

Article	Ref. in National Report	Question / Comment	Answer
Article 15	Section H, pages 92-95	Could you provide detailed information on the methods used in safety assessments of nuclear facilities? / Limited description of the methodology of safety assessment	Some additional information on Loviisa L/ILW safety case can be found in the Loviisa NPP Environmental Impact Assessment report 2021, chapter 7.9.2.
Article 27	Section I, page 101	On page 101 of the report, the 4th bullet in the list of shipments does not note the origin of the 2 shipments sent to Finland. From where did these shipments originate?	Denmark and Sweden
Article 28	Section J, page 103	As Finland is no longer producing sources, what is the proposed disposition path for sources made outside of the country?	Primarily disused radioactive sources should be returned to the manufacturer or supplier. As secondary option disused radioactive sources can be transferred to licensee who has safety licence for receipt, treatment and storage of radioactive waste.
General	Section K, page 106	Can further information regarding the type of visitors be provided (13000 visitors annually to the Oikulo visitor's center)? Are these visitors mainly Finnish nationals, academics, international industry colleagues, etc?	15 000 would be more close to long time average. (15 065 year 2024) More than 90% are Finnish. Roughly 50% are travellers and 50% groups. Most groups are schools and academics, also all kinds of social groups and companies.
Planned Activities	Section K, Page 110	Canada commends Finland on the successful activities towards certain major developments since the 7th Review Meeting. Section K.3 states that STUK is drawing up a safety assessment that will be appended to the safety statement prepared in the operating licence application. Please provide an update on STUK's safety assessment for Posiva.	STUK is aiming to deliver its statement on the operating licence application to the Ministry of Economic Affairs and Employment in the end of 2025. During the final third of 2024, STUK received updated operating licence application materials from Posiva and continued processing them. STUK also supervised the commissioning of Posiva's nuclear facility and the preparations for its use. Overall, STUK has progressed well in processing the operating licence application, but the material is still being reviewed and STUK has also submitted a new request for clarification concerning the operating licence application material and is awaiting responses to some previous requests for clarification. STUK has paid special attention to the operations of Posiva's organisation. As part of the safety assessment, STUK assesses the readiness of Posiva's organisation with regard to the operation phase. STUK has enhanced supervision to ensure that the organisation meets the defined safety requirements and prerequisites.
Article 19	p. 34	What criteria does STUK consider for the assessment of precautionary action zone and Emergency Planning Zones after becoming less prescriptive?	Criteria for both zones have changed to be more goal-directed (, where the goal is safety). Safety shall be at the same level as before change. This could allow smaller planning zones than before in case of highly safe nuclear installations. In case of radioactive substance releases protective action inside precautionary action zone is to evacuate population before release begins. Goal is to prevent severe deterministic effects of ionising radiation. For old sparsely populated PAZ areas (5 km radius) evacuation was considered to take (at least) 4 hours. Now PAZ should be area where emergency services can evacuate population effectively in less than 4 hours. Radiological criteria for PAZ is basically IAEA criteria: it shall be demonstrated that, in the event of an accident, the radiation dose of an unprotected person outside the precautionary action zone will not exceed 1 Sv within 10 hours of the start of exposure. In case of radioactive substance releases protective action inside emergency planning zone is to shelter indoors and outside EPZ no sheltering should be needed. Radiological criteria for the outer limit of EPZ is: radiation dose of unprotected person outside the emergency planning zone will not exceed 10 mSv within 48 hours of the start of exposure. There is still maximum limit of 20km radius for EPZ. No new PAZ or EPZ has been accepted after the change in Finnish regulation. Thus all considerations have not actually been made. Both radiological and rescue criteria have to be fulfilled for such areas to be accepted.
Article 3.4	p. 65	In light of potential future new construction of e.g., SMR and other reactors. Have waste (low and high level) from potential future nuclear facilities been considered in the current planned waste storage capability?	The current storage capacity is limited to the existing facilities. The waste arising from the future facilities has to be taken care of by the licensees of the future facilities.
General	Section B, page 26	Regarding smoke detectors, as a private entrepreneur is responsible for removing the radiation sources from the recycled detectors, how does the public know to send the detectors to the private entrepreneur. Or, how does Finland ensure that detectors are recycled so the private entrepreneur can remove the radiation sources?	Smoke detectors from households are collected regionally at separate waste recycling centers. From these centers smoke detectors are sent to private entrepreneur, who does their further processing and removes radiation sources.
Article 6.1.3	Section G, page 70	A prerequisite for a Decision in Principle is that the planned host municipality is in favour of siting the facility. Has there been any challenges to the definition of "municipality" or distance from the proposed facility for which a region/area needs to be considered the "planned host?"	There has not been challenges about the definition. All the nuclear facilities in Finland are under area of single municipality and the acceptance required in the Decision in Principle phase is from the hosting municipality.

Article 19	Section E, page 38, Figure 9	The Decision in Principle (DiP) is provided after the completion of the EIA. According to Figure 9, this is prior to construction. However, further in the report, there are discussions of many other EIAs for operational extensions. Do those EIAs follow the same authority - with e.g. DiP by the government?	Act on the Environmental Impact Assessment Procedure defines that the Ministry of Economic Affairs and Employment is the contact authority for the EIAs done for projects and facilities under Nuclear Energy Act during the whole life cycle.
Article 11	Section H, page 79	The report notes that spent fuel must spend a minimum of 20 years in a storage pool. Is this covered in legislation, or is it guidance? Could provisions be requested/made to shorten this time period?	The 20-year period is not a regulatory requirement. The thermal dimensioning of the spent nuclear fuel disposal facility is approximately 2 kW per canister to avoid excessive temperature rise in the bentonite clay and host rock next to the emplaced canister the closed disposal facility. Shorter cooling periods could be used if some fuel element positions were left empty in the disposal canisters. The thermal dimensioning considers the heat transfer of the decay heat taking into account the disposal hole and disposal tunnel layout. A shorter cooling period with full canisters would require re-estimation of the spacing between disposal holes and tunnels and would likely result in an increase in the size of the whole disposal facility.
Article 15	H/94	Can you specify the volume of decommissioning wastes arising from Loviisa NPP to be disposed of in extended LILW repository (EIA process). Will the repository acceptance criteria allow to accept all the decommissioning wastes?	Current estimate is that there will be about 2900 tons of activated decommissioning waste (3500 m3 in packages) and 17136 tons of contaminated decommissioning waste (20966 m3) to be disposed to Loviisa LILW repository. There will be some waste types or packages, which are not currently included in to the waste acceptance criterias of Loviisa LILW repository. The licensee can updated the waste acceptance criteria for decommissioning waste, if it can be shown that the new waste types do not cause any risk to long term safety of LILW repository. In practise this means that the safety case for LILW repository needs to be updated for decommissioning waste. If the WAC cannot be extended to all possible waste types from decommissioning, then licensee needs to find out another disposal solution for the waste type in question.
Article 24	F/57	Can you specify minimum cooling time for spent fuel assemblies before disposal and maximum dose rate on the surface of the disposal container?	The design requirements currently for the fuel are the fuel assemblies maximum average burnup limit of 60 MWD/kgU and the minimum cooling time of 20 years. Maximum dose rate varies between different types of fuel assemblies (EPR, BWR).
Article 32	p. 52 and p. 106	In Finland, 6-week training course "Nuclear Safety and Nuclear Waste Management Course" is organised by different organisations in Finland, including operating organisations, universities and STUK. Does STUK supplement the education for their own staff in addition to this 6-weeks training course? Has it been considered to open the course to an international arena (for countries with similar waste solutions)?	STUK supplements the national training course with its own training program. STUK's training system is being revised and e.g., new tools are being introduced in 2025. The system it consists of various topical training programs and related training courses addressing the key topic areas related to e.g., STUK's and its departments' various areas of expertise, regulatory work and related processes and tasks. As for the the national 6-week course, the course has an important role on national level. The course brings different organizations of the nuclear sector together and provides a comprehensive general training course. The course is carried out and managed in a close cooperation between different participating organizations and e.g., senior specialists of these organizations act as the lecturers. Consequently, the participation quotas per organization, course fees etc. are also affected by e.g., the number of lecturers the organization provides for the course. Furthermore, the course language is Finnish. So as for now, there has not been plans to open the course to an international arena. Turning it into an international version would require a lot of work. In case the course is turned into 'a more commercial version', an international version could be an option - but so far this has not been in talks as the main development focus has lately been in the modernization of the training methods and means (a hybrid course).
Article 19	p. 33	Will or do the recent and ongoing updates of nuclear and radiation safety regulations have an effect on STUK's independence as a regulatory body? An update on the progress and the anticipated benefits of the review process, e.g. on strengthening regulatory independence, would be of interest.	STUK has strong independence supported by our position in government, mandate to issue binding regulations, mandate to decide our selves competences and resources and financing system supporting independence. Current renewal does not have specific objectives for this. Some changes, like financing, might have an effect that has to be carefully assessed.
Article 19	p. 37	The current licensing process differs from the one previously used for the LILW disposal facilities. What challenges has STUK observed with the implementation of new licensing process for existing facilities?	The current licensing process has been in force since 1987 and construction, commissioning and start of the operation of the LILW disposal facilities have been carried out under the existing process. For example the first operating licenses for the LILW disposal facilities have been granted under the current system. We might have lost some knowledge from the early stages of the licensing of the facilities, but no major challenges is recognized nowadays from the early licensing phase.
Article 32	p. 25	STUK operates a storage facility for disused sources. Can STUK elaborate on how STUK's functions for operating the storage facility and STUK's functions a regulatory body are separated and sufficient independence is ensured.	STUK has a duty to operate and regulate interim storage for a state-owned intermediate and lowlevel radioactive waste. The storage room is situated inside TVO's Olkiluoto low- and intermediate level waste disposal facility. These functions are performed by two different departments within STUK. Specifically, STUK's Environmental Surveillance Department operates the storage facility and STUK's Nuclear Waste Regulation and Safeguards Department provides oversight and performs inspections. While the separate departments provide some degree of separation of functions, this situation challenges the independence of the regulator given that STUK is both the operator and regulator of this facility. STUK has set up a internal project focusing on the challenges of storing low and intermediate level waste under the responsibility of the state. The aim of the project is to clarify and improve STUK's internal responsibilities and processes in the area of low and intermediate level waste.
Article 17	Section H, pages 98-99	Please elaborate on long-term strategies for monitoring and maintaining closed waste disposal / Unclear information about post-closure monitoring and maintenance strategies.	The nuclear energy act section 7 h states the following: The disposal of nuclear waste in a manner intended as permanent shall be planned in a way that gives priority to safety and so that ensuring long-term safety does not require the surveillance of the disposal site. So the design goal for a disposal facility shall be passively safe facility after closure and no monitoring or maintenance shall be needed. Despite of this design criteria, there could be some monitoring performed at the site after closure if deemed necessary during the closure. According to the guide YVL D.5, 815, the licensee shall make a proposal on the potential post-closure monitoring measures at the disposal facility site when applying for STUK approval for the closure of the facility.

Article 16	Section H, pages 95-98	Could you elaborate on how international operational incidents influence safety protocols in Finland? / No mention of the integration of lessons learned from international safety incidents.	<p>According to Section 7 a of the Nuclear Energy Act (990/1987), the safety of nuclear energy use must be continuously improved by utilizing operational experience, safety research, and advancements in science and technology. The YVL A.10 guide, "Operational Experience Feedback of a Nuclear Facility," provides more detailed instructions on how operational experiences, including international experiences, should be collected, analyzed, and utilized to enhance nuclear facility safety. The guide emphasizes the importance of a systematic operational experience feedback process as part of the overall safety management of a nuclear facility.</p> <p>International operational incidents are obtained primarily through the IRS system. Each incident is addressed at STUK. The incidents' safety significance is assessed especially regarding the Finnish NPPs which is potentially followed by discussions with the license holders and implementing appropriate measures to address the issues.</p>
Article 11	Finances and resources of the regulatory body p45	<p>Regarding competency and resources of the regulatory body, what technical and scientific disciplines have been identified as being necessary for the assessment of long-term safety (including post closure) of radioactive waste disposal facilities, both near surface and deep geological facilities? Please include the following in your response:</p> <p>(a) Scientific and technical disciplines and corresponding numbers of people employed (full time equivalent) within the regulatory body</p> <p>(b) Additional skills and numbers of people (full time equivalent) via external experts, including any Technical Support Organisation</p> <p>(c) Any strategy or plan to increase capacity in the identified areas in parallel with phases of disposal facility development: e.g. supporting dialogue with operators in advance of applications, in developing associated regulatory guidance, and then in assessing an application for licencing</p>	<p>The spent nuclear fuel disposal facility has been in STUK's oversight for over 25 years due to the multiphase licensing process. The post-closure safety has been assessed thrice during this time and the ongoing regulatory review is the third review. Each of the post-closure safety cases and reviews builds upon the earlier post-closure safety cases. Thus, the current review group resources are not useful in estimating resource needs of review group resources in other licensing schemes. The personnel was increased in the early phases of the project in the late 1990s and early 2000s and reached the maximum at the construction license phase when over 20 people were working in mainly the review. The number of personnel working mainly in the in the operating license review group is 14. The review groups receive strong support from the other departments at STUK.</p> <p>The identified key competencies are the engineered barriers (performance of the canister, clay materials, rock engineering), behaviour of spent nuclear fuel (thermal dimensioning, criticality and behaviour as a release source), safety analysis (deterministic, probabilistic and biosphere analysis), performance assessment, scenario analysis (future studies) host environment (geology, hydrogeology, hydrogeochemistry), and LILW related areas (cements, waste matrices).</p> <p>STUK has international consultants working in most of the aforementioned areas and receives additional support in areas where expertise at STUK is limited. The current consultant group consists of approximately 10 individuals and organisations.</p>
Article 32	B/20	Could you please clear the situation with LILW arising from research and industry? It is stored in interim storage at Olkiluoto disposal facility. Who is responsible for operating of this part of the facility? Which organization assumes the ownership of the waste package? There are two operators of this facility?	<p>STUK has a duty to operate and regulate interim storage for a state-owned intermediate and lowlevel radioactive waste. The storage room is situated inside TVO's Olkiluoto low- and intermediate level waste disposal facility. These functions are performed by two different departments within STUK. Specifically, STUK's Environmental Surveillance Department operates the storage facility and STUK's Nuclear Waste Regulation and Safeguards Department provides oversight and performs inspections. While the separate departments provide some degree of separation of functions, this situation challenges the independence of the regulator given that STUK is both the operator and regulator of this facility.</p> <p>STUK has set up a internal project focusing on the challenges of storing low and intermediate level waste under the responsibility of the state. The aim of the project is to clarify and improve STUK's internal responsibilities and processes in the area of low and intermediate level waste.</p>
Article 9	G/73	Who is responsible for WAC control of waste packages in LILW disposal facilities in Olkiluoto and Loviisa NPPs?	WAC is set by the licensees of the LILW repositories and approved by STUK. The licensees control that waste packages to be disposed fullfills WAC criterias.
Article 11	H/85	It is clear that no hazardous waste is expected to arise in radioactive waste sector. In case of hazardous waste contaminated by the radionuclides would be created (for example from decommissioning of NPP) will be the characteristic "radioactivity" given priority and such waste would be managed as radioactive waste?	If the contamination is such that the waste can not be cleared and treated as a hazardous waste, the waste will be managed as a radioactive waste. The protective measures (eg. cointainment) for treating radioactive waste is usually adequate for hazardous waste as well. However this must be assessed case by case.
Article 14	H/92	Are there considerations to dispose also other radioactive waste in DGR for spent nuclear fuel?	Posiva has in operating license application also included the possibility of other radioactive waste, but has no existing plans for them.
Article 32.2.4	Section L.7	Some waste is provided in terms or volume and total activity as well, however, not all wastes and disused sealed sources are presented in terms of 'total activity'. Please elaborate?	Finnish regulation requires the reporting of the total activity only for disposed waste. The licensees shall have detailed information on every waste package including total activities in their database. This information shall be available also for regulator, if asked.

Article 7	L.4 Posiva's programme for spent fuel disposal	<p>The trial run of final disposal (TRFD) at the Posiva underground disposal facility mentions that there will four dummy fuel canisters encapsulated and disposed of into the test deposition holes bored into the test tunnel. As part of the test, one canister will be retrieved.</p> <p>Was the facility designed to allow for retrievability if required? If so, can you confirm how this would be achieved? What are the benefits and challenges of incorporating retrievability in the design?</p> <p>If retrievability was not part of the original design, could you explain why you are testing retrievability?</p>	<p>Option for retrievability of the SNF from disposal facility has been included in the facility design from early stages of licensing but it shall not compromise safety of the facility. Retrievability option was required in early government decision related to the SNF and it has remained since as a license condition for the facility. Reasoning behind the retrievability requirement was that it could become expedient as a result of technical progress. Nowadays it is not required in the legislation.</p> <p>Posiva has demonstrated that the canister can be retrieved from a closed disposal tunnel as long as the mechanical strength of the canister remains.</p> <p>The retrieval of a canister in the TRDF is supporting the retrievability condition but it is more relevant from the reversibility point of view. For example, if canister is damaged during the disposal process, there has to be possibility to open the canister at the encapsulation plant.</p>
Article 27	SECTION I Transboundary movement	<p>Which transboundary shipping regime would disused sealed sources be shipped under? Would this be under controls from European Council Directive 2006/117/EURATOM on the supervision and control of shipments of radioactive waste and spent fuel?</p>	<p>European Council Directive 2006/117/EURATOM has been applied once, when radioactive waste was returned to another European country.</p> <p>Disused sources are not waste, so they are shipped according requirements set in 1493/93/EURATOM, the Regulation on shipments of radioactive materials between Member States.</p>
Article 20	Page 46	<p>Please could you provide further information on the SAFER2028 research program. For example, what the aims and objectives of the SAFER2028 research programme? What benefits have been realised (or hope to see in the future)?</p>	<p>SAFER2028 research program objectives are to generate and maintaining expertise for the regulator as well as produce research results usable for regulator and licensees. The expertise generated and maintained by the program has supported STUK in the nuclear reactor and waste regulations and also some STUK employees have a researcher background from the previous programs. The usability of the research results is a criteria for funding and it is evaluated annually. In the evaluation process some of the research topics have been scaled down or shut down since the results were not usable.</p>
Article 28	Page 88	<p>Regarding the accidental melting of Am-241 sources mentioned on page 88, can it be determined where such sources have originated from? Given this has happened a number of times what regulatory action, if any, has been taken? Have any improvements to processes been implemented to prevent this from happening? What were the safety implications for the operator and public?</p>	<p>From smelted sources it is no longer possible to determine their origin, since all identification marks like serial numbers are lost during melting. But the operator has been able to track the actual shipment and the origin of that shipment and the supplier and the operator have through out the years been collaborating in order to diminish the possibility of accidentally melting of Am-241 sources lately as the supplier has been able to improve the efficiency of its operations at the point where the scrap metal is loaded.</p> <p>Operators have improved their capabilities to detect radioactivity from scrap metal. If they detect radioactivity in the primary measurements at the entrance point, scrap metal is measured in more detail. They also return scrap metals to supplier if radioactivity is detected.</p> <p>As Am-241 is really difficult to detect prior to melting (due to its weak gamma energy) the operator measures the melted scrap continuously.</p> <p>As 99 % of the radioactivity goes to the slag when Am-241 source is melted, the workers or the members of the public are not exposed to radioactivity. As a safety precaution workers wear protective equipment if they need to work in the steel factory after melting or whenever they need to work with the slag containing radioactivity (in this case Am-241). Protective equipment includes at least protective overall, gloves and respiratory protection.</p>
Planned Activities	K.4 1) p.112, last para	<p>It is stated that the MEAE started a comprehensive reform of the nuclear energy legislation in 2019 which will change the current nuclear energy act, nuclear energy decree, STUK's regulations and guidance. What was the rationale for the decision for such extensive change? And what were the main objectives, i.e. what is expected to be achieved?</p>	<p>Rationale for overall renewal is manifold. The act itself is quite old, not following modern legislation expectations and has been updated numerous times, making it difficult to understand. Other reasons are Government programme objectives related to nuclear power and STUK's objectives for strategically develop risk informed approaches and emphasize licensee responsibility. Objectives comes from these being: modern legislation, enabling new technologies and business models when shown to be safe, setting risk balanced regulation and enabling more risk informed regulatory oversight.</p>
General	Section A - p.11	<p>Terrafame Oy was granted a licence to produce yellow cake which was limited till June 2024. Did Terrafame Oy take up the production of yellow cake in the meantime or has the permission expired?</p>	<p>1) Government granted the production in 2020. 2) This was challenged by a group of stakeholders. 3) Supreme Administrative Court ruled out the appeals in 2021, and a Government decision requirement became effective. 4) The requirement stated that the production shall start within three years after licence becomes effective (or the licence ceases). 5) Uranium recovery could not be started until STUK evaluated the process safety and gave a launch-grant decision. 6) The STUK decision came in June 2024. 7) After this STUK decision, the commercial recovery production has gradually started. Before the Government licence, Terrafame had a STUK licence (granted in 2017) for a uranium recovery test plant. However, this plant produced only small amount of liquid concentrates, not final solid recovery product. No solids have been produced until Autumn 2024.</p>
Article 32	Section B - p.20	<p>"Generators of non-nuclear radioactive waste perform some waste management operations, such as initial storage, clearance and disposal into landfill type sites."</p> <p>Is solid waste, that is not suitable for landfill, then conditioned from the generator of the waste? Are the waste acceptance criteria then given by the disposal facility which will take over the waste?</p>	<p>Non-nuclear waste, in which activity in under clearance level can be disposed to landfill or otherwise handled as municipal waste. For the waste that is sent for low and intermediate level waste disposal facilities, the waste acceptance criteria comes from disposal facility operator.</p>

Article 20	Section E - p.45	Finland just started operation of a new EPR plant, so more waste will be produced in the future. Is an increase in staff planned for the waste management and the regulation of the management activities or was this already considered in the planning of the reactor and sufficient staff is already in place?	Additional personnel were recruited for the waste facility at an early stage to ensure sufficient competence during the commissioning phase. Competence is also ensured by rotating personnel between different plants (PWR/BWR). No additional recruitment is currently planned, but the situation will be reviewed periodically. From regulator perspective, the start of the operation of a new NPP unit did not cause need for new requirements for waste management regulation.
Article 15	Section H - p.97	Is the waste from decommissioning of the Encapsulation plant already considered for disposal in a repository? And could this waste be disposed of for example in the Loviisa facility?	<p>The decommissioning waste from the encapsulation plant has been considered in disposal plans. The decommissioning of the encapsulation plant is planned to follow an immediate dismantling strategy, and the waste generated from its dismantling will be disposed of in appropriate low- and intermediate-level waste (LILW) disposal facilities.</p> <p>The decommissioning waste from the encapsulation plant is planned to be disposed of either in TVO's LILW disposal facility or in a waste facility to be built at Posiva's spent fuel disposal facility. Part of the decommissioning waste from the encapsulation plant can be disposed of in a disposal facility to be built in the ground of Olkiluoto. The total amount of waste from the encapsulation plant is small in relation to the total amount of operational and decommissioning waste from the Olkiluoto power plant units.</p> <p>The new operating license granted in 2023 for the Loviisa nuclear power plant's LILW disposal facility allows the disposal of limited amounts of nuclear waste originating from outside the Loviisa nuclear power plant. This includes, for example, decommissioning waste from the FIR 1 research reactor and radioactive waste from industrial, scientific, and medical applications. The capacity of the Loviisa disposal facility is sufficient for the operational waste generated during the lifetime of the current Loviisa nuclear power plant units, and the facility is planned to be expanded in the 2040s to accommodate decommissioning waste.</p> <p>Therefore, the disposal of encapsulation plant decommissioning waste at the Loviisa facility could be possible if the waste meets the licensing conditions and radiation protection requirements. However, this would still require a separate regulatory decision and potentially additional approvals from STUK.</p>
Article 32	Section A page 11	The national interim storage facility for non-nuclear radioactive waste at Olkiluoto, consisting in a cavern located within the Olkiluoto LILW disposal facility, is suspected to be the origin of a tritium leak at a very low level of activity. The conclusion from measurements is that no further actions or restrictions are needed for the operation of the LILW disposal facility other than the regular monitoring of radiation levels. Could Finland indicate the consequences of this leak on the operation related to the storage cavern itself? Have provisions been made to further address the situation?	<p>Since the observations, tritium has been regularly measured in the air of the final disposal facility. The concentrations have been very low and have not required radiation protection measures for use of the facility. The source of tritium is most likely small-scale state-owned waste (radioactive sources collected from the source users) which is partly stored in its own storage and partly disposed of in the waste silos in disposal facilities. At the moment there is no further actions planned.</p>
Article 28	(section K, p 109)	It is indicated (section K, p 109) that MEAE steers a national coordination group that is engaged to find solutions for the disposal of high activity sealed sources (HASS), whilst Annex L.6 mentions recommendations and suggestions made by this group in 2018 and an overseeing by a "monitoring" group. In addition, it is mentioned that STUK has established a specific project which notably aims at finding a solution for all HASS. Could Finland explain the links between those groups/project and the associated timelines associated with their objectives?	<p>National group YETI brings together all stakeholders and gives recommendations concerning radioactive waste streams. STUK has the main operative responsibility for intermediate storage and end processing of radioactive waste, that is coming into the responsibility of the state. This responsibility is based on the radiation act (859/2018) 80 § and enactment 1034/2018, 32 §. As part of this responsibility, STUK has started a project in 2023 to improve the intermediate storing as well as to find solutions for radioactive waste streams that currently does not have a route to the final disposal, or the existing route will become obsolete in the near future. The project aims to map the alternative options for final disposal within 2025. Based on the results, existing waste packages will be processed ~2026. STUK will also develop in 2025-2026 the capacity of the intermediate storage based on the future needs.</p>
Article 32.1.4	p.25, 2nd para	It is stated that waste from operation and decommissioning of the FIR research reactor is expected to be transported and disposed of in Loviisa during 2024. What is the status as regards disposal of waste from the FIR reactor?	Most of the wastes from operation and decommissioning of FIR 1 research reactor have already been disposed of.
Article 32.2.2	p.29 and p.151, L.7	The report states that the inventories as presented are extracted from the IAEA SRIS database. Could you please elaborate on the rationale for using the IAEA SRIS database? Is the use of SRIS supplementary to a national database or are FI using SRIS as the main tool to keep track of the national inventory of spent fuel and radioactive waste?	<p>Finland started to use SRIS as we felt that it is the easiest way to fulfill the reporting requirements of radioactive waste and spent fuel coming from IAEA and Commission. Our licensees add themselves the data on their inventories to SRIS and country coordinator of SRIS checks the data. We decided to extract the information we need to national database from SRIS. Additional information on free released waste amounts and types is asked separately from licensees. By combining the data from SRIS and from above mentioned questionnaire, we fulfill our national need for waste reporting. So in practice it could be said that the SRIS is the main tool for us to follow the national inventory.</p>

Article 19.1	p.36	It is stated that it is foreseen that traditional type of regulatory guides in printed form will not be issued any more. Please elaborate (principle level) on i) how revisions of the regulatory requirements in the regulatory guides will be managed, and ii) how traceability of changes in the guides over time is ensured, compared to traditional (printed) type of publications where traceability of changes is feasible by means of updated (printed) versions of the document?	Besides printed form, regulatory guides in Finland have been published in electronic form (pdf and html) since late 90s. Regulatory requirements are stored in a database system, including versioning and metadata on a single requirement level. It is possible to export selected sets of changed requirements. Traceability of changes is significantly easier than when comparing printed documents.
Article 22.3	p.54, 2nd para (p.14, 1st para)	It is stated that expiry of the waste management obligation is conditioned that a lump sum has been paid to the State for the further monitoring and control of the waste. What mechanisms - if any - are in place to determine the amount of the lump sum to be paid to the State? Under the understanding that more details for this process will be developed closer to closure of a disposal facility, could you please indicate the anticipated principles to be used as bases for determining the size of the lump sum to be paid to the State?	The lump sum will be managed by the Waste Management Fund, and the general idea is that the sum shall be large enough so that the capital paid into the Fund and its potential appreciation would cover the costs of the oversight of the closed disposal facility site. There are no specific legal mechanisms for determining the "lump sum" yet. The licensee will make a proposal for a plan for the potential post-closure monitoring measures which is approved by STUK (YVL D.5 815). In this plan, the disposal facility concept, the inventory of the disposed wastes and possibility of continuation of the regulatory control on some areas (e.g. safeguards) have to be taken into account. This plan is valuable in determining the costs of the oversight of the closed disposal facility.
Article 11	Section H, p. 85	Do you have any experience with asbestos contaminated by Ra-nuclides? If so, please provide more information about technologies which were used for treatment and conditioning (including disposal possibility).	Some small amounts of contaminated asbestos has been found. These are packed in air-tight plastic wrapping, placed in 200-l drums (no compacting!), characterized with gamma spectrometry and the drum is disposed as LLW in the final repository.
Article 27	Section I, p. 101	What has been the impact of restrictions and shutdowns on the eastern border on the number of investigations in recent years?	The number of documented investigations has decreased in 2024 as the border has been closed.
General	Section L, p.118	A very nice and clear description of the regulatory process and the regulator's perspective on building the Onkalo repository. Could you briefly outline what has been the biggest challenge in the process from a regulatory body and the overall country perspective?	From the Regulatory Authority's Perspective One of the biggest challenges has been ensuring long-term safety, as the disposal system must remain secure for tens of thousands of years. This has required complex safety assessments, considering geological, technical, and radioactive waste behavior factors. Additionally, the acceptance and verification of new technological solutions has been a significant part of the regulatory process. Especially, when the disposal programme starts moving from the concept phase towards commissioning changes in design are not avoidable especially in first of a kind facility. Late-stage design changes are often necessary, the important question arises whether the updated design still remains within the scope of the original safety case and whether the conclusions drawn remain valid. STUK has played a critical role in evaluating whether Posiva's plan meets both national and international safety requirements. This has required close cooperation with experts and stakeholders. From the National Perspective Finland's biggest challenge has been public acceptance and political decision-making, as deep geological disposal is a long-term commitment. The construction of Onkalo is a unique international project, requiring extensive dialogue between local communities, authorities, and policymakers. Moreover, the project's success has depended on ensuring sufficient expertise and funding, as the planning and implementation of final disposal are multi-phase and long-term processes.
Article 19	Section L.5, p. 134	How was the recent decommissioning of the FIR 1 research reactor and hot cells communicated to the public?	Before the licensing process of Nuclear Energy Act, EIA process for decommissioning of FIR 1 research reactor was conducted. It is mandatory for decommissioning processes and it includes public consultations both on EIA program and EIA report stages. In addition to this, the licensing process under Nuclear Energy Act includes public hearing step.
Article 32	Section L6, p. 149	What is the basic (Guidance, Manual...) document for the National cooperation group on nuclear waste management?	The final report of the National Cooperation Group on Nuclear Waste Management is publicly available in the Government's Institutional Repository. The Group continues its work as a Monitoring Group to handle the recommendations and suggestions set out in the Final report. Please see the link http://urn.fi/URN:ISBN:978-952-327-441-9

Article 19	Section E, p. 31	The Report mentions that: „The current Nuclear Energy Act and the Radiation Act were issued in 1987 and 2018, respectively. Since, several amendments to the Nuclear Energy Act and new detailed regulations have been issued.” Could such a high frequency of amendments impact the stability of the legal system in this area, undermine its transparency, and weaken the legal protection afforded to individuals and entities required to comply with it?	<p>Especially the Nuclear Energy Act has gone through multiple changes over the years but only some of them are more relevant for the use of nuclear energy. Most of the changes to the Act are a result of changes in other related legislation for example to general administrative procedures, references to other new legislations or sanction regulations. These have only a minor impact for the entirety of the legislation and do not impact the stability of the regulatory framework but keep it coherent with the rest of the legal system.</p> <p>There have been few bigger substantial changes to Nuclear Energy Act mostly because of the EU-directives in the nuclear field and also for example in environmental impact assessment. Few bigger changes have been also done as a result of the changes in the Finnish Constitution. These have resulted bigger changes to the regulatory framework of nuclear energy and have required careful implementation on national level. However, given these bigger changes to the regulatory framework are relatively rare, it could be said that they do not impact the stability in the long run.</p> <p>Also, it can be stated that multiple changes to the Nuclear Energy Act do not compromise the transparency of the legal system. All of the legislation is drafted in a standard law drafting procedures with open stakeholder consultation. Furthermore, all of the reasonings to the changes and all relevant preparatory documentation are openly available to the public during consultation and after it.</p> <p>In general, it could be said that given the nature of the multiple changes and the way these changes are communicated to the relevant stakeholders, it does not weaken the protection of the individuals and entities. When possible and where necessary, appropriate transition periods are given for the entities to adjust their activities to new requirements. However, multiple changes over time can possibly cumulate to some inconsistencies within the quite extensive amount legislation which is one of the reason the legislation is now under reform. HS3</p>
Article 13	p.89	Are there regulatory standards which have been developed for each of the three stages in the site selection for the geological disposal?	Requirements concerning the site and its selection are set in the Section 31 of STUK Regulation Y/4/2018. These requirements concern all stages of the disposal facility. The applicability of the site is assessed during each licensing step.
Article 12	Section H, p. 88	It is mentioned that Am-241 is sometimes detected in slag after melting metal scrap. Is the radiation monitoring carried out on a voluntary basis from the company, or is there a legal obligation to monitor the slag and end product for radioactivity?	Metal slag contains Am-241 if the scrap metal has accidentally had sealed source among it. The production process steel has to be stopped after melting of a sealed source. Physical properties of Am make it end up in the slag. Areal radiation monitoring is constantly on in the process line. If radiation is detected, the process needs to be run down and cleaning process of the whole melting line need to be initiated.
Article 19	Section E, p. 33	The Report mentions that: „The Nuclear Energy Act was amended in 2023 when the Building Act was renewed. The change was related to the handling of zoning plans in the construction license of nuclear facilities that do not require a decision-in-principle.” What is STUK's role in handling zoning plans in the construction license for the installation and in the construction permit for the nuclear installation itself?	<p>The amendment to the nuclear energy act was made just to correct the reference. It did not make any changes to the practices. The text in the national report is bit inaccurate. The amendment is applied to all nuclear facilities. The municipality is responsible on the zoning decision and STUK gives statements during the zoning process. This process has to be finished before the construction begins.</p> <p>Related to the zoning, STUK has in practice sole responsibility for the regulation and supervision of the emergency arrangements of operating organizations. However, in addition, regional emergency services are responsible for the preparation of external rescue plans for nuclear sites concerning rescue actions in an emergency. These plans are approved by the State Regional Administrative Agency (AVI). STUK is entitled to take part in the planning and to give its expert opinion on the plan before its approval. STUK's authorities and responsibilities concerning the regulation and supervision of EPR arrangements are based on the Nuclear Energy Act.</p>
Article 19	Section E, p. 34	The Report mentions that: „The aim is to have the renewed legislation in force in 2028.” Approximately how long does the legislative process for adopting an Act or a Regulation take in your country? Could you please briefly describe this process with a timeline?	There have been few bigger substantial changes to Nuclear Energy Act mostly because of the EU-directives in the nuclear field and also for example in environmental impact assessment. Few bigger changes have been also done as a result of the changes in the Finnish Constitution. These have resulted bigger changes to the regulatory framework of nuclear energy and have required careful implementation on national level. However, given these bigger changes to the regulatory framework are relatively rare, it could be said that they do not impact the stability in the long run.
Article 19	Section E, p. 35	What is the position of YVL Guides. within the legislative structure, and are they legally binding or merely recommendatory in nature?	The safety requirements in YVL Guides are binding on the licensee, while preserving the licensee's right to propose an alternative procedure or solution to that provided for in the requirements. If the licensee can convincingly demonstrate that the proposed procedure or solution will implement safety level in accordance with the Nuclear Energy Act and STUK Regulations, STUK may approve this procedure or solution.
Article 25	Section F, p. 61-62	What specific channels and strategies does STUK use to ensure effective and timely communication with the public during a radiological or nuclear emergency, especially for residents living outside areas near nuclear facilities?	STUK ensures effective and timely communication during nuclear and radiological emergencies through multiple channels, both during an incident and in advance through proactive communication. Key channels include emergency alerts and official announcements, websites and social media, text message alerts and mobile 112 application, announcements from local and regional authorities, press releases and media cooperation, public events and information campaigns, and collaboration with international and neighboring country authorities. Communication reaches the entire population, including those living far from nuclear facilities.

Article 25	Section F, 9. 62	What bilateral agreements and arrangements are in place between Finland and neighbouring countries to ensure awareness in the event of a nuclear accident?	<p>Finland is a Contracting Party to the International Convention on Early Notification of a Nuclear Accident, as well as to the Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency, both signed in Vienna in 1986. Furthermore, as a Member State of the European Union, the Council Directives and Regulations and Decisions concerning accident situations apply in Finland.</p> <p>Finland has respective bilateral agreements with Denmark, Germany, Norway, Russia, Sweden and Ukraine. Accordingly, arrangements have been agreed on to directly inform the competent authorities of these countries in the case of an accident. Similar arrangements ensure direct notification to the authorities of Estonia. The bilateral agreements also cover the exchange of relevant information on nuclear facilities.</p> <p>In addition to the domestic nuclear emergency exercises held annually on each nuclear power plant sites, STUK has taken part in international emergency exercises. STUK has also participated as a co-player in emergency exercises arranged by the Swedish nuclear power plant operators and authorities. Neighboring countries have been actively invited to take part in the Finnish exercises.</p> <p>In general, it could be said that given the nature of the multiple changes and the way these changes are communicated to the relevant stakeholders, it does not weaken the protection of the individuals and entities. When possible and where necessary, appropriate transition periods are given for the entities to adjust their activities to new requirements. However, multiple changes over time can possibly cumulate to some inconsistencies within the quite extensive amount legislation which is one of the reason the legislation is now under reform.</p>
General	Section A, P11, Para 3	It is stated that "In 2022 a minor tritium leak was detected in the low and intermediate level radioactive waste disposal and interim storage facility built in Olkiluoto". Are there any leaks of other nuclides? In addition to monitoring, measuring and evaluating the records of the waste stored and disposed of regarding tritium leakage, what other measures have been taken to prevent further tritium leakage? Is this facility still operating normally at present? Has the monitoring measures been strengthened?	No other leaking radionuclides were detected. Since the observations, tritium has been regularly measured in the air of the disposal facility. The concentrations have been very low and no extra radiation protection measures are required. The facility is operating normally and no other measures are planned.
Article 32.1.2	Section B, P19, Para 3	It is stated that "Options for the management of waste below clearance level are either general clearance or case-specific clearance. For case-specific clearance, the activity concentration values are determined on a case-by-case basis". Please provide examples of case-specific clearance.	The basic radiation protection requirement for the clearance of nuclear waste is that the annual dose constrain to any member of the public or worker handling the waste is 0.01 mSv, and that the radiation exposure arising from the cleared waste is otherwise kept as low as reasonably achievable. Licensee can apply case-specific clearance for waste, which fulfills this criteria. The most common example is the clearance of oils. It is regulated that hazardous waste needs to be free released by using case-specific method, where the receiver of waste needs to be defined.
Article 11	Section H, P80, Para 1	It is stated that " Large metallic waste components have been transported for treatment at the Studsvik facility in Sweden which reduces the volume of radioactive waste to be disposed significantly. Activation products or parts containing external contamination or components that have been separated from the metal are transported back to Finland for disposal". How are the activation products or parts containing external contamination or components that have been separated from the metal conditioned and packaged to meet the waste acceptance criteria of the repository?	The waste has been packed in 200-liter drums and handled as normal dry waste. 200-liter drums with accepted waste type (e.g. metal) and known activity meet the waste acceptance criteria of L/ILW disposal facilities. So far only small amounts of secondary waste is returned, so there has not been any need to create a new waste type for the slag. They have just been classified as "non combustible and non compactable". Also returning metals belong in this category.
Article 8	Section G, P72	It is stated that "The preliminary safety analysis report and the other safety related documents for the extension of the Olkiluoto spent fuel interim storage facility were reviewed in 2010 before the construction work. The Final safety analysis report and the other safety related documents were reviewed in 2015 when STUK finalized the safety assessment on commissioning of the extension. The extension has been designed to withstand an aeroplane crash and the design of the existing part of storage has been updated." What factors were mainly considered in updating the design of the existing part of storage?	<p>The extension of the storage facility has been implemented to accommodate the increasing amount of spent nuclear fuel, particularly due to the storage needs of fuel removed from OL3. The structures of the extension have been designed to withstand an airplane crash, leading to a reassessment of the design of the original storage section and reinforcement of its structures.</p> <p>The building of the extension of the Olkiluoto spent fuel interim storage facility meant modification of several systems affecting also the existing part of the storage. These modifications include e.g. the fuel pool cooling system, which was also provided with a capability to use external water sources for water injection in emergency situations, the radiation monitoring system, and the update of the surveillance and control system for the storage facility. The main update here was, however, the improvements made for the protections against airplane crashes also for the existing part of the storage.</p> <p>Based on the Fukushima nuclear accident and the EU stress tests, preparedness for various accident scenarios has been significantly improved. In the event of an accident, cooling water can be supplied from multiple sources to maintain the water level in the storage pools. Additionally, monitoring instrumentation has been enhanced, with specific improvements made to the temperature and water level measurements of the pools.</p>

Article 11	H,P80,Figure 13	It can be seen in Figure 13 that after 2016, the cumulative amount of Olkiluoto NPP waste increased at a higher rate than in previous years. Please introduce the reasons.	Annual cumulative waste amount depends highly on large component replacements during the outages. For example replacement of different heat exchangers causes high volumes of metallic waste.
General	p.106-107	What activities has STUK undertaken to gain the understanding of the local public for the geological disposal project? Posiva seems to have conducted the public relation activities, such as organizing public event and newsletter distribution.	<p>STUK has promoted public understanding of nuclear waste disposal by acting as an independent supervisory authority and communicating openly about the oversight of Posiva's operations. STUK's communication has focused on the authority's role and its task of supervising nuclear waste disposal.</p> <p>STUK has participated in public hearings and discussion events addressing the safety principles of disposal and regulatory oversight. It has also responded to questions from citizens and local authorities regarding environmental impacts and long-term safety. Additionally, STUK has provided information on nuclear waste management and the licensing process through its website, social media, and press releases, as well as collaborated with various authorities.</p> <p>When Posiva was searching for a site for the disposal facility in late 90s, it had four sites as candidates in the final stage, of which Eurajoki was one. Before Posiva made its choice, STUK was actively present in all four localities. STUK helped the local media in all municipalities when they wrote stories on the topic. STUK experts participated in public events and meetings of local decision-makers whenever STUK was invited. STUK did not organize public events itself and did not participate in events organized by Posiva. STUK also created confidential relationships with the non-governmental organizations that had an impact in the municipalities, both those that opposed the project and those that supported it. STUK's goal was to provide information about the radiation safety of the disposal facility and the disposal process. The aim was to build trust in STUK and the process, to help the residents understand the project from a radiation safety perspective. STUK had no position on whether the municipality should reject or approve the project. The residents made that decision for many reasons. Many, even most, of the reasons were outside STUK's purview.</p>
Article 13	p.89	In the geological disposal project, are there any site-specific regulatory standards for the Olkiluoto, such as the site-specific regulations for Yucca Mountain in U.S.?	There are no site specific regulations. Requirements concerning the site and its selection are set in the Section 31 of STUK Regulation Y/4/2018. STUK reviews the applicability of the site in the connection of the license applications.
General	p.12	Is the public opinion evaluated regularly at the local level and whether these indicators reflect the positive trend observed at the national level?	A regular local opinion poll has not been organized in Eurajoki and nearby municipalities, only the nationwide poll is done regularly.
General	-	What technologies are being considered to enhance the resilience of current storage facilities to changing climate conditions?	So far, none. Changing climate conditions is not considered to pose any significant risk increase for the current storage facilities in the coming decades. Aging management as usual. Increasing need for ventilation and air conditioning is a topical issue. For the disposal facilities, different climate scenarios are assessed in the long-term safety case.
General	-	How is the long-term durability of waste packages used for intermediate storage and final disposal evaluated?	<p>Intermediate storage: The storage conditions shall be such that the condition of the waste packages will not degrade during the planned storage period. Air humidity and temperature variations in the storage shall be limited where necessary. The condition of waste packages that are stored for a prolonged period of time shall be systematically monitored, and it shall be possible to remove degraded waste packages from the storage. In Finland the storage periods are usually quite short at maximum about 5 years.</p> <p>Post-closure: The technical solutions of its safety systems are assessed and substantiated analytically and, if necessary, experimentally. The planning of a disposal facility, including packaging, shall account for the need to develop an understanding of the performance of the barriers and long-term safety through investigations and monitoring. The post-closure performance of packages is estimated through a performance assessment and scenario analysis that take into account possible future loads in the disposal facility during the whole assessment period.</p>
Article 7	p.132	What do the operator and the regulator plan to do if the test results, including the RAW package retrieval test, are negative?	In order to start the Trial run of final disposal tests the commissioning tests of the facility have to be done successfully. All the process phases implemented in the TRFD have been already tested successfully in the system and facility level commissioning tests earlier. If despite of that the TRFD test is negative the reasons for negative result will be analysed and corrective actions determined based on this analysis. During the TRFD multiple test RAW packages will be manufactured so it is possible to learn and make corrective actions during the TRFD between different RAW packages test phases.
Article 11	(p. 86)	How is the long-term stability of engineered barriers confirmed? Are appropriate experiments conducted?	The long-term stability of engineered barriers is not confirmed per se. Rather, the assumptions about their stability and performance are supported by analyses. Various experiments have been conducted in support of the long-term stability and performance of engineered barriers, such as the disposal canister and bentonite buffer.
Article 13	P12 para2	P12: Repeated interviews of the public, extending by now to almost four decades, indicate trend-like growth of the public trust to geological disposal. What is the scope of the public interviews? Is it limited to the local communities where the geological disposal facility is located, or does it extend to the public of the whole Finland? What are the main methods used for public interviews?	The opinion poll "Finnish energy attitudes" is conducted by Finnish Energy Industry every year for decades. The opinion poll asks about Finns' attitudes towards all forms of energy production, including nuclear energy and, in connection with this, the disposal of spent nuclear fuel. The survey is nationwide, and the opinions of people in different municipalities are not separately asked.

Article 32	P24 para 1	P24: The Olkiluoto NPP has a landfill on site, which license was terminated in 2022. TVO is planning to replace its landfill by near-surface disposal facility for VLLW. What is the current solution to the cleared waste, which is generated after the termination of the landfill site? Is there a timetable for the development of the near-surface disposal facility?	Maintenance and metallic waste which is planned to be disposed to the near-surface disposal facility is packed, measured and stored in sea containers. The first disposal campaign is planned to be done in 2026 or 2027 depending on accumulation of the waste.
Article 32	Section B	What types of waste containers are used for intermediate level waste inside the cavern for ILW, and are they certified? If so, which standards are they certified by?	In Olkiluoto concrete boxes containing 200 L metal drums are used for ILW, but they are not certified, because they are not contributing to the post closure safety case for disposal. In Loviisa Fortum-designed cylindrical concrete containers are used. They are not certified by a standard but are approved by the Finnish Radiation and Nuclear Safety Authority (STUK).
Article 32	Section B	Is the process for removing radiation sources from recycled smoke detectors licensed by the regulatory body? What regulations govern this process?	It is licenced under Radiation Act. Entrepreneur doing this, has a safety licence for the use of radiation. It is regulated and inspected under Radiation Act and related decrees and regulations.
Article 32	Section B	What is the operational design lifetime of the interim storage facility for spent nuclear fuel (SNF), and how is the aging management of SNF casks and SNF assemblies conducted? Please describe in more detail.	The operational design lifetime of interim storage facilities for spent nuclear fuel (SNF) is planned to accommodate the long-term interim storage of fuel before disposal. In Finland, the expected lifetime of SNF interim storage facilities is at least 50 years, but an extension of the operational period is possible based on periodic safety assessments and maintenance. The oldest storage pools may have a service life closer to 100 years. According to the Nuclear Energy Decree, a safety assessment of interim storage facilities is conducted every ten years. These assessments evaluate the technical condition of the facility, potential aging-related changes, and the adequacy of safety measures to ensure continued safe operation. In the design, construction, operation, condition monitoring, and maintenance of spent nuclear fuel handling and storage, it is necessary to prepare for the aging of systems, structures, and components that are important for operational safety. This ensures that they meet the design basis requirements throughout the facility's operational lifetime, maintaining the necessary safety margins. Further specifications on aging management requirements are provided in Guide YVL A.8, titled "Aging Management of a Nuclear Facility." Fuel transfer casks are inspected in accordance with the maintenance and monitoring program established by the license holder to ensure their structural integrity and safe operation. A condition monitoring program must be established for the stored fuel. The condition of individual fuel assemblies is regularly monitored. Additionally, various water chemistry parameters are continuously monitored.
Article 20	Section E	How are licensee fees determined and formed, and for which specific activities or practices are they applied? Could you provide a breakdown of the licensee fees by activity or license type? Additionally, how is the potential for conflicts of interest in the fee structure and regulatory oversight managed?	The fees are charged on the basis of the Nuclear Energy Act (990/1987) and referred to in Article 3 of the Decision (1285/1993). The services are subject to a fee (hourly rate) based on actual cost. Both direct and indirect costs are taken into account when calculating the cost price. Indirect costs consist of the costs of supporting nuclear activities (e.g. internal administration of the department, code work and competence development), STUK's general administration costs (e.g. property, information, personnel and financial management), premises and absence costs, and depreciation. The hourly billing rate used during the year is based on the performance of the previous year's paid nuclear energy control. Regarding regulation of nuclear facilities, the majority of regulatory authority functions are financed via fees collected from licensees and, therefore, budget constraints coming from government or licensees do not have a major impact on recruitment of e.g. inspector positions.
General	N/A	How is aging management and lifetime operation (LTO) conducted for spent nuclear fuel facilities? Are the SNF assemblies and casks are subject for aging management and LTO? Are these casks regularly monitored? Additionally, is there a requirement for re-assessment of spent nuclear fuel facilities due to changes in nuclear fuel type?	Fuel and interim storage facilities for spent nuclear fuel, as well as fuel transfer casks, fall under the scope of aging management. In Finland, the regulatory framework requires continuous assessment and maintenance to ensure that facilities remain safe throughout their entire operational lifetime. Guide YVL D.3 sets out requirements for the condition monitoring and maintenance of spent nuclear fuel storage. Additionally, STUK regulations STUK Y/1/2018 section 5 and STUK Y/4/2018 section 6 specify requirements related to aging management. In the design, construction, operation, condition monitoring, and maintenance of spent nuclear fuel handling and storage, it is necessary to prepare for the aging of systems, structures, and components that are important for operational safety. This ensures that they meet the design basis requirements throughout the facility's operational lifetime, maintaining the necessary safety margins. Further specifications on aging management requirements are provided in Guide YVL A.8, titled "Aging Management of a Nuclear Facility." For SNF assemblies the aging monitoring is executed by choosing some SNF assemblies for aging monitoring. The selected assemblies are inspected visually (shroud tube removed) every ~10 years. Fuel transfer casks are inspected in accordance with the maintenance and monitoring program established by the license holder to ensure their structural integrity and safe operation. A periodic safety assessment is conducted for interim storage facilities of spent nuclear fuel every ten years, simultaneously with the safety assessment of nuclear power plants. If the fuel type changes, this must be taken into account in updated safety analyses and storage arrangements. The impact of t+H80he change must be carefully evaluated, ensuring that the new fuel type meets all safety requirements for storage.

Article 32	Section B, page 27	"In Financial Provisions, ""The capital of the fund is composed of... and the returns of the fund"" Which instruments are using to evaluate the fund (i.e. equities, bonds, etc.) and what are their limitations (i.e. max 30% of equities, 10% real estates etc.)?"	Instruments are premium lending, government bond and stock. The lending option available to licensees has been limited to 60 per cent of all the fund's assets, and the government has an obligation to invest at least 20 per cent of the fund's assets in government bonds or transfer through the State budget from the Fund to the State finances for a fixed period (Nuclear Energy Act, Section 52 a). This way, at least 20 per cent of the fund's assets are always available for investment activities other than premium lending.
Article 32	Section B, page 21	It is stated that "The Radiation Act (Section 54) provides for the financial security for radioactive waste management for non-nuclear practices as follows: the Act ensures that the licensee meets the costs incurred for rendering radioactive waste harmless and for carrying out any decontamination measures that may be needed in the environment, and ensures that the licensee shall furnish collateral security if the operations produce or are liable to produce radioactive waste that cannot be rendered harmless without incurring substantial cost." In this case, how is the amount of collateral to be provided by the licensee determined?	Amount of security is set at Government Decree on Ionizing Radiation section 29. For sealed sources it is fixed amount which is based on the activity of the sources or separately for a high-activity sealed source. In decommissioning and possible environmental clean-up measures the amount of security is based on the estimations of the costs. Estimation is done by the licensee.
Article 32.1.1	Section B, page 16	Why did you need to merge two minor separate funds?	The Ministry of Economic Affairs and Employment decided to merge the two research programmes (KYT2022 Finnish Research Programme on Nuclear Waste Management 2019–2022 and SAFIR2022 National Nuclear Power Plant Safety Research 2019–2022) we had at the time. Thus it was practical to merge also the related research funds.
Article 32.1.1	Section B, page 16-17	"You mentioned about some major changes for the fund. -Why did you need to do that changes? -How did you improve the management of the fund, how was it and how is it now? -How did you improve the allocation of the fund? -How did you reform the management of the research funding system?"	There was no necessity, but the will to amend regulation and administration of the investment of assets under the Fund's management in a way that it provides opportunities for better long-term fund performance while at the same time ensuring that there are enough assets available to cover the costs of nuclear waste management. As a result of the changes, the Fund hired a full-time Managing Director. Two separate research funds (nuclear safety, nuclear waste management) were merged because the related research programmes were merged. The research programmes were merged because some research projects were left between the two programmes. Another reason was the will to reduce administration of the research programmes. At that time also Posiva, the disposal company for spent nuclear fuel disposal, was preparing to move from the construction phase to the commissioning phase where the research interests are changing.
Article 32.1.1	Section B, page 17	You mentioned that funds are annually collected. Do you have a certain time to collect the money (i.e. first week of January)? If that is the case, why did you choose that certain time?	A prospective party with a waste management obligation shall submit a waste management chart to the Ministry of Economic Affairs and Employment for approval for the first time well in advance of commencing operations that will generate nuclear waste and at the latest in connection with the licence application relating to these operations. The party with a waste management obligation shall later supplement the approved waste management chart and related calculations every third year by the end of June in order to confirm the liabilities and Fund targets referred to in section 43, subsection 2 of the Nuclear Energy Act. The supplement shall indicate the costs and prices of nuclear waste management measures, information on the amounts of nuclear waste included in the management obligation and the necessary nuclear waste management measures as well as a calculation of the total costs of nuclear waste management based thereon at the end of each year taking into consideration the cost level of said year. The party with a waste management obligation shall submit to the Ministry of Economic Affairs and Employment by the end of June and at three-year intervals updated calculations relating to the supplemented waste management chart in order to confirm the liabilities and Fund targets referred to in section 43, subsection 2 of the Nuclear Energy Act.
Article 32.1.1	Section B, page 17	How did you choose fund management board members and director?	The Government appoints the Board of Directors for three years at a time. In addition to the chairperson, the board shall have a deputy chairperson and a maximum of five other members. One member shall be appointed from among the persons proposed by the Ministry of Economic Affairs and Employment (MEAE) and one from the Ministry of Finance. The Board of Directors shall have sufficient expertise in investment activities and risk management and other expertise necessary for the performance of the tasks of the Board of Directors. The Financial Supervisory Authority shall, at the request of the MEAE, issue a statement on the expertise in the investment activities and risk management of the persons proposed to the Board of Directors. The Fund also has a Managing Director who manages the day-to-day administrations of the Fund in accordance with the instructions and regulations issued by the Board of Directors. The Managing Director is a civil servant of the ministry and appointed on the basis of his/her skills and experience.
Article 32	Section B	Could you provide a detailed explanation of the domestic measures prepared for the management of low and intermediate-level operational waste?	Both NPP operators have rooms, equipment and expertise to take care of most of the LILW waste produced during the operation of the NPPs. This includes characterization, storage, treatment and disposal of the wastes at the NPP site. Only some large metallic components are decontaminated abroad since there is not proper facility in Finland for these operations.
Article 32	Section B	Could you describe the methodology used to calculate the lump sum required for monitoring and controlling of nuclear waste? Which specific criteria are used for formation of the lump sum?	The lump sum will be managed by the Waste Management Fund, and the general idea is that the sum shall be large enough so that the capital paid into the Fund and its potential appreciation would cover the costs of the oversight of the closed disposal facility site. There are no specific legal mechanisms for determining the "lump sum" yet. The licensee will make a proposal for a plan for the potential post-closure monitoring measures which is approved by STUK (YVL D.5 815). In this plan, the disposal facility concept, the inventory of the disposed wastes and possibility of continuation of the regulatory control on some areas (e.g. safeguards) have to be taken into account. This plan is valuable in determining the costs of the oversight of the closed disposal facility

Article 8	p.73	It is mentioned that the design of the existing part of the storage facility has been updated. What were the main points of attention in the design updates?	Protection against large airplane crash was improved for the existing part of the facility. Also the cooling water systems for the spent fuel pool were improved to enable water feed from outside. The monitoring of the storage pool water level and temperature was improved to take into account earthquake resistance and loss of the facility power supply to address lessons learned from the Fukushima accident.
Article 16	p.111	It is mentioned that the operating license of the Loviisa disposal facility for low and intermediate waste was renewed in 2023, and now allows the disposal of small amounts of similar radioactive waste originating elsewhere in Finland. Could you please detail the regulatory process to allow this renewal of the license in terms of ageing of the facility and what regulatory oversight was put into place to ensure the continuity of the safety functions? Regarding the extension of license for other waste than generated by the NPP itself, could you please detail the process to extend the licence in terms of acceptance criteria and safety functions related to the new types of waste that will be disposed within the facility?	In Finland operating license is given for a fixed period. Fortum applied for an extension of the operating license of low and intermediate level waste repository to year 2090. Regulatory process included review of all licensing documents as required for a new operating license application including the review of post-closure safety. In licensing documentation Fortum presented, how they manage the aging of the repository and there are already actions on-going to improve the operational safety of the facility. For new waste types and packages licensee must ensure that they will fit to the waste acceptance criteria of repository before disposal, or they can update the waste acceptance criteria for a new waste types or packages. If they need to update the waste acceptance criteria for repository, long term safety of the repository has to be analysed. Update of WAC and related analysis of long-term safety needs approval from STUK before new waste types or packages can be disposed.
Article 26	p.138	Please explain if there were specific challenges, from a regulatory point of view, regarding the decommissioning of the research reactor FIR1 and the management of waste resulting from its operation? How was the oversight of the regulatory body in terms of predictions of discharges and waste generated during decommissioning? / Also Article 11	The biggest challenge for the decommissioning wastes of the research reactor was the fact that the end point of the wastes was not defined in the early phase of the decommissioning licensing. When VTT contracted Fortum as the main contractor for the decommissioning and responsible for the waste management of the wastes from operation and decommissioning, project moved steadily. The predictions on the releases and amounts of wastes generated were on right scale.
Article 19	p.11	During the licensing process of the yellow cake production facility, how was the waste management taken into account? More specifically, was the future waste generated during the operating and the dismantling phases of the facility taking into account as a potential blocking point to deliver the license (availability of waste conditioning techniques and a safe disposal facility for such wastes)?	In the Terrafame plant processes are mostly in liquid form. The final recovery starts with precipitation and solid uranium oxide exists in packing and storage areas. In the FSAR, the licensee states that all liquid or solid spills within the plant can be washed into a closed drainage system, and pumped back in the liquid process. Also all contaminated protection wear, tools, tissues, used components etc. can be washed or cleaned, and waters recycled back in the liquid process. However, the first three years of commercial recovery is defined (also in FSAR) as a test time for the production cleanliness. As soon as contaminated waste emerges, the Licensee stores wastes and starts to prepare a management program including disposal. The produced uranium oxide has the isotope ratios of natural uranium. The final product is stored at the plant only a limited time. Therefore the chemical toxicity of uranium has been considered a primary issue, and activation of structures and components as minor. During decommissioning, facility cleaning is expected to be a primary issue, and removal of activated structures and components a minor. During licensing, STUK has evaluated the safety couple times and required several improvements to licensee justifications. The licensee has been responsive to improvement requirements and no blocking has been needed.
Article 11	p.11	The text mentions that a tritium leak was detected in the low and intermediate level radioactive waste disposal and interim storage facility built in Olkiluoto. Please explain what is planned regarding this issue, especially in terms of potential retrievability and reconditioning of the waste; conformity of the waste isolation matrix and potential subsequent changes in the acceptance criteria; measures planned to be put into place to ensure the safety functions of the facility; ageing of this type of waste and long term effect on the disposal facility; and regulatory oversight of this issue? / Also Article 16	Since the observations, tritium has been regularly measured in the air of the disposal facility. The concentrations have been very low and no extra radiation protection measures are required. The facility is operating normally and no other measures are planned at the facility.
Article 19	Section E, page 33	"... allow management of the Fund to widen the possibilities of investment of the funds." Why did you need that amendment in the legislation? Which problems made you take this amendment?"	There was will to amend regulation and administration of the investment of assets under the Fund's management in a way that it provides opportunities for better long-term fund performance while at the same time ensuring that there are enough assets available to cover the costs of nuclear waste management.
Article 22	Section F, page 53	The cost is given at 2820 Mn € in 2023. Do you publish annual estimates publicly, if so, at which websites do you publish? Additionally, is there a website you announce the current fund value?	We do not publish annual estimates publicly.

Article 24	Decommissioning	Is there any published information on the results of environmental radiological monitoring programmes? Is there any published guidance on Long-Term Surveillance Plans (LTSP) around uranium milling or mining sites after license termination?	In Finland, the only uranium mine that has been closed was located in Paukkajanjaara, and it was operational from 1958 to 1961. The average uranium concentration was 0.14%, and a total of approximately 40 tons of uranium was produced. Only a few publications have been made about the mine's surroundings, for example: https://www.julkari.fi/bitstream/handle/10024/125055/stuk-tiedottaa-2-2005-luonnon-radioaktiivisia-aineita-sisaltavat-materiaalit.pdf?sequence=1 (in Finnish) ja https://nordia.journal.fi/article/download/76199/37517/105690 (in English)
Article 25	Nat. Report. Pg. 60/157	According to the report, Posiva and TVO have a joint organisation and plans for emergencies. Annually, emergency training and exercises are arranged to maintain operational preparedness. The STUK 's personnel carried out periodic annual inspection programmes to emergency management at both installations to assess the content and scope of these training activities, as well as to obtain feedback from the training at both the NPP and the spent fuel repository. In relation to the emergency training program and the hypothetical case that a member of the inspection team detected a weakness in the scope or execution of this training program, is there any mechanism whereby any weakness detected would be corrected accordingly as soon as possible?	STUK conducts annual inspections of licensees' emergency preparedness arrangements. STUK does not review the exact content of each training session but primarily assesses the overall scope of the training. The training itself includes a feedback mechanism, and the licensee continuously strives to improve both the training and its content. STUK also periodically inspects the licensees' training processes. One of the best ways to test procedures and evaluate the adequacy of training is to conduct emergency exercises. The feedback and observations from these exercises are also taken into account in training programs.
Article 25	Nat. Report. Pg. 60/157	How do STUK staff report findings or deviations to the inspected license owner and how does STUK monitor that these deficiencies are resolved?	STUK prepares an inspection report in which the inspection findings and any requirements are documented. Each requirement is assigned a deadline by which a response must be provided. The required action may, for example, involve submitting an updated document to STUK. In some cases, the deadline may be set for the next inspection. STUK also monitors the implementation of the required actions through its document management system. Once a response to a requirement has been received, it is assessed, and the final outcome is recorded in the document management system or technical inspection reports.
Article 20	Regulatory Body	Could you describe the competence management system adopted? Which difficulties have been faced when implementing the competence management system? Do they have a methodology to assess performance and to monitor their results?	The competence management system encompasses various elements. For instance, the system combines basic of competence information (e.g., different job profiles and the respective competence profiles), procedures and processes (e.g., competence evaluations and maintenance of the profiles, performance evaluations, personal development planning, human resource planning and resourcing, introduction, management of training and other development methods) and systems and tools (HRD system platform, other HR-systems, training support etc.). The competence management system is subject to continuous development and maintenance work. Therefore, it requires ongoing attention and support especially in the organization that has broad a range of expertise areas. The main challenges have involved system support issues and developing a system of compatible elements that support each other. Also e.g., managerial training/support is needed when the system has been developed or updated. A performance appraisal and evaluation discussions are part of STUK's annual process cycle. An element of the appraisal is person's professional competence and abilities shown in work. Also, periodical competence reviews are carried out. The monitoring of the achieved results and outcomes is also carried out during the periodical review and update of personal development plan. On a broader scale, the quality and quantity of key competencies is evaluated e.g., on general (department level) during the annual planning process when the operational and HR plans are created and updated.
Article 10	p.85	It is mentioned that spent nuclear fuel encapsulation and disposal facilities produce small quantities of hazardous waste. Hazardous waste is collected and sent to a hazardous waste treatment plant. Will some secondary waste from these facilities be considered as radioactive waste? If so, where will they be treated?	If the contamination is such that the waste cannot be cleared and treated as a hazardous waste, the waste will be managed as a radioactive waste. Posiva will use the TVO's facilities for treatment and disposal of low and intermediate level waste. The protective measures (eg. containment) for treating radioactive waste is usually adequate for hazardous waste as well. However this must be assessed case by case.
Article 12	p.88	Concerning the fact that existing facilities need to be improved based on the latest operational experience from Finland and abroad, and the latest technical developments should also be considered, what processes or mechanisms are in place to manage the operating experience feedback and who is responsible for implementing this process?	International operational incidents are obtained primarily through the IRS system. Each incident is addressed at STUK. The incidents' safety significance is assessed especially regarding the Finnish NPPs which is potentially followed by discussions with the license holders and implementing appropriate measures to address the issues.

Article 4	p.66	It is mentioned that the biological, chemical and other non-radiological hazards posed by the spent fuel storage are comparable with conventional industry hazards. Such hazards are regulated by legislation related to general occupational safety and to the management of hazardous substances. Is the analysis of these aspects handled by a separate entity, or is it managed within the same regulatory body, or perhaps in collaboration with other organizations?	Finnish Safety and Chemicals Agency (Tukes) is responsible for regulating non-radiological hazards and occupational safety.
Article 6	p.71	Regarding the extension of Olkiluoto spent fuel storage facility : what were the main points of attention regarding safety? What were the advantages of implementing the project at the same location compared to constructing a new facility elsewhere?	<p>The construction of the extension was carried out according to updated safety requirements (Government Decree 733/2008), which among other things required that the design has to withstand a large airplane impact. Regarding the implementation of the project at the same location/facility, an advantage was that it could be processed as a plant modification. It also benefits from the use of the same organisation and the proximity of the plant to power plants.</p> <p>The extension of the storage facility has been implemented to accommodate the increasing amount of spent nuclear fuel, particularly due to the storage needs of fuel removed from OL3. Based on the Fukushima nuclear accident and the EU stress tests, preparedness for various accident scenarios has been significantly improved. In the event of an accident, cooling water can be supplied from multiple sources to maintain the water level in the storage pools. Additionally, monitoring instrumentation has been enhanced, with specific improvements made to the temperature and water level measurements of the pools.</p>
Article 15	H.5, p.93	<p>(Background) It is explained that the detailed regulatory requirements for the Safety Case are outlined in Guide YVL D.5 Annex A.</p> <p>(Inquiry 1) Upon what overarching provisions and grounds does the STUK have the authority to require a Safety Case as a part of a license application? Specifically, what are the required elements and scope of review for such a Safety Case?</p>	<p>For each disposal facility the licensing documentation required by the legislation includes proofs for both operational and post closure safety. In the very beginning, both are based on conceptual level design. During the process, operational and post closure safety cases are updated based on the information gained from site investigations, detailed design, construction etc.</p> <p>Section 7 h of the Nuclear Energy Act (NEA) states that "The disposal of nuclear waste in a manner intended as permanent shall be planned in a way that gives priority to safety and so that ensuring long-term safety does not require the surveillance of the disposal site." Section 7 § of the NEA gives STUK the mandate to issue regulations on the long-term safety of disposal of nuclear waste. The Nuclear Energy Decree Chapter 5 has detailed requirements on the licensing documentation submitted to STUK in each licensing phase. In each phase, it is possible to require "any other description considered necessary by the authorities".</p> <p>The regulation Y/4/2018 "Radiation and Nuclear Safety Authority Regulation on the Safety of Disposal of Nuclear Waste" Section 4 requires that a post-closure safety case is submitted as part of each licensing phase.</p>
Article 32	Section B, p.19	<p>(Background) The document states that Finland employs a dual classification system for low and intermediate-level radioactive waste (LILW), with separate classifications for pre-disposal management and disposal.</p> <p>(Inquiry 1) What is the rationale behind having different classification systems for pre-disposal management and disposal of LILW?</p> <p>(Inquiry 2) Are there any long-lived radioactive wastes that are not acceptable to Finland's current or planned repositories? If so, what is the proposed management strategy for these wastes?</p>	<p>Inquiry 1: This is done for practical reasons. The classification systems have different goals. For the pre-disposal management, the classification is based on radiological protection of the workers. The classification for disposal distinct the long lived and short-lived wastes and set the limits for the disposal facility and especially for the technical barriers. For short lived nuclides the technical barriers shall prevent the release of the radionuclides into the surrounding bedrock for at least several hundreds of years. For long-lived wastes, the period is at least for several thousands of years. For LILW, most of the wastes are short lived but there is a small fraction of activated core components which fall into intermediate long lived waste category. This must be taken into account in the pre-treatment of these wastes.</p> <p>Inquiry 2: There are some wastes, mainly from the use of radiation in industry, science and medicine, which are not suitable to the existing disposal facilities. The strategy is to seek a suitable disposal solution for these wastes during the interim storage.</p>
Article 13	Section H, p.90	<p>(Background) The document states that since the 1980s, Olkiluoto has been the focus of site investigations for a deep geological repository (DGR) for spent nuclear fuel. It is also stated that the ONKALO Underground Research Laboratory (URCF), located at the proposed disposal depth, has been instrumental in conducting in-situ investigations to assess the bedrock's suitability for high-level waste disposal.</p> <p>(Inquiry 1) What is the planned operational period for the ONKALO URCF?</p> <p>(Inquiry 2) Are there any plans to repurpose the ONKALO URCF as a disposal tunnel for spent nuclear fuel? If so, what regulatory approvals are necessary to convert the URCF into a fully operational DGR?</p>	The Onkalo URCF was constructed and used to support the site characterization of the future disposal facility. As originally planned, it was extended to be part of SNF disposal facility. So, Onkalo as URCF does not exist anymore but Onkalo is nowadays the name that Posiva uses to indicate the entire DGR for spent nuclear fuel. Some in situ tests and monitoring studies are being conducted in the facility still. The URCF is not planned to be repurposed as disposal tunnels and no regulatory process for this exists.

Article 32.1.1	p.24	(Background) The document mentions that the management of waste below clearance levels involves two primary approaches: general clearance and case-specific clearance. (Inquiry 1) What are the distinctions between general clearance and case-specific clearance procedures for waste below clearance levels? (Inquiry 2) What is the regulatory limit for the concentration of Uranium-235 in waste that is eligible for clearance?	1) a. In a general clearance procedure, the destination of the materials released from the facility need not be designated, or is only designated in its outline, and the activity levels to be applied are fixed. Activity levels are directly from BSS. b. In a case-specific clearance procedure, the recipient of the material and the maintenance process must be defined; the activity levels will be imposed based on case-by-case consideration. This requires always approval from STUK. 2) Nuclear materials cannot be released from regulatory control.
General	A 12	(Background) A wide range of communication activities have been undertaken to foster public trust in the development of a deep geological repository (DGR). These efforts have included both formalized processes such as environmental impact assessments, public hearings, and comment periods, as well as more targeted initiatives like meetings with local officials, community working groups, seminars, media outreach, public opinion polls, and socio-economic incentives. (Inquiry 1) From the regulatory body's perspective, what specific strategies have been employed to tailor communication to different public and stakeholder groups? (Inquiry 2) What factors have contributed to a relatively positive perception of nuclear power among environmental groups in the context of DGR development?	Inquiry 1: It is important for STUK to be trusted. On the other hand, STUK trusts that the local residents know how to make the right decision for their municipality. STUK has always wanted to help the local residents understand the radiation safety of spent nuclear fuel and its disposal and the risks related to radiation safety. STUK's goal is to show that it is an authority independent of both industry and energy policy and that it reliably monitors the radiation safety of the project. We want to communicate reliably that the disposal project can only be implemented if it is safe for current and future generations and the environment. STUK treats all stakeholders and residents equally. The communication was tailored by finding out first what issues people wanted information about and answered the questions that interested them. We did not focus only on questions that STUK thought were interesting. Inquiry 2: We cannot know this for sure. However, the truth is that when the political decisions to select a disposal site and start a concrete disposal project were made at the turn of the millennium, the discussion in Finland remained very focused and did not become strongly polarized.
Article 17	Institutional Control	Regarding the two types of institutional controls that can be implemented: restrictions on land use (passive control) and technical surveillance of closed facility surroundings (active control), who is responsible for the post-closure monitoring activities, in case in place? To what extent is the regulatory body involved?	According to the Nuclear Energy Act section 34, after the disposal facility has been closed and the responsibility and ownership of the disposed wastes has been transferred to the State, the State has the right, at the disposal site, to take all measures required for the monitoring and control of the nuclear waste and for ensuring the safety of the repository. To cover the monitoring costs, the operator of the disposal facility has to pay a lump sum for the state before the responsibility of the disposal facility is transferred to the state. The responsible governmental party on the monitoring of the closed disposal facility is not defined at the moment.
Article 25	Emergency Preparedness	Is radiation monitoring included in the off-site emergency plans? To what extent? Is environmental sampling and laboratory analysis part of the emergency plans? Is there any public guidance?	Various radiation measurements are prepared for during accidents. Sampling and laboratory analyses are also planned to be conducted if necessary. General preparedness guidelines are available in Finnish: https://www.stuklex.fi/fi/val-ohje . One guideline, "Protective actions in a nuclear or radiological emergency," has been published in English: https://www.finlex.fi/data/normit/48537/VAL1e.pdf
General	General	Greece, would like to commend the commitment of Finland and its success in this pioneering project for the implementation of this first of a kind deep geological disposal in the world.	Thank you for the compliment.
General	Page 12	What actions helped to change public opinion regarding the safety of nuclear waste disposal? Taking a look at the statistics, the negative opinion has decreased over time.	People form their opinions on their own and there has not been specifically aimed actions to influence those. In Finland the public has quite high trust on the actors on the nuclear field (licensees, regulator, ministries, research facilities...) and increased confidence towards the safety of disposal could be consequence of the SNF disposal project proceeding as planned.
Article 32	Page 26	What would be the biggest challenges in the decommissioning process of any NPP?	Based on the existing time schedule, it is difficult to identify technical challenges related to the NPP decommissionings in the far future (2050s-). From the waste management point of view, the disposal facilities are in place. Finland has gained some experience in decommissioning during the decommissioning project of the research reactor in Finland. Maintaining the expertise and knowledge gained for the decommissioning period is a challenge.
Article 16	Page 98	How are the conditions for closing the facility appropriate for the disposal of spent nuclear fuel waste?	Post closure safety is taken into account in the evaluation of the closing conditions. Also ageing management of the technical conditions is important to ensure the right initial conditions at the closing.
General	Page 143	What are FIGURE L5-12. package's layers? Please describe. What things need to consider, when packing these types of packages?	Figure L5-12 does not show any real package. The plastic wrapper is only used for contamination shielding during handling and measurements before the concrete block is placed into the final disposal package. When using plastic like this, it is important to select a relatively thick and durable type in order to avoid holes due to handling of the heavy object.

Planned Activities	L.4, p.123	(Background) POSIVA has submitted various documents, including a Safety Case, as part of its application for an operating license. Among these, the Safety Case for the operation of the Spent Nuclear Fuel Disposal Facility (SC-OLA, Stage: pre-operation) and the Post-closure Safety Case for a low-and intermediate-level radioactive waste management facility (Stage: post-closure) represent different stages in the safety case development process. (Inquiry 1) Given the distinct developmental stages of the SC-OLA and the Post-closure Safety Case, there are likely to be significant differences in their structure, content, and requirements. What are the primary differences between these two types of safety cases?	The licensing documentation for the operation of Posiva's encapsulation plant and disposal facility consists of two sets of materials -The FSAR (operating phase) and technical documentation of the facilities that are needed to start operations -the post-closure safety case which assesses the safety of all future wastes to be disposed of in the disposal facility. These are very different in nature. The FSAR and technical documentation are basically equal to those of any nuclear facility which is approaching to the operating phase. The post-closure safety case is a separate set of documents and supporting materials which assess the post-closure of the disposal facility. The detailed requirements for the FSAR and post-closure safety case can be found in YVL A.1 Appendix A, Section 5.3, and YVL D.5 Sections 7.2 and 7.3.
Article 15	page 94	The STUK review of the safety case for the spent fuel disposal facility showed "that there is a need to further improve the post-closure safety by clarifying the safety arguments and the related methods and by reducing the uncertainties concerning the performance of barriers.". Can you please provide some more specific information about the improvements made, including, how the uncertainties regarding the performance of the barriers were addressed?	In Posiva's safety safety case for the operating licence stage, uncertainties in the long-term performance of the barriers are managed by way of scenarios and quantitative safety analyses conditional on them. The review of Safety Case for the Operating License Application is still on-going. Findings of the STUK review will be made public in the form of review report once completed.
Article 17	page 99	What scenarios are analyzed after the institutional period of 200 years?	Analyses of releases are based on an estimated set of representative scenarios that lead to releases of radionuclides. Calculation groups cover cases where either mechanical failure of canister(s) is expected due to EITHER earthquake or isostatic load due to ice cover on top of disposal facility OR loss of buffer mass and failure of canisters due to corrosion.
General	Section K2, p. 109	As mentioned regarding the second challenge identified in the 7th Review Meeting "The decommissioning of the research reactor has been a very important learning process for the regulatory body as the experiences gained will be used in updating the regulations and guides and later in planning the regulatory oversight for the decommissioning of NPPs.". Can you please provide some important aspects of this regulatory update and of the lesson learned from the decommissioning of the research reactor?	The decommissioning license step was added to the nuclear energy legislation in 2017. The license for decommissioning of the research reactor was applied before this addition as an operating license for decommissioning. Despite of this, the license application review and the regulatory oversight of the dismantling works gave STUK feedback on the need of development of the regulations and planning of the oversight of the dismantling works. For example the documentation required for the decommissioning license are bit overlapping and this will be clarified for the new nuclear energy legislation which is under renewal. For the regulatory oversight of the dismantling works, an oversight plan for the research reactor was written. It described for example the oversight during different stages of the project, onsite inspections and holdpoints for certain steps. It seemed to be good way to guide the oversight, at least in a small decommissioning project.
General	Section K4, p. 112	Regarding the first challenge identified in the present report (commissioning of the spent nuclear fuel encapsulation and disposal facilities), can you provide whether there is a timeline for the review of STUK and the commissioning?	During 2024, STUK has received updated operating license application materials from Posiva and has continued their review. STUK expects to receive additional updated application materials in the spring of 2025. Deficiencies identified in the materials, updates required due to facility modifications by Posiva, and the overall scope of necessary updates have delayed the review process more than initially expected. The Ministry of Economic Affairs and Employment has granted STUK additional time to complete its safety assessment until the end of 2025. Challenges have been particularly noted in the manufacturing and commissioning of the disposal facility's systems, as this is a first-of-a-kind facility. During manufacturing and system commissioning, issues have been identified that have led to design modifications in the systems. These modifications may impact multiple parts of the design documentation, which Posiva has been updating during the operating license application review process. This directly causes delays in the timeline for granting the operating license. As long as significant changes are made during the review process, neither the operating license nor STUK's safety assessment can be finalized. STUK expects to receive additional modification materials during the spring of 2025. Furthermore, the commissioning tests for the encapsulation and disposal facilities will continue throughout 2025.
Article 32	page 24	Can you please provide some information regarding the anticipated treatment steps and conditioning methods for the highly activated metals?	In Olkiluoto the activated reactor pressure vessels of all reactor units and activated spent reactor internals accumulated during the plant operation (excluding fuel channels and bundle parts) will be segmented, packed in custom-made containers, and disposed of in the final repository on site together with other decommissioning waste. In Loviisa the highly activated metals are mainly stored in the dry silos located in the reactor halls and spent fuel storage. These will be packed and disposed in the decommissioning phase. Some small metal parts are disposed during operation in specially designed concrete containers, in the cavern for ILW.

Article 32	page 26	As stated in the report, disposal of an individual Am241 smoke detector into normal municipal waste was earlier considered as the optimum option from the radiological point of view. Can you please provide some information on the assessment (e.g. methodology, scenarios, criteria etc) supporting this conclusion?	Municipal waste was earlier dumped in a landfill. That was regular procedure for mixed waste before circular economy. Municipal waste contained also other materials like metal, which are currently handled and recycled more efficiently.
Article 22	page 52	Please provide some more information about the six-day curriculum of the course on nuclear waste management. Is this course for students or only staff members? What organization provides this course? Since the duration of six days might seem short, can you specify the qualification/expertise of the students/people towards which this course is oriented?	This six-day course on nuclear waste management is not offered anymore since it was merged with the course on nuclear safety. The short course was offered for all staff in organizations in the nuclear energy sector and students. The course was provided by STUK, Ministry of Economic Affairs and Employment, universities, TVO, Fortum, Posiva and VTT. As mentioned, it was aimed for people working or studying in the area.
Article 11	page 82	Which are the scenarios and pathways considered in calculating the annual effective dose due to the disposal of radioactive waste?	<p>In our guidance, the assessment period is divided into two phases. The first phase is the first few millennia (10 000 years chosen by the implementer) during which doses are assessed. The limit is 0,1 mSv/a for representative person living in the vicinity of the disposal facility. After this "dose assessment (DA) period" the main measure is the sum of normalized releases of radionuclides at the geosphere-biosphere interface zone. In STUK guidance, nuclide-specific release constraint limits are set and a limit of 1,00 of sum of normalized releases is set until the end of assessment period ("Release constraint limit (RCL) period"). Also, stylized biosphere modelling and doses assessment is required during RCL period but there isn't any numerical limit for the doses at the moment. However, it should be noted that the nuclide-specific activity releases are derived from the dose constraint of 0.1 mSv/a.</p> <p>For the DA period, Posiva does not expect any releases from the Spent Nuclear Fuel Facility. The main scenarios, for which the doses are assessed at the Analysis of Releases are based on releases from LILW-repository at early phase as a consequence of degradation of concrete</p> <p>During RCL period, stylized doses assessment are conducted for the cases mentioned above (Answer to Question #32815).</p> <p>Dose assessment pathways are ingestion (contaminated drinking water, contaminated food in the vicinity of repository) and inhalation of radon gas.</p>
Article 11	page 82	As mentioned in the report, the probability of events causing significant radiation exposure shall be very low and the widespread impacts of the release must also be low. Can you please elaborate on how you assess the probability of such events, in particular, considering the large uncertainties involved in a such long timeframe of thousands of years?	<p>YVL guide D.5 states that: "3.2.4 Rare events impairing long-term safety 315. According to the paragraph 1 of the Section 11 of the STUK Regulation Y/4/2016 the probabilities of rare events impairing long-term safety and their impacts on the disposal system and the long-term safety of disposal shall be assessed. The radiation exposure caused by them shall be assessed where possible. The probability of events causing significant radiation exposure shall be very low, and the widespread effects of the release of radioactive substances caused by them shall be low. In addition according to the paragraph 2 the radiation exposure caused by inadvertent human intrusion into the emplacement rooms during the period following their closure shall be assessed. [2018-02-13]"</p> <p>Assessment of probabilities/frequencies of events is done by the implementer where possible. When assessing the frequencies and magnitudes of Earthquakes (EQs) during temperate periods, catalogues of historical EQs are utilized. However, when assessing the frequencies and magnitudes of EQs during post-glacial periods (rebounds), such data doesn't exist and thus there is no chance to set any probability/frequency. In such cases, consequences are assessed as such.</p>
Article 32	Section B	What are the plans for further management of the radioactive sources from the smoke detectors? / It is noted that smoke detectors are handled according to the WEEE directive, and that the radioactive sources are transferred to the interim storage.	Radioactive sources from the smoke detectors are packed and sent to the interim storage. Final disposal to these will be done as it will be done to other sealed sources containing Am-241.
Article 32	Section D	Does the inventory of non-nuclear radioactive waste include radioactive waste from the decommissioning of non-nuclear facilities such as cyclotron bunker facilities etc.? If not, what are the plans to include such waste streams.	Non-nuclear radioactive waste inventory does not include waste from decommissioning. Estimation on waste amount is made in more detail at the stage when the application of the safety licence for decommissioning is done. Currently just one decommissioning project has been launched.
Article 28	Section J	Which disposal solutions are being considered for the high activity radioactive sealed sources? / It is noted that Finland has a few high activity radioactive sealed sources in storage for which a disposal route is to be determined.	STUK has started a project in 2023 to improve the intermediate storing as well as to find solutions for radioactive waste streams that currently does not have a route to the final disposal. The project aims to map the alternative options for final disposal for existing waste packages within 2025 based on commercial services (bidding competition). STUK will also develop in 2025-2026 the capacity of the intermediate storage based on the future needs and continue to search for solutions for any possible waste packages or future waste streams that remain unsolved.

General	Section A, p. 12	The increase of the public confidence to geological disposal, in particular taking into account that a steady and significant positive trend is observed after the start of the construction of the facility, is commendable and it might be encouraging for other countries as well. Can you provide details about some of the actions taken by the implementer and STUK to communicate with public and other stakeholders?	<p>According to the Finnish Energy Attitudes Survey, both the popularity of nuclear power and confidence in the safety of final disposal vary in the same direction from year to year. Both trust in nuclear power and trust in the safety of disposal reached their highest level to date in 2022. In the following two years, the trends of popularity and trust have been slightly decreasing.</p> <p>Throughout the final disposal project, STUK's citizen and media communications have been based on transparency. After the site selection and political decisions made at the turn of the millennium, STUK has not had any special campaigns regarding disposal. STUK communicates about the supervision of the disposal project according to the same principles and practices as it does about its other activities. For the time being, the supervision of the disposal project is a supervision project at STUK. The project will end when the plant starts its normal operations. During the project, STUK will publish a quarterly monitoring report on its website every four months, in which STUK will report on its observations during the review period. Whenever the quarterly report is published, STUK will also publish a press release about it. Sometimes the media will write stories based on the press release, sometimes not. It is noteworthy that the most stories on the subject are published by the regional newspaper published in the Eurajoki area.</p> <p>Posiva has its own stakeholder, media and citizen communication campaigns and Posiva is responsible for their communications.</p>
Article 32	page 19	In figure 3, the classification of RW for disposal purposes is shown, where waste is classified as VLLW, LILW and spent fuel. Later, in p. 19. it is written that "The classification for the disposal purpose is given in Regulation STUK Y/4/2018. It distinguishes short-lived and long-lived waste accordingly: ...". In the same page it also seems that the VLLW, LLW and ILW classes are associated with the radiological hazard during predisposal management. Can you please explain how these definitions are linked and clarify the classification scheme that applies to disposal?	The classification systems have different goals. For the pre-disposal management, the classification is based on radiological protection of the workers. The classification for disposal distinct the long lived and short-lived wastes and set the limits for the disposal facility and especially for the technical barriers. For short lived nuclides the technical barriers shall prevent the release of the radionuclides into the surrounding bedrock for at least several hundreds of years. For long-lived wastes, the period is at least for several thousands of years. For LILW, most of the wastes are short lived but there is a small fraction of activated core components which fall into intermediate long lived waste category. This must be taken into account in the pre-treatment of these wastes.
General	Section K	(Section K.4) How does Finland manage the tight timeline and unique technical requirements for commissioning its spent nuclear fuel encapsulation and disposal facilities, and what adjustments have been necessary during the process?	<p>During 2024, STUK has received updated operating license application materials from Posiva and has continued their review. STUK expects to receive additional updated application materials in the spring of 2025. Deficiencies identified in the materials, updates required due to facility modifications by Posiva, and the overall scope of necessary updates have delayed the review process more than initially expected. The Ministry of Economic Affairs and Employment has granted STUK additional time to complete its safety assessment until the end of 2025.</p> <p>Challenges have been particularly noted in the manufacturing and commissioning of the disposal facility's systems, as this is a first-of-a-kind facility. During manufacturing and system commissioning, issues have been identified that have led to design modifications in the systems. These modifications may impact multiple parts of the design documentation, which Posiva has been updating during the operating license application review process. This directly causes delays in the timeline for granting the operating license. As long as significant changes are made during the review process, neither the operating license nor STUK's safety assessment can be finalized. STUK expects to receive additional modification materials during the spring of 2025. Furthermore, the commissioning tests for the encapsulation and disposal facilities will continue throughout 2025.</p> <p>STUK oversees Posiva's activities during commissioning and reviews commissioning related plans and result reports. The various phases of commissioning of the encapsulation and the disposal facilities may only be started after STUK has established that the safety factors and safety regulations have been adequately considered for each phase.</p> <p>STUK reviews design modifications through document inspections and conducts commissioning inspections on-site to verify both the system's readiness for test operation and the results after the test operation. If deficiencies are identified in the documentation or during STUK's participation in test operation inspections, clarification requests and requirements have been issued accordingly.</p>
Article 4	(v)	How many leaking fuel assemblies have been identified in the VVER 440 nuclear power plants since their commissioning?	35 pcs from the two plant units together
Article 4	(v)	How many leaking fuel assemblies are expected to be identified during the lifetime of the VVER 440 nuclear power plants ?	In the past 20 years we've only had 4 leaking fuel assemblies, so probably a similar number for the remaining 25 years.
Article 4	(v)	How are leaking fuel assemblies from VVER440 power plants stored and how are they disposed permanently?	The leaking assemblies can be stored in the same way as the intact assemblies, in the wet storage pools. Also in the final disposal the primary option is to treat the fuel just the same. This is however not yet planned in detail / still under discussion.
Article 32	Section B	Is there a time limit for storage of radioactive waste before it has to be transferred to a safety licence holder with the aim of storage or disposal? Is there a time limit for decay storage at the licensee?	Radioactive waste shouldn't be stored unnecessarily, as stated in the Radiation Act section 83. Duration of decay storage at the licensee is three years or it can be longer if it is justified at the safety assessment, regulation S/5/2019 section 32.

Article 6	Section G	What are the main challenges Finland encountered with public acceptance and public engagement regarding radioactive waste disposal?	In the end, there were no particularly big challenges. Open, long-term communication was enough. Of course, it is essential that Posiva chose Eurajoki as the disposal site, where people were already accustomed to nuclear power. In the final stage of site selection, there would also have been two communities to choose from that had no experience with nuclear power. According to surveys, residents in these locations were not nearly as supportive of the project as in the two nuclear power locations, Eurajoki and Loviisa.
Article 7	Section G	What specific technologies and storage methods does Finland use for interim storage of spent fuel, especially regarding container design?	On-site wet pool storage on both NPP sites.
Article 22	Section F	How has Finland structured its financial provisions for long-term nuclear waste management through the State Nuclear Waste Management Fund?	The purpose of the VYR Fund is to ensure that the State has sufficient funds and competence. The capital of the fund is composed of annual payments made by operators under a waste management obligation. The Fund determines, based on decisions made by the Ministry of Economic Affairs and Employment (MEAE), the annual fee to be paid to the fund each year, ensuring that the fund always has enough assets to secure the costs of all nuclear waste management measures that still have to be carried out. MEAE makes the decisions based on justified estimates assessed by independent bodies (specialized in the evaluation of technical economic calculations) of parties with a waste management obligations. Justified estimates are assessed every three year and they consist of the future costs of management of their existing nuclear waste, including spent nuclear fuel, and decommissioning of their nuclear facilities.
General	Section K	(Section K.2)What strategies are being implemented to maintain and develop decommissioning expertise and competence in Finland?	At the moment the decommissioning of the FIR 1 -research reactor has been important project for Finland to develop the decommissioning expertise and competence. The lessons learned will be documented to support the maintenance of expertise and also used to support the ongoing nuclear energy act renewal project. Also the periodic updates and regulatory reviews of the decommissioning plans of the operating NPPs is one way to maintain and develop the expertise and competence on the field. But since the first NPP decommissioning in Finland will be done in 2050s, some extra efforts are most probably needed to develop more expertise and competence in the future.
General	Section K	(Section K.3) What steps is Finland taking to establish long-term management solutions for high-activity sealed sources?	STUK has started a project in 2023 to improve the intermediate storing as well as to find solutions for radioactive waste streams that currently does not have a route to the final disposal, or the existing route will become obsolete in the near future. The project aims to map the alternative options for final disposal for existing waste packages within 2025 based on commercial services (bidding competition). Based on the results, some or all of the existing waste packages will be processed ~2026. STUK will also develop in 2025-2026 the capacity of the intermediate storage based on the future needs and continue to search for solutions for any possible waste packages or future waste streams that remain unsolved.
General	Section F, pgs. 52-53	The section entitled, "Strengthening and maintaining competence building in Finland," describes an excellent program and represents a best practice for Contracting Parties to emulate.	Finland thanks the United States of America for this positive assessment and for the suggestion as the Best Practice.
General	Section K, p. 108	The National Report states "risk-informed oversight has been developed in all areas of oversight and oversight has been graded within the framework of the current regulations. There are still major differences in the maturity of procedures and tools between different areas of oversight of STUK." Please clarify the continued major differences in the maturity of procedures and tools with respect to oversight.	The use of graded approach in the regulatory supervision in the nuclear reactor regulations is more mature than on the nuclear waste regulation. There is just simply more data to support the graded approach on reactor regulations. Especially, when compared to the SNF DRG, which is a first of a kind facility.
General	Page 12, Page 69	Could Finland elaborate more on the steps taken to inform and convince the public of the need to build a deep geological disposal facility? / Could Finland elaborate more on the steps taken to inform and convince the public of the need to build a deep geological disposal facility?	The political decision to locate a disposal facility, both nationally and locally, was made 25 years ago. At that time, the future of nuclear power was even more uncertain than it is today. The authority reminded decision-makers and citizens that, for the time being, Finland had sufficient expertise to handle disposal, but there was no certainty about the future. At that time, nuclear power was not an attractive field of study, for example. It was also reminded that Finland had a solution for financing disposal. The funds invested in the Nuclear Waste Fund were sufficient and available for the time being. If a solution were not made, it might not be possible to be sure of an equally well-functioning financing system in far future. Among other things, STUK considered it sensible to seek a solution at that time. At the same time, STUK emphasized that from a radiation safety perspective, no other solution than a completely safe one is possible. STUK also reminded that its own expertise and decision-making and monitoring system partly guarantee that an unsafe facility cannot be put into operation.
General	Page 12, Page 69	Were there disagreements and what measures did the regulator and the operator use to overcome any negative public sentiment? / Were there disagreements and what measures did the regulator and the operator use to overcome any negative public sentiment?	STUK did not try to change people's opinions. STUK wanted to explain the radiation and nuclear safety of the project in a way that was understandable also for layman. The goal was that people could base their opinions on correct information in that regard.
Article 16	Page 98, Closure plans	Are there any legal requirements for a specific period within which the closure plan of the disposal facility should be reviewed and updated (if necessary)? / Are there any legal requirements for a specific period within which the closure plan of the disposal facility should be reviewed and updated (if necessary)?	At the moment there are no specific legal requirements for the closure plan. However defacto closure plan is needed for periodical safety review. The need of legal and technical requirements for the closing plan is taken into considerations in the nuclear energy legislation renewal and in the future the might be such requirements.

General	Section B, J, p. 20	<p>If there is no permanent disposal pathway for some radioactive wastes such as certain high-activity sealed sources, the National Report notes that the State may agree to take custody of the waste for a fixed payment. Please elaborate on how the payment amount is determined. For example, is it based on expected storage and disposal costs or other criteria?</p>	<p>The payment is done by the estimation of the expected costs of the storage and disposal. It is done for each application separately because both the activity and the radionuclide and the dimensions of the actual source/source holder affects the expected storage volume and therefore the disposal costs.</p>
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