ANNEX VII – E-mail and response from MVM Paks II to Brigitte Artmann

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From: "Heierth, Hans \(StMUV\)" <Hans.Heierth@stmuv.bayern.de>
To: "Brigitte Artmann" <brigitte-artmann@gmx.de>
Subject: AW: Hearing PAKS II in Munich - protocol
Date sent: Wed, 16 Mar 2016 12:27:56 +0200
Copies to: Kühlewind, Hans, Dr. (StMUV) <Hans.Kuehlewind@stmuv.bayern.de>

Liebe Frau Artmann,

nun hat die ungarische Seite zumindest schon mal die im Erörterungstermin offene und in schriftlicher Form zugesagte Antwort auf ihre Frage vorgelegt, die ich Ihnen, falls noch nicht sowieso schon bei Ihnen vorliegend, gerne zukommen lasse. Das Protokoll scheint immer noch nicht vorzuliegen, bzw. haben wir zumindest noch nicht erhalten.

Herzliche Grüße
Hans Heierth

Von: Brigitte Artmann [mailto:brigitte-artmann@gmx.de]
Gesendet: Freitag, 27. November 2015 15:37
An: Heierth, Hans (StMUV); Balint Dobi fm.gov.hu
Cc: Jan Haverkamp Greenpeace; Heinz Smital; Oda Becker; Kühlewind, Hans, Dr. (StMUV)
Betreff: Hearing PAKS II in Munich - protocol

Dear Mr Heierth, dear Mr Dobi,

Referring to the Aarhus Convention Article 4, to IFG and UIG I kindly ask for the protocol of the PAKS II hearing in Munich. To keep the costs and your efforts law, the digital version is enough.

Best regards,

Brigitte Artmann

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Question: After how many years of service does an individual member of the rescue services (for example a voluntary fireman) collect **the 250 mSv <u>voluntary</u> threshold level (per missions and per lives)** if 5% of the radioactive materials is released to the atmosphere from a VVER-1200/V491 at the Paks II. site, in its surroundings with a radius of 25 km, then with steps of 50 km and 100 km from Paks to Nürnberg assuming weather conditions with wind blowing from the East.

We summarise our answers which were also given by the representatives at the public hearing in the followings.

1. Concerning the 250 mSv threshold level:

- *Independently of the chosen reactor type, the possibility of accidents is clearly limited by the Hungarian legislation, namely by the government decree No. 118/2011. (VII. 11.) on the nuclear safety requirements of nuclear facilities and related regulatory activities. The Annexes of the mentioned governmental decree (referred to as the Nuclear Safety Codes) define the safety requirements as follows:*
    - *3a.2.4.0600. The total frequency of cases resulting in a partial or full core meltdown for an event sequence originating from all assumed initiating events, except for sabotage, shall not exceed 10^{-5} /year.*
    - *3a.2.4.0800. Events resulting in large or early releases shall be practically excluded. The total frequency of event sequences resulting in large or early releases summarized for all initiating operating conditions and effects, excluding sabotage, shall not exceed 10^{-6} /year. The fulfilment of the requirements shall be demonstrated by Level 2 probabilistic safety analyses.*

- *The Nuclear Safety Codes also says that:*
  3a.2.4.0700. For the fulfilment of the criterion of limited environmental impacts, for events resulting in DEC 1 operating conditions and for events resulting in DEC 2 operating conditions with consideration to the specifications of Section 3a.2.2.7000, it shall be demonstrated that
    a) no urgent protective measures are required beyond a distance of 800 m from the nuclear reactor;
    b) there is no need for any kind of temporary action, i.e. the temporary evacuation of the population, beyond a distance of 3 km from the nuclear

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reactor;
c) there is no need for any kind of subsequent protective measure, i.e. the final re-settlement of the population, beyond a distance of 800 m from the nuclear reactor;
d) there is no need for any long-term restriction on food consumption.

- *In the nuclear safety related licencing process only such power plant could be licenced, which can be operated (in case of normal operation and also during accidents) within the limits provided by the environmental permit.*
- *Therefore such operational condition cannot occur in which the individuals of the German voluntary emergency services would receive 250 mSv extra dose (integrated for a lifetime), because members of the German voluntary emergency services will not be involved in the implementation of any potential public protective actions at the Paks site or within the 3000 m radius of it.*
- *According to results of the dose calculations, it can be stated that even the members of the Hungarian emergency services both voluntary and professional (fire brigades, police, rescue services) involved in the implementation of the public precautions could not receive more than 250 mSv extra dose. According to the Hungarian legislations in case of emergency the dose received by a person taking part in the intervention shall not exceed an effective dose of 50 mSv. Exception is made with the person who carries out operation to prevent major exposure of the public or to save lives. In this case all possible measures shall be made to keep the exposure under the effective dose of 100 mSv or under 250 mSv in life saving operation.*
- *The Hungarian nuclear safety legislation does not prescribe the obligatory analysis of such occurrences which exceed the DEC 1 and 2 levels. The Annexes of the government decree No. 118/2011. (VII. 11.) on the nuclear safety requirements of nuclear facilities and related regulatory activities clearly provides a list of events which have to be taken into account. The reactor does not need to be prepared to such events that have more serious consequences than those of DEC 1 and 2 events. These events belong to the category that can be practically eliminated.*

2. The chances of releasing 5% of the radioactive materials from the reactor core.

- *The nuclear reactor at Chernobyl was an RBMK type reactor. The known severity of the emission of radioactive materials at Chernobyl was the result of design faults of that reactor type. The reactor became instable preceding the accident that resulted in a reactivity initiated accident. This caused an explosion inside the reactor which*

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seriously damaged the technological systems along with the reactor building. The atmospheric release was seriously exacerbated by a graphite fire that lasted almost 10 days, which was not appropriately handled by the authorities due to the lack of experience and inadequate emergency preparedness and response plans. The radiological consequences were worsened by the reaction of the corium melting through the biological shielding with water in the last days of the accident.

- *The atmospheric releases as the percentage of the core inventory in PBq were as follows:*

Isotope	**Chernobyl**	**Fukushima (with exclusion of the early, uncertain assumptions)**
^{137}Cs	85 PBq (20 - 40 %)	7 - 20 PBq (1 - 3 %)
^{131}I	1760 PBq (50 - 60 %)	100 – 400 PBq (1 - 6 %)
^{133}Xe	6500 PBq (100 %)	6000 - 12000 PBq (40 - 90 %)

(Source: International Atomic Energy Agency, „The Fukushima Daiichi Accident, Technical Volume 1/5," IAEA, Vienna, 2015.)

- *In the Fukushima Daiichi accident, the aerosol-based releases were much smaller than in Chernobyl because of the lack of graphite fire in the water-moderated reactor. Despite the fact that hydrogen explosion occurred in the reactor building, it only partially damaged the containment around the reactor pressure vessel, the physical barriers partially survived. Therefore the release of radioactive materials was more controllable; the main source of the atmospheric releases was the controlled containment venting actions taken by the operators.*
- *The localization efficiency of a well-designed containment was proved by the Three Mile Island incident. A series of human errors resulted in a partial core meltdown, but despite of the catastrophic situation of the core and the significant quantity of radioactive material released to the containment, the immediate radiological consequences were minimal in the surroundings of the power plant.*
- *In case of the Paks II. units, the most serious radiological consequences can be resulted by severe accidents with core meltdown . However, lessons learnt from the above mentioned experiences were taken into account in the design of the new units. Graphite fire cannot occur in water-moderated reactors, while hydrogen explosion is eliminated by the application of passive autocatalytic hydrogen recombiners. The passive safety systems can cool the core and prevent its damage for 72 hours without any human interaction, and even if the core melts down, the double wall containment*

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resistant to external and internal impacts localises the isotopes released in accident situations. The core catcher and the passive cooling system of the containment ensure that the amount of the radioactive materials released from the corium is minimal.

- *The expected release from the core to the containment is 65% for the iodine and caesium isotopes and about 95% for other radioactive gases. The leakage rate from the inner containment building to the air space between the two containment walls (the so-called annulus) is 0.2 V/V%/day. The release from the annulus to the atmosphere is possible only through a high efficiency filtering and ventilation system. The leakage rate without any filtering from the containment to the environment is only 0.002 V/V%/day. As a consequence, the radioactive release into the environment following a severe accident could be significantly less than 5% of the core inventory. Based on this, the assumption of releasing 5% of the core inventory to the environment does not have a physical basis.*

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