

**Joint Convention
on the Safety of Spent Fuel Management and
on the Safety of Radioactive Waste
Management**

Sixth Review Meeting (May-June 2018)

A. Questions Posted to Greece by the Contracting Parties and Answers provided by Greece, pp.2-10

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| 1. | Country Brazil | Article Planned Activities | Ref. in National Report K, 25 |
| Question/ Comment | The report states that “a safety analysis, including a qualitative accident analysis and specification of the waste acceptance criteria of the NRWIS, have been requested from the operator during the renewal of the license.” Is there any safety guide on radioactive waste acceptance criteria in Greece? Could you provide further information on that? | | |
| Answer | The legislation regarding RW management (presidential decree PD 122/2013, its amendment PD 71/2017 and ministerial decisions) is supported by specific EEAE guideline for the authorization of RW management facilities. This guideline presents the documents and their content that the facility should submit to EEAE as part of the authorization process and the frequency of the document submission. It also refers to the EEAE’s review and the assessment procedures, including assessment criteria. EEAE uses IAEA safety standards as technical guidance in the area of radioactive waste management. For the NRWIS facility, as determined in the terms of the facility license, the safety analysis – including specification of waste acceptance criteria - shall be performed according to IAEA safety standards and especially, WS-G-6.1 “Storage of radioactive waste”, safety guide. Currently, waste acceptance criteria are only referred to contact dose rate for the purposes of staff radiation protection, taking into account the dose constraints applied in the facility. | | |
| 2. | Country Romania | Article General | Ref. in National Report A; page 5 |
| Question/ Comment | NRWIS responsibilities are referring to interim storage of radioactive waste and disused radiation sources, low activity sources dismantling, characterization of radioactive waste, re-packaging and re-sorting of radioactive waste and radioactive sources and characterization and clearance of radioactive waste. Which is the available infrastructure for conducting sorting and re-packaging? Which waste are subject for re-packaging and which is the solution adopted? | | |
| Answer | The available infrastructure of NRWIS includes fume hood with laminar flow, lead cabinet, gamma ray spectrometer with NaI(Tl), alpha and beta spectrometer with plastic scintillator, portable spectrometers, contamination monitors, β - γ detectors, ancillary equipment. Re-packaging is only performed for the radioactive elements from the disassembling activities of smoke detectors and occasionally for lightning rods, as well as for the RW originated from the past activities | | |

of the NCSR “Demokritos” laboratories that cannot be cleared. Stainless steel containers are used, at the moment.

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| 3. | Country Slovakia | Article General | Ref. in National Report Section K/ p. 25 |
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Question/ Comment Could Greece indicate the main outcomes of the follow-up review mission of November 2017, especially regarding radioactive waste?

Answer The Recommendations and Suggestions, of the initial IRRS mission, related directly to radioactive waste management have been reported in the previous report of Greece for the 5th Joint Convention review meeting. All Recommendations and Suggestions, but one Suggestion (S8) which remains open, were assessed as “closed” or “closed on the basis of progress made and confidence in effective completion”. Please refer to the Report of the Follow-up Mission, which is publicly available (http://eeae.gr/files/anakoinoseis/IRRS_Report_Followup_for_Greece.pdf) for further explanation of the findings of the follow-up mission. As concerns the open Suggestion 8, according to which EEAE should consider incorporating a waste classification scheme into its regulatory system, the follow up mission found that “Even if the IAEA classification scheme is generally applied in regulatory oversight, EEAE has not incorporated it into its regulatory system. It is noted that development and publication of the classification system is provided in the national program to be undertaken by EEAE within the next couple of years. The follow-up mission resulted to one new Recommendation on the procedure for license renewal and one new Good Practice related to clinical audits. Both are not directly related to the area radioactive waste management.

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| 4. | Country United Arab Emirates | Article General | Ref. in National Report page 31 |
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Question/ Comment The overview matrix states that “Options for disposal to be considered’. Does Greece have a plan for consideration for such options? If so, what is the timing for such consideration?

Answer As provided in the national legislation (Article 4.1 of PD 122/2013) radioactive waste shall be disposed in an authorized disposal facility in Greece. Initial steps towards the construction of disposal facility are defined in “action 5” of the National Program. Such steps comprised mainly determination of disposal technical options for the various waste streams, needs for research programs, scope of the environmental impact assessment studies, criteria for site selection, public and stakeholders involvement and selection of potential sites for the construction of the facility. According to the National Program the timeframe for action 5 is up to 2030.

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| 5. | Country United Arab Emirates | Article Article 4 | Ref. in National Report page 20 |
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Question/ Comment What is the period of validity for the license for the extended shutdown of GRR-1? Does Greece intend to require the decommissioning of the reactor following the return of the spent fuel to the US? Is there a plan in place for the return of the spent fuel before 2019?

Answer The extended shutdown license is valid until 2019, with the possibility of extension. There is no final decision for the future of the reactor. NCSR "Demokritos" with the support of EEAE is in the process of making all the necessary arrangements with USDOE so to return the fuel to the USA according to the existing agreement.

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| 6. | Country Ukraine | Article Article 11 | Ref. in National Report H, 21 |
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Question/ Comment There are mentioned "Feasibility license" and "Design approval" as the licensing stages. What is the reason for this? At that, there is not mentioned that designing is subject to licensing. If there is a licensing of development of the feasibility study, what is the goal of such licensing?

Answer Design approval stage equals to the construction licensing of IAEA terminology. The first stage in the overall licensing procedure for a radioactive waste management facility is a feasibility licensing stage where a decision "in principle" for the construction of a facility has to be taken at a governmental level in relation to the benefits and the needs covered by the proposed facility. At this stage, social and economic aspects, as well as the compliance with the national program are taken into account.

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| 7. | Country Ukraine | Article Article 11 | Ref. in National Report H, 21 |
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Question/ Comment In the National Report, there is stated that there are no RW disposal facilities in Greece, and "...there are no plans for construction of new ... disposal facilities". There is also stated that RW that cannot be cleared from the regulatory control are stored in the storage facility. At that, each storage facility has certain limited design life, whereas creation of the disposal facility should also create quite much time. Therefore, it is expedient to launch the activities on creation of the disposal facility as early as possible.

Answer As provided in the national legislation (Article 4.1 of PD 122/2013) radioactive waste shall be disposed in an authorized disposal facility in Greece. Initial steps towards the construction of disposal facility are defined in "action 5" of the National Program. Such steps comprise mainly determination of disposal technical options for the various waste streams, needs for research programs, scope of the environmental impact assessment studies, criteria for site selection, public and stakeholders involvement and selection of potential sites for the construction of the facility. According to the National Program the timeframe for action 5 is up to 2030.

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| 8. | Country Romania | Article Article 23 | Ref. in National Report F; page 17 |
| Question/ Comment | According to PD 122/2013 (Article 7.4), license holders shall implement integrated management program, including quality assurance program. Can be provided information in connection to QA program of NRWIS? Are available working procedures for characterization, handling, re-packaging, sorting, others? | | |
| Answer | The quality assurance (QA) program of the NRWIS is outlined in article 23 and 24 of the JC report. In this framework, NRWIS has developed working procedures for handling of radioactive materials/waste, disassembling of devices, RW storage, packaging, decontamination methods, verification of clearance methods, radiation protection verification. These working procedures are either standalone documents or parts of the document for QA procedures and program. | | |
| 9. | Country Ukraine | Article Article 23 | Ref. in National Report F, 17 |
| Question/ Comment | The document provides too brief information on the implementation of the requirement of Article 23 of the Convention and ensuring of quality assurance. In particular, reference is made to only short paragraph of the Presidential Decree (p. 7.4 PD 122/2013). Are other regulatory requirements in this area established and, if so, do they meet: the IAEA GSR Part 2, or the IAEA GS-R-3 or the ISO 9001-2015 standard? Please provide a list the documents that regulate the quality assurance (human and organizational factors), as well as describe how the regulatory oversight over compliance with the requirements of these documents is carried out. Item 7.4 of PD 122/2013 also states that the regulator should periodically check quality assurance. Indicate the frequency of inspections in this area and the scope of oversight issues. | | |
| Answer | The legislation regarding RW management (presidential decree PD 122/2013, its amendment PD 71/2017 and ministerial decisions) is supported by specific EEAE guideline for the authorization of RW management facilities. This guideline presents the documents and their content that the facility should submit to EEAE as part of the authorization process and the frequency of the document submission. It also refers to the EEAE's review and the assessment procedures, including assessment criteria. Among other, the guideline makes reference to specific requirements and information that the facility should provide regarding the quality management and quality assurance as: policy and commitment to safety and radiation protection; arrangements for ensuring necessary human and financial resources; economic policy to manage RW and relevant costs; risk assessment for population and environment; acceptance criteria; clearance levels; infrastructure; nuclear safety and physical protection; | | |

standard operation procedures (SOPs) for each RW management activity; SOPs the delineation of areas and workplace monitoring, radiation protection of personnel; periodic quality control (QC) program, QMS and QA review and assessment; documentation and record keeping; transparency and public awareness; etc. EEAE performs on-site inspections to the NRWIS (the only centralized storage and RW management facility in the country) on a regular base. Usually 2 or 3 on-site inspections are performed annually, according to EEAE annual inspection plan (e.g. 3 in 2015, 3 in 2016 and 2 in 2017). The scope of the inspections includes: authorization aspects; personnel resources; personnel health surveillance and radiation protection; premises and infrastructure; SOPs for management of RW and radioactive materials; quality assurance program; emergency preparedness and response program; security; operational safety; radiation protection monitoring. During the inspections, the basic elements of the QMS and QA documentation are reviewed and assessed, while verification of radiation protection is performed through measurements and tests.

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| 10. | Country United States of America | Article Article 26 | Ref. in National Report Section F pg. 19 |
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Question/
Comment Please describe monitoring activities that are conducted at the GRR-1 facility to ensure any unplanned release of radioactivity to the environment is detected.

Answer In the current extended shutdown state of the reactor, with no fuel in the core, the issue of radioactivity releases to the environment is relevant to a potential accidental release from the irradiated fuel stored in the fuel storage pool. As part of the approved fuel safety surveillance and monitoring program of the reactor, regular measurements of fuel pool water are made. The water level in the pool is also constantly controlled to detect immediately any leakage of water from the pool walls. It is noted that, although not associated with the terms and conditions of the reactor license, NCSR "Demokritos" keeps on its general routine environmental radioactivity monitoring program within its campus by air, aerosol and soil samples measurements.

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| 11. | Country United States of America | Article Article 28 | Ref. in National Report Section J pg. 24 |
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Question/
Comment Please elaborate on the procedures/policies in place for addressing disused sealed sources that cannot be returned to the supplier or exported for recycling/reuse.

Answer Disused sealed sources that cannot be exported, similarly with orphan sources, shall be stored in the NRWIS until their final disposal. Priority is given to the repatriation of all imported sealed sources. Thus this waste stream is expected to decline in the future as any imported source shall be accompanied by the written commitment of the supplier to accept it back after the source's useful lifetime.

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| 12. | Country United States of America | Article Article 28 | Ref. in National Report Section B pg. 9 |
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Question/
Comment The report notes that some disused sealed sources are stored by the owners on site (such as an old teletherapy Co-60 source). Please describe procedures which ensure that storage conditions are safe and secure. How often are storage facilities inspected?

Answer All facilities temporarily stored disused sealed radioactive sources (DSRS) are authorized through a license issued by EEAE with a validity period of 2 years. A radiation source officer (RSO) or radiation protection/safety officer (RPO) is assigned. The facility is inspected by EEAE at least once within the license validity period (every 2 years at minimum).

Security measures apply to the premises and storage rooms, the magnitude and complexity of which depends on the risk and the categorization of the sources. For high activity sealed sources (HASS, i.e. category 1 and 2 SRS), either in use or disused, security systems (alarms, motion detection etc) are installed and connected on-line to security agencies. The facility is obliged to notify EEAE for every incident on the SRS, immediately.

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| 13. | Country Brazil | Article Article 32 | Ref. in National Report B, 07 |
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Question/
Comment The report states that radioactive waste in Greece originates mainly from medicine, industry and research. How many licensed installations are under regulatory control in Greece? Is there a regular program of inspections aimed to these installations? How often are inspections performed per year?

Answer RW originates or may originate mainly from (data as 2017): 154 nuclear medicine facilities; RW consists of very short lived radioisotopes and are cleared on site. 5 brachytherapy facilities using I-125 SRS in a form of seeds. 56 (out of 195) research laboratories using radioisotopes in liquid form; RW are managed on site due to very low activity and short life of radioisotopes.

2 industrial facilities undertaking works with radioactive lightning rods (replacement); the dismantled elements are stored on-site 376 industrial facilities using sealed radioactive sources (SRS) and 33 medical facilities with teletherapy, brachytherapy and blood irradiator systems; the SRS are being in use and will be repatriated after their useful life according to existing agreements. One (1) RW management facility (NRWIS). All the afore mentioned facilities are inspected by EEAE at least once within the validity period of the license, i.e. 3-5 years for nuclear medicine and research facilities and 2 years for the industrial. The highest risk facilities, as determined by EEAE procedures, are inspected yearly, according to annual EEAE inspection program. The NRWIS is inspected 2-3 times each year.

In 2017, 88 inspections were performed in nuclear medicine facilities, 11 in radiotherapy and brachytherapy facilities with SRS (Co-60, I-125 seeds, blood irradiators), 16 in research facilities with liquid radioisotopes, 103 in industrial facilities, 2 in the industrial facilities for lightning rods, and 2 in the NRWIS. In total, 685 inspections were performed in 2017. Similar inspection program apply every year.

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| 14. | Country Brazil | Article Article 32 | Ref. in National Report B, 08 |
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Question/ Comment According to report “NRWIS facility is the only facility in Greece that serves as a radioactive management facility in Greece”. However, the report indicates that there is radioactive waste temporarily stored in NCSR “Demokritos”, some waste is stored in the building of the research reactor GRR-1 and also some disused sources are stored by the owners on site in locations across the country waiting for final management. How does Greece deal with this situation concerning the nuclear safety and security? Is there any future plan to centralize all radioactive waste in NRWIS facility?

Answer According to the legislation, the owner may keep the waste on site under safe and secure storage no longer than 10 years. After this period the waste shall be transferred to a centralized storage facility awaiting for final disposal. As envisaged by the National Program the establishment and operation of national RW storage and management (NRWSM) facility is foreseen. All facilities and activities involving radioactive materials, including radioactive waste are regulated and supervised through regular inspections by EEAE. Moreover, EEAE keeps a national radioactive sources database. Following the new legislation on radioactive waste, EEAE shall also maintain a national inventory of the radioactive waste.

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| 15. | Country Montenegro | Article Article 32 | Ref. in National Report B e), 9 |
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Question/ Comment Report stated that some disused sources are also stored by the owners on site in locations across the country waiting for final management i.e. export for recycling to an authorized facility (e.g. old - decayed teletherapy Co-60 source, sealed source found in scrap metal, smoke detectors, radioactive lighting rods). For all these sources a radiation source officer is assigned and the facilities hold a license, which is renewed every 3 or 5 years (depending on the facility). The financial and administrative responsibilities for the final management of such sources are assigned to the licensee. Could Greece kindly provide more information about planned conditioning activities of such sources which could be exported for recycling?

Answer At the moment conditioning activities have not been planned, as final decisions on the disposal options and the disposal facility have not reached, yet. The national committee for radioactive waste management (NCRWM) has been formed, recently; among its duties

are the decision and practical implementation of the RW management routes, including disposal.

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| 16. | Country Romania | Article Article 32 | Ref. in National Report B; d) page 8 |
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Question/
Comment The NRWIS facility is used for safekeeping of disused /orphan sealed sources (without back-end agreement) and primary unconditioned radioactive waste. Which are the premises for treating the raw wastes in the absence of WAC for disposal?

Answer At the time, there is no treatment of radioactive waste taking place, besides re-packaging in steel drums if needed, as for example in the case of dismantled lightning rods or historical waste. Until the final disposal solution is decided, no specific WAC for disposal will be considered. Treatment and storage of waste will be implemented by avoiding any irreversible treatment of the waste. At the moment, placing into appropriate containers, according to the operating conditions and acceptance criteria of the storage facility, is considered as a viable solution.

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| 17. | Country Romania | Article Article 32 | Ref. in National Report B; e) page 9 D; d) page 11 |
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Question/
Comment The inventory of radioactive waste, sources and other material is maintained by EEAE. Is also indicated that EEAE maintains the national radioactive sources inventory.

In connection with Annex II: Inventory of radioactive waste (Table 2, 4 and 6) which highlight that future characterization works will be implemented by NCSR, it means that all items can be identified during the inspections? Since is declared that EEAE performs on regular basis on-site inspections to verify the inventory of the material and compliance with radiation protection regulations.

Answer EEAE keeps a national radioactive waste inventory, based on data of the inventories of the facilities, including the storage facility NRWIS. Facilities are obliged to keep the data of their inventory, verification of which is part of the inspection of the facilities.

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| 18. | Country Romania | Article Article 32 | Ref. in National Report Policies and Practices (page 10) |
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Question/
Comment Could you describe what is the current strategy and timescale regarding the characterization of historical radioactive waste (originating mainly from the past operation of the research reactor) stored in the research reactor building?

Answer Management of historical radioactive waste (originating mainly from the past operation of the research reactor) stored in the research reactor building is directly connected to the establishment and operation of national RW storage and management (NRWSM) facility.

The national program, under the respective Ministerial Decree and the amended Presidential Decree for the RW management, started to be implemented in September 2017. Among others, it foresees the selection and the establishment of the NRWSM facility within 4 years from September 2017. Completion of the characterization of the historical waste is expected after the establishment of the NRWSM. This RW is currently stored in a safe and secure manner in the reactor auxiliary building.