

## 6. Swedish Nuclear History and The First Days and Weeks with Fukushima – From Sweden No. 1 –

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### Who am I



My name is Carl G. Lindvall. I've worked in different management and staff positions in the nuclear industry in Sweden since the 80-ies, mainly in the areas of health physics, dosimetry, fire protection and occupational health, in later years also with QA systems.

Since last year I've retired from the daily work

on site, but still support our CEO and the Swedish industry in national and international organisations, for example in Committee on Radiation Protection and Public Health (CRPPH) of OECD/NEA, ISO nuclear standardisation committee, World Nuclear Association (WNA) and lots more.



Barsebäck NPP, Sweden

Over the years my job gave me lots of possibilities to interact with and work together with international organizations such as technical and OSART missions for IAEA, peer reviews for

World Association of Nuclear Operators (WANO), members of different committees and workgroups under OECD, Chairman for the Information System on Occupational Exposure (ISOE) system

of OECD/NEA, WNA WG etc. Many of these missions have included contacts with lots of colleagues in the Japanese nuclear industry, JNES, TEPCO, Kansai, CRIEPI, JANUS and more.

When I got the invitation to this essay series in the early summer, I was most flattered and honoured but also a bit scared, can I really live up to the expectations? After a few days intensive discussion, with my self, I decided that this is possible, but only with good help from my friends. I hope that we, in this and coming essays, convey an echo from Sweden on how we reacted and what we have learned from the accident, and where to go and how to get there and hopefully give encouragements to our colleagues in Japan through questioning and critical and positive reflections. With this as an overall goal it's obvious that I need to cooperate with a few colleagues, some you will meet more often than others.

In this first essay I'll try to give a description, background and history to the Swedish nuclear industry. In coming essays we will more focus on our views on the Fukushima incident from different angles, emergency preparedness organization, public information/communication, information exchange, political reactions, and more.

To be noted: All texts and aspects are our private views.

## The Swedish nuclear history

Sweden was relatively early in the planning of commercial nuclear power. The first plans were drawn already around 1950, and after the "Atoms for Peace" conference the door was opened for sharing reactor technology over the borders. The foundation for the great national effort to embrace this new technology was formulated in a

government inquiry in 1956 in which it was predicted "...except experiments reactors the investigation assume that 5-6 nuclear-powered (power) plants can be added during the next 10 years ...". This aimed mainly to reduce the Swedish dependence on imported oil.

As Sweden has large deposits of minerals containing uranium, though with low grade, and that there was a difficulty to enrich uranium ore to higher grade, the Swedish government and industry decided to go for heavy water reactors. The first, entirely Swedish designed reactor was projected in 1957 and was finished for commercial operation in 1963. After this grand venture in which the Swedish government and industry jointly drive the development, the next reactor was a pressurized heavy water reactor (PHWR). This was however a mistake and it was never loaded and later re-designed to an oil fired power plant. After this, the Swedish industry, ASEA ATOM later ABB ATOM, changed over to the light water technology and BWR reactors. In total 9 BWR reactors were built and taken in operation from 1972 – 1985. Also three PWRs from Westinghouse were built in this period.

After the TMI accident the political support for nuclear energy decreased and after a public referendum in 1980, the government decided that all nuclear power should be phased out by 2010! In addition, a law was established that banned all new planning for and design of nuclear power. Under these dark clouds lived the Swedish nuclear power industry until 2000 when the end-date was removed. However, during these period two reactors in Barsebäck was forced, by the law, to close. Since 2010 the "prohibition law" has been removed and it is now again open and allowed to plan for new nuclear power in Sweden. However, a new nuclear power plant must replace an old one.

Today's number (10) of reactors currently in operation may not be increased.

### **The First Days and Weeks with Fukushima in Sweden (Karl Östlund)<sup>1</sup>**

When the tsunami and nuclear facility accident occurred, many people felt deep sorrow and compassion for the Japanese people. The great majority felt the tsunami was the most critical issue to address and in the beginning the problems with the nuclear facility was clouded in the news by the devastation from the tsunami. Soon we started to receive information about the critical reactor situation and at authority level much work had to be done on what could happen and the effect of those scenarios. Our main source of info was media, which was unfortunate since these segments often fail to grasp the important details, focusing mainly on events easy to present to the world.

Sweden never questioned the Japanese ability to handle this situation but was very concerned about not receiving quality information directly from the Japanese Government. This would have been a good platform for communication and receiving suggestions to what this country could do for Japan. Sweden were impressed by the commitment the Japanese workers showed the world during the critical weeks after the accident, we were very concerned about dosimetry and tried to figure out how this was handled.

Since Sweden and EU had several thousand citizens in Japan we had to prepare for scanning those if a large release of activity would occur. This was prepared mainly in theory but a true deployment of the equipment was estimated to be 8 hours, which never had been tried before.

If Japan had invited other countries to do field

measurements at good estimation of the release would have been produced. Many other countries with similar reactors would benefit from this, now the iodine is decayed leaving only Cesium-137 and much less information to base our national resources and methods on.

### **What are the first lessons learnt**

First of all nuclear accidents happen.

While we of course always strive for 100% correct maintenance and operational management of the nuclear facilities, but we can never trust that we will succeed completely. Nor can we expect that the public have confidence in this. We have to admit that people/employees make mistakes, both individually and as an organisation. This in itself is nothing new or restrictive. Our challenge lies in how these realities are addressed.

The future of nuclear power will rest on fragile foundations, as long as the general perception is that nuclear power is a serious threat to human well-being. Our goal must be to explain to politicians and the public that even the worst possible accident with an extremely low probability is still possible to handle and that its consequences are not of "Judgement day" calibre. We must also demythologize "nuclear power". We in industry and universities must increase our efforts, in cooperation with governments and other opinion makers to increase public understanding and acceptance for the nuclear technology.

Unfortunately one of the problems is that we ourselves build up the image that nuclear power is uniquely dangerous, by using difficult words and accepting limitations that are more stringent than in other industry/activities. For example, radiation standards/limits are much more restrictive for radiation sources from nuclear power than for "natural radiation"

Talking about environmental issues, most of our scientists and politicians actually share the conviction that nuclear power must play a central role in the energy mix if we are to avert radical climate change. Then it is not acceptable for short-term populist, political moves to take control of the debate. We, the nuclear industry, must be a part and trustworthy counterweight in these discussions.

### Actualities, Whats on

Next week I'm on my way to another volcanic island, ISLAND, for the Nordiska Sällskapet för Strålskydd, NSFS (Nordic Society for Radiation Protection) meeting/symposium. NSFS is the national/regional part of International Radiation Protection Association (IRPA). I myself have been a member of the Swedish part of the board for the last six years and will now resign. Many interesting papers are on the list and some connections to Fukushima is to be foreseen in the discussions. More from this meeting later.

See also:<http://yourhost.is/nsfs-2011/home.html>

### The new CRPPH Expert Group

As agreed during the last CRPPH meeting May 2011, a new Expert Group on the Radiological Protection Aspects of the Fukushima Accident (EGRPF) to manage any Fukushima related work has been established and the first meeting of the Expert Group will most likely be held before the end of the year. National nomination should be sent to CRPPH by the 15th of September. As a first start of this groups work a short summary of our national lessons learned should be sent to CRPPH by the 30th of September.

(Note 1)Have a degree in medical physics and have, since 2005 side by side with his Ph.D. studies, been working at Lunds University and the Swedish Radiation Safety Authority (SSM) with radionuclide methods and issues within the field of emergency preparedness planning and response.

September 2011