

A first step towards a national risk assessment

National risk identification



MSB Contact:

Johanna Enberg, +46 (0)10-240 40 55

Publication number MSB 336-2011 – November 2011

ISBN 978-91-7383-180-2

Foreword

There are many types of risks in our society, risks that have to be assessed from an overall perspective. This includes everything from everyday risks to risks that may cause great damage to our society. There may be consequences for the public, the functionality of our society and, ultimately, our ability to uphold our basic values.

The EU has decided that all members carry out national risk assessments, which is an important step in our efforts to minimize risks. We improve our ability to learn from one another and share experiences. In the future, we might also gain more knowledge on cross-border risks as well as dependencies among Member States. Together, we can achieve a comprehensive assessment of risks within the EU.

Furthermore, EU Member States must collaborate in order to prepare ourselves for future risks; foreseeable as well as unknown. Climate change in particular will change our perception of risks in the future.

Sweden has thus far conducted risk and vulnerability analyses from the perspectives of our local, regional and central authorities. Our preparedness has traditionally been built on the activities and responsibilities of these actors. In addition, a joint national and cross-sectoral risk assessment gives us a better understanding of possible shortcomings and whether we can prioritize differently.

A national risk assessment helps us inform the public about the risks Sweden is facing as a nation, and how we can prepare ourselves nationally and in collaboration with other EU Member States.

A national risk assessment becomes an important part in the work to set up the preventive, preparatory, operational and evaluating aspects of the joint European efforts to strengthen the security of the union. This report is the first step of our national risk assessment, and will form the basis of future efforts in Sweden.

Helena Lindberg
Director General

Swedish Civil Contingencies Agency

Table of contents

1. Introduction	9
1.1 Assignment and underlying documents	9
1.1.1 Government assignment.....	9
1.1.2 The Council's conclusions – guidelines for Member States.....	9
1.1.3 Commission guidelines.....	10
1.2 Interpretation and implementation of the assignment	12
1.3 Outline of the report	13
2. Developing a national risk assessment	15
2.1 Starting points for the development.....	16
2.1.1 Basic values – what we want to protect	16
2.1.2 Risk identification	16
2.1.3 Selection of risks that are to be analysed	17
2.1.4 Analysis and risk assessment.....	17
2.1.5 Synthesis and the national risk assessment.....	17
2.2 Planned efforts for 2012 and 2013.....	17
3. Society's emergency preparedness	19
3.1 The Swedish emergency preparedness system	20
3.1.1 The actors' risk and vulnerability analyses - the bottom-up perspective.....	21
3.1.2 Capability assessment – the vulnerability perspective	22
3.1.3 Critical dependencies.....	22
4. Selection of risks	24
4.1 The government agencies' risk and vulnerability analyses.....	24
4.1.1 Methods used by government agencies	25
4.2 Method for processing risk and vulnerability analyses.....	26
4.2.1 Supplementary analysis in workshops.....	27
5. Situations that Sweden would have difficulties managing without the support of other Member States	29
6. Identified risks	31
6.1 Floods	32
6.2 Landslides	34
6.3 Storms.....	35
6.4 Earthquakes and volcanic eruptions	37
6.5 Solar storms	39
6.6 Heat waves.....	41
6.7 Forest fires	42
6.8 Vermin infestation (pests)	43
6.9 Infectious diseases – outbreaks, pandemics, zoonoses and epizooties	44

6.10	Resistant bacteria and resistance to antivirals	46
6.11	Disruptions in the supply of medicines	47
6.12	The risks associated with nuclear and radiological materials	49
6.13	Risks associated with chemicals	51
6.14	Dam failures	53
6.15	Disruption of food and drinking water supply	55
6.16	Extensive fires in buildings and tunnels	57
6.17	Disruptions in electronic communications	58
6.18	Disruptions in energy supplies.....	60
6.19	Disruptions in payment systems.....	63
6.20	Oil spills	64
6.21	Disruption of transport and major transport emergencies ...	65
6.22	Terrorism	66
6.23	Cyber-attacks	67
6.24	Risk of societal instability and civil unrest	69
References.....		72
Appendix 1 Consequence-assessed scenarios from collaboration		
exercises		86
	SAMÖ-KKÖ 2011 – nuclear technical accident.....	86
	SAMÖ 2008 – IT attack against financial systems.....	94
	SAMÖ 2007 – terrorist attack.....	96
Appendix 2 Scenarios: solar storms and sulphur mist.....		98
	Scenario – Sweden is hit by a solar storm.....	98
	Scenario – Sweden hit by sulphur mist	98
Appendix 3 Scenarios with an overall assessment of society's		
emergency preparedness.....		100
	Ice storm (2010).....	100
	Influenza pandemic (2010)	102
	Scenarios involving pandemics, disruptions in payment systems and IT- related disruption (2008).....	103
	Accident involving radioactive materials (2007)	106
	Disruptions in electronic communications (2007)	108
	Disruptions in municipal technical systems (2007)	111
	Disruptions in transport (2007).....	113
	Disruptions in electricity supply (2007)	114
	Disaster abroad involving many Swedish citizens (2007).....	114
	Accident involving chemicals (2007).....	114
	Epizooties and zoonoses (2007).....	115
Appendix 4 Assessing capability		116
Appendix 5 Areas of cooperation		118

Appendix 6 Concepts and terms..... 119

Summary

The Swedish Civil Contingencies Agency (MSB) has been tasked by the Government to outline a national risk assessment based on the European Council's conclusions for risk assessments in the European Union. In the report, the MSB accounts for the work on the national risk assessment and for the available information about the national risk assessment.

This national risk identification is a presentation of the work so far, and a first step in the process of developing a national risk assessment in Sweden.

Emergency preparedness in Sweden is to a large extent based on the activities of actors at the local, regional and central levels of society, who handle threats, risks and vulnerabilities in Sweden. Later on in the process, the MSB aims to supplement these levels with a national perspective.

The risks that are presented in the report generally have a low probability of occurring, but may have large consequences in a national perspective, and are thus considered important from an EU perspective. The risk identification is based on a selection of risks which government authorities and county administrative boards have identified in their 2010 risk and vulnerability analyses. These risks cover a wide spectrum of incidents. The risks covered in this report are:

- floods,
- landslides,
- storms,
- earthquakes and volcanic eruptions,
- solar storms,
- heat waves,
- forest fires,
- vermin infestation (pests),
- infectious diseases – outbreaks, pandemics, zoonoses and epizooties,
- resistant bacteria and resistance to antivirals,
- disruptions in the supply of medicines,
- the risks associated with nuclear and radiological materials,
- risks associated with chemicals,
- dam failures,
- disruption of food and drinking water supply,
- extensive fires in buildings and tunnels,
- disruptions in electronic communications,
- disruptions in energy supplies,
- disruptions in payment systems,
- oil spills,
- disruption of transport and major transport emergencies,
- terrorism,
- cyber-attacks and
- risk of societal instability and civil unrest.

Furthermore, the report presents a couple of typical cases that could result in a Swedish request for international assistance. The appendices to this report include previous scenarios that have been assessed through various methods, in order to provide a description of previous work on scenarios.

This report forms a point of reference for the future development of a national risk assessment.

1. Introduction

1.1 Assignment and underlying documents

1.1.1 Government assignment

Following a Government decision on 9 June, 2011, the Swedish Civil Contingencies Agency (MSB) has been tasked to develop a national risk assessment.¹ The assignment is as follows:

The Swedish Civil Contingencies Agency is to produce a national risk assessment together with the relevant authorities. This assessment is to be based on the European Council's conclusions on risk assessments in the European Union (8068/11). The Swedish Civil Contingencies Agency is to present their work to the Government Offices (the Ministry of Defence) on 30 November, 2011, at the latest.

1.1.2 The Council's conclusions – guidelines for Member States

The European Council's conclusions mentioned in the Government assignment cover the reference points regard risk assessments as part of disaster management in the EU.² According to these conclusions, comprehensive national risk assessments contribute to a consensus within the EU as regards the risks facing the EU.

This consensus will facilitate collaboration within the union in terms of preventing and reducing common and cross-border risks.

In addition, comparable risk assessment methods make it possible for regions within the EU, or Member States facing common or similar risks, to conduct joint risk assessments. The assessments will also help political leaders prioritize resources towards the most serious risks, which can increase our emergency preparedness and prevent future disasters.

The Council's conclusions refer to the Commission guidelines for assessment and mapping of risks in connection to disaster management, which were published in December, 2010.³

The council advises the Member States to present the Commission with available information on the progress of the national risk assessment no later than the end of 2011, regarding in particular:

- a description of the process, methodology, methods, and non-sensitive data used for national risk assessments;

¹ Letter of regulation for fiscal year 2011, with regard to the Swedish Civil Contingencies Agency, 2011/06/09 (Fö2011/947/SSK)

² Council conclusions on Further Developing Risk Assessment for Disaster Management within the European Union. 11–12.4.2011. (8068/11)

³ Commission Staff Working Paper: Risk Assessment and Mapping Guidelines for Disaster Management. 21.12.2010. SEC(2010) 1626 final. (17899/10)

- non-sensitive details of the assumptions and risk scenarios, and non-sensitive information on the results of the national risk analysis;
- a description of impacts and likelihood resulting from the risk scenario analysis in an appropriately disaggregated format, e.g. separately for human, economic, environmental and other impacts, such as political, social/psychological, in line with the EU guidelines;
- a short list of risk scenarios in an order enabling identification of risks likely to be shared by Member States, and including low-probability, high-impact risks which Member States acting alone would be unlikely to be able to address;
- any other risks considered important for the EU overview, including low-probability, high-impact risks;

Furthermore, the Council advises the Member States to appoint a common point of contact where national risk assessments can be coordinated and to organize a suitable coordination between the involved actors within the different risk areas.

In addition, the Member States are to provide the public with relevant non-sensitive information about the findings of the risk assessments. In the risk assessment, Member States should identify and analyse scenarios for individual risks and, when suitable, use both qualitative and quantitative methods for risk assessments, take into consideration available findings from national risk assessments in order to carry out a suitable capability analysis and planning as part of the preventive measures, exchange information and experiences with other Member States and the Commission relating to common risks, in order to further develop the risk management.

1.1.3 Commission guidelines

The guidelines provide overall support and suggestions for how Member States can develop a process for national risk assessments. A risk assessment⁴ is, according to the guidelines, a comprehensive process for the following partial processes: risk identification, risk analysis and risk evaluation. Risk identification⁵ is a process for discovering, mapping/recognizing and describing risks. Risk analysis⁶ is a process for understanding the nature of the risk and for determining the risk level. Risk evaluation⁷ is a process for comparing results from the risk analysis with the risk criteria, in order to determine whether the risk and/or its size is acceptable.

The guidelines include the suggestions for various considerations that must be carried out in the different partial processes as well as possible methods. However, there are great differences in the support given for the different partial processes, in terms of scope and level of detail.

The guidelines suggest that Member States produce risk scenarios during the identification phase, which are then to be analysed and evaluated in the following stages of the assessment process. Furthermore, Member States are

⁴ ISO Guide 73:2009, definition 3.4.1

⁵ ISO Guide 73:2009, definition 3.5.1

⁶ ISO Guide 73:2009, definition 3.6.1

⁷ ISO Guide 73:2009, definition 3.7.1

recommended to, as far as possible, develop quantitative methods for analysing these risk scenarios. A gradual approach is suggested, in which the number of scenarios is developed successively (the long-term goal should be 50-100 scenarios).

According to the guidelines, assessment of risks should be conducted for three different consequence categories: human, economic (including environment) and political/social consequences; quantitatively for the first two categories, such as number of deaths/injuries, costs in euros and political/social consequences expressed on a qualitative scale. Member states should present their risk assessments for each scenario in three different risk matrices – one for each consequence category. The time horizon for assessments should gradually be developed from the initial 1-5 years to comprising risks in the coming 25-35 years.

Furthermore, the guidelines describe the dimension of cross-border risks, the implementation of multidimensional risk analyses or risk analyses of multiple incidents that occur independently or as a consequence of other incidents. Finally, the guidelines describe the importance of risk mapping.

1.2 Interpretation and implementation of the assignment

As part of the report, the MSB details the progress of a national risk assessment to the Government Offices (the Ministry of Defence), which constitutes a presentation of the current available information on the national risk assessment.

The MSB has carried out this assignment together with the government agencies in the cooperation areas⁸. Government agencies have been invited to a common workshop and have been able to comment on the report.

The report is based on the Council's conclusions for risk assessments in the European Union (8068/11).

- The report includes a description of the processes, procedures, methods and non-sensitive information that have been used.
- The report presents a first risk identification in Sweden and provides a comprehensive picture of the risks identified by Swedish government agencies.
- The risks that have been selected and presented in the report generally have a low probability of occurring, but could have serious consequences and could in many cases affect several Member States, and are thus important for the overall EU assessment.
- The appendices to the report include various different scenarios where the probability and/or consequences have been estimated and where the overall emergency preparedness capability has been assessed.
- In addition, the report also includes some typical cases that are currently being examined with regard to whether they may necessitate international assistance.

The report will be used in the future work on producing a national risk assessment. It serves both as an important basis for other government agencies and actors in this subsequent processes, and as important information to the public about national risks.

Furthermore, the findings in the report will also be used in the planning phase of the preparatory and preventive work in the field of civil contingencies.

In addition, the report can be used to exchange examples of good practice with other Member States, other countries and with the Commission, in order to develop the joint risk management efforts within the EU.

⁸ Areas of cooperation, see Appendix 5

1.3 Outline of the report

The report will initially describe the reference points for the interpretation and implementation of the risk report, in the form of the Government assignment and the Council's conclusions on risk assessments, as well as the Commission's guidelines.

In Chapter 2 we present some initial thoughts on the time frame and ambitions for the future process (in 2012 and 2013) of developing the framework for a national risk assessment.

Chapter 3 describes the history of previous work on emergency preparedness in Sweden.

In Chapter 4 we describe the methods and the process which have served as the basis of the work on establishing a comprehensive list of risks that are presented in the report. In addition, we list the methods that government agencies have used in their risk and vulnerability analyses.

In Chapter 5 we discuss which types of situations Sweden would have difficulties handling without the assistance of other Member States. Furthermore, the Chapter lists the typical cases on which the Government has based an investigation of the reception of international assistance during a crisis.

In Chapter 6 we present the findings from the risk identification that has been conducted. Several of these risks fall within the framework of the typical cases that are presented in the preceding chapters, and which regard situations that could necessitate a request for international assistance. A number of these risks could also have cross-border consequences.

Appendices 1-3 account for scenarios that have been developed in other contexts. Although these scenarios were not developed as part of a national risk assessment, they still constitute examples of risk scenarios that were formed within the framework of processes or exercises aimed at strengthening Sweden's civil contingencies. Therefore, we believe that the scenarios can contribute to a more in-depth understanding of the situation in various risk areas.

In Appendix 1 we present some scenarios from the large national collaboration exercises (SAMÖ) that have been conducted on a more or less regular basis in recent years. The short, medium and long-term consequences from the exercise SAMÖ-KKÖ 2011 are described from an individual, organizational, technical and financial perspective.

In Appendix 2 we present a number of brief scenarios involving solar storms and sulphur mist, two types of risks for which available knowledge and understanding of the consequences are currently being studied.

In Appendix 3 we present a selection of capability assessment scenarios and in Appendix 4 we demonstrated the Swedish process for how to conduct a capability assessment.

Appendix 4 also lists the government agencies that are part of the various cooperation areas.

In Appendix 5 we present the concepts and terms used in this report.

2. Developing a national risk assessment

The work in the report constitutes the first step towards a national risk assessment. Developing processes and methods for an assessment of risks from a comprehensive national perspective is an important component of the work to strengthen civil protection and emergency preparedness. In Sweden, this development has a high priority. A national risk assessment makes it possible to compare risks from a national perspective, which also creates better prerequisites for a sound prioritizing of resources. The fact that the work is carried out within an EU context and based on common guidelines will, over the long term, make our risk assessments comparable with those of other Member States, which will considerably increase the value of a national risk assessment.

Despite the high expectations and ambitions, Sweden is currently in an initial stage of this process. However, the prospects of this work are sound. Thanks to the existing work on risk and vulnerability analyses at different levels in the system, a developed concept for 'capability assessments', and well-established networks for coordination and collaboration among government authorities, we have a number of tools that can be used within the framework of the future development.

Experiences from other countries indicate that it will take at least two years to establish the methods and process for a national risk assessment. In most cases the process will mainly involve ministries and government authorities. Experts and the private sector have usually participated in some stage of the process, although this structure differs depending on the country. However, only a few countries seem to have been able to connect local and regional risk assessment efforts to a national process. Sweden hopes to be able to achieve this.

According to the Government's direction, the MSB is to, on a regular basis, present "a comprehensive assessment of Sweden's emergency preparedness, including a national risk assessment, an assessment of Sweden's capability to handle these risks and a risk matrix that clarifies society's overall risks and vulnerabilities".⁹ Therefore, the MSB will continue to develop a process for a national risk assessment, together with the relevant government agencies.

⁹ Government Bill 2011/12:1, Budget proposal for the year 2012, Expenditure area 6 Defence and civil protection

2.1 Starting points for the development

The EU guidelines, which provide overall support and suggestions for how Member States can develop a process for national risk assessments, among other things, are an important reference point for the continued development process.

The EU guidelines do not offer in-depth support for some of the stages in the assessment process. This means that Sweden will have to continue developing several aspects of the national risk assessment process based on the intentions described in the guidelines, in order to establish a national risk assessment that is relevant to security measures within Sweden and the EU.

Below we provide a general description of a process that starts with drawing up the basic values, i.e. what is to be protected. We then conduct a risk identification and make a selection of risks that are to be analysed. After that, an analysis and risk evaluation is conducted, using scenarios. Finally, a synthesis of the individual scenarios is made. The work is then compiled into a national risk assessment.

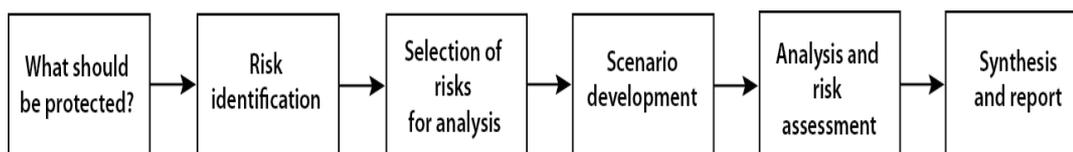


Figure: A general process for assessments and reporting on national risks

2.1.1 Basic values – what we want to protect

The starting point of the risk identification is the value which is to be protected, i.e. the overall goals for societal safety.¹⁰ These goals are then supplemented by the consequence criteria used to value the risks. In Norway, one of the countries whose methods Sweden is studying, the consequence criteria is based on five values.¹¹

2.1.2 Risk identification

The risk identification used in this report is based on contributions made by government agencies from different sectors and at different levels of society (46 government agencies in total) within the framework of their annual risk and vulnerability analyses. This extensive data has then been processed (see

¹⁰ The overall goals for societal safety, as established by the Swedish Riksdag and the Government, is; to protect the population's lives and health, to protect society's functionality, and to protect our ability to maintain our basic values such as democracy, the rule of law, and human rights and freedoms.

¹¹ The Norwegian Directorate for Civil Protection and Emergency Planning, Nasjonalt Risikobilde – prosess og metode, ISBN 978-82-7768-231-0, DSB, 2010. These five social values are: Life and health; Nature and environment; Economy; Social stability; Ability to govern the country and territorial control

Chapter 4 “selection of risks”) during workshops where a number of these government agencies have participated.

In 2012 we will continue to develop the methodology for risk identification at the national level. The government agencies’ risk and vulnerability analyses are important assets, but the process will probably have to be supplemented by methods for a more unbiased risk identification based on various forms of expert assessments.

2.1.3 Selection of risks that are to be analysed

For the next stage of the process, we need to develop criteria for selecting the risks that are to be assessed. These criteria could be based on the overall goals for societal safety (see 2.1.1).

The suggestions for quantitative selection criteria for the consequence categories human and financial consequences, which are found in the EU guidelines, have to be reviewed and adjusted to fit Swedish conditions, whilst maintaining an ambition to achieve the highest possible level of comparability with other EU Member States.

In addition, we have to develop selection criteria for political/social consequences. Since the events that are relevant in these contexts are often complex and involve great uncertainties, it might be suitable to develop qualitative selection criteria.

An initial rough evaluation of risks will be conducted based on the developed consequence categories. This evaluation will then serve as the basis for a prioritizing of risks that are to be analysed in the subsequence stage.

2.1.4 Analysis and risk assessment

During the analysis stage, a number of scenarios will be developed based on the selection of risks that has been produced. In this stage we will also conduct a risk evaluation by estimating the consequences and probabilities of the events studied. The consequences will be evaluated based on a mix of quantitative and qualitative criteria, such as human, economic (including environmental) and political/social consequences. In addition, a risk mapping could possibly be used as a basis for analysis and evaluation.

2.1.5 Synthesis and the national risk assessment

In the synthesis we discuss the findings of the risk evaluation. A synthesis is made of the individually analysed scenarios, after which the national risk assessment is compiled. The overall risk profile can be presented as a coherent risk matrix. The findings from the national risk assessment can then serve as a basis for prioritizing resources and activities from a national perspective.

2.2 Planned efforts for 2012 and 2013

The Swedish emergency preparedness system is based on the involvement of all levels of society. Therefore, it is important that the processes that are outlined for the national and the EU level are coordinated and integrated with the existing Swedish processes. Connecting the bottom-up perspective with a top-

down perspective – i.e. the national perspective – has not been done before. Since the international experience on this subject is relatively small, Sweden has the chance to contribute with new experience.

The existing system for the government agencies' risk and vulnerability analyses will be an important reference point. Nevertheless, the development work should also observe other processes and activities, such as

- national reporting on existing EU directives (e.g. the Floods Directive, EPCIP and Seveso),
- the process of developing reference scenarios and national disaster management plans at the EU level,
- the work on risk and vulnerability analyses,
- the process of capability assessments, existing national and cross-sectoral risk analyses and compilations,
- the national strategy and response plan for the protection of vital societal functions,
- the work on developing basic safety levels and targets, and
- research within the field of civil protection and emergency preparedness.

With this in mind, and considering the aspects that need to be developed, the MSB estimates that the first methods and process for a national risk assessment can be ready in the spring of 2012.

A more systematic identification will also be conducted, partially in parallel with this method development (see 2.1.2). Similar to most other stages in this process, this work will require the participation of experts from government agencies in different sectors and different levels of society, particularly in the cooperation areas.

In the autumn of 2012, the risks for which specific scenarios will be developed will be selected. These scenarios are evaluated together with the cooperation areas and other experts within each respective risk area. The competencies and experts required will differ depending on which risk scenario is to be analysed. Each risk scenario will more or less require its own expert group. This work will then be compiled into a national risk assessment, which will be presented in the spring of 2013.

3. Society's emergency preparedness

Emergency preparedness means the ability to prevent, withstand, and manage crisis situations through training, practice, and other measures, as well as through the organizations and structures created before, during, and after a crisis.¹²

Emergency preparedness is intended to:¹³

- reduce the risk of and consequences of serious disruptions, crises and accidents,
- protect the health and safety of children, women and men, and
- prevent or limit property damage and environmental damage.

These goals are based on the goals for societal safety:¹⁴

- protect the health and lives of the public,
- protect society's functionality, and
- protect our ability to maintain our basic values like democracy, the rule of law, and human rights and freedoms.

The Swedish Civil Contingencies Agency is responsible for matters in Sweden, relating to protection against accidents, emergency preparedness and civil defence, in the event that no other agency has already assumed this responsibility. The Agency's responsibilities regard actions before, during and after an accident or a crisis.¹⁵

The responsibility principle serves as the point of reference for Sweden's emergency preparedness. Government agencies will retain their regular responsibilities during a crisis, which means that the MSB will never assume another actor's responsibilities during a crisis. In addition, the responsibility principle also means that each actor has to cooperate with other relevant actors.¹⁶ Sweden's emergency preparedness work is also based on the proximity principle and the equality principle, meaning that a crisis is to be managed as closely as possible, both in terms of location and characteristics.

¹² Skr. 2009/10:124 The government letter '*Samhällets krisberedskap – stärkt samverkan för ökad säkerhet*,' bilaga 3, s. 89.

¹³ Ibidem s. 15

¹⁴ Ibidem s. 9

¹⁵ Ordinance (2008:1002) on Instructions for the Swedish Civil Contingencies Agency

¹⁶ Skr. 2009/10:124 The government letter '*Samhällets krisberedskap – stärkt samverkan för ökad säkerhet*' s. 5.

3.1 The Swedish emergency preparedness system

The responsibility principle means that society's emergency preparedness is based on the principle that all actors retain their responsibilities during a crisis. There is also a geographic responsibility. The public institution in charge of a geographic area will be responsible for the directions, priorities and coordination of cross-sectoral measures before, during and after a crisis. Municipalities have geographic responsibilities at the local level and the county administrative boards have geographic responsibilities at the regional level, while government authorities and the Government are responsible for the national level.¹⁷ The Government's responsibilities mainly concern strategic matters.

All government agencies are to produce annual risk and vulnerability analyses in order to strengthen Sweden's emergency preparedness. Furthermore, the¹⁸ stipulated that 22 government authorities and all 21 county administrative boards are to make plans and preparations to ensure their ability to handle a crisis, prevent vulnerabilities and withstand threats and risks. In addition, government agencies with special responsibilities relating to emergency preparedness are to collaborate with one another. Six cooperation areas have been set up:

- Cooperation area Economic security
- Cooperation area Hazardous substances
- Cooperation area Geographic responsibility
- Cooperation area Protection, rescue and care
- Cooperation area Technical infrastructure
- Cooperation area Transportation

The work in the cooperation areas are intended to give government agencies with special responsibilities for emergency preparedness a comprehensive, overall perspective of society's emergency preparedness, and that they can make coordinated decisions through joint planning. By collaborating when working with threats and risks during the preventive and preparatory stages, synergy effects can be achieved where actors work together and use their resources effectively. This increases the actors' capability, whilst making visible any vulnerabilities or dependencies. Such a collaboration also reduces the risk of unachieved measures.¹⁹

In addition to the cooperation areas, there are also other collaboration forums that deal with more or less delimited areas in the field of civil contingencies.

¹⁷ Government Bill 2007/98:92, Reinforced emergency preparedness – for safety's sake, page 7, and Government Bill 2011/12:1, Budget proposal for 2012, Expenditure area 6 Defence and civil protection, s. 75.

¹⁸ Emergency Management and Heightened Alert Ordinance (2006:942)

¹⁹ The Swedish Civil Contingencies Agency, *Vägledning för arbetet inom samverkansområden – Att arbeta i samverkansområden enligt förordningen (2006:942) om krisberedskap och höjd beredskap*, s. 17.

These include the Naturolycksplattformen, Finansiella Sektorns Privat-Offentliga Samverkansgrupp (FSPOS), Växtskyddsrådet, the National Pandemic Group and the Counter-Terrorism Cooperative Council.

The county administrative boards are in charge of coordinating society's emergency preparedness at the regional level. Each county administrative board is responsible for a geographical area, and is to serve as a uniting function between local actors such as municipalities, county councils and the private sector, and the national level. The risk and vulnerability analyses conducted annually by county administrative boards are to be based on the risk and vulnerability analyses submitted by the municipalities in the county. In addition, the county administrative board is to coordinate information to the public and the media in the event of a crisis.²⁰

At the regional level, county administrative boards and the regions have a special responsibility for issues relating to healthcare, culture and public transport, for example. All county councils and regions must conduct risk and vulnerability analyses once every term of office.

Municipalities have a large responsibility for emergency preparedness at the local level. Similar to the county administrative boards, each municipality has a geographic area of responsibility, meaning that the municipality is to make sure that different actors within the municipality are cooperating and that they are coordinated in their planning and preparations in the event of an extraordinary event. Furthermore, the municipality is to ensure that the disaster management measures taken by different actors during an extraordinary event are coordinated, and that the information to the public is coordinated. All municipalities are to carry out a risk and vulnerability analysis once every term of office.²¹

3.1.1 The actors' risk and vulnerability analyses - the bottom-up perspective

The development of risk and vulnerability analyses within the Swedish emergency preparedness system has been based on the system's basic principles, namely *the responsibility principle*, *the equality principle* and *the proximity principle*. This means that the work methods that have been developed for risk and vulnerability analyses have focused on developing methods at the local and regional level, as well as on operational responsibilities for government agencies.

The aim of risk and vulnerability analyses has been that the analysis should be the basis of the preventive and preparatory emergency preparedness work for the actors that carry out the analyses, and that the knowledge about what is to be protected, what might happen, and what our capability is to handle various incidents and what consequences they might have can be compiled, in order to

²⁰ Section 7 of the Emergency Management and Heightened Alert Ordinance (2006:942)

²¹ Act on municipal and county council measures prior to and during extra-ordinary events in peacetime and during periods of heightened alert (2006:544)

make the emergency preparedness more efficient. However, so far such a risk assessment has not yet been conducted at the national level in Sweden.

Since 2002, government agencies have been tasked with conducting annual risk and vulnerability analyses. The municipalities' and county councils' responsibilities with regard to risk and vulnerability analyses are based on an agreement from 2004 which became law in 2006.²²

3.1.2 Capability assessment – the vulnerability perspective

In addition to the government agencies' work on identifying risks, they also conduct a special capability assessment. The purpose of this special capability assessment is to assess Sweden's capability to withstand and handle crises, and ultimately to gain an understanding of how much society can handle and where its deficiencies are. In other words, the assessment is a way of identifying vulnerabilities.

The special capability assessment is a tool for government agencies to assess its capability to handle or withstand an incident that is described in a predefined scenario. The capability assessment is presented along with the government agencies' risk and vulnerability analyses.²³ Their current structure does not include the risk of certain incidents occurring or any suggestions aimed at reducing this risk. Since 2003, government agencies' capability to handle crises within their area of responsibility has been studied by the MSB. Before this, the National Board of Civil Emergency Preparedness conducted annual follow-ups of the government agencies' capability. The government agencies' capability assessments have differed in recent years, but since 2007 scenarios are used to support the assessment, as are indicators of emergency preparedness.

Appendix 3 has a list of some of the scenarios used by government agencies for their analyses.

3.1.3 Critical dependencies

As of 2011, the MSB's regulation stipulates that government agencies, as part of their risk and vulnerability analyses, are to identify and evaluate critical dependencies that fall within their areas of responsibility. Critical dependencies are crucial for vital societal functions to be able to function. Such dependencies are characterized by a loss or disruption in activities, leading to relatively immediate impairments that may result in a serious crisis occurring, that may render us unable to handle a crisis, or that worsens a crisis.²⁴

Since 2006, the MSB in collaboration with a number of actors has worked on identifying and analysing critical dependencies in society, mainly through the "Critical Dependencies in Society" project. Within the framework of the project, a method has been developed for conducting dependency analyses. In addition,

²² Ibidem

²³ Regulations on risk and vulnerability analyses from government agencies (MSBFS 2010:7).

²⁴ Ibidem.

the MSB provides an interactive computer tool that can be used in the analysis of operational dependencies.²⁵

The project concludes that the sectors where disruptions have the greatest consequences for other vital societal functions are electricity supply, electronic communications and the transport sector. One of the sectors that are usually affected by these disruptions in other sectors is the healthcare sector.²⁶

²⁵ The Swedish Civil Contingencies Agency, *Faller en – faller då alla? En slutredovisning från KBM:s arbete med samhällskritiska beroenden*, MSB 0001-09,2009; www.msb.se; www.beroendehjulet.se

²⁶ *Ibidem*

4. Selection of risks

The selection of risks in this risk identification is based on the risk and vulnerability analyses of 46 central and regional government agencies. Descriptions of how these government agencies produce their risk and vulnerability analyses, as well as how the MSB has processed this material, are presented below. The selection of risk incidents has been modified somewhat in two workshops, of which one was conducted internally while the second was conducted together with other government agencies. The findings are presented below, along with a description of the processes, procedures, methods and non-sensitive information that have been used.

4.1 The government agencies' risk and vulnerability analyses

The MSB has issued regulations relating to risk and vulnerability analyses.²⁷ These regulations are part of the process of increasing the analyses' comparability and transparency.

However, the steering of methods used by government agencies, county councils and municipalities in their risk and vulnerability analyses is very loosely regulated. The reason for this is to allow the actor to choose method based on their relevant prerequisites. In addition, the steering is adjusted to fit the use of specific scenarios and analyses, which differ depending on the actor's area of responsibility.

The MSB has produced guidelines to help government agencies produce their risk and vulnerability analyses.²⁸ These new guidelines offer suggestions for how to conduct the analytical process and how to present the findings, with a focus on how risks and threats can be identified and rated, and on how emergency preparedness should be assessed.²⁹ Measures are then planned

²⁷ Regulations on municipal and county council risk and vulnerability analyses (MSB 2010:6) and regulations on state authority risk and vulnerability analysis (MSB 2010:7) gained legal force in January, 2011.

²⁸ The Swedish Emergency Management Agency, *Risk- och sårbarhetsanalyser: vägledning för statliga myndigheter*, 2006:4. dnr. 0050/2006,2006, s. 6. These guidelines were in effect when the government agencies conducted their risk and vulnerability analyses in 2010, but were replaced in January 2011 by the MSB's Guidelines for risk and vulnerability analyses.

²⁹ Emergency preparedness (which can be divided into *disaster command capability*, *operational capability* and *capability of vital societal functions to withstand serious disruptions*) can be analysed with the help of indicators and be assessed based on a qualitative four point scale.

based on the findings in the risk identification, the risk evaluation and the capability assessment.³⁰

The guidelines include a model for how risks and threats can be rated based on probabilities and consequences, which are graded on qualitative five point scales.³¹ These grading scales will then form the basis of the five point risk matrix that is used when rating risks.

4.1.1 Methods used by government agencies

The county administrative boards' and the government authorities' risk and vulnerability analyses give us a comprehensive view of the risks and vulnerabilities identified in 2010 at the local and regional level, respectively, and within different sectors.

The government agencies have identified risks based on their own operations and areas of responsibility. Only a few government agencies have included descriptions in their risk and vulnerability analyses about the delimitations used in the risk identification and risk analysis. A couple of government agencies state that the risk analysis from 2010 is partially based on previously identified risks that are still considered relevant.

However, there are many differences in the agencies' risk and vulnerability analysis from 2010 in terms of analytical structure and scales used for risk assessment, as not all government agencies have followed the guidelines issued by the MSB. Some government agencies state that they have applied the criteria presented in the guidelines, although somewhat revised. A small number of the government agencies that have used different types of graded assessment scales provide explanations for the various levels of risk.

The MSB has previously concluded that government agencies could potentially improve their risk and vulnerability analyses, based on the quality of the analyses from 2010. According to the MSB, the government agencies should develop their method description from being only about the process to becoming a more extensive description of the analytical methods used for assessing risks, vulnerabilities and capability.³²

Of the government agencies that describe which methods they have used to collect data for their risk and vulnerability analyses, several have used various

³⁰ Measures are categorized according to the classification *rules and regulations, methods and ways of working, actors and technology and infrastructure*. The Swedish Emergency Management Agency, *Risk- och sårbarhetsanalyser: vägledning för statliga myndigheter*, 2006:4, dnr. 0050/2006, 2006, s. 42-48, 52.

³¹ The grading scale for probabilities consists of the following values: 1= Very low probability, 2=low probability, 3= Medium probability, 4= High probability, 5= Very high probability. The grading scale for consequences consists of the following values: 1= Very limited consequences, 2= Limited consequences, 3= Serious consequences, 4= Very serious consequences, 5= Disastrous consequences

³² The Swedish Civil Contingencies Agency, *Risk- och sårbarhetsanalyser 2010 – Återkoppling av redovisande myndigheters risk- och sårbarhetsanalyser*, dnr. 2010-1795, s. 18

scenario-based methods. ROSA is one example of such a method³³ which involves risks and threats being identified through a gradual analysis process, and MVA³⁴ which aims to analyse risks and vulnerabilities through discussions at seminars. Another analytical tool used by some government agencies when producing risk and vulnerability analyses is IBERO³⁵ – a scenario-based IT tool that was developed mainly to analyse an actor’s capability to withstand and handle unwanted incidents and their consequences. The tool makes it possible to store large amounts of information from different actors and compare the results of the analyses, among other things.

In addition to this, government agencies have used the municipalities’ risk and vulnerability analyses³⁶, other government agencies’ risk and vulnerability analyses, results from previous workshops, surveys and interviews. Other supplementary material, investigations, statistics, external analyses and experiences from relevant incidents have also been used in the risk identification process. The majority of government agencies that describe which methods they have used to process data have used qualitative methods.

Some government agencies describe a process stretching over several years and which forms the basis of their risk and vulnerability analyses. This work is often conducted in collaboration with other actors, both public and private, with an emphasis on collaboration partners within the agency’s area of responsibility. Based on the government agencies’ risk and vulnerability analyses of 2010 we can conclude that work groups, seminars, networks and exercises are the most common ways of organizing the work.

4.2 Method for processing risk and vulnerability analyses

In order to process material from the 2010 risk and vulnerability analyses of 46 government agencies, the MSB created an Access-based database. The structure of the database is based on the official guidelines for government agencies³⁷ and has a special function for entering the risks described by government agencies in their risk and vulnerability analyses. The entered data has not been processed. However, there were some assessments made

³³ The abbreviations stands for Risk and Vulnerability Analysis. The ROSA method is the result of a collaboration between the Swedish Emergency Management Agency, the County Administrative Board of Kronoberg and Västmanland Municipality.

³⁴ MVA stands for Multidimensional Operational Analysis and is developed by a group of researchers at Lund University, along with the Swedish Emergency Management Agency and a number of municipalities.

³⁵ The IBERO method stands for Instruments for Rating Preparedness in Areas of Responsibility, and was developed by the County Administrative Board of Stockholm with support from the Swedish Emergency Management Agency and in collaboration with the Swedish Defence Research Agency (FOI) and Lund University.

³⁶ This means the county administrative boards that had access to municipal risk and vulnerability analyses in 2010

³⁷ The Swedish Emergency Management Agency, *Risk- och sårbarhetsanalyser: vägledning för statliga myndigheter*, 2006:4, dnr. 0050/2006, 2006

regarding which of the identified incidents could be considered a risk, as not all government agencies have followed the analytical structure and terminology used in the guidelines. This may cause a certain decline in the data being entered.

Each risk has been entered separately into the database and been connected to the corresponding government agencies and any possible cooperation areas that the government agencies are part of. Some government agencies have accounted for which capability area³⁸ the risk were identified in. In these cases, the identified risks have been connected to a selected capability area. Furthermore, each risk has been categorized according to a number of categories that are freely based on a previous report in the field of accidents and crises.³⁹

The purpose of categorizing data is to be able to classify and sort the entered data and gain a better understanding of the collected material. When choosing category, the information provided by the government agencies in their risk and vulnerability analyses have served as guidelines. In certain cases, where government agencies have not described the identified risks in enough detail, certain interpretations of the material have been made.

The database has scales for assessing probabilities and consequences of the risks that are assessed according to the guidelines. Since not all government agencies have assessed their risks according to these grading scales, there exists a certain internal decline in the database which affects the reliability of the risk identification.

The number of identified risks varied depending on the agency. In total, there are 600 risks entered into the database. These risks are not unique, meaning that a risk may have been entered several times into the database if more than one government agency has identified the same risk, or alternatively if a risk appears several times in a government agency's risk and vulnerability analysis.⁴⁰

In order to get a more comprehensive picture of which risks might affect us at the national level, the MSB has created a selection of the risks that according to the government agencies' assessments could have "very serious" or "disastrous" consequences – 149 risks in total. Furthermore, this selection has been processed by clustering similar risks together. After this have been completed, the risk register comprised 27 different risks.

4.2.1 Supplementary analysis in workshops

Two workshops have been conducted in order to supplement the risk identification. One was conducted internally at the MSB on the 20 September,

³⁸ Refers to the government agency's own capability, alternatively the county's or sector's capability.

³⁹ The Swedish Civil Contingencies Agency, *Statistik och analys Olyckor & kriser 2009/2010*, MSB:0170-10, 2010

⁴⁰ In the latter case, this could be because the government agency has identified the risk within more than one capability area in their risk and vulnerability analysis.

while the second was conducted together with the government agencies in the cooperation areas and the Natural Disaster Platform on the 29 September. The purpose of the workshop was to, with the support of the participants, supplement the risk identification with risk incidents that are considered relevant to the national risk status. The workshop also featured discussions about the continued work on creating a process for a national risk assessment in Sweden.

The original identification of 27 risks was largely confirmed by the government agencies. Some risks which the government agencies did not consider to be relevant at the national level were removed, some risk were modified, and other risks considered by government agencies to be more relevant were added. In the end, there were a total of 24 risks identified.

The actors that participated in the workshop on 29 September were: The Swedish Public Employment Service, the Swedish Energy Agency, the Swedish Social Insurance Agency, the Swedish Fortifications Agency, the Swedish Coast Guard, the Swedish National Mapping Agency, the National Food Agency, the County Administrative Board of Gotland, the County Administrative Board of Gävleborg, the County Administrative Board of Jämtland, the County Administrative Board of Jönköping, the County Administrative Board of Uppsala, the County Administrative Board of Värmland, the County Administrative Board of Örebro, the County Administrative Board of Östergötland, the Swedish Rescue Service in Ljungby, the Swedish Maritime Administration, the Swedish Tax Agency, the Swedish Institute for Communicable Disease Control, the National Board of Health and Welfare, the Swedish National Grid, the Swedish Transport Agency and Swedish Customs.

5. Situations that Sweden would have difficulties managing without the support of other Member States

There is no easy way of identifying various situations or potentially unwanted incidents where Sweden as a nation would not manage on its own. There are a number of different factors that affect this outcome, such as the scope of the incident, the time frame of the incident, if other related incidents have occurred, geographical prerequisites, financial prerequisites and access to certain staff or equipment at any given time.

In certain cases public actors do not even have to get involved, if the companies arrange for their own supporting resources within their area of responsibility.⁴¹ Over the years, many government agencies have assessed their own capability to handle various incidents through the special capability assessment, although this material does not on its own provide sufficient data for assessing what Sweden as a state is capable of handling.

There are still uncertainties regarding what role a municipality that receives assistance may have, who is in charge of hiring, what adjustments are made to the work environment legislation, how the process is financed and who decides on whether to accept assistance.

The Government has ordered an investigation regarding Sweden's possibilities of receiving international assistance in the event of a crisis or serious incidents in peacetime (2010:49), which aims to map Sweden's prerequisites and any obstacles for receiving international assistance, and covers both staff and resources. The findings from the investigation will be presented on 16 January, 2012.

The directive states that the investigator is to study a number of typical cases where Sweden might request international assistance. These typical cases are:

- large natural disasters,
- extensive emissions of biological or chemical substances and oil spills,

⁴¹ An example of this is how the energy company E.on sent for repairmen from Finland, Denmark, Norway and Germany after the storm Per, as well as after the storm Gudrun. From the Swedish Energy Agency, *Utvärdering av stormen Per, Konsekvenser och lärdomar för en tryggare energiförsörjning*, ER 2007:37, december 2007

- nuclear accidents or other incidents involving radiological and nuclear materials,
- spread of contagion through pandemics, and
- society's handling of consequences from antagonistic actions, such as terrorist attacks or cyber-attacks.

This also includes the need for assistance in preventive actions to increase national preparedness, for example before large events.

Based on these typical cases, the investigator is to provide a general description of which type of assistance might be necessary and through which collaborations and agreements this assistance might be requested.

The typical cases above are clearly connected to the risks surrounding natural disasters, CBRN-related incidents and antagonistic actions identified in this report, which are described in-depth in the following chapter.

6. Identified risks

In this chapter we describe different types of risks in Sweden that may have serious consequences.⁴² The compilation aims at providing a comprehensive view of a selection of risks that could affect Sweden, and which in many cases could affect several Member States, and are thus important for the overall EU assessment.

It is not possible to analyse risks in Sweden from a strictly national perspective. Risks are usually affected by, and have effects in a larger context. There are many incidents which could occur in other countries, such as cyber-attacks, volcanic eruptions and pandemics, which can also affect Sweden. This became especially clear in 2004 when Sweden was affected by the tsunami disaster that hit South-East Asia on the other side of the world, where 543 Swedish citizens lost their lives. Similarly, incidents at the local or regional level, such as power failure, could quickly lead to effects that must be handled at the national level.

As previously mentioned, the risks below were collected from the government agencies' risk and vulnerability analyses. Most of these described risks could be said to originate from natural disasters, followed by CBRN incidents, disruptions in critical infrastructure, large accidents and antagonistic threats. However, it is difficult to categorize risks. Something described as a natural disaster might be triggered by human interference, and a disruption in critical infrastructure could be the result of an accident, incorrect handling or a deliberate action.

The run-through of the various risks below include a description of the risk or the unwanted incident in question, previous incidents connected to this risk or incident and possible outcomes, i.e. which consequences the incident *could* have if it was to occur. In some cases, the probability of the incident occurring is also described.

The descriptions of the risks sometimes focus on the threat and sometimes on what is at risk. Many of the risks have components that overlap. Some of the risks are very extensive and cover several aspects of an area, while others have much more limited descriptions.

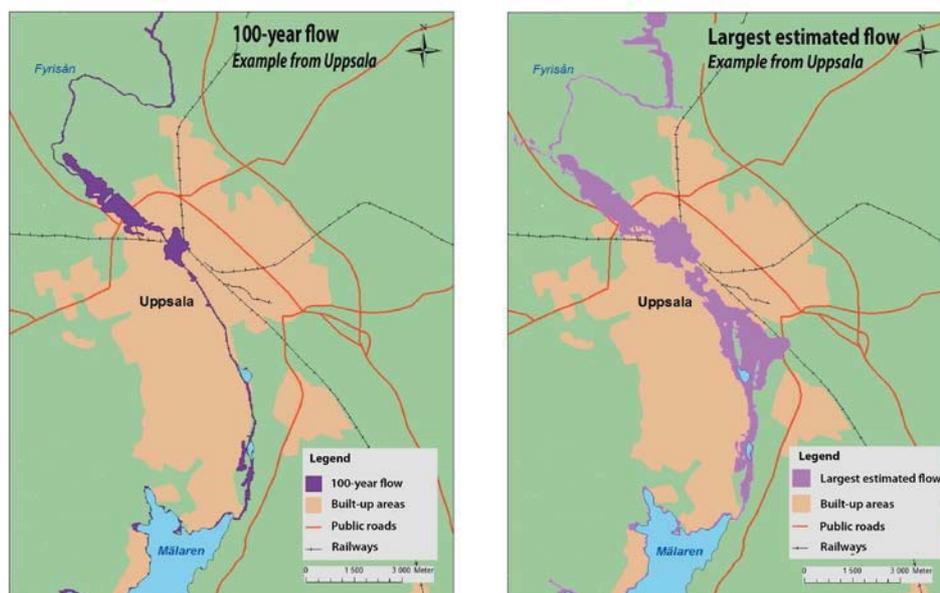
Besides data from the government agencies' risk and vulnerability analyses, other supplementary data has also been used to describe the risks.

⁴² For practical reasons, the risks presented below have been divided into different categories. We would like to emphasize that these risks are not synonymous with a more technical definition of the term risk. Instead, these examples should be viewed in a wider context, using a more general definition of the term risk. In other words, references made to "risks" mainly regard a type of incidents, occurrences or circumstances that may have unwanted effects (in this case serious or very serious consequences).

6.1 Floods

On average, Sweden is hit by a larger flood once every five years.⁴³ The flood usually coincide with the melting away of snow, which can be worsened if combined with rain. However, it is becoming more common for abundant rainfall to cause floods at other times of the year. In addition, intensive rainfall that might occur during thundershowers and stagnant fronts can cause floods in a relatively short period of time, although usually limited a certain geographical area.

The first countrywide assessment and risk identification of the consequences of floods in Sweden is currently being conducted, which marks the beginning of a long-term national development work to prevent and handle the risks and consequences of large floods.⁴⁴



Map 1: Example of flood mapping – the Fyris River in Uppsala

The flood mapping above illustrates the prevalence of 100 year flows and the largest estimated flow.⁴⁵

⁴³ The Swedish Rescue Service Agency, *Översvämning*, 2000, s. 4

⁴⁴ Directive (2007/60/EG) from 23 October, 2007 on assessments and handling of the risk of floods. The Directive is implemented as the Ordinance (2009:956) on Flood Risks. The MSB carries out the preliminary assessment of serious flood risks throughout the country and decides which areas are to be considered significant flood risks. The findings are to be presented for the EU no later than 22 December, 2011.

⁴⁵ The term return period is used to measure the risk of floods. The return period is the average time between two floods of the same size. The probability of a 100-year flood occurring in any given year is one in a hundred. The 100-year flood is calculated through a statistical analysis of observed water-bearing series. The probability of the flood occurring once during a 100-year period is 63 percent, while the probability of it occurring twice during this period is 40 percent. The highest calculated flow is based on a combination of all critical factors that may contribute to a flood, such as melting snow and rainfall. The

There are a number of areas in Sweden where the risk of floods is large and where the consequences of floods can be very severe. Examples of such areas are Uppsala, which is shown on the map above, Lake Mälaren, which is described below, and the Göta älv River, which is described in section 6.2 Landslides.

Mälaren is Sweden's third largest lake and shares an outflow of water with Lake Hjälmaren, stretching from Bergslagen in the west towards Norrström in central Stockholm. Around 2.5 million people live around Lake Mälaren, and there is a lot of infrastructure around the lake. In addition, several municipalities use the lake for its drinking water.⁴⁶

Mälaren has been regulated since the early 18th century to prevent the water level from becoming too high or too low. However, high flows can cause some problems. In the late autumn of 2000 Lake Mälaren had the highest water level in modern times. The floods hit holiday houses and large areas of farm land, and threatened several vital societal functions. The underground station in Gamla Stan in Stockholm was nearly flooded.⁴⁷

The floods in the year 2000 showed that the tunnel systems used for water, electricity, telecommunications and district heating in Stockholm are at risk of being damaged⁴⁸. This is estimated to have serious consequences at both the local, regional and national level, as declines in infrastructure could cause disruptions for vital societal functions.⁴⁹

Larger floods are estimated to have consequences for housing areas, industries and the agricultural sector. It is probable that several stretches of road in parts of central Stockholm and Västerås are at risk. The railway network at the Stockholm Central Station and in particular the tunnel under the Riddarholmen islet could be affected, as well as certain other stretches near Lake Mälaren.

A larger flooding of Lake Mälaren would increase the risk of contaminated leaks, e.g. from industrial areas, which could affect the quality of the drinking water.⁵⁰ In addition, there are a number of sewage treatment plants near Lake Mälaren that could be hit by the flood, with negative effects on the sewage

Swedish Civil Contingencies Agency, *Översiktlig översvämningskartering längs Norsälven – Sträckan Torsby till Vänern*, dnr.2009-1982, 2009

⁴⁶ Mälarens vattenvårdsförbund, *Mälaren en sjö för miljoner*,

<http://www.malaren.org/artikel.asp?categoryID=2&parentID=0&pageID=9>, 2011-09-30

⁴⁷ SOU 2006:94, *Översvämningshot – Risker och åtgärder för Mälaren, Hjälmaren och Vänern*. 2006

⁴⁸ *Ibidem*

⁴⁹ The County Administrative Board of Stockholm, *Kartläggning av riskerna för översvämnning i tunnelsystemen i Stockholms län*, rapport 2011:24, 2011

⁵⁰ *Ibidem*

treatment.⁵¹ Furthermore, floods increase the risk of a contamination spreading.

6.2 Landslides

Landslides are defined as a ground movement that usually appears in silt and mud in connection to watercourses, lakes and coasts.⁵² During a landslide, rocks, stones, pebbles and sand start to move.⁵³ Landslides are common where watercourses have eroded the ground, as well as around steep hills with cracked and weathered rocks.⁵⁴ In addition, landslides can be caused by natural erosion processes, but also be caused by human activities such as constructions and forestry.⁵⁵

The Göta älv River originates from Lake Vänern and runs through a 93 kilometre long valley, after which it flows into the sea in Gothenburg.⁵⁶ Along the valley are layers of sediment consisting of mud, which at some places are more than 100 metres deep. Quick clay, which can lose its firmness and become floating, is common, which makes the Göta Älv river one of the most landslide-prone areas in Sweden.⁵⁷

The largest landslide in modern time at Göta älv happened on 7 June, 1957 in Göta. This landslide covered approximately 37 hectares of land and demolished a sulphite factory, where three employees died. Large amounts of soil slid into Göta älv, which halted ship traffic in the river for a month.⁵⁸

The Tuve landslide occurred on the 30 November, 1977 and is one of the worst natural disasters in modern Swedish history. A large landslide caused a large area of soil below a residential area to start moving in sliding down a sloping rock. The landslide moved approximately 300,000 square metres of land and caused an enormous amount of damage. Nine people died, 62 people were injured, 436 people lost their homes and 65 houses collapsed. In addition,

⁵¹ SOU 2006:94, *Översvämningshot – Risker och åtgärder för Mälaren, Hjälmaren och Vänern*. 2006

⁵² The Swedish Civil Contingencies Agency, *Var inträffar ras och skred?*, <https://www.msb.se/sv/Forebyggande/Naturolyckor/Skred-ras-och-erosion/Var-intraffar-skred-och-ras/>, 2011-09-28

⁵³ The Geological Survey of Sweden, *Skred och ras*, http://www.sgu.se/sgu/sv/samhalle/risker/skred_s.htm, 2011-09-28

⁵⁴ The Swedish Civil Contingencies Agency, *Ras*, <https://www.msb.se/sv/Forebyggande/Naturolyckor/Skred-ras-och-erosion/Vad-ar-skred-och-ras/Ras/>, 2011-09-28

⁵⁵ The Swedish Civil Contingencies Agency, *Människans ingrepp i naturen*, <https://www.msb.se/sv/Forebyggande/Naturolyckor/Skred-ras-och-erosion/Varfor-intraffar-skred-och-ras/Manniskans-ingrepp-i-naturen/>, 2011-09-28

⁵⁶ Swedgeo, *Geotekniska förutsättningar för ökad tappning från Vänern till Göta älv*, Varia, SGI-V565, 2006

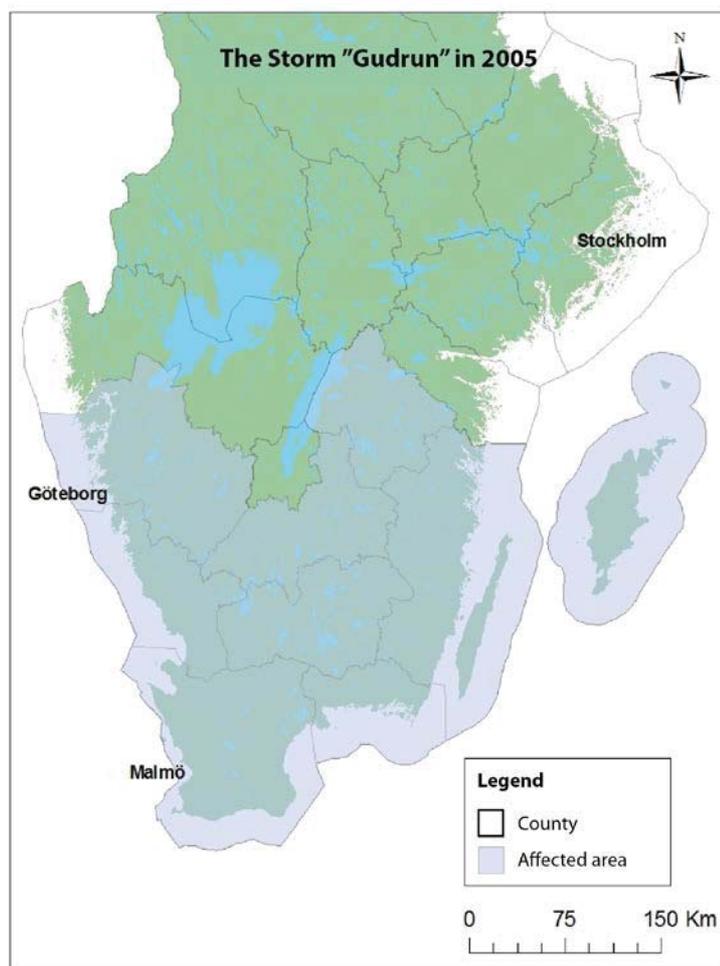
⁵⁷ *Ibidem*

⁵⁸ The Swedish Civil Contingencies Agency, *Naturolycksdatabasen – Götaskredet 1957*, <http://ndb.msb.se/ViewCase.aspx?id=98&l=SV&xMax=351705&xMin=311705&yMax=6464256&yMin=6424256>, 2011-09-30

electricity grids, telecommunications, and water and sewage pipes were damaged, which affected many households outside the area of the landslide.⁵⁹

6.3 Storms

Strong storms have hit Sweden many times in recent centuries. The Swedish Meteorological and Hydrological Institute highlights nine such incidents in the last 100 years.⁶⁰ It is usually the southern part of the country that is hit the worst. Autumn and winter storms occur during contrasts in temperature between north and south. This contrast is the greatest at the 'polar front', which marks the border between the colder northern air and the milder southern air, which usually stretches just over the southern parts of Sweden during autumn and winter.⁶¹



Map 2: The prevalence of the storm Gudrun in Sweden

⁵⁹ The Swedish Civil Contingencies Agency, *Tuveskredet, Göteborgs kommun, 30 november 1977*, <https://www.msb.se/sv/Forebyggande/Naturolyckor/Skred-ras-och-erosion/Exempel-pa-intraffade-skred-ras-och-ravinutveckling/Tuveskredet-Goteborgs-kommun-30-november-1977/>, 2011-09-28

⁶⁰ <http://www.smhi.se/kunskapsbanken/meteorologi/stormar-i-sverige-1.5770>, 2011-09-28

⁶¹ www.krisinformation.se

Gudrun, which hit Sweden on the 8-9 January, 2005 is to worst storm to have hit Sweden in modern times. Worst hit were the eastern parts of Halland County, the southern parts of Småland County and western Blekinge County. 72-73 million cubic metres of forest fell in the Götaland region, which corresponds the around three years of felling in Götaland and nearly a whole year's worth of felling in Sweden.⁶² Seven people died during the storm and an additional eleven people died in the subsequent clearance work.

Almost 30,000 kilometres of power grid was damaged and as many as 730,000 customers experienced power cuts. Furthermore, more than 250,000 households lacked working phone lines immediately after the storm. In some places, more or less all vital societal functions were shut down temporarily.⁶³ There were serious accessibility-related problems on the roads and railways. The net costs for restoring and rebuilding in the transport and communication sector alone was approximately SEK 500 million.⁶⁴

Two years after the storm Gudrun, Sweden was hit by the storm Per. The gusts and average wind in the storm was 10 percent, or 2-4 m/s lower than in the storm Gudrun. The Götaland region was hit the worst by this storm as well. The storm resulted in five deaths and the felling of close to 16 million cubic metres of forest. In total, 440,000 customers experienced power cuts during the storm.⁶⁵

Snowfall generally does not cause any serious problems in Sweden. However, large amounts of snow in a short period of time in combination with strong winds can have serious consequences. Snowstorms usually cause more problems in southern Sweden than in northern Sweden.⁶⁶

One example of large amounts of snow in combination with strong winds is when 150 cm of snow fell in the Gävle area during two days in December, 1998. The city was more or less paralysed; schools and businesses were shut down, public transport stopped running and many were snowed in.

Another example of a snowstorm causing problems is the storm over middle and northern Götaland in November, 1995, where 60 centimetres of wet snow fell. However, the worst snowstorm to hit Sweden in modern times probably occurred in the winter of 1978-79 in Skåne.⁶⁷ The region was hit by two snowstorms; one before the new year and a protracted storm in February, 1979.

⁶² The Swedish Forest Agency, *Ekonomiska och sociala konsekvenser i skogsbruket av stormen Gudrun*, rapport 12–2006, 2011

⁶³ The Swedish Civil Contingencies Agency, *Statistik och analys Olyckor & kriser 2009/2010*, MSB:0170-10, 2010

⁶⁴ Government report (2007/08:RFR5) *Uppföljning av hur stormen Gudrun hanterats inom transport- och kommunikationsområdet*. 2007. However, the total costs are greater as some expenses have not been accounted for, such as repair costs in 2006 and 2007.

⁶⁵ The Swedish Civil Contingencies Agency, *Statistik och analys Olyckor & kriser 2009/2010*, MSB:0170-10, 2010

⁶⁶ *Ibidem*

⁶⁷ <http://www.smhi.se/kunskapsbanken/meteorologi/skanes-klimat-1.4827>, 2011-09-30

⁶⁸ The wind reached 25 metres per second and the temperature was at times minus ten degrees Celsius. Enormous piles of snow were created and buried cars as well as houses.

Many people felt that the winter of 2009/2010 was unusually long, cold and snowy. This resulted in disruptions for in particular the railway services, rail-bound public transport, road transport and shipping. In addition, the weather caused roofs to collapse under the large piles of snow, and caused disruptions in the supply of water and electricity.⁶⁹

An ice storm is a type of storm where winds and rainfall create ice formations on the ground, on buildings and on power grids. Between 4 and 10 January, eastern Canada was hit by a large ice storm. Extreme ice formations caused extensive damage on the power grids in Québec and Ontario.⁷⁰

Weather conditions like the one in Canada in 1998 are unusual in Sweden. However, in February 1921 large parts of western and middle Sweden were hit by something resembling an ice storm, as wet snow rapidly froze due to a quick drop in temperature.⁷¹ As a result, the entire landscape was covered by a 4.5 centimetre thick layer of ice. Besides the incident in 1921, the Swedish Meteorological and Hydrological Institute states that similar conditions have been documented in Sweden on five occasions.⁷² A scenario involving an ice storm was used for a capability assessment by government agencies in 2010, as is presented in Appendix 3.

6.4 Earthquakes and volcanic eruptions

The lithosphere, which is the outermost layer of Earth, consists of several plates that are in constant movement. When these plates collide or chafe against one another it can cause earthquakes and volcanic eruptions.⁷³ Sweden does experience some seismic activity, and there are around 500-700 earthquakes every year.⁷⁴ Most of these are of a magnitude of 2.0 on the Richter scale and can only be registered by seismic monitoring stations. However, about once every year Sweden is hit by an earthquake with a magnitude of over 3.0, which can usually be felt. Earthquakes can cause damage to constructions and lead to

⁶⁸ http://www.krisinformation.se/web/Pages/Page_____72890.aspx, 2011-11-16

⁶⁹ The Swedish Civil Contingencies Agency, *Perioder med stora snömängder vintern 2009/2010*, dnr. 2010-4284

⁷⁰ Fisher Georg, Molin Staffan, *Isstormen i Kanada*, The Swedish Defence Research Agency 2001

⁷¹ The Swedish Civil Contingencies Agency, *Samhällets krisberedskapsförmåga vid isstorm*. MSB219 – December, 2010

⁷² *Ibidem*

⁷³ The Geological Survey of Sweden, *Seismisk aktivitet*, <http://www.sgu.se/sgu/sv/geologi/tektonik/seismik.html>, 2011-09-30

⁷⁴ The Swedish National Seismic Network, *Nätet*, <http://snsn.geofys.uu.se/>, 2011-09-29

landslides. For example, an earthquake can cause a mine to collapse, which happened in 2008 in the Kiruna mine in Sweden, where one person died.⁷⁵

On 23 October, 1904 there was a large earthquake with a magnitude of 5.4 in the southern part of the Oslo fjord. The earthquake could be felt in most of southern Sweden, as well as in Finland, Estonia, Latvia, Lithuania, Poland, Germany and Denmark. In Sweden, the earthquake resulted in several landslides and property damage.⁷⁶

Although there are no active volcanoes in Sweden, volcanic activities in other countries, Iceland in particular, can have effects on Sweden. Materials found in the eruption, such as volcanic ash and sulphur mist, have reached Sweden several times in the past. In today's society volcanic eruptions mainly affect air travel, including airborne hospital transports, but can also have a negative effect on health and the environment.⁷⁷

The ash clouds that were produced during the volcanic eruption on Iceland in April 2010 caused a lot of problems for air travel in Europe. However, the actual ash clouds and possible fallout is not believed to have had any serious consequences for functions that are important to society, nor for the health of people and animals.⁷⁸

Volcanic sulphur mist may appear during a volcanic eruption, as volcanic gases enter the troposphere. Sulphur mists are often limited to a certain geographical area, and can last for a couple of days to several weeks. In a small number of cases the mist can last for months.⁷⁹ A scenario where Sweden is hit by sulphur mist can be found in Appendix 2.

The sulphuric contaminations in the mist can irritate the skin and lead to breathing problems. Furthermore, the contamination can cause heart and vascular disease by affecting the blood's viscosity and causing nerve irritation that can affect the heart rhythm.⁸⁰ In addition, grazing animals might get affected as their pasture is contaminated by sulphuric pollutants and toxic metals. Vegetation is at risk of being damaged and forests can have chronic

⁷⁵ The Swedish National Seismic Network, *Svenska skalv som kändes*, <http://snsn.geofys.uu.se/>, 2011-09-29

⁷⁶ Laufeld, S., *Skalvet 1904 Sveriges värsta på tusen år*, Svenska dagbladet, 2005-01-15, http://www.svd.se/kultur/understrecktet/skalvet-1904-sveriges-varsta-pa-tusen-ar_386575.svd, 2011-09-30

⁷⁷ Andersson, E., *Vulkanisk svaveldimma: Risken att det drabbar Sverige*, Thesis, The Department of Physical Geography and Quaternary Geology, Stockholm University, 2011

⁷⁸ The Swedish Civil Contingencies Agency, *Samhällsviktig verksamhet - Konsekvensbedömning av vulkanutbrott*, dnr. 2010-4400, 2010-04-22

⁷⁹ Camuffo, D. & Enzi, S., *Chronology of 'Dry Fogs' in Italy, 1374-1891*, Theoretic and Applied Climatology. 50, 31-33, 1994

⁸⁰ Allan, A.G., Baxter, P.J. & Ottley, C.J., *Gas and particle emissions from Soufrière Hills Volcano, Montserrat, West Indies: characterization and health hazard assessment*, Bulletin of Volcanology 62: 8–19, 2000

damage if exposed to the mist for a longer period of time, coniferous trees in particular.⁸¹

The volcanic fissure Laki on southern Iceland had a large eruption in the summer of 1783, where large amount of volcanic gasses were emitted into the atmosphere. The sulphur mist spread over Scandinavia, Europe, South-West Asia, Northern Africa and even South America. The effects of the fog lasted for up to around five months, particularly in western Europe. The gasses caused breathing problems, throat irritation and sore eyes, among other things. There was a large number of casualties among people and animals, especially in rural areas. In addition, the poisoned vegetation resulted in widespread failure of the crops in parts of Europe.⁸²

6.5 Solar storms

Solar storms can refer to two types of space weather created by the sun; geomagnetic storms and solar flares. Both of these can cause disruptions. During strong eruptions on the sun, plasma clouds consisting of charged particles are slung into space. If these plasma clouds hits Earth, energy from the clouds' magnetic field can be transferred into Earth's magnetosphere, creating a geomagnetic storm. Solar flares are caused by radiation from the sun, with frequencies stretching from radio waves to gamma radiation.⁸³ If this radiation is directed at Earth it might interfere with radio communication and satellites.

The magnetic fields induce electric currents into the surface of the planet, the conductivity of which varies depending on the surface. The currents seek materials with good conductivity, such as power lines, communication cables, railway tracks, and pipelines for oil and gas.⁸⁴ The power grid is particularly vulnerable, as geomagnetically induced currents enter the power lines and pass through transformers, which can lead to overheating and cause damage.⁸⁵ A scenario where Sweden is hit a solar storm can be found in Appendix 2.

In March, 1989 Earth was hit by a strong geomagnetic storm. This caused problems in Canada and the United States in particular, but also to a lesser extent in Sweden. Safety relays were triggered in six power lines in central and southern Sweden, fire alarms were set off and Swedish power company Sydkraft noticed a 5°Celsius increase in the temperature in the rotor of a nuclear power plant.⁸⁶ In the end of October, 2003 two geomagnetic storms caused large disruptions in Sweden and the United States, among other

⁸¹ Andersson, E., *Vulkanisk svaveldimma: Risken att det drabbar Sverige*, Thesis, Institutionen för naturgeografi och kvartärgeologi, Stockholm University, 2011

⁸² Thordarson, T. & Self, S., *Atmospheric and environmental effects of the 1783–1784 Laki eruption: A review and reassessment*, Journal of geophysical research 108, 2003

⁸³ Wik., *The Sun, Space Weather and Effects*, Doctor's thesis, The Swedish Institute of Space Physics, Lund University, 2008

⁸⁴ Ibidem

⁸⁵ Lundstedt, H., *The sun, space weather and GIC effects in Sweden*, Advances in Space Research 37 1182–1191, 2006

⁸⁶ Ibidem

countries. In Sweden, safety relays were triggered in several power lines and transformers around the country, which among other things led to 50,000 households in Malmö being without electricity for 20-50 minutes.⁸⁷ In addition, the temperature increased substantially in some transformers.

⁸⁷ Elforsk, *Solstormar – Transienta geomagnetiska störningar*, Elforsk rapport 03:33, 2004

6.6 Heat waves

A heat wave is defined by the Swedish Meteorological and Hydrological Institute as a period of at least five consecutive days where the temperature reaches at least 25 degrees Celsius. This means that Sweden can only have heat waves during the summer. Unusually high temperatures during other seasons are instead referred to as “high temperatures relative to the season”. The longest period of consecutive days where the temperature reached 25 degrees Celsius in Sweden occurred in Osby in 1994.⁸⁸ The period where the temperature reached at least 25 degrees lasted for 25 days, during which time the temperature exceeded 30 degrees seven days in a row.⁸⁹

Studies in Sweden and Europe show that heat waves lead to higher mortality, particularly among the elderly and those with diseases. In 2003, Europe experienced extreme heat. In total, the two week heat wave is estimated to have resulted in between 22,000 and 45,000 more deaths in Europe than normal.⁹⁰ Elderly people with heart or lung disease are particularly exposed. During a heat wave; hospitals, health centres and home-help services are under a lot of pressure, as the elderly and the unwell require more care. In addition, small children are extra sensitive to fluid deficiency. In Sweden, heat waves result in more visits to lakes and other swimming sites, which leads to more drownings and a greater exposure to water-borne diseases.⁹¹

If the weather is dry and warm, the risk of forest fires increases. Under these conditions, thunder or negligence at a barbecue can easily cause a fire. In other words, heat waves lead to higher pressure on the rescue services in terms of fires and hospital transports.⁹²

Furthermore, higher temperatures necessitate greater care when handling foodstuffs. If the hygiene is not seen to, the risk of bacteria or diseases spreading increases. Therefore, the demands on storage, transport and other handling of foodstuffs will be raised. A lack of water can affect primary production through the feeding of animals. Heat waves cause the animals stress, which makes it extra important that the animals have access to water, and that the stables have sufficient ventilation.⁹³ Moreover, the heat could lead to an increased amount of bacteria in water catchments. Low water levels in lakes and watercourses can cause wells to dry up, leading to a lack of water for drinking and irrigation.⁹⁴

⁸⁸ In the period 1961–2010

⁸⁹ The county administrative boards, *Händelsescenario för Risk- och sårbarhetsanalys Värmebölja i nutid och framtid*, 2011

⁹⁰ Rocklöv, J., Hurtig, A-K., Forsberg, B., *Hälsopåverkan av ett varmare klimat – en kunskapsöversikt*, Umeå University, 2008

⁹¹ The county administrative boards, *Händelsescenario för Risk- och sårbarhetsanalys Värmebölja i nutid och framtid*, 2011

⁹² *Ibidem*

⁹³ *Ibidem*

⁹⁴ *Ibidem*

6.7 Forest fires

There are around 3,000-4,000 fires in woods and fields in Sweden every year. About once or twice every decade, Sweden experiences summers with extensive forest fires. The most common causes of forest fires are human activities such as felling, camp fires and people playing with fire. In addition, natural phenomena such as lightning strikes cause forest fires.⁹⁵

In Sweden, forest fires are mainly a problem if they affect vital societal functions. Common forest fires, which do not affect such functions, are not necessarily a large problem in Sweden. Instead, some experts believe that the problem in Sweden is the opposite – there are not enough forest fires.⁹⁶ These experts argue that forest fires are good for biological diversity. However, forest fires always lead to financial losses for whoever owns the forest.⁹⁷

A warmer climate could prolong the fire season, and would also risk increasing the fire's geographical area. This would lead to an increased number of forest fires. The number of days with a high risk of forest fires is expected to increase in southern Sweden in particular.⁹⁸

On the 11 August, 2006 there was a fire in Bodträskfors in Boden Municipality. This fire would become the largest forest fire in Sweden in modern times.⁹⁹ An area as large as 1,900 hectares went up in flames, which brought large financial losses for the forest owners. Around 80 firemen from around the country, Swedish Home Guard, seven helicopters and volunteers spent a week fighting and stopping the fire.¹⁰⁰

⁹⁵ The Swedish Civil Contingencies Agency, *Beredskap inför skogsbrand*, 2010-04-12
<https://www.msb.se/sv/Insats--beredskap/Naturolyckor/Skogsbrand/>, 2011-09-28

⁹⁶ The World Wide Fund for Nature, <http://www.wwf.se/vrt-arbete/skog/problem/skogsbrnder/1195745-skogsbrnder2>, 2011-09-28

⁹⁷ The Swedish Forest Agency, <http://www.skogsstyrelsen.se/Aga-och-bruka/Skogsbruk/Skador-pa-skog/Vader-och-klimat/Skogsbrander/>, 2011-09-28

⁹⁸ The Swedish Civil Contingencies Agency, *Statistik och analys Olyckor & kriser 2009/2010*, MSB:0170-10, 2010

⁹⁹ The Swedish Civil Contingencies Agency, *Att mäta sårbarheter mot naturolyckor - Om sårbarheter om begrepp och indikatorer*, MSB 0110-09

¹⁰⁰ Swedish radio, *Största skogsbranden i modern tid*, <http://sverigesradio.se/sida/artikel.aspx?programid=98&artikel=927287>, 2011-09-28; The Swedish Civil Contingencies Agency, *Skogsbrand i fokus -seminariedokumentation 28-29 november 2006, i Boden*.
https://www.msb.se/Upload/Utbildning_och_ovning/Konferenser_seminarier/Dokumentation/Skogsbrand/Boden_2006/Boden%202006%20-%20Skogsbrand%20i%20fokus.pdf, 2011-10-13

6.8 Vermin infestation (pests)

Pests include various diseases, insects and other parasites that attack and damage plants.¹⁰¹ The consequences of serious pests being introduced or spread in Sweden is that their establishment as well as the use of pesticide have negative effects on nature, both in terms of natural forests, conservation of natural resources, biological diversity and on nutrients. Under such a scenario, the forestry sector would suffer the greatest losses.

The Swedish Board of Agriculture highlights two incidents that have occurred in the EU in recent years. In 2007 and 2009 there were outbreaks of the Asian long-horned beetle (*Anoplophora spp*) in the Netherlands. This insect attacks trees, and there is a risk that it is imported to Sweden along with plants from plant nurseries.

The pine wood nematode (*Bursaphelenchus xylophilus*) infects pine trees in particular, and is now considered to be established in Portugal. It is spread through wood that have not been heat-treated, such as loading pallets and other wooden packing. In 2008, pine wood nematode was discovered in Sweden in wooded packing from Portugal, but the nematode has not been established in the wild. The Swedish Board of Agriculture believes that the risk of nematodes from packing or bark mulch reaching growing pine trees in Sweden is small. However, if this were to happen the consequences are estimated to be severe. The methods for fighting the nematode are gradually improving, but the estimated cost of extermination is close to SEK 1 billion per attack with a radius of approximately 10 kilometres. The consequences of the nematode's damage and the efforts to fight it are believed to be the greatest for the forestry sector, but it would also affect nature and the biological diversity, the local climate and nutrients.

Furthermore, climate change contributes to the change in risks facing Sweden, as new pests become able to establish themselves in the country.

The Swedish Board of Agriculture also mentions pests that attack forests (Siberian pine-tree lappet) and potatoes (potato wart disease and the Colorado potato beetle) as examples of risks that would have serious consequences. Neither the Asian long-horned beetle, the Siberian pine-tree lappet, the Colorado potato beetle or the pine wood nematode are yet established in Sweden, but there is a risk that they are imported. There are two types of potato wart disease in Sweden, but can be handled to some extent by growing resistant types of potato.

¹⁰¹ The Swedish Board of Agriculture, *Risk och sårbarhetsanalys 2010*, dnr. 90-11553/10

6.9 Infectious diseases – outbreaks, pandemics, zoonoses and epizooties

Diseases are always a viable risk for people, animals and plants. A pandemic is when an infectious disease spreads across a large part of the world and its inhabitants, such as an outbreak of influenza. There are also diseases that can spread from animals to humans, known as zoonoses. An outbreak of a contagious animal disease is called an epizootic.¹⁰²

These days, diseases are spread between people, between people and animals, through the drinking water, through food, and through travelling and trade. Furthermore, infectious diseases can also be spread on purpose by those with sufficient resources, in order to achieve political goals. Medical advances improve our ability to prevent and treat diseases. However, the development of resistance can severely worsen our ability to handle outbreaks. For more information, see Section 6.10 Resistant bacteria and resistance to antivirals

There are outbreaks of infectious diseases every day. We have provided a small number of examples below, where the effects hit all parts of society, not just the healthcare and veterinarian sectors.

Since the year 1900, humanity has been hit by four influenza pandemics: The Spanish flu (1918–1920), the Asian flu (1957–1958), the Hong Kong flu (1968–1969) and influenza A(H1N1) 2009¹⁰³ as well as a large outbreak of the respiratory disease SARS (2003–2004). Around one third of the world's population was infected by the Spanish flu, and 20–50 million people died. In Sweden the official death toll was approximately 34,000.¹⁰⁴ Complications caused by bacteria were the most common cause of death among those infected.¹⁰⁵ (At this time, antibiotics had not yet been discovered and developed into pharmaceuticals.) In Sweden, around 15% are estimated to have been infected by the Asian flu, and slightly less by the Hong Kong flu.¹⁰⁶ The Asian flu affected a number of societal functions, such as healthcare, transport, mail delivery, defence exercises and education, due to a shortage in staff. The Hong Kong flu, on the other hand, had little effect on society. At the time of the SARS outbreak (2003–2004) around 8,000 people from 32 countries were infected, of which 800 people died. South-East Asia and Canada in particular were hit by the outbreak.¹⁰⁷ No one in Sweden has died from SARS.

¹⁰² Section 1 of the Swedish Epizootic Disease Act (1999:657) defines epizooties as dangerous animal diseases, i.e. diseases that pose a serious threat to the health of people or animals or that can cause large financial losses for society

¹⁰³ The Swedish Civil Contingencies Agency, *Statistik och analys Olyckor & kriser 2009/2010*, MSB:0170-10, 2010

¹⁰⁴ The National Board of Health and Welfare, *Influensapandemiens påverkan på samhället. Nödvändig erfarenhetsbakgrund för pandemiplanering*, 2007-123-2, 2006

¹⁰⁵ Ibidem

¹⁰⁶ Ibidem

¹⁰⁷ The Swedish Emergency Management Agency, *Hot- och riskrapport 2006*, KBM:s temaserie 2006:7

Bird flu is mainly an epizootic, although it does also appear as a zoonosis that mainly infects people living around domesticated birds. In 2003-2006, an outbreak spread rapidly across large parts of South-East and East Asia. Bird flu is no longer a pandemic (currently at level 3 according to the WHO), but the disease is discovered in domesticated birds on a regular basis, and causes illness and deaths among people. As of the year 2010, the flu had spread to 16 countries. At total of 516 people have been infected, of which 306 people died.¹⁰⁸

Other significant outbreaks of zoonoses include influenza A(H1N1) in 2009 and Creutzfeldt-Jakob disease/bovine spongiform encephalopathy (BSE)¹⁰⁹. In 2009, there were more than 18,000 confirmed deaths around the world caused by influenza A(H1N1),¹¹⁰ of which 1,934 deaths occurred in Europe.¹¹¹

Three examples of serious outbreaks of animal diseases are classical swine fever in the Netherlands (1997), foot-and-mouth disease in the United Kingdom (2001) and bird flue (H5N1) (2003-). There have been regular outbreaks of classical swine fever in the EU, although there have not been any outbreaks in Sweden since 1994.¹¹²

During the 2000s, Sweden has had serious animal diseases such as Bluetongue disease in 2008, anthrax in 2008 and 2011, and bird flu in 2006. The preparedness for Bluetongue disease and anthrax was poor. The pressure on the veterinary infectious disease control increased substantially during all three outbreaks. Measures were taken to stop these outbreaks. In 2007, government agencies carried out a capability assessment of a scenario involving epizooties and zoonoses, see Appendix 3.

Large outbreaks of infectious diseases pose a threat to the lives and health of the public, and can seriously affect society's functionality. In addition, they can lead to large financial costs due to trade barriers and similar consequences. All large outbreaks, regardless of whether they affect humans or animals, necessitate tests and diagnostics, and preventive measures such as vaccination if there is a vaccine against the disease. A pandemic increases the pressure on the healthcare providers and leads to a shortage in staff. The trend towards an altered disease panorama will probably affect Sweden increasingly more, as a result of climate change and travel. In 2008, 2009 and 2010, government agencies carried out a capability assessment of a scenario involving influenza pandemics, which is presented in Appendix 3.

¹⁰⁸http://www.who.int/csr/disease/avian_influenza/country/cases_table_2011_08_09/en/index.html, 2011-09-29

¹⁰⁹ The Swedish Board of Agriculture, *Risk- och sårbarhetsanalys 2010*, dnr. 90-11553/10

¹¹⁰ The World Health Organization (WHO), *Pandemic (H1N1) update 82*, http://www.who.int/csr/don/2010_08_06/en/index.html, 2011-11-07

¹¹¹ The European Centre for Disease Prevention and Control (ECDC), *Daily Update Pandemic (H1N1) 2009*, www.ecdc.europa.eu, 2010-01-04

¹¹² The Swedish Board of Agriculture, *Risk- och sårbarhetsanalys 2010*, dnr. 90-11553/10

6.10 Resistant bacteria and resistance to antivirals

An increase in the use of antibiotics has shown to lead to increasingly more types of bacteria becoming resistant to antibiotics. It is becoming more common for bacteria to be resistant to several types of antibiotics, and there are now bacteria that are resistant to all known antibiotics. Furthermore, viruses can become resistant to antiviral medication, and extensive use of antivirals, e.g. during a pandemic influenza, can lead to these becoming less effective.

Resistant bacteria and viruses are caused by antimicrobial treatment of people and animals, but there are indications that resistance can also be caused by bacteria and viruses being exposed to antibiotics and antivirals in nature, for example in sewage water.¹¹³ The spread of resistant micro-organisms can occur between people, such as in hospital acquired infections, or between people and animals, as well as through travelling, medical tourism, migration and trade, e.g. through food.

The origin of antibiotic resistant is very complex and has many different components. It is not solely about incorrect treatment with antibiotics, but also about the need to prevent hospital acquired infections through improved healthcare hygiene.¹¹⁴ In addition, there are risks involving patients being treated abroad, as resistance might be imported.

Compared to the rest of the world, the situation in Sweden is relatively favourable.¹¹⁵ However, at times serious situations do occur in parts of Sweden, and there are efforts to decrease the prescription of antibiotics to both people and animals.¹¹⁶ For example, antibiotics in animal feed to promote growth was banned in Sweden in 1986.

Antibiotic resistant bacteria can be spread from person to person and through imported food and animal feed. The animals might be infected with resistant bacteria, or it might appear while the meat is being handled.¹¹⁷ The National Veterinary Institute also mentions pets as a source of resistant bacteria.

If the prevalence of resistant micro-organisms in Sweden increases, the consequence will be reduced ability to treat infections or use antivirals for

¹¹³ Larsson, Joakim, Löf, Lars, *Läkemedel i miljön*, The Medical Products Agency, *Läkemedelsboken 2011–2012*, s. 1182–1193

¹¹⁴ www.socialstyrelsen.se/smittydd/vardhygienochresistens, 2011-11-14

¹¹⁵ European Centre for Disease Control och European Medicines Agency, *The Bacterial Challenge: Time to React*, 2009-09-17, http://ecdc.europa.eu/en/publications/Publications/0909_TER_The_Bacterial_Challenge_Time_to_React.pdf, 2009-09-23

¹¹⁶ The Swedish Institute for Communicable Disease Control, *SWEDRES 2010*, <http://www.smittskyddsinstitutet.se/upload/Publikationer/swedres-2010.pdf>, 2011

¹¹⁷ Egervärn, M. and Lindmark, H., Riskprofil. *Livsmedel som spridningsväg för antibiotikaresistens*, Livsmedelsverket och Statens veterinärmedicinska anstalt, 2009-10-15 http://www.slv.se/upload/dokument/rapporter/bakterier_virus_mogel/Riskprofil_Livsmedel_som_spridningsvag_for_antibiotikaresistens.pdf, 2009-11-11

preventive purposes, such as to maintain vital societal functions. The slow development of new antibiotics contributes to this threat scenario. In the event of a pandemic, resistance to antiviral agents among influenza viruses could become a serious problem. The quality of healthcare would decrease as patients could no longer be treated for infections, and the risk of serious infection during other treatments would also increase.¹¹⁸

6.11 Disruptions in the supply of medicines

The supply of medicines can be described as a chain of activities involving actors such as producers and suppliers, who then deliver the pharmaceuticals to sellers and end-users.¹¹⁹ The supply of medicines depends on other vital societal functions. For example, the provision of healthcare material and pharmaceuticals depends on working transport.¹²⁰ The greater part of medical supplies in Sweden is transported by boat or lorry.¹²¹ Furthermore, transports are dependent on electricity, fuel, electronic communications and staff.¹²² Therefore, disruptions in other vital societal functions could have serious consequences for the supply of medicines, especially if they were to occur at the same time as a temporary increase in need for pharmaceuticals, such as during an influenza pandemic.¹²³

Disruptions in deliveries constitute a potential risk for the supply of medicines, especially if many countries need a certain pharmaceutical at the same time. Pharmaceuticals in Sweden are mainly imported from other European countries. Although Sweden has an extensive production of pharmaceuticals, the country still relies on imports of pharmaceuticals that are produced abroad. Disruptions in deliveries can lead to a widespread shortage of pharmaceuticals that are rarely produced or demanded, but which are crucial for the health of certain patient groups.¹²⁴ The influenza pandemic in 2009 is an example of an incident where Sweden depends on pharmaceutical production in other

¹¹⁸ The National Veterinary Institute, *Risk- och sårbarhetsanalys 2010*, dnr. 2010/896; Strama: *STRAMA ten years*, 2005,

<http://soapimg.icecube.snowfall.se/strama/STRAMA%2010%20ar.pdf>, 2011-09-26

¹¹⁹ The Swedish Emergency Management Agency, *Beroende- och konsekvensanalys, Hälso- och sjukvård: Offentligt arbetsmaterial från KBM:s projekt Samhällskritiska beroenden*, dnr. 0021/2007, 2007

¹²⁰ The Swedish Civil Contingencies Agency, *Faller en – faller då alla? En slutredovisning från KBM:s arbete med samhällskritiska beroenden*. MSB 0001-09, 2009

¹²¹ The National Board of Health and Welfare, *Risk- och sårbarhetsanalys 2010*

¹²² The Swedish Civil Contingencies Agency, *Faller en – faller då alla? En slutredovisning från KBM:s arbete med samhällskritiska beroenden*. MSB 0001-09, 2009

¹²³ The Swedish Civil Contingencies Agency & The National Board of Health and Welfare, *Influenza A(H1N1) 2009 Delrapporterna från utvärderingen av förberedelser och hantering av pandemin*, 2011-03-17, 2011

¹²⁴ The Swedish Emergency Management Agency, *Gränsöverskridanden beroenden – en studie om samhällsviktiga verksamheters beroenden över nationalgränser*, dnr. 0021/2007, 2007

countries. The incident shows us the importance of functioning vaccine deliveries.¹²⁵

In the event of a temporarily increased need for a certain pharmaceutical, e.g. during an influenza pandemic, it might be necessary to prioritize certain pharmaceutical resources if these are limited. There are difficulties connected to the prioritizing of pharmaceuticals, such as deciding which vital societal functions should be prioritized, but also which activities are to be deemed vital to society.¹²⁶

The National Board of Health and Welfare's stockpile of pharmaceuticals and medical equipment has in recent years been adjusted to fit a changing threat scenario.¹²⁷ The National Board of Health and Welfare is in charge of national stockpiles of certain pharmaceuticals, such as long-term stocks of antivirals in the event of an influenza pandemic, and a continuously renewed stockpile of antibiotics. In addition, several county councils have their own stockpiles of antiviral pharmaceuticals in order to handle short-term peaks in consumption, for example due to an outbreak of influenza or a pandemic.¹²⁸

A reduced amount of stockpiles of pharmaceuticals at pharmacies, hospitals and wholesalers could lead to increased vulnerability in the event of a serious incident. The re-regulated pharmacy market has shifted responsibility from the Government to the county councils. In many cases, county councils have for some time been procuring new models for the hospitals' supply of medicines. Modern logistical solutions often lead to smaller stockpiles at hospitals, pharmacies and wholesalers. However, this could lead to increased vulnerability in the event of a serious incident. The Government's influence over pharmaceutical production and provision has in many cases shifted to private actors.¹²⁹

Furthermore, there is also a need for pharmaceuticals and vaccines for veterinary purposes, for which there are no response plans or stockpiles. In addition, there are no agreements between any government agency and

¹²⁵ The Swedish Civil Contingencies Agency & The National Board of Health and Welfare, *Influenza A(H1N1) 2009 Delrapporterna från utvärderingen av förberedelser och hantering av pandemin*, 2011-03-17, 2011

¹²⁶ See The Swedish Civil Contingencies Agency & The National Board of Health and Welfare, *Influenza A(H1N1) 2009 – utvärdering av förberedelser och hantering av pandemin*, 2011-03-03, 2011
s. 17–18

¹²⁷ The Swedish Emergency Management Agency, *Gränsöverskridanden beroenden – en studie om samhällsviktiga verksamheters beroenden över nationalgränser*, dnr. 0021/2007, 2007; The Swedish Civil Contingencies Agency & The National Board of Health and Welfare, *Influenza A(H1N1) 2009 – utvärdering av förberedelser och hantering av pandemin*, 2011-03-03, 2011

¹²⁸ The Swedish Civil Contingencies Agency & The National Board of Health and Welfare, *Influenza A(H1N1) 2009 Delrapporterna från utvärderingen av förberedelser och hantering av pandemin*, 2011-03-17, 2011

¹²⁹ See The National Board of Health and Welfare, *Risk- och sårbarhetsanalys 2009*

supplier of veterinary pharmaceuticals in the event of a shortage. This is because of the change of direction in the national preparedness planning.¹³⁰

6.12 The risks associated with nuclear and radiological materials

Nuclear and radiological materials are used in energy production in the nuclear power industry.¹³¹ There are also radioactive materials in other parts of society, such as healthcare, industries, research and teaching. Transported radioactive materials are categorized as dangerous goods, and are subject to safety measures in laws and regulations.

In all types of high-risk industries, such as nuclear power production, fallout can be caused by technical malfunctions or inadequate safety routines, security measures, out-of-date installations, etc. Despite extensive safety precautions, we can never fully rule out the risk of a nuclear meltdown or another serious incident at a nuclear power plant that leads to a large fallout of radioactive material. This could cause a large number of acute deaths through radiation injuries near the power plant, as well as deaths caused by tumours that develop long after the incident, and serious consequences for the environment.

There has been a small number of cases of unintentional fallout of nuclear materials. In 1979, there was a partial meltdown at the Three Mile Island nuclear power plant in the United States. In 1986, an experiment at a nuclear power plant in Chernobyl in the Ukrainian part of the Soviet Union caused a meltdown and explosions with large fallout of radioactive materials. In March, 2011, the cooling systems in the Fukushima nuclear power plant failed, following a flood caused by a tsunami. The accidents in the Ukraine and Japan are classed as level 7, the highest level on the 'INES scale'. In 2007, government agencies conducted a capability assessment of a scenario of an accident involving radiological materials, see Appendix 3. In addition, the SAMÖ-KKÖ exercise in 2011 had a scenario involving a nuclear accident, see Appendix 1.

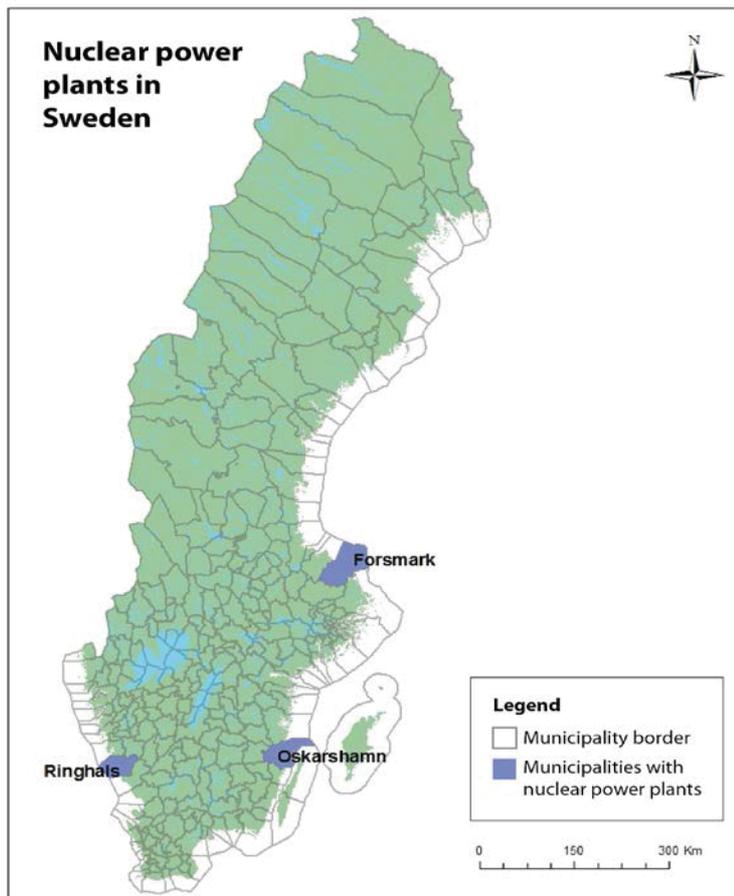
Accidents involving radiological materials are more common, and usually only have limited geographical consequences. One of the most serious accidents that involved radioactive materials occurred when a medical radiotherapy source was stolen in Goiânia, Brazil in 1987. The radiotherapy source was opened and the radioactive content proliferated locally. Four persons died, several were injured and the environment had to be decontaminated. The collection of metal junk could lead to accidents involving radiation sources. In addition, workplace or transport-related accidents can lead to fallout of radioactive materials or exposure to radiation. In 2010, several workers conducting maintenance work

¹³⁰ The Swedish Board of Agriculture, Opinions, draft *Ett första steg mot en nationell riskbedömning – nationell riskidentifiering 2011-10-14*. 2011-11-27

¹³¹ The Swedish Radiation Safety Authority, *Risk- och sårbarhetsanalys 2010*, dnr. 2010/1234, 2010-11-14

in the mine in Aitik, Sweden, were probably exposed to radiation.¹³² The accident is rated as level 2 on the INES scale.

Sweden is a comparatively large producer of nuclear and radioactive materials. In addition, Sweden's use of nuclear power creates highly radioactive waste that must be taken care of and monitored for a long period of time, until the waste is finally deposited in bedrock. Sweden currently has ten nuclear power reactors in operation, distributed across three different sites along the Swedish coast. The plants were put into operation between 1972 and 1985.¹³³



Map 3: Nuclear power plants in Sweden

Fallout of radioactive materials from nuclear power plants can never be completely ruled out, despite rigorous safety precautions. The consequences of radioactive fallout from a nuclear power plant would affect the entire society, with effects remaining for a long period of time. The fallout could immediately cause radiation injuries among people, and could also contaminate or be suspected of contaminating agricultural and food products. Areas could become unusable for a very long period of time (decades or even centuries), and people would not be able to live or work there, nor use the land for agriculture. Cases of cancer might appear a couple of years or even decades after the fallout.

¹³² Boliden AB, *Årsrapport 2010*, February 2011,

http://vp031.alertir.com/files/press/boliden/Boliden2010_sv.pdf, 2011-09-30

¹³³ Swedenergy, *Om kärnkraftsproduktion*, 2010

The probability of accidents involving radiological materials that could lead to exposure to radiation is much higher than the probability of nuclear accidents. The seriousness of the consequences depend on which radioactive material the accident involved, and what amount. Transport accidents involving radioactive materials could lead to people, animals and the environment, within a limited geographical area, being exposed and contaminated. If a satellite crashes, radioactive fragments could spread across large areas. One example of this is the reactor-powered satellite Cosmos 954, which re-entered the atmosphere in 1978 and crashed in the Northwest Territories in Canada.¹³⁴ The accident caused the spread of radioactive materials across 124,000 square kilometres of land.

The handling of dangerous waste in Sweden is well organized, and there is only a relatively small risk of sporadic, small-scale waste collection. Imported goods containing radioactive materials have occurred, and remain to be a risk, although the consequences of the previous incidents have been very limited.

6.13 Risks associated with chemicals

Dangerous goods are necessary for the functionality of society and are used by many societal actors, e.g. in industries, research, energy production and the healthcare sector, as well as in most households. Due to this extensive use, there is also a risk that incidents occur that have negative consequences. These consequences might affect individuals or groups of people, society or the environment. In order to minimize the risk of accidents and limit accessibility for unauthorized people, the handling of chemicals is strictly regulated. The seriousness of the consequences of a chemical emission depends on a number of factors, such as the characteristics of the substance, the size of the emission, the site of the accident, the current weather, the length of the incident and how it is handled.

In addition, there is a risk of emissions of hazardous materials in the production, use and transport of said materials. Materials might spread through accidents involving fires, explosions or toxic emissions. Besides accidents that cause emissions, there are also large emissions of dangerous chemicals originating from a large number of small sources, for example from households. Substances spread in this way include pharmaceuticals in sewage water, biocides, mercury in low energy light bulbs and cadmium in agriculture. In 2007, government agencies conducted a capability assessment of a scenario of an accident involving chemicals, see Appendix 3.

There have been several incidents involving chemicals. We provide a small number of examples of larger incidents that had more extensive effects on society, people's health and the environment.

In 1975, it was discovered that the company BT Kemi had buried barrels of biocide in Teckomatorp, which had then leaked into the ground and the water. The consequences of the toxic waste started in 1966 when gardeners

¹³⁴ Health Canada, http://www.hc-sc.gc.ca/hc-ps/ed-ud/fedplan/cosmos_954-eng.php, 2011-11-04

experienced problems with their plantations, continued in the early 1970s, when the locals experienced breathing problems, and ended in an extensive contamination of the ground.¹³⁵ The ground is still being sanitized, with costs so far amounting to SEK 500 million.¹³⁶

During the construction of a railway tunnel through Hallandsås horst, 1,405 tonnes of the poisonous sealing material acrylamide were used. In October, 1997, it was discovered that cows had been poisoned by the substance, which had leaked out into a nearby watercourse.¹³⁷ The tunnel construction had to be halted, and the incident probably contributed to additional delays and added costs.

Five examples of transport accidents in Sweden are Kävlinge 1996, Kälarne 1997, Borlänge 1998 and 2000, and Östersjön 2010. In Borlänge, Kävlinge and Kälarne freight trains carrying dangerous chemicals derailed.¹³⁸ Nitric acid leaked out during the accident in Borlänge 1998.¹³⁹ Two and seven railway carriages, respectively, tipped over and caused leakages of acetic acid and ethylene oxide in Kälarne. The towing work was very extensive. People living in the vicinity had to leave their homes. In February, 2010, a ship lost several containers between Öland and Gotland, one of which carried 20 tonnes of environmentally hazardous and flammable substances. The containers sank and no salvaging was planned at the time. It is not yet clear what the environmental risks are, such as for the fishing, or how extensive the consequences could be.¹⁴⁰

The emission of ozone-depleting materials is an historical example of large-scale emission from many small sources. In the 1970s, it was suspected that chlorofluorocarbons (CFC) were damaging the ozone layer in the atmosphere, which protects the planet from ultraviolet radiation. CFC was used as cooling agents in refrigerators and as fuel in spray cans. International agreements have gradually been introduced to limit the use of CFC.

¹³⁵ Svalöv Municipality, *BT Kemi Efterbehandling, Historien om en miljöskandal som kan bli ett föredöme för framtiden*, 2010-11-26

¹³⁶ Skånska dagbladet, *Ny sanering efter BT Kemi*, 2010-02-27

¹³⁷ <http://www.trafikverket.se/Privat/Projekt/Skane/Hallandsas/Bakgrund/Projekthistorik/>, 2011-09-28

¹³⁸ The Swedish National Board of Psychological Defence, *Ammoniakolyckan i Kävlinge*, Message 142, 1997; The National Accident Investigation Commission, rapport RJ 2000:01, *Olycka med godståg nr 5800 innehållande farligt gods den 4 juli 1997, SSV om Kälarne, Z län*, dnr. J-02/97

¹³⁹ The Swedish National Board of Psychological Defence, *Olycksplats Borlänge bangård*, 2000

¹⁴⁰ SVT, *20 ton miljöfarlig last i vattnet*, 2010-02-07,

http://mobil.svt.se/2.33731/1.1879117/20_ton_miljofarlig_last_i_vattnet, 2011-09-28;

Aftonbladet, *Fartyg har tappat tonvis med miljögifter*, 2010-02-06,

<http://www.aftonbladet.se/nyheter/article12140537.ab>, 2011-09-28

In Sweden, large-scale handling of chemicals is conducted at around one hundred plants.¹⁴¹ Furthermore, large amounts of chemicals, mainly petroleum products, are being transported every day. The total amount is estimated to be 15-21 million tonnes per year.¹⁴² ¹⁴³ The largest tankers that traffic the Baltic Sea have freights amounting to 150,000 tonnes. In the period between 1998 and 2008, exports from Russian harbours in the Gulf of Finland increased fivefold.¹⁴⁴ Chemical substances can also cause fires and explosions.

In Sweden, around a hundred intentional, small-scale incidents involving chemicals occurred between 1990-2005. These incidents often involved acids or tear gas, but also pesticides, household chemicals, home-made explosives or chemicals stolen from school labs.

The risk of accidents and a larger spread from several small sources remains a part of the threat scenario. Chemicals that are spread through air and water, and through trade, continue to pose a cross-border threat.

The combined effects of chemicals mean that their joint effect might be bigger than the sum of their individual effects. It can also be difficult to predict the combined effects on people, animals and the environment. As new substances are being introduced or used in new ways, we will need new knowledge not only about these substances, but also about their combined effects.

Their consequences include direct damage on the health and lives of people, the functionality of society, such as food production, and on the environment. Furthermore, there might be long-term damage on society. For example, environmental damage might render soil and water unusable for agriculture or housing.

6.14 Dam failures

There are around 10,000 dams in Sweden, of which 1,000 are used to generate hydroelectric power.¹⁴⁵ Dam failure is described as a dam, or parts of a dam or its foundation bursting, resulting in an uncontrollable and rapid flow of water.¹⁴⁶

There are a number of causes of dam failure. High flows of water might cause the water to run over, and weaknesses in the dam or its foundation might cause

¹⁴¹ These plants follow the regulations in the Ordinance (1999:382) on measures for preventing and limiting the consequences of serious chemical accidents.

¹⁴² The Swedish Emergency Management Agency: *Klarar vi krisen? Samhällets krisberedskapsförmåga 2007*, dnr. 1443/2007, 2008

¹⁴³ The Swedish National Audit Office, *Skyddet för farligt gods*, RiR 2008:29, 2008

¹⁴⁴ The Swedish Emergency Management Agency, *Klarar vi krisen? Samhällets krisberedskapsförmåga 2007*, dnr. 1443/2007, 2008

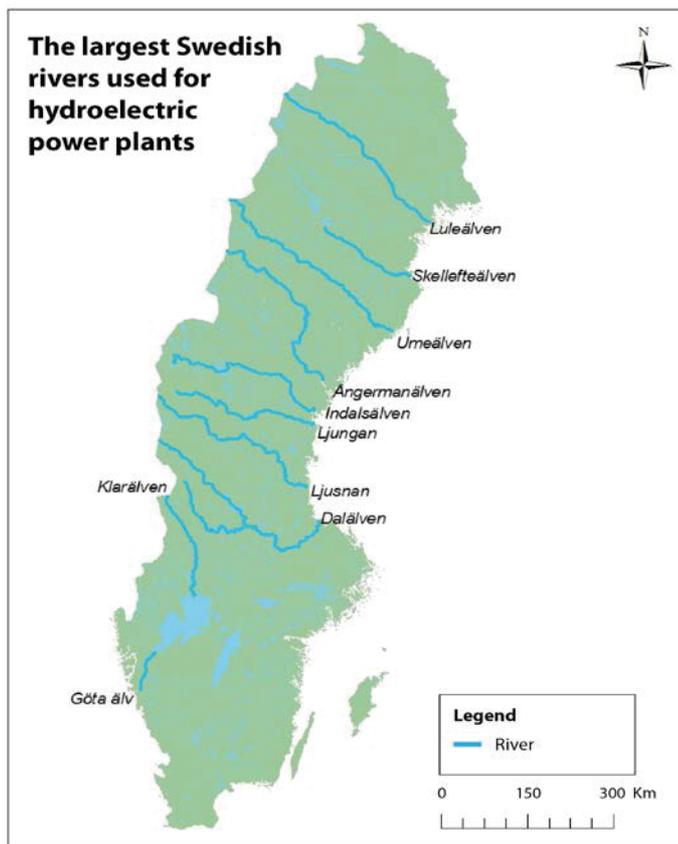
¹⁴⁵ Elforsk, *Dammsäkerhet, Beredskapsplanering för dammbrott – Ett pilotprojekt i Ljusnan*, Elforsk rapport 05:38, January 2006

¹⁴⁶ The Swedish National Grid, *Översyn av de statliga insatserna för dammsäkerhet – en rapport till regeringen*, dnr. 2010/877, 2010-06-30

the dam to burst. In addition, an earthquake or a landslide could cause a dam failure.¹⁴⁷ Furthermore, dam failure might be caused by sabotage.

So far, Sweden has not suffered any serious dam failures. However, there have been some serious incidents: the dam failure in Noppikoski (1985), Sysslebäck (1973) and the collapse of a mining dam in Aitik (2000).¹⁴⁸ One person died in Sysslebäck, and buildings and roads were destroyed. In Noppikoski, the Hansjö power plant was damaged, as were roads, bridges and forests. There were no serious damage in Aitik. There was a somewhat more serious dam failure in Hästberga in Skåne on the 7 November, 2010, where a dam burst by the power plant in Helge å, which flooded the stream.¹⁴⁹ The dam failure resulted in material damage on properties, a bridge and several stretches of road. There were no injuries.

A dam failure at around 200 of the country's dams would endanger people's health and lives, the environment, vital societal functions and would cause large financial costs.¹⁵⁰



Map 4: The largest Swedish rivers used for hydroelectric power plants

¹⁴⁷ Elforsk, *Dammsäkerhet, Beredskapsplanering för dammbrott – Ett pilotprojekt i Ljusnan*, Elforsk rapport 05:38, Januari 2006

¹⁴⁸ *Ibidem* s. 5

¹⁴⁹ The Swedish Accident Investigation Board, *Slutrapport RO 2011:01, Dammbrott, Hästberga, Hässleholms kommun, Skåne län, 7 November 2010*, dnr O-12/10, s. 6

¹⁵⁰ The Swedish National Grid, *Redovisning av 2010 års risk- och sårbarhetsanalys inkl. förmågebedömning från Affärsverket Svenska kraftnät*, 2010-11-18

A dam failure at around 25 of the Swedish dams would put serious stress on society. Many of these dams are used for hydroelectric power, located at the upper part of one of the ten large rivers that are used for hydroelectric power plants. A dam failure could cause other dams further down to river to burst as well.¹⁵¹

A dam failure at one of these dams could have extraordinary consequences for society, such as serious power failures. Taken as a whole, a dam failure could put serious stress on society, i.e. consequences that could jeopardize people's lives and health, the functionality of society and basic values. The consequences could be a combined effect of widespread damage along a river, or damage at a certain location that has serious consequences. These dams differ from other dams due to the large area of possible damage downstream and the consequences of this damage for the region and the country.

An uncontrollable stream of water could cause floods along the greater part of the river, and would entail a risk of:

- a large number of casualties,
- destruction of people's homes and property, cultural environments and workplaces,
- disruptions in the country's energy supply, due to damage to the electricity grid and destroyed hydroelectric power plants,
- disruptions of transports due to destroyed bridges and other damage to roads and railways,
- destroyed infrastructure and extensive disruptions on other vital societal functions, such as water supply installations, and radio and telecommunications, and
- serious environmental damage that cannot be restored for a long period of time, as well as large financial costs.

6.15 Disruption of food and drinking water supply

Access to food and water is a prerequisite for our survival, which means that the provision of food and drinking water must be maintained at all times. The structure in the field of food and drinking water is complex, comprising around 80,000 primary producers and more than 70,000 food and beverage companies, more than 2,000 drinking water installations and an extensive infrastructure.¹⁵² In 2007, government agencies carried out a capability assessment of a scenario involving disruptions in the municipal technical systems, see Appendix 3.

¹⁵¹ The Swedish National Grid, *Översyn av de statliga insatserna för dammsäkerhet – en rapport till regeringen*, 2010-06-30, dnr 2010/877

¹⁵² The National Food Agency, *Risk- och sårbarhetsanalys samt förmågebedömning inom Livsmedelsverkets ansvarsområde – presentation november 2010*, dnr. 1250/2010, 2010-11-12

Vänern, Vättern and Mälaren are large sources of water that provide for a large portion of Sweden's population.¹⁵³ In addition, these lakes have extensive traffic of chemical and petroleum transports, among other things. This entails an increased threat scenario with could have serious consequences.

The flow of food, from raw material to finished product, often involves several stages. Many actors are involved and foreign trade is both extensive and important. In order to produce and distribute food, a constant influx of raw materials and other production factors is required. In addition, staff and a number of technical systems must be available.¹⁵⁴

The food consumed in Sweden is a combination of domestic production and imports. Around 60 percent of the food consumed in Sweden originates from domestic producers.¹⁵⁵ We are more or less self-sufficient when it comes to certain types of food, such as grains and butter. Other types of food have to be imported. The most important markets for food imports, in terms of economical value, are Norway, Denmark and Germany. In addition, the dominating trading partners for fresh and frozen vegetables are the Netherlands and Spain.¹⁵⁶ However, some of the imported products are refined in Sweden and then exported to other countries.

Examples of disruptions and interruptions in the production systems for food are technical malfunctions, accidents or lack of necessities or fuel, as well as disruptions in electricity, telecommunications and IT systems. In addition, there are several causes of disruptions in the drinking water system, such as burst pipes, floods and contamination of water sources. Deteriorated drinking water quality is more common than a complete halt in water supply.¹⁵⁷

Another type of threat concerning food safety is when food is used as a carrier of various dangerous substances. In addition, infectious diseases can be spread through drinking water and groceries. We have to learn more about the prevalence of antibiotic-resistant micro-organisms in imported food, as well as about climate change's future effect on the prevalence of mycotoxins in food.¹⁵⁸

In the end of November 2010, the gastrointestinal parasite *Cryptosporidium* was discovered in the Municipal drinking water around Östersund.¹⁵⁹ This parasite gave several thousand people stomach disease. The residents in Östersund had to boil their water before using it for food, drinking and brushing their teeth. The outbreak was probably caused by sewage water

¹⁵³ The Swedish Coast Guard, *Risk- och sårbarhetsanalys för Kustbevakningen 2011*, dnr. 07-234/11:2, 2011-11-10

¹⁵⁴ The National Food Agency, *Livsmedelsförsörjning i ett krisperspektiv*, 2011, s. 3

¹⁵⁵ *Ibidem* s. 15

¹⁵⁶ *Ibidem* s. 22–25

¹⁵⁷ The Swedish Civil Contingencies Agency, *Statistik och analys Olyckor & kriser 2009/2010*, MSB:0170-10, 2010, s. 55-56

¹⁵⁸ *Ibidem*

¹⁵⁹ www.krisinformation.se

entering the drinking water via the Lake Storsjön. In 2011, Skellefteå suffered similar problems with contaminated water.¹⁶⁰

Disruptions in the supply of drinking water, such as leaking water pipes caused by cold and ground frost occurred throughout the country during the winter of 2009/2010.

In 2009, pieces of glass were found in Swedish food products around the country. This incident led to a large recall by the food industry. The incident also inspired other actors, as pieces of glass were found in other types of food, such as salad and bread.¹⁶¹

6.16 Extensive fires in buildings and tunnels

In this section, the term extensive fire refers to various types of fires in buildings, tunnels and the underground.

Fires in buildings refer to fires in public buildings, residences, industrial buildings and other buildings.¹⁶² The most common cause of fire in public buildings is arson, in residences the most common cause is chimney fire, while the most common cause of fire in industries and other buildings is technical malfunctions. Fires in buildings mainly cause damage to people and property.¹⁶³

In recent decades, the building fires that had the most casualties in Sweden were the discotheque fire in Gothenburg in October 1998, where 63 youths between the ages of 12 and 20 years old died, and more than 50 were seriously injured¹⁶⁴, and the hotel fire in Borås in 1978, where 20 people died, many of them young, and 50 were injured.¹⁶⁵ The fire in Gothenburg was an arson fire that spread from the stairwell to the premises.¹⁶⁶ The fire in Borås started in a rubbish bin, caused by a burning cigarette, and spread rapidly through the hotel. In both cases it was difficult to evacuate the premises.¹⁶⁷

¹⁶⁰ Ibidem

¹⁶¹ The National Food Agency, *Risk- och sårbarhetsanalys samt förmågebedömning inom Livsmedelsverkets ansvarsområde – Redovisning november 2010*, dnr. 1250/2010, 2010-11-12

¹⁶² The Swedish Civil Contingencies Agency, *Räddningstjänst i siffror 2009*, MSB 0185-10

¹⁶³ Rescue services, MSB: *Brandorsaker vid byggnadsbränder per byggnadsgrupp*, 2010

¹⁶⁴ The Swedish Accident Investigation Board, *Brand på Herkulesgatan i Göteborg, O län, den 29–30 oktober 1998*, dnr. O-07/98

¹⁶⁵ Swedish Civil Contingencies Agency, information system IDA, *Stora olyckor 2011-09-27*; The National Board of Health and Welfare, *Katastrofmedicinska studier under 35 år Erfarenheter från KAMEDOs verksamhet 1963-1998*, SoS rapport, 1999:4

¹⁶⁶ The Swedish Accident Investigation Board, *rapport RO 2001:02, Brand på Herkulesgatan i Göteborg, O län, den 29 - 30 oktober 1998*, dnr. O-07/98

¹⁶⁷ Swedish Civil Contingencies Agency, information system IDA, *Stora olyckor 2011-09-27*; The National Board of Health and Welfare, *Katastrofmedicinska studier under 35 år*, SoS rapport, 1999:4

An extensive fire in a road tunnel could result in a prolonged fire and could harm both vital societal functions and people. Fires in road tunnels are caused by, among other things, overheating combined with leakage or electrical malfunctions, engine fires or collisions.¹⁶⁸ One example of such a fire is the fire in the Årsta tunnel in Stockholm in June, 2008. There were no casualties in the fire, but traffic had to be halted for a couple of hours, and thick smoke meant that the tunnel had to be evacuated. The fire was caused by a burning truck.¹⁶⁹ A similar scenario occurred in the Oslofjord tunnel in Norway in June 2011, where two persons suffered serious smoke injuries.¹⁷⁰

A large fire in the Stockholm underground could cause a large number of casualties, and subsequently affect the public's use and trust of the service.¹⁷¹ Such an extensive accident has not occurred in Sweden, although there have been some smaller fires in underground stations and on trains.¹⁷²

6.17 Disruptions in electronic communications

Electronic communications refer to electronic communications networks and communications services and their respective installations and services, as well as other radio uses such as telecommunications, the internet and radio.¹⁷³

Electronic communications are used in everything from phone calls, information exchange and searches to financial transactions and the operation and monitoring of industrial processes.¹⁷⁴ The electronic communications are, along with electricity, vital in order to maintain normal functionality in society. Most activities are powered by electricity and controlled by electronic communications.¹⁷⁵

Electronic communications very regularly constantly cross national borders. The systems for telephony and data transfer are interconnected, while at the

¹⁶⁸ The Swedish National Board of Housing, Building and Planning, *Redovisning av Boverkets Risk- och sårbarhetsanalys 2010 samt förmågebedömning avseende scenariot isstorm*, dnr. 4010-1135/2010, 2010-11-05; The Swedish Rescue Services Agency, *Räddningsinsatser i vägtunnlar*, 2005

¹⁶⁹ SVT, *Kaos i trafiken efter tunnelbrand* 2008-06-17, http://svt.se/2.33538/1.1175571/kaos_i_trafiken_efter_tunnelbrand, 2011-09-29

¹⁷⁰ SvD, *Norsk vägtunnel brann*, 2011-06-23, http://www.svd.se/nyheter/utrikes/flera-saknas-efter-brand-i-norsk-vagtunnel_6270404.svd, 2011-09-29

¹⁷¹ See the MSB's *Risk- och sårbarhetsanalys samt förmågebedömning*, dnr. 2010-873, 2010-11-02; see also Stockholms läns *Risk- och sårbarhetsanalys 2010*, rapport 2010:18

¹⁷² The Swedish Accident Investigation Board, *rapport RJ 2009:10, Brand i tunneltåg vid Rinkeby station, AB län, den 16 maj 2005*, dnr. J-06/05

¹⁷³ The Electronic Communication Act (2003:289), Section 7

¹⁷⁴ The Swedish Emergency Management Agency, *Beroende- och konsekvensanalys, elektroniska kommunikationer: Offentligt arbetsmaterial från KBM:s projekt Samhällskritiska beroenden*, dnr. 0021/2007, 2007

¹⁷⁵ The Swedish Emergency Management Agency, *Klarar vi krisen? Samhällets krisberedskapsförmåga 2007*, dnr. 1443/2007, 2008

same time being somewhat independent.¹⁷⁶ Operations and monitoring centres are located in the countries where they are the most efficient, and depend on the overall systems.

There are many causes of disruptions in electronic communications. They may be caused by incorrect use, communication cables being damaged by digging work or other physical damage. However, they can also be caused by data infringement and other intentional disruptions such as terrorist attacks on communications infrastructure, IT-related attacks such as viruses, worms or trojans, unauthorized interception or altered information. In addition, the increased dependency on mobile communications networks and the internationalization constitute large risks for electronic communications.¹⁷⁷ In 2008, government agencies carried out a capability assessment of a scenario involving IT-related disruptions, while a scenario involving disruptions in electronic communications was used in a capability assessment in 2007, see Appendix 3.

Technical malfunctions or natural causes such as thunderstorms are common causes of disruptions in electronic communications. For example, in February 2011 a malfunction in a router at TeliaSonera in Frankfurt caused problems in the internet traffic in several countries. In September 2011, mobile telephone operator 3 suffered an extensive shut-down after a malfunction in a centrally located power unit. In the end of September, a network cable broke in the communications network for the Södra Länken system in Stockholm, which caused serious traffic disruptions in the important traffic routes. In October 2011, a program error caused all telephone services to Jämtland County Council and seven municipalities to stop working. In October, Swedish Radio's telephone system in western Sweden was shut down by a thunderstorm. There are many similar examples.

It is also common that cables are cut off during digging work, which causes problems to various extents. This happened between Falun and Borlänge in early February 2011, which affected Stora Enso, Dalarna University and the newspaper Dalarnas tidningar, among others. In April 2011, the Karlstad broadband network suffered similar problems. In October 2011, digging work in Bromma caused a large number of customers in Norrland at several smaller broadband providers to lose their connection, while a similar incident in Kalmar in September 2011 affected customers at Bredbandsbolaget, Telenor and 3.

Sabotage and vandalisms is less common. However, there was a network shut-down in early 2011 outside Luleå that was probably caused by sabotage. It was probably caused by thieves who were trying to steal copper wires, and who were able to cut off two fibre cables as well as a signal cable used for the railway. A

¹⁷⁶ The Swedish Civil Contingencies Agency, *Faller en – faller då alla? En slutredovisning från KBM:s arbete med samhällskritiska beroenden*, MSB 0001-09, 2009

¹⁷⁷ The Swedish Post and Telecom Authority, *Risk- och sårbarhetsanalys för sektorn elektronisk kommunikation. Myndighetens redovisning för 2010*, 10-1621/10-2284, 2010-11-11

large number of subscribers at cable provider Comhem experienced disruptions, as did mobile phone users at Telia and Tele2.

6.18 Disruptions in energy supplies

Sweden's energy supply is a complex system consisting of several actors and processes. The Swedish Energy Agency describes the field of energy as a system with different types of energy carriers (e.g. oil) that are converted and then distributed to the end-users. End-users consist of industries, residences, services and transports. Electricity and biofuels are the most important energy carriers for industries, residences and services. In the transport sector, oil-based fuels are more or less the only energy carrier used. Almost three quarters of all energy used in Sweden is imported, mainly as coal, oil, uranium, natural gas and biofuels. The largest domestic energy sources are hydro energy and biofuels.¹⁷⁸

Sweden has one of the highest electricity consumptions per person in the world. This high consumption is partly due to electricity intensive industries and a cold climate. In addition, around 20% of houses are exclusively heated by electricity, and electricity prices are at historical lows. Hydro energy and nuclear power usually amount to approximately 45 percent each of the Swedish electricity production, although this number varies every year.¹⁷⁹

When it comes to oil-based fuels, Sweden's refineries mainly import raw oil from Denmark, Norway and Russia. The raw oil is sent to the refineries to be used in the production of oil products. These refineries make up close to three percent of the total refinery capacity in the EU.

The Government does not control any oil stockpiles, although it does have the right to assume control of an oil stockpile facility and has access to another installation that is currently not in use. Oil companies and other large actors must keep a backup stock of raw oil or oil products that correspond to 90 days of normal consumption.¹⁸⁰ The provision of oil is based on a system where the industry is in charge of the stockpiles and are part of the normal logistics chain for oil products. This means that products always have the right quality and can be shipped to the market swiftly.

Functioning electricity is often a prerequisite for more or less all energy supply. Therefore, disruptions in the electricity system will have immediate consequences. The Swedish electricity system consists of production plants and a countrywide transferring and distribution system. The latter one consists of a main network, a smaller number of regional networks and a large number of local networks.

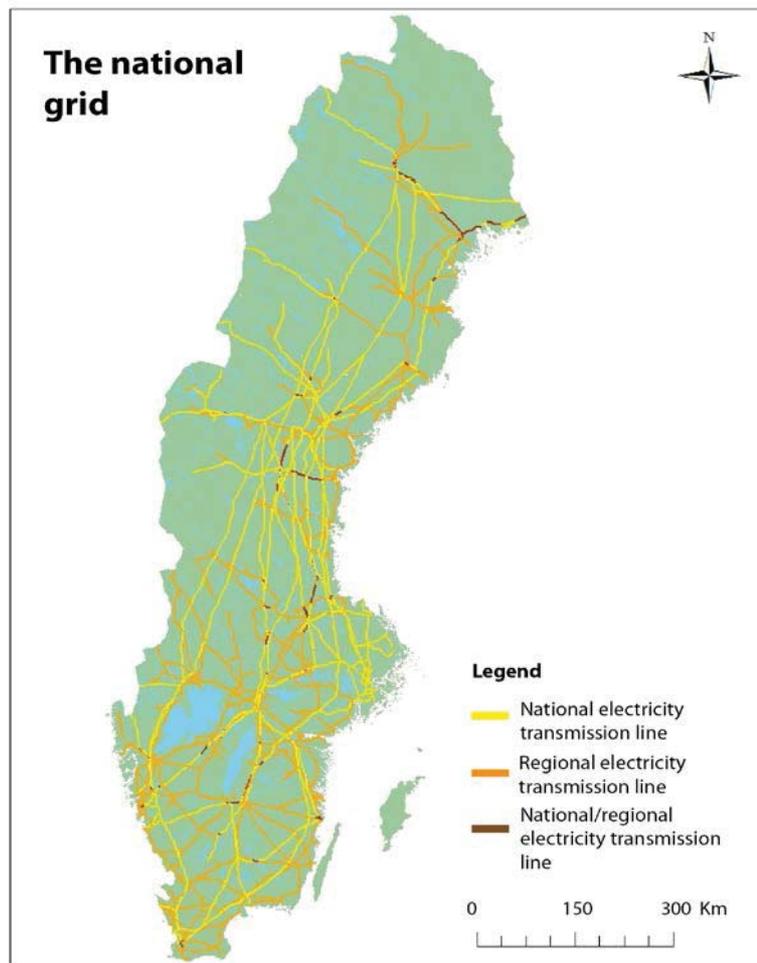
Isolated incidents or accidents related to electricity production usually do not cause power cuts, as production is spread to several plants and production

¹⁷⁸ The Swedish Energy Agency, *Trygg energiförsörjning 2010 – En översiktlig redovisning och analys av hot, risker och sårbarheter i energisystemet*, ER 2010:38, dnr. 00-10-974

¹⁷⁹ *Ibidem*

¹⁸⁰ *Ibidem*

types. If a situation occurs where several nuclear reactors are shut down due to, for example, maintenance or revisions, while the water levels are low during a cold winter, Sweden could suffer a short-term electricity shortage (effect shortage) as well as a long-term electricity shortage (power shortage). The connection to electrical systems in neighbouring countries does improve reliability, but these countries will also have higher energy consumption during cold seasons. The responsibility for electricity balance is currently held by the electricity market, but the Swedish National Grid is in charge of making sure that there is an effect reserve available during the winter season. This effect reserve is created through agreements with electricity producers, electricity providers and consumers, and aim to put additional production capability and reduced consumption at the disposal of society. However, the goal is to phase out the effect reserve no later than the winter 2019-2020.¹⁸¹



Map 5: Overview of the national grid

During large disruptions in the main or regional network, however, both domestic and foreign users are at risk of being affected. Strong storms, hurricanes or technical malfunctions are usually the cause of disruptions. Isolated malfunctions in local networks outside the cities often cause

¹⁸¹ Ibidem

disruptions in the electricity supply for end-users. Thunderstorms and snowstorms are the most common causes of power failure in the local networks.¹⁸² In 2007, government agencies carried out a capability assessment of a scenario involving disruptions in electricity supply, see Appendix 3.

Crises relating to heating provision are uncommon in Sweden, but a large heating crisis during a cold season could have serious consequences.¹⁸³ One example of this is the situation during and after the storms Gudrun in 2005 and Per in 2008, when many households found themselves without electricity.

Even though Sweden generally has high operational safety and flexibility in its energy supply, there have been extensive disruptions in Sweden's energy supply in the past.

Sweden has been relatively spared when it comes to sabotage directed at electricity systems, but there have been some examples. For example, in 1989 a 400kW telegraph pole was blown up in Härjedalen; in 1986 a sabotage against the regional network in Västernorrland County resulted in costly disruptions in the process industry, and during 1990-1992 there were several attempts at sabotaging a main station in Uppland that provides Stockholm with electricity.¹⁸⁴ Crime is a noticeable threat, but thefts of electrical cables and oil products will usually not cause disruptions in energy supply.¹⁸⁵

Bad weather is a common cause of disruptions in electricity supply. In 1991, icy weather caused power lines to fall over and in 1993 severe snow storms caused several power failures. The storm Gudrun in 2005 and the storm Per in 2007 are other examples of bad weather causing serious disruptions.

On 23 September, 2003, southern Sweden as well as Själland and Bornholm in Denmark suffered a serious power failure. The southern part of the main network collapsed while the northern part continued to function. Since the main network in eastern Denmark is connected to the Swedish one, the disruption affected Själland and Bornholm as well.¹⁸⁶

During the late autumn of 2009 and the winter of 2009/2010, the situation on the Swedish and Nordic electricity market was at times very severe. The reason for this was that several nuclear reactors and some other power plants were shut down, as well as prolonged cold, limited transferring capability within and to the Nordic countries and that demand was too high. The Swedish National Grid issued a warning regarding effect shortage, and for the first time the effect

¹⁸² Ibidem

¹⁸³ The Swedish Energy Agency, *Värmeavbrott, En guide till hur kommuner kan lindra en värmekris*, ET 2009:26, 2009

¹⁸⁴ SOU 1995:20, *Utan el stannar Sverige – Scenarion och överväganden om påfrestningar i det framtida samhället*, delbetänkande av Hot- och riskutredningen, 1995

¹⁸⁵ The Swedish Energy Agency, *Trygg energiförsörjning 2010 – En översiktlig redovisning och analys av hot, risker och sårbarheter i energisystemet*, ER 2010:38, dnr. 00-10-974

¹⁸⁶ Ibidem

reserve was used (once in December, January and February, respectively) in order to stabilize the situation on the electricity market.¹⁸⁷

6.19 Disruptions in payment systems

The financial sector provides services such as payment, access to cash, private insurance services and securities trading.¹⁸⁸ These services are provided by companies in the private sector. The payment system could, somewhat simplified, be said to consist of technical and administrative systems that make it possible to pay for goods and services in society.¹⁸⁹ Allowances and compensation in the social insurance system, such as support for families with children, people suffering from illness and people with disabilities, are administered by the National Social Insurance Office, while pensions are administered by the Swedish Pensions Agency.¹⁹⁰ However, payments are made through the banks' payment systems.

The financial sector is dependent on technical resources such as electricity, telecommunications and IT.¹⁹¹ Furthermore, the sector is mainly concentrated to the Stockholm region, and is greatly dependent on certain central financial functions. The systems in the financial sector can suffer a number of different disruptions, caused by incorrect use, computer errors, power failures, disruptions in communications, hazardous code or other intentional attacks.

In the Swedish National Audit Office's review of the payment systems' emergency preparedness towards technical threats and risks, it was concluded that the existing flaws in the system could lead to more serious damage for society, companies and individuals than what is necessary.¹⁹² If the payment system suffers a disruption, the trust in the payment system might suffer, which in turn could have long-lasting and damaging effects on society.

In the year 2000, the Swedish central bank's RIX system suffered from a number of incorrect payments, caused by an error in the communication system between the banks and RIX.¹⁹³ The same year, the Nordbanken bank had problems with the software in an internal data system, which among other things meant that the bank could not compile data for customer payments. In 2008, a malfunction in the Swedish central bank's network made it impossible to contact the outside world through ordinary IT solutions.

¹⁸⁷ Ibidem

¹⁸⁸ Finansiella sektorns privat-offentliga samverkan, the Swedish Financial Supervisory Authority, *I lust och nöd – Handbok i privat-offentlig samverkan i den finansiella sektorn på lokal nivå*

¹⁸⁹ The Swedish National Audit Office, *Krisberedskap i betalningssystemet. Tekniska hot och risker*, RiR 2007:28, 2007-12-10

¹⁹⁰ The National Social Insurance Office, *Årskrönika 2010*

¹⁹¹ The Swedish Financial Supervisory Authority, *Redovisning enligt 9 § Förordning (2006:942) om krisberedskap och höjd beredskap*, dnr. 10-2825, 2010-11-12

¹⁹² The Swedish National Audit Office, *Krisberedskap i betalningssystemet, Tekniska hot och risker*, RiR 2007:28, 2007-12-10

¹⁹³ The Ministry of Finance, *En samlad reglering för stärkt krisberedskap mot allvarliga tekniska fel och störningar i det centrala betalningssystemet*, 2010/1619, december 2010

From the end of April to the middle of May 2007, there were extensive attacks against the Estonian internet infrastructure.¹⁹⁴ Several internet banks were blocked during the attacks, but the central networks and computer systems at Estonian government agencies could be protected. Furthermore, between 10 May and 15 May, two Estonian banks were attacked; Hansapank and SEB Eesti Uhisbank. There were serious Denial of Service attacks that during a limited time period completely shut down their internet operation, and also blocked the banks' contacts with the rest of the world for a somewhat longer period of time.

During the collaboration exercise SAMÖ 2008, the scenario involved an IT attack against the financial systems, as presented in Appendix 1. In 2008, government agencies carried out a capability assessment of a scenario involving disruptions in the payment system, see Appendix 3.

6.20 Oil spills

An oil spill can cause serious damage. Plants and animals can be harmed, beaches can be contaminated and sea beds can be damaged or destroyed. In addition, oil spills have social and financial consequences for those who are affected.¹⁹⁵

In the last 15 years, oil transports from Russia through the Baltic Sea have increased tenfold. The ships are adjusted and become larger, with tank volumes from 100,000 tonnes to 250,000 tonnes of oil. In addition, the Baltic Sea is becoming increasingly more used by all types of ships, fishing vessels and wind farms, etc.¹⁹⁶ During the period 1998-2008, the number of discovered oil spills in Swedish waters varied between 200 and 400 per year.

The most recent large oil spill in Swedish waters occurred in September, 2011. On 11 September, there was a collision in the North Sea that resulted in an oil spill from a bunker tank.¹⁹⁷ The oil spill from the accident resulted in a major influx of oil in Bohuslän County, particularly in the Tjörn area. The amount of oil has not yet been confirmed, but is at least 300 tonnes of bunker oil. The spill led to a resource intensive oil clearance operation in the archipelago.

¹⁹⁴ The Swedish Emergency Management Agency, *Sveriges beredskap mot nätangrepp*, 2008:1, 2008

¹⁹⁵ The Swedish Coast Guard 2011a, <http://www.kbv.se/sv/hallbar-havsmiljo/miljoraddning/olja/>, 2011-09-28

¹⁹⁶ Region Blekinge, *ÖVINING: 4,000 ton olja på väg mot Blekingekusten*, [http://www.regionblekinge.se/region-blekinge-\(svenska\)/press-och-nyheter/nyheter/oevning,-oevning-4000-ton-olja-paa-vaeg-mot-blekingekusten.aspx](http://www.regionblekinge.se/region-blekinge-(svenska)/press-och-nyheter/nyheter/oevning,-oevning-4000-ton-olja-paa-vaeg-mot-blekingekusten.aspx), 2011-09-28

¹⁹⁷ The Swedish Coast Guard, <http://www.kbv.se/sv/hallbar-havsmiljo/nyhetsarkiv/>, 15 september–6 oktober 2011

There have also been other large oil spills around Sweden caused by ship-related accidents in the last two years, such as when the ships Full City and Godafoss ran aground in 2009 and 2011, by the Norwegian south coast.¹⁹⁸

In 2003, there was a large oil spill following the collision between the ships Fu Shan Hai and Gdynia in Bornholmströmmen. ¹⁹⁹ Gdynia was damaged but still operational. However, rescue attempts were aborted when it became clear that the ship would sink. Fu Shan Hai later sank to the bottom of the sea, 65 metres below the surface.

Sweden, Denmark and Germany collaborated and managed to clean up approximately 1,000 tonnes of oil from the water. However, despite these efforts oil reached the coast of Skåne. The operation cost the Swedish Coast Guard approximately SEK 10 million, and cost the affected municipalities in Skåne around SEK 15 million. The total cost, i.e. the loss of ships and cargo, the rescue effort, the repairs of Gdynia and the clearance of oil, amounted to more than SEK 1 billion.²⁰⁰

6.21 Disruption of transport and major transport emergencies

Many functions in society depend on functioning transports.²⁰¹ Transport is an extensive concept and does not only refer to the physical transport, but also the infrastructure, steering and operation, and services. A large disruption in the transports or a disruption in a transport node, such as a harbour or an airport, can have devastating consequences for society. In 2007, government agencies carried out a capability assessment of a scenario involving disruptions in transports, see Appendix 3.

A transport accident can have large consequences for society. This is particularly true if the accident happens in the wrong place at the wrong time, such as a transport of dangerous goods (see example in section 6.13 Risks associated with chemicals and 6.20 Oil spills). However, all accidents can have devastating consequences in terms of human suffering.

Fortunately, the number of deaths caused by road accidents in Sweden has decreased since the switch to right-hand traffic, even though the number of vehicles on the roads is many times higher. However, a larger number of road accidents involving buses have occurred in recent years. In 2007, an accident on county road 288 between Östhammar and Uppsala resulted in 6 deaths and 52 injured people. In addition, six people died when a bus tipped over outside Fagersta. In 2006, nine people died and 42 were injured, 24 of them seriously

¹⁹⁸ Information from the Swedish Coast Guard 2011-11-04

¹⁹⁹ The Swedish Coast Guard, *Operation Fu Shan Hai*, <http://www.kbv.se/sv/hallbar-havsmiljo/miljoraddning/olja/operation-fu-shan-hai/>, 2011-10-03

²⁰⁰ Ibidem

²⁰¹ The Swedish Emergency Management Agency, *Beroende och konsekvensanalys transporter: Offentligt arbetsmaterial från KBM:s projekt Samhällskritiska beroenden*, dnr. 0021/2007, 2008-02-01

injured, in an accident outside Arboga.²⁰² On 15 August 1988, a bus accident in Mabödal in Norway received a lot of attention in Sweden as it involved a group of school children and their parents from Kista who were on a school trip in Norway. The accident claimed the lives of 16 people, most of whom were children.

The most recent large railway accident occurred in Lerum in 1987, when 9 people died and 130 were injured. In 1992, a tram accident in Gothenburg resulted in 13 deaths and 29 injured people. When it comes to Swedish commercial air traffic, the most recent serious crash occurred in 2001 at the Linate airport outside Milan. 118 people died when an SAS plane collided with another plane on the runway.²⁰³

When it comes to ship accidents, the M/S Estonia disaster on 28 September 1994 was the largest individual ship accident in the area in modern times.²⁰⁴ A large proportion of the passengers were Swedish citizens, and of the 552 Swedish citizens on the ship, 501 died. Only 137 of the 989 on board could be saved.

A ship fire can occur and have serious consequences both on passenger ships and on shipping and oil vessels at sea. If a large ship fire breaks out, there is an evident risk for people's health and lives, as well as financial values. One example of a ship fire with devastating consequences is the fire on the Scandinavian Star on 7 April 1990 outside Lysekil. There were 482 people on the ship, of whom 159 died as a result of the fire.²⁰⁵

6.22 Terrorism

Terrorism can be described as an action that can seriously hurt a state or international organization if it aims to strike terror into a population or group of people, forces public organs or international organizations to take action or destabilizes and destroys fundamental political, constitutional, financial or social structures.²⁰⁶

In Europe, most acts of terrorism are carried out by ethnical-nationalistic and separatist groups, mainly in France and Spain.²⁰⁷ However, actors motivated by Islam are seen as the most serious threat, as they often aim to carry out attacks with large numbers of casualties, according to the Swedish Security Service. In

²⁰² The Swedish Civil Contingencies Agency, *Statistik och analys Olyckor & kriser 2009/2010*, MSB:0170-10, 2010, s. 122-123

²⁰³ *Ibidem*

²⁰⁴ SOU 1999:48, *Lära av Estonia, Den andra delrapporten och slutredovisning*, Analysgruppen för granskning av Estoniakatastrofen och dess följder, 1999

²⁰⁵ Swedish Radio, *Branden på M/S Scandinavian Star*, <http://sverigesradio.se/sida/artikel.aspx?programid=2519&artikel=3587287>, 2011-09-28

²⁰⁶ The Act on (2003:148) criminal responsibility for terrorist offences

²⁰⁷ The Swedish Security Service,

<http://www.sakerhetspolisen.se/terrorism/terrorhotetieuropaochsverige.4.7671d7bb110e3dcb1fd80002808.html>, 2011-09-28

2007, a scenario involving terrorist attacks was practised during collaboration exercise SAMÖ, see Appendix 1.

Large terrorist attacks against western democracies have taken place in New York and Washington DC (2001), Madrid (2004) and London (2005). On 22 July 2011 a large terrorist attack with suspected right wing motives took place in Norway, and resulted in the death of 77 people.

On 11 December 2010, a suicide bombing attempt occurred on a street in central Stockholm. No one was harmed during this terrorist attack, except for the perpetrator who died. Since 1 October 2010, the Swedish Security Service has raised the terrorism threat level.²⁰⁸ There have been cases where detailed plans of attacks by violent groups and individuals have been exposed. A number of arrests in connection with planned terrorist attacks have been made recently.²⁰⁹

Terrorist attacks could have serious consequences for society. Society's functionality could worsen and the attacks could affect the technical infrastructure and cause deaths and injuries. In addition, attacks can have potent psychological effects, which could become extra clear during a spread, or threat of spread, of an infectious disease (bioterrorism) or other dangerous substances via food and the drinking water.

The risk of this happening in Sweden must be taken seriously. Both the attempted attack in Stockholm in 2010 and certain exposed plans are believed to be connected to Sweden's participation in international military actions abroad, public positions in issues regarding politics, religion or international conditions, or the acts of individual persons.

6.23 Cyber-attacks

The term "cyber-attacks" can be described as a more extensive attack on information systems and extensive network attacks.²¹⁰ The people who carry out these attacks might do it in order to destroy, but also to access or manipulate information. The reasons behind cyber-attacks could be dissatisfaction, organized crime, terrorism or other politically motivated attacks. They may be aimed at a nation, an organization or individuals. Cyber-

²⁰⁸ The Swedish Security Service,

<http://www.sakerhetspolisen.se/publicerat/nyhetsarkiv/nyheter/andradhotbildmotsverige.5.34ffc68f1235b740c0680004841.html>, 2011-09-28

²⁰⁹ See the Swedish Security Service's web news for the most recent examples:

Utredningsläget för misstänkt terroristbrott i Göteborg, 2011-09-12,

<http://www.sakerhetspolisen.se/publicerat/nyhetsarkiv/nyheter/utredningslagetformisstan ktterroristbrottigoteborg.5.7a0bb45e13205deef2b800078.html>, 2011-10-05 and *Fem*

personer gripna misstänkta för förberedelse till terroristbrott i Danmark, 2010-12-29,

<http://www.sakerhetspolisen.se/publicerat/nyhetsarkiv/nyheter/fempersonergripnamissta nktforforberedsetillterroristbrottidanmark.5.34ffc68f1235b740c0680005585.html>, 2011-10-05

²¹⁰ The Swedish Civil Contingencies Agency, *Statistik och analys Olyckor och kriser 2009/2010*. MSB 0170-10, 2010

attacks can be seen as a part of various types of information operations, which is a form of non-military force, but can also be a supplement to conventional military action.²¹¹

It might be very difficult to determine where the attacks originate from, although increasingly more directed attacks on information systems have been exposed in recent years.²¹²

So far, Sweden has not been hit by any major, society-wide IT incidents. However, smaller internet attacks are relatively frequent, as are attempts at attacks on Swedish government agencies and public organizations.²¹³ These attacks are often caused by dissatisfaction and are directed at symbolic targets. Effects are usually temporary, and the consequences are often small apart from possible attention surrounding the attack.

For example, the websites of the Swedish Government and the Swedish Police have on several occasions been hit by Denial of Service attacks, or attempts at such attacks. In the end of 2010, the Swedish Prosecution Authority was hit by a Denial of Service attack, in connection with the authority seeking international assistance to interrogate the founder of Wikileaks, Julian Assange, in a preliminary investigation of a suspected rape. As in the case of the Government and the Police, the effect was temporary. The Swedish Prosecution Authority's website www.aklagare.se was inaccessible for about half a day, but the authority's work was not affected to any appreciable extent, not was the public's trust.

During the collaboration exercise SAMÖ 2008, the scenario involved an IT attack against the financial systems, as presented in Appendix 1.

However, there have been incidents in other countries where cyber-attacks have posed a serious national threat.²¹⁴ Examples include the large-scale internet attacks on Estonia in May 2007, when media outlets and government agencies had their online services shut down by Denial of Service attacks, and the coordinated attacks on the Ministry of Foreign Affairs of Georgia's website in 2008.

One special category of internet attacks that has received a lot of attention in recent years is attacks on so called SCADA systems (Supervisory Control and Data Acquisition). Cyber-attacks aimed at operations such as nuclear power plants, air traffic control or traffic systems could have very serious consequences. The risk of such attacks is gradually increasing, as systems that were previously completely isolated are increasingly being connected to networks and communicate through technical or administrative computer

²¹¹ The Swedish Civil Contingencies Agency, *Samhällets informationssäkerhet, Lägesbedömning 2009*, MSB 0023/09, mars 2009

²¹² The Swedish Civil Contingencies Agency, *Statistik och analys Olyckor och kriser 2009/2010*, MSB 0170-10, 2007

²¹³ *Ibidem*

²¹⁴ The Swedish Civil Contingencies Agency, *Samhällets informationssäkerhet, Lägesbedömning 2009*, MSB 0023/09, mars 2009

systems, which in turn are connected to the internet. Portable computers that are used in fieldwork, and which are connected directly to steering systems for technical work, but are also used in the regular company network, are at risk of becoming a bridge used to transfer harmful code into the system.

There have still only been a relatively small number of attacks on control systems. The closest thing to such an attack in Sweden happened in Motala in December 2010, when someone hacked into housing company Platen's control system and managed to change the district heating temperature for 700 apartments, a shopping mall and a retirement home.²¹⁵

The most evident example so far of harmful code that was created to attack control systems is the worm Stuxnet, which was discovered in the summer of 2010. It is an advanced piece of code that appears to have been designed to enter Iranian nuclear sites and destroy equipment for uranium enrichment.

A loss in communication in the Southern Link tunnel system in Stockholm in September 2011 was caused by a technical malfunction in a network cable.²¹⁶ Nevertheless, it shows us what the consequences could be after a serious disruption of communication in control systems for traffic lights, lighting, fans and gates in a larger tunnel system. Traffic in southern Stockholm was paralysed for almost an entire day, which had socio-economic consequences.

6.24 Risk of societal instability and civil unrest

There are a number of risks that can cause societal instability. Various forms of crime, such as organized crime or threats and violence towards politicians and civil servants are risks that threaten people, fundamental societal functions, trust, safety, democracy and human rights.

Increased alienation and segregation are examples of social risks that originate from insufficient social and socio-economic conditions. In addition, increased hostility towards immigrants and less social unity are risks worth mentioning in this context. This type of risk can lead to a loss in trust in established social institutions and law enforcement agencies, which in turn can cause civil unrest and violent riots in vulnerable areas, and may also benefit organized crime.²¹⁷

²¹⁵ Swedish Radio, *700 hushåll utan värme efter hackerattack*,

<http://sverigesradio.se/sida/artikel.aspx?programid=160&artikel=4239787>, 2011-11-04

²¹⁶ SvD, *Fortsatt trafikchaos under hela kvällen*, http://www.svd.se/nyheter/inrikes/sodra-lanken-avstangd-pa-grund-av-tekniskt-fel_6504284.svd, 2011-09-28

²¹⁷ See the County Administrative Board of Gävleborg, *Regional risk- och sårbarhetsanalys Gävleborgs län 2010*, dnr. 451-1405-10; Swedish Civil Contingencies Agency, *Statistik och analys Olyckor och kriser 2009/2010*. MSB 0170-10, 2010; Nilsson & Ivarsson Westerberg, *Våldsamma upplopp i Sverige – från avvikelse till normalitet*, 2011; Hallin, Jashari, Listerborn & Popoola, *Det är inte stenarna som gör ont, Röster från Herrgården, Rosengård - om konflikter och erkännande*, 2010; The County Administrative Board of Skåne County, *Regional risk- och sårbarhetsanalys 2010*, dnr. 450-4297-10, bilaga 1

In recent years, there have been violent situations involving car fires and stone-throwing against the rescue services and the Police in vulnerable suburbs around the metropolitan areas of Sweden, usually committed by groups of youths. Besides the rescue services and the Police, violent riots also increase the workload of other vital societal functions, such as the social services and healthcare workers, and can also cause injuries as a result of the violence. There have not yet been any deaths connected to stone-throwing or car fires.²¹⁸ In some cases, ambulance drivers have had to wear protective vests, and the rescue services have at times required police escorts on calls to the Rosengård district in Malmö.

For example, the following incidents have gained attention:

- stones thrown at the Police and rescue services in Malmö and Gothenburg (in August 2009), often after the rescue services have been called out to a fire. In addition, there have been a number of shootings in Malmö in 2010, many of them against immigrants,²¹⁹
- violence in Rosengård in Malmö in August 2009, where a number of people had gathered for the street party “Reclaim the Rosengård”,
- arson fires in Malmö, Gothenburg, Stockholm and Uppsala in 2009²²⁰ and
- violence in Stockholm suburb Tensta in December 2008, where stones were thrown at the rescue services and the Police, and there were some arson fires.²²¹

In recent years, similar riots have taken place in metropolitan areas in other countries, such as violent riots in the suburbs of Paris in 2005 and 2007,²²² as

²¹⁸ Hallin, Jashari, Listerborn & Popoola, *Det är inte stenarna som gör ont Röster från Herrgården, Rosengård – om konflikter och erkännande*, 2010; The Swedish Civil Contingencies Agency, *Statistik och analys Olyckor och kriser 2009/2010*, MSB 0170-10, 2010

²¹⁹ The Swedish Civil Contingencies Agency, *Statistik och analys Olyckor och kriser 2009/2010*. MSB 0170-10, 2010; The County Administrative Board of Gävleborg, *Regional risk- och sårbarhetsanalys 2010*, dnr. 451-1405-10

²²⁰ The Swedish Civil Contingencies Agency, *Statistik och analys Olyckor och kriser 2009/2010*, MSB 0170-10, 2010

²²¹ Schaub, Katarina, *Inga fler bilder av Tensta i brand – En pilotstudie om krishantering och samverkan i Järvaområdet 22–29 december 2008*, 2010

²²² The Swedish Institute of International Affairs, Country Guide

<http://www.landguiden.se/Lander/Europa/Frankrike/Modern-Historia>, 2011-09-26;

Swedish Radio, *Paris-förorter skakas av nya upplopp* 2007-11-27,

<http://sverigesradio.se/sida/artikel.aspx?programid=83&artikel=1740895>, 2011-09-22

well as riots in Copenhagen in 2006 and 2007²²³, and in London as recently as in August 2011.²²⁴

²²³SVT, *Våldsamma kravaller i Köpenhamn* 2006-12-16,

http://svt.se/2.22584/1.723399/valdsamma_kravaller_i_kopenhamn, 2011-09-22; SVT,

Nya kravaller i Köpenhamn, 2007-01-06,

http://svt.se/2.22584/1.773813/nya_kravaller_i_kopenhamn_i_natt, 2011-09-22

²²⁴The Swedish Institute of International Affairs, Country Guide

<http://www.landguiden.se/Lander/Europa/Storbritannien/Aktuell-Politik/Kalendarium>, 2011-09-26

References

- Allan, A.G., Baxter, P.J. & Ottley, C.J., *Gas and particle emissions from Soufrière Hills Volcano, Montserrat, West Indies: characterization and health hazard assessment*, Bulletin of Volcanology 62: 8–19, 2000
- Andersson, E., *Vulkanisk svaveldimma: Risken att det drabbar Sverige*, Thesis, The Department of Physical Geography and Quaternary Geology, Stockholm University, 2011
- The Swedish National Board of Housing, Building and Planning, *Redovisning av Boverkets Risk- och sårbarhetsanalys 2010 samt förmågebedömning avseende scenariot isstorm*, dnr. 4010-1135/2010, 2010-11-05
- Camuffo, D. & Enzi, S., *Chronology of 'Dry Fogs' in Italy, 1374-1891*, Theoretic and Applied Climatology, 50, 31-33, 1994
- Commission Staff Working Paper, *Risk Assessment and Mapping Guidelines for Disaster Management*, 21.12.2010, SEC(2010) 1626 final (17899/10)
- Council conclusions on Further Developing Risk Assessment for Disaster Management within the European Union, 11–12.4.2011. (8068/11)
- Directive (2007/60/EG) from 23 October, 2007 on assessments and handling of the risk of flooding.
- The Directorate for Civil Protection and Emergency Planning, *Nasjonalt Risikobilde – prosess og metode*, 2010
- Elforsk, *Solstormar - Transienta geomagnetiska störningar*, Elforsk rapport 03:33, 2004
- Elforsk, *Dammsäkerhet. Beredningsplanering för dammbrott – Ett pilotprojekt i Ljusnan*, Elforsk report 05:38, january 2006
- The National Electrical Safety Board, *Risk- och sårbarhetsanalys*, dnr. 10EV967, 2010-11-10
- The Epizootic Disease Act (1999:657)
- The Ministry of Finance, *En samlad reglering för stärkt krisberedskap mot allvarliga tekniska fel och störningar i det centrala betalningssystemet*, 2010/1619, december 2010
- Finansiella sektorns privat-offentliga samverkan, the Swedish Financial Supervisory Authority, *I lust och nöd – Handbok i privat-offentlig samverkan i den finansiella sektorn på lokal nivå*

The Swedish Financial Supervisory Authority, *Presentation in accordance with Section 9 of the Emergency Management and Heightened Alert Ordinance(2006:942)*, dnr. 10-2825, 2010-11-12

Fisher Georg, Molin Staffan, *Isstormen i Kanada*, The Swedish Defence Research Agency, 2001

The Swedish Fortifications Agency, *Risk- och sårbarhetsanalys för Fortifikationsverket 2010*, 1187/2010-4, 2010-11-09

Regulations on municipal and county council risk and vulnerability analyses (MSB 2010:6)

Regulations on risk and vulnerability analyses by government agencies (MSBFS 2010:7)

Emergency Management and Heightened Alert Ordinance (2006:942)

Ordinance (2008:1002) on Instructions for the Swedish Civil Contingencies Agency

Ordinance (1999:382) on measures for preventing and limiting the consequences of serious chemical accidents.

Ordinance (2009:956) on Flood Risks.

The National Social Insurance Office, *Årskrönika 2010*

Hallin, Jashari, Listerborn & Popoola, *Det är inte stenarna som gör ont, Röster från Herrgården, Rosengård - om konflikter och erkännande*, Malmö Publications in Urban Studies Mapius 5, 2010

ISO Guide 73:2009

ISO GUIDE 73:2009(E/F), Risk management — Vocabulary

The Swedish Board of Agriculture, *Risk- och sårbarhetsanalys 2010*, dnr. 90-11553/10, 2010-11-12

The Swedish Board of Agriculture, Opinions, draft *Ett första steg mot en nationell riskbedömning – nationell riskidentifiering 2011-10-24, 2011-11-27*

The Swedish Chemicals Agency, *Kemikalieinspektionens risk- och sårbarhetsanalys*, dnr. 190-H11-00144, 2011-02-21

The Swedish Emergency Management Agency, *Beroende- och konsekvensanalys, elektroniska kommunikationer: Offentligt arbetsmaterial från KBM:s projekt Samhällskritiska beroenden*, dnr. 0021/2007, 2007

The Swedish Emergency Management Agency, *Beroende- och konsekvensanalys, Hälso- och sjukvård: Offentligt arbetsmaterial från KBM:s projekt Samhällskritiska beroenden*, dnr. 0021/2007, 2007

- The Swedish Emergency Management Agency, *Beroende och konsekvensanalys transporter, Offentligt arbetsmaterial från KBM:s projekt Samhällskritiska beroenden*, dnr. 0021/2007, 2008-02-01
- The Swedish Emergency Management Agency, *Gränsöverskridanden beroenden – en studie om samhällsviktiga verksamheters beroenden över nationalgränser*, dnr. 0021/2007, 2007
- The Swedish Emergency Management Agency, *Hot- och riskrapport 2006*, KBM:s temaserie 2006:7
- The Swedish Emergency Management Agency, *Indikatorer på krisberedskapsförmåga*, dnr. 0433/2007
- The Swedish Emergency Management Agency, *Klarar vi krisen? Samhällets krisberedskapsförmåga 2007*, temaserie 2008:2, dnr. 1443/2007, 2008
- The Swedish Emergency Management Agency, *Risk- och sårbarhetsanalyser: vägledning för statliga myndigheter*, 2006:4, dnr. 0050/2006, 2006
- The Swedish Emergency Management Agency, *Sveriges beredskap mot nätangrepp*, KBM:s utbildningsserie 2008:1, 2008
- The Swedish Emergency Management Agency, *Utvärdering av samverkansövning 2008 (SAMÖ)*, dnr. 1470/2007
- The Swedish Emergency Management Agency, *Utvärdering av samverkansövning 2007 (SAMÖ)*, dnr. 0887/2006
- The Swedish Coast Guard, *Risk- och sårbarhetsanalys för Kustbevakningen 2010*, dnr. 07-1293/10, 2010-11-10
- The Swedish Coast Guard, *Risk- och sårbarhetsanalys för Kustbevakningen 2011*, dnr. 07-234/11:2, 2011-11-10
- The Electronic Communication Act (2003:289)
- Act on municipal and county council measures prior to and during extra-ordinary events in peacetime and during periods of heightened alert (2006:544)
- The Act on (2003:148) criminal responsibility for terrorist offences
- The Swedish mapping, Cadastral and Land Registration Authority, *Risk- och sårbarhetsanalys (RSA) 2010 för Lantmäteriet*, dnr. 606-2010/2656, 2010-11-08
- Larsson, Joakim, Löf, Lars, *Läkemedel i miljön*, The Medical Products Agency, *Läkemedelsboken 2011-2012*
- The National Food Agency, *Livsmedelsförsörjning i ett krisperspektiv*, 2011

The National Food Agency and the National Veterinary Institute, *Riskprofil. Livsmedel som spridningsväg för antibiotikaresistens*, 2009

The National Food Agency, *Risk- och sårbarhetsanalys samt förmågebedömning inom Livsmedelsverkets ansvarsområde Redovisning november 2010*, dnr. 1250/2010, 2010-11-12

Lundstedt, H., *The sun, space weather and GIC effects in Sweden*, *Advances in Space Research* 37 1182–1191, 2006

The County Administrative Board of Blekinge, *Risk- och Sårbarhetsanalys för år 2009/10*, dnr. 100-9080-2008, bilaga 1B, dnr. 450-3077-10, 2009

The County Administrative Board of Dalarna, *Regional risk- och sårbarhetsanalys för Dalarnas län 2010*, rapport 2010:24

The County Administrative Board of Gotland, *En lokal/regional risk- och sårbarhetsanalys för Gotlands län samt Länsstyrelsen i Gotlands län*

The County Administrative Board of Gävleborg, *Regional risk- och sårbarhetsanalys Gävleborgs län 2010*, dnr. 451-1405-10

The County Administrative Board of Halland, *Regional risk- och sårbarhetsanalys Hallands län 2010*, reviderad 2010-11-11

The county administrative boards, *Händelsescenario för Risk- och sårbarhetsanalys Värmebölja i nutid och framtid*, 2011

The County Administrative Board of Gävleborg, *Regional risk- och sårbarhetsanalys Jämtlands län 2010*, dnr. 451-6586-2010, november 2010

The County Administrative Board of Jönköping, *Regional risk- och sårbarhetsanalys för Jönköpings län 2010*, dnr. 451-1627-2010, 2010-11-09

The County Administrative Board of Kalmar, *Risk och sårbarhetsanalys för Kalmar län 2010*, 451-1652-10, 2010-11-11

The County Administrative Board of Kronoberg, *Regional risk- och sårbarhetsanalys för Kronobergs län 2010*, 451-1075-10, 2010-10-28

The county administrative board in Norrbotten, *Risk- och sårbarhetsanalys 2010*, Länsstyrelsens rapportserie nr. 8, 2010

The county administrative board in Skåne, *Regional risk- och sårbarhetsanalys 2010*, dnr. 450-4297-10, bilaga 1

The County Administrative Board of Stockholm, *Kartläggning av riskerna för översvämning i tunnelsystemen i Stockholms län*, rapport 2011:24, 2011

The County Administrative Board of Stockholm, *Risk- och sårbarhetsanalys 2010 för Stockholms län*, rapport 2010:18, 2010

The County Administrative Board in Södermanland, *Risk och Sårbarhetsanalys samverkan i Södermanland, 2010-11-10, Risk- och sårbarhetsanalys för den kärntekniska anläggningen i Studsvik, Risk- och sårbarhetsanalys 2010 Översvämningar, 2010-11-12*

The County Administrative Board of Uppsala, *Risk- och sårbarhetsanalys för Uppsala län 2010*, Länsstyrelsens meddelandeserie 2010:09, 2010

The County Administrative Board of Värmland, *Risk och sårbarhetsanalys 2010*, 450-1165-2010, 2010-11-12

The County Administrative Board of Västerbotten, *Risk- och sårbarhetsanalys för Västerbottens län 2010*, dnr. 451-1571-2010

The County Administrative Board of Västerbotten, *Risk- och sårbarhetsanalys 2010 Västernorrlands län*, dnr. 451-6518-10

The County Administrative Board of Västmanland, *Risk- och sårbarhetsanalys 2010 Västmanlands län*, dnr. 451-941-10

The County Administrative Board of Västra Götaland, *Risk- och sårbarhetsanalys Länsstyrelsen Västra Götalands län – För verksamhetsåret 2010*, rapport nummer: 2010:59

The County Administrative Board of Örebro, *Risk- och sårbarhetsanalys för Örebro län 2010*, 2010:35

The County Administrative Board of Östergötland, *Risk- och sårbarhetsanalys – för verksamhetsåret 2010*, dnr. 450-1469-10, rapport nummer: 2010:13

The Swedish Civil Contingencies Agency, *Analys av samhällskonsekvenser efter antagonistisk attack mot kärnkraftverk*, dnr. 2010-7869, 2011-08-16

The Swedish Civil Contingencies Agency, *Att möta konsekvenserna av ett förändrat klimat – MSB:s arbete med klimatanpassning*, bilaga 1, dnr. 2009-15211, 2010-06-22

The Swedish Civil Contingencies Agency, *Att mäta sårbarheter mot naturolyckor - Om sårbarheter om begrepp och indikatorer*, MSB 0110-09

The Swedish Civil Contingencies Agency, *Ett fungerande samhälle i en föränderlig värld – Nationell strategi för skydd av samhällsviktig verksamhet*, 2011

The Swedish Civil Contingencies Agency, *Faller en – faller då alla? En slutredovisning från KBM:s arbete med samhällskritiska beroenden*, MSB 0001-09, 2009

Swedish Civil Contingencies Agency, informationssystem IDA, *Stora olyckor*, 2011-09-27

The Swedish Civil Contingencies Agency & The National Board of Health and Welfare, *Influenza A(H1N1) 2009 Delrapporterna från utvärderingen av förberedelser och hantering av pandemin*, 2011-03-17, 2011

The Swedish Civil Contingencies Agency & The National Board of Health and Welfare, *Influenza A(H1N1) 2009 – utvärdering av förberedelser och hantering av pandemin*, 2011-03-03, 2011

The Swedish Civil Contingencies Agency *Perioder med stora snömängder vintern 2009/2010*, dnr. 2010-4284

The Swedish Civil Contingencies Agency, *Risk- och sårbarhetsanalys samt förmågebedömning 2010*, dnr. 2010-873, 2010-11-02

The Swedish Civil Contingencies Agency, *Risk- och sårbarhetsanalyser 2010 – Återkoppling av redovisande myndigheters risk- och sårbarhetsanalyser*, dnr. 2010-1795

The Swedish Civil Contingencies Agency, *Räddningstjänst i siffror 2009*, MSB 0185-10

The Swedish Civil Contingencies Agency, *Samhällets informationssäkerhet, Lägesbedömning 2009*, MSB 0023/09, mars 2009

The Swedish Civil Contingencies Agency, *Samhällets krisberedskapsförmåga 2008*, MSB 0034-09, 2009

The Swedish Civil Contingencies Agency, *Samhällets krisberedskapsförmåga vid isstorm*, MSB219 – december 2010

The Swedish Civil Contingencies Agency *Samhällsviktig verksamhet - Konsekvensbedömning av vulkanutbrott*, dnr. 2010-4400, 2010-04-22

The Swedish Civil Contingencies Agency, *Statistik och analys Olyckor & kriser 2009/2010*, MSB:0170-10, 2010

The Swedish Civil Contingencies Agency, *Uppföljning av samhällets krisberedskapsförmåga 2010*, MSB 263, 2011

The Swedish Civil Contingencies Agency, *Utvärdering SAMÖ-KKÖ 2011*, MSB322 – oktober 2011

The Swedish Civil Contingencies Agency, *Vägledning för arbetet inom samverkansområden – Att arbeta i samverkansområden enligt förordningen (2006:942) om krisberedskap och höjd beredskap*

The Swedish Civil Contingencies Agency, *Årsredovisning 2010, MSB241* – februari 2011

The Swedish Civil Contingencies Agency, *Översiktlig översvämningskartering längs Norsälven - Sträckan Torsby till Väneren*, dnr. 2009-1982, 2009

The Swedish Environmental Protection Agency, *Naturvårdsverkets risk- och sårbarhetsanalys 2010*, 100-1673-10 S, 2010-11-08

Nilsson& Ivarsson Westerberg, *Våldsamma upplopp i Sverige – från avvikelse till normalitet*, the Swedish Civil Contingencies Agency, 2011

The Swedish Post and Telecom Authority, *Risk- och sårbarhetsanalys för sektorn elektronisk kommunikation Myndighetens redovisning för 2010*, 00-1673-10 S, 2010-11-08

Government Bill 2001/02:158, Society's safety and emergency preparedness

Government Bill 2005/06:133 Cooperation during crises – for a safer society

Government Bill 2007/98:92 Reinforced emergency preparedness – for safety's sake

Government Bill 2011/12:1, Budget proposal for 2012, Expenditure area 6, Defence and civil protection

Report from the Swedish Riksdag (2007/08:RFR5) *Uppföljning av hur stormen Gudrun hanterats inom transport- och kommunikationsområdet*, 2007

Government decision Assignment to conduct capability assessments as part of risk and vulnerability analyses in 2009, 2008-12-14 (Fö2008/3567/SSK)

Letter of regulation for fiscal year 2011, with regard to the Swedish Civil Contingencies Agency, 2011-06-09 (Fö2011/947/SSK)

The Swedish National Audit Office, *Krisberedskap i betalningssystemet. Tekniska hot och risker*, RiR 2007:28, 2007-12-10

The Swedish National Audit Office, *Skyddet för farligt gods*, RiR 2008:29

Rocklöv, J., Hurtig, A-K., Forsberg, B., *Hälsopåverkan av ett varmare klimat – en kunskapsöversikt*, Umeå University, 2008

Rescue services, MSB: *Brandorsaker vid byggnadsbränder per byggnadsgrupp*, 2010

The Swedish Rescue Services Agency, *Räddningsinsatser i vägtunnlar*, 2005

The Swedish Rescue Services Agency, *Översvämning*, 2000

Schaub, Katarina, *Inga fler bilder av Tensta i brand. En pilotstudie om krishantering och samverkan i Järvaområdet 22–29 december 2008*, Crismart – Nationellt Centrum för Krishanteringsstudier, 2010

The Swedish Maritime Administration, *Risk- och sårbarhetsanalys för Sjöfartssektorn 2010*, 10-03426, 2010-11-05

The Swedish Tax Agency, *Skatteverkets risk- och sårbarhetsanalys 2010*, dnr. 131 211958-10/113, 2010-11-01

The Swedish Forest Agency, *Ekonomiska och sociala konsekvenser i skogsbruket av stormen Gudrun*, rapport 12–2006, 2011

Government Letter 2009/10:124 Samhällets krisberedskap – stärkt samverkan för ökad säkerhet, bilaga 3

Skånska dagbladet, *Ny sanering efter BT Kemi*, 2010-02-27

Swedish Institute for Communicable Disease Control, *Risk- och sårbarhetsanalys för SMI - årliga redovisningen 2010*, dnr. 159/2010-15, 2010-12-06

The National Board of Health and Welfare, *Influensapandemiers påverkan på samhället. Nödvändig erfarenhetsbakgrund för pandemiplanering*, 2007-123-2, 2006

The National Board of Health and Welfare, *Katastrofmedicinska studier under 35 år Erfarenheter från KAMEDOs verksamhet 1963-1998*, SoS rapport, 1999:4

The National Board of Health and Welfare, *Risk- och sårbarhetsanalys 2010*

The National Board of Health and Welfare, *Risk- och sårbarhetsanalys 2009*

SS-ISO 31000:2009, Risk management – principles and guidelines

The Swedish Energy Agency, *Risk- och sårbarhetsanalys avseende Statens energimyndighet 2010*, dnr. 00-10-974, november 2010

The Swedish Energy Agency, *Trygg energiförsörjning 2010 – En översiktlig redovisning och analys av hot, risker och sårbarheter i energisystemet*, ER 2010:38, dnr. 00-10-974

The Swedish Energy Agency, *Utvärdering av stormen Per - Konsekvenser och lärdomar för en tryggare energiförsörjning*, ER 2007:37, december 2007

The Swedish Energy Agency, *Värmeavbrott, En guide till hur kommuner kan lindra en värmekris*, ET 2009:26, 2009

The Swedish Accident Investigation Board, *Report RO 2001:02, Brand på Herkulesgatan i Göteborg, O län, den 29 - 30 oktober 1998*, dnr. O-07/98

The Swedish Accident Investigation Board, *Report RJ 2009:10, Brand i tunneltåg vid Rinkeby station, AB län, den 16 maj 2005*, dnr. J-06/05

The Swedish Accident Investigation Board, *Final report RO 2011:01, Dammbrott, Hästberga, Hässleholms kommun, Skåne län, den 7 november 2010*, dnr. O-12/10,

The National Accident Investigation Commission, *Report RJ 2000:01, Olycka med godståg nr 5800 innehållande farligt gods den 4 juli 1997, SSV on Kälarne, Z län, dnr. J-02/97*

The Swedish Meteorological and Hydrological Institute, *Risk- och sårbarhetsanalys med förmågebedömning för SMHI 2010*, 2010/506/180, 2010-11-10

Public Government Investigation, SOU 1999:48, *Lära av Estonia. Den andra delrapporten och slutredovisning*, Analysgruppen för granskning av Estoniakatastrofen och dess följder, 1999

Public Government Investigation SOU 1995:20, *Utan el stannar Sverige – Scenarion och överväganden om påfrestningar i det framtida samhället*, delbetänkande av Hot- och riskutredningen, 1995

Public Government Investigation, SOU 2006:94, *Översvämningshot – Risker och åtgärder för Mälaren, Hjälmaren och Vänern*, 2006

Public Government Investigation, SOU 2009:88, *Kärnkraft – nya reaktorer och ökat skadeståndsansvar*, 2009

The National Veterinary Institute, *SVA:s risk- och sårbarhetsanalys 2010*, SVA 2010/896, 2010-11-15

Stockholm County *Risk- och sårbarhetsanalys 2010*, rapport 2010:18

The Swedish Radiation Safety Authority,
Strålsäkerhetsmyndighetens risk- och sårbarhetsanalys med förmågebedömning 2010, SSM 2010/1234, 2010-11-04

The Swedish National Board of Psychological Defence, *Ammoniakolyckan i Kävlinge*, Meddelande 142, 1997

The Swedish National Board of Psychological Defence, *Olycksplats Borlänge bangård*, 2000

Svalöv Municipality, *BT Kemi Efterbehandling. Historien om en miljöskandal som kan bli ett föredöme för framtiden*, 2010-11-26

Swedenergy, *Om kärnkraftsproduktion*, 2010

The Swedish National Grid, *Redovisning av 2010 års risk- och sårbarhetsanalys inkl. förmågebedömning från Affärsverket svenska kraftnät*, 2010-11-18

The Swedish National Grid, *Översyn av de statliga insatserna för dammsäkerhet – en rapport till regeringen*, dnr. 2010/877, 2010-06-30

Swedgeo, *Geotekniska förutsättningar för ökad tappning från Vänern till Göta älv*, Varia, SGI-V565, 2006

Thordarson, T. & Self, S., *Atmospheric and environmental effects of the 1783–1784 Laki eruption: A review and reassessment*, Journal of geophysical research 108, 2003

The Swedish Defence Research Agency, *Risk- och sårbarhetsanalys 2010*, FOI-R--3051—SE, 2010

The Swedish Transport Administration, *Trafikverkets risk- och sårbarhetsanalys 2010*, TRV 2010/95107, 2010-11-02

The Swedish Transport Agency, *Risk- och sårbarhetsanalys 2010 med tillhörande förmågebedömning*, TSG 2010-137, 2010-11-12

Swedish Customs, *Redovisning av Tullverkets risk- och sårbarhetsanalys som följer av förordningen (2006:942) om krisberedskap och höjd beredskap, samt genomförda och planerade åtgärder*, dnr. TV0-2010-139, 2010-11-10

Electronic resources

Aftonbladet, Fartyg har tappat tonvis med miljögifter, 2010-02-06,
<http://www.aftonbladet.se/nyheter/article12140537.ab>, 2011-09-28

Boliden AB, *Årsrapport 2010*, februari 2011,
http://vp031.alertir.com/files/press/boliden/Boliden2010_sv.pdf, 2011-09-30

Egervärn, M. och Lindmark, H., *Riskprofil Livsmedel som spridningsväg för antibiotikaresistens*, The National Food Agency and the National Veterinary Institute, 2009-10-15

http://www.slv.se/upload/dokument/rapporter/bakterier_virus_mogel/Riskprofil_Livsmedel_som_spridningsvag_for_antibiotikaresistens.pdf, 2009-11-11

The European Centre for Disease Prevention and Control and the European Medicines Agency, *The Bacterial Challenge: Time to React*, 2009-09-17,
http://ecdc.europa.eu/en/publications/Publications/0909_TER_The_Bacterial_Challenge_Time_to_React.pdf, 2009-09-23

European Centre for Disease Prevention and Control (ECDC), *Daily Update Pandemic (H1N1) 2009*, ECDC, www.ecdc.europa.eu, 2010-01-04

Health Canada, http://www.hc-sc.gc.ca/hc-ps/ed-ud/fedplan/cosmos_954-eng.php, 2011-11-04

<http://www.smhi.se/kunskapsbanken/meteorologi/skanes-klimat-1.4827>, 2011-09-30

<http://www.smhi.se/kunskapsbanken/meteorologi/stormar-i-sverige-1.5770>, 2011-09-28

http://www.who.int/csr/disease/avian_influenza/country/cases_table_2011_08_09/en/index.html, 2011-09-29

<http://www.trafikverket.se/Privat/Projekt/Skane/Hallandsas/Bakgrund/Projekthistorik/>, 2011-09-28

<http://computersweden.idg.se/2.2683/1.406544/it-haveri-bakom-trafikkaos>, 2011-11-04

http://www.krisinformation.se/web/Pages/Page_____72890.aspx, 2011-11-16

The Swedish Coast Guard 2011a, <http://www.kbv.se/sv/hallbar-havsmiljo/miljoraddning/olja/>, 2011-09-28

The Swedish Coast Guard, <http://www.kbv.se/sv/hallbar-havsmiljo/nyhetsarkiv/>, 15 September–6 October 2011

The Swedish Coast Guard, Operation Fu Shan Hai, <http://www.kbv.se/sv/hallbar-havsmiljo/miljoraddning/olja/operation-fu-shan-hai/>, 2011-10-03

Laufeld, S., *Skalvet 1904 Sveriges värsta på tusen år*, Svenska dagbladet, 2005-01-15, http://www.svd.se/kultur/understrecket/skalvet-1904-sveriges-varsta-pa-tusen-ar_386575.svd, 2011-09-30

The Swedish Civil Contingencies Agency, *Beredskap inför skogsbrand*, 2009, <https://www.msb.se/sv/Insats--beredskap/Naturolyckor/Skogsbrand/>, 2011-09-28

The Swedish Civil Contingencies Agency, *Människans ingrepp i naturen*, <https://www.msb.se/sv/Forebyggande/Naturolyckor/Skred-ras-och-erosion/Varfor-intraffar-skred-och-ras/Manniskans-ingrepp-i-naturen/>, 2011-09-28

The Swedish Civil Contingencies Agency, *Naturolycksdatabasen – Götaskredet 1957*, <http://ndb.msb.se/ViewCase.aspx?id=98&l=SV&xMax=351705&xMin=311705&yMax=6464256&yMin=6424256>, 2011-09-30

The Swedish Civil Contingencies Agency, *Ras*, <https://www.msb.se/sv/Forebyggande/Naturolyckor/Skred-ras-och-erosion/Vad-ar-skred-och-ras/Ras/>, 2011-09-28

The Swedish Civil Contingencies Agency, *Skogsbrand i fokus - seminariedokumentation 28-29 november 2006, i Boden*, https://www.msb.se/Upload/Utbildning_och_ovning/Konferenser_seminarier/Dokumentation/Skogsbrand/Boden_2006/Boden%202006%20-%20Skogsbrand%20i%20fokus.pdf, 2011-10-13

The Swedish Civil Contingencies Agency, *Tuveskredet, Göteborgs kommun, 30 november 1977*, <https://www.msb.se/sv/Forebyggande/Naturolyckor/Skred-ras-och-erosion/Exempel-pa-intraffade-skred-ras-och-ravinutveckling/Tuveskredet-Goteborgs-kommun-30-november-1977/>, 2011-09-28

The Swedish Civil Contingencies Agency, *Var inträffar ras och skred?* <https://www.msb.se/sv/Forebyggande/Naturolyckor/Skred-ras-och-erosion/Var-intraffar-skred-och-ras/>, 2011-09-28

Mälarens vattenvårdsförbund, *Mälaren en sjö för miljoner*, <http://www.malaren.org/artikel.asp?categoryID=2&parentID=0&pageID=9>, 2011-09-30

Nationencyklopedin, <http://www.ne.se/lang/risk>, 2011-11-05

Region Blekinge, *ÖVNING: 4,000 ton olja på väg mot Blekingekusten*, [http://www.regionblekinge.se/region-blekinge-\(svenska\)/press-och-nyheter/nyheter/ovning,-oevning-4000-ton-olja-paa-vaeg-mot-blekingekusten.aspx](http://www.regionblekinge.se/region-blekinge-(svenska)/press-och-nyheter/nyheter/ovning,-oevning-4000-ton-olja-paa-vaeg-mot-blekingekusten.aspx), 2011-09-28

The Swedish Forest Agency, <http://www.skogsstyrelsen.se/Aga-och-bruka/Skogsbruk/Skador-pa-skog/Vader-och-klimat/Skogsbrander/>, 2011-09-28

The Swedish Institute for Communicable Disease Control, *SWEDRES 2010*, <http://www.smittskyddsinstitutet.se/upload/Publikationer/swedres-2010.pdf>, 2011

Strama, *STRAMA tio år*, 2005,

<http://soapimg.icecube.snowfall.se/strama/STRAMA%2010%20ar.pdf>, 2011-09-26

The Swedish Radiation Safety Authority,

<http://www.stralsakerhetsmyndigheten.se/Allmanhet/Om-stralning/INES-skalan/>

SvD, *Fortsatt trafikchaos under hela kvällen*, [http://www.svd.se/nyheter/inrikes/sodra-](http://www.svd.se/nyheter/inrikes/sodra-lanken-avstangd-pa-grund-av-tekniskt-fel_6504284.svd)

[lanken-avstangd-pa-grund-av-tekniskt-fel_6504284.svd](http://www.svd.se/nyheter/inrikes/sodra-lanken-avstangd-pa-grund-av-tekniskt-fel_6504284.svd), 2011-09-28

Geological Survey of Sweden, *Skred och ras*,

http://www.sgu.se/sgu/sv/samhalle/risker/skred_s.htm, 2011-09-28

Geological Survey of Sweden, *Seismisk aktivitet*,

<http://www.sgu.se/sgu/sv/geologi/tektonik/seismik.html>, 2011-09-30

The Swedish National Seismic Network, Nätet, <http://snsn.geofys.uu.se/>, 2011-09-29

The Swedish National Seismic Network, *Svenska skalv som kändes*,

<http://snsn.geofys.uu.se/>, 2011-09-29

Swedish radio, *Största skogsbranden i modern tid*,

<http://sverigesradio.se/sida/artikel.aspx?programid=98&artikel=927287>, 2011-09-28

Swedish Radio, *Branden på M/S Scandinavian Star*,

<http://sverigesradio.se/sida/artikel.aspx?programid=2519&artikel=3587287>, 2011-09-28

Swedish Radio, *700 hushåll utan värme efter hackerattack*,

<http://sverigesradio.se/sida/artikel.aspx?programid=160&artikel=4239787>, 2011-11-04

SvD, *Norsk vägtunnel brann*, 2011-06-23, [http://www.svd.se/nyheter/utrikes/flera-saknas-](http://www.svd.se/nyheter/utrikes/flera-saknas-efter-brand-i-norsk-vagtunnel_6270404.svd)

[efter-brand-i-norsk-vagtunnel_6270404.svd](http://www.svd.se/nyheter/utrikes/flera-saknas-efter-brand-i-norsk-vagtunnel_6270404.svd), 2011-09-29

SVT, *20 ton miljöfarlig last i vattnet*, 2010-02-07,

http://mobil.svt.se/2.33731/1.1879117/20_ton_miljofarlig_last_i_vattnet, 2011-09-28

SVT, *Kaos i trafiken efter tunnelbrand*, 2008-06-17,

http://svt.se/2.33538/1.1175571/kaos_i_trafiken_efter_tunnelbrand, 2011-09-29

SVT, *Nya kravaller i Köpenhamn*, 2007-01-06,

http://svt.se/2.22584/1.773813/nya_kravaller_i_kopenhamn_i_natt, 2011-09-22

SVT, *Våldsamma kravaller i Köpenhamn*, 2006-12-16,

http://svt.se/2.22584/1.723399/valdsamma_kravaller_i_kopenhamn, 2011-09-22

Swedish Radio, *Paris-förorter skakas av nya upplopp*, 2007-11-27,

<http://sverigesradio.se/sida/artikel.aspx?programid=83&artikel=1740895>, 2011-09-22

The Swedish Security Service,

<http://www.sakerhetspolisen.se/terrorism/terrorhotetieuropaochsverige.4.7671d7bb110e3dcb1fd80002808.html>, 2011-09-28

The Swedish Security Service,

<http://www.sakerhetspolisen.se/publicerat/nyhetsarkiv/nyheter/andradhotbildmotsverige.5.34ffc68f1235b740c0680004841.html>, 2011-09-28

The Swedish Security Service, *Fem personer gripna misstänkta för förberedelse till terroristbrott i Danmark*, 2010-12-29,

<http://www.sakerhetspolisen.se/publicerat/nyhetsarkiv/nyheter/fempersonergripnamisstanktaforforberedelse tillterroristbrottidanmark.5.34ffc68f1235b740c0680005585.html>, 2011-10-05

The Swedish Security Service, *Utredningsläget för misstänkt terroristbrott i Göteborg*, 2011-09-12,

<http://www.sakerhetspolisen.se/publicerat/nyhetsarkiv/nyheter/utredningslagetformisstanktterroristbrottigoteborg.5.7a0bb45e13205deef2b800078.html>, 2011-10-05

The World Wide Fund for Nature, [http://www.wwf.se/vrt-](http://www.wwf.se/vrt-arbete/skog/problem/skogsbrnder/1195745-skogsbrnder2)

[arbete/skog/problem/skogsbrnder/1195745-skogsbrnder2](http://www.wwf.se/vrt-arbete/skog/problem/skogsbrnder/1195745-skogsbrnder2), 2011-09-28

The World Health Organization (WHO)

http://www.who.int/csr/don/2010_08_06/en/index.html, 2011-11-07

The World Health Organization (WHO), *Pandemic (H1N1) update 82*,

http://www.who.int/csr/don/2010_08_06/en/index.html, 2011-08-09

The Swedish Institute of International Affairs

<http://www.landguiden.se/Lander/Europa/Storbritannien/Aktuell-Politik/Kalendarium>, 2011-09-26

The Swedish Institute of International Affairs

<http://www.landguiden.se/Lander/Europa/Frankrike/Modern-Historia>, 2011-09-26

Wik, *The Sun, Space Weather and Effects*, Doctor's thesis, The Swedish Institute of Space Physics, Lund University, 2008

The Baltic Sea Portal, *Uppkomsten och förekomst av tsunami-flodvågor*,

http://www.itameriportaali.fi/sv/muut_meret/sv_SE/2461/, 2011-09-30

www.beroendehjulet.se

www.krisinformation.se

www.msb.se

www.socialstyrelsen.se/smittskydd/vardhygienochresistens, 2011-11-14

Appendix 1 Consequence-assessed scenarios from collaboration exercises

The three scenarios below are collected from the national, cross-sectoral collaboration exercises SAMÖ-KKÖ 2011, SAMÖ 2008 and SAMÖ 2007. The scenarios used in this type of large collaboration exercises are produced based on certain comprehensive criteria: they are to be complex, have serious consequences for society over a long period of time and involve a large number of actors at all levels of society, including the private sector.

The scenarios have descriptions of possible consequences. The short, medium and long-term consequences from the exercise SAMÖ-KKÖ 2011 are described from an individual, organizational, technical and financial perspective.

SAMÖ-KKÖ 2011 – nuclear technical accident

In the SAMÖ-KKÖ 2011 exercise, society's ability to handle the consequences of a nuclear technical accident was tested. The exercise was divided into different stages. The first stage was carried out on 2–3 February, 2011. Stage 2 – which took place between 11 February and 23 March, 2011 – focussed on handling the incident in a long-term perspective, and on restoring society. Stage 1 was carried out in real-time (2 days), while stage 2 was conducted over a 7-week period.

SAMÖ-KKÖ 2011 focussed mainly on Kalmar County, although it also involved a number of central actors. Approximately 70 actors from all levels of society, including the private sector, took part in the exercise.

Scenario and course of events in short, stage 1

The first two days

The starting point for the SAMÖ-KKÖ 2011 was the problems experienced in Sweden in the autumn of 2010 due to an electricity shortage. The weather had been unfavourable with snow and unusually strong cold. Electricity prices were high and several sectors in society had problems running their organization. In addition, the public was widely affected. During the autumn, various measures were taken to lessen these effects. During the night leading up to the 2 February there are disruptions with the OKG AB nuclear plant outside Oskarshamn. Early that morning there are problems with the cooling of two reactors, which causes the OKG management to assume "Increased preparedness". Before lunch there have also been a strong fire in a waste site for radioactive material, which result in the evacuation of the staff at OKG and Swedish Nuclear Fuel and Waste Management Company, SKB (CLAB). Later that day, more problems occur as the voltage in the outer electricity grid drops. The various back-up systems for cooling the reactors fail to function as intended, prompting OKG to sound a breakdown alarm. The malfunctioning cooling leads to radioactive emission in the filter system, which is currently not working as intended. Because of this, the fallout is greater than expected. The

fallout continues for two hours during the night before the 3 February. OKG rates the accident a 5 on the 7-point INES scale.²²⁵

There is a strong public opinion in society. Many people worry and feel a lack of confidence in the actors in charge of the incident. This is to some part because of variations in the initial risk assessment, in part because of conflicting messages, such as regarding the number of iodine pills, as well as regarding the recommendations for evacuation and being outdoors.

Scenario and course of events in short, stage 2

Up to four weeks later

The situation at OKG has stabilized. However, all reactors are still shut down, and the decontamination of the area is still in progress. There are measurements and analyses to conclude the extent of the fallout and how much ground have been covered. The decontamination of densely built-up areas is prioritized. Particularly high values have been measured for a passage from the power plant, across Figeholm and south-west towards to Kosta/Orrefors area. The radiation density in the area around Kosta/Orrefors is so high that the relocation of residents is recommended. This relocation affects around 12,000 people. This results in a serious shortage of staff in both the private and public sector. Municipal organizations are greatly affected, and they have extensive problems with maintaining municipal services. A large number of houses and industrial areas are empty and unguarded. Consequently, crimes such as burglary and theft increase. For a couple of weeks, during periods of high pressure, manual shut-down is conducted in the south of Sweden. The forecast by the Swedish National Grid is that the operational situation will continue to be strained, but that the number of affected customers will decrease. A malfunction occurs at vital stations in the electricity system for central Stockholm. This leads to a power cut throughout the entire city of Stockholm. The power failure is expected to last for at least 36 hours.

The transport sector is under a lot of pressure, especially in southern and middle Sweden. The E22 motorway is shut down between Norrköping and Kristianstad. Traffic is redirected to the E4, which is prioritized and kept open for traffic. Furthermore, a large number of main roads are also closed to traffic, as are connecting county roads. Railway services in middle and southern Sweden are non-existent. The situation is in general very critical in the healthcare sector, mainly due to shortage of staff and necessities. The hospitals in Kalmar and Västervik experience substantial disruptions, while the hospital in Oskarshamn is completely shut down. The medical centres in Kalmar County are overworked due to the widespread public unrest. The social services have

²²⁵ INES stands for International Nuclear and Radiological Event Scale. It is an international scale used to communicate the safety impact of nuclear and radiation-related incidents to the public and the media. The scale clarifies how serious an incident is. There are seven different levels, where level 1–3 are called incidents and level 4–7 are called accidents. The scale is constructed so that each step is approximately 10 times more serious than the previous one. Source: <http://www.stralsakerhetsmyndigheten.se/Allmanhet/Om-stralning/INES-skalan/>

serious problems, due to the relocation and non-functional alarm systems, among other things.

Matters regarding employee protection increase during this period, mainly regarding personal protection equipment, but also regarding radiation risks. The public is irritated, especially about the municipalities' brief and inconsistent answers. One aspect that is brought to the fore is the EU limits for food products. Importing countries require testing and analyses of the exported food products. There are a lot of worries about recalls of the products from the area. There are uncertainties about the handling of animals (pigs, birds, broody hens, cattle and sheep) in the relocation and evacuation areas. Should the animals be left behind or put down?

After a dramatic drop, the Swedish currency is somewhat stabilized. However, banks and insurance companies still have troubles conducting their activities. Problems with money transports result in a shortage of cash.

After two weeks, public worry and anger is widespread. It is mainly the government agencies' failure to listen to the public that is criticized, both by the public and by the media. Many believe that the government agencies have avoided answering a number of their questions and comments. This includes:

- Uncertainties as to who is in charge of what, and a feeling that questions are passed back and forth among the agencies.
- Conflicting responses as to whether the decontamination has begun, and how it will be carried out.
- The municipalities' conflicting assessments of the radiac's impact on the drinking water.
- Unanswered questions about the danger of the fallout and its possible consequences.

A month after the accident, the public is still fairly worried. The fact that a number of different public sectors, such as municipal services, healthcare, railway services and the Police, are still experiencing a lot of problems creates a widespread sense of insecurity. People feel like society is rocked to its foundation. For most people, these matters develop into a feeling of powerlessness: Will society ever return to normal? Will people ever be able to return?

Consequences

A large number of consequences will follow the fallout of radioactive materials from the nuclear power plant and the subsequent electricity shortage. In addition, the handling of the incident will further affect the consequences. ²²⁶

²²⁶ The consequence analysis is collected from the MSB's report *Analys av samhällskonsekvenser efter antagonistisk attack mot kärnkraftverk*, dnr. 2010-7869, 2011-08-16. However, the consequences have been adjusted based on an accident scenario. The work on the report above was based on the scenario used in SAMÖ-KKÖ 2011, and the analyses made during the exercise. Therefore, the basis of the analysis is the same. In the report, it is also concluded that the consequences for society are similar regardless of whether the incident was caused by an accident or an attack.

In order to get a better understanding and a indication of which consequences the handling should focus on, it is preferable to attempt to determine which consequences should be considered the most serious or most important. However, the question as to which consequences are the most important differs depending on which perspective the incident is viewed from. For this analysis, we have chosen four complementary perspectives: the individual or human perspective, the organizational perspective, the technical perspective, which also includes resources, and the socio-economic perspective. Since the consequences change over time, the most serious consequences are discussed with regard to the short term (up to two weeks after the incident), the medium term (between two weeks and one year after the incident), and the long term (one year or more after the incident) respectively.

The following matrix summarizes the consequences that are considered the greatest or most serious to society.

	The short term up to two weeks after the incident	The medium term between two weeks and one year after the incident	The long term one year or more after the incident
The individual	Need for information	Worry about the future	Personal finances, compensation
Organization	Need to collaborate Need for information, communication	Municipal activities and economy	Social debate and decisions - energy - safety - responsibility
Technical	Resources - staff, experts - testing, laboratory analyses	Electricity shortage Temporary solutions for infrastructure	Food production and distribution, testing
The economy	Forecasts and speculations	Handling of costs Trust	Government assistance

The individual's perspective

The greatest and most serious consequences from an individual's perspective mainly concern the people who are affected by ionizing radiation or electricity shortage, although the incident will have consequences for everyone living in Sweden. For the public, the need for information during the time after the incident will probably constitute the most important consequence. This regards information both about the actual incident and, for those who are directly affected, how people should handle the situation. Worries about personal finances and health-related issues caused by ionizing radiation will probably be widespread. However, these worries can be reduced by providing individuals with information about the incident and how it should be handled. For those who had to leave their homes due to the radiation, the evacuation will constitute a serious and considerable consequence.

Over time, worries about the future will become the biggest consequence for those directly affected. These matters may regard how life is supposed to go on, and about practical solutions regarding housing, school and work, as well as financial losses. The need for information will continue to be important, both over the mid- and long term. In the long term, matters regarding compensation for financial losses will probably become the greatest consequence for those directly affected. Medical effect from the ionizing radiation, including worries about one's health, will also be important consequences in the long term (decades). People who, because of their profession, may be exposed to radiation after a radioactive fallout, will constitute a risk group. Many people worry about cancer or other injuries caused by the radiation, but only a smaller number of people will suffer health-related problems. However, for these people the illness will obviously be the most important and serious consequence of the radioactive fallout. From an insurance perspective, it will in many cases be difficult to prove whether any specific case of cancer was caused by the radioactive fallout.

The organizational perspective

From an organizational perspective, the consequences of the radioactive fallout will mainly affect municipalities and county administrative boards in the vicinity of the incident. The need for collaboration, information and communication dominates the first two weeks after the incident. For example, directly after the radioactive fallout, information to the public will have to be coordinated among central and regional government agencies and the municipalities, as well as different levels of society. Actors in the public and private sector will have to exchange information on how to handle the incident. The need for collaboration, information and communication also appears when the public and the media starts requesting information. Other significant consequences will affect the agricultural sector and the food industry.

In the medium term, the consequences will be the greatest for municipal services and finances. Their operation will have to be moved, at the same time as it is burdened by the fact that people are evacuated, relocated or move away permanently. An adjustment to changes in the population and the tax base will take place gradually over several years. The consequences and length of this adjustment will depend on whether the municipalities receive any form of financial assistance. The Government and the Riksdag (Swedish Parliament) are both expected and required to take political action. There will be a need for political decisions at all levels of society. However, there is a risk that these decisions are not prepared properly, which could decrease the effectiveness of public services.²²⁷ There will probably be production-related disruptions in the private sector throughout the first year after the incident. There will probably be structural adjustments made based on the available production facilities, as well as available staff and transports. In addition, the contamination will probably also lead to new business opportunities.

²²⁷ Public Government Investigation, SOU 2009:88, *Kärnkraft – nya reaktorer och ökat skadeståndsansvar*, 2009

In the public debate, people will demand that someone is held accountable for the incident, and the energy supply will be discussed. In the long term of the organizational perspective, the social debate will be the greatest consequence: debates on energy supply, nuclear safety and matters regarding accountability. Indirect consequences of the previous handling of the incident will also become noticeable, such as when previous decisions are to be implemented. Furthermore, preventive replanning aimed at energy supply and nuclear safety will also be conducted.

The technical perspective

The greatest consequence from a technical perspective will likely be the need for various types of resources, mainly personnel and national expertise in various fields, as well as for testing and analysis. There will also be a risk that certain resources will not be enough. Furthermore, the electricity shortage is a substantial consequence of the incident, and unless it is attended to within a few weeks it will become the greatest consequence in the medium term. However, the electricity shortage will probably be solved before the end of the first year. There will initially be strong disruptions in transports within the affected area. When the electricity shortage has been solved, the transport problem will become the most serious consequence in the midrange term, and will require temporary solutions. The need for resources for decontamination, testing and analysis will remain to be an important consequence over the medium and long term, especially for the food industry. However, long-term solutions will eventually be implemented.

The greatest consequence in the long term is the need for testing and analysis of food products. Several decades after the incident there will still be restricted areas and landfills to handle the radioactive waste. Temporary infrastructure solutions during the first year, e.g. for transport routes, will eventually be replaced by permanent solutions. Infrastructure for electricity and telecommunications in restricted areas will be used as long as they are operational. However, if the maintenance and reparation of this infrastructure turns out to be problematic, impossible or very expensive, it will probably be replaced by new infrastructure in a new location. New construction of road and railway takes time, and appeals made in accordance with the Environmental Code will prolong this process further. In addition, there will be additional costs before decontaminated or new infrastructure is put in use. There can also be situations where investments in infrastructure delay or replace other societal investments.

The socio-economic perspective

From an economic perspective, speculations and forecasts will be the greatest consequences in the short term, with regard to public finances. Other important consequences include a decline in the stock market, a weakened currency and higher interest rates. After the initial period following the incident, the effects of the trust in Sweden's economy will be the most substantial consequence, which is connected to the question of costs. The economy will stabilize over the first year after the incident, and the handling of the incident will generate growth. In the long term, the need for government

support and questions regarding this support will become the most significant consequence, following by compensation-related processes.

The extent of the socio-economic consequences at the local and regional level is strongly connected to whether the compensation processes can be initiated swiftly and that the actors that have been suffering financially can receive compensation as soon as possible. However, this will become less relevant if it becomes evident that there are not enough means for full compensation. In this case, trust-related problems would become worse for the government agencies, including the Government.

The scope of the socio-economic consequences at the national level is partly decided by whether Sweden, the Swedish Government in particular, is able to afford the enormous costs that a large radioactive fallout of the magnitude discussed would generate, as well as how this affects the financial market's trust in Sweden's economy and businesses. The compensation levels stipulated in Swedish law, (currently at SEK 6 billion, alternatively the future level of SEK 12 billion) will not cover the total costs of the fallout. In addition, there will be costs for, for example, testing, analyses and healthcare for many years to come. In other words, the total scope of the socio-economic consequences will depend of whether the Government and the Swedish Central Bank is able to restore trust in Sweden's economy. This will in turn affect financial markets, which also play a deciding role for the development of Sweden's economy.

Conclusions

In addition to the discussion above about the greatest and most serious consequences, we can observe that time has a substantial impact on the scope of the consequences for society about a year after the incident, compared to one or two decades later. Many questions or problems will be solved or become a thing of the past, such as the large population changes in the affected areas. Consequences and issues that remain for a long period of time - sometimes forever - are environmental damage such as contaminated areas and landfills, as well as health issues and worries about health issues. Some measures to handle the consequences of the incident will proceed over a long period of time, such as administration of uninhabitable areas and insurance-related legal matters.

The conclusions of this report is that an accident at a nuclear power plant could have large and costly consequences for society, even when considering the uncertainties in this analysis. Radioactive fallout and power shortages would bring about serious consequences on their own. However, a combination of these incidents would create a very serious situation in society. The most serious consequences are:

- *The need for information;* critical over a long period of time, depends on the level of civil unrest, but also on the coordination of information and operations among different actors.
- *The need for testing and analyses in the food industry;* will also remain critical for a long time. The needs will remain for several decades after the incident.

- *Enormous costs*; which will be paid mainly by the tax payers. The long-term trust in Sweden's economy will depend of how the Government decides to handle these costs.

The key word for societal consequences of an accident at a Swedish nuclear power plan is *trust*. Trust in politicians and authorities, in food products and the environment, and in Sweden's economy.

SAMÖ 2008 – IT attack against financial systems

This scenario is about an organized IT attack on society's financial systems, which could seriously affect public trust. SAMÖ 2008 took place on 22–23 April, 2008 and involved actors in the Stockholm region as well as the County Administrative Boards of Östergötland, Dalarna and Gävleborg.²²⁸ The exercise was conducted as a simulation, including a response cell giving the injects. 21 actors from the national and regional level participated in SAMÖ 2008. Additional actors participated only in the response cell, not least from the private sector and the local level. SAMÖ 2008 also included an external monitoring phase, which was initiated on 31 March. The purpose of the phase was for the participating actors to have a common point of reference before the actual exercise.

Description of the scenario

On 31 March, the newspaper publishes an article about the EU passing a far-reaching regulation to prevent money laundering in Europe. Sweden was one of the promoters of the regulation. The regulation is intended to target organized crime in Europe. In April, the fictitious IT magnate John Smith accuses Sweden of opposing the free movement of capital within the EU.

As from mid-April, there are reports about several robberies of money transports around the country, as well as reports about criminal networks. Banks experience problems with their websites and internet services, and have problems involving insiders and customers who receive incorrect bank statements.

On 22 April, two American banks are found to have credit problems. Problems with credit and debit cards, and a stolen card database prompt financial actors in Sweden to analyse the incidents and exchange information. However, the customers were not asked to pay any damages. Several robberies of money transports result in disruptions in cash supply.

Stolen online identification accounts cause problems for the Swedish Social Insurance Agency and the Swedish Tax Agency, among others.

On 23 April it is reported that the two American banks have experienced financial problems and have cancelled their payments. In Sweden, many customers are affected as bank accounts from the stolen card database are emptied. Robberies against money transports and money depots cause a halt in money transports, resulting a shortage of cash. At the same time, there are large disruptions in internet traffic which, along with the stolen online identification accounts, make it difficult for government agencies, companies and individuals to carry out transactions or send information. Many government agencies experience security problems with their websites, such as people not being able to log on or use their online identification accounts. The

²²⁸ All information about the exercise and the scenario is collected from: The Swedish Emergency Management Agency, *Utvärdering av samverkansövning 2008 (SAMÖ)*, dnr. 1470/2007

banks, however, are relatively unaffected, despite problems with payments through the bank giro service.

There are serious disruptions in road and rail traffic due to shut down traffic lights caused by IT problems as well as fuel shortage and payment problems at fuel pumps. A service office in Stockholm housing several government agencies is destroyed in a fire. The media reports that people are being referred to other offices. There are many reports of violence and riots. The Government discusses the possibility of summoning the Swedish Auxiliary Police. Vigilance committees are formed in Gävleborg and Dalarna County, and are reported to be armed. Regional disaster management councils are summoned to collaboration meetings in order to coordinate information and get a comprehensive picture of the situation in the region.

On 24 April, the scenario is further escalated as several people are killed and injured in a failed attempted robbery of a money transport, while bank offices are rushed by angry mobs trying to withdraw their money. As a result of frauds in the land registry, several homes are hijacked. Several government agencies' websites are shut down due to disruptions on the internet. At the same time, intelligence activities are increasingly pointing towards the magnate whose IT empire is behind many of the disruptions and robberies. The Swedish Finance Police confirms that there has been a coordinated IT attack against Sweden.

Consequences

Problems with the financial system can have great and hard to grasp consequences not only for the affected country, but for a large number of other countries as well. The systems used for financial transactions are global, which could make it difficult to find the source of the problem, and to fix it.

The public will soon experience problems if, for example, cash machines and credit card terminals stop working. Without cash, functioning debit cards and payment systems, you cannot buy food, fuel or pay your rent, etc. In addition, there are probably not enough shops and banks that have the resources to handle analogue sales and transactions. It is seen as a matter of course that the internet and the payment systems are working.

If the problems remain for a longer period of time, there might be problems with looting. People will eventually become desperate in their hunt for food.

SAMÖ 2007 – terrorist attack

SAMÖ 2007 was about coordinated terrorist attacks against the Stockholm area. The exercise was carried out on 25–26 April, mainly in and around Stockholm.²²⁹ The exercise was conducted as a simulation, including response cell giving the injects and practical field training exercises. Approximately 40 actors from the national, regional and local level, including the private sector, took part in the exercise. In addition, some additional actors participated only in the response cell. SAMÖ 2007 was preceded by an intelligence phase, which proceeded for about a month. The purpose of the intelligence phase was to analyse the threat and to study how other actors would be informed about these analyses.

Background scenario

For a number of years, Sweden has strengthened its international presence in war-torn areas. For the last two years, the Foreign Force of the Swedish Armed Forces has participated in a UN-led international force that is tasked with establishing and maintaining peace and security in Bogaland. The task force is to maintain public order and make sure that the agreements between the combating parties are followed. For about a year, the Swedish battalion has been in charge of a Provincial Reconstruction Team in one of the country's least stable provinces, Kazuria. The Swedish battalion has been faced with a number of difficult situations, and their capture of the most well-known war criminal made the news around the world. The Swedish Security Service has recently issued a warning that there is an increased threat of terrorist attacks aimed at Sweden.

Main scenario

The first main incident occurs on 25 April at 8:23 in the morning, in a railway tunnel below Södermalm. A powerful explosive charge explodes on-board a commuter train exiting Stockholm during the morning rush hour. Several passengers are killed and many are injured. The explosion cut off all power to the railway power lines between the Stockholm Central Station and Årstaberget.

This leads us to the second main incident, which occurs a couple of minutes later. There is an explosion south of the Stockholm Central Station, near Tegelbacken. A lorry carrying explosives explodes under a railway viaduct as an X2000 train heading towards the station has stopped above. The train stopped due to the power cut. The train's first carriage is seriously damaged, as are cars on the Central bridge and people nearby. Several passengers on-board the train are killed instantly, and many are injured. Buildings within a radius of a couple of hundred metres are hit by the explosion. Among the passengers on the train is the regional management of the Swedish Maritime Administration.

The third main incident takes place at Arlanda Airport, starting at 8:57 a.m. when a fire alarm from the air-traffic control tower reaches the rescue services station RC Norr. The tower is shut down by a cable fire. During the rescue

²²⁹ All information about the exercise and the scenario is collected from: The Swedish Emergency Management Agency, *Utvärdering av samverkansövning 2007 (SAMÖ)*, dnr. 0887/2006

efforts, a threat is received about proliferation of an infectious biological substance in the Arlanda terminal system.

Main incident number four takes place on 26 April at 8:23 in the morning, on an SL bus at a bus stop by Rosersberg railway station. A 'dirty bomb' containing a radioactive material explodes on the bus, which had stopped at the bus stop. Around 40 people are injured or killed by the explosion. The policemen that are first to respond lack protective gear against radiological material and the Rescue Service's operation takes time due to the radiation measurements and decontamination efforts.

The final main incident takes place in Södertälje. At 8:32 a.m. there is an explosion on the E4/E20 bridge over the Södertälje channel. The southern half of the bridge collapses and parts of the bridge fall into the water. A tank lorry and several cars fall into the channel. The northern half of the bridge is seriously damaged, and there are a number of injured people on the bridges nearby.

Consequences

Besides the direct damage on people and property that is caused by this type of event, the local infrastructure will be affected for a long time. When problems arise in the provision of electricity, among other things, there will soon be serious problems as most aspects of a modern society are dependent on electricity. This includes everything from computers to drinking water and public transport.

After an incident such as the one described above, where there are several attacks within a short period of time, there is an enormous need to inform and communicate with the public. However, the prerequisites for conveying information to the public are made more difficult by disruptions in the power supply and telecommunications, which results in greater social unrest. Thus, worries can prompt people to evacuate the city, which can cause serious traffic problems and an increased risk of accidents, etc.

Furthermore, the healthcare services will be put under a lot of pressure due to the large number of injuries at the same time. In addition to finding a sufficient number of "regular" hospital beds, there will probably be a number of burn victims for which the numbers of dedicated rooms are limited.

Since several roads leading out of the city are damaged or likely to be blocked by people leaving the city, it might prove problematic to get the injured people to hospitals in other cities.

Appendix 2 Scenarios: solar storms and sulphur mist

The scenarios involving solar storms and sulphur mist were outlined by the MSB, and are examples of two risk areas where work is currently being done to compile available knowledge and increase our understanding of the consequences.

Scenario – Sweden is hit by a solar storm

In December strong solar storms appear, the effects of which mainly affect the Nordic countries. Currents are successively induced in power lines, causing several transformers to overload. One power transformer is so damaged that it has to be taken out of service and be replaced. This affects as many as 200,000 households in a number of geographical areas, who are left without power for 10-12 hours. The telephone and mobile telephone network experiences serious disruptions due to damaged equipment in base stations and power failure.

Consequences: Because of the cold weather, with a temperature below zero degrees Celsius, mainly elderly people suffer from chilling and frostbite. Vital societal sectors have backup power sources, but are dependent on the supply of fuel for the aggregates. Several hospitals experience problems with the aggregates. Operations can in many cases continue, although with reduced capability. The telephone network can handle longer power failures as long as the backup power aggregates hold and fuel is refilled. The mobile telephone network, however, experiences serious disruptions and shuts down in some places due to overloading. In addition, a small number of regions report that they have problems with the water supply.

Scenario – Sweden hit by sulphur mist

In June, a strong and explosive volcanic eruption on Iceland send large mounts of gas into the atmosphere. The sulphur mist is carried east by the wind, towards Europe. A coinciding high pressure enters western Europe and pushes the sulphur mist towards the ground, where it remains due to temperature inversion in the air. The sulphur mist mainly affects Sweden, southern Norway, Denmark, and western and northern Germany.

People and animals who are exposed to the sulphur mist experience irritated mucous membranes and difficulties breathing. Those affected are mainly asthmatics, elderly and children. In addition, there are reports of more serious effects such as palpitation of the heart and heart attacks. Vegetation, including entire cultivations, is discoloured and wither. As time goes by, herbivores get sick by the high sulphur content in the grass, and water acidification leads, in some cases, to death of fish.

Consequences: The incident puts a lot of pressure on the healthcare service, mainly by people with respiratory problems, elderly and children. Many sectors suffer from a shortage of staff, as people do not want to leave their homes due to health risks. Contamination is mainly caused by grounds with high sulphuric content. This leads to problems for the agricultural sector and other businesses that have grazing animals. There is a shortage of certain fresh food products

such as milk, meat and vegetables, but also cereals. The extent of the damage depends on the duration of the volcanic eruption and on the weather.

Appendix 3 Scenarios with an overall assessment of society's emergency preparedness

The overall assessment of society's emergency preparedness is an assessment of how well prepared our society is to handle known threats and risks, as well as how well we can handle unforeseen events.

Since 2003, the MSB, and previously the Swedish Emergency Management Agency (SEMA), have been tasked by the Government to evaluate government agencies' capability of handling crises within their area of responsibility. Before this, the National Board of Civil Emergency Preparedness conducted annual follow-ups of the government agencies' capability. The government agencies' capability assessments have differed in recent years, but since 2007 scenarios are used to support the assessment, as are indicators of emergency preparedness.

In this Appendix we present a couple of scenarios for which government agencies have conducted capability assessments in the years 2007–2010, and for which the MSB and the SEMA have carried out emergency preparedness assessments.

Ice storm (2010)

Ice storms are a scenario that has been analysed on two occasions in Swedish capability assessments. The first assessment was conducted in 2005, when it focused on long-term power shortage caused by an ice storm. The scenario analysed was based on the ice storm that hit Sweden in 1921, as well as the storms that hit Canada in 1998 and France in the late 1990s.

The second analysis of an ice storm scenario was conducted in 2010. This scenario was sent out to 35 Swedish government agencies, all the county administrative boards and certain government authorities. The government agencies assessed their own operations as well as the sector's or the county's capability of withstanding and handling the scenario. The MSB has compiled the government agencies' presentations and conducted an overall capability assessment.²³⁰

Scenario

"The weather in Sweden the last few days has been clear and cold. The temperature has been around -10°C at night and 5°C on average during the day. Electricity consumption has been high for the season, and the Swedish National Grid has electricity reserves on standby. Weather forecasts indicate that there might be heavy squalls, snowfall and freezing rain over large parts of Sweden, covering several bordering counties including both larger cities and the countryside. The Swedish Meteorological and Hydrological Institute has issued a class 2 warning for the coming days, as there is an imminent risk of an ice storm.

²³⁰ The Swedish Civil Contingencies Agency, *Uppföljning av samhällets krisberedskapsförmåga 2010*, MSB 263, 2011

The following morning, the storm hits with full force. Because of strong winds and glaciation, power lines break down and distribution plants eventually short-circuit. This results in extensive power failure in the area.

The widespread glaciation also breaks telephone poles, radio masts and mobile telephone masts, causing extensive disruptions in electronic communications. Roads become more or less inaccessible due to several centimetres thick ice as well as fallen trees and power lines. There are reports of several road accidents. The public is advised to stay home. Acute transports are only possible if several vehicles drive as a group, and if the Swedish Transport Administration has spread de-icing salt on the roads. Due to the extensive ice coating, the railway services in the area are also down. The ice storm has effects on several sectors of society, such as disruptions in the payment system, the provision of food and drinking water, the municipal healthcare service, etc.

The storm declines after three days. The following week is clear and cold, which means that the ice remains on roads and railway tracks. Around 1 million households in the area are without electricity. The electricity grid's reduced capability and overloading also results in power shortages in other parts of the country. However, clearance work and repairs can be initiated. Broken down distribution plans in the affected area are estimated to be back in operation within a couple of days, but damaged power lines will only be back in full operation within one or two weeks at the earliest. Manual shut-down will have to be implemented in the area and other parts of Sweden over the coming months. Telecommunications are also expected to have problems during this time.”

Overall assessment

The government agencies assessed their emergency preparedness – i.e. disaster management capability and the capability of vital societal functions to withstand serious disruptions – based on a four-point assessment scale; “Good”, “Good, but with some shortcomings”²³¹, “Insufficient” or “Defective”.

A large majority of the selected government agencies estimated that their capability with regard to their operation and their area of responsibility (sector/council) was *good, but with some shortcomings* or *insufficient* in an ice storm scenario. The capability within the agency's own operation was generally assessed to be somewhat better than the county's/sector's capability.

The MSB's overall assessment is that society's emergency preparedness was *insufficient* in an ice storm scenario, with special consideration given to assessments of the electricity, electronic communications and transport sectors. This insufficient capability would ultimately affect all sectors of society. Therefore, the scenario would risk leading to large direct or indirect health

²³¹ The equivalent of the rating “Mainly good capability, but with certain shortcomings” as above.

effects for individuals and cause serious disruptions in societal functions in the affected area.²³²

Influenza pandemic (2010)

As with ice storms, a pandemic is a scenario that has been analysed on several occasions in Swedish capability assessment. The first assessment was carried out in 2005, when a bird flu scenario was analysed. In the last three years – 2008, 2009 and 2010 – more or less the same scenario has been analysed. This has allowed the MSB to monitor the development of government agencies' emergency preparedness.

Scenario

A new form of influenza virus is spreading, and over the world large parts of the population are infected. The virus is discovered in Sweden in early September. The sick leave rate rises to about 15 percent over seven weeks. The pandemic reaches its peak during week two and three, when the sick leave is at 50 percent. Those who get sick stay at home for at least five working days.

Overall assessment

Based on the government agencies' capability assessments, the MSB's assessment found that society's emergency preparedness for a pandemic was *mainly good, but with certain shortcomings*. A majority of the county administrative boards estimated that their county's overall capability was good. The Swedish Institute for Communicable Disease Control assessed its own capability as good, while the National Board of Health and Welfare, which is in charge of the coordination of Sweden's disease control, estimated that the Board's and the sector's capability was insufficient at a 50 percent sick leave rate.

The MSB assessed that the overall capability of vital societal functions to withstand serious disruptions was *mainly good, but with certain shortcomings*, based on the overall assessment of the government agencies' analyses. Several government agencies assessed their own capability to be good or good with certain shortcomings, both with regard to their own operations and with regard to the county or sector. However, the MSB's overall assessment was somewhat more cautious due to the National Board of Health and Welfare's assessment of the capability as insufficient, which the MSB considered to be an important factor.

Many government agencies believe that access to antivirals and the ability to conduct vaccinations are the most important material resources in the event of a pandemic. In addition, access to medical supplies and various types of disinfectants was considered important. These resources are also dependent on functioning transport and agreements with suppliers.

When it comes to human resources, about half of the government agencies state that they have sufficient personnel and that they are able to redistribute their staff. However, only a small number of the government agencies have

²³² The Swedish Civil Contingencies Agency, *Uppföljning av samhällets krisberedskapsförmåga 2010*, MSB 263, 2011

staff that is educated and trained for this type of incident. Many government agencies mention the difficulties of replacing functions that require special competence, in the event of widespread illness. Based on these assessments, the MSB believes that trained human resources are of utmost importance, and that the dependency on key personnel with the right competency is more important for the handling of a pandemic than is the number of people on sick leave.

Scenarios involving pandemics, disruptions in payment systems and IT-related disruption (2008)

When the MSB assessed Sweden's emergency preparedness in 2008, the results from three different scenarios were compiled: a pandemic, disruptions in payment systems and IT-related disruption. In other words, the assessment of Sweden's emergency preparedness was based on all scenarios, as well as supplementary data.²³³

Scenario – Pandemic

“A new form of influenza virus is spreading, and over the world large parts of the population are infected. The sick leave rate rises to about 15 percent over seven weeks. The pandemic reaches its peak during week two and free, when the sick leave is at 50 percent. Those who get sick stay home for at least five working days.

Even before the first outbreak in Sweden, a national healthcare counselling hotline and website are opened. It is kept open throughout the entire pandemic, although it has very long queues at times.

One week after the outbreak, the Government decides that the influenza is to be classed as a public danger, which means that it is covered by the Communicable Disease Act's regulations on duty to report, quarantine, isolation, etc.”

Scenario – Disruptions in payment systems

“Sweden currently holds the Presidency of the Council of the European Union. During Sweden's presidency, the EU takes decisive action against organized crime. At the same time, a new criminal organization is set up in several Swedish cities.

There are disruptions in many of Sweden's internet banks. Among other things, payments are registered to the wrong customers, and bank statements turn out to be incorrect. Many bank customers receive spam e-mail stating that cash will be paid out to those who enter their bank details and pin number. Due to the problems experienced by the internet banks, fewer people are comfortable with carrying out transactions on the internet, and many prefer to use cash only.

Several government agencies, including the Swedish Social Insurance Agency, the Swedish Tax Agency, the Swedish National Debt Office and the National Board of Student Aid, are attacked by corrupt code and their computer systems

²³³ The findings were presented in the MSB's report *Samhällets krisberedskapsförmåga 2008*, MSB 0034-09, 2009

break down. This means that the payments conducted by these government agencies, such as pensions, student loans and unemployment benefits, cannot be made. In addition, the Swedish Tax Agency cannot make payments to the municipalities.

At around the same time, there are robberies against several money depots around Sweden, and the security service companies cancel their money transports due to the fear of additional robberies.

There are rumours and speculations about cancelled payments. There are headlines in the media such as “Parents’ allowance and sickness benefits will not be paid out!” The public is worried, as the cancelled payments could be damaging to their credit ratings since they cannot pay their bills or rent.

The fear of defaulted payments worsens the cash shortage further, as cash machines are emptied. Supermarkets are quickly emptied as the public hoards food and other necessities. In addition, many people are unable to buy groceries, fuel, etc. as they cannot use their debit cards and do not have access to cash.

The public demands that public transport and taxi fares are made free, and bank offices are rushed by angry mobs who want to withdraw their money.”

Scenario – IT-related disruption

“A current social issue has led to some heated debates, and there are angry letters and debate articles written around the country. Your government agency is particularly affected, as it is seen as the promoter of an unwanted change.

On several public internet forums a number of people start posting about how easy it is to block the internet or break into the websites belonging to the political parties, government agencies or others that are regarded as having symbolic functions in this matter. After a couple of days, someone posts instructions for how to carry out such an attack, and someone else posts a link to a program that has been programmed to send large amounts of junk data to your agency. The tool is so simple that an 11-year-old could use it.

Right before the end of a workday in the middle of the week, one of the co-workers at the agency notices that it takes an unusually long time to access the agency’s website. After a while, 10-15 minutes, it is suddenly impossible to access it. A quick phone call confirms that it cannot be accessed by the public either. After half an hour, the media calls and asks what has happened.

Early the next morning, one of the co-workers who arrive first at the office concludes that although it is possible to log on to his computer, he cannot access his e-mail account. He walks over to the coffee machine as discusses the matter with his colleagues who are now arriving. Everyone seems to be having the same problem. Soon after, the director-general at the agency receives a call from the media about the defamatory comments about certain Swedish politicians which he has sent to several national editorial offices in Sweden from his e-mail. At the same time, the head of staff and the in-house lawyer notice how their mobile phones are blocked by strange phone calls. Those who call want to purchase products which have been offered at bargain prices on a

website. The head of information, who was receiving a lot of phone calls as it was, receives similar phone calls.

Around lunch time, the media calls once again. Someone has posted all the agency's e-mail account passwords on an internet hacking forum. As if that was not enough, it appears that several co-workers have chosen very inappropriate passwords.

Overall assessment

Disaster command capability

Based on the three scenarios, along with supplementary data, the MSB assessed that Sweden's disaster command capability was *mainly good, but with certain shortcomings*.

- There were shortcomings related to perseverance. The government agencies had difficulties maintaining a prepared and trained management function for seven days.
- There were shortcomings in the government agencies ability to provide coordinated information to the public during a crisis.
- In addition, the government agencies had problems producing a common situation awareness.

Operational capability

The MSB found society's operational capability to be *insufficient*.

- There were difficulties obtaining a sufficient number of staff and material resources in the event of a crisis.
- Problems with deciding on a common situation awareness had consequences for the coordination of joint operations.
- In several fields there were insufficient knowledge regarding the distribution of responsibility during a crisis.
- In addition, operational capability was not exercised sufficiently.

Capability of vital societal functions to withstand serious disruptions

The MSB's assessment concluded that the capability of vital societal functions to withstand serious disruptions was *insufficient*.

- The ordinary resources were insufficient during a serious disruption. In addition, the routines for redistributing and receiving additional resources had not been practised enough.
- Vital societal infrastructure has defects in robustness, especially when it comes to electronic communications.
- The government agencies reserve power supplies rarely lasted for seven days without refuelling.
- Only a few actors from the private sector participated in the exercises.

Accident involving radioactive materials (2007)

An accident involving radioactive materials has been used in several analyses and evaluations, such as the SAMÖ-KKÖ exercise in 2011 which tested society's ability to handle the consequences of a nuclear technical accident. The evaluation of SAMÖ-KKÖ showed that society can handle such an incident adequately. A specific test and evaluation was made of the capability of important actors to sound/receive alarms and activate the relevant disaster command structures. The grade was *good, but with certain shortcomings*. Besides this, there was no overall assessment of society's emergency preparedness based on the scenario. The most recent assessment of capability to handle a nuclear accident was conducted in the capability assessments of 2007.²³⁴

Scenario

"A very serious reactor accident has occurred in Sweden, which has resulted in extensive radioactive fallout in the region. Evacuation of the inner emergency zone. Need for decontamination in the affected county. Restrictions on grazing animals and food products in large parts of the country. Serious psychological effects."

Overall assessment

Disaster command capability

In the 2007 capability assessment, the SEMA found that Sweden's disaster command capability for a large accident involving radioactive material was *mainly good, but with certain shortcomings*.

In the assessment²³⁵, the SEMA wrote that it is possible to quickly discover an impending nuclear technical accident with radiological consequences. Normally, there will be time to take action and make preparations. However, the capability to quickly set up a common situation awareness had some shortcomings, as there were differences in the involved actors' emergency preparedness. There are technical prerequisites for communication between government agencies, but the communication is made more difficult by the fact that there are several management support systems that are incompatible with one another. The affected government agencies found this to be unacceptable.

Operational capability

Our assessment found some operational capability. However, the operational capability was *insufficient*. Emergency care and primary care services would be heavily burdened. In these areas, capability was considered defective, mainly due to lack of planning and routines for identifying and looking after patients if they have been in contact with dangerous material. There would probably be a shortage of equipment such as radiation protection gear and radiometers. Access to hospitals and radiation physicists would soon become a limiting factor. In addition, there would be a lot of pressure on child and elderly care

²³⁴ The Swedish Emergency Management Agency, *Klarar vi krisen? Samhällets krisberedskapsförmåga 2007*, dnr. 1443/2007, 2008

services, as well as home care services. However, the social services would probably adjust to the new situation quickly and offer the necessary support measures.

Operational capability in the so-called nuclear counties is of course particularly interesting. The opinions below are based on the three county administrative boards' capability assessments as well as their risk and vulnerability analyses for 2007.²³⁶

- The County Administrative Board of Halland stated that the county's operational capability in general was good. There have been reports that some functions, such as decontamination and routines for information, could be improved upon. The Board reports that the rescue service organization is suitable. Decontamination and technical tools were the only aspects that received somewhat worse judgements.
- The County Administrative Board of Kalmar stated that the county's operational capability in general was good. The main task could be solved even though certain aspects had not functioned as intended. There were some shortcomings within the Police and voluntary organizations, as well as concerning decontamination, evacuation and assistance to other counties. The organization, planning and technical equipment was found to be functioning well.
- The County Administrative Board of Uppsala stated that the county's operational capability in general was good. The Board stated that the main task could be solved despite certain shortcomings. These shortcomings mainly regarded the Board's staff and the municipalities, as well as information, decontamination, coordination and computer support. The organization, planning and technical equipment was found to be functioning well.

Capability of vital societal functions to withstand serious disruptions

The capability of vital societal functions to withstand the incident was found to be *insufficient*. Society would be not able to ensure basic services, safety and care or solve other vital societal tasks in the event of a serious accident involving radioactive materials.

Emergency wards and primary care centres lacked protection against radioactive materials. This means that you could not use the hospitals that are near the accident site. The ambulances lacked any form of indication or measurement equipment. In addition, the Police would only have limited means of lessening the consequences of the incident.²³⁷

Transport of people and goods on land would be heavily affected for a long period after the incident. No transports are allowed through the worst affected areas. Capability-related problems cause extensive delays. However, the effects on transports by sea would probably be less severe. Air traffic would probably cease within the affected area, as the air territory would be closed.

²³⁶ Ibidem

²³⁷ Ibidem

Disruptions in electronic communications (2007)

Scenario

In the 2007 capability assessments, the government agencies analysed the following scenario²³⁸:

“Due to bad weather in early December, there have been large disruptions in electronic communications for seven days. These disruptions affect an area about the size of a county. The term electronic communications comprises telecommunications, IT and radio.”

Overall assessment

The SEMA assessed Sweden’s emergency preparedness for 2007 based on the following three aspects.

Disaster command capability

The SEMA’s assessment found that society’s disaster command capability in 2007 with regard to disruptions in electronic communications was *insufficient*.

Society’s disaster command capability would be severely tested if the electronic communications were to break down. This applies, in particular, to the ability to inform, coordinate and issue alarms. Several government agencies use RAKEL as a supplementary communication system. In addition, many agencies emphasize that they have various types of reserve systems, such as the Swedish Armed Forces’ telephone network and satellite telephones. These systems improve the agencies’ ability to maintain prioritized functions considerably. However, since communication requires both a sender and a receiver, it would still be difficult to instruct, coordinate and inform if the other party lacks the same equipment.

The media is dependent on electronic communications to collect and disseminate information. The media companies capability to handle disruptions in electronic communication varies greatly among different forms of media as well as different companies. The Swedish National Board of Psychological Defence conducted a survey in 2007 which showed that around half of all large and medium-sized media companies in Sweden believe that they are prepared for disruptions in electronic communications. The technological development in the media industry means that the dependency on electronic communication is increasing. At the same time, the development allows the media to communicate in many different ways, which makes the media companies less vulnerable.

In many cases electronic communications are required in order to receive media reports. Newspapers have a special position, as electronic communications are not needed to use them.

Although the media industry has a relatively strong capability, a disruption in electronic communications would likely lead to a lack of information at all levels of society. It would be difficult or impossible for an individual to get in

²³⁸ Ibidem

touch with friends and relatives, and many of the ordinary media channels would be inaccessible. Citizens would probably feel less safe due to the lack of information and communication.

Furthermore, a disruption in electronic communications would also make it significantly more difficult for actors within the disaster management system to collaborate. The assessment found that they would have serious problems communicating and conveying reports. The lack of a common situation awareness would make the general lack of information in society even worse.

Society's operational capability

The SEMA's assessment found that society's operational capability in 2007 with regard to disruptions in electronic communications was *insufficient*.

Since the deregulation of the telephone market, the operators are responsible for their networks and their services. This also includes the repairing and restoring functionality after a disruption. In addition, the fact that the industry's ability to collaborate and inform the public was considered insufficient also affects the process of fixing the disruption. The operational capability is also affected by the difficulties of creating a situation awareness. A correct situation awareness is crucial for the right resources to be allocated to the right place.

At the time of the assessment, very few operators had the competence needed to operate all stages of electronic communication without assistance. Many of the operators were specialized on certain functions, which make them dependent on other operators and subcontractors. Several operators are often dependent on the same supplier, which usually also means that they are dependent on the same repairer in the event of damage. When it comes to some technical competencies, organizations can depend on a very small number of people. If these people are unavailable in the event of a malfunction, it could have negative consequence and possibly create or extend a disruption. Slimmed-down organizations and a dependency of subcontractors can also made the operators vulnerable during large incidents where the damage is so extensive that they do not have enough staff to fix the problem.

Since the systems are spread out geographically, vehicles and accessible roads will be needed in order for the operation and maintenance staff to get to and fix the problem. A strong storm is a likely cause of disruptions in the electronic communications. Bad weather often has a negative effect on road accessibility, as trees or large amounts of snow might block the roads. The Swedish Post and Telecom Authority's assessment of the sector's capability to restore functionality found that it was mainly good. Considering the industry's vulnerability and mutual dependencies, as well as the fact that roads are likely to be inaccessible for a relatively long period of time, the SEMA rated the operational capability as somewhat worse. The Swedish Post and Telecom Authority shared this opinion.

Capability of vital societal functions to withstand serious disruptions

In 2007, the SEMA's assessment found that the capability of vital societal functions to withstand a disruption in electronic communications was *insufficient*.

A disruption in electronic communications would lead to an interruption in the information flow. This would in turn bring about disruptions in the flow of goods and services. In other words, the organizations that would be affected the most would be those that are dependent on, or consists of, flows of information and products. Operations that are monitored by electric systems, or which rely on remote control, would also encounter serious problems. This could have particularly serious consequences for society if it affects the production of drinking water.

This production often runs on electricity, whilst being operated and controlled by electronic communications. In many cases, the capability of handling power failure is better than the capability to handle disruptions in electronic communications. In the event of a power failure, the operation can still run on reserve power, but it is harder to implement functioning back-up solutions for electronic communications. There are a number of different communication systems that could be used in parallel, in order to diversify the communication system. However, it is not certain that these solutions would provide the safety that is needed, since the different systems often break down at the same time. This could be caused by, for example, mutual dependencies among the systems, or that the wires are located in the same place.

Although hospitals have back-up systems for electricity, they would be seriously affected by a breakdown in electronic communications. It would be more difficult to handle case books, deliver test results or communicate with other divisions. The social services would also be put under a lot of pressure after the incident, since the personal alarms used by patients would stop working, among other things. Without these personal alarms, the social services would not know when patients are in need of help. This means that the staff would have to visit all patients on a regular basis.

However, what causes the most unrest among the public is that the SOS Alarm service cannot be reached. The system can be overloaded, which would mean that those who need to contact SOS Alarm cannot get through. In addition, individuals need functioning communication channels in order to contact SOS Alarm. As with regional power failure, the consequences could be lessened by redirecting resources from areas that still have functioning electronic communications. However, the transports of various reinforcements requires that the roads are accessible, which they probably are not if the disruption is caused by a storm. One way of maintaining vital societal functions in all types of regional disruptions is to move the operation to an area that is unaffected by the disruption. It is probably not necessary to move the entire function, but only the parts that are vital to society. Nearly half of the government agencies with special responsibilities relating to emergency preparedness state that they are able to move parts of their operation. However, in order for such a transfer to work, it must be prepared and practised.

Disruptions in municipal technical systems (2007)

Scenario

In the 2007 capability assessments, the government agencies analysed the following scenario²³⁹:

“The municipal technical systems are down for seven days. The term municipal technical systems refers to the provision of drinking water, sewage systems and district heating.”

Overall assessment

Disaster command capability

In 2007, the SEMA’s assessment found that society’s disaster command capability in the event of a disruption in municipal technical systems is *mainly good, but with certain shortcomings*. A longer interruption in municipal technical systems would put a lot of pressure on municipal operations in particular, but also on the Police, the rescue services and the healthcare services. Management organizations must function well in order for society to take the actions necessary in the event of disruptions in vital societal functions. Society’s disaster command capability is limited by its ability to convey information, transfer operations to another location, and the extent to which employees are able to go to work, even if the incident affects them personally.

The need for information would be substantial. The public, government agencies and the private sector would all need to know how long the disruption will be and how widespread it is. In addition, it is also very important that the public receives information on what to do. Can you drink the tap water? What is the best way of keeping your house warm? It was concluded that the media would be able to keep the public informed. It is mainly the affected municipalities’ and county administrative board’s disaster command capability that determines whether the media receives the correct information.

It will be significantly more difficult to coordinate the work if the actors’ regular offices are unusable. The incident would make it difficult for the businesses and government agencies in the affected area to use their offices. In some cases the offices can be kept warm using radiators and car heaters, while water can be supplied by tank lorries and the sewage systems can be replaced by portable toilets. However, these solutions would not be sufficient for the larger cities. Since the disruptions would probably only affect a limited geographical area, it would be very beneficial to move the operations to other locations.

Another challenge would be to get the staff to go to work. Many employees would have to stay home if preschools and schools are closed. If the weather is very cold, people may also want to stay home in order to keep the heat up.

Operational capability

On the assumption that the disruption does not take place in any of the larger cities, the SEMA found that society’s operational capability in the event of a disruption in municipal technical systems is *mainly good, but with certain*

²³⁹ Ibidem

shortcomings. The type of operational capability needed depends on what systems are affected by the disruption. In the event of a disruption in municipal technical systems, it is mainly the municipalities that are to have operational capability.

When it comes to drinking water, the operational capability regards disconnecting damaged parts of the system or arranging a transfer from another water plant or water source. Alternative solutions include arranging drinking water in tank lorries, among other things. For smaller cities, provision of drinking water can be arranged by using tank lorries, although it will require a lot of labour. However, this is not a realistic solution for the larger cities. Instead, these areas will need to have alternative water plants and water sources.

If the sewage system stops working, the municipality must be prepared to transport portable toilets and emptying them in a suitable way. In a city with 50,000 residents, approximately 75 cubic metres of latrine is produced every day, as well as plastic bags, paper and cardboard boxes. In the event of a prolonged disruption, the healthcare services will have to carry out very extensive tasks that the staff is not used to. Large disruptions in the water and sewage systems could increase the risk of infectious diseases, especially in the summer. A hospital uses so much water that the water supply cannot be replaced by tank lorries. In addition, many hospitals are dependent on district heating. Only some hospitals have their own heating source or reserve heating. Other healthcare centres are also dependent on the municipal technical provision. If healthcare is not prioritized, hospitals and other healthcare facilities might have to be closed or evacuated, which would have serious consequences for people's lives and health. In some parts of the country, the distance between hospitals is so great that they cannot replace one another.

The district heating companies have relatively good preparedness for handling disruptions and restoring functionality. Societal consequences depend to a great extent on the season; if the heating fails during winter the premises might have to be evacuated. This could be a large and difficult task in the metropolitan areas in particular. Warm shelters might have to be set up for people without heating. However, many of the facilities intended to be used as warm shelters are connected to district heating networks, which complicates the matter.

Capability of vital societal functions to withstand serious disruptions

The SEMA found that the capability of vital societal functions to withstand a disruption in municipal technical systems was *insufficient*. Disruptions in municipal technical systems would have immediate consequences for society. Large parts of the private and public sectors in the affected area would experience problems, as offices and other places of work cannot be used for longer periods without water, drainage and in some cases heating. Schools and preschool would possibly have to be closed if access to water, drainage and heating cannot be ensured.

Households would be seriously affected, especially if the district heating breaks down. Small houses without other heating options would rapidly become cold.

A disruption in water supply could be troubling for the rescue services. Difficulties in finding access to water could become a serious problem for the fire protection services. For smaller fires, the emergency units can get by with the water contained in the fire engines. However, larger fires require water to be pumped from watercourses or fire hydrants. In addition, a disruption in water supply could cause sprinkler systems to stop working. Therefore, the rescue services might have to ensure other measures of fire protection, or evacuate certain buildings.

The industries are also dependent on clean water and functioning drainage. This is true not least in process engineering, including the food industry, which uses around a quarter of the water in Sweden. Essentially, food production is not possible without access to water and drainage, which would thus have substantial financial consequences. Since institutional kitchens and large-scale households cannot cook, it will also have serious consequences for home-help services, the elderly care and schools.

Disruptions in transport (2007)

Scenario

In the 2007 capability assessments, the government agencies analysed the following scenario:

“Due to blockades, there is a widespread shortage of food for seven days. Groceries that are usually delivered every day cannot be delivered as often, which makes certain shelves in the shops look empty. These empty shelves set off a wave of hoarding, which worsens the situation further. The healthcare services experience a shortage in medical supplies. Many people have difficulties getting to work. Companies are affected as ordered products cannot be transported from harbours, railway yards or airports. The media also stirs up the feeling of a crisis.”

Overall assessment

In 2007, the SEMA made the following assessment of Sweden’s disaster command capability in the event of a serious disruption in transport.

“The SEMA finds that society’s disaster command capability and operational capability in the event of a serious disruption in transport is mainly good. However, the SEMA has found that the capability of vital societal functions to handle a serious disruption in the transport system is insufficient. Several central societal functions, not least healthcare, are very dependent on functioning transports. It is surprising that it is currently unclear which transports are to be prioritized when capacity is limited.”²⁴⁰

Since this assessment was made, there have been extensive restructuring in the transport sector in 2009 and 2010. Therefore, this assessment can not be considered to be up-to-date.

²⁴⁰ Ibidem s. 51

Disruptions in electricity supply (2007)

Scenario

In the 2007 capability assessments, the government agencies analysed the following scenario:

“Due to bad weather in early December, electricity supply breaks down for seven days.”

Overall assessment

“Our modern society is dependent on electricity, and a power failure affects more or less everyone. The effects will be particularly serious for energy production, electronic communications, municipal technical services and the transport sector. If the power failure is caused by a storm, which it often is, accessibility on roads will be a considerable limiting factor of operational capability and the capability to withstand the disruption. The SEMA finds that society’s crisis response capability in the event of a prolonged regional power failure is mainly good. However, the SEMA finds that society’s operational capability and the capability of vital societal functions to withstand such an incident are insufficient.”²⁴¹

Disaster abroad involving many Swedish citizens (2007)

Scenario

In the 2007 capability assessments, the government agencies analysed the following scenario:

“During the winter sports holiday, a serious fire breaks out at a large hotel complex in the Alps. The hotel is mainly used by Swedish travel agencies. 40 Swedish citizens have died and 200 have been seriously injured.”

Overall assessment

“The SEMA finds that experiences from recent years, mainly the tsunami disaster in South-East Asia and the evacuation of Swedish citizens from Lebanon, have strengthened society’s ability to help Swedish citizens in the event of a disaster abroad. The SEMA believes that society’s disaster command capability in good in such a situation. This is also true with regard to the capability of vital societal functions to withstand the effects of such an incident. The SEMA has found the operational capability to be mainly good. Any shortcomings are mainly connected to the fact that the Swedish Response Team and the Swedish National Air Medevac are still in development.”²⁴²

Accident involving chemicals (2007)

Scenario

In the 2007 capability assessments, the government agencies analysed the following scenario:

“A train with poisonous condensed gases derails near a densely built-up area. The accidents results in large direct emissions as well as smaller continuous

²⁴¹ Ibidem s. 29

²⁴² Ibidem s. 57

emission. There is little time for evacuation, and an important authority announcement urges the public to stay indoors.”

Overall assessment

“The SEMA finds that society’s disaster command capability in the event of a serious accident involving chemicals is mainly good. This is also true with regard to society’s operational capability and the capability of vital societal functions to withstand the effects of the accident. In the event of a large accident, regional resources are often not sufficient. However, affected areas can often receive supplementary resources from other counties, or from the Government.”²⁴³

Epizooties and zoonoses (2007)**Scenario**

In the 2007 capability assessments, the government agencies analysed the following scenario:

“There is an unexpected amount of illness in animals in several places around the country. People have also been found to be sick, and it is suspected that they were infected by animals. The infection is suspected to be transmitted through water or food.”

Overall assessment

“In recent years, society’s ability to handle epizooties and zoonoses have improved due to several smaller outbreaks in recent years. The government agencies in charge of the issue are well aware of their roles, and collaboration networks have been set up. Therefore, the SEMA finds that society’s disaster command capability is good. In the event of a large outbreak that is widespread and prolonged, however, there are serious shortcomings with regard to the perseverance of several important actors. Therefore, society’s operational capability is considered to be insufficient. The capability of vital societal functions to withstand the disruption is considered to be mainly good.”²⁴⁴

²⁴³ Ibidem s. 63

²⁴⁴ Ibidem s. 69

Appendix 4 Assessing capability

In this appendix, we will describe what a capability assessment is and how it is conducted.

Capability assessment – the government agencies' task

A capability assessment is a tool for assessing emergency preparedness based on a uniform template and a predefined scenario. The capability assessment is sent out as a questionnaire to selected government agencies is presented along with the government agencies' risk and vulnerability analyses.

It should be noted that a capability assessment regards the estimated capability of handling and withstanding a certain incident. It should not be confused with risk assessments, which focus on an overall assessment of the likelihood and the negative consequences of different types of incidents. However, the terms capability and risk are directly connected to one another. Measures taken to improve capability of handling and withstanding a certain type of incident could decrease the likelihood that the incident occurs and reduce its possible consequences. Increased capability leads to reduced risk.

What is emergency preparedness capability?

In the current version of capability assessments, emergency preparedness consists of two types of capacities: disaster management capability²⁴⁵ and capability of vital societal functions to withstand serious disruptions.²⁴⁶

Disaster management capability: *“Disaster management capability means that within the area of activity or responsibility there must be an ability, during serious disruptions, to lead one's own activity; to make decisions within one's own area of activity or responsibility; to disseminate quick, accurate, and reliable information; and if needed to be able to cooperate with other actors. There must be an ability to initiate measures as early as possible to manage or participate in managing the consequences of incidents that occur, and carry out the measures required to remedy, protect against, and alleviate the effects of what has occurred.”*

Capability of vital societal functions to withstand serious disruptions: *“Capability of vital societal functions to withstand serious disruptions means that there must be an ability within one's own area of activity or responsibility to withstand serious disruptions so that the activity can be conducted at such a level that society can continue to function and ensure basic services, security, and medical care at the same time.”*

Assessment scale

In the capability assessment, assessments (in checkboxes) of disaster

²⁴⁵ The definition of disaster management capability encompasses what in previous capability assessments were referred to as “disaster command capability” and “operational capability”.

²⁴⁶ The definition of these terms according to Government decision (Fö2008/3567/SSK).

management capability and capability of vital societal functions to withstand serious disruptions are made according to the following scale:²⁴⁷

Good capability: Does not mean that a disaster goes unnoticed, but that the government agency (and the sector/county) is found to have the resources and capability to carry out vital societal tasks in the event of a disaster.

Mainly good capability, but with certain shortcomings: Means that societal services are put aside to some extent in order to prioritize more pressing matters. The government agency (and the sector/county) does not have enough resources to carry out the tasks in a satisfactory way.

Insufficient capability: Could mean, for example, that transports are cancelled, that the public suffers noticeable financial losses or that some form of rationing is introduced. The government agency's (and the sector's/county's) resources are far from enough to carry out vital societal tasks during a disaster.

Defective capability: Means that society is more or less unprepared.

Indicators

The MSB has produced a number of indicators to help assess the two capacities²⁴⁸. In the capability assessment, the respondent is to decide on these indicators. The need for and importance of indicators varies, depending on which type of scenario is being assessed. The following indicators are the most common:

- Alarm and global monitoring
- Leading, collaborating and informing
- Prospects of moving vital societal activities
- Backup power
- Rules and regulations
- Experience
- Material resources
- Human resources

Roles and areas of responsibility

The responding government agencies first assess their disaster management capability and the capability to withstand serious disruptions within *their own area of activity*, i.e. for their own organization. Then, as far as possible, an assessment is made of the *area of responsibility*. For government authorities, this means an assessment of their "sector". For county administrative boards, it means that they assess the county's capability. Since "sectors" and counties include a large number of private and public actors, which the respondents cannot easily assess completely, this part of the assessment should be interpreted with caution.

²⁴⁷ See The Swedish Emergency Management Agency, *Risk- och sårbarhetsanalyser – vägledning för statliga myndigheter*, 2006:4, dnr. 0050/2006

²⁴⁸ See, for example, The Swedish Emergency Management Agency, *Indikatorer på krisberedskapsförmåga*, dnr. 0433/2007

Appendix 5 Areas of cooperation

A list of areas of responsibility and government agencies, in accordance with Section 11 of the Emergency Management and Heightened Alert Ordinance (2006:942)

Areas of cooperation	Government agency
Technical infrastructure (SOTI)	The Swedish National Grid The National Electrical Safety Board The National Food Agency The Swedish Civil Contingencies Agency The Swedish Post and Telecom Agency The Swedish Energy Agency
Transportation (SOTP)	The Swedish Maritime Administration The Swedish Energy Agency The Swedish Transport Administration The Swedish Transport Agency
Hazardous substances (SOFÄ)	The Swedish Coast Guard The National Food Agency The Swedish Civil Contingencies Agency The Swedish National Police Board The Swedish Institute for Communicable Disease Control The National Board of Health and Welfare The Swedish Board of Agriculture The National Veterinary Institute The Swedish Radiation Safety Authority Swedish Customs
Economic security (SOES)	The Swedish Financial Supervisory Authority The Swedish Social Insurance Agency The Swedish Pensions Agency The Swedish National Debt Office The Swedish Tax Agency
Geographical responsibility (SOGO)	County administrative boards The Swedish Civil Contingencies Agency
Protection, rescue and care (SOSUV)	The Swedish Coast Guard The Swedish Civil Contingencies Agency The Swedish National Police Board The Swedish Maritime Administration The National Board of Health and Welfare The Swedish Transport Agency Swedish Customs

Appendix 6 Concepts and terms

The use of terms and concepts within the different legal areas that are relevant in this context mainly follow the definitions suggested in ISO 31000:2009 and ISO Guide 73:2009. This also means that the terms and concepts are in line with the EU guidelines, although there are some differences. Below we describe how some, in this context, central concepts and terms are used in Swedish legislation and authority guidelines.

Serious incident

“A serious incident an incident that deviates from the normal, which entails a serious disruption or imminent risk of a serious disruption in important societal functions and which requires a prompt action. (See the Act on municipal and county council measures prior to and during extra-ordinary events in peacetime and during periods of heightened alert (2006:544) ²⁴⁹

The principle of responsibility

“The principle of responsibility means that whoever is responsible for an activity in normal conditions should maintain that corresponding responsibility even during major emergencies. These responsibilities include taking the measures required to create both resilience and disaster management capability. The principle also means that each actor is responsible for cooperating with others, often across sector boundaries. (Government Bill 2007/08:92, bet. 2007/08:FöU12, rskr. 2007/08:193).” ²⁵⁰

Extraordinary incidents in peacetime

“*Extraordinary incident means an incident that deviates from the normal, which entails a serious disruption or imminent risk of a serious disruption in important societal functions and which requires prompt action by a municipality or county council.*”²⁵¹

Capability of vital societal functions to withstand serious disruptions

“*Capability within one’s own area of activity or responsibility to withstand serious disruptions so that the activity can be conducted at such a level that society can continue to function and ensure basic services, security, and medical care in the event of a serious disruption.*” (Government decision, dnr. Fö2006/2843/CIV).”²⁵²

²⁴⁹ Reinforced emergency preparedness – for safety’s sake (Government Bill 2007/08:92), s. 76

²⁵⁰ Samhällets krisberedskap – stärkt samverkan för ökad säkerhet (skr. 2009/10:124), s. 88

²⁵¹ Section 4 of the Act on municipal and county council measures prior to and during extra-ordinary events in peacetime and during periods of heightened alert (2006:544).

²⁵² Government Bill 2007/08:92, s. 77

Capability

“Refers to disaster management capability and capability of vital societal functions to withstand serious disruptions. (Government decision, dnr. Fö2010/314/SSK, Assignment to conduct capability assessments as part of risk and vulnerability analyses in 2010)”²⁵³

Geographical responsibilities

“Within a geographic area there is to be a body responsible for the direction, prioritization, and coordination of cross-sectoral disaster management measures in the event of a disaster. Geographical responsibilities refer to achieving this coordination. The actors handles the same disaster, but have different tasks. Each actor acts independently and is in charge of their own organization. Actors must ensure that they have the same understanding of what has happened, how the disaster will develop, what direction the measures should have and what the priorities should be.”²⁵⁴ “This is mainly achieved by having geographic responsibilities at the local, regional and national level to support the sector responsibilities [operational responsibilities]. These responsibilities are held by municipalities, county administrative board and the Government.”²⁵⁵

Threat

“Refers to the capability and intent of an actor to carry out harmful actions. A threat can also consist of an incident or a phenomenon that in and of itself causes danger for something or someone without there being actors with the capability and intent to cause damage in that context.”²⁵⁶

Crisis

“A crisis is an incident that affects numerous people and large portions of society, and threatens basic values and functions. A crisis is a condition that cannot be managed with normal resources and organizations. A crisis is unexpected, and resolving it requires coordinated measures from several actors.”²⁵⁷

Emergency preparedness

“The ability to prevent, withstand, and manage crisis situations through training, practice, and other measures, as well as through the organizations and structures created before, during, and after a crisis.”²⁵⁸

²⁵³ MSB 2010, s. 77, *Vägledning för risk- och sårbarhetsanalyser*, MSB245 - april 2011, ISBN 978-91-7383-129-1

²⁵⁴ Government Bill 2007/08:92, s. 77

²⁵⁵ Cooperation during crises – for a safer society (Government Bill 2005/06:133), s. 108,

²⁵⁶ MSB 2010, s. 78, *Vägledning för risk- och sårbarhetsanalyser*, MSB245 - april 2011, ISBN 978-91-7383-129-1

²⁵⁷ Government Bill 2007/08:92, s. 77

²⁵⁸ Section 4 of the Emergency Management and Heightened Alert Ordinance (2006:942)

Disaster management

“Disaster management means the immediate and operational management of an incident or disruption in society.”²⁵⁹

Disaster management capability

“Disaster management capability means that within the area of activity or responsibility there must be an ability, during serious disruptions, to lead one’s own activity; to make decisions within one’s own area of activity or responsibility; to disseminate quick, accurate, and reliable information; and if needed to be able to cooperate with other actors. There must be an ability to initiate measures as early as possible to manage or participate in managing the consequences of incidents that occur, and carry out the measures required to remedy, protect against, and alleviate the effects of what has occurred.”²⁶⁰

Disaster command capability

“Disaster command capability means that within the area of activity or responsibility there must be an ability, during serious disruptions, to lead one’s own activity; to make decisions within one’s own area of activity or responsibility; to disseminate quick, accurate, and reliable information; and if needed to be able to cooperate with other actors. (Government decision, dnr. Fö2006/2843/CIV).”²⁶¹

The equality principle

“The... principle states that organizational changes are not to be greater than necessary [during a crisis].”²⁶²

The proximity principle

“It is an important principle that a crisis is to be handled in the area where it takes place, and be managed by those most closely affected and responsible.”²⁶³

Operational capability

“A capability to, within one’s own area of activity or responsibility, initiate measures as early as possible to manage or participate in managing the consequences of incidents that occur, and carry out the measures required to remedy, protect against, and alleviate the effects of what has occurred. (Government decision, dnr. Fö2006/ 2843/CIV).”²⁶⁴

Risk

The term risk is used in many different contexts in our society, as well as in Swedish legislation. Common definitions include²⁶⁵: a) a threat or a danger; b) a likelihood; c) a contexture of likelihood and damage (consequence) i.e. the

²⁵⁹ Skr. 2009/10:124), s. 88

²⁶⁰ Government decision, dnr. Fö2010/314/SSK, Assignment to conduct capability assessments as part of risk and vulnerability analyses in 2010

²⁶¹ Government Bill 2007/08:92, s. 78

²⁶² Government Bill 2005/06:133, s. 51, Cooperation during crises – for a safer society

²⁶³ Government Bill 2005/06:133, s. 51, Cooperation during crises – for a safer society

²⁶⁴ Government Bill 2007/08:92, s. 78

²⁶⁵ The Rescue Services Agency 2000, s. 33, Riskhantering vid skydd mot olyckor – problemlösning och beslutsfattande, R16/219-00, ISBN 91-7253-073-1

expected value; d) a measure of spread. Since the use of the term differs depending on the sources used for this report, the term is used in a broad sense in this report. Therefore, definition 1.1 in ISO Guide 73²⁶⁶ is suitable for this report, since the definition is very broad (the definition below is from the SS-ISO 31000 standard²⁶⁷).

"1.1 Risk

effect of uncertainty on objectives

- NOTE 1 An effect is a deviation from the expected — positive and/or negative.
- NOTE 2 Objectives can have different aspects (such as financial, health and safety, and environmental goals) and can apply at different levels (such as strategic, organization-wide, project, product and process).
- NOTE 3 Risk is often characterized by reference to potential events (3.5.1.3) and consequences (3.6.1.3), or a combination of these.
- NOTE 4 Risk is often expressed in terms of a combination of the consequences of an event (including changes in circumstances) and the associated likelihood (3.6.1.1) of occurrence.
- NOTE 5 Uncertainty is the state, even partial, of deficiency of information related to, understanding or knowledge of, an event, its consequence, or likelihood.

Society's emergency preparedness

"Society's overall ability to prevent, withstand, and manage crisis situations through training, practice, and other measures, as well as through the organizations and structures created before, during, and after a crisis."²⁶⁸

Civil contingencies

"Civil contingencies means the efforts required to protect society against accidents and serious/extraordinary incidents. Government agencies, organizations and institutions as well as individuals participate in this work."²⁶⁹

Vital societal functions

"A vital societal function must meet at least one of the following conditions:

A shortcoming or serious disruption in the activity, alone or alongside similar incidents in other activities, leads to a serious crisis occurring in society in a short period of time.

²⁶⁶ ISO GUIDE 73:2009(E/F), s. 1, Risk management — Vocabulary

²⁶⁷ SS-ISO 31000:2009, s.1, Risk management – principles and guidelines

²⁶⁸ Government Bill 2007/08:92, s. 78

²⁶⁹ Government Bill 2007/08:92, s. 78

The function is necessary or quite essential for a crisis already occurring in society to be manageable so that the harmful effects are as small as possible. (The Swedish Emergency Management Agency, Fact sheet 2007/02/23).²⁷⁰

²⁷⁰ Government Bill 2007/08:92, s. 78

Coordination

“Refers to activities intended to ensure that different public institutions base their operations on the same prerequisites and that their implementation is not characterized by divergent goals among different public institutions.”²⁷¹

Collaboration

“The term refers to the dialogue between different independent and coordinate actors intended to achieve common goals.”²⁷²

Societal crises in peacetime

“Serious strain does not refer to an isolated incident, such as an accident, a sabotage, etc. but is a state where one or several incidents develop or escalate into something that affects several aspects of society. Serious strain can be said to consist of various types of extreme situations that have a low probability of occurring. The state is of such a magnitude that serious disruptions occur in vital societal functions and require coordinated action from several government agencies and public institutions in order to manage the situation and limit the consequences.”²⁷³

Vulnerability

“Indicates to what extent and how seriously society, or parts of society, are affected by an incident. The consequences that an actor or society – despite a given capability – did not manage to anticipate, manage, withstand, and recover from indicates the level of vulnerability.”²⁷⁴

Roles and areas of responsibility

“Regards the government agency’s own area of activity, as well as the area of society within which the agency has a particular responsibility.”²⁷⁵

²⁷¹ Civil contingencies (Government Bill 2001/02:158), s. 183

²⁷² Government Bill 2001/02:158, s. 183

²⁷³ Government Bill 2001/02:158, s. 183

²⁷⁴ MSB 2010, page 79, *Vägledning för risk- och sårbarhetsanalyser*, MSB245 - april 2011, ISBN 978-91-7383-129-1

²⁷⁵ MSB 2010, page 79, *Vägledning för risk- och sårbarhetsanalyser*, MSB245 - april 2011, ISBN 978-91-7383-129-1

- The Swedish Civil Contingencies Agency
- 651 81 Karlstad Telephone +46 (0)771-240 240 www.msb.se
- Publication No. MSB 336-2011, ISBN 978-91-7383-180-2