

Radiation Protection Instruction

EnRich 2021

1. General remarks

Event: **EnRich 2021**,
3rd **European Robotics Hackathon**,
Subject: "Exercise: Nuclear Power Plant Accident"

License holder: Republic of Austria,
FEDERAL MINISTRY OF DEFENCE (MoD)
Roßauer Lände 1, 1090 Wien.

For the license holder: MoD, Directorate General for National Defence
Directorate 5 – Procurement,
Central Technical Affairs Division,
Dr. BITTNER Roland,
Referat technisches Rechts- und Sicherheitswesen,
Roßauer Lände 1, 1090 Wien.

Radiation protection officers: Rudolf DEUTSCH, MBA,
Armament and Defence Technology Agency (ADTA).
Deputy: KELLERMANN Daniel, ADTA.
Deputy: Dr. **WILFINGER Roman**, MBA,
ADTA/OPMT.

Location: Nuclear Power Plant Zwentendorf,
Sonnenweg 1, 3435 Zwentendorf an der Donau,
as well as transportation of the sealed radioactive sources
to and from the location of EnRich 2021.

Time frame: Duration of the exercise: from Monday, 4 October, to Friday 8 October 2021,
plus preparation and follow-up activities,
transportation of the sealed radioactive sources, etc.

2. Introduction

The event **EnRich 2021** (subject: "Exercise: nuclear power plant accident"), in the Austrian nuclear power plant Zwentendorf is the third "**European Robotics Hackathon**" (EnRich) held from 4 to 8 October 2021, in the course of which robotics experts will practice for an emergency in real operational scenarios (i. e. in the different areas of a nuclear power plant). Incidents in

nuclear power plants, such as in Chernobyl and Fukushima, or even the decommissioning and dismantling of old nuclear facilities vividly demonstrate how important the use of robot technologies is when it comes to radioactive contamination. The robots are used where the conditions are too dangerous for humans. The aim is to use robots to find radioactive cooling water from the coolant circuits, e.g. radioactive water valves and pipelines, and to detect, measure and mark or enter the findings into a digital map.

When handling sealed radioactive sources during the exercise, participants run the risk of exposure to gamma radiation. Therefore the objective of this Radiation Protection Instruction is to keep the chance of radiation exposure as low as possible by way of respective regulations.

3. Legal basis

This Radiation Protection Instruction is based on the following legal regulations:

- *Radiation Protection Act 2020* (with the latest amendments) and *Radiation Protection Instructions* as per section 68 Radiation Protection Act 2020,
- *General Radiation Protection Directive 2020* (with the latest amendments), *Radiation Protection Instructions* as per section 85, as well as
- *Notices of approval* for the authorisation to carry out the activity, issued by the responsible provincial governments, as well as the conditions contained therein.

4. Scope of Applicability

This radiation protection instruction applies to activities involving sealed radioactive sources for the exercise.

All persons active in this area have to follow this Radiation Protection Instruction and the instructions issued by the radiation protection officer and his deputies.

5. Approval

Through the notices of approval of the provincial governments of Lower Austria (KRW2-BA-0943/001), Styria (A23-002867/2010-0005), Tyrol (1f-STR-ra-1013/6), Upper Austria (US-491145/2-2009-Spe/Ho) and also Korneuburg (KOW2-BA-0425) the handling of sealed radioactive substances has been authorised.

6. Radiation protection organisation

Radiation protection during the exercise is organised by the Federal Ministry of Defence, Office of Armament and Defence Technology, Department NBCUT, and will henceforth be referred to as the "Radiation Protection Organisation".

All the radiation protection officers listed below, their deputies and other persons entrusted with radiation protection who have the required expertise in radiation protection are **radiation-exposed personnel** who are permanently present or **can be contacted immediately** (e.g., via mobile phone) as long as the exercise is ongoing.

Radiation protection officer:

Rudolf DEUTSCH, MBA

Telephone: +43 50201 / 10 30 930

Mobile phone: +43 664 622 56 44

E-Mail: rudolf.deutsch.4@bmlv.gv.at,

Office Building Vorgartenstraße 225, 1024 Vienna,

Postal address: Roßauer Lände 1, 1090 Wien

1. Deputy: **KELLERMANN Daniel**, ADTA,
Mobile phone: +43 664 622 56 45.
2. Deputy: **Dr. WILFINGER Roman**, MBA, ADTA/OPMT,
Mobile phone: +43 664 622 56 93.
3. Further personnel responsible for radiation protection and radiation protection officers in charge of their respective organisational element as well as personnel exposed to radiation:

BALOUN Robert	ADTA
WO II GUBA Josef	CBRN Defence Centre
WO III DVORAK Erwin	NBCDEF COY/3 MECHHQBN
WO III STEINKELLNER Ernst	NBCDEF COY/3 MECHHQBN
WO I HEUBACHER Anton	NBCDEF COY/6 HQBN
WO II HARTL Gerald	NBCDEF COY/7 HQBN

The radiation protection officer is responsible for enforcing the necessary protective measures in his area of responsibility and is authorised to issue instructions to the employees. They must follow his instructions. During the absence of the radiation protection officer, all rights and duties shall pass to his deputy.

7. Operational procedure applying to radiation protection

- sealed radioactive sources

Reference sources (Co-60 and Cs-137 radiation sources) are used for the activities during the exercise. **Test sources** are used to check the functioning of measuring instruments. For simplification, both will be referred to as "sealed radioactive sources".

Sealed radioactive sources are radioactive substances that are enclosed in a solid inactive shell or permanently embedded in solid inactive substances in such a way that a leakage of radioactive substances is prevented completely under normal operational conditions.

The sealed radioactive sources create a controlled area that can be entered. Personal dosimeters must be worn in the controlled area.

1. Working requirements

In addition to the radiation protection officer, all other persons entrusted with radiation protection **must have the necessary knowledge of radiation protection when handling sealed radioactive sources**. This knowledge will be imparted again in abbreviated form within the framework of the radiation protection instruction for the special requirements of the exercise.

2. Rules of conduct

In principle, the basic rules of radiation protection apply to all activities involving sealed radioactive sources:

1. Keep distance!
2. Limit the time spent in the immediate vicinity of the source!
3. Use provided shielding!
4. Special rules of conduct: Sealed radioactive sources used in the course of the exercise may only be **handled with suitable distance tools**.
5. Sealed radioactive sources may only be used in the radiation source holders provided for the respective activities.
6. Outdoors, sealed radioactive sources may only be used in a so-called source protection. (Reason: securing the sources outdoors against birds such as magpies, etc.)

3. Operation rules

1. The sealed radioactive sources may only be handled by persons who have been designated by the radiation protection officer and who have been properly instructed.
2. The sealed radioactive sources are to be used only as intended.
3. As long as the sealed radioactive sources are not used in accordance with their intended purpose, they must be stored at the storage locations as specified in the notice of approval for the exercise in such a way that they are protected against theft and fire.
4. When handling sealed radioactive sources, the following measures must be taken to prevent theft or loss of the radioactive materials and unauthorised access to them: e.g. safekeeping, guarding by military police, etc.
5. The sealed radioactive sources must be kept away from corrosive substances.
6. The sealed radioactive sources must be visually inspected for damage before use. Attention must be paid to deformation, cracks, scratches, porous areas, corrosion, etc.
7. If damage or leakage is suspected, the sealed radioactive sources must no longer be used and the radiation protection officer must be informed immediately.
8. The cover of the test source must not be changed in any way. The cover must be carefully protected against damage. A damaged source must not be used any more.
9. The location where sealed radioactive sources are used is specified in the notice of approval. Should a change of this location or of the storage site be necessary, the radiation protection officer must be informed in advance.

10. The radiation protection officer must be informed prior to any change in the location of storage or usage.
11. The removal from the storage location and the return of sealed radioactive sources must be recorded in a control register indicating the source number, the date and the name of the person removing the source.
12. The transport of sealed radioactive sources to and from the exercise venue requires special measures to be taken in consultation with the radiation protection officer.
13. Questions concerning the transportation and handling of, and work with the sealed radioactive sources must be addressed to the radiation protection officer.
14. Access to control and supervision areas by persons who are not radiation-exposed personnel, such as exercise participants, is only permitted if the sealed radioactive sources have been safely stored by the Radiation Protection Organisation in compliance with the requirements of radiation protection.
15. Sealed radioactive sources may only be handled with a suitable distance tool.
16. One member of the Radiation Protection Supervisory Organisation is always present **at each of the unlocked access or entrance doors to the control and transition areas** if sealed radioactive sources have been removed from the transport and storage containers. The unlocked access doors are additionally marked with an orange warning light.
17. Participants of the radiation protection exercise are obligated to carry a thermoluminescence dosimeter (TLD) and a warning dosimeter/an electronic personal dosimeter (EPD) for the duration of the exercise.
18. After the work in the control and supervision areas, e.g. after completing the exercise, the dosimeters must be returned to the Radiation Protection Organisation immediately, and the persons concerned may only stay or move outside the control and supervision areas.
19. Staying in the control and supervision areas without a good reason is prohibited.
20. The instructions issued by the Radiation Protection Organisation are to be followed at all times.
21. The Radiation Protection Organisation is authorised to instruct the exercise participants at any time in order to ensure personal or general safety; the instructions must be followed **immediately!**
22. The Radiation Protection Organisation may, in case of imminent danger, terminate the handling of sealed radioactive sources and the "Exercise: nuclear power plant accident" at any time without giving reasons.
23. The participants must register in the "dosimeter list" on the website "<https://enrich.european-robotics.eu>" before the start of the exercise. Should additional personnel participate in the exercise, they may still be entered into the dosimeter list on the first exercise day.
24. With their personal signature, each participant confirms – at the latest on the first day of the exercise or before the start – that they have completely read, understood and taken note of these instructions. The respective number of each individual personal dosimeter will be entered by the Radiation Protection Organisation when the device is handed out.
25. Persons who are not listed in the dosimeter list will not be allowed to enter the control and supervision areas, i.e. the exercise location.

8. Access regulations governing the control and supervision areas

The participants of the exercise may only enter the **control and supervision areas**, i.e. the exercise area, together with one of the radiation protection officers or with a person entrusted with radiation protection (see list in section "*Radiation protection organisation*") in exceptional cases, e.g. if a robot gets out of control, if there is a sudden defect or any other incidents occur.

Before participants enter the control and supervision areas, the radiation protection officer or the persons entrusted with radiation protection must safely place the sealed radioactive sources in the designated storage container or shielding container or shielding area by means of suitable distance tools to keep the radiation dose as low as possible (in accordance with the ALARA principle: „as low as reasonably achievable“). Adolescents under 18 as well as pregnant and breastfeeding women are expressly prohibited from entering the control and supervision areas.

9. Alarm exercise, accidents and incidents

- In consultation with the fire brigade, the exercise area or the control and supervision areas with the sealed radioactive sources must be clearly marked at the access point with the sign of the applicable hazard group.
- The measures in the event of incidents and accidents are to be explained during the instruction. The following measures must be observed:
 - Notification in accordance with the emergency plan,
 - all employees immediately clear the affected area,
 - the license holder, his deputy or the on-site commander, in consultation with the responsible safety expert, the radiation protection officer or his deputy/deputies and the other persons entrusted with radiation protection initiate further steps (e.g., blocking of affected zones, safe storage of sources, briefing of emergency forces, etc.).
- In the event of safety-relevant incidents (e.g. damage to radiators, suspicion of contamination, theft, fire), the authorities or their organs, the license holder and the radiation protection officer must be informed immediately.
- If a person is suspected of having taken in radioactive substances, a respective check (excretion analysis, whole body counter measurement) must be carried out, which the affected person must be subjected to.

10. Instruction

Before starting, every person participating in the exercise including radioactive substances in the control and supervision area has to be instructed as to the work methods, the possible dangers, and the safety and protection measures to be applied.

These radiation protection instructions and the additional exercise instructions are also part of this instruction, which is publicly accessible under the following address "<https://enrich.european-robotics.eu>".

The instructor will keep records regarding the contents and the date/time of the briefing, and every person instructed has to sign off on the record when the personal dosimeters are handed out.

11. Medical Supervision

Employees who may receive an effective dose of more than 1 mSv – but not more than 6 mSv – in a calendar year while working with the measuring device must be assigned to category B of persons exposed to radiation in their profession. If 6 mSv may be exceeded in a calendar year, the exposed person must be assigned to **category A**, which is subject to occupational health examinations.

Since service personnel working in the Radiation Protection Organisation are exposed to radiation, they have to present a valid medical certificate proving their physical fitness in accordance with the General Radiation Protection Directive, paragraph 2, *Medical Examinations*.

12. Prevention of third party interference and loss of the source

The following measures shall be taken by the license holder, his deputy or the commander on site to prevent the loss of sealed radioactive sources and unauthorised access or use:

- access control to the exercise venue,
- safe storage of the sealed radioactive sources,
- the location must be guarded by the military police and military guards and be controlled by the duty officer,
- technical anti-theft measures may possibly have to be installed.

13. Transport and storage of sealed radioactive sources

The sources as well as the transport, the transport set and the marking of the storage site at the Zwentendorf nuclear power plant are organised and carried out by NBCDEF COY/7 HQBN (2 CO₆₀ sources), NBCDEF COY/3 MECHHQBN (1 CO₆₀ source), NBCDEF COY/6 HQBN (1 CO₆₀ source), CBRN Defence Centre (2 CO₆₀ sources) and NBCDEF COY/4 MECHHQBN (1 CO₆₀ source).

14. Validity

This radiation protection instruction comes into force at the start of preparations for the exercise and ends when the review process has been completed and all sealed radioactive sources have been safely stored at their destination.

Rudolf DEUTSCH, MBA (electronically signed)
Radiation protection officer of the exercise
Vienna, 01 September 2021

Attachment

Emergency plan

Emergency plan

EnRicH 2021

Radiation protection officer:

Rudolf DEUTSCH, MBA

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First deputy of the Radiation Protection Officer:

KELLERMANN Daniel

Mobile phone: +43 664 622 56 **45**.

Second deputy of the Radiation Protection Officer:

Dr. WILFINGER Roman, MBA

Mobile phone: +43 664 622 56 **93**.

Safety officer:

RAAB Helmut

Mobile phone: +43 664 622 **87 15**.

Outside duty hours one of the following persons must be informed:

- BG JANISCH Michael, +43 664 622 **14 31**.
- KRUDER Pamela, +43 664 622 **56 49**.
- Military Police access control, +43 664 622 **49 80**.
- Duty officer (Office Building Vorgartenstraße), +43 5 02 01 **10 13 41**.

Section 104 Requirements for Control and Supervision Areas

The following requirements apply to the control and supervision area:

- (1) An area in which exposed workers may receive an effective dose in excess of six millisieverts in a calendar year in the course of their work is to be considered a control area.
- (2) An area in which exposed workers may receive an effective dose exceeding one millisievert in a calendar year but not exceeding six millisieverts in the course of their work is to be considered a supervision area.
- (4) The responsible authority must define the boundaries of the control area and the supervision area as a part of the approval procedure.

Section 105 Requirements for Control and Supervision Areas

(1) The following requirements apply to the control area:

1. The control area shall be separated and marked as such by the radiation warning sign with the appropriate notes and information in accordance with **Attachment 6**.
2. Access is to be limited to those persons that have received the respective instructions.
3. Access controls are to be carried out in accordance with procedures specified in writing by the license holder.
4. If there is a significant risk that the contamination may spread, appropriate precautions must be taken, in particular for the access and departure of persons and goods and the monitoring of contamination in the control area and, if necessary, in adjacent areas.
5. Workplaces must be monitored for radiation in accordance with section 107.

(2) The following requirements apply to control areas:

1. Workplaces must be monitored for radiation in accordance with section 107.
2. If necessary, the provisions of sect. 1 (1) shall also be applied.

Section 106 Access to control and supervision areas by persons who are not radiation-exposed personnel.

(1) The license holder shall draw up written regulations governing the access of persons that are not radiation-exposed personnel to control and supervision areas. In particular

1. the type and content of any instructions to be given to the persons entering,
2. the type and extent of any access controls, and
3. an estimate as to the occurring doses have to be specified.

(2) Should on the occasion of such a contact an effective dose exceeding 10 microsievert be incurred, or should, due to multiple contacts, an effective dose of more than 100 microsievert per year be expected, records have to be kept, giving account of the actually occurring doses. These records must be kept for at least 7 years.