases and often just one specific case. A case study is a comprehensive and precise description of the studied phenomenon.

Usually case study is chosen as a research practice when there is a desire to understand the subject profoundly and to take into account the related circumstances and the background of the context (Saaranen-Kauppinen & Puusniekka 2006a). Even though a single case may produce knowledge which is not limited to the specific case, the aim is not in producing broad generalizations (Ibid). A case study is often driven by a feeling or tentative knowledge that the case is important in some way. However, its definitive significance is revealed during the research. It is important for the researcher to understand the difference between the case and the subject of the study. The latter refers to the issue that the case is expressing. (Laine et al. 2007: 10.) In this study Talvivaara is used as a case to demonstrate how an environmental disaster can affect policy change.

3.2 Documents

The data used for this master's thesis consists of various official documents and expert interviews. The selected documents describe the measures taken as a consequence of the Talvivaara case or measures which were affected by the case. These documents can be divided roughly into two categories. First, updates to the existing regulation and second, guidance measures or suggestions based on reports written about the case. The latter can be also considered to have been part of the discussion following the leaks.

The documents served multiple purposes for this research. First, they worked as an evidence of learning and concrete actions taken because of the case. Second, they were partly used for describing the events of Talvivaara. Finally, they played an important role as a 'background' material for the interviews and thus were utilized in the thematization and the question forming. For the case description of Talvivaara, various sources were used, including media, state authorities' communications, academic papers and the company's own press and stock exchange releases.

Drawing the link between the documented measures and the case was not difficult as it was often mentioned in the documents themselves. In addition, the references to these measures in articles related to Talvivaara, the timing of them and my discussions with various subject experts supported my assumptions. However, the challenge with some of the documents was to determine the exact impact of the case to the specific measure. Documents related to the stress tests and the investigation report were of course self-evident as Talvivaara is clearly mentioned as the driving force behind them. On the other hand, even though it is quite safe to assume that the case had at least some impact to the recently released (February 2015) EIA guide for mining, the case is not specifically mentioned in the document itself. There were also several other documents published about the case, but they were left out of the examination as their main focus was in the aspects (e.g. specific environmental impacts of the leak) that I did not see relevant for this research's purpose.

3.3 Expert Interviews

To get more depth to the research I decided to conduct expert interviews for a better understanding of the impacts, which also may not be always visible by looking from the outside. Second, the interviews provide opinions about the new policies and the consequences that the case produced. Furthermore, as Åkerman and Alastalo (2010) note, document data

alone may be insufficient when studying unfinished and on-going processes. Åkerman and Alastalo (2010: 373) define expert interview as a situation where the aim is to obtain information about the studied phenomenon or process by interviewing experts of the field. The interviewees are selected based on their institutional or otherwise significant position in the studied process. The purpose of collecting the data is to produce a description of some historically unique process or phenomenon.

Semi-structured interview can be described as the intermediate form between structured and unstructured interviews (Hirsijärvi & Hurme 2011: 47). There is no one universal definition of this interview form. However, the common characteristic is that some aspects of the interview have been fixed, but not all of them. According to Tuomi and Sarajärvi (2009: 75) semi-structured or focused interviews proceed according to the themes which have been chosen in advance. Under the themes there are usually more specified questions or an aiding list of issues that the interviewer wants to get addressed. Methodologically, focused interviews emphasize the interviewees' interpretations about the issues, the relevance they give to the issues and how the relevancies are formed in the interaction (Ibid). It is a matter of taste if the questions have to be presented in the same order and in a specific form for all the informants (Ibid). The range of required uniformity varies from almost unstructured interview to almost structured interview. In this research, I chose to prepare quite specific questions under the themes, which could be asked from the interviewees if they did not cover them on their own. According to Saaranen-Kauppinen and Puusniekka (2006b), this can be suitable when the wanted information is specific, and there is no need to give the interviewees too great liberties in the interview situation.

In principle, the chosen themes are based on the framework of the study, meaning the already acquired knowledge about the studied phenomenon (Tuomi & Sarajärvi 2009: 75). In this study, the themes for the interviews were bound to the case description and the framework I created at the end of the theory chapter (2.6). This gave me a preliminary list of impacts and possible impacts, which I could then divide into four main themes: (1) environmental regulation, (2) government's role and legitimacy, (3) social and economic impacts, and (4) societal reactions. The last two themes are partly overlapping, but the idea was to have a separate category, focused on how the societal conditions may have affected case and on the other hand, how the case may have caused wider societal reactions. Following this, I prepared a list of open-ended questions under the themes to ensure the specific issues I saw important

would be addressed. As the interviews progressed, I reviewed the questions and adjusted where I saw, for example, more elaboration was needed.

The next stage was to select the experts that could address the aforementioned issues and questions. The idea was to have a diverse group of experts which could cover the case from different perspectives, providing a more holistic view of the case and its impacts. The interviewees were selected based on their significant position related to the case study, which in practice meant they had been either active actors in the Talvivaara case or they were in otherwise important position in relation to the mining sector. Keeping the scale of the master's thesis and the length of the interviews in mind, the final number of interviews was six in the end. However, I had additional names in reserve in case some of the people would be unable to participate or the information gained from the interviews would turn out to be lacking.

The interviewed experts (see attachment 2) were representatives of the Ministry of the Environment, a regional Centre for Economic Development, Transport and the Environment (ELY), Geological Survey of Finland (GTK), and the Finnish Association for Nature Conservation (FANC). Furthermore an Environmental Manager from a mining project operating in Finland and a Professor of Environmental Law from the University of Eastern Finland were interviewed. FANC is the largest nature conservation organization in Finland and has been a vocal critic in the Talvivaara case. GTK is a national research center under the Ministry of Employment and the Economy, researching earth resources for the needs of industry and commerce. ELY manages the government's regional implementation and development functions in Finland, including various environmental issues, such as environmental impact assessments.

While all the interviewees have vast knowledge about the field, it should be assumed that they are also representing some wider interests and their organizations. This was taken account in the selection process and thus, they are not seen as "neutral experts" without any partiality. However, it should be noted that there are varying opinions and attitudes even inside these "coalitions". The representatives from the Ministry of the Environment and the regional ELY-center provide the authorities point of view from two different levels. GTK provides various services for the mining sector and they are generally seen as supporters of the mining industry. The Environmental Manager provides the mining companies' perspective and the

representative of FANC, the more critical environmental NGO's point of view. The Professor of Environmental Law I have assumed to provide more neutral perspective.

About half of the asked experts accepted to participate in the interviews. One person declined referring to lack of knowledge about the subject. Another person directed me towards other people in the same organization who the person felt would be more suitable to answer the questions. One more person declined because of a decision in principle their organization had made to not comment any issues related to Talvivaara. Finally, I was unable to make contact with several experts from my original list of people. The interviews were conducted via internet video telecommunication software (2), telephone (2) or in person (2). I would have preferred to interview everyone in person but this would have been impractical due to the interviewees' various locations around the country, demanding days of travel and additional resources. Furthermore, due to the nature of this study, the additional information gained from the interaction in person would not have added much if anything to the study. The two telephone interviews were originally meant to be conducted utilizing an internet telecommunication software, but due to technical difficulties at the interviewees' end, telephone was used as a back-up measure. Scheduling the interviews often took several weeks due to the busy schedules of the experts. Thus, rescheduling when I finally had the expert on the line, with the uncertainty of being able to fix the technical problems that were out of my control, was not a sensible option. Moreover, I had prepared for possible technical difficulties with alternative video communication options, but even those failed to work in the moment. One of the interviewees asked the questions to be sent in advance to which I agreed.

All the interviews were conducted in Finnish, between the end of May and June 2015, at the times suggested by the interviewees themselves. I began all the interview situations with some small talk, explaining how the interview would proceed, trying to get the interviewee comfortable and relaxed for the actual questions. I felt like this was accomplished well and all the interviews progressed in a pleasant atmosphere. This was most likely helped by the fact that most of the experts had at least some kind of experience giving interviews in their position. Even though I had quite specific questions prepared, at the beginning of the interviews I encouraged everyone to discuss freely if the topics evoked any issues or thoughts about the case they deemed relevant. Furthermore, at the end of each theme, I asked if there were any other issues related to the specific theme they would like to discuss. Finally, I kept my ears open all the time for possible questions evoked by the answers. In addition to encouraging the interviewees to speak freely, I emphasized that some of the questions could

be difficult and it would be alright to not have an answer to every one of them. With this I was hoping to avoid complete guesswork in a situation where the interviewee would feel forced to answer something. As an interviewer, my aim was not to lead the interviewees. I presented my questions as clear questions and I reacted to the answers trying not to bring forward my own opinions. However, I gave a lot of minimal feedback, short words and acknowledgements, such as "yes", "right" and "okay" as a sign that I was listening (Ruusuvuori & Tiittula 2005: 26-29).

The length of the interviews varied between 45 to 90 minutes, most of them going well over the 60 minute mark. All except the two telephone interviews were recorded on an external recorder or a computer program. The recording allowed me to return to the interviews and enabled more accurate analysis and reporting (Ruusuvuori & Tiittula 2005: 14-15). In the two telephone interviews I was unable to record the discussions due to the previously mentioned technical difficulties and instead I relied on writing the answers down into my notebook. This forced me compress the answers to some degree and most likely to lose some content. However, I felt like I managed to capture the main points fairly well, especially when the interviewee had a clear opinion or answer to the question. In both cases I wrote open my notes immediately after the interview when it was still fresh in my memory. Moreover, I asked if I could contact the experts via e-mail if there would be something to clarify later on.

Afterwards, I transcribed the recorded discussions into a text form. In transcribing, I used minimal editing to make the text easier to read. In practice, this meant removing some filler words and repetition if I felt it did not change the message. I did not mark the pauses as I felt it did not add anything for my study as the studied subject was in the content of the discussions. Altogether, the transcribed text covered approximately 85 pages.

3.4 Analysis

The first part of the research process after setting the research questions and coming up with the theoretical framework, was writing the case description of Talvivaara. The questions and the framework guided the process, affecting the choices on what parts were included in the description. After finishing the description, I decided to create a timeline to visualize where the key events took place and where the eventually conducted measures were taken. This way the timeline also helps to understand the policy process in a better way. The creation of the timeline was part of the analysis as it required identifying the key events and their relation to

reactions and other events. To review my decisions, I compared them to other research papers' findings, media attention and established links between the events and the reactions.

The interview data was analyzed utilizing thematic analysis. Thematic analysis is a basic qualitative analyzing method, where the aim is to identify central subject matters or themes from the research data (Eskola & Suoranta 1998: 174). Thematic analysis is a natural and commonly used method for thematic interviews (Saaranen-Kauppinen & Puusniekka 2006c). According to Eskola and Suoranta (1998: 175-179), the interplay between the theory and the empirical is essential for successful thematic analysis. Otherwise the resulting list of quotations may not offer much for deeper analysis or conclusions. Thematic analysis may vary greatly depending on the studied subject and the chosen approach for it.

In qualitative analysis, two approaches are commonly distinguished which can be used as the basis for the analysis: data-oriented and theory-oriented classification structures. However, it is possible to distinguish a third approach which is a combination of the two, a theory-bound approach. This division into three approaches allows us to take into account the factors directing the analysis in a better way (Tuomi & Sarajärvi 2009: 95). The division highlights the significance of theory in qualitative research. In this research I follow the theory-bound approach, which according to Tuomi and Sarajärvi (2009: 96-97) means that the units of analysis are selected from the data, but contrary to data-oriented approach, previous knowledge and theory directs or helps the analysis. The impact of previous knowledge is recognized in the analysis, which opens new lines of thought. Tuomi and Sarajärvi highlight that in this kind of analysis, data orientation and the ready models are engaged in a dialogue and the researcher's task is to combine in various and sometimes even creative ways the elements that emerge from the data and theory. In practice, this meant that my conclusions did not come directly from the data but the theoretical premise and definitions served as aiding tools for my analysis and interpretations. (Ibid.)

I began my actual analysis by reading the transcribed data several times, familiarizing myself with the content. The next step was data reduction, which according to Tuomi and Sarajärvi (2009: 109) means compressing the information and screening out all the irrelevant for the research. Based on the framework and the research questions, I focused on data which would give me information about the different stages of the policy process, the governance measures, the impacts of the case and the wider societal context of those impacts. As the

aiding list of questions for the interviews had been already guided by the framework, majority of the answers fitted into these boundaries.

In practice, I compressed all the answers to my questions into shorter phrases while removing repetition and the parts that I deemed irrelevant, without losing the key content. To help this process, I used the highlight tool to mark all the parts I used from the transcripts to form these statements. Keeping the statements under the original themes of the interview at this point allowed me to find the context fast if needed. I did this process individually to all the transcribed interviews. The unit of analysis for the interviews was a statement, by which I mean a sentence or a combination of multiple sentences forming a unity of thoughts. In an interview this is unit of analysis is practical as sentences in spoken language can be fragmentary. On the other hand, a sentence can contain multiple thoughts. At this point, the data was practically a list of statements or opinions said by the experts.

The next stage was grouping (clustering), which according to Tuomi and Sarajärvi (2009: 110) means going through the listed statements thoroughly, while looking for concepts describing similarities and/or differences. Concepts with similar meaning are grouped and combined into a category, which is named after the content. This process was fairly straightforward, producing categories such as media's role, NGO's role and permit processes.

The next stage following the grouping was abstraction. Abstraction means proceeding from the linguistic expressions used by the original information towards the theoretical concepts and conclusions (Ibid: 111). In this research it meant placing the categories under the predetermined themes which had already guided the interviews. Thus, at this stage the analysis was no longer data-driven, and instead I brought in my previous knowledge acquired from the case description and the presented theoretical concepts. The idea behind the expert interviews was to get deeper into the context of the various impacts of the case and thus, dividing the data into the key impact areas seemed suitable.

In practice, the above two stages meant combining all the reduced data into one file, while placing the formed categories under the suitable themes, e.g. placing everything said about media's role in the case under the theme "societal reactions". Once again, I used the highlight tool on the individual files to help to see which statements I had used from each interviewee. I did this process one theme at a time. Furthermore, I marked the source after each statement to be able return to the original context if needed. At this stage I was also looking for similarities and differences in the opinions and interpretations. This formed a general view on what the

experts thought about the issues related to the themes: e.g. where they agreed, disagreed and why they did so. I coded the names of the experts according to their position, as I felt like this could be seen to have affected their opinion. For example, a person working for the Ministry of the Environment commenting on some conducted measure may have a different significance than an outsider who may not know what was going on behind the scenes when the measure was being planned. The results from this stage were interesting in their own right. They were translated into English, written into an appropriate form and are presented as the second part of the results.

Finally, the results from the interviews, together with the knowledge gained from the case description and the documents, were then interpreted through the theoretical framework. In practice, I used the previously created framework for analysis to describe the policy process of Talvivaara. These results are presented in 5.3.

3.5 Reliability and Validity of the Research

In qualitative analysis the reliability and validity of the research are evaluated in a different way than in quantitative analysis. Instead of evaluating the repeatability of the research, reliability in qualitative analysis emphasizes the questions related to the systematic approach and the criteria of trustworthiness (Ruusuvuori, Nikander, & Hyvärinen 2010: 26). In systematic analysis, it is important that the researcher explains all the decisions and the principles that he follows. Trustworthiness refers to how the described way has led to the conclusions and interpretations based on the research report. In addition to presenting the strengths of the analysis, it is important to address its possible limitations.

A key issue regarding reliability of this research is related to reporting the results from the interviews as it required some amount of generalization, e.g. when presenting general opinions about a specific measure. An additional layer was added by the required translation as the interviews were conducted in Finnish. These factors were addressed by recording the interviews and transcribing them afterwards (Silverman 2006: 287). Moreover, especial attention was paid on presenting the results and indicating clearly when I added my own interpretations and how those were formed.

Validity in qualitative research refers to questions such as is the research valid, has it been rigorously done, and are the results and the conclusions "correct". Important questions refer to the collected data and to the credibility of the conclusions. In this research, choosing the

suitable experts for the interviews played a major role regarding the validity and the reliability of the study. The case study is a polarizing issue with many interests on the line. Thus, the results from the relatively small number of interviews should be processed this in mind. The thought process behind selecting the experts is explained in detail in chapter 3.3, but in essence, the aim was to have a diverse group of experts, providing a more holistic view about the case and the related issues. One possibly valuable perspective that was left unrepresented in the interviews, due to no response to my contact attempts, was the environmental consultant side. Another perspective I was unable to include, due to scheduling issues, was a representative from the Ministry of Employment and the Economy. Furthermore, the relatively small number of interviews, with representatives from different perspectives, may not allow very broad generalizations to be made.

Another challenge of validity was related to writing the case description (chapter 4). This was due to two reasons. First, writing a case description required decent amount of summarizing and many decisions on what details to write in and what to leave out. These decisions may have a significant impact on how the case reads and thus, the researcher's role is highlighted. To review my choices, I compared them to other research papers and examined the media attention the specific issues had received. Second, many of the sources used for this were either from the media or from the company's official communication, which may have already included someone's interpretation of the information. To minimize the problems related to this, my focus was on reporting the concrete events and when presenting opinions or statements, the sources were clearly indicated.

Finally, about halfway through my thesis work, I was hired as an environmental assistant to a mining exploration project in the northern Finland. This is worth mentioning because Talvivaara was a common topic among my coworkers and other professionals I met from the field. Understandably, some of the people earning their living from mining had often quite different views on the case to, for example, some of the environmental activists I had met earlier in mining related discussion events. Knowing this could influence my judgment, I tried to pay especial attention to explore the case as objectively as possible. Nonetheless, the experience was greatly beneficial for understanding how mining companies operate in Finland and how strong impact Talvivaara has had on them.

4 TALVIVAARA

In this chapter I describe the case of Talvivaara starting from the planning stages to the end of 2014. To understand the significance and the complexity of the case, it is important go through the history in rather detailed manner. The main focus of this research is in the aftermath, but the events leading up to the most significant leak in 2012 help to understand how the conflict and the related discussions developed. This may explain why the case became so significant and how the different actors may have influenced the policy process. Years 2013 and 2014 are covered with lesser detail, as they were less eventful, with the discussion revolving largely around the financial problems of the company.

In short, Talvivaara Mining Company Plc. is an internationally significant base metals producer with its primary focus on nickel and zinc. Talvivaara's main asset is its nickel mine that is located in Finland, province of Kainuu and the municipality of Sotkamo (Figure 3). Talvivaara's two polymetallic deposits, Kuusilampi and Kolmisoppi contain one of the largest known sulphide nickel resources in Europe, with the current estimate of 2,053 million tonnes of mineral reserves (Talvivaara 2009a). These resources have been estimated to allow production for several coming decades (Talvivaara 2009b).

FIGURE 3: Talvivaara's location (Talvivaara Mining Company Plc.)

4.1 Background

Kainuu is a province that consists of nine municipalities and its regional capital is Kajaani, which is located 35km from the Talvivaara mining area. The population of the province has been falling steadily since the late 1980's 100,000 people down to 82,000 people in 2012 (SVT 2014). Ever since the recession of the late 2000s, the province has been affected by relatively high unemployment numbers. In 2007, the unemployment rate had reached 16.1 % (SVT 2007). The circumstances for a new mine were favorable, especially as the previously biggest employer in the area, UPM-Kymmene paper factory in Kajaani, had been under the threat of closing down for several years. In the fall 2007, during the construction stage, the atmosphere for the new mine was optimistic. This was reflected in the regional newspaper, Kainuun Sanomat, which was writing about the mine in mostly positive or neutral manner (Vakkuri 2013). The biggest newspaper of Finland, Helsingin Sanomat, which focuses more on the news from capital area, covered the mine with much lesser interest, but also wrote about it in either positive or neutral manner (Ibid).

Just six kilometers from the Talvivaara mine, there is a village of Tuhkakylä, which is occupied by 250 residents. Tuhkakylä has not greatly benefitted from the mine, as the employees travel from elsewhere to work, mainly from Sotkamo and other neighbor municipalities. In fact, Tuhkakylä has no more services left and it was forced to close their only school in 2010, due to decreasing amount of students. The mine's sphere of influence also includes Kajaani's Halla-aho and Lahnasjärvi areas, which have combined 60 residents. (Kujala 2011.)

The local area is not new to the mining business. Less than ten kilometers from the Talvivaara mine and two kilometers from Tuhkakylä, is a talc mine owned by Mondo Minerals Plc. Mondo Minerals started its operations in 1968 and it experienced some serious environmental problems during 1997-1998. Cyanide, nickel and arsenic discharges escaped from the company's talc factory to the nearby Nuas Lake. The case went to court, but the company was released of charges. (YLE 6.4.2010.) In 2010, Mondo Minerals opened a new talc mine at the close proximity of the previous one.

The new technology used in Talvivaara mine is called bioheapleaching. Bioheapleaching is a process, whereby metals are leached from the ore as a result of bacterial action. The same process is triggered by microorganisms in nature in the presence of air and water. The bacteria used in the process is growing naturally in the ore. In commercial use, this natural process is

accelerated by modifying several physicochemical and microbiological process parameters, including blowing air to the finely grinded ore stacks and watering them with acidic water. The nickel in Talvivaara deposit is bound in black shale, which is about two billion years old sea mud. The black shale contains ten percent graphite, including carbon that was formed from sea weed and aquatic plants. In practice, the carbon makes the traditional way of froth flotation impossible as the enriched product cannot achieve high enough values. According to Talvivaara, bioheapleaching can accumulate over 90 percent of the nickel from the mine's ore. Bioheapleaching is also cheaper as the ore does not need to be grinded as fine and the smeltery phase, which requires a lot of energy, can be passed. (Talvivaara 2009c; & HS 18.11.2012.)

The gypsum pond is the final repository used in the process. The calcium used in the metal recovery process transforms into gypsum in the anaerobic conditions. The gypsum ends up to the pond with the effluent. The metals that stratify in the pond precipitate to the gypsum sediment and sink to the bottom of the sediment. (HS 18.11.2012.) Talvivaara has two gypsum ponds which cover together approximately 100 hectares. The secondary pond is also known as the storage pond. The ponds can hold together millions of cubic meters of water. (Suomen Luonto 2012.)

4.2 History of Talvivaara

The Geological Survey of Finland first ran a detailed exploration of the Talvivaara area in 1977-1983. In 1986, Outokumpu Plc. was granted mining licenses to the found deposits, and it continued the work until the early 1990's. The found resource was large in size, but deemed too low in grade to be economically viable for the time being. In 2004, Outokumpu Plc. decided to sell the mining rights to Talvivaara Mining Company. With the deal came also the rights to the new, promising, mining technology called bioheapleaching, which Outokumpu had been developing since 1987. (Talvivaara 2009d.)

4.2.1 2005-2009 Establishing the Mine

Talvivaara's environmental impact assessment is conducted in 2004-2005 by Lapin Vesitutkimus Plc. (the consult firm changed its name to Ahma Ympäristö Plc. in 2013). Talvivaara starts testing the new bioheapleaching technology in 2005 and 2006. At the same time, the company is collecting money from the investors to complete the feasibility study of the plan. Seven million euros is raised, and later, another thirty million euros to accelerate the

development. Talvivaara applies for environmental permit in March of 2006, and it is granted one year later in 2007. (Talvivaara 2009d.)

In June 2007, Talvivaara lists itself into the London Stock Exchange (Talvivaara stock exchange release (ser from now on) 13.6.2007). Soon after, the Finnish government decides to support the project by participating to the infrastructure investments with over fifty million euros. At the end of the same year, the company tells about new found mineral reserves and starts preparing a new production plan. Talvivaara and its environmental friendly technology also receives positive feedback from several sources, including European Mining Deal of the Year award from Project Finance Magazine. (Tiainen, Sairinen & Mononen 2014.)

The company starts its metal production after intensive construction phase in October 2008, with the planned annual nickel production of 33,000 tonnes and 60,000 TPA (tonnes per annum) of zinc (Talvivaara ser 1.10.2008). In addition to nickel and zinc, the mine is estimated to produce smaller amounts of copper and cobalt. In December, the company announces that its estimated mineral reserves have increased by 42 percent (Talvivaara ser 4.12.2008).

In February 2009, Talvivaara delivers its first batch of nickel product to Norilsk Nickel Harjavalta refinery. In May, Talvivaara does its secondary listing into Helsinki Stock Exchange and in June the official opening ceremony is held in Sotkamo. In July, Talvivaara collects eighty-three million euros from stock issue and decides to increase its annual production capacity of nickel up to 50,000 tonnes in 2012. (Talvivaara ser 24.2.2010.) In the second half of 2009, Talvivaara receives several complaints about unpleasant odor, which is caused by the hydrogen sulfide released from the mine. The company responds by saying its emissions are inside the appointed discharge limit, but promises to apply new technology to minimize the harm. (Tiainen et al. 2014.)

4.2.2 2010 First Signs of Problems

In February 2010, Talvivaara announces plans for harvesting uranium as a by-product from the mine (Talvivaara ser 9.2.2010). This comes as a big surprise to the general public, as the company has not mentioned beforehand about the possibility of uranium mining in any of its public plans. Talvivaara's CEO, Pekka Perä, believes that the company does not need to conduct a new environmental impact assessment for the new process, but a new supplementary assessment is enough. (Tiainen et al. 2014.)

In March, Talvivaara experiences its first big leak in the gypsum pond (Talvivaara ser 18.3.2010). According to the company, the leakage did not cause discharge outside the mining concession. The company shuts down the metals recovery plant temporarily to decrease the inflows to the gypsum pond. The inspection record of KaiELY (Kainuu's Centre for Economic Development, Transport and the Environment) reveals that the leak's true detection and starting time was two days earlier than reported by the company (Tiainen et al. 2014). The production is restarted on 19.3. and on 26.3. the company receives a permission to release cleansed, but more alkaline than normal water, towards the waterway of Tuhkajoki (YLE 26.3.2010).

In April, The Finnish Association for Nature Conservation (FANC) demands that a new EIA must be conducted because of the uranium plans and the mine's permits should be taken into reconsideration (FANC 11.4.2010). According to the association, the company should have informed the public about the uranium plans already during the mine's planning stages, as clearly, the company knew about the uranium enrichment plans long before it was announced to the public. The association criticizes that this kind of behavior is immoral and does not fit into present-day company's societal responsibility. Furthermore, the association opposes the uranium mining because it promotes nuclear power. (Ibid.) 20.4. Talvivaara applies for a permit from the Finnish Government to extract uranium as a byproduct and delivers its EIA program to KaiELY on 1.6. (Talvivaara ser 20.4.2010; Talvivaara press release 1.6.2010). Following this, the Green Party announces that it wants to prohibit uranium mining in Finland (Vihreät 31.10.2010).

In September, information comes out that the Minister of the Environment Paula Lehtomäki's family has a share in Talvivaara. This raises questions in the media whether the minister has been incompetent due to likelihood of bias. Lehtomäki denies the accusations and later, the Financial Supervisory Authority judges that she did not have any inside information about Talvivaara's stock trading that could have benefitted her. (Tiainen et al. 2014.)

At the end of October, Talvivaara reports that the estimates of the company's mineral reserves have increased once again. The new estimation has 54 percent upgrade to the previous numbers. The company starts evaluating the possibility of expanding the production capacity of the mine. (Talvivaara ser 27.10.2010.)

2010 marks as the year when the company's problems start to ascend to the public discussion. The company is openly criticized for its environmental impacts in the regional newspaper

(Kainuun Sanomat) during the fall. The impacts were seen larger than what were promised during the establishment stage of the mine. However, the uranium issue causes the most heated discussion which continues throughout the whole year. As the year progresses, people start to react more incredulously toward the uranium. The locals are worried that there will be similar problems with the uranium as there have been with the production of nickel and with the unexpected environmental impacts. Finally, the transparency of the uranium project takes another hit as Kainuun Sanomat releases information that the Ministry of Employment and the Economy knew about the plans already in fall 2009. (Tiainen et al. 2014.)

4.2.3 2011 Politicization

In January 2011, Talvivaara is awarded with certification for the environmental management system ISO 14001 (Talvivaara press release 4.1.2011). The system sets guidelines for the company's environmental practices in the future. In February, Talvivaara signs uranium take-off agreement with Cameco Corporation (Talvivaara ser 8.2.2011).

In March, KaiELY gives its coordinating authority's statement on Talvivaara's uranium recovery impact assessment report. KaiELY finds that the assessment report fulfils the requirements of the EIA decree but notes that the mine's operations have caused distrust which is reflected in the uranium recovery project. KaiELY urges Talvivaara to improve their communications and transparency. (KaiELY 1.3.2011.)

In April, Member of the European Parliament, Satu Hassi submits a complaint to the Chancellor of Justice about Talvivaara's mining permit. Hassi asks for an account if the authorities that granted the mining permission have knowingly ignored the uranium issue or has it been a question of incompetence. She also asks if the permission should be cancelled. (YLE 12.4.2011.) A demonstration (40-50 people) demanding the mine to be closed is organized in Helsinki. The organizer, environmental network Hyökyaalto, also demands that a reliable study of the mine's environmental harm should be conducted. (YLE 20.4.2011.)

Talvivaara had already noticed in the fall 2010 that sodium, sulfate and manganese concentrations were significantly higher in the effluents than they should be. The main reason for this was found out to be the new cleansing system which had not been designed to remove the sodium sulfate that was forming in the process. This led to the "salinization" of the nearby water areas. When the company noticed the problem, it took action and managed to reduce the emissions by improving their cleansing process. The load peak was passed by the end of 2010. (Tiainen et al. 2014.) In May 2011, KaiELY informs about Talvivaara's negative

environmental impact to the nearby lakes. According to KaiELY, the effluents and run-off waters from the mine have caused the water quality to decline in the area. The water is not recommended to be used as washing water, because the manganese, sulfate and iron concentrations have increased. (Kauppalehti 19.5.2011.)

In June, Talvivaara applies for an extension of the mining concession area from the Ministry of Employment and Economy (Talvivaara ser 17.8.2011). The Finnish Government's holding company, Solidium Ltd., buys Talvivaara's stocks from Outokumpu Mining Ltd. and now owns 4.3 percent of the company (Tekniikka & Talous 1.6.2011). In the same month, STUK (Radiation and Nuclear Safety Authority of Finland) announces that it is supporting Talvivaara's permission for uranium recovery (STUK 13.6.2011). The uranium project is also moving on the other fronts, as Talvivaara receives permissions from the Municipality of Sotkamo and the Regional State Administrative Agency (AVI) for the uranium recovery facility and the uranium testing operations (Tiainen et al. 2014).

In September, Talvivaara applies for a permission to increase its discharge limit. However, in the same month the company tells in a press release that it has reduced its water emissions and supplemented its water processing material to KaiELY and AVI of Northern Finland (Talvivaara press release 26.9.2011). At the same time, several newspapers are writing about skin problems that the nearby lake has been causing. The company denies its role and states that it has been following its environmental permit. At the end of the month, the Greens of Oulu arrange a demonstration against Talvivaara's permission application. (Tiainen et al. 2014.)

In October, the CEO of Talvivaara, Pekka Perä, announces that he is leaving his leading position in the company (Talvivaara ser 7.10.2011). Later in the month, KaiELY gives its decision on the extension project, demanding a new EIA for it. According to the decision, the mine's emissions have been much larger than what was estimated in the EIA of 2005. The mine has improved its processes, but many questions are still unresolved. (Tiainen et al. 2014.) Several members of the parliament across party lines express their contentment with the decision. The members of the parliament also demand genuine environmental responsibility from the company. (Sotkamo-lehti 26.10.2011.) Satu Hassi's complaint about the mining permission from April comes back to the media attention, as the mining superintendent of the Ministry of Employment and Economy, Pekka Suomela, comments the

issue. According to him the complaint is unwarranted and Talvivaara's environmental problems have come as a surprise to the authorities and the company (YLE 24.10.2011).

During the fall, several news outlets are publishing stories about Talvivaara's environmental impacts in almost daily fashion. In addition to the water related harm, there are stories about the dust and odor problems, and about the decline of property and land values. The public discussion is trying to find out who is to blame and what are the reasons for the mine's environmental problems. The authorities receive strong criticism and they are accused of disregard and incompetence. (Tiainen et al. 2014.) The Minister of the Environment, Ville Niinistö, states that KaiELY is assessing if the mine is able to reduce the emissions enough so its operations can continue. On the same day, Pekka Perä refutes Niinistö's comments and claims that the company has a decision from October that says the mine is not causing any danger to the nature nor health. According to Perä, the company has been thrown in the middle of a political game, which is directed against the whole mining sector of Finland. (HS 15.11.2011.)

Talvivaara attempts to answer the sensation by publishing an extensive environmental update on its actions done to minimize its environmental impact. The company repeats the line it has used numerous times already: the public discussion has not brought up any new information, the environmental impacts were already known the previous year and the mine has reduced its emissions significantly since that. Talvivaara emphasizes that it is in tight cooperation with the authorities and ends the update by reminding of its positive impact to the regional and national economy. (Talvivaara press release 17.11.2011.)

The public pressure stays on the company and the Ministry of the Environment demands a report from KaiELY about the monitoring of the mine (YLE 18.11.2011). Despite the emission issues, the uranium project is moving as the European Commission accepts Talvivaara's uranium take-off agreement with Cameco Corporation (Talvivaara ser 30.11.2011). In December, KaiELY delivers the asked report about its monitoring of the mine. The report reveals that the mine has received 38 remarks and 10 recommendations. According to the Minister of the Environment, Ville Niinistö, this shows that the environmental problems have been large and they have been analyzed extensively. Niinistö comments that in the future it should be discussed if the first review of the permission could be done in two years when dealing with new kind of large scale operations. Niinistö also tells

that the environmental administration starts to assess how the mining supervisors and instructions should be developed. (Ministry of the Environment 13.12.2011.)

Talvivaara's problems received significantly more media attention in 2011. At the end of the year, the case was in the newspapers almost daily. Both, Kainuun Sanomat and Helsingin Sanomat, wrote about the mine in dominantly negative manner (Vakkuri 2013). The picture of the environmental impacts portrayed by the media differed significantly from the company's and partly from the controlling authorities' view (Tiainen et al. 2014).

4.2.4 2012 Spring: Total Conflict

In 2012, the amount of news articles on Talvivaara increases considerably compared to the previous years. The company itself starts emphasizing environmental reporting, for example, by providing monthly water monitoring reports and introducing a new 'Paikanpäällä.fi' blog, which provides information about the mine's environmental monitoring and impacts. The company also goes through some management changes as Pekka Perä becomes the executive chairman and Harri Natunen replaces him as the new CEO of the company (Talvivaara ser 16.2.2012).

In January, European Commission confirms positive opinion on Talvivaara's uranium recovery process under the Euratom Treaty and in March, the Finnish Government grants the license to extract uranium as a by-product from the mine (Talvivaara ser 18.1.2012; & 1.3.2012). The government states that the project benefits the society as a whole and fulfills the requirements of radiation and nuclear safety (STUK 1.3.2012).

In March, Talvivaara's employee is found dead at the mine (Talvivaara press release 16.3.2012). The incident causes media uproar, which continues for the rest of the month. Talvivaara is allowed to continue its operations after a one week halt. According to Tukes's (Finnish Safety and Chemical Agency) accident report, Talvivaara had some faults in its work and process safety, but notes that the company has done significant improvements since to correct the discovered weaknesses (Tukes 2012). Before the month is over, Talvivaara suffers another setback as metalliferous waters escape to the environment from the mine (Talvivaara press release 20.3.2012). The company estimates the size of the discharge small and ensures that on an annual scale the nickel levels will stay clearly under the required discharge limit.

Despite the recent discharge, Talvivaara reports that its overall strain on the water system has decreased significantly in the beginning of 2012 due to the new technology taken into use

(Paikanpäällä.fi 17.4.2012). Couple days later, Helsingin Sanomat (HS 26.4.2012a) reports by referencing Suomen Luonto that the lakes surrounding the popular tourism area of Vuokatti, are also suffering from increased sulfate concentrations. In the same article, local land owner complains that he is unable to sell his cabins by the lake. At the end of the month, a big group of dead birds is found in the gypsum pond of Talvivaara (HS 28.4.2012).

In May, the Minister of the Environment, Ville Niinistö, comments that Talvivaara has until the end of the year to fix their emission problems (YLE 3.5.2012). According to Niinistö, if the company does not manage to handle their emissions, even closing down the mine is an option (Ibid). The reason for the bird deaths is found out to be metal poisoning and the company assures it is an unusual case and that they will do more to prevent further deaths (Paikanpäällä.fi 22.5.2012). Talvivaara's founder Pekka Perä, comments that the media has taken the company's environmental problems way out of proportion and that there is no evidence that the widely spread sulfate concentrations would have serious consequences to the nature (HS 16.5.2012). Perä also claims that the politicians are inciting anti-mining atmosphere in Finland. Niinistö responds to the criticism by saying that it is the Minister of the Environment's responsibility to talk about the issues which are concerning the citizens. Niinistö also says the company should concentrate on its own issues and stop trying to pin the responsibility on others. (HS 20.5.2012.) Three shareholders of Talvivaara make a complaint about Niinistö's comments to the Chancellor of Justice, claiming the Minister has been acting biased and unfair towards the company (Vihreä Lanka 21.6.2012).

Talvivaara's EIA on expansion of the mine receives 223 opinions and statements (KaiELY 28.5.2012). KaiELY gives its environmental authority's opinion and demands further accounts from Talvivaara for the environmental impact statement. At the same time, the uranium permit process moves on. The Regional State Administrative Agency of Northern Finland (PS-AVI) organizes a hearing on Talvivaara's uranium recovery facility's environmental permit. The permit's handler, PS-AVI receives approximately 100 notifications about the project, most of them opposing it. In the event, the attendees' lack of confidence in the company is apparent. (3T.fi 3.4.2012.)

In the spring, Talvivaara faces opposition from several directions. FANC demands that Talvivaara's operations are ceased until the environmental degradation is stopped, but KaiELY dismisses it based on lack of cogent reason (KaiELY 9.5.2012). FANC also appeals to the Supreme Administrative Court about Talvivaara's uranium mining and enrichment

permission (FANC 26.3.2012). The Finnish Members of the European Parliament, Satu Hassi and Sirpa Pietikäinen make an interrogatory to the European Commission about the Finnish authorities' actions in the case. Furthermore, the Minister of the Environment, Ville Niinistö, receives an interrogatory about the emissions of Talvivaara. Finally, the environmental report's reliability is questioned, as the consult firm's then CEO is found out to have been also an investor in Talvivaara. (Tiainen et al. 2014.) The authorities' supervision is constantly on the news. Everything related to Talvivaara's operations and its supervision is seen as a failure. The case is being also used as a weapon to oppose other mining projects. (Ibid.) The criticized chief director of KaiELY comments that the authorities have to stay with the facts and that it seems like Talvivaara is getting their emissions under control better than before (KaiELY newsletter 2/2012). Citizens' movements are also active. The closure of Talvivaara is demanded in an internet petition, initiated by the now active Stop Talvivaara, and few demonstrations are organized (HS 26.4.2012b).

The Ministry of the Environment attempts to remove the doubts of incompetence due to the likelihood of bias by forbidding the leaves of absence for its officials in mining companies. In addition, the Ministry of Finance is preparing general instructions for the leaves of absence. (HS 24.5.2012.) Nevertheless, the accusations towards the environmental authorities continue as more news and rumors keep coming up. For instance, KaiELY's chief director Kari Pääkkönen is found to have a connection to Talvivaara from the 1990s, as he was leading the unit in the Geology Survey of Finland (GTK), which was conducting Talvivaara's start-up stage's mineral testing (HS 19.6.2012).

4.2.5 2012 Fall: Major Leak

On fourth of November 2012, a leak is detected at the gypsum pond and the company's metals recovery plant is suspended as a precautionary measure (Talvivaara ser 5.11.2012). The leak location is identified on 7.11. but the company is unable to plug it. The Finnish defense forces aid with the operation (Paikanpäällä.fi 9.11.2012). After about a week from the detection, KaiELY announces that the leaking water is no longer escaping the mine. KaiELY also makes an investigation request about Talvivaara to the police. (Kainuun Sanomat 12.11.2012.)

The leakage is found out to be significantly larger than what the company has experienced before. The metal rich waters keep leaking into the environment for about a week, even with the huge patching operation working on it. This creates a massive media event, where

Talvivaara is the main topic of the news repeatedly. The public reacts and environmental organizations, citizens' movements and single politicians demand the mine to be closed down. The authorities also get their part of the public's frustration. KaiELY's chief director's resignation is demanded and there is a distinct disappointment to the authorities' actions. (Tiainen et al. 2014.) The Prime Minister of Finland, Jyrki Katainen, comments the incident and hopes that the case does not ruin the belief and trust to the whole mining sector in Finland (HS 12.11.2012). Katainen also wants to find out if there needs to be changes to the legislation because of the leakage.

The mine's technical flaws are being criticized as is the company's decision not to let the media freely to the area during the leak. Talvivaara has to provide clarifications three times before the restart permit is granted by KaiELY. Tukes and STUK are included into the inspection to make sure the mine is safe to start operating. The case also receives some international attention and the petition to close down the mine receives thousands of new signatures (from 11,000 to 18,000 in four days). (Tiainen et al. 2014.) A big demonstration is organized in Helsinki, which gathers almost 1,000 people. The Minister of the Environment, Ville Niinistö, promises more resources for taking care of the issue. (HS 14.11.2012.)

Overall, the authorities see that the leakage's environmental harm was serious but local (Valtioneuvoston kanslia 16.11.2012). The authorities note that the incident caused anxiety, fear and uncertainty. SYKE (Finnish Environment Institute) estimates later in their report that the leak released 2000 kg of nickel, 1000 kg of zinc, 70 kg of uranium and 60 kg of cobalt to the northern and southern water systems. In addition, about 150 tonnes of manganese and iron escaped to the waters. SYKE states that it will take time to see the whole impact to the environment. (SYKE 11/2013.)

The incident raises question if ELY had enough resources to monitor Talvivaara as the mining industry has been growing so rapidly in Finland. In addition, ELY-center's job to promote commercial activity at the same time, combined with the connections of some of its employees to the mining industry, causes the people to question its neutrality. (Tiainen et al. 2014.)

Talvivaara's environmental disaster brings about some administrative changes. The Ministry of the Environment updates its guidelines to the supervisory authorities in relation to the administrative enforcement and other advisory actions (Ministry of the Environment 7.11.2012). The governmental parties' leaders see that due to the case, the need for changes in

the legislation should be evaluated. Proposition for new Environmental Protection Act is sent for comments (Ministry of the Environment 16.11.2012). One of the goals of the new proposition is to tighten up the mining industry's environmental regulation. It is also being proposed that the operator has to take more responsibility for the monitoring expenses. Reports about Talvivaara will be taken into account during the Act's development. Furthermore, the government grants one million euros funding to secure the regional environmental protection and the environmental authorities' operations. Finally, stress tests for mines will be funded for the whole country. (Tiainen et al. 2014.)

In response to the notably increased criticism towards mining, the Government also starts a round-table process, gathering the mining industry and the relevant stakeholders together to discuss the future of mining in Finland. The process leads to a decision to establish an action plan, which goal is to make Finland's mining industry a forerunner in sustainable mining. The action plan, which is published in the following spring, includes numerous industry measures for achieving societal support for its operations. (Ministry of the Employment and Economy 29.4.2013.)

In November, Talvivaara's founder Pekka Perä, is appointed back as the company's CEO (Talvivaara ser 15.11.2012). Perä, who has been staying absent from the public during the recent leakage, apologizes for the company's environmental damage and admits that the company has made some mistakes, including the shortcomings in informing the public (YLE 15.11.2012).

In the aftermath, Talvivaara's economic situation is brought up to the discussion as a new feature. There is a fear that the taxpayers will have to pay for the environmental damages if the company goes bankrupt. However, Talvivaara assures that it will bear the expenses of the aftercare. On the other hand, scientists are warning that the situation is uncontrollable due to the nature of the technology if the company goes bankrupt. (Tiainen et al. 2014.)

On 21st of November, Talvivaara is cleared to restart their metals recovery plant which has been kept down because of the leak. New water treatment plant is commissioned which enables the company to achieve nearly closed water circulation system. (Talvivaara ser 21.11.2012.) According to KaiELY, restarting the plant improved risk management and helped unloading the water storages. A leak is soon found in the dam of Kortelampi, but it does not spread and the safety dam's elevation work progresses well. (Tiainen et al. 2014.)

Talvivaara organizes neighborhood review in Kajaani 28.11.2012, where Perä explains the reasons for the leak. The mine's water carrying capacity was full, so the risk to storage the excess water to the gypsum pond had to be taken (Kainuun Sanomat 29.11.2012). Overall, instead of just looking for the perpetrators from one direction, the media begins to see flaws in the actions of the authorities and the company behind all the problems (Tiainen et al. 2014). At the end of the year, KaiELY publishes a bulletin, attempting to correct the incorrect information related to the authorities' actions in Talvivaara. ELY underlines that the authorities' monitoring tasks have not been moved to the operator (Ibid).

4.2.6 2013 Financial Problems

In 2013, the main stories about Talvivaara are related to the continuing water problems at the mine and especially to the financial problems of the company. Every time the threat of closing down the mine comes up, it causes discussion about its consequences to the environment. In addition, the government is forced to step in to help the company economically, which causes mixed reactions. The continuously falling nickel prices are yet another issue that is hurting the company.

The mine keeps struggling with the excessive water that is still sitting in the mining area. In the first half of the year, much discussion is being had about the permit to discharge excess waters to the waterways and also about the legality of it (e.g. HS 31.1.2013; 2.2.2013; 14.2.2013; & 7.3.2013). Talvivaara receives the discharge permission from KaiELY on 12.2. (Talvivaara ser 12.2.2013). The decision receives criticism and its legality is questioned (HS 13.3.2013). Later Vaasa's Administrative Court limits the exceptional discharge permit towards Vuoksi waterway, until all the complaints have been processed (HS 3.4.2013). In June, the Court overturns KaiELY's permit, because the water problems have been going on so long that it cannot be counted as an exceptional situation anymore. However, Talvivaara claims that they already have a permit from the regular permit procedure and the company will continue according to it (HS 28.6.2013).

Another big storyline of the year are the financial problems of the company and the government's role in the case. Early in the year, Talvivaara proposes to raise gross proceeds of 260 million euros through a rights issue to keep the operations going (Talvivaara ser 14.2.2013). The company's main owner and the CEO, Pekka Perä, promises to invest at least five million euros of his own money to the company (HS 15.2.2013). The Government's holding company Solidium, which owns 9 percent of Talvivaara at this point, decides to

invest at least 23 million more to save the company and the environment (HS 18.3.2013). Right after the end of the rights offering, the gypsum pond leaks again which forces the company to give two more days for the small investors to decide if they want to cancel their investments (Talvivaara ser 8.4.2013; & HS 11.4.2013). The leak appears to be related to the big leak from the previous year, but it stays relatively small and the waters do not escape the mine's safety dams (Talvivaara ser 9.4.2013; & HS 9.4.2013). The rights offering succeeds even though the pension company Ilmarinen cancels its participation (Talvivaara ser 15.4.2013). Solidium covers for Ilmarinen and ends up investing altogether 47 million euros, which gives it 16.7 percent ownership of the total stocks (HS 16.4.2013). Talvivaara is criticized for informing about Ilmarinen's cancellation too late to ensure it would not affect the small-scale investors. Talvivaara refutes the criticism and states it provided the information as fast as it possibly could (Ibid; & HS 17.4.2013).

Talvivaara's financial problems do not ease and they come back to the news in the second half of the year. First, with the cooperation negotiations and later again, when the company applies for corporate reorganization (Talvivaara ser 15.11.2013). There is a public debate if the mine should be closed or not, should the government step in to help, and what are the consequences to the environment if the mine will be shut down (e.g. HS 8.11.2013a; 8.11.2013b; & 12.11.2013). The case experiences a minor scandal, as the official receivers are discovered to have previous connections to the company. Following this, one of the two lawyers withdraws from the case (HS 23.11.2013). The District Court accepts Talvivaara's corporate reorganization and later does the same for its subsidiary company Talvivaara Sotkamo Ltd. (Talvivaara ser 29.11.2013; & 17.12.2013).

4.2.7 2014 Struggle for Survival

In 2014, the financial problems and the uncertain future of the mine keep dominating the news about Talvivaara. Overall, however, the company is notably less in the news compared to the previous few years.

The consideration for charges about Talvivaara's gypsum pond leakage and the discharges into waterways has been completed and four members of Talvivaara's management, including Pekka Perä, are charged of aggravated impairment of the environment. The prosecutor also requests a corporate fine imposed on Talvivaara Sotkamo Ltd. and a compensation for the benefit obtained by the alleged crime. The company and all the suspects deny the charges. (Talvivaara ser 22.9.2014; & HS 23.9.2014.) The trial is expected to begin in early 2015.

The discussion about the environmental disaster's reasons continues in 2014. Long Play, a web publication focusing on investigative journalism, publishes an article attempting to explain Talvivaara's problems' background (Kauppinen 2014). The article is based on Talvivaara's preliminary investigation records and interviews of the employees. The article claims that the environmental problems were well known by the management of the company already in 2009, but they were blatantly ignored. According to the interviewees, the project had right from the beginning an unrealistic schedule, which led to numerous emergency decisions.

Media's role in the case also receives criticism. Talvivaara has been criticizing media constantly over the years for exaggerating the problems. Journalist and non-fiction writer Marko Eerola publishes his book, Kirottu kaivos – totuuden jäljillä Talvivaarassa (2014), which takes Talvivaara's side on the issue. According to the book, the environmental damages were much smaller in reality than what the media has been reporting. The book goes as far as saying, no environmental disaster happened in Talvivaara. According to Eerola, the media has been reporting the environmental interest groups' claims while ignoring the facts. Eerola notes that he has invested to the company but he dismisses its impact on his judgement. (HS 26.11.2014.)

The biggest storyline of the year is Talvivaara's restructuring program's progression and the discussion about the future of the mine. In November, Talvivaara's subsidiary company, Talvivaara Sotkamo Ltd. is forced to apply into bankruptcy due to the absence of any additional financing (Talvivaara ser 6.11.2014). However, just few days later, Helsingin Sanomat (12.11.2014) reports that Talvivaara has begun negotiations with its partners and investors about buying the subsidiary company back. During the same week, a group of Finnish ministers, including the Prime Minister Alexander Stubb, visit the mine and assure they will do everything in their power to keep the mine running (HS 15.11.2014).

4.3 Talvivaara's Timeline and Recent Developments

The following two diagrams visualize when the key events occurred on Talvivaara's timeline (Figure 5 & 6). The red boxes mark the major events which also caused the biggest reactions. The blue boxes indicate the concrete measures taken by the governmental institutions (dark blue), the beginning of the preparation of said measures and the publications of major reports conducted about the case (light blue).

Since the observation period, in August 2015, following a long period of uncertainty about the future of the mine, the government owned Terrafame Group Plc.'s subsidiary company Terrafame Ltd. entered into an agreement with Talvivaara Sotkamo Ltd., buying the business and assets from the bankrupt's estate. Due to the agreement, the mine's operations will be restarted under Terrafame Oy mining company. The government's aim is to secure the environmental situation, which requires restarting the mining operations. In addition, the government is looking to acquire private investors in the long term. (Ministry of Employment and the Economy 7.8.2015.)

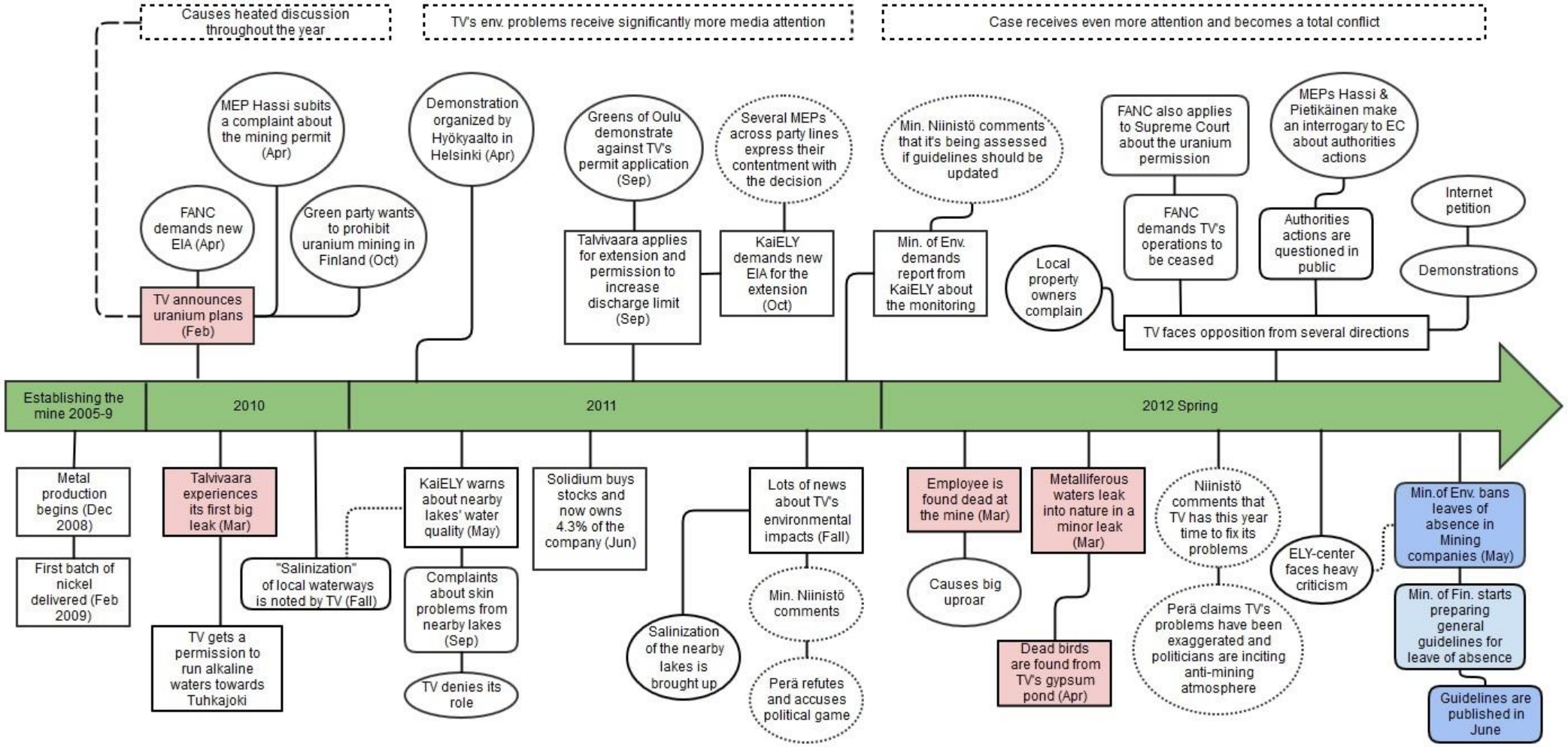

FIGURE 4: Talvivaara timeline 2005-2012 spring

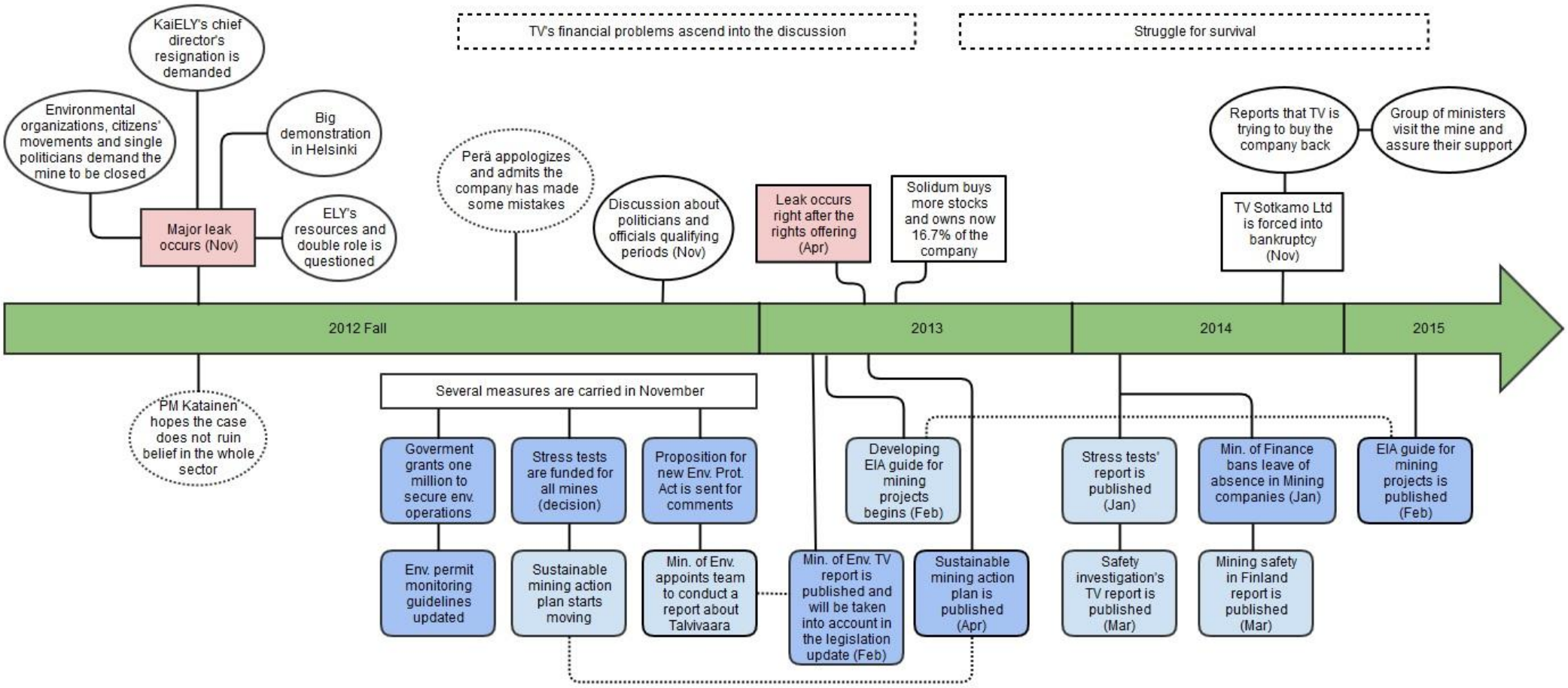

FIGURE 5: Talvivaara timeline 2012 fall-2015

5 RESULTS

In this chapter, I will first present the list of impacts of the case. The focus is on the impacts that have wider implications to the whole mining sector. Second, I present the results from the interviews theme by theme. These results add depth by giving expert opinions about the measures and the possible implications of them. Furthermore, the interviews give additional information about the case and possibly confirm some of the more speculative impacts. In the third part, I present the results in relation to the framework created at the end of the theory chapter.

5.1 Talvivaara's Implications to the Mining Sector

The following list of implications (Figure 6) was brought together from the case description, the documents and later supplemented with the information gained from the expert interviews. It should be noted that it is difficult to tell how much the case exactly affected some of the conducted measures regarding the environmental regulation. For example, the first discussions about the need to produce EIA guide for mining can be found from years before Talvivaara. Furthermore, as also suggested by couple of the interviews, some of the changes would have been possibly conducted regardless of Talvivaara. Nonetheless, it is safe to say the case had at least a major impact on them, as it was taken into account in their planning and sped up the implementation.

The most evident implications are the case specific measures and the changes in the environmental regulation. The exceptional case specific measures mean measures that were aimed to address the case specific problems, but do not have impacts outside the case. However, they are worth mentioning, as they highlight the exceptional nature of the case. First, after the major leak in 2012, the government granted one million euros additional funding for the ELY-center of Kainuu to secure the regional environmental protection and the operations of the environmental authorities. Second, the government also established its own website addressing the environmental impacts of Talvivaara, which rarely if ever seen in Finland.

The case had multiple implications to the environmental regulation. The lessons from Talvivaara would be taken into account in the Environmental Protection Act reform, which also included the plan to transfer the monitoring expenses to the operator. The monitoring guidelines for the environmental permits was updated, clarifying the supervisory authorities'

actions in permit offense situations. The update also included new issues such as communication in emergency situations. Both, the Ministry of the Environment and Finance forbid the absences of leave in mining companies for their employees as a response to the legitimacy critique in 2012. Furthermore, the case pushed the development of EIA guide for mining under way. Perhaps the most significant single measure was the Sustainable Mining Action Plan for Finland, which included numerous more specific measures (34), with appointed quarters in charge and indicators to evaluate their progress. The Plan's ultimate goal, which emphasizes self-regulation, is to make Finland's mining industry a global leader in sustainable mining.

The case has also indirect implications to regulation. As supported by the interviews, the case will stick in the minds of decision-makers and the authorities have become more critical and cautious in the permit processes. The several reports conducted about the case, including the results from the stress tests, produced numerous recommendations for the mining sector and affected some of the aforementioned measures (e.g. Environmental Protection Act reform). It could be said that they also contributed to the societal discussion about mining in general as they revealed several areas that could be improved.

The case sparked number of discussion topics about mining in the wider context. Another two topics that could be added to the list were the discussion about uranium mining and the media's role in reporting the case. However, much of the discussion revolved around the case specific issues, e.g. should Talvivaara have told about their uranium plans in advance and did the media exaggerate reporting this disaster. Some of the discussion could be seen to have had direct effect to the conducted measures. Other topics may have had more indirect effect, e.g. via the Sustainable Mining Action Plan, which attempts to take into account wide range of issues. The discussion may also become accumulated experience, which can have an effect in the future.

Finally the case has had several socio-economic impacts. In general, the case has had a major impact on the image of mining in Finland (Tiainen et al. 2014). The opposition of mining has increased which extends to even simple mining exploration. Several other mining projects have been compared to Talvivaara and phrases like "preventing another Talvivaara" have been used by the opposition (e.g. see Vakkuri 2013). The increased fears and decreased trust in authorities have increased the public participation in mining issues. Since Talvivaara, mining has been clearly more prominently visible in the media. The case may have also

affected the investors' (and the government's) readiness to invest into new mining projects. This view was partly supported by the interviews, which assumed in general that the investors would be at least more critical when evaluating their options. However, this is a subject that could use more research. Another speculative impact is related to the Finnish mining companies. Much of the criticism of mining in Finland stems from the thought that foreign companies come and take the money, trash the environment and leave. As the disaster happened to a Finnish company, it is possible they have lost at least part of the "aura of trust" that has surrounded the Finns. Finally, the case had at least one globally significant impact. The World's most popular mining responsibility system TSM (Towards Sustainable Mining), initiative of the Mining Association of Canada, decided to include a new section about water management following Talvivaara.

Exceptional case specific measures	
1	The ELY-center of Kainuu was granted a significant amount of additional resources and help
2	The Government established its own website concerning the impacts of Talvivaara

Implications to regulation	
1	Monitoring guidelines for environmental permits was updated
2	Environmental Protection Act reform
	-Lessons from Talvivaara were taken into account in the process
	-Transferring the monitoring expenses to the operator
3	Stress tests for mines
	-Produced a report based on the findings
4	The Ministry of the Finance and the Ministry of the Environment forbade the leaves of absence in mining companies for their employees
5	The Sustainable Mining Action Plan for Finland was established
	-Includes Sustainable Mining Network, Social Responsibility Report and Mining Responsibility System, etc.
6	EIA Guide for mining projects was created
Indirect impacts	
7	The case will stick in the minds of decision-makers
8	The authorities have become more critical and cautious in the permit processes and in their decisions

Major official reports about the case, which contributed to the discussions and affected the measures	
1	Safety Investigation Authority's investigation report
	-Recommendations for the mining sector
2	Ministry of the Environment's Talvivaara report
	-Suggestions mostly related to legislation
3	Ministry of the Environment's report concerning environmental safety in mining
	-Suggestions about measures

Discussion topics regarding mining in the wider context sparked by the case	
1	Environmental governance's resources in relation to mining
2	Discussion about qualifying periods for politicians
3	Waking up to the changed operational environment of the mining industry
4	Realization that new and better instruments are required, especially regarding the monitoring
5	Discussion about issues regarding the environmental insurance and safety deposits in mining
6	Responsibility and task assignment discussions to more concrete level (who is supposed to do what and who's fault is it)
7	Government's role in mining
8	Double role of the ELY-centers
9	Discussion about the role of the people in the EIA process: can they also be stakeholders in the company?
10	Demands for more transparency and better communications

Socio-economic impacts of the case (partly speculative)	
1	Increased opposition against mining and mining exploration
2	The environmental risks of mining are perceived greater and increased fears
3	Finnish mining companies losing their "aura of trust"
4	The image of mining has suffered in Finland
5	Trust in authorities has suffered
6	Media's increased interest in mining issues
7	Public participation regarding mining has increased
8	Investor's more cautious approach towards mining
9	The attitudes of mining companies has changed into more positive towards stakeholder cooperation
10	Following Talvivaara, water management section was updated in the globally used TSM mining responsibility system

FIGURE 6: List of Talvivaara's implications

5.2 Expert Opinions

The structure of this chapter follows the themes of the interview, which seemed to be suitable also for the analysis. The sections proceed roughly from the opinions of the conducted measures or occurred events towards the future and to the wider implications. With the results from this section, we are able to get one step deeper from the list of implications, getting opinions about the conducted measures and better understanding of the context of the implications.

The interviewed experts have been coded in the following way:

(A): Environmental Manager of a mining project operating in Finland
(B): Professor of Environmental Law
(C): Representative of Finnish Association for Nature Conservation (FANC)
(D): Representative of Geological Survey of Finland (GTK)
(E): Representative of the Ministry of the Environment
(F): Representative of Centre for Economic Development, Transport and the Environment

The numbers stand for how many experts out of the total presented the statement or opinion.

5.2.1 Environmental Regulation

All the experts (6) saw the environmental permit guidelines update as a beneficial and necessary measure and it was seen to help clarifying the monitoring practices. The stress tests were seen to have brought more information and understanding (6), thought there had been some confusion in their implementation (A) and it was questioned if the mining companies should have paid for the measure's expenses in the end (F). In fact, the representative of the Ministry of the Environment clarified that the stress tests as a measure had to be implemented so fast that it was left a bit shallow and too broad. However, the tool will be analyzed and it will be seen if it can be used in the future more often (E).

The Sustainable Mining Action Plan for Finland was also seen as a good, necessary measure and all the experts felt it had increased the required discussion (6). It was seen to have brought cooperation between several different stakeholders and to help Finland profile itself as a sustainable mining country (E). The representative of FANC, who has been involved in the program, highlighted that mining companies' attitudes had improved significantly since the difficult beginning, especially concerning the stakeholder cooperation. A key part of the Plan was also the Sustainable Mining Network led by SITRA (Finnish Innovation Fund), which

has been developing a Social Responsibility Report. Under this is a Mining Responsibility System, which would be one of the concrete implications of the Plan. (C.) However, its implementation will be voluntary for the companies.

The plan to transfer the environmental permit's monitoring expenses to the operator was seen as a good and fair measure by all the experts (6), if it brings better cooperation and results (A). It was noted that this could help in a situation where one mine takes all the authorities' time, which may cause others to suffer (A). It also benefits the mines themselves that the monitoring is done properly (C). It was noted that the monitoring expense transfer is a standard practice in the nuclear sector (D). According to expert representing the Ministry of the Environment, the monitoring expense transfer measure would have been conducted regardless of Talvivaara, following the general principles. The measure was also expected to help the authorities' decreased resource situation (C, E).

Every expert (6) felt like there is a need to develop the water management expertise in Finland concerning the companies, authorities and consults. The mining industry in Finland has perhaps leaned too much on the fact that it has been allowed to discharge the waste waters according to the environmental permit so far (A), instead of developing closed water circulation systems. There are problems even with the basics (A) and extreme weather events have been ignored (E). However, according to the interviewee from GTK, there are now attempts to develop the water management expertise in Finland. Concerning regulation, it was noted that the water management issues are already analyzed in two parts of the EIA: evaluation of structural decisions and preparation for exceptional situations (D).

Most of the experts felt that the case had impacted the permit processes and EIA requirements (A, B, C, D, F). The authorities have become more critical and cautious when it comes to decisions (A, B, F). On the other hand, no change was seen in the permit authorities' way in processing the mining issues (E). It was noted that there can be significant variance between the different ELY-centers (E, F), e.g. in resources and through that also in the level of expertise (E). In this context, some of the experts brought up fears regarding the possible changes in these processes. Just following a strict list of issues may lead to losing the overall picture (A) and demanding too detailed reports may have a negative impact (D). The representative of the regional ELY-center emphasized that it is the authorities' role to assess which issues are essential in the context of the project (F).

Regarding the case of Talvivaara, it was seen that the tools to deal with the continuous environmental problems, resulting in breaking the conditions of the environmental permit, already existed in the legislation but the problem was in their implementation (A, B, F). It came as a surprise that it failed so badly in Finland (B), which has always had high-level permit culture (E). Furthermore, the mine's great employment impacts were supposed as a possible reason that the tools were not used (F). A fundamental problem in the rural areas is that they have so few options. Mega-sized projects are a stroke of luck for them, which may influence the sense of proportion negatively and then the permit preconditions are not monitored as accurately (C). The person working as an Environmental Manager for a mining company saw that additional legislation would most likely not have prevented the case and saw the problems more as an expertise and process based. In Finland there is also a great desire to put everything in the law, whether it is a good or a bad thing (A).

It was also noted that the case has brought up the responsibility question that if the permit does not forbid something, it does not mean it is allowed (E). The representative of FANC assumed that the mining companies may now be more careful at what kind of permits they will apply. Previously it has been common to prepare inadequate applications which have been then supplemented along the way. This has also made the permit process difficult and vague.

The experts had hard time saying if the shortcomings demonstrated by the case were already known because this has been the first case where the system has been tested (A, E). Unfortunately things need to usually go wrong before they get better (A). On the other hand, it was seen that there were no problems with the monitoring before Talvivaara but the case will cause tweaking which can be positive (D). We have learned new things from the case and it has forced to think to what the permit emission values are being bound to (E). FANC had feared already before Talvivaara that the double role of ELY-centers will affect the processing of environmental issues and their representative saw the case as a proof that this fear had been justifiable. Furthermore, the same interviewee argued that the low resources of the environmental governance was already a known issue, meaning it is clear that only few state officials will not be able to handle the monitoring of such a huge project appropriately.

The case's impact to even further regulation remains to be seen, but unlikely (6). The measures that were seen necessary had already been implemented (E). Once the Mining Responsibility System has been established, all the case's consequences have been addressed

or are at least are known by now (C). Nonetheless, the case was seen to have indirect implications as it sticks in the minds of the decision makers (B). Also what happens at the mine next was seen to have significance (A).

Generally the experts felt that most of the changes brought by Talvivaara would have been implemented regardless, but the case sped up the process (6). However, there was a concern if the measures would help with the environmental authorities' resource problem. The resources have been cut systematically even after the case. The guidelines have improved but the resources have not. (C.) Finally, the case has helped to realize that there is a need for environmental and PR-people and that the operations should be generally improved. All the experts (6) felt that the mining sector requires better and more open communications and monitoring.

5.2.2 The Role of the Government and Legitimacy

The government's role in the case was mainly understood (approved) by the experts (6). The government and the authorities stayed in their own roles (B, D) and acted as well as they could with the expertise and the understanding they had (A). However, the government received also some criticism from the interviewees. It was noted that they could have acted better during the EIA and permit processes at the early stages of the project (F) and when the damage happened, the government was slow in its movements (C). The interviewee from Ministry of the Environment elaborated that understanding the different roles of the different authorities took time and producing analytical data before the media was a challenge. The latter could have brought better sense of proportion to the discussion (E). Once the government begun taking action, its work was purposeful and it wanted to solve the issue (C). Government had an important role once the crisis began as it 'took the reins', even if it felt like it needed a little bit of sparring all the time (C).

Talvivaara's impact to the government's willingness to support upcoming mining projects divided the opinions. On the one hand it was seen that they have the capability to evaluate case-by-case (B, D), even though they will now probably put more effort into looking what kind of project is in question (C, E). On the other hand, it was seen that the case will certainly impact the government's (and other investors') readiness to invest (A). For the latter, one given reason was that the case has shown that a mine is always a risky investment (A).

All the experts (6) saw that the trust in the authorities had suffered as a result of the case. Some more specific reasons given for this were the exceptionally high trust that had preceded

the case in Finland (A, B) and the general trend where experts and authorities are questioned more and more (D). The government's slow reactions in the beginning may have also affected negatively (E). The loss of trust was seen as very harmful. If the citizens do not trust the authorities, there is no chance for the mining companies to acquire the social license to mine (A). The case has also increased the perception that the mining business does not always operate with completely clean hands (C). The companies' self-regulation was emphasized (A, B), but it was also understood that if there is no trust, nothing that you do will matter in the end (A). A permission approved by everybody should be the basis for everything (A). The peat sector was given as an example of a bad situation (D).

All the experts (6) felt that the authorities' leaves of absence have developed their expertise, but the decision to forbid them in mining companies was mainly understood. Even if malpractices may not really have happened, this could manifest as a credibility problem (B, F). Finland is a small country so ineligibility issues may be hard to avoid and the top experts have demand in both the governance and the private sides (A, C). Qualifying periods could be appropriate for the authorities (B). If you make decisions in your position about a company where you are also a shareholder, it does not look good from outside (F). It requires alertness when considering who makes the decisions and it should be discussed. More transparency is needed. (A.)

On the one hand it was seen that there was no problem with ELY-center's double role as different people make the decisions regarding to environmental protection and industry and commerce. Their actions are unbiased. (D.) On the other hand, the double role received strong critique as noted earlier by the expert representing FANC.

The authorities could restore their credibility slowly with good practical work (B, D, E, F), transparency and clear communication (C, D, F). The information should be publicly available, e.g. in internet, to make the discussion revolve around facts and not on assumptions (C). However, the lack of resources was seen as a problem here by the interviewee from the Ministry of the Environment. It was also noted that it is not the authorities' job to make political evaluations, but it is the legislation that describes the compromises between the different interests (B). Mining companies should avoid publicly criticizing the authorities (A). Nonetheless, matters of principle like uranium will most likely always cause criticism from some quarters (A). Another issue that was brought up was that the Environmental Protection

Act's coercive measures are relatively slow, which may show up as a credibility problem, as it may appear as an inability to do anything (E).

The interviewed Environmental Manager of a mining project, who has experience from several countries in the mining business, highlighted that Finland has had traditionally a really good cooperation between the authorities and the companies, compared to for example Sweden. According to the interviewee, the case has made the authorities very cautious and if the relationship goes from constructive to reactive, it will certainly not improve the state of the environment.

5.2.3 Social and Economic Impacts

The acceptability of mining was seen to have decreased as a result of Talvivaara (A, B, D, E), especially among citizen who could not separate Talvivaara from other mining projects (A) and in areas which have no previous experience of mining activity (D). One reason for this was seen to be the fact that mining is not risk-free activity and now these risks are acknowledged better (A, C, F).

There were two opinions about the case's impact on investors, but generally it was believed that the investments are analyzed at least more carefully. Part of the experts did not believe in significant impact on investors (B, D). Finland's position as an interesting mining country has not weakened (B). On the other hand, it was noted that investors do not necessarily look first at the environmental issues (A), but Talvivaara's, Northland's, and Laivankankaa's cases, where a lot of money and time have been lost, may have brought up the economic risk that is present in the mining business (A, B). Also the global trends, such as ethical investing, was brought up as a possible factor affecting investments into problematic mines (F).

Pressure to increase environmental security deposits was noted (A, B) and it was hoped (F) and the whole system should be improved overall (B). However, increasing them was seen unlikely (C, D, E). The deposits were not seen very significant right now (A) and it was seen possible that the demands about transparency regarding the closure expenses may increase (A, D). According to expert from FANC, it would be more important to get the mining companies involved in the voluntary responsibility system that is being prepared.

All this was expected to make mining slightly more expensive, but not necessarily less profitable (6). According to the Environmental Manager, no useless expenses caused by the measures had been yet observed and at the general level, the measures were good and normal

compared to what is demanded from the mining companies internationally. However, all this requires new persons in charge, temporal resourcing, updating the data and education to follow these new issues (C). On the whole, the case's social impacts were seen as significant and this could have big implications as fears and suspicions have increased surprisingly much (A, B, F).

5.2.4 Societal Reactions

The reason why the case became such a significant event, was seen to have been a result of several reasons. Even though Talvivaara's environmental impacts were relatively local (however, it was noted that they affected three provinces (F)), the impact can be very broad through the experienced risks (B, F). New mines are not thought as averages but just from your own point of view (B). The impacts were seen as various: the environment, image, other livelihoods, property harm, and the fact that Talvivaara was mining sector's first big case, all played a role (C, F). The 'story' behind Talvivaara, including all its problems, was seen as a significant factor. Alongside it, the environmental problems themselves may have been secondary. (A.) The gap between the expectations and the reality was wide and the incompetent communication aggravated the situation (D). On the other hand, the environmental impact in the lakes was very visible compared to for example forestry or other industrial impacts, which may have played a role (A). Also the leak situation itself was quite wild, it was accompanied with a long time of uncertainty about the real impacts and it was difficult to describe and to relate into anything else (E).

No expert found it surprising that so many actors activated in the case because it was such a significant incident (5). This is in contrast to Talvivaara mine's comments which had questioned many times why was the case receiving so much attention. The role of the NGOs in the case was seen as significant, especially through the media (5). NGOs were seen to have brought up new issues to the discussion, alternative information (F) and pressure to develop the operations (E). They were seen to have impacted the operations locally and their role was believed to grow in the future (F). On the other hand, they gave a quite bad overall picture of the situation (E). Even though none of the experts criticized the NGOs bluntly, they received criticism during the conflict and were accused of exaggerating the environmental impacts on more than one occasion.

The media's role was seen as very significant in the case by all the experts (6). It was seen to have created mental images and it brought forward especially the critical perspective (B).

According to the interviewee from FANC, it brought up the deep disapproval and the concern that the citizens had about the environmental activity of Talvivaara, was able to channel it to politicians, and was able to steer the issue into a better direction. The citizens get most of their news and information about mining from the media, which increased its significance (A). The media was also criticized for categorizing all mining into the same category with Talvivaara (A, B, F) and for exaggerating at times (A, D). It was noted that it should have been understood that Talvivaara is a single case and that the field is very fragmented and includes greatly varying activity, actors and attitudes (A, B, F). On the other hand, the media was seen all in all as decorous and it brought important information to the public (D, F). The mining companies' accusations of the media were seen as unfounded on the one hand (C). Talvivaara also made itself an easy target for the big headlines (A, F). If a mining company does not provide the information and withdraws into itself, it creates a shroud of mystery, which certainly does not forward any issues (C). However, media's influence to the authorities was doubted (A). Media acted fast and its downside was that the authorities had to react fast to issues which required deeper reflection (E).

There had been a notable change in the way the media covered mining sector since the big leak in 2012. The reporting was seen now as more neutral and less dramatizing from the pro-mining perspectives. One reason for this was the mining sector's attempts to increase the understanding of the journalists via better cooperation (A). The media's expertise has increased (D). Generally the mining sector has been receiving a lot more attention since Talvivaara. In a long run this was seen as a positive thing as it forces other companies to focus more on the highlighted problems (C).

The media strategies and communications of the mining companies were seen as weak and there was room to improve (A, B). The complex risks of mining require better and clearer communications from the companies (B). Generally the experts hoped for better, clearer and more transparent communication, but there was no certainty if it is changing (B, A, D, E). In Finland the mining companies often lack PR-persons, especially on the spot, when internationally it is a common practice to have a community manager in addition to the PR-officer (A). The way of reporting traditionally and reacting to angry opinion pieces is an outdated method to take care of things. The wider public and the stakeholders are interested in the data on how for example the environmental issues are taken into account, what chemicals are in the discharge waters and how those values have varied over time. (C.)

More transparent and clearer communications was also seen to help with the challenge of explaining the complex risks associated with mining to the general public (6) and also to the politicians (E). The plans should be told clearly, alternative suggestions should be heard and regular dialogue should be maintained (C). On the one hand, it was seen that it is always possible to popularize the impacts in such a way that everyone will understand them relatively well (F). On the other hand, it was seen that if you summarize too much, you lose the content, and nobody has figured out yet how to present these results in an easy way (A). The low resources of the authorities were brought up again as a factor limiting their communications (F). According to the expert from GTK, the mining companies have only one way to respond to this challenge: 1) the company publishes and commits to follow its environmental principles, 2) it acts according to them, and 3) reports this publically. Finally, there could be more stakeholder cooperation.

Talvivaara's impact on public discussion was seen to have been significant. Before the case, there was not much talk about the mining sector in Finland, as the country may have been living in a state of 'post-Outokumpu', and the industry's activities were not questioned much. (A.) At the larger scale, the mining sector's operation culture has changed a lot during the last 50 years. Networking and transparency have increased. However, it is difficult to see how big role Talvivaara has had in this. (F.) The representative of FANC felt like the mining sector's attitudes have changed significantly to more constructive direction since the end of 2012. Public participation has increased (A, B) which reflects the increased fears and concerns (A). In addition, there is much more focus on simple mining exploration (A, D)

The measures followed by the case were seen as a result of the longer public discussion (A, B, C, F), but also partly as reacting to the pressure (A, B, C) and as a completely reactionary actions from the side of the government (D, E). The longer processes, the Sustainable Mining Action Plan and the Responsible Mining Network which came from it and led to the development of Social and Mining Responsibility Systems, were a result of longer consideration and cooperation according to the interviewee from FANC. In this context, the small size of Finland was noted to be actually helpful. Generally the case was seen to have sped up the development as it brought out the shortcomings (5).

When asked if the societal discussion did leave some important topics uncovered, few issues came up. The feasibility study of the mine should be the basis for all the operations and if it is not in order, neither can be anything else (A). The feasibility studies should not be too 'rosy'

(D). There are few examples of these cases and the expert (A) asked if there would be some way to affect it. The belief that the market will take care of these issues has been proven to be wrong. Another topic that was brought up was the single-use nature of the mines (D, F) and that some ore deposits could be left completely unexploited (F). The wider scale discussion was bit left out in the aftermath (F). Finally, the discussion about how large the environmental catastrophe was in the end and its proportional comparison without additional fanaticism was never done (D).

When asked what will be the biggest impact of the case in the end, pointing out just one single aspect was bit difficult for the experts. However, it was seen that it impacts the image of mining (A), how people view the field - meaning increased interest in the environmental impacts of mines (B). Another significant impact was seen in how the mining companies have understood the importance of stakeholder cooperation and how the attitudes have changed since 2012 (C).

On the whole, all the experts were optimistic about the future. Even though the case was seen as an unfortunate event, the common feeling was that it will lead into improvements and better things in the long run. The case was even seen as an opportunity push the Finnish mining sector into the top of the international level (D).

5.3 Results in the Context of the Theoretical Framework

In this section, I will describe the policy process of Talvivaara utilizing the framework created at the end of the theory chapter: framework for analysis (2.6). The results from the two previous subchapters (5.1 and 5.2) are taken into account in this. In essence, I will describe each step of the policy process of Talvivaara, while addressing how the societal conditions may have affected these steps.

Interpreting the case through the theoretical framework, we can first look at the societal conditions that enabled the risks to come true. When Talvivaara was still at the planning stages, the circumstances for a new mine were favorable. The area of Kainuu had been affected by high unemployment rates for a long time. This may have helped accepting the risks easier, even though the technology was new and untested at a larger scale. In this context, some of the interviewees contemplated if the high employment impacts could have affected the authorities' decision-making. In essence, the risks involved with the mine were accepted in a techno-economic pursuit of prosperity. Before Talvivaara, there had not been a

major mining related disaster in Finland and the domain had not drawn much attention. The efforts to learn and to change policy were accelerated in the wake of the disaster. Finally, the disaster was overwhelmingly seen as a result of human failures by the general public, even though there were some attempts from the company to put part of the blame on higher than usual rainfall. However, these attempts were mainly ridiculed in the public discussion and seen as an issue of incompetence.

Following the model of policy change in a mining-related disaster case, the first step of the process is how the disaster gains enough attention. Accumulated experiences from prior incidents increase this possibility. While, the prior incidents on other mines did not play a major role in this case, it could be argued that the previous problems at Talvivaara certainly affected the interest once the big leak happened at the end of 2012. Prior to the leak, the mine had been already featured heavily on the news due to the various scandals, including the two smaller leaks, the death of an employee, salinization of the surrounding water ways and especially the uranium issue. However, even prior to the problems there had been some discussion about the "mining boom" in Finland and its implications to the society. The worries and fears related to this discussion may have also played some role in the great interest in the case. The case could be seen as a culmination of the existing problems related to the mining sector and it forced the society to address them.

As the case received enough attention, group mobilization was able to take place. However, it could be said that this step did not follow a single incident but more groups and individuals started to take part as the conflict grew bigger. What began as a local contention, grew to become a nationwide conflict as the problems continued. The uranium issue already in 2010 caused FANC and the Green Party to become active. Furthermore, in 2011 the environmental group Hyökyaalto organized a demonstration in Helsinki as a response to the continuous environmental problems at the mine. Several members of the parliament across party lines commented the case regarding the discharge limits and the Minister of the Environment, Ville Niinistö, had commented the environmental impacts on multiple occasions. Following the problems in 2012 spring Talvivaara was criticized heavily from many fronts and the citizen movement Stop Talvivaara had begun demanding the closure of the mine. Local property owners and later also fishermen complained about the environmental impacts. Both the authorities and the mining company had to defend their actions. Following the big leak in November 2012, more people activated on the issue. In addition to the already active environmental groups, now including Greenpeace, and citizen movements, more individual

politicians joined the criticism. The general public was also active in opinion columns and demonstrations and even the Prime Minister, Jyrki Katainen, commented the case. At this point, almost every governmental institution and organization with mining interests had been forced to at least comment the issue. In effect, only the other mining companies operating in Finland had kept quiet in the public. Finally, in the aftermath the government started a massive round table process, which gathered all the mining stakeholders in attempt to resolve the problems regarding mining in Finland. It could be said that the group mobilization for this case was substantial.

The case also formed or reinforced the existing loose fronts at the ideological level. First, the uranium issue divided the people into camps who support or oppose uranium mining. The second issue was more related to mining in general, as the benefits of mining were questioned following the disaster. Movements campaigning for moderation in consumption and on the contrary, for the economic benefits of mining, could be linked into the latter issue.

The group mobilization led to discussions of ideas in various forums about the reasons for the disaster. This stage followed the group mobilization, meaning, it developed as the conflict grew larger and more problems surfaced. Even before the major leak in November 2012, everything related to Talvivaara and its supervision had been seen as a failure. The existing policies were questioned as was the institutional capacity to enforce them. For example, the low resources of the environmental governance were brought up as a problem. The failure of the security institutions caused people to lose their trust and to doubt the institutions' expertise. The responsible ELY-center's director's resignation was demanded and the whole environmental governance's level in Finland was questioned.

The complex nature of the risks related to the mine, mostly invisible and partly incalculable, overshadowed the discussion. There was uncertainty about the complete impacts of the leak(s), which to this day has been only roughly estimated. Conflicting information coming from the different parties and their experts did not help the situation. The different parties accused each other of exaggerating or downplaying the impacts and as the discussion revealed more facts about the case, accusations of cover-ups and scaremongering came into play. Talvivaara defended itself by referring to undeniable proof and stating it was following the accepted permit values (e.g. in the context of the "salinization" of the waters and the water discharge limits). The complexity was also prominently displayed in the debates related to the

closure of the mine. A big argument against the closure were the uncertain impacts it would have to the environment due to the nature of the technology used in the mine.

The NGOs had a strong role in the discussion through media, as was also suggested by the expert interviews. They were able to use the media, legal control and consultation effectively to drive their interests. According to the representative of FANC, the problems brought up by their association and the suggestions for solving them were taken surprisingly well into account by the government in this case. This could be seen as an example how the influence of interest groups extends to the decision making and to the will formation of political parties.

The discussion was not limited only to the problems of Talvivaara, but it extended to issues concerning the whole mining sector (e.g. see 5.1). The various reports, which were written about the case or which were conducted because of the case, provided numerous suggestions or measures for the whole mining sector. Better communication and more transparency were demanded and are still demanded as demonstrated by the interviews. Notably, every discussion topic did not lead to action. However, the learning may accumulate and affect future policymaking.

According to the model, the discussion stage is critical for the learning as the different sides learn more about the policy problem while debating and forming their arguments. If the policy change occurs without such discussion, it may be evidence of superstitious learning or mimicking. However, if policy change occurs after such discussion, it may be evidence of instrumental learning and possibly some social and political learning, which is more likely to lead to positive policy outcomes. Interestingly, as the timeline of Talvivaara's history (see 4.3) shows clearly, almost all the concrete measures were conducted or initiated almost immediately after the big leak in November 2012. Only the Ministry of the Environment's and later the Ministry of Finance's decisions to forbid leaves of absence was carried before the biggest incident. These decisions were a response to the criticism towards the authorities in spring 2012.

The links of the conducted measures to Talvivaara and the discussions revolving around it are evident as already discussed in 5.1 and supported by the interviews. Thus, following the model, the updated regulation which followed the case could be interpreted as instrumental learning. This may lead to positive policy outcomes. Indeed, the results from the expert interviews support this assumption. Generally, the experts saw the conducted measures as good and needed, assuming they are implemented well. However, the social learning in the

context of the case may have been more significant regarding its consequences to the mining sector.

A major change has occurred in how the mining's environmental and economic risks are perceived greater now. The legitimacy of the authorities has suffered and the image of mining in Finland has taken a major hit. These in consequence have led to increased opposition of mining in general and to demands for more transparency. Media's interest in mining issues has grown and public participation regarding mining has increased. These changed attitudes have also impacted on the authorities' way to process the permit issues even where the legislation has not changed. However, major changes have also happened in the attitudes of the mining companies as revealed by the interviews. The companies have responded to the interest groups' demands to participate in decision-making and increased transparency with more stakeholder cooperation. Another example of a new approach was seen already from Talvivaara as it attempted to address the transparency issue by introducing paikanpaalla.fi blog in 2012, which provided information about the mine's monitoring and environmental impacts.

Analyzing the conducted governance measures more deeply, the Mining Action Plan and the initiatives started under it stands out of the group clearly. It could be interpreted as a form of reflexive governance, which addresses the reasons behind the visible problems and aims to anticipate future challenges. Indeed, as suggested by the interviews, the initiatives under the plan were seen as a result of longer reflection. On the contrary, some of the other measures may have been conducted under a pressure to "do something" fast without too much planning behind them, as suggested by some of the experts. For example, even though stress tests were generally seen as a helpful measure which may have brought more information to the authorities, the results of them were partly questioned. The Ministry of the Environment's decision to forbid authorities' leaves of absence in mining companies was also understood because they may "look bad" to public, but generally all the experts agreed they had developed the authorities' expertise.

As demonstrated above, the case has many parallels to the theoretical framework. However, the process did not seem to follow strictly the policy change model, but instead it could be described somewhat cyclical. The conflict had already caused group mobilization, discussion and even some policy changes before the major leak occurred in November 2012. The major leak however caused the collapse of reputation of mining in general in Finland, activated even

more actors and pushed most of the eventually conducted measures into process. It could be seen that the lessons learned from the continuous problems related to the case accumulated. Every time a new incident happened, the past experiences played a role in generating attention to the new issue. Eventually the major leak was the "final nail in the coffin", a catalyst, triggering a series of concrete measures.

Following the above conclusion, it can be argued if the case of Talvivaara matches Birkland's definition of focusing event in a sense that the "suddenness" of it can be questioned. However, it is hard to say if anyone could actually foresee the major leak coming. The environmental conflict built-up over time but the major leak may have been the crucial factor, forging an image of a total disaster.

6 CONCLUSIONS AND DISCUSSION

The purpose of this research has been to study environmental disasters' impact on policy change through the case study of Talvivaara. The subject was approached with the theories of risk society, reflexive modernization and the model of event-related policy change. These concepts were then modified and tied together into a framework. The framework addresses how the conditions of contemporary societal conditions affect the policy process, what steps are required for a policy change to occur and what kind of learning it may produce. This step was followed by a detailed case description of Talvivaara, which revealed how the conflict developed. The case description and the thematic analysis of the expert interviews produced a comprehensive list of the case's implications and opinions about them. Finally the results were analyzed through the theoretical framework which illustrated how the aforementioned model can describe the policy process of Talvivaara.

When an environmental disaster occurs, action is taken and there is an attempt to learn something from the incident, to ensure something similar will not happen again. Talvivaara has not been an exception. Action has been taken and indeed – a lot has been learned. The case has likely become a defining moment for the mining sector and environmental policy in Finland. However, events like Talvivaara always raises the question, why did the case become so significant in the first place? As Birkland (2006) states, not all major incidents become focusing events. The interviewed experts had no convergent answer when the question was presented. Thus, a conclusion could be made that it may have been the sum of multiple factors. The continuous problems already before the major leak, the large economic losses, the failure of the safety institutions, the broken promises and the role of the first big mining disasters among other things – may have all impacted the strong societal reaction.

The substantial group mobilization reflects that multiple interests were on the line. Almost every group with some kind of mining interests took part in the followed discussion. As I discussed in the results section, the long build-up before the major leak occurred may have played a role in this. The followed discussion revealed many problems with Talvivaara but it later extended to issues concerning the whole mining industry and even the environmental governance. For example, the flaws with the water management was later found out to be a weak link for the whole mining industry in Finland. The discussion also revealed a wider problem, which could be described roughly as the outdated modus operandi of the mining industry, manifesting as e.g. inadequate stakeholder cooperation, lack of transparency and

weak communications. The way the discussions progressed is along the same lines with Birkland's (2006) findings, that large events are more likely to trigger discussion of a broad range of problems, while smaller events will lead to discussion of narrow range of issues.

The interviews emphasized the role of the NGOs and the media in the societal discussion. Earlier we established that the discussion was linked to the conducted measures and following this, we can make the conclusion that the NGOs were a major factor influencing the policy process. This was also supported by the comments of the representative of FANC, according to whom their suggestions were taken into account in the conducted measures with a surprisingly high rate this time. However, it is possible that several other parties would suggest the same, if presented with the same question. Notably, mining before Talvivaara had been left largely unattended in Finland. The grown influence of the environmental groups due to the disaster follows the findings of Baumgartner and Jones (1993) who found that the "policy monopoly" of the U.S. nuclear power domain broke down over time, as events and political changes came together to allow greater participation in nuclear energy issues. Before the events, the environmental groups had found it difficult to gain access to the policy community. However, it is uncertain how much the NGOs in Finland have actually attempted to influence the mining policies before Talvivaara and it could be a question for further research.

Even though the government's actions were criticized heavily during the conflict, the experts saw the eventually conducted measures beneficial in general, even if the government took its time to start reacting. The numerous measures also tell that it had the will to solve the problems. Nonetheless, the case has affected the public's trust on the governmental institutions and the recovery will take time and good practical work. Interestingly, although the experts saw the conducted measures useful, most of them felt like the tools to deal with the problems related to Talvivaara already existed, but the main issue was in their implementation. Thus, a big part of the learning caused by the case may be indirect and "invisible", affecting the individuals involved in the supervision of mining projects. This could be seen on how the authorities have become more critical and cautions in their decisions. In addition to the authorities, the experts believed that the case will affect the mining companies' practices, for example in the permit application practices. The new policies and practices will have some impact on the cost of mining, but the experts saw it insignificant when looking at the overall picture. However, the impact on investors may be more notable but mainly through the exposed economic risks related to mining in general.

Indeed, many of the revealed problems were addressed with various measures. Reforms to the environmental legislation were proposed, guidelines were updated and measures to produce more information were conducted. However, some of the revealed problems encouraged a different kind of approach, emphasizing self-regulation and cooperation. The Sustainable Mining Action Plan and its several initiatives attempts to address many of these issues. The Action Plan as a governance arrangement stands out from the group as an example which follows the more modern methods, which are anticipatory and adaptive. It could be seen as a form of reflexive governance. However, all the discussed issues did not result in action. Another wider issue that was partly known already before the major leak, was the low resources of the environmental governance. According to the interviewees, this affects the authorities' expertise, communications and the ability to monitor sufficiently. It could be seen disconcerting that there has been no major action to address the issue. On the contrary, the resources have been even cut after the case. However, some relief should come from the plan to transfer the monitoring expenses to the operators. In addition, according to the Ministry of the Environment, the ELY-centers will specialize in the future in a way that, for example, areas with a lot of mining activity will receive staff that is specialized in mining issues.

In addition to the regulative measures, the case produced a wide range of societal reactions. The risks of mining have been reevaluated – both the economic and the environmental. Fears, suspicions and the opposition have increased. The image of mining has suffered. Now the opposition reaches also to the simple mining exploration and it is not seen as a separate activity from the actual mining anymore. It could be seen that the opponents of mining have found it to be a viable strategy to start hindering the projects from the early exploration stages. The general public is also more interested in mining than before. This can be seen from the increased media coverage, not only about Talvivaara, but also about other mining projects. All this could mean a lower margin of error for the mining companies to operate as their problems will draw more attention. A person working for the regional environmental authority revealed to me that after the events of Talvivaara, he had been bombarded with questions from the media, asking are there really no problems with the mines in his region.

Consequently, it could be seen that the case has had a major impact on the societal governance of the mining sector. The public has become more active and want to take part in the decision making. The different interest groups and stakeholders' opinions have to be taken into account better than before and they have more power to affect the policy processes. The authorities' decisions are questioned more and as a result they have become more cautious, as

we learned earlier from the experts. The public is also demanding more transparency to the decision making and monitoring. This consequently may force the mining companies to change their practices, even where no regulation demands it. All in all, more is required from the companies and the authorities if the social license to mine is to be acquired.

Based on the above findings, we can say that the case has affected policy change on multiple levels. First, it brought attention to the problems revealed by the case. The already known problems were included into the discussion which also revealed new, wider problems related to the whole industry and the environmental governance. Second, it changed the public's risk perception about mining. The social concerns may play a role in future decision making and for example in the permit processes, as those require certain amount of individual interpretation. This way the social concerns may affect the industry, even where they have not led to new legislation. However, if we go with Birkland's (2006) proposition that learning can decay over time if there is long enough period between the focusing events, it is possible the policymakers can forget this kind of learning as the time passes. Finally and most evidently, the case changed the field's tangible policies and practices, while accelerating the already planned measures.

There are two major conclusions we may draw from the case regarding policy change and disasters in general. First, a lot have been learned, action has been taken to prevent similar incidents in the future. The case has produced new and innovative approaches which will improve the whole mining sector in the long run. Indeed, disasters can produce positive policy change. Second, a grimmer and perhaps a more of a discussion starter than a conclusion: a disaster may be needed to drive such action into practice. Unfortunately, things need to often go wrong before they improve. From a learning perspective, it is possible that a large disaster is required to reveal just how bad a disaster can be, as Birkland (2006: 162) contemplates. To cite the words of one of the interviewed experts, it is hard to say if the problems revealed by the case were already known beforehand, because this was the first time when the system was tested. The complexity of the contemporary risks make them hard to estimate as they are difficult to understand without profound knowledge about the issue. The reservations of few experts in the face of potential great economic benefits may get lost in the background noise and labelled as scaremongering.

The latter observation is a subject for its own discussion as it evokes such questions as is it even possible to gather the political will to change some industry wide systems before

something bad actually happens? It may be very difficult to change the existing systems without some major evidence that it needs reform. Furthermore, even if the proactive change is successful and prevents these risks from coming reality, there is little to be shown that these efforts were required.

This research has provided a focused overview about an otherwise extensive and complex subject, describing how a disaster case, and more specifically a case that has been perceived as a manufactured disaster, can affect a whole industry of a state on many levels. However, drawing very broad generalizations from a study that focuses on a very specific political system in a specific type of country may not be too fruitful, as is often true with single case studies. These limitations should be recognized and the findings should be taken as a one more piece of information when attempting to understand the big picture.

Further research could include a comparative study of the case and a similar mining disaster in another country, which could provide further insight about the subject, revealing possible similarities and differences in the societal responses. In the context of the Finnish mining sector, more research could be done about the case's impact on mining companies' practices. Apart from the comments about the progress within the Sustainable Mining Action Plan, there is little information publicly available about any changes in practices, even if those were speculated by the interviewees.

Finally, couple words about the compatibility of the utilized theories in this work. While risk society and reflexive modernization provide a perspective to wider societal change, the model of event-related policy change provides more of an analytical tool to study the learning in the policy process and more specifically, in the context of focusing events. However, whereas the model attempts to explain the link between learning and policy change, it largely ignores the social and political factors outside the specific policy domain. These could play a significant part, especially in the discussion stage. In this sense, by including the above mentioned macro level theories, we have been able to take the wider context better into account in the research. This seemed suitable in light of this study. For example, during the interviews, it was mentioned on more than one occasion that a reaction in question was part of an ongoing wider societal trend, such as increased criticism of institutions and expert opinion.

Historically the field of environmental policy and politics is rather unique, in a sense that significant events have always played a major part in shaping it. Thus, these single incidents have a key role in shaping the field in the long run. While slow change allows for gradual

adaptation, abrupt change is more challenging for the social structure and the production system which do not adapt easily. This is particularly an issue when such events do not occur frequently, because memory decays and risk perception weakens. Nonetheless, policy leaps may occur. It could be said that every disaster brings losses but also gains. Regarding the latter, our understanding of the processes involved increases, which advances our awareness of the interactions between human and ecological systems, and the effects of our past decision-making processes. Ultimately, it may allow us to examine how risk society unfolds.

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Figures

Figure 3. Talvivaara Mining Company Plc. Official website. http://www.talvivaara.com/toiminta/Talvivaaran_kaivos Accessed 8.10.2013.

Attachments

Attachment 1. Used abbreviations. Finnish names in brackets.

FANC	Finnish Association for Nature Conservation (SLL, Suomen luonnonsuojeluliitto)
ELY	Centre for Economic Development, Transport and the Environment
KaiELY	Kainuu ELY
Plc.	Public Limited Company
Ltd.	Limited Company
ser	Stock Exchange Release
TPA	Tonnes per annum
GTK	Geological Survey of Finland (Geologian tutkimuskeskus)
EIA	Environmental Impact Assessment
STUK	Radiation and Nuclear Safety Authority (Säteilyturvakeskus)
AVI	Regional State Administrative Agencies (Aluehallintovirasto)
PS-AVI	Regional State Administrative Agency of Northern Finland
Tukes	Finnish Safety and Chemicals Agency (Turvallisuus- ja kemikaalivirasto)
SYKE	Finnish Environment Institute (Suomen ympäristökeskus)
TSM	Towards Sustainable Mining
SITRA	Finnish Innovation Fund
NGO	Non-governmental organization

From the timelines (Figure 4 & 5):

TV	Talvivaara
MEP	Member of the Parliament
EC	European Commission
PM	Prime Minister

Attachment 2. Conducted expert interviews

Kauppila, Tommi (2015). Geological Survey of Finland, Leading Researcher & head of the eco-efficient mining research program. Interview via phone 15.6.2015.

Kuntonen-van't Riet, Joanna (2015). Anglo American Exploration, Environmental Manager. Interview via telecommunication software 28.5.2015

Luotonen, Hannu (2015). North Karelian Centre for Economic Development, Transport and the Environment, Senior Researcher. Interview in Joensuu 27.5.2015.

Pajukallio, Anna-Maija (2015). Ministry of the Environment, Counsellor, environmental risks. Interview via phone 16.6.2015.

Pölönen, Ismo (2015). University of Eastern Finland/Finnish Environment Institute, Environmental Law Research Professor. Interview in Joensuu 21.5.2015.

Yrjö-Koskinen, Eero (2015). Finnish Association for Nature Conservation, Executive Director. Interview via telecommunication software 23.6.2015.

Attachment 3. Aiding list of questions for the expert interviews.

I. Ympäristösääntely

1. Tapauksen seurauksena ympäristölupien valvontaohje päivitettiin. Siinä on tarkennettu valvontaviranomaisten toimia luparikkomustapauksissa ja mm. tiedottamista poikkeustilanteessa on korostettu uutena asiana. Mitä mieltä olet tästä?
2. Tapauksen seurauksena rahoitettiin stressitestit koko maan kaivoksille. Mitä mieltä olet tästä?
3. Stressitesteistä julkaistussa raportissa oli monia suosituksia nimenomaan vesien hallintaan liittyen (myös patorakenteet). Myös ympäristöministeriön Talvivaara-selvityksessä oli muutosehdotuksia liittyen patojen ja kaivosten ympäristölupahakemusten käsittelyä varten (tarvittaisiin virnaomaisten lausunto). Millaiseksi koet kaivosalan vesiosaamisen tason Suomessa? Onko tulevaisuuden muutoksia ennakoitu (esim. ilmastonmuutos ja sen seurauksena kasvava sadanta)?
4. Suomi kestävän kaivosteollisuuden edelläkävijäksi – toimintaohjelma käynnistettiin Talvivaaran ison vuodon jälkeen ja se sisältää lukuisia toimia. Mitä mieltä olet siitä? Onko lähtenyt toteutumaan hyvin ja ovatko toimet riittäviä?
5. Talvivaaran tapaus on otettu huomioon myös meneillä olevassa ympäristösuojelulain uudistuksessa. Tiivistettynä, tarkoitus olisi tiukentaa kaivosalan ympäristösääntelyä ja siirtää valvontamaksuja toiminnanharjoittajalle. Mitä mieltä olet tästä?
6. Luuletko että Talvivaara tulee vaikuttamaan luvitusprosesseihin? Entä YVA-vaatimuksiin? Vaatiiko enemmän vakuuttelua, takuita?
7. Miten arvioisit kokonaisvaltaisesti Talvivaaraa seuranneita toimia? Ovatko olleet riittäviä? Puutteita? Onko niillä pureuduttu todellisiin syihin, joista Talvivaaran ongelmat syntyivät?
8. Olivatko tapauksen osoittamat puutteet valvonnassa tiedossa jo ennen Talvivaaraa? Vaadittiinko tällainen isompi tapaus ikään kuin sysäämään muutokset liikkeelle?
9. Millaisia reaktioita toimenpiteet/muutosideat ovat aiheuttaneet kaivosyhtiöissä?
10. Oletko huomannut muutosta viranomaisten tavassa käsitellä kaivosasioita?
11. Luuletko että tapauksella tulee olemaan vielä lisää vaikutuksia sääntelyyn?
12. Tuleeko mieleen vielä jotain sääntelyyn liittyvää joka jäi tässä käsittelemättä?

II. Valtion rooli ja legitimiteetti

13. Mitä mieltä olet valtion roolista tapauksessa? Olisiko pitänyt ottaa suurempaa/pienempää?
14. Tuleeko mieleen mitään minkä suhteen valtio olisi voinut toimia paremmin tai missä se toimi hyvin?
15. Tapauksen yhteydessä puhuttiin myös vastuullisesta sijoittamisesta. Luuletko että tapaus tulee vaikuttamaan valtion/Solidiumin halukkuuteen tukea uusia kaivosprojekteja? Toisaalta tuleeko valtio ottamaan aktiivisempaa roolia tulevaisuudessa?
16. Koetko että luottamus viranomaisiin on kärsinyt tapauksen seurauksena? (kaivosyhtiöt, kansalaiset)
    a. Tullaanko heidän päätöksiä kyseenalaistamaan herkemmin?
    b. Vaikuttaako tämä kaivosyhtiön omavastuuseen?
17. YM ja myöhemmin VM kielsivät työntekijöiltään virkavapaat kaivosyrityksistä kritiikin seurauksena. Niitä oli aiemmin perusteltu sillä että ne ovat kehittäneet virkamiesten osaamista. Mitä mieltä olet ratkaisusta?

18. ELY:n kaksinaisroolia on kritisoitu tapauksen yhteydessä. Myös YVA:n tekijöiden roolista (saavatko olla osallisena kaivosyhtiössä), hyväksyvän viranomaisen osuudesta kaivosyhtiössä (esim. Paula Lehtomäen tapaus) ja poliitikkojen karensseista on puhuttu. Koetko että nämä ovat riski legitimiteetille?
19. Tuleeko mieleen jotain toimia joilla valtion virkamiehet voisivat parantaa luottamusta?

III. Sosiaaliset ja taloudelliset vaikutukset

20. Onko tapaus vaikuttanut kaivostoiminnan yleiseen hyväksyttävyyteen? Koetaanko alan riskit nyt suurempana? Jos koetaan, tuleeko tämä vaikuttamaan kaivosyhtiöiden toimintaan?
21. Luuletko että tällä on vaikutusta sijoittajiin?
22. Luuletko että tapauksen seurauksena ympäristövakuuksien ja takuiden koko tulee kasvamaan?
23. Tekeekö tämä kaikki kaivostoiminnasta kalliimpaa?
24. Tuleeko mieleen vielä jotain muita tapauksen aiheuttamia taloudellisia vaikutuksia?

IV. Yhteiskunnalliset reaktiot

25. Talvivaaran ympäristövaikutusten todellisesta suuruudesta on kiistelty. Esimerkiksi onnettomuustutkimuskeskuksen raportti totesi että vaikutukset olivat lopulta vain paikallisia. Talvivaarasta on kuitenkin tullut merkittävä tapaus yhteiskunnallisesti. Osaatko sanoa miksi näin tapahtui ja minkä takia siihen reagoitiin niin vahvasti?
26. Talvivaaran yhteydessä useat eri toimijat aktivoituivat: kansalaisliikkeet (Stop Talvivaara, Hyökyaalto), SLL, kansanedustajat ja erityisesti vihreät, ainakin kolme ministeriötä ja jopa pääministeri Katainenkin puuttuivat asiaan. Oliko jonkun toimijan osallistuminen ja toisaalta, oliko minkään toimijan hiljaisuus yllätys?
27. Kuinka suuri vaikutus ympäristöjärjestöillä, mielenosoituksilla, medialla ja muilla ns. perinteisen politiikan ulkopuolella toimivilla vaikuttajilla oli tapauksessa?
    a. Oliko jollain tietyllä taholla suurempi vaikutus kuin muilla?
28. Koetko että kaivossektorin hallinnassa on tapahtunut jotain huomattavia muutoksia Talvivaaran seurauksena?
29. Ovatko tapauksen perusteella tehdyt toimet yhteiskunnallisen keskustelun seurausta vai reaktioita?
30. Kaivostoimintaan liittyvät riskit ovat hyvin monimutkaisia ja ne voi olla haastavia selittää alaa tuntemattomille kansalaisille (esim. bioliuotus & vuotaneet kemikaalit). Tämän lisäksi riskeistä voi olla eroavia näkemyksiä eri osapuolten ja asiantuntijoiden välillä. Miten kaivosyhtiöt voivat vastata tähän haasteeseen? Entä muut osapuolet?
31. Tapauksen yhteydessä eri toimijat syyttelivät toisiaan salailusta, vähättelystä ja liioittelusta. Tarvitaanko alalle lisää läpinäkyvyyttä?
32. Millainen rooli medialla oli tapauksessa?
33. Miten media on käsitellyt kaivosalaa ja mitä muutoksia siinä on nähtävissä?
34. Talvivaaraa kritisoitiin useasti huonosta tiedottamisesta. Tiedottaminen nostettiin esiin myös muun muassa uudessa viranomaisten valvontaohjeessa ja stressitestien yhteydessä tuotetussa raportissa. Vaikuttaako tapaus kaivosyhtiöiden tiedotuskäytäntöihin tulevaisuudessa?
35. Tapaus synnytti keskustelua useista eri aiheista. Jäikö joku tärkeä asia käsittelemättä?

Lopuksi

36. Missä luulet Talvivaaran tapauksella olevan loppujen lopuksi suurin vaikutus?
37. Tuleeko mieleen vielä jotain tapaukseen liittyvää jota haluaisit kommentoida?