Nuclear Power Plant Cernavoda

Emergency Planning

Comments to the

Environmental Impact Summary by ICIM

by

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on behalf of

the Campagna per la Riforma della Banca mondiale

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Accident Risk

For Cernavoda NPP - as for any other nuclear power plant – severe accidents with a large release of radioactive material into the environment cannot be ruled out.

The Environmental Impact Summary [ICIM VI.2] estimates the probability for accidents with a large release of radionuclides in the NPP-C2 to be lower than 10^{-7}. This is far too optimistic, because it is taking into account only internal events and ignores conservative estimates for the core melt frequency. The IRR[1] estimates the probability for accidents with large radioactive releases in a CANDU reactor as 5×10^{-5}, meaning that it could be higher than ICIM's estimation at least by by a factor ten.

The Environmental Impact Summary considers specific beyond design base accidents: [ICIM VI.2.] lists 6 severe accident scenarios which are analyzed in the FSAR[2]- unfortunately without details such as the description of the initiating events, the development of the accident, time of containment failure, and the source term (thermal energy, release time and fractions for the different nuclide groups depending to the release phases). Without details the statement *"the risks in such situations do not exceed the maximum risk allowed by the regulatory body"* [ICIM VI.2.] is not convincing. In this connection [ICIM VI.2.] refers to the FSAR of unit 1, explaining that unit 2 is similar to unit 1. In this part of the EI-Summary changes planned for unit 2 are not mentioned. The EI Summary is discussing the design of NPP C2 only in a very general way [ICIM VII].

"The risk of accidents will be minimized by a complex design concept (defense in depth) and the use of effective operating procedures, measures and programs that cover the potential normal, abnormal and accidents situations, including the most improbable cases" [ICIM VII.]. Without description of these measures, procedures and programs and without any references to safety standards it is impossible to verify this statement.

Another escape route for radioactive material is with the waste water. CANDU plants are plagued by the problem of tritium release to water bodies in their vicinity. This is not the big catastrophe- compared to a core melt accident- but it can be a serious hazard if the contaminated water is used as a drinking water source for the population – an issue which was heavily discussed in Canada. Nonetheless local authorities have to be prepared for such accidents, because they have to provide clean water to the people.

[1] IRR: Institute of Risk Research, University of Vienna, Austria

[2] FSAR: Final Safety Assessment Report

Limits

The regulatory limit of 250 mSv for the failure of two systems is high. According to the Candu-6 intervention levels shielding of the affected population would be required and evacuation cannot be ruled out [ICIM Table VI-4]. Based on the Environmental Impact Summary it is impossible to evaluate whether there are proper emergency plans for the protection of the population:

- It is not explained which areas and how many people could be affected.
- Preplanned provisions are not described.
- The short distance of only 2 km to the town of Cernavoda with approx. 20.000 inhabitants is not considered

The Environmental Impact Summary does not present any information about the preparation of the municipality of Cernavoda and other villages and towns in the region for a nuclear accident:

- alarm systems,
- location and capacities of shelters,
- provisions for stable iodine administration .
- the emergency plans are not described at all.

Emergency Planning for the NPP Cernavoda

Since the ICIM impact study does not consider emergency situations and emergency plans at all, we looked at the overview the PHARE study provides about the Romanian emergency plans and intervention measures. As it is described in the PHARE report the NPP Cernavoda has planned its emergency procedures for the protection of the population in the region around the plant according to the IAEA methodology. [PHARE 7.3.1]

Three zones were designed:

PAZ: Precautionary Action Zone:

For this area urgent protective actions are pre-planned and will be implemented immediately. The PAZ consists of the NPP site itself and the so-called exclusion zone, where permanent settlement is not allowed. In the case of Cernavoda the radius of this zone around the NPP is only 1 km. The typical size is 3 km. [PHARE 7.3.1] Unfortunately the town of Cernavoda is only 2 km from the plant. In most other countries it would be impossible to build a NPP in this short distance of the town.

UPZ: Urgent Protective Action Planning Zone:

For this region preparations are made to promptly implement urgent protective measures based on environmental monitoring (size 10 km). 26.000 people are living within a 10 km radius around the NPP. Most of them (ca. 20.000) live in the town of Cernavoda, where evacuation of population in a short time on a safe way is hard, because there is only one way out of the town over the new bridge. The other possibility to get out is a street which leads in the direction of the NPP.

LPZ: Long Term Protective Action Planning Zone:

In this area preparations are made for measures, which shall reduce the long term dose from deposition and ingestion. This actions depend on the results of environmental monitoring results.
With 50 km the Cernavoda LPZ represents the lower limit of the IAEA recommendations (50 to100 km) [PHARE 7.3.1]. This is said to be justified because of the dose calculations for accidents and because of the low probability that emergency situations could occur simultaneously in both units of the NPP.

All emphasizing in the EI Summary that the risk of a severe accident with a big release of radioactivity is very low is not really convincing:

1. Because of the lack of information about the source term and of meteorological data it is impossible to verify the transport calculation of airborne radionuclide emissions in case of accidents.

2. The probability for simultaneous failure in both units is probably underestimated, because a severe earthquake could affect both units. As we have shown in our comments to the EIA procedures [AIAE 2002] the NPP`s earthquake design base, which is a peak ground acceleration (PGA) of 0,2g is probably far too low, because a severe earthquake could generate even twice the acceleration assumed as a design base.

In the distance of 10 to 20 km around the plant reside approximately 65.000 people. In a 100 km radius from the NPP live 1,37 million people. And this is only the Romanian population.

The Bulgarian boarder is 35 km away from the NPP and even if the region is sparsely inhabited. According to the [ESPOO Convention] as well as to the COUNCIL DIRECTIVE on EIA (CD 97/11/EC) Bulgaria has to be informed and has the right do demand consultations in the licensing process.

In our view it is not justified to concentrate the precautionary measures in the LPZ to the reduction of the long term exposure. Inhalation of radioactive particles (especially iodide) during the transition of the plume can be a substantial contribution to the exposure of the population even within more distant regions than 100 km. Therefore the precautionary distribution of stable iodide could be necessary in the whole LPZ.

Austria has no NPP at all and the shortest distance to a NPP in a neighboring country is 35 km, but the Austrian government provides stable iodine prophylaxes for all people under the age of 45 as a precautionary measure; families get the pills for their children without fee and schools have stored stable iodine in order to use it in case of a nuclear accident.

The average wind speed at Cernavoda is 4 m/s, at this speed the radioactive cloud reaches Cernavoda in less than 10 minutes; to cover the distance of 30 km, the radius where two bigger towns are located, the cloud needs about two hours and for the distance of 100 km the radioactivity would need 7 hours. But the speed could be higher up to 50 km/h (from 12 to 18 days wind velocities exceed 15 m/s with a maximum of 100 km/h).

On the other side it has to be considered that the most frequent weather situation at the NPP site is calm (30%). In this case the radioactivity could stay long near the site – Cernavoda town, included.

Even if a severe accident is unlikely to occur, if it does the release could affect any of the1,37 million people – depending on the weather situation (wind speed & direction, rain etc.). Therefore all of them have to be prepared for emergency situations.

Civil and military defense forces are of much help in emergency situations, they can evacuate people from where the contamination is very high, they can use their equipment for decontamination of vehicles, roads and buildings. They can help monitoring the environment, water and food for the population. They can provide information for the people.

But the first requirement for emergency preparedness is a well informed population. People have to understand the danger of radioactivity and the different pathways of exposure and the possibilities to protect themselves.

People need information what they have to do in case of an accident as well as what they should not do. They need to have stored all the material necessary for the protection measures:

- Stable iodine for the thyroid blockage has to be distributed to the population at home as well as in schools, nurseries, farms and factories. Iodine prophylaxes is the most effective method to protect the people (especially children and young people) from the danger of thyroid decease. To avoid the exposure stable iodine is to be taken as fast as possible, therefore people must have the pills at hand and instant alarming is required.
- To protect water sources (e.g. private wells) or vegetable beds in gardens people must have synthetic material to cover them.
- Farmers have to know how they can protect their cattle
- People have to know where they can find shelter or how they can secure their houses or flats, when the radioactive cloud is coming (e.g. shielding behind stone walls – avoid the windows; close the windows and stay inside).

References

[AIAE 2002]: NPP CERNAVODA 2 - Comments to the documents provided for the EIA; Wenisch.A, Ganglberger E, Högelsberger H., Austrian Institute for Applied Ecology, November 2002;

[ESPOO Convention] Convention on Environmental Impact Assessment in a Transboundary Context

[CD 97/11/EC]: Council directive 97/11/EC on the assessment of the effects of certain public and private projects on the environment.

[ICIM]: Cernavoda 2 NPP Environmental Impact Summary; National Institute of Research and Development for Environmental Protection – ICIM, Bucharest, July 2002

[PHARE]: Task 4 Report from the Modernization Project for Cernavoda NPP2 Environmental Impact Assessment. DeAngelis-009-RO/Phare-SCR/A6-C May 2001