DANISH HEALTH AUTHORITY
Radiation Protection

2025

Joint convention on the safety of spent fuel management and on the safety of radioactive waste management

Questions and Comments to the

NATIONAL REPORT FROM THE UNITY OF THE REALM

DENMARK

GREENLAND

8TH REVIEW MEETING

Health for all

Joint convention on the safety of spent fuel management and on the safety of radioactive waste management
Questions and Comments to the
Denmark
Greenland
8th Review meeting

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Introduction

In October 2024 the Unity of the Realm submitted the 8th National Report under the obligation of JOINT CONVENTION ON THE SAFETY OF SPENT FUEL MANAGEMENT AND ON THE SAFETY OF RADIOACTIVE WASTE MANAGEMENT.

Subsequently, the submitted National Report was circulated to Contracting Parties of the Joint Convention and to the observers invited under Article 33(2) of the Convention for reviewing.

This document presents answers to the questions and comments resulting from the review of the 8th National Report from the Unity of the Realm. Questions are presented in such a way as to preserve the anonymity of the Contracting Party posing the question.

The questions to the National Report from Denmark were answered by the Radiation Protection under the Danish Health Authority in co-operation with the Danish Ministry of Health, the Ministry of Resilience and Preparedness, Danish Decommissioning and the Danish Emergency Management Agency.

The questions to the National Report from Greenland were answered by the Greenlandic National Board of Health.

In total 46 questions were received from the Contracting Parties of the Joint Convention to the 8th National Report from the Unity of the Realm. Thirty-eight questions were directed to the Danish part of the National Report and eight to the Greenlandic part of the National Report.

The questions are mainly related to the following issues:

- Legislative matters
- The National Programme and it’s implementation
- Waste management
- Decommissioning

1. Questions, Comments and Answers

1.1. Question (#46518)

It would be of interest to know the purpose of the export/import transports (between Denmark, Sweden and Finland).

Answer
These transboundary movements of radioactive waste relate to:

I) Shipments of radioactive sample materials for laboratory analysis and the return of the resulting radioactive waste.
II) Shipment of combustible radioactive waste for processing (incineration) and the return of the resulting radioactive concentrate (ashes).

1.2. Question (#46519)

Description about the conditions for storage of NORM at licenses would be of interest.

Answer
Regulatory requirements concerning storage of NORM waste are provided in the Radiation Protection Act and associated Executive Orders. In general, NORM waste is managed as any other kind of radioactive waste in Denmark. However, there is not a national storage or disposal facility that accepts NORM waste. Hence, the licensees (operators) shall ensure the safe and secure management of NORM waste until such solutions are in place.

Licensed storage facilities for NORM waste are typically located in restricted access areas or buildings in which closed ISO-containers are placed. The package of NORM waste typically includes several barriers – *e.g.* plastic drums with internal plastic liners placed inside a steel drum. The steel drums are placed inside ISO-containers.

1.3. Question (#46520)

It is stated that a final management solution for NORM is awaiting development. What kind of solution for storage of NORM is under development?

Answer
The statement in the national report refers to development of a disposal solution for NORM waste.

However, there is no national storage or disposal facility that accepts NORM waste. Hence, the licensees (operators) shall ensure the safe and secure management of NORM waste until such solutions are in place.

1.4. Question (#46521)

What levels of contamination are set for the release of sites following decommissioning?

And are there different levels of remaining contamination set for different future use of the sites?

Answer
The release of land (sites) from regulatory control is subject to a dose constraint on the effective dose of 10 µSv/year to members of the public according to § 12 in Executive Order No. 670/2019.

The goal of the decommissioning of the nuclear facilities at the Risø site is defined as *green field* in Parliamentary Resolution B48/2003, hence the dose constraint associated with the release of the land areas at the Risø area is also 10 µSv/year.
The Danish Health Authority approved the release of areas at the Risø site on the 2nd of September 2024.The approval excluded areas under buildings, which are under decommissioning, and one smaller area, which was previously used as a site for disposal of sludge from the conventional water treatment plant at the Risø site. This area needs further investigations prior to development of a management plan leading to the release from regulatory control for this area.

1.5. Question (#46522)

Which organization is responsible for the sampling programme and are the results of the sampling programme checked by an independent third part?

Answer
Danish Decommissioning (DD) developed the sampling programme together with DTU Sustain, Department of Environmental and Resource Engineering: Radioecology and Tracer Studies Group. DTU Sustain carried out the sampling by drilling cores, sample preparation and the measurement of radioactivity.

Prior to initiating the programme for sampling and measurement was presented to the nuclear regulatory authorities.

An independent third party was not involved in the process of the release of the land on the Risø.

1.6. Question (#46523)

It is not clear whether the Waste Management Plant at Risø which is planned for decommissioning is the same site as "the upgraded storage facility" which are under planning/construction.

Could it be stated why the existing Waste Management Plant no longer is suitable for waste storage and whether it is this plant that are to be upgraded.

Answer
The Waste Management Plant refers to a number of buildings and facilities, of which all are located in close proximity to but not directly adjacent to or as an integrated part of the planned upgraded storage facility. The majority of the facilities at the Waste Management Plant are no longer relevant for present and future operations. Also, several buildings belonging to the plant will experience an unacceptable increase in the risk of flooding from the Roskilde Fjord during storm surges when sea levels rise in the future. These facilities are thus being decommissioned and will not be included in future DD-operations related to waste management or storage. A small number of buildings from the Waste Management Plant where waste is received from external users and sorted before being moved to storage, will be kept in operation for some years going forward, until new, similar facilities are constructed within the site of the upgraded facilities. The facilities in these buildings are adequately secured against storm surges and can be kept safely in operation until their replacement facilities in the upgraded storage site are constructed.

1.7. Question (#46524)

It is stated that Danish Decommissioning may store waste up until a national disposal facility is commissioned; what are the criteria for the waste facility to be able to stored waste longer than 1 year?

Answer
Executive Order No. 670/2019, § 24 states that radioactive waste shall be discharged or disposed of as soon as reasonably achievable and that radioactive waste may be stored for no more than 12 months with a view to its decay and subsequent clearance or discharge or disposal. Radioactive waste that cannot be managed in this manner must be transferred (to the waste management organisation). In special cases, the Danish Health Authority may authorise storage for more than 12 months. The Danish Health Authority authorises such storage based on case-by-case assessments, taking into account available management routes for radioactive waste, as well as specific circumstances associated with the licensed use of radioactive materials in question.

The Operational Limits and Conditions for the storage facilities at the Risø site specifies the terms for the safe and secure management of radioactive waste in currently operated storage facilities at the Risø site. The specified terms are in agreement with the provisions for storage of radioactive waste stated in Executive Order No. 670/2019.

The planed upgraded storage facilities at the Risø site will be subject to approval in accordance with the nuclear installations act and licensing in accordance to § 5 in Executive Order No. 670/2019, including the requirement of undertaking a safety assessment in accordance to § 20 in Executive Order No. 669/2019. The assessments shall address all aspects of safe operation of the upgraded storage facilities throughout its lifetime. A license will specify conditions to ensure that safety of the upgraded facilities is maintained over the lifetime of the facilities.

1.8. Question (#43344)

An upgraded storage facility and associated waste management facilities are planned to be constructed. Are there any further plans what kind of facilities are needed?

Answer
The upgraded storage facility is designed, and further action awaits submission and approval of application for construction as required by the Nuclear Installations Act and approval of the EIA by the relevant authorities. The associated waste management facilities are not designed yet.

1.9. Question (#43345)

Please provide further information on the incident, when several Co-60 pellets were dropped during handling in the hot cell and that could not be retrieved? What further steps are planned for the decontamination work?

Answer
The Co-60 pellets were dropped when the Hot Cells was in operation (1964-1989) and Danish Decommissioning (DD) has no detailed information on the incidents. During decommissioning some of these pellets have already been secured with remote vacuum cleaning and the remaining pellets are considered to be stuck. The remaining pellets will either be loosened remotely and vacuum cleaned or covered with sufficient shielding material and handled during the dismantling of the cells.

1.10. Question (#43346)

Danish Decommissioning plans for commissioning of the storage facility in 2028. Is the license for storage going to be limited? Will the possible long-term storage be taken into account in the design of the facility?

Answer
According to Parliamentary Resolution B90, the upgraded storage facility is designed to for an operation period of up to 50 years. A geological disposal facility must be in operation at the latest by 2073.

The use of the planned upgraded storage facilities at the Risø site will be subject to licensing according to § 5 in Executive Order No. 670/2019, and the operator will be required to compile a safety assessment according to § 20 in Executive Order No. 669/2019. In the safety assessment, the operator must document the safe operation of the facilities including the safe storage of radioactive waste throughout the lifetime of the facility. This includes evaluation of the need for limits with respect of total activity stored at each facility in order to adhere to dose constraints and dose limitations for occupational and public exposure. Based on such evaluations, a license will specify conditions to ensure that safety of the upgraded facilities is maintained over the lifetime of the facilities.

1.11. Question (#43347)

“A planned system for online registration of radioactive waste has not yet been implemented. In the meantime, The National Board of Health has begun registration of ionizing sources in Greenland.”

Is it planned to have a publicly available record of the inventory in the future?

Answer
There are currently no plans to establish a publicly available record of the inventory.

1.12. Question (#43348)

“The Ministry of Health is working in close collaboration with Arctic region experts to develop and implement procedures for dealing with an orphan source.”

What is the current status of this concept and what measures are planned?

Answer
Greenland have not yet developed detailed procedures for dealing with an orphan source. In emergency situations the health authorities will seek support from local

authorities with measuring equipment and professional assistance from experts primarily in Denmark. The health authorities are working on initiatives to enhance internal capacity.

1.13. Question (#42647)

Two of the challenges identified for Denmark in the 7th JC review cycle were related to public acceptance of the technical solutions promulgated in the country. Also, the Contracting Parties agreed that National Reports for the Eighth Review Meeting should address, as appropriate, the actual measures that have been taken in implementing the following issues ... (ii) Inclusive public engagement on radioactive waste management and on spent fuel management programmes. Section H.2.6 of the Danish national report provides some information on the interaction with stakeholders. Could Denmark provide some more information on how those challenges have been or are planned to be addressed?

Answer

In the reporting period 2021-24, the level of information made available to the public has been increased. Interim reports and plans for the upgraded storage facility at Risø site and for the execution of the National Programme are discussed regularly in Contact Forum Roskilde and made public available online publication. The National Programme was discussed with the Contact Forum Roskilde and the National Contact Forum prior to its publication in June 2021. The contact fora will be invited to comment and discuss the National Programme following updates. Danish Decommissioning engages in communication with civil society, primarily in Roskilde Kommune (municipality) and the Greater Capital Region of Copenhagen. An Open Doors-event is organised annually at the Risø site. Visits from school classes, citizens groups and associations, etc., are conducted on a regular basis. As for public acceptance of a disposal facility, a communication plan involving a dialogue process described in Parliamentary Resolution B90/2018 will be prepared by the Ministry of Resilience and Preparedness which has been handed the portfolio of radioactive waste management, following a government re-organisation in August 2024, cf. the reply to question 42646.

1.14. Question (#42646)

Section H.2.5 of the Danish national report presents actions to address the ARTEMIS mission findings taken place in 2022. Could Denmark please elaborate on which entity is responsible and what is the progress made against recommendations addressed to the Government related to the update of the national programme on RWM (R3 & 6)?

Answer

1) The entity responsible for the update of the National Programme in the reporting period 2021-24 has been the Ministry of Higher Education and Science. The Danish Health Authority and the Danish Agency for Higher Education and Science have assisted

their respective ministries with contributions to the update of the National Programme. Following a re-organisation of government portfolios in August 2024, all matters pertaining to the management and disposal of radioactive waste (except regulatory matters) have been transferred to a new ministry, the Ministry of Resilience and Preparedness. A new agency for resilience, announced on 29 January 2025, has been given the portfolio of radioactive waste from Danish Agency for Higher Education and Science.

2) Progress with regard to ARTEMIS mission R3 & R6 has been achieved by continued planning to define interim targets and end states of the programme. Work has been concentrated on:

1. the consolidation of a project plan for the construction of an upgraded storage facility and
2. on an implementation plan for a disposal facility. Update of the national programme is pending government approval of a revised disposal facility concept, as well as the inclusion of all types of radioactive waste in the programme, e.g. NORM.

National Programme for the Responsible and Safe Management of Radioactive Waste, Subsection 7.1, pp. 61-62.

1.15. Question (#40317)

Denmark mentions that strategy for radioactive waste management was adopted in 2020. Could you elaborate how the strategy was adopted?

Answer

The national strategy (National Programme) is based on Parliament Resolutions B48/2003 and B90/2018. The resolutions combined lay out the national policy on: 1) operation (care and maintenance) and decommissioning of the nuclear facilities at the Risø site and 2) long-term management and disposal of Danish radioactive waste.

The National Programme was approved in December 2020 by the following ministries:

- Ministry of Health
- Ministry of Higher Education and Science
- Ministry of Defence
- Ministry of Environment
- Ministry of Industry

1.16. Question (#40318)

Denmark describes the structure of the national strategy by sub-areas and timescales in section B.1.2. Could you elaborate how the progress on the implementation of the national strategy is monitored and how are adjustments made to address possible lack of progress?

Answer

Progress on the implementation is monitored by the relevant agency under the Ministry of Resilience and Preparedness responsible for the performance evaluations mentioned in the National Programme. Evaluations are performed annually or triennially. Minor technical adjustments are included in the annual target and performance plan for Danish Decommissioning. In case of the need of significant adjustments, the matter is referred from the agency to the Ministry of Resilience and Preparedness for consideration and possibly further political decision.

National Programme for the Responsible and Safe Management of Radioactive Waste, Subsection 7.2, p. 64.

1.17. Question (#40319)

The Radiological Characterization Laboratory is described as a subject to an external audit on an annual basis due to its commitment to maintain high-quality standards. It is also mentioned that the most recent external audit took place in 2019. Could you clarify why the most recent external audit took place 4 years ago and what has been the most relevant impact of this delay?

Answer

The text as presented can unfortunately be misunderstood.

All processes and operational work in DD with regards to decommissioning of the nuclear facilities, management of radioactive and other hazardous waste is certified according to DS/EN ISO 9001:2015, and it is within this system the external audit of the Radiological Characterisation Laboratory is carried out. The note regarding 2019 specifies that this was the year the external auditor DNV specifically included this specific laboratory in their audit plan, but as with all other certifications it is the mandate of the external auditor to choose which areas of the organisation to cover during each audit.

The DS/EN ISO 9001:2015 certification of DD has had an external audit annually since originally receiving the certification. Furthermore, this specific laboratory is included in the internal audit programme of DD.

1.18. Question (#40320)

Based on the report, Danish Decommissioning seems to have exceptionally broad responsibility in implementation of the strategy. How Danish Decommissioning ensures that its staff have adequate skills in a timely manner and in each sub-area of the strategy? How Denmark ensures that the qualified staff is available?

Answer

Structuring the deliverables via an implementation plan is the starting point. This plan indicates the competences needed at what time, which is supported by the manning strategy. The resources then need to be available in a timely manner, which is constantly evaluated by management and HR.

DD has focus on improving the option of having foreign resources employed in order to increase the market available. Also, DD choose to work from an intelligent customer perspective, meaning engaging with specialized consultants on specific tasks, but where DD should still be able to grasp the quality and interconnectedness of the deliverables. Further, the existing resource pool is constantly evaluated for opportunities for employees growing into new areas of expertise within the company.

As a third leg, DD has engaged in collaborations with especially Danish University of Denmark, DTU, and with Norsk Nuklear Dekommissionering (NND), in order to make a joint effort in the educational area and within the R&D activities which we have in common.

1.19. Question (#40321)

Denmark mentions that “special waste” constitutes a limited fraction of the radioactive waste in terms of mass and volume, but accounts for a significant proportion of the long-lived activity in the combined inventory, and therefore places critical constraints on predisposal management and disposal options. It is also mentioned that discussions took place in December 2023 regarding defining generic waste acceptance criteria for a disposal facility concept and the current state of characterisation of the historic waste fractions, including the “special waste”. In addition, Danish Decommissioning is currently reviewing the implementation plan in the light of these discussions to revise and develop the plan further. Could you elaborate how the work is progressing, and whether it continues to consider the international option?

Answer

The base case for the disposal solution in Denmark, is to dispose all Danish radioactive waste in Denmark.

Danish Decommissioning (DD) has proposed different concepts for the disposal solution, and for the 'special waste' a borehole solution is being investigated further.

In a parallel track various other options for handling the different waste fractions are being investigated, why DD participates in several forums for international collaboration on pre-disposal and disposal solutions. This is in line with the Parliamentary Resolutions from 2003 and 2018, where DD is mandated to seek an international solution for the special waste. There are no specific international options for the special waste at this moment.

1.20. Question (#40170)

"The Waste Documentation System operated by Danish Decommissioning is based on bar code identification which enables real-time spatial tracking of any registered waste item. Danish Decommissioning also applies colour-coding of waste categories, waste containers and waste routes, which has reduced the number of waste handlings as well as waste destination errors."

1. What are the benefits of this approach and what are the detriments?
2. How is the bar code system implemented? Is it a central system which all waste producers can access?
3. Are some waste items not included as they are not registered? Why would a waste item not be registered?
4. What value does colour coding add and how does it work in practice?
5. Are there any issues with bar codes staying attached to the package during long-term storage?

Answer

Ad 1. The tracking system works by linking waste items to a container or storage facility, and containers to a specific storage facility. It logs the plan, status, and location for each waste item, also before it is placed in storage. When a container is moved, the system only accepts the movement if the correct measurements are taken prior to the transfer. The benefits of this process are that it ensures the correct flow of waste through the organization is maintained. The system allows us to trace where and when a waste item or container has been, what the measurements were, as well as who conducted the transportation.

No detriments have been identified.

Ad 2. The system is only accessible to Danish Decommissioning (DD). DD is responsible for registering institutional waste in the system from external suppliers.

Ad 3. All waste that has been decommissioned and conditioned is included in the database. Waste that is still in the process of decommissioning is not registered until it has been conditioned. All waste received from the surrounding society is registered at arrival at DD.

Ad 4. The colour coding works as a 'traffic-light'-indicator of the process for the specific item. The value is that it is easy for every employee to translate what the status and plan is for a specific item. We work with the colours white, green, yellow, blue and red. E.g. if an item has a red code, the complete waste item goes to storage. If the item has a yellow code, the item is contaminated and work has to be done, in order to remove the contamination/contaminated part.

Ad 5. For containers approved for long-term storage, DD uses heavy-duty stickers, ensuring that barcodes remain intact during storage. DD have not experienced stickers falling off, why we continue with the system.

1.21. Question (#40135)

"Household ionizing smoke detectors containing Am-241 are collected at the local scrap yards as they are being replaced by photoelectric smoke detectors in households etc. (Table 7). The Danish Health Authority, Radiation Protection has instructed local scrap yards to collect these with the Waste from Electrical and Electronic Equipment (WEEE)."

What controls are placed on the scrap yards to manage the ionising smoke detectors before they are collected by the licenced recycling companies? For example, do the local scrap yards require to be licenced to collect the household smoke detectors? Are there any limits on sources that are held in scrap yards? What are the security requirements regarding storage of these sources?

Answer

The storage of consumer products such as household ionizing smoke detectors containing Am-241 (37 KBq) with a total activity less than or equal to 1.000 times the exemption value for Am-241 (given in Annex 3 in Executive Order No. 670/2019) are exempt from the licensing and notification requirements. This means that the local scrap yard is exempt from licensing and notification requirements as long as less than approximately 250 household ionizing smoke detectors are kept in storage.

The Danish Health Authority has assessed that with the current practice, it is very unlikely that the local scrap yards at any given point of time will be storing more than 250 household ionizing smoke detectors given that smoke detectors are collected only as a very limited fraction of Electrical and Electronic Equipment (WEEE).

Individual household smoke detectors are not subject to the security measures for high-activity sealed sources, which only apply when the total activity of Am-241 in storage exceeds 0.06 TBq.

At the local scrap yards, the general requirements of safe and secure management of radioactive materials apply (§ 36 in Executive Order No. 670/2019). Hence, ionizing smoke detectors shall be stored protected against theft and vandalism as well as fire,

flooding and similar environmental impacts. In addition, ionizing smoke detectors may not be stored together with explosive, corrosive or highly flammable substances or other substances that might compromise safety during storage. Given that access to the local scrap yards which are fenced is only possible during opening hours, and that scrap yards are manned during opening hours, as well as the fact that WEEE is stored inside a building (locked up outside opening hours), the general security measures of safe and secure storage are met.

1.22. Question (#40139)

It is stated that, in the national programme, “The waste management area outlines how existing and future radioactive waste is to be characterized, classified, segregated, sorted, minimized and otherwise managed”. Could you elaborate what precise measure are in place to minimize radioactive waste? (Art. 32).

Answer

There are provisions in Executive Order No. 670/2019 § 32 and § 34 on the optimisation of management of radioactive materials which includes the management of radioactive waste (see text below).

> *§ 32. Manufacture of radionuclides and any holdings of radioactive material shall be kept to the minimum necessary for its use.*
>
> *§ 34. All use of radioactive material shall be facilitated in such a way that the production of radioactive waste is kept to the minimum necessary for that use.*

The exact measures put in place to comply with these provisions depend on the circumstances related to the specific type of use. As an example, during decommissioning, § 34 is applied when activated/contaminated parts of building materials or radiation shielding materials are separated from non-radioactive parts by cutting or sawing.

During the planning phase, Danish Decommissioning (DD) aim to minimize the use of materials which could become contaminated. Additionally, DD decontaminate mildly contaminated items to facilitate free release. DD enhance waste segregation and employ reduction methods such as active incineration and water evaporation to decrease the volume of waste for disposal, thereby converting more waste into conventional waste. Furthermore, DD are increasingly exploring opportunities for recycling of radioactive sources.

1.23. Question (# 40140)

According to our understanding, the report mentions that for siting of a repository, two sites shall be selected from a list as a result from prior investigation studies. These will then undergo more detailed site studies. Should these studies fail, further sites will be identified as in the first step. Could you elaborate on the rationale behind this plan to select precisely two sites for further investigations?

Answer

The rationale behind the selection of two sites reflects a political concern regarding the number of sites. In the event that favourable conditions for a disposal facility cannot be demonstrated for neither site, Parliamentary Resolution B90/2018 includes the option of adding new sites to the investigation studies.

1.24. Question (#40141)

Is it correct that the whole national programme, including construction and operation of a future repository, is financed by a fund solely relying on the state budget?

Answer

It is correct that Denmark ensures that adequate financial resources are made available to support the safe operation (care and maintenance) and decommissioning of the nuclear facilities at the Risø site, including radioactive waste management facilities, future disposal facility pre- and post-closure, through budget positions (reserve funds/allocations) on the Financial Act.

1.25. Question (#40142)

It is stated that *“Additional assessments will be performed before a decision for the need of a permanent disposal facility or implementation of alternative solutions, including options for export to Denmark under a Danish-Greenlandic agreement, can be made”.* What kind of assessments are required for such a decision, and, would an agreement for an export to Denmark not be the best option in the first place, considering the very low amounts of radioactive waste?

Answer

An agreement for a transfer to Denmark or export to another country with the necessary facilities will be the best option in the first place. There are at present very low amounts of radioactive waste. A safe, permanent disposal facility may be established, but would demand extensive and costly preparations.

1.26. Question (#38660)

What is the capacity of developing storage facility?

What classes of radioactive waste are planned to store here?

Answer
The capacity of the facility is set based on the amount of already stored waste combined with estimates of waste generated from the final decommissioning of the nuclear facilities at the Risø site and estimates of future amounts of institutional waste. In addition, an additional buffer capacity is added to ensure efficient operation of the storage facility and to ensure adequate storage capacity if the generation of institutional waste increases in the future.

The upgraded storage facility is planned for storage of low level and intermediate level radioactive waste.

1.27. Question (#38661)

Is the concept of a deep borehole for special radioactive waste still being considered or has the idea been abandoned?

Answer
Danish Decommissioning is investigating the borehole solution and is following the development of the concept quite closely. The concept of a borehole needs to reach a higher level of qualification before decisions can be taken in this regard.

1.28. Question (#33932)

Denmark has legacy waste from its former research reactors. Could you please elaborate on how it ensures the safe management and long-term monitoring of this waste, particularly concerning potential environmental impacts?

Answer
Elaborate analysis have been carried out for potential safety issues for the upgraded storage facilities, including natural disasters such as storm surges, meteorites, earthquakes and other identifiable threats such as plane crashes, fire and sabotage. Radiation levels at the storage facilities are being continuously monitored in accordance with protocols and instructions, and frequent inspections are carried out at the facilities. The established framework of combined maintenance and monitoring of facilities along with the preparedness for disastrous events ensures a safe management of the legacy waste.

1.29. Question (#33712)

Under Article 26, the report only describes the doses from the decommissioning of the DR1 and DR2 reactors, as well as the doses from the decommissioning of the DR3 reactor, the Hot Cell Facility, the Fuel Fabrication Facility, and work at the Waste Management Plant. There is no information on how articles 26.1, 26.2, 25.3 and 26.4 are complied with. Could you please give additional information on how you comply with these articles?

Answer

All relevant personnel receive education and instruction that ensure they can safely carry out the decommissioning work. In case of external contractors, they will also receive relevant instructions that ensure they can safely carry out work in radiological classified areas. The Financial resources are approved and ensured by the government before the decommissioning work begins.

26.2: A project plan for each specific project is approved in advance by the nuclear regulatory authorities, to ensure estimated radiation exposure is justified and optimised in accordance with the Danish legislation. The project plan also includes a risk and safety assessment including estimates for discharges and unplanned and uncontrolled releases. Each specific planned decommissioning task is also reviewed by the nuclear regulatory authorities, for the same reasons. During operation radiation protection personnel monitor radiation levels and ensure the actual condition are as estimated and advice if a work procedure can be adjusted to optimise actual doses. After the project is completed, radiation exposure doses are reported to the nuclear regulatory authorities, to ensure compliance.

26.3: There are no specific emergency plans for decommissioning tasks, instead all relevant personnel receive education and instruction that ensure they can react correct in case of any emergency. There are also procedures of how to assemble relevant personnel in case of an emergency. To ensure this works, an exercise is conducted once a year, with multiple training sessions focused solely on radiation protection emergency preparedness being conducted as well. The only exception to this is emergency concerning fire, this is handled by the local municipal fire department, with radiological assistance if necessary, from our full-time on-site radiation protection department.

26.4: All important information is kept in two separate archives (complete sets of records), one physical and one digital.

1.30. Question (#33713)

Do you have any interesting lessons learned that you would like to share, from your experience in the decommissioning activities carried out to date? What challenges did you have to address?

Answer
There are many, the most interesting one is how much value old pictures and information gathered from interviewing retired employees, from when the facilities were in operation, have provided. The value was high due to lack of documentation like “As built drawings”. Some of the major challenges is and finding solutions to unique problems in an environment with lack of information, this constantly leads to changes in planning and unfortunately often delay deadlines.

1.31. Question (#33714)

There is no analysis of the way Denmark has adopted steps to ensure that after the closure of a disposal facility, articles 17.1, 17.2, and 17.3 are met. Could you please give information on the way you comply with these articles? How are reflected in regulations the provisions to meet this article?

Answer
The national programme includes provisions for institutional control and closure for the disposal solution. Given the early stage of the disposal solution project, Danish Decommissioning will suggest and describe potential institutional control measures and the safe closure in the safety assessment of the disposal facility.

National Programme for the Responsible and Safe Management of Radioactive Waste, Subsections 1.1., pp. 10-13, 5.3, pp. 49-50, and 7.2, p. 64.

The release from regulatory control of the site of the disposal facility will be subject to a dose constraint of the effective dose of 10 µSv/year to members of the public.

1.32. Question (#33737)

It is said that the Danish Emergency Management Agency must coordinate countermeasures. The overall nuclear contingency plan concerns coordination and cooperation between the state authorities responsible for maintaining and continuing essential societal functions in the event of a nuclear accident. Could you explain a little more about which contingency plans are scheduled in relation to dismantling installations? How often are these contingencies texted?

Answer
In addition to the nuclear emergency plan, the municipality must prepare a contingency plan for "likely, everyday incidents" – for example, fires.

The municipal contingency plan must be risk-based, i.e. the municipality is obliged to take into account risks arising from, for example, facilities for receiving and managing

radioactive waste. In this regard various forms of oversight is conducted by the municipality, as well as exercises are conducted between facility and municipality.

According to the Operational Limits and Conditions for Danish Decommissioning (the licensee) established by the Nuclear Regulatory Authorities, it is required that:

Emergency preparedness and response (EPR) plans and procedures must be in place to ensure the deployment of on-site response efforts and alerting of external emergency management services.

Tasks and responsibilities associated with the maintenance of the emergency response plan, including duty and on call duty arrangements, management and maintenance of equipment, education and updating hereof and planning and conducting emergency training, must be assigned to explicit staff members within the Danish Decommissioning's organization.

According to the Operational Limits and Conditions for Danish Decommissioning decommissioning plans must include a safety assessment which also must address plans and procedures for management of contingencies. Decommissioning plans and the associated safety assessment must be kept up to date at all times.

1.33. Question (#33740)

It is said that the Danish Emergency Management Agency must coordinate countermeasures. The overall nuclear contingency plan concerns coordination and cooperation between the state authorities responsible for maintaining and continuing essential societal functions in the event of a nuclear accident. Do you have any experience with this coordination? Could you explain more which agreements are established between the licensee and the municipalities?

Answer

Coordination between authorities is tested on a regular basis; for example, tabletop exercises are held regularly, where the authorities test their own procedures and coordination regarding precautions, etc. with other authorities. It is included in the national nuclear emergency plan that coordination will primarily take place in the National Operational Staff (NOST).

In cases where Denmark is hit or affected by major crises and incidents, such as extreme weather, fire, explosions, power outages, accidents or attacks, the National Operational Staff – colloquially NOST – meets to manage and coordinate the operational efforts across the authorities.

A number of the authorities included in the national nuclear emergency plan are permanent members of NOST, and thus participate in coordination work on a regular

basis, as the members of the authorities do not only participate in NOST in relation to nuclear accidents. (Nuclear experts, etc. assist the general representatives of the authorities.)

According to the Operational Limits and Conditions for Danish Decommissioning (the licensee) established by the Nuclear Regulatory Authorities it is required that:

An on-site system for emergency preparedness and response (EPR) must be in place at the nuclear facilities. The on-site EPR must ensure measures to mitigate the effects of fires, flooding, personal injury and accidents involving radioactive substances and nuclear materials. The EPR must be coordinated with emergency preparedness response measures of the Danish Technical Univeristy (Risø Campus) and external emergency management services including fire brigades, hospitals and the national nuclear emergency management. The on-site EPR must be able to make a coordinated response adapted to the nature and complexity of the incident or accident.

EPR plans and procedures must be in place to ensure the deployment of on-site response efforts and alerting of external emergency management services.

Annual EPR exercises must be conducted at the Risø site, and the licensee must invite the local emergency management services to take part in the activities.

1.34. Question (#33750)

Could you give more details about the operation of this platform aimed at improving communication with stakeholders? Who will be its manager? Have you carried out any activities so far?

Answer

The platform so far consists of a dedicated landing page on the website of the Ministry of Higher Education and Science (to be relocated to the website of the Ministry of Resilience and Preparedness). The webmaster and the contact person are employees of the Ministry of Resilience and Preparedness. Activities at this point have been focused on the publication of news, information and meeting records. Meeting facilitation of the contact fora and replies to queries from the public are tasks that are handled by the ministry.

Link to landing page on radioactive waste, including English language section, at ufm.dk

1.35. Question (#33644)

Following Parliamentary Resolution, Danish Decommissioning is planning construction of a new upgraded storage facility for all the radioactive waste for which Danish Decommissioning bears prime responsibility.

1. What prompted you to plan a new upgraded storage facility?
2. What is the most important technical focus for the new upgrade storage facility?

Answer

Ad 1: The current facilities were only commissioned for a 20-year operating period (2003-2023). The current facilities are not suitable for lifetime extension due to their technical properties. One facility is exposed to the risk of flooding during hurricane conditions and the impact of a significant rise in the sea level forecasted for the period until 2100 is also a source of concern.

Ad 2: a) a safe barrier system on a safe location, b) increased volume to ensure sufficient capacity for 50 years of operational lifetime, and c) climate-controlled storage conditions to prevent corrosion of waste packages.

1.36. Question (#33645)

The Waste Documentation System operated by Danish Decommissioning is based on bar code identification which enables real-time spatial tracking of any registered waste item

Please briefly explain the operation process of the real-time spatial tracking system of waste, and the benefits gained from the introduction of this system.

Answer

The tracking system works by linking waste items to a container or storage facility, and containers to a specific storage facility. It logs the plan, status, and location for each waste item, also before it is placed in storage. When a container is moved, the system only accepts the movement if the correct measurements are taken prior to the transfer. The benefit of this process is that it ensures the correct flow of waste through the organization is maintained. The system allows us to trace where and when a waste item or container has been, what the measurements was, as well as who conducted the transportation.

1.37. Question (#32752)

Under which criteria are Naturally Occurring Radioactive Materials being controlled (handled?) as radioactive waste?

Answer
Naturally Occurring Radioactive Materials (NORM) are regulated as other radioactive materials to in accordance with the limits specified in Annex 1 (see § 5) in Executive Order No. 670/2019. Annex 4 in Executive Order No. 670/2019 (page 37) lists activity concentration values for exemption or clearance of the naturally occurring radionuclides. Material containing NORM in quantities or concentrations exceeding exemption or clearance levels are considered radioactive materials subject to the provisions of Executive Order No. 670/2019. According to these provisions, radioactive materials (including NORM) with no further foreseen use are considered radioactive waste.

1.38. Question (#32751)

Is there any procedure to define the number of the stakeholders as well as the appropriate stakeholders that will be engaged?

Answer
The identification of appropriate stakeholders may be defined on a case-by-case basis. The two contact fora were established with a view to secure representation of central stakeholders. Currently, central stakeholders are defined as representatives of (in random order):

- Concerned citizens' groups
- Environment NGOs
- Ministry of Resilience and Preparedness
- Competent regulatory authorities (radiation protection, nuclear security, environmental protection, planning authorities, local/municipal authorities, building authorities)
- Danish Decommissioning
- Geological Survey of Denmark and Greenland
- Danish Regions (national organisation of the regional authorities)
- Local Government Denmark (national organisation of the municipal authorities)
- Local politicians, e.g. members of a municipal council.

The number of stakeholders may vary depending on the size and scope of the issue(s) to be covered by stakeholder engagement. There are no formal rules governing the number of representatives.

1.39. Question (#31542)

The National Report notes the Finance Act covers the operating costs of the Danish Health Authority and the Danish Emergency Management Agency through allocations to the respective ministries in charge, i.e., the Ministry of Interior and Health and the Ministry of Defence, respectively. Apart from the broad specifications in the annual Finance Act,

there are no detailed provisions to ensure that the regulatory authorities are assured relevant competences and resources corresponding to the obligations given to the regulatory body by law. Please describe how the Financial Act has affected the retention of decommissioning and radioactive waste experts within the Danish regulatory agencies. Has any aspect of the radioactive waste management regulatory framework or implementation been altered or delayed based on economic considerations?

Answer

Danish Health Authority:
The general specifications in the annual Finance Act allocates funds to the Danish Health Authority as provisions to meet the obligations given to the regulatory body by law. The Director General and the Executive Board is responsible for the day-to-day management of the Danish Health Authority, and also decides on the allocation of resources internally between the total of eight departments, one of which is the department for radiation protection.

The Finance Act also includes funds reserved for the regulatory oversight of the Danish nuclear facilities, which are all under decommissioning, and where radioactive waste in Denmark is being managed. Approximately half of the resources for maintaining regulatory oversight of the Danish nuclear facilities are covered by these reserved funds. Since the last reporting, one staff with responsibilities for compiling, assessing and maintaining the national inventory for radioactive waste has been recruited. The number of decommissioning and radioactive waste experts has remained constant.
Since the last reporting, implementation radioactive waste management regulatory framework has not been altered and no delays have occurred due to economic considerations.

However, in January 2025, the Danish Government launched an initiative to reduce the burden imposed on private operators/licensees as a result of having to comply with regulatory requirements. The initiative is of a general nature but also has impact on the activities of the Danish Health Authority, which has been tasked to identify areas where the number of regulatory requirements can be reduced or where the burden associated with compliance with requirements be eased and finally where regulatory activities, including inspections, can be reduced.

The task has been completed and further potential actions await final decision from Government regarding implementation. The resulting impact on DHA activities related to radioactive waste management is therefore currently unknown.

Danish Emergency Management Agency:
As for DEMA (agency now under the Danish Ministry for Resilience and Preparedness), the agency's total grants are allocated through the Finance Act, as the framework for this usually follows from multi-year political agreements usually between a broad majority of parties in/members of the Parliament.

DEMA's work as Nuclear Regulatory Authority only forms part of DEMA's authority tasks, but within DEMA, appropriations are organized with due regard for "mandatory" tasks - for example tasks such as Nuclear Regulatory Authority.

Overall, the Nuclear Regulatory Authorities has so far found the current system for allocating appropriations satisfactory both in principle and in practice.

1.40. Question (#31543)

The National Report states the construction of an upgraded storage facility at the Risø site project is in the final stages of the planning phase. When the legislative approval is obtained, can Denmark elaborate on the regulatory agencies' implementation strategy for radioactive waste management?

How does the regulatory body communicate with the public stakeholders after the legal approvals are obtained?

Answer

The implementation strategy for radioactive waste management of Danish regulatory agencies is part of the framework for implementation of the National Programme for the Responsible and Safe Management of Radioactive Waste (2020) (National Programme 2020). The National Programme presents the current framework including applicable legal provisions and corresponding relevant authorities as well as provisions regarding transparency policy and public involvement processes. The National Programme is subject to revision and updates as appropriate, and any needs for development of *e.g.* legal provisions etc. are to be identified in the revision processes and addressed by the relevant regulatory authority accordingly.

In the framework of the National Programme the strategy for management of radioactive waste in Denmark is to limit the amounts of radioactive waste stored a licensee's sites, and to promote transfer of radioactive waste which cannot be managed by discharge, decay, incineration or other means of processing, to the national radioactive waste management organisation. The Danish legal framework includes provisions to ensure that storage at licensee´s sites is limited and the transfer of radioactive waste takes place within one year of generation.

The national waste management organisation, Danish Decommissioning, is by parliamentary resolution responsible for development of a disposal solution by 2073 at the latest, and for safe storage of the radioactive waste until then.

Upon construction and licensing of the upgraded storage facility, the management routes for radioactive waste will remain as before, *i.e.* Danish Decommissioning will continue to receive, treat and manage radioactive waste from users of radioactive materials in Denmark.

Communication with public stakeholders can take place through several channels; The Danish Health Authority and the Danish Emergency Management Agency are ad-hoc participants in the public information fora, one local for the Risø site, and one national, established as communication channels for implementers of the national programme. The role of the regulatory authorities in these fora is to respond to inquiries regarding legal or regulatory matters raised by the stakeholder participants in the fora.

The regulatory authorities may organise public stakeholder initiatives to address specific topics or concerning specific facilities, during planning and construction stages as well as after commissioning.

Public stakeholders may also request information and/or meetings with the regulatory authorities concerning specific topics or concerning specific facilities. The regulatory authorities are by law obliged to accommodate such requests, taking into account considerations of safety and security in matters relevant for specific facilities.

1.41. Question (#47736)

It is stated that between the 7th national report and this, the 8th national report, that the inventory in Building 249 increased from 1,605 tons to 2,092 tons of stored waste, but the activity decreased from 234 TBq to 194 TBq. Please explain why the stored activity went down when the stored mass increased.

Answer

Between the 7th and 8th national reports, Danish Decommissioning has added 76 storage units to the intermediate storage. The tare weight of the containers accounts for approximately 175 tons. The waste in the containers is primarily composed of:

- 155 tons of waste from the decommissioning of the concrete reactor block of DR3, which contains a low level of activity.
- 23 tons from the heavy water plant room of DR3.
- 58 tons of unirradiated concrete used for shielding the experimental rigs from DR3, which is not activated. The weight of the experimental rigs is much lower. The radiological characterization of the experimental rigs has not been finalized, and we currently only have measurements for the activity of Co-60.
- 53 tons of miscellaneous iron and steel from DR3.
- 24 tons of miscellaneous iron and steel from the Hot Cells.

The decrease in activity is due to the decay of short-lived radionuclides, which primarily consist of H-3, Co-60, Fe-55, and Eu-152.

1.42. Question (#47737)

In the Greenland Section of the report, there is a comment that there was consideration of the suggestion from the 2018 review meeting on inviting an IRRS and ARTEMIS missions to Greenland. Please elaborate on the results of the review and evaluation of the suggestion on inviting an IRRS and ARTEMIS missions to Greenland.

Answer
An IRRS or ARTEMIS mission has not yet been conducted in Greenland.

1.43. Question (#47738)

The report states that the Guidelines for the safe management of radioactive waste generated from the mineral and the hydrocarbon industries in Greenland were expected to be published in 2021. What is the current status of the publication of these guidelines?

Answer
In 2021 the Greenlandic Parliament passed legislation that effectively bans extraction of uranium bearing ore. Hence, publication of these guidelines have been put on halt.

1.44. Question (#47739)

Does Greenland have a plan/program that contains milestones with anticipated dates for the development of a system for the storage of radioactive waste?

Answer
A plan/program that contains milestones with anticipated dates for the development of a system for the storage of radioactive waste, has not been developed yet.

1.45. Question (#47740)

Section J states that “A system for the safe storage of radioactive waste has been developed and is implemented in Greenland.” Please elaborate on the main components of the system. Are there physical storage facilities in operation or is the system mainly just administrative arrangements?

Answer
The system for safe storage of radioactive waste is currently limited to administrative arrangements.

1.46. Question (#47741)

Is there a published quantitative inventory of radioactive waste in Greenland?

Answer:
There is no publicly available inventory of radioactive waste in Greenland.

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