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Planning iodine thyroid blocking in the vicinity of decommissioned nuclear power plants

Recommendation by the German Commission on Radiological
Protection

Adopted at the 269th meeting of the German Commission on Radiological Protection on
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Planung der Iodblockade in der Umgebung stillgelegter Kernkraftwerke

Empfehlung der Strahlenschutzkommission

This translation is for informational purposes only, and is not a substitute for the official statement. The original version of the statement, published on www.ssk.de, is the only definitive and official version.

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1 Introduction

Germany has revised its energy policy and has decided to stop using nuclear power to generate electricity and gradually decommission any nuclear power plants still in operation. The first step in this process was carried out in 2011 by permanently ceasing the generation of electricity at Germany's seven oldest reactors and the Krümmel nuclear power plant.

Provisions for nuclear emergencies have to be maintained until the irradiated fuel has been removed from the decommissioned nuclear power plants¹. However, the planning of protective measures may be revised given the change in potential risk. The SSK was asked to assess the extent to which the plans may be revised.

This recommendation addresses the protective measure "iodine thyroid blocking".

2 Planning iodine thyroid blocking in the vicinity of decommissioned nuclear power plants

2.1 Recommendation

Decommissioned nuclear power plants:

The planning of iodine thyroid blocking no longer needs to be maintained in the vicinity of nuclear power plants that were permanently decommissioned in 2011.

Nuclear power plants yet to be decommissioned:

The SSK recommends continuing the planning of iodine thyroid blocking for a period of 12 months from the date of final decommissioning in the vicinity of all nuclear power plants yet to be permanently decommissioned.

The nuclear supervisory authorities of neighbouring states should be contacted to discuss and determine whether this recommended approach can and/or should be adopted by nuclear power plants situated near Germany's borders that are scheduled for decommissioning.

2.2 Explanatory statement

There is no need to provide for iodine thyroid blocking as a response to an incident in the vicinity of nuclear power plants that have been decommissioned for at least one year. This decision is based on the following argumentation:

- Due to radioactive decay, the nuclear fuel rods contain such a small amount of iodine isotopes relevant to iodine thyroid blocking (in particular iodine-131 (I-131)) that the intervention reference levels for implementing iodine blocking among all groups of people (children, young people, pregnant women and people up to the age of 45) cannot be reached if radioactive substances were to be accidentally released.

Given this situation, the SSK determined the relevant point in time as of which the release potential is so low that the intervention reference levels can no longer be reached. For a conservative estimation, double the amount of nuclear fuel usually found in the reactor core was considered to be the release potential (approx. $7 \text{ E}+18 \text{ Bq}$ for I-131). This also covers every other potential sources of iodine isotope release such as the fuel pool. After a 365-

¹ Decommissioned nuclear power plants are plants that have been permanently shut down.

day decay period, the level of iodine-131 (I-131) in the nuclear power plant would be so low that even in the case of a complete release the discharge limits for normal operation would not be reached by far. This in turn means that the intervention reference levels for iodine blocking cannot be reached, irrespective of the envisaged scenarios.

- Scenarios involving unintended criticality that would lead to a build-up of iodine isotopes such that they require the implementation of iodine blocking, e. g. due to an external impact on fuel rods stored in the fuel pool, can be fully excluded. The SSK has asked the Reactor Safety Commission (RSK) for an assessment in order to be able to determine whether such scenarios are likely to occur.

The RSK covered this issue at several meetings and commissioned the Gesellschaft für Anlagen- und Reaktorsicherheit (GRS) to perform corresponding criticality calculations.

The RSK's deliberations were concluded at the commission's 465th meeting on 24 April 2014. The RSK found that in the case of permanently decommissioned nuclear power plants, criticality involving nuclear fuel pools could only occur in highly theoretical conditions and would only be for a limited period of time. Significant iodine production should therefore not give cause for concern. This statement can also be applied to nuclear power plants in Germany that are to be permanently decommissioned once their fuel rods have been transferred from the reactor pressure vessel to the fuel pool.