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Speech held by Lisa Hedin from the Swedish NGO Office for Nuclear Waste Review, MKG, at Milkas conference 27-29 of April 2007.

**Slide 0.**

**Slide 1.**

Hi! My name is Lisa Hedin and I work for the Swedish NGO office for Nuclear Waste Review. MKG is the abbreviation in Swedish so I'll use that. Much shorter! If you don't understand all that I am saying it could be because most of my English I've learned in Australia. Any words you think I am making up might actually be real Australian words! ☺ Although most words I learned from the time I have spent in Australia either had to do with combine harvesters (in Australian headers) or sheep so they probably won't fit in this speech anyway! Sheep are known to be found everywhere and in any subject though! ☺ I finished my university studies in 2004 with a M Sc in environmental Science. The university program I attended included maths and physics and environmental studies. After that I have been spending time in Australia and working for MKG since 2005.

I was talking to Gordon from Canada yesterday and he told me about how he got lost here in Stockholm Friday night. I don't find my way in Stockholm either. I am from the (the people here from Stockholm will not like this) as we call it the front side of Sweden – Gothenburg on the west coast. But we should not argue about what is the front side of Sweden. That would be like arguing about what is the best way to take care of nuclear waste – maybe, or possibly, there isn't an answer. However I will tell you a little bit about our organisations work and about the alternative method for managing spent nuclear fuel – very deep boreholes.

**Slide 2.**

MKG is an environmental organisation working only with nuclear waste issues. Like Milkas – the organisation organising this weekend. One of MKG:s member organisations is The Swedish Society for Nature Conservation, SSNC. It is the biggest environmental organisation in Sweden, with about 170 000 members. MKG was founded in 2004 and is receiving funding from the Swedish Nuclear Waste fund since 2005. MKG is conducting very active work in the nuclear waste area in Sweden and we are determined to make a difference in the nuclear waste handling throughout Sweden.

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The aim of MKG is to promote the implementation of the environmental best option for management of spent nuclear fuel (both method and site).

MKG is reviewing the work the nuclear industry of Sweden is carrying out in the field of nuclear waste management, with a focus on the environment. We are also following the progress of other countries work in the field and we are producing reports of our own. For example, last year MKG gave out the a report called "Final Deposition of High-level Nuclear Waste in Very Deep Boreholes – An evaluation based on recent research of bedrock conditions at great depths".

Whatever the opinions are from person to person in this room about nuclear power and all the troubles around that, we still have the nuclear waste already produced that needs to be taken care of as best we can. And we have a process in Sweden that has gone far into implementing a method for taking care of the waste. For MKG it is important to be involved in the process of finding the best method to take care of the nuclear waste, as we are now risking to end up with a decision to use an insecure and inappropriate method to take care of the nuclear waste and risk the safety of future generations and environment. On addition, if the industry's application for building a repository in Sweden isn't good enough when it comes to the environmental court and political decision makers, a lot of water will pass under the bridge before anything will be done about the waste. That is also a risk and a danger for future generations. Due to this importance to evaluate alternative methods to handle nuclear waste MKG thinks it is very important for environmental organisations to work for better presentation of the alternative methods.

### **Slide 4.**

The nuclear power industry, acting through a jointly owned nuclear waste management company, SKB, has been working for some thirty years on the KBS method, an option for final disposal that they now are eager to put into practice. The method involves placing the waste in mined tunnels 500 meters underground in bedrock that contains mobile groundwater that has contact with the biosphere. The waste is to be isolated by man-made barriers of copper and clay. Despite three decades of work, the long-term safety of the system has yet to be demonstrated. MKG is now of the understanding that it will not be possible to demonstrate the long-term security of the industry's method.

MKG has many doubts that the KBS-method will be providing as good long time safety as the industry is claiming it will. MKG see a lot of problems with the KBS method when it comes to ice ages, location near the coast and in a discharge area for groundwater. So far the industry's efforts to show that the KBS-method will be safe for 100 000 years are unconvincing. MKG is very uncertain that it will be possible for the nuclear industry to prove the method to be effective. Even the authorities in Sweden cannot see the reason for the industry to be so positive about their locations at this point in time. Not according to the data presented so far.

## **Slide 5.**

In Sweden, the application for building a repository for nuclear waste will first be evaluated by the environmental court. The environmental laws of Sweden highlight that it is important that there are alternative methods presented in the application besides the company's main option. Regarding the nuclear waste project in Sweden, it is, some researchers and experts opinion, that there hasn't been enough serious effort undertaken to explore alternatives. There are several alternatives that could be in need of a deeper evaluation, however MKG would primarily like to see the long-term environmental advantages of the very deep borehole method explored.

## **Slide 6.**

An alternative to the KBS method is disposal of high-level nuclear waste in very deep boreholes, whereby the waste will be deposited at a depth of 3 to 5 kilometres. Groundwater at these depths may have been immobile for millions of years. Modelling has shown that the groundwater would remain stable even after a repository has been constructed. Totally isolated from the biosphere, the repository can therefore be expected to afford a considerably more robust system than the KBS method that the industry arrived at thirty years ago.

As I mentioned before, MKG has conducted a study on the subject of very deep boreholes. Professor Karl-Inge Åhäll made an evaluation regarding the facts so far known and made a conclusion that a lot of interesting things have happened in the field of drilling very deep boreholes the last years and therefore maybe it is a method to consider. At least it is a method to evaluate further than what has been done so far. I have some copies of the report here if anyone is interested, also some other material in the back room.

The basics about the concept of disposing nuclear waste in very deep boreholes is that the groundwater is naturally making a border between the water that has contact with the biosphere and the deeper water. Illustrated in the figure. The further down into the earths crust the more salty the groundwater becomes. Saltier water means higher density water. The higher density water stays parted from the lower density water further up for long time and it is a very stable barrier. Some water found on greater depths could be as old as millions of years.. Even if there was a leakage from a very deep bore hole, the radioactivity wouldn't reach the ground surface for maybe millions of years, and by that time it wouldn't be hazardously radioactive anymore. The method of very deep boreholes isn't depending on man made barriers to keep the radioactivity away from environment and humans and could therefore be called more technology robust. Of course there would be a possibility that also in these bore holes have man made barriers like a canister etc.

The technical robust function in form of stable deep density parted groundwater of the very deep boreholes is the foremost advantage with the method. However there is also an advantage of making retrieval harder. Spent fuel rods contain plutonium, which can be used as raw material for the manufacture of nuclear weapons. Picture a future with no nuclear power plants, or for example a Sweden

with no nuclear power plants. Having nuclear waste just 500 meters below ground could cause a threat to society and peace. If the country is having nuclear power plants running it probably wouldn't be interesting to use the plutonium in the repository. But if the country for some reason is feeling in need of plutonium and there are no nuclear power plants it could be of interest to retrieve the waste from the repository. Not only to build nuclear bombs but also to build radioactive dirty bombs. Normal bombs with nuclear waste mixed in to them. When they detonate it is possible to spread radioactivity over a large area and harm both environment and humans.

In March of this year, KASAM - Swedish National Council for Nuclear Waste, held a conference about the method of very deep boreholes. For example one borehole expert and one borehole company worker held speeches. They were both puzzled about that no further investigations has been made already on the method very deep boreholes and they had no doubts that it is a method possible to carry out.

### **Slide 7.**

The nuclear power industry claims that there are too many "ifs" and uncertainties with the very deep borehole technique, and that it is therefore not possible to assess whether it is superior to the KBS method. The Swedish NGO Office for Nuclear Waste Review, MKG, is of the opinion that the industry has a duty to investigate the alternative "very deep boreholes" further so it can be compared with KBS method on vital issues of long-term safety. It is unacceptable that potentially better options in terms of long-term environmental security are ignored or rejected because of the industry's unwillingness to consider alternatives. It is vital that the Swedish environmental courts and the Government have a solid scientific basis for the choice of disposal method when decisions are to be taken on the industry's application for permission to commence the construction of a final repository. For this to be possible, the industry for example must put much more effort into the study of the very deep borehole alternative. Full scale development of the alternative is hardly necessary, only research to answer some critical questions. For example determine if there is to be found big enough areas of old stable groundwater possible to locate a repository of very deep boreholes in. It is also of interest to investigate the possibilities to dispose canisters in the boreholes in a safe way. (Something the borehole experts at the conference couldn't see will be a big problem). It is feasible to wait a few years before submitting an application for a KBS repository; a slight delay in a project that is to last more than 100,000 years is not questionable if there could be environmental improvements made.

MKG does not endorse a specific method for final disposal of high-level nuclear waste, but wants the government to make it clear to the nuclear industry that their proposed method cannot be approved until they have produced a better basis for environmental comparisons with alternative methods. We don't know if very deep boreholes will be safe, but we want to know more, for us and for society to make better decisions.

Public health and the environment must be the prime concern when planning for a final repository for high-level nuclear waste. The goal must be that no radioactivity will leak from the repository and reach the biosphere for at least 100,000 years. It

is unacceptable to risk that future generations might be exposed to radioactive materials because we did not chose to use the method for final disposal of spent fuel from nuclear reactors that is best for the environment in the long term.

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For more information you can visit the MKG website [www.mkg.se](http://www.mkg.se). There is an English part there, however it is about to become more developed.

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Thank you for your attention. Questions?