

MOBILITY MISSION REPORT

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MISSION TITLE

Radioactive Waste Facility Security and Academic and Archival Research on Transnational DGS Scientific Collaboration

DESCRIPTION


Concerned organisations

- IAEA
- National security agencies/security advisors
- Civil society organisations

Concerned infrastructures or facilities

- IAEA
- IAEA Archives
- CEU library, Vienna

Concerned phases

- Phase 0: Policy, framework and programme establishment
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- Phase 4: Facility operation and closure
- Phase 5: Post-closure

Themes and topics

- Theme 1: Managing implementation and oversight of a radioactive waste management programme
 - Programme planning
 - Organisation
- Theme 5: Geological disposal facility design and the practicalities of construction, operations and closure
 - Facility and disposal system design
 - Constructability, demonstration and verification testing
 - Health and safety during transport, construction, operations and closure
 - Monitoring and retrievability
- Theme 7: Performance assessment, safety case development, and safety analyses
 - Integration of safety-related information
 - Performance assessment and system models
 - Treatment of uncertainties

Keywords

Long-term radioactive waste storage; security; civil society; transnational scientific collaboration; historical survey

EXECUTIVE SUMMARY

Civil society organizations and the media express concerns about the availability of information related to the security of critical nuclear infrastructure - particularly since the Russian invasion of Ukraine in 2022. There does not seem to be a great deal of political drive to address these concerns with policy initiatives that improve the security of such facilities under new threat conditions. Academics and scientists focused on longer-term technical solutions for the management and storage of radioactive waste have also raised concerns about the obstacles to accessing data from other jurisdictions that is relevant to the success of their efforts.

Both of these matters could represent liabilities in the successful management of radioactive waste and might therefore be of interest to the Eurad 2 Steering Committee when considering the scope of its future research objectives.

While some stakeholders have raised these issues during Eurad discussions, it is up to the management to determine whether it would be appropriate to tackle these subject matters within the framework of the programme.

My objectives in this study and research mission related directly to my interest in and earlier engagement with these issues. It was my intention to observe the extent to which threat mitigation efforts to secure the protection of radioactive waste storage facilities given novel and unanticipated global threats are being addressed by the

international agency responsible for coordinating and monitoring the management of back-end operations. It was also to identify the theoretical and historical models that support the argument that the examination and international review of waste management failures, entailing the sharing of the details of their scientific and technical basis, bolsters learning processes and may be key to accelerating successful solutions to these challenging problems.

As a member of the Civil Society Larger Group I have had opportunities to observe Eurad project beneficiaries presenting good practices, novel problem-solving approaches and technical achievements. What has been lacking, perhaps, are critical perspectives related to the inability to access national technical and scientific data and the decision-making processes that surround governance and policy, and advocacy directed towards the creative solutions for overcoming these obstacles to progress. Non-state actors such as civil society groups may be in a position to better promote these ideas.

The cross-cutting topics in focus during the IAEA international security conference was thought to be an excellent opportunity to gain an overview of the types of security guidance, security applications, technical measures, regulatory challenges and degree of adherence to legal instruments that exists today. National statements, policy discussions, reports and coordination activities may offer insights about the most pressing issues in this area, and I hope to share the conference papers and my learnings with my civil society colleagues.

Access to an academic database and library collection at the Central European University, which has a particularly strong academic focus on critical thinking in the social science and humanities, is valuable to find sources that provide a scientific and theoretical basis to work on a methodological framework to promote within Eurad the value of considering innovative approaches to its own project goals. Models, arguments and methodological tools will be sought during this research.

Finally, some historical examples of models, and successful implementation of transnational efforts to find technological and policy solutions to the challenges in the area of radioactive waste management systems are sought. These could serve to demonstrate the added value of collaboration and encourage the fostering of open information systems.

1. MISSION BACKGROUND

There were three objectives to this research mission as a member of the Eurad Civil Society Larger Group. The first was to learn about state-of-the-art security challenges and security management approaches to protecting nuclear sources at the International Conference on Nuclear Security: Shaping the Future (ICONS2024). The second was academic database searches for surveys of waste storage transnational scientific collaborations and theoretical literature from the social sciences and humanities, and the third was archival research to survey IAEA-led joint ventures to consolidate long-term solutions for the safe disposal of radioactive waste and examples of RWM storage failures.

1. Security Conference: Civil society organizations wish to know the extent to which the security of radioactive waste is being addressed by monitoring agencies. As the conference offers an overview of emerging risks and threats, it will also give an indication of the salience of radioactive waste storage security issue for the IAEA and/or its member states.

2. Academic Research: The scientific literature suggests that technological progress is greatly enhanced by openness, sharing and examining the causes of failed experiment. During Eurad general discussions scepticism was expressed about the value and feasibility of creating an overview of storage failures for the sake of accelerated learning and scientific progress. There may be a need for a theoretical justification of this line of argumentation.

3. Archival Research: The archives of the IAEA would likely offer models of transnational collaboration that focus on learning from failed experiment.

1.1. R&D background

1. Given new security threats, the extent to which the security of radioactive waste facilities is also being considered is increasingly appearing in the media as a public concern. Attendance at this 5-day international conference offers a competence development opportunity to learn more about the scope of attention given to this issue and share it with civil society organizations.
2. Some of the Eurad discussion participants were sceptical of an approach to future joint research that considers a historical and transnational index of deep geological storage failures. Others, mainly scientists, were supportive of the idea. A preliminary overview of theoretical views from the social sciences was deemed necessary to prepare for joint research proposals that consider such a future project in the Eurad framework.
3. Approval of my proposal for archival research was submitted months in advance of the expected visit date. Researchers who want to access the non-classified historical records and de-restricted board of Governors documents must prepare a detailed plan of research so that relevant subject information is available on site. Communications with the IAEA archives assistant continued over a period to determine which historical documents are accessible and which sources would require more than five days of on site attention to review.

1.2. Mission objectives

The conference and research opportunity will deepen my knowledge to contribute to the Eurad community and Eurad partner activities. It will also help to inform the research I will conduct in future, which entails approaching the practical problem of RWM sustainability strategies by reviewing historical experiences across cultures, borders, and changing environmental conditions. Theoretical approaches to efficient modes of learning and researching, theories of scientific progress and collaborative information ecosystems are equally of interest.

How civil society expectations can be integrated into security plans and policies will also be considered, as non-state actors also have a role in expanding the vision for achieving high standards in radioactive waste management, whether they are related to present and future security standards or environmental health standards.

1.3. Mission request

I have helped to develop policy instruments to promote government transparency and public participation as an advisor at the Biosphere Institute in Geneva.

As much of my work has focused on the challenges of decision-making processes and inclusion of the public in these processes, this mission will help me to inform civil society organizations I am in partnership with, including Nuclear Transparency Watch. It will also promote exchange of information and innovative approaches to future work within Eurad2. Gathering experience in developing an overview of security risks in the area of radioactive waste management solutions will be useful in this regard. Lessons learned from historical failures will also provide insights to anticipate future challenges.

1.4. Mission composition

Host organisation

1. International Atomic Energy Agency (IAEA); 2. Central European University (CEU); 3. IAEA Archives

Host facility

1. IAEA conference centre; 2. CEU Library; 3. IAEA Archives Reading Room

Mission dates

19 May 2024 – 31 May 2024

2. MAJOR PRACTICES, TECHNIQUES, METHODS, TOOLS OR SYSTEMS OPERATED OR STUDIED

IAEA conference participation as a civil society practitioner and scientific layperson

2.1. Practice, technique, method, tool or system operated or studied during the mission

Attendance at the ministerial and scientific segments of the security conference gave me an overview of nuclear security challenges, opportunities and prevention measures. It also offered insights about the degree of attention devoted in such a security-themed five-day forum specifically to radioactive waste security concerns.

Description

Attendance at workshops and panels, and the opportunity to download and analyze conference papers on topics of special interest; the ability to ask questions during discussions and directly following presentations helped to consolidate the information I had learned; and private discussions with presenters and attendees helped me to better understand the information presented.

Usage

My observations over the course of the security conference and notes summarizing the presentations will be useful as a record and for further information sharing.

Benefits

It is unusual for civil society organization representatives to attend a high-level IAEA conference and it is fruitful to be able to benefit from technical discussions as a layperson and to profit from opportunities for personal engagement with presenters. For example, I learned about an international peer reviewed report made available by the Malaysian nuclear agency in 2018 to assess the security of radioactive disposal facilities “Borehold Disposal of Disused Sealed Radioactive Sources”; the public had been invited to engage in a related study to provide feedback; the agency also presented a model of disused sealed radioactive waste disposal that was designed with the security of the material in mind and have developed security-related guidelines, procedures and checklists. Another presentation introduced the international industry standards currently being developed with cooperation agreements engaging the IEC, ISO, ITU and CEN and focusing on used medical equipment with high-level radioactive sources. Something Eurad partners might want to consider is the importance that industry standards developers place on a common technical vocabulary. As one presenter stated “you can only start talking about security when you’re all using the same terms.” All terms are formalized in a very consistent manner.

Limitations

It is possible that the scope of the panels and the programme does not accurately reflect the degree of attention paid to radioactive waste security issues at the national level; it is also possible that I missed this being addressed in a presentation I did not attend due to the overlapping programme structure.

Applicability

Members of civil society organisations should be encouraged to consider attending an IAEA conference. While intensive and demanding, the opportunity is particularly valuable to get an overview of current technical concerns and solutions, which can be a rich source of information for a range of stakeholders and fodder for brainstorming project proposals in future.

2.2. Practice, technique, method, tool or system operated or studied during the mission

Gathering of historical examples of transnational scientific collaborations

Description

The archives of the IAEA provide a selective but nevertheless good source of models for successful cross-boundary observations of deep geological radioactive waste storage failures.

Usage

Examples from history can serve to demonstrate the feasibility of projects that focus on obtaining an overview of the various technical obstacles to successful storage techniques. While it is a main objective for Eurad to support joint research, such examples that in addition to coordinating research it would be wise to identify those of our respective efforts which might with advantage be developed on a joint basis. The failures of storage repositories, which have not, as yet, been documented on the European level, is a case in point.

Benefits

The advantages of implementing this approach would include reduced duplication, improved resource allocation and better efficiency in finding deep geological waste management storage solutions.

Limitations

National security concerns would represent an obstacle to open sharing of case studies but might be overcome if national agencies are convinced of the benefits gained.

Applicability

Some of the IAEA missions focusing on failed solutions could be implemented in the frame of the Eurad 2 projects or in other non-governmental organization project proposals.

2.3. Practice, technique, method, tool or system operated or studied during the mission

IAEA press protocol

Description

IAEA transparency: Journalists covering the security conference are not permitted to ask questions

Usage

While it is understandable that certain discussions may be politically sensitive it is atypical that an international agency funded by public financing would be closed to press questions, particularly given the salience of current geopolitical events related to the threat environment and its potential impact on nuclear security and nuclear security policy. All security measures have serious implications for the environmental and human health of present and future generations.

Benefits

This IAEA protocol may be information of interest to some of the Eurad stakeholders; it will be concerning to colleagues in civil society organizations who work on Aarhus Convention issues. Within the EU, which is a signatory of the Convention and obliges all EU Member States to ratify it, minimum transparency and public participation obligations exist. If journalists attending IAEA events are limited to passive observance, they may not be able to fulfil their duty as watchdogs of democracy.

Limitations

It is possible that this protocol is only in place during security-themed IAEA events and not as a general rule, i.e., for annual General Assemblies. Further inquiry with the IAEA management would be necessary.

Applicability

Aarhus Convention practitioners may wish to advocate for an updating of this policy. The challenges posed by war or terrorism to the security of critical infrastructure is high on the agenda of public concern. Media organizations should be able to raise questions of concern to the public in such a forum.

2.4. Practice, technique, method, tool or system operated or studied during the mission

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Description

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Usage

Klikněte nebo klepněte sem a zadejte text.

Benefits

Klikněte nebo klepněte sem a zadejte text.

Limitations

Klikněte nebo klepněte sem a zadejte text.

Applicability

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3. MISSION FINDINGS AND CONCLUSIONS

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3.1. Lessons learned and conclusions

It has been a valuable exercise to consider the benefits of challenging conventional approaches to technological problem-solving. Many models shared over the course of the IAEA security conference were concrete examples of problem-solving that were being implemented or still in the planning stages. From a literature review focusing on an examination of knowledge scope and research strategy indicators conducive to broader insights and more prolific findings supported the main premises resulting from my observations within Eurad.

A critical perspective may not always be well-received in the context of an EU project that encompasses many politically and nationally sensitive issues, but a forward-looking scheme that seeks to advance academic and scientific problem-solving approaches to important technical and societal challenges merits some consideration.

This research and study mission was a success insofar as vital new information was digested providing insights for my future research. Materials collected included nearly 50 academic articles and books, 60 watermarked archival pdfs and over a hundred photographs of original historical IAEA records.

Regarding the security focus, the overview of security concerns and technical and infrastructure challenges that were shared by security practitioners in the form of presentations and scientific papers enhanced my understanding of the range of vulnerabilities that exist in the management of radioactive waste – both today and when long-term solutions are being considered.

It came as somewhat of a surprise that over the course of the conference there was no specific focus on the physical vulnerabilities of above ground and near-surface radioactive waste storage facilities – particularly during crisis or military conflict conditions which are very high at this time on the public and press agenda.

To their credit the CSO World Institute for Nuclear Security (WINS) did present a 2023 report dedicated to an assessment of the risks that would arise from such situations which are not commonly acknowledged or addressed by government agencies. It also considered policies, procedures and practices that could be considered to mitigate such risks. While the report did not expressly pay attention to RWM facilities these might be said to fall under the rubric of the review. Likewise, while there were a number of sessions on cybersecurity risk and risk management, presenters and attendees did not raise issues about threats facing the security of digitally monitored waste facilities.

Some of these security vulnerabilities may not get sufficient attention from ministerial-level stakeholders due to the extension of state budgetary resources they conceivably represent. Given to the nature of unanticipated risk this topic could be a furtive area of future research within the Eurad framework, in principle, since RWM facility vulnerabilities would have serious implications for future generations and must be considered also in the design phases. The conclusion of one security practitioner was that under-analyzed security vulnerabilities may invalidate risk-acceptance decisions for agencies dealing with critical infrastructure and public safety. It was also stated that it is “highly likely that violent groups will capitalize on the advantages [unmanned aircraft devices coupled with AI capabilities] provide”. If that is the case, some of the current

threats we are facing should have, and indeed could have, been considered earlier had economic factors not been so prominently stressed.

Society may learn from examples of past errors in judgement. There is a body of literature that examines blind-spots and offers recommendations for addressing the challenge on the political level. Within the Eurad framework – especially the research stream of knowledge management - the scientific and technical programme envisioned by the Eurad 2 Steering Committee may also benefit from the theoretical underpinnings of some of this literature. Likewise, techniques inspired by social scientific research for working through perceived obstacles could be valuable in developing a research programme that avoids the pitfalls of earlier RWM research.

While scientific progress is sometimes slow and necessarily entails a degree of failure, the mistakes that are made along the way, if considered thoughtfully, may provide the most valuable impetus for accelerated learning and help to facilitate social and scientific progress. Eurad is in a position to complement, and intensify, the already growing regional cooperation in nuclear security and nuclear technology solutions. Future Eurad projects might consider establishing a metric for security culture that incorporates the views of civil society organisations.

3.2. Relevant findings and conclusions for home organisation

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3.3. Relevant findings and conclusions for host organisation

Klikněte nebo klepněte sem a zadejte text.

3.4. Relevant findings and conclusions for other organisations

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4. POTENTIALS FOR IMPROVEMENT OR DEVELOPMENT

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4.1. Generic potentials

This section is not mandatory. If applicable, replace this entire field with a description of about 150 words of generic potential improvements or developments you can suggest for the practices, techniques, methods, tools or systems operated or studied during the mission. If not applicable, remove the entire section.

4.2. Potentials for home organisation

This section is not mandatory but can be prepared with the mission supervisor or mentor from your home organisation. If applicable, replace this entire field with a description of about 150 words of specific potential improvements and developments you can suggest for your home organisation. If not applicable, remove the entire section.

4.3. Potentials for host organisation

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APPENDICES

Mission journal

From May 20-24, 2024 I attended the security conference ICONS24. The event offered a wide variety of technical sessions, panel discussions, plenary sessions and side events related to showcasing different aspects of nuclear security. There were sometimes opportunities for me to speak directly with presenters following a session, which allowed me to ask follow-up questions. Notes were taken, and when relevant photos of slide presentations.

Monday the plenary panel “Securing sustainable progress: The important role of nuclear security in advancing the Sustainable Development Goals” was of particular interest to me due to my research related to preserving the biosphere. Most of the day was filled with ministerial speeches to be analyzed following publication.

Tuesday I attended a side event hosted by Interpol on nuclear and radiological terrorism patterns and trends, and threat assessment methodologies. The focus was on forecasting a terrorist attack specifically involving nuclear and radiological material. Afterwards I had an opportunity to pose a question privately to UK Radiological and Nuclear Terrorism Prevention Unit agent Kitty Lai about the threats posed by the proliferation of uncrewed aerial systems such as drones, which in some jurisdictions are permitted to fly over nuclear facilities, and about vulnerable radioactive waste storage facilities. She did not explain why these were left out of the methodologies but indicated it had something to do with the disparity in law among IAEA member states. Perhaps this meant they could only formulate a methodology using the information that Interpol was in possession of.

One panel included a presentation on uncrewed aerial systems and their emerging capabilities as related to nuclear security. It was noted that this constitutes an under-analyzed threat to national security. There was a policy session on evolving strategies in the nuclear security landscape and a panel on Shared challenges, shared solutions: Regional and international cooperation to enhance nuclear security.

Wednesday offered a plenary about managing the threats and benefits of emerging technologies and this was followed by an exploration of the practical uses and potential threats of artificial intelligences. “Eyes on the sky: Strategies to mitigate the threats posed by uncrewed aerial systems” presented a case study where a civil society watchdog organization triggered the Slovakian government to implement legislative and practical changes in its approach to protecting its facilities from drones; similarly a policy and law focused panel assessed and evaluated physical protection systems in an evolving threat landscape.

Thursday I was unable to participate in a visit to the Nuclear Security Demonstration Centre at the laboratories in Seibersdorf due to a conflict in the programme. There was a session focusing on an exploration of the role of civil society in shaping the future of nuclear security, and a side event organized by civil society on nuclear security in times of crisis. This included a presentation (“Falling Short in a Dangerous World”) from NTI of its Nuclear Security Index. This is a security assessment across 176 countries of radiological and nuclear security, but it failed to take into consideration radioactive waste storage facilities as potential targets of malicious actors. There was also a think tank, and three academics.

The safety and security standards developed by the IAEA, it was noted, differ from industry standards. The IAEA standards have a much more top-down approach; in the

medical industry these standards “start with the patient/user/staff and primarily the manufacturer of the equipment itself”; that is to say: equipment design. However these new standards would not cover storage, only the active period of the equipment.

The panel “Strengthening Regulatory Frameworks for Radioactive Sources Throughout the Life Cycle (PLR)” showcased a range of nuclear security measures that would need to be fostered to mitigate threats included greater international collaboration and regulatory enforcement, and increased inspection/monitoring/ training, etc., but as with many of the other risk mitigation presentations the threat focus was restricted to diversion of dangerous radiation sources, not on the vulnerability of nuclear sources as targets of terrorist or aggressive enemy state actions.

Friday I attended a plenary panel on the changing role of the IAEA, a legal policy workshop on adapting regulatory frameworks for new threat situations and considerations related to public communications. In the afternoon I visited the Reading Room of the IAEA Archives and discussed with the Archives Assistant the resources available based on my requested inventory.

Saturday, May 26th and Sunday May 27th was spent using the CEU library database of academic journal sources, reviewed articles and scanned position papers and chapters of books on site between around noon and 8 pm. Afterwards, time was also spent reviewing documents, organizing them into separately themed folders, and summarizing key points to facilitate the later retrieval process.

The week of May 28th was spent in the Reading Room of the IAEA Archives.

Day 1: The documents selected earlier from the inventory list was shown to me by the Archives Assistant. Additionally, there was a database on the on site computer that held an itemized list of declassified documents to choose from. These sources were not searchable, which made the process of selection laborious and slow. This first day was spent familiarizing myself with the scope of the archival material available to me, and in discussions with the Archives Assistant.

Day 2: Most of this day involved scanning hundreds of original historical documents and photographing selected sources; there were discussions again with the Archives Assistant about whether it would be worthwhile to request the declassification of further sources; a limited number of pdf documents related to administrative decisions, scientific advisory committee conclusions and mission reports were looked over.

Day 3: Most of this day was spent looking over hard copies of historical documents, and determining which ones might be of interest; photographing selected documents, particularly INFCE (International Nuclear Fuel Cycle Evaluation) and WAMAP (IAEA Waste Management Programme) materials.

Day 4: Perusal of the on site digital index with reading and selection of IAEA Scientific Advisory Committee meetings, findings and observations; search for data from different eras enabling the conclusion of a trend; collection, review and analysis of historical documents.

Day 5: UN entrance pass was extended for one more day with the security administration staff; final decisions were taken about the on site computer sources as researchers are permitted only a certain number of documents per calendar year; more photographing; I learned that I would only be sent the on site computer database sources selected the following week.

MISSION BENEFICIARY

Christiana Maria MAURO
Legal Consultant, Senior Advisor at the Biosphere Institute, Geneva
Board Member
Nuclear Transparency Watch, Rue Saint Sabin 38, Paris, France

PARTNER EXPERTS CONTRIBUTING TO THE MISSION

Host organisation experts

- Mr. Sanjai Padmanabhan (Administrator, Conference Services Section, Division of Conference and Document Services, Department of management, IAEA, Vienna)
- Ms. Angelika Gulyas, Senior Collection Management Librarian Cataloger, CEU Library, Central European University, Vienna)
- Mr. Lukas Hechenblaickner (Archives Assistant, Archives and Records Management Section, Division of General Services, Department of Management, IAEA, Vienna)

Home organisation experts

- Nadja Zeleznik (Chair, NTW)

Other organisations experts

N/A

REPORT APPROVAL

Date	Beneficiary	Home mentor/supervisor	Host mentor/supervisor
Date of last signee	Name	Name	Name
	Visa	Visa	Visa