

Document:	NSRAO2-POR-030	Procurer:
ARAO identification code:	02-08-011-004	REPUBLIC OF SLOVENIA Gregorčičeva ulica 20, 1000 Ljubljana
Date:	March 2019	By authorisation of:
Revision:	5	ARAO, Ljubljana Celovška cesta 182, 1000 Ljubljana
Number of copies:		
Facility:	LILW repository Vrbina, Krško	
Contractor:	ARAO, Ljubljana	
Contractor's project manager:	Mag. Sandi Viršek, univ. dipl. inž .geoteh. in rud.	
Document title:	<p style="text-align: center;">Draft Safety Analysis Report for the Vrbina Krško LILW repository</p> <p style="text-align: center;">Chapter 9 Operation</p>	

DOCUMENT HISTORY

Revision:	Date of (previous) revision:	Brief description of changes relative to the previous version:	Notes:
1	May 2017	amendment of the document following review	
2	January 2018	amendment of the document following review by an approved nuclear and radiation safety expert	
3	November 2018	amendment following review by SNSA	
4	February 2019	amendment following review by SNSA	
5	March 2019	supplementing of application	

TABLE OF CONTENTS

9 OPERATION..... 7

9.1 GENERAL 8

9.1.1 DESCRIPTION OF OPERATION..... 8

9.1.1.1 Capacity and duration of repository operation 8

9.1.1.2 Planning of operation 8

9.1.1.3 Execution of the LILW transport to the repository 8

9.1.1.4 Acceptance criteria for disposal 9

9.1.1.5 Acceptance of containers with LILW at the repository..... 9

9.1.1.6 Keeping records of containers 9

9.1.1.7 Placing of containers in the disposal silo 9

9.1.1.8 Closing of the disposal silo and activities following cessation of operation – sealing 10

9.1.1.9 Potential radiation sources other than radioactive waste necessary for safe operation of the LILW repository 10

9.1.2 Non-compliance management and corrective measures..... 10

9.2 ORGANISATIONAL STRUCTURE 11

9.2.1 General..... 11

9.2.2 Repository management..... 12

9.2.3 Activities of the general service..... 12

9.2.4 Activities of the technical department 12

9.2.5 Activities of the radiation protection service..... 13

9.2.6 Activities of the security service 13

9.2.7 Repository operations board 13

9.2.8 Repository safety board 13

9.2.9 Occupational health and safety 13

9.2.10 Provision of first aid, fire protection and evacuation..... 13

9.2.11 Consideration of human factors..... 14

9.3 ADMINISTRATIVE PROCEDURES 15

9.3.1 General administrative procedures 15

9.3.2 Administrative procedures of the repository management 15

9.3.3 Administrative procedures of the repository technical department 16

9.3.4 Administrative procedures of the radiation protection service 16

9.3.5 Administrative procedures of the general service 16

9.4 OPERATING PROCEDURES 17

9.5 EMERGENCY AND ACCIDENT ACTION PROCEDURES 19

9.5.1 REPOSITORY STATES..... 19

9.5.2 Procedures to be taken in ABNORMAL operational states..... 19

9.5.3	<i>Procedures to be taken in EMERGENCY design basis events and accidents</i>	19
9.6	MAINTENANCE, SURVEILLANCE, INSPECTIONS, TESTING.....	21
9.6.1	<i>Control, testing and operational status</i>	21
9.6.2	<i>SSC labelling</i>	21
9.6.3	<i>SSC maintenance</i>	21
9.6.4	<i>Handling and storage</i>	22
9.6.5	<i>Management of measuring and testing equipment</i>	22
9.6.6	<i>Operational monitoring</i>	22
9.7	AGEING MANAGEMENT PROGRAMME	23
9.7.1	<i>ageing management bases</i>	23
9.7.2	<i>SSC ageing control</i>	23
9.8	MONITORING OF CHANGES IN THE REPOSITORY	25
9.8.1	<i>Modification management programme</i>	25
9.8.1.1	General	25
9.8.1.2	Proposed modifications.....	25
9.8.1.3	Assessment of merits of proposed modifications	26
9.8.1.4	Design of solutions for the modifications.....	26
9.8.1.5	Assessment and classification of modifications.....	26
9.8.1.6	Safety analyses	27
9.8.1.7	Temporary modifications	27
9.8.1.8	Preparation of documentation	28
9.8.1.9	Review, verification and approval of a modification	28
9.8.1.10	Notification and reporting modifications	28
9.8.1.11	Implementation of modifications	28
9.8.1.12	Completion of modifications	29
9.8.2	<i>Bringing a modification into effect</i>	29
9.8.3	<i>Management of design</i>	29
9.8.4	<i>Temporary modifications</i>	29
9.9	QUALIFICATIONS AND COMPETENCIES OF THE REPOSITORY STAFF	30
9.9.1	<i>STRATEGY OF TRAINING OF THE LILW REPOSITORY STAFF</i>	30
9.9.2	<i>CONDITIONS FOR PROFESSIONAL QUALIFICATIONS FOR WORKERS AND CONTENTS OF THE PROGRAMMES</i>	31
9.9.3	<i>PROCEDURE OF PROFESSIONAL COMPETENCY VERIFICATION AND GRANTING OF LICENCES</i>	32
9.10	HUMAN FACTOR – CONSIDERATION OF HUMAN FACTORS	33
9.11	OPERATING EXPERIENCE FEEDBACK PROGRAMME	34
9.11.1	<i>Organisation of the operating experience and operating indicators feedback</i>	34
9.11.1.1	Personnel involved in operating experience feedback.....	34
9.11.1.2	Operating experience feedback infrastructure	34
9.11.1.3	Adopting of decisions and implementation of measures	34
9.11.2	<i>Operating experience and operating indicators feedback programme</i>	34

9.11.2.1	General	34
9.11.2.2	Type, scope and criteria for data collection	34
9.11.2.3	Method of collecting and storing information on in-house and international operating experience	35
9.11.2.4	Method of evaluating the information collected	35
9.11.2.5	Methods used to analyse the information collected	35
9.11.2.6	Method of implementation of preventive or corrective measures	36
9.12	DOCUMENT AND RECORD CONTROL	37
9.12.1	<i>Formats of written procedures for radioactive waste management</i>	37
9.12.2	<i>Keeping of records as a constituent part of written procedures</i>	37
9.12.3	<i>Document changes and control</i>	37
9.13	OCCASIONAL SHUTDOWN OF OPERATION	38
9.13.1	<i>Description of the standby phase (interruption of operation)</i>	38
9.13.1.1	Standby phase periods	38
9.13.2	<i>States of the repository facility in the standby phase (potential emergencies)</i>	40
9.13.3	<i>Organisational structure in the repository standby phase</i>	40
9.13.4	<i>Implementation of the standby phase operating state</i>	41
9.13.4.1	general	41
9.13.4.2	Planning of standby phase operating state	41
9.13.4.3	Management of design	41
9.13.4.4	Requirements for SSCs in the standby phase	41
9.13.4.5	SSC ageing management	41
9.13.4.6	Operational monitoring	41
9.13.5	<i>Procedures</i>	41
9.13.5.1	General	41
9.13.5.2	Administrative procedures	42
9.13.5.3	implementation procedures	42
9.13.5.4	Procedures to be taken in emergency operational states	42
9.13.5.5	Procedures to be taken in emergency design basis events and accidents	42
REFERENCES	43

ABBREVIATIONS AND TERMS

ADR	European Agreement concerning the International Carriage of Dangerous Goods by Road
AMP	Ageing Management Program – AMP implementation programme
ARAO	Agency for Radwaste Management
IAEA	International Atomic Energy Agency
Krško NPP	Krško nuclear power plant
LILW	Low- and intermediate-level radioactive waste
osnVP	Draft Safety Analysis Report
TO	Technological facility
USO	Administrative and service building
OSH	Occupational Health and Safety

9 OPERATION

The repository operation is presented in the reference document "Obratovanje" [1]. Chapter 9 is a summary of that document.

9.1 GENERAL

The LILW repository management system is defined, for all phases, in Chapter 3 of this draft safety analysis report. Here follows a general description of the repository operation.

9.1.1 DESCRIPTION OF OPERATION

9.1.1.1 *Capacity and duration of repository operation*

All waste will be conditioned for disposal at the Krško NPP, as permitted under the Ionising Radiation Protection and Nuclear Safety Act [2], which, in its Article 95, permits the operator of a nuclear installation to store and process radioactive waste and spent fuel for the requirements of the provider of the service of general economic interest of radioactive waste management, provided that it obtains the relevant licence from the authority responsible for nuclear safety. The operation of the repository will be concerted with the conditioning of LILW and with the plan of transport of LILW to the repository, which, in turn, will be concerted with the LILW acceptance programme. The repository's annual capacity is a maximum of 200 containers.

Dynamics of disposal:

- trial operation in 2020 and 2021;
- from 2022 to end of 2024, operation at full capacity;
- in 2025, transition to standby phase;
- restarting of operation in 2050;
- termination of operation and decommissioning in 2061; and
- closing of the repository in 2062.

Repository operation complies with operational limits and conditions (NRVB---5X/30; NSRAO2-POR-027-00 02-08-011-003) [3], which are also presented in Chapter 11 of this draft safety analysis report.

Those operating activities that affect safety are carried out by employees (of authorised repository services such as the radiation protection service, persons responsible for physical security, operators, etc.) in compliance with the competences conferred to them by the repository manager. Other tasks and activities to be discharged by individual services will be defined in future stages of the project.

9.1.1.2 *Planning of operation*

The repository will operate in accordance with periodic plans to be approved by the ARAO director.

One of the elements of the periodic plan is the programme of acceptance of LILW. Prior to any acceptance of LILW at the repository in accordance with the programme, a detailed written agreement will be made between the consignor and the repository on the extent and nature of the LILW being the object of shipment. The repository will not accept any containers with LILW unless approved in advance.

9.1.1.3 *Execution of the LILW transport to the repository*

LILW containers are transported from the Krško NPP to the repository by road (in accordance with provisions of ADR – Decision on the Publication of Annexes A and B to the European Agreement Concerning the International Carriage of Dangerous Goods). Packages – (disposal containers) meet the requirements for package type IP-2. Containers are transported on a custom-made semi-trailer which enables appropriate securing of the container during transport and the same position for all the containers. The vehicle transport one container at a time.

9.1.1.4 Acceptance criteria for disposal

Acceptance criteria for acceptance at the repository and disposal are a constituent part of operational limits and conditions (document: Acceptance criteria for radioactive waste at the LILW repository) [4].

9.1.1.5 Acceptance of containers with LILW at the repository

Shipments containing LILW will enter the repository secure (controlled) area via the entry point within the administrative and service building. Access to the entry point will be restricted by (the first) sliding door, which will be designed as an extension of the repository outer fence. The door opening regime will be implemented in accordance with the physical security plan. The entry point for vehicles will be divided into two driving lanes. The driving lane next to the administrative and service building (ASB) will serve mainly for in-bound transport of ordinary – i.e. nonradioactive – waste and for out-bound traffic of all vehicles, while the driving lane running parallel to the first driving lane and further from the ASB will serve in particular for in-bound transport of containers with LILW and for all extraordinary transports. The driving lanes at the entry point will be separated by road markings and fitted with (the second) sliding doors, which will delimit the entry point area and the exit into the repository site. On arrival of a shipment, which will usually stop in front of the second sliding door, a formal verification will take place of whether the acceptance of the shipped LILW has been approved by the repository and the shipment's compliance with other requirements. The vehicle security check will take 3 minutes (a distance of 1 m from the vehicle). Upon being established as formally acceptable, the shipment will continue its way towards the entry into the controlled area. At the time of entrance of the shipment into the repository, verification of the compliance with transport requirements, including the control of radiation parameters, will also take place. This verification will take place in particular in front of the controlled area entrance door for vehicles, i.e. in front of the third sliding door near the technological facility. The measurement of contamination and dose rate of the vehicle at the entrance will take 6 minutes. Upon completion of verification, the vehicle will continue to the hall.

Transport and acceptance of shipments or packages containing LILW that do not meet all the ADR requirements will take place accordance to extraordinary agreements and special written procedures.

9.1.1.6 Keeping records of containers

In the hall, the vehicle will drive onto the marked position, where the container will be offloaded from the vehicle to the lift. The lift gripper will be equipped with a barcode reader to read the barcode fitted to the container. The reader will be connected to the monitoring system in the technological facility.

With the disposal container offloaded, the vehicle will forthwith leave the hall. Prior to leaving the controlled area, the vehicle will be inspected (vehicle contamination control will be carried out), and prior to leaving the repository site via the entry point within the administrative and service building, it will be formally recorded. In an event of contamination, a decontamination procedure will be carried out.

9.1.1.7 Placing of containers in the disposal silo

The containers will be placed in the silos from above using a portal crane with a capacity of 40 t. It will be possible to operate the crane from the control room in the technological facility or locally with the help of a local panel. A set of cameras will be installed on the lift, the silo and the facility structure to aid lift operations and, in particular, the positioning of containers in the disposal silo. Each silo will have capacity for 990 containers (99 containers in each of the ten disposal layers). The disposal containers will be arranged in the silo alongside and on top of each other. Here the assumption is that there will be a gap of 20 cm between the walls of the containers. After every second layer, the gaps between the containers will be filled in and a

levelling layer constructed. Transport operations in the hall will be carried out with implemented measures to prevent collisions between transport devices and vehicles or other accidents.

Waters that may penetrate through silo walls will be collected at the silo wall and diverted into the bottom section of the silo with a collection pool and pumping station. The bottom section of the silo will be accessible via an access shaft provided in the silo's secondary liner. Vertical communication in the shaft is provided by means of a personnel lift, stairway, ventilation duct, cable trays, piping for pumped water, and a vertical gap along the entire shaft for the purposes of transporting loads by means of a 1.5-t capacity winch on the portal crane. All the described systems are presented in more detail in Chapter 6 of this draft report.

9.1.1.8 Closing of the disposal silo and activities following cessation of operation – sealing

Having filled the silo with LILW containers, all the remaining gaps are filled with backfill grout and the disposal silo is covered with a concrete slab and a layer of low-permeability material, which is to reach almost to the landscaping layer at the surface (approx. 1 m below the final plateau level). Following the cessation of silo operation, all the installations and devices are removed from the access shaft and silo bottom section and all the gaps are filled with filler material.

9.1.1.9 Potential radiation sources other than radioactive waste necessary for safe operation of the LILW repository

No radiation sources of this kind are envisaged to be present at the repository. In the event of a need for calibration etc., such radiation sources will be provided by authorised organisations or sources normally used by the ARAO radiation protection service will be used for such purposes. In the event that the presence of such a source at the site of the repository becomes necessary for calibration purposes, the safety analysis report will be amended accordingly.

9.1.2 NON-COMPLIANCE MANAGEMENT AND CORRECTIVE MEASURES

Rectifying of non-compliances established by tests and verifications is verified by means of reviews of implementation and validation of specified corrective measures.

For those SSCs for which non-compliance has been established by tests and verifications, modification of design solution is implemented in accordance with the requirements in section 9.9.1.

9.2 ORGANISATIONAL STRUCTURE

This subsection describes the organisational structure of the LILW repository operator, lists the functions and responsibilities of different employees, and describes other topics such as qualifications of employees and safety at work.

9.2.1 GENERAL

According to plans, the repository is to conduct its activity as an independent organisational unit of ARAO [5] – LILW Repository Sector.

The repository operational organisational structure is presented in the organisational structure diagram (

Figure 9-1). All the repository services and organisational units are involved in the operation, and in this they act in collaboration with and assisted by the existing ARAO services and outside contractors as necessary.

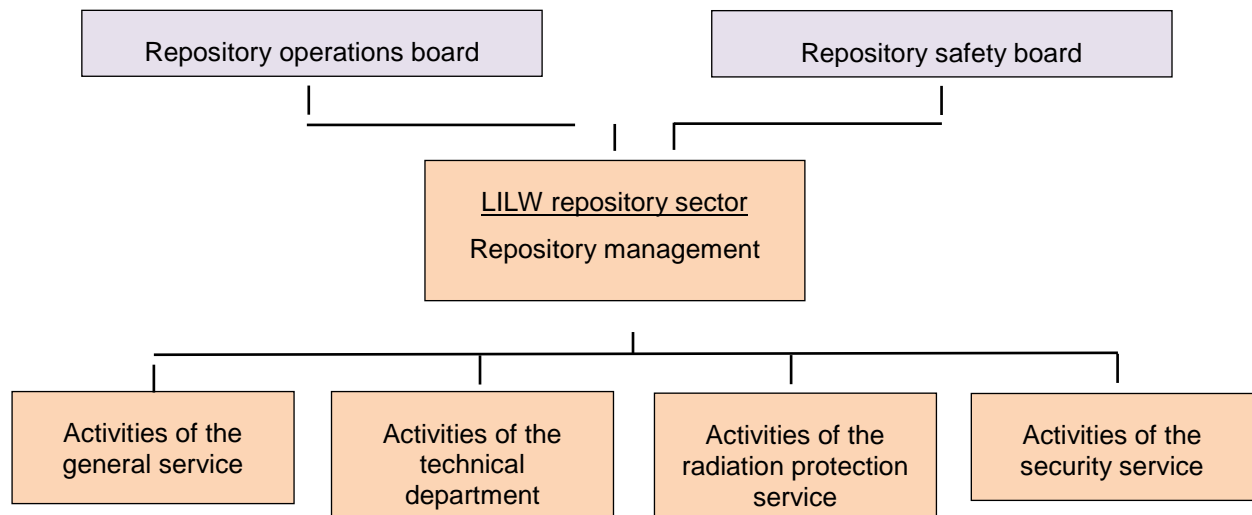


Figure 9-1: Organisation of repository operations

In particular the following existing ARAO services are involved both in the operations and in the monitoring of operations:

- Engineering department – envisaged (ARAO);
- QA/QC department (ARAO); and
- Radiation protection service (ARAO).

The radiation protection service reports directly to the ARAO director.

As the ARAO director’s advisory bodies, the following bodies are involved in the monitoring of operations:

- Repository operations board and
- Repository safety board.

The roles of ARAO sectors and services in the operations of the repository are laid down in the ARAO organisational regulations. The roles of organisational units in the implementation

of different groups of repository practices and of surveillance bodies are outlined below and will be regulated by special organisational regulations of the repository.

Table 9-1: Presentation of work posts and number of LILW repository employees; other tasks (e.g. general service tasks) will be carried out by existing services in ARAO

EMPLOYEES INVOLVED IN SAFETY-RELATED TASKS AT THE LILW REPOSITORY			
Head of the repository sector (repository management) 1 employee	Technology of waste conditioning and disposal (technical department) 1 employee	Repository equipment operator I (technical department) 1 employee	Repository equipment operator II (technical department) 1 employee
LOGISTICS, MAINTENANCE AND SECURITY			
Logistician (technical department) 1 employee	Maintenance technician (technical department) 1 employee	Head of security (security service) 1 employee	Security officer / receptionist (security service) 1 employee
EMPLOYEES IN THE RADIATION PROTECTION SERVICE ORGANISATIONAL UNIT (OU)			
Head of the radiation protection OU (RPS) 1 employee	Officer I in the radiation protection OU (RPS) 1 employee	Officer II in the radiation protection OU (RPS) 1 employee	

9.2.2 REPOSITORY MANAGEMENT

The repository is managed, on behalf of ARAO, by the head of the repository sector. The repository management consists of the head of the repository and the staff providing technical and administrative support to the management.

The repository manager’s responsibility is to maintain contacts with the ARAO director, to whom he/she reports, and to implement ARAO policy and directives. The repository manager also provides bases for the cooperation with the repository operations board and the repository safety board.

9.2.3 ACTIVITIES OF THE GENERAL SERVICE

Personnel, legal and general matters related to the repository operation will, to the highest practicable extent, be dealt with by the existing ARAO services. The existing service will also provide IT support at the repository site. To accommodate the requirements of specific tasks of general service associated with the repository operation, the existing ARAO general service will be expanded accordingly.

9.2.4 ACTIVITIES OF THE TECHNICAL DEPARTMENT

The repository technical department carries out technological and logistical activities associated with the disposal of LILW or any other radioactive waste-management practices at the repository.

9.2.5 ACTIVITIES OF THE RADIATION PROTECTION SERVICE

The responsibility for implementing radiation protection measures lies with the radiation protection OU. The OU at ARAO carries out entrance control of LILW shipments at arrival, provides for protection of personnel from radiation and carries out radiological measurements for the purposes of repository operation.

9.2.6 ACTIVITIES OF THE SECURITY SERVICE

The security service carries out security tasks in accordance with the nuclear facility security and private security requirements.

Access levels are approved by the repository manager.

Persons participating in the repository trial operation have passed security screening, this pursuant to Article 120 of the ZVIJSV [6].

9.2.7 REPOSITORY OPERATIONS BOARD

The repository operations board is an advisory body to the ARAO director. It is chaired by the repository manager.

The repository operations board tables its views on safety, technical, economic and other issues in relation to the repository operation phase, standby phase and closing phase.

The structure, organisational scheme and mode of operation of the board are regulated by a special organisational procedure.

9.2.8 REPOSITORY SAFETY BOARD

The repository safety board is an advisory body to the ARAO director.

The repository safety board tables its views on key safety issues in relation to the repository operation phase, standby phase and closing phase.¹

The structure, organisational scheme and mode of operation of the board are regulated by a special organisational procedure.

9.2.9 OCCUPATIONAL HEALTH AND SAFETY

Occupational health and safety (OSH) activities are organised, provided and implemented by the OSH commissioner at ARAO.

Personal protective equipment for the work in the radiologically controlled area are provided by the ARAO OU responsible for OSH, in agreement with the radiation protection service.

The OSH activities in the course of implementing modifications or other interventions that do not fall within the scope of operations are also carried out by the OSH coordinator appointed by ARAO pursuant to the Decree on the implementation of safety and health requirements at temporary and mobile construction sites [7].

9.2.10 PROVISION OF FIRST AID, FIRE PROTECTION AND EVACUATION

First aid, fire protection and evacuation activities are provided with resources within the ARAO organisational structure. These activities include:

- Provision of first aid kits.

¹ The basis for setting up the repository safety board is provided in JV5 Rules Article 52. (The investor or facility operator shall ensure that decisions relevant for radiation or nuclear safety are preceded by appropriate consultation so that all relevant safety aspects are considered. Safety issues shall be reviewed by a suitably qualified experts not directly involved in the preparation or adoption of the decisions.)

- Training of a group of employees to provide first aid.
- Inspection of fire alarm devices and fire extinguishers.
- Provision of markings, lighting and equipment for the purposes of evacuation.

Every person employed regularly, temporarily or occasionally at the repository must be trained in protection against fire. Training must take into account any new or changed fire hazards and the specific features of the work post and knowledge must be periodically refreshed [8].

9.2.11 CONSIDERATION OF HUMAN FACTORS

In planning operations, ARAO considers factors that have impacts on working environment, task discharging efficiency and job satisfaction, in particular:

- Suitability and sufficiency of human and other resources;
- Suitable working hours, including breaks for meal;
- Suitability of working environment and means of work; and
- Sufficiency and transparency of communications.

9.3 ADMINISTRATIVE PROCEDURES

All activities relevant for the safe management and operation of the repository will be carried out in accordance with written procedures. Procedures are described in more detail in the document "Formati in seznamih postopkov" [10]. They will be developed in the future LILW repository design, construction and operation phases.

The system of written procedures will also incorporate documents arising from general requirements concerning repository operation (e.g. rules of procedure in accordance with ISO 9001 and 14001 and associated documents, declaration of safety, complete with risk assessment, fire safety rules, evacuation plan, radioactive waste management programme, etc.).

Individual procedures may appear in several lists of different procedure types. Types of procedures and individual procedures will be defined in more detail in the management system, which is described in Chapter 3 of this draft safety analysis report and will be elaborated in the future project phases.

In the scope of setting up the management system and defining procedures, a safety culture will be implemented as is the norm in nuclear facilities.

Below follows a list of administrative and operational procedures (general documents mentioned in the preceding paragraph are not included). The list of procedures also includes documents that, in terms of their content, are programme documents, as well as those procedures constituting important operating instructions.

9.3.1 GENERAL ADMINISTRATIVE PROCEDURES

The repository operation will observe all the ARAO general procedures. Alongside general procedures, additional general procedures specific to repository requirements will also be observed. Procedures will be defined in their final form prior to the commencement of trial operation, which will also optimise the application of procedures. The baseline list comprises the following individual general procedures:

- Organisational rules for the repository and its organisational units and the rules of procedure for cooperation with administrative authorities and other stakeholders.
- Organisation and proceedings of the repository operations board.
- Organisation and proceedings of the repository safety board.
- Method of development, implementation and control of procedures.

9.3.2 ADMINISTRATIVE PROCEDURES OF THE REPOSITORY MANAGEMENT

- Programme of training and introduction into job tasks, and associated implementation procedures
- Programme of maintenance, inspections, surveillance and testing, and associated implementation procedures
- Programme of monitoring of ageing processes, and associated implementation procedures
- Programme of repository modification management, and associated implementation procedures
- Operating experience feedback programme, and associated implementation procedures
- Physical security plan, and associated implementation procedures

- Operational limits and conditions, complete with acceptance criteria for disposal, and associated implementation procedures
- Programme of radioactivity monitoring, and associated implementation procedures
- Environmental monitoring
- LILW acceptance programme
- SSC management records
- Document designation
- SSC labelling
- Entry of persons and vehicles into the controlled area and access levels
- Standby phase
- Measuring equipment management
- Release management
- Implementation of repository informational visitor tours
- Periodic safety review
- Reporting

9.3.3 ADMINISTRATIVE PROCEDURES OF THE REPOSITORY TECHNICAL DEPARTMENT

- Drawing up instructions for the use and operation of components
- Organisation, method of and scope of work in the control room
- LILW data capture and storage

9.3.4 ADMINISTRATIVE PROCEDURES OF THE RADIATION PROTECTION SERVICE

- Definition of the radiologically controlled area
- Requirements and conditions governing works within the radiation area
- ALARA rules of procedure
- Radiation protection programme, and associated implementation procedures

9.3.5 ADMINISTRATIVE PROCEDURES OF THE GENERAL SERVICE

- Organisation of involvement of external contractors
- Maintenance works on non-safety-related SSC
- Keeping bore cores

9.4 OPERATING PROCEDURES

Below follows a summary (indicative) list of all procedures and instructions covering the repository operation period. It summarises the applicable section of the reference document "Formati in seznamih postopkov" [10]. It also lists programmes with associated implementation procedures. Responsibilities for the procedure documents and instructions rest with the services/custodians within organisational units.

Underlining indicates those programmes that, in the document system, reside at a higher level than procedures and instructions.

The list of written procedures will be a constituent part of the operating licence application.

The measures relate to:

- use of the facility, and are laid down in JV9 [11] and JV5, Article 26 [12],
- organisational procedure of modification management, in accordance with JV9 [11].

The operator's written procedures will constitute a part of the scope and contents of periodic safety review, JV9, Annex 9 [11].

General procedures

1. Programme of training and introduction into job tasks, and implementation procedures
2. Operating experience feedback programme
3. Programme of acceptance and disposal of LILW, and implementation procedures
4. Organisation of the repository
5. Access, movement of persons and vehicles at the repository
6. Requirements and conditions governing works
7. LILW data capture and storage
8. Periodic safety review
9. Administrative and service activities
10. SSC labelling and operation
11. Document designation and keeping
12. Repository informational visitor tours
13. Outside contractors
14. Operational monitoring
15. Programme of monitoring of ageing processes
16. Programme of repository modification management
17. Reporting
18. Conducting calculations and analyses
19. Keeping cores

Operation

20. Operation, operational limits and conditions for trial operation, operational records
21. Acceptance of components into trial operation
22. Instructions for the use and operation of components
23. Establishing compliance with acceptance criteria
24. Keeping records of containers
25. LILW transport at the repository
26. Placing of containers in the disposal silo
27. Controlled drainage of water, monitoring, measurement and drainage of water (floor drain sump, control pool, etc.)
28. Capture, measurement and pumping out of water from the silo
29. Handling and storage of SSCs and equipment in cases of damages sustained in operation
30. Actions in emergencies (equipment failures etc.)
31. Actions in emergencies and accidents (dropping of a container etc.)

32. Filling of gaps in the silo
33. Closing of the silo
34. Programme of maintenance, inspections, surveillance and testing (SSC) and implementation procedures

Protection

35. Physical security

Radiation protection

36. Radiation protection programme and implementation procedures
37. Programme of radioactivity monitoring and implementation procedures, Programme of extraordinary radioactivity monitoring
38. Entrance control of LILW (shipments)
39. Surveillance measurements of the working environment
40. Measuring equipment management
41. Instructions for safe work in the radiologically controlled area
42. Measures of containment in cases of contamination
43. Decontamination procedures
44. Storage of radioactive waste generated in the process of disposal and implementation of termination of surveillance

9.5 EMERGENCY AND ACCIDENT ACTION PROCEDURES

Actions to be taken in LILW repository emergencies are described in the reference document "Ukrepanje v primeru izrednega dogodka" [13] and summarised in Chapter 14 of this document.

9.5.1 REPOSITORY STATES

Facility states are defined in the document "Projektne osnove za odlagališče NSRAO Vrbinja, Krško" [14] in its section 8.3.

Repository operational states:

1. normal operational state (described in section 5.2 of this document);
2. abnormal operational states (anticipated operational occurrences);
 - authorised dose limit exceeded;
 - loss of off-site power supply;
 - failure of a LILW transport vehicle at the repository site;
 - failure of the crane above the silo;
 - failure of the pump station in the silo and by the control pool;
 - failure of the fire alarm system;
 - failure of the fire protection system;
 - failure of the LILW data recording system;
 - failure of devices for measuring releases and radiological monitoring devices;
 - and
 - rejection of an LILW shipment.

Anticipated operational occurrences further include anomalies in filling gaps in the silo, minor collisions of transport devices, failures of auxiliary systems (e.g. heating), etc.

3. design emergencies and accidents (described in section 5.2 of this document):
 - fire;
 - container drop;
 - airplane crash (including explosion and fire);
 - terrorist attack;
 - earthquake (followed by operational shutdown and the checking of SSCs).

9.5.2 PROCEDURES TO BE TAKEN IN ABNORMAL OPERATIONAL STATES

Abnormal operational states (an abnormal operational state is an emergency state – equipment failure and other emergency events with a probability of occurrence of less than once a year and more than once within the facility operation period), which is not a design basis event or accident and which, due to relevant design solutions, does not lead to design basis events or major nuclear safety-related SSC damages) will be described in procedures regulating the repository operation. Furthermore, these procedures will lay out measures to prevent emergencies and their remedying (defence in depth).

9.5.3 PROCEDURES TO BE TAKEN IN EMERGENCY DESIGN BASIS EVENTS AND ACCIDENTS

Actions to be taken in emergency design basis events and accidents, listed in section 9.5.1 of the draft safety analysis report, are regulated by special procedures. Procedures in addition to general provisions:

1. the powers and responsibilities required to perform certain activity;

2. work method;
3. the appropriate methods and standards for the performance of work;
4. use of resources;
5. criteria for the successful implementation of an activity;
6. the measures to be implemented in response to deviations from the criteria referred to in the previous indent; and
7. other work-related details for the activity.

include:

- method of recognition of an emergency condition;
- organisation of work and roles of key persons in managing an emergency condition;
- resources to manage an emergency condition;
- training to manage an emergency condition;
- measures to mitigate and eliminate consequences and other measures in the scope of defence in depth;
- provision of safety functions and establishing of operational state;
- cooperation with external organisations in preventing harmful effects on personnel and the general public; and
- analysis and assessment of the consequences.

Procedures concerning the repository are provided by the repository manager.

9.6 MAINTENANCE, SURVEILLANCE, INSPECTIONS, TESTING

Throughout the entire operating life of the repository, during its decommissioning and during its long-term post-closure controls, ARAO shall ensure, by means of SSC maintenance, testing and inspection, that SSCs are available, reliable and operable. Operability means a state of SSCs in which the capacity to operate or perform their functions in accordance with the operating conditions and restrictions and with design bases is ensured.

Maintenance, inspection, surveillance and testing activities are organised by the LILW repository sector, which also attends to their implementation. These activities are implemented by ARAO either on its own or in collaboration with qualified subcontractors. Involvement of subcontractors in the maintenance, inspection, surveillance and testing activities is subject to approval by the repository manager.

Maintenance, inspection, surveillance and testing activities are implemented under supervision by the head of the maintenance, inspection, surveillance and testing task team. The head of the maintenance, inspection, surveillance and testing task team is appointed by the repository manager.

The purpose of implementing the programme of SSC maintenance, inspection, surveillance and testing is to obtain appraisal as to whether the repository's safe operational state is ensured or whether there is a need for corrective measures. The programme ensures maintenance of organisational solutions for safe operation as developed in the design and validated during construction and trial operation, throughout the repository operational life, and beyond its closure.

The programme ensures incorporation of all the relevant requirements laid down in operational limits and conditions. The frequency of activities is based on the reliability analysis and on the results of activities already completed. SSC maintenance activities are not undertaken during repository active operating phases (i.e. during placing of containers in the disposal silo).

Below follows a summary of key elements of SSC maintenance, inspection, surveillance and testing applicable to the LILW repository. These elements are presented in more detail in the reference document "Vzdrževanje, pregledi, nadzor in preskušanje" [15].

9.6.1 CONTROL, TESTING AND OPERATIONAL STATUS

An SSC or its accompanying documents must be fitted with a marking related to the control or testing procedure status (status indicator) which indicates that the procedure has been carried out and ensures that any product not having passed the control or testing procedure will not be applied or installed, i.e. not involved in operation.

9.6.2 SSC LABELLING

In the course of trial operation, labels assigned in the design and construction phases will be applied for SSCs. Labels for any temporary equipment will ensure differentiation from labels of permanent equipment.

9.6.3 SSC MAINTENANCE

The programmes of SSC maintenance, testing and inspection which have been set up, verified and applied in the phase of trial operation shall be amended and applied in the phase of operation.

SSC maintenance is regulated in the reference document "Vzdrževanje, pregledi, nadzor in preskušanje" [15].

9.6.4 HANDLING AND STORAGE

Handling and storage of all SSCs and other vital equipment that might, in the course of trial operation, get damaged if handled or stored in an improper way will be prescribed.

9.6.5 MANAGEMENT OF MEASURING AND TESTING EQUIPMENT

Measuring and testing tools and devices that may affect quality shall be managed, periodically calibrated and maintained within their intended accuracy ranges [16], [17].

In selecting measurement and testing equipment, requirements defined for the planned measurements are considered. The requirements concern, in particular, data on type, accuracy, allowable errors and measurement range.

9.6.6 OPERATIONAL MONITORING

The programme of operational monitoring which has been set up, verified and applied in the phase of trial operation shall be amended and applied in the phase of operation.

Operational radioactivity monitoring is elaborated in the reference document "Obratovalni monitoring" [18].

9.7 AGEING MANAGEMENT PROGRAMME

Ageing management is elaborated in the reference document “Nadzor procesov staranja” [19]. This document lays down the powers and responsibilities of various key entities and activities to define the programme and to implement it and regulatory bases for and the provision of conditions to maintain and manage the facility in the appropriate configuration.

9.7.1 AGEING MANAGEMENT BASES

Possible ageing mechanisms and their effects, including wear and potential degradation, are systematically identified in safety-related SSCs and the condition of SSCs continuously monitored and assessed (through SSC maintenance, testing and inspection).

In addition, measures are implemented to mitigate or avoid the effects of ageing, and it is ensured that the requirements for the provision of SSC safety functions, as stated in the design bases, are met throughout all the repository phases.

Identification of ageing mechanisms and implementation of measures to mitigate or eliminate effects of ageing are laid out in the ageing management programme. The ageing management programme consists of the framework ageing management programme (the Programme) and ageing management implementation programmes (AMPs) according to which ageing management is implemented by different SSC characteristics.

9.7.2 SSC AGEING CONTROL

The Programme covers all the safety-related SSCs. The list of safety-related SSCs is presented in Chapter 5 and described in Chapter 6 of this document.

The decision on application of particular ageing management implementation programmes (AMPs) to monitor ageing of a SSC or a SSC element is based on an assessment, this considering possible ageing effects and mechanisms and impacts from the environment. Assessments for a particular SSC or a group of SSCs will be produced in tabular form in the phase of Programme amendment in the scope of application for trial operation (pursuant to JV5 Rules, Article 26).

For each SSC element, the table will provide data (NUREG-1801 terms are given in parentheses) in the following sections:

- SSC or SSC element designation (Item);
- SSC or SSC element definition (Structure and/or Component);
- Material (Material);
- Environment (Environment);
- Ageing effects and mechanisms (Aging Effects/Mechanism);
- Ageing management implementation programme (Ageing Management Programme – AMP);
- Further evaluation (Further Evaluation).

The ageing management implementation programmes will be developed based on the framework Programme.

The baseline ageing management programmes applied as the basis in the phase of the programme amendment in the scope of application for trial operation are presented in the following table:

Table 9-2: Baseline ageing management programmes for nuclear and radiation safety related SSCs

SSC designation	Description of nuclear safety related SSCs	Baseline ageing management implementation programme (AMPs, NUREG-1801)
O1	Final package (disposal container)	<ul style="list-style-type: none"> • XI.S6 Structures Monitoring
O3	Silo	<ul style="list-style-type: none"> • XI.S6 Structures Monitoring
O4	Drainage system	<ul style="list-style-type: none"> • XI.M36 External Surface monitoring of Mechanical Components • XI.M38 Inspection of Internal Surfaces in miscellaneous Piping and Ducting Components • XI.M41 Buried and underground Piping and Tanks • XI.S6 Structures Monitoring • XI.S7 RG 1.127 Inspection of water-Control Structures Associated with Nuclear Power Plants • XI.S8 Protective Coating Monitoring and Maintenance Programme
O5	Barrier between silo and aquifer	<ul style="list-style-type: none"> • XI.S7 RG 1.127 Inspection of water-Control Structures Associated with Nuclear Power Plants
O8	Flood protection – embankment	<ul style="list-style-type: none"> • XI.S7 RG 1.127 Inspection of water-Control Structures Associated with Nuclear Power Plants
O9	Hall above the silo	NA – NSR (NSR)
O10	Disposal/transport equipment	<ul style="list-style-type: none"> • XI.M23 Inspection of Overhead Heavy Load and Light Load (related to Refuelling) handling System • XI.M36 External Surface monitoring of Mechanical Components
O12	Fire safety	<ul style="list-style-type: none"> • XI.M26 Fire protection • XI.M27 Fire Water System
O13	Physical security systems	<ul style="list-style-type: none"> • XI.E2 Insulation Material for Electrical Cables and Connection Not Subject to 10CFR50.49 Environmental Qualification Requirements Used in Instrumentation Circuits • XI.E3 Inaccessible Power Cables Not Subject to 10CFR50.49 Environmental Qualification Requirements • XI.E6 Electrical Cable Connections Not Subject to 10CFR50.49 Environmental Qualification Requirements
O16	Radiation protection system	See O14.
T1	Building / building structure	<ul style="list-style-type: none"> • XI.S6 Structures Monitoring
T2	Flood protection	See O9
T5	Sewerage systems	<ul style="list-style-type: none"> • XI.S6 Structures Monitoring
T6	Physical security systems	See O14.
T7	Radiation protection system	See O14.
T9	Fire protection system	<ul style="list-style-type: none"> • XI.M26 Fire protection • XI.M27 Fire Water System
F1	Outer perimeter fence	<ul style="list-style-type: none"> • XI.S6 Structures Monitoring

9.8 MONITORING OF CHANGES IN THE REPOSITORY

Monitoring of changes is described in the reference document “Nadzor sprememb na odlagališču” [20], from which, the following findings are summarised. In the current phase, the purpose of the document “Nadzor sprememb na odlagališču” is in particular to define the programme contents and basic components and to produce a draft programme of managing changes in the repository.

9.8.1 MODIFICATION MANAGEMENT PROGRAMME

9.8.1.1 *General*

ARAO addresses improvements promptly, i.e. as soon as it finds that the safety of the facility can be improved by means of modifications to the project, the methods of operation, maintenance, testing, training or procedures, notwithstanding the fact that the facility meets all the regulatory safety requirements.

A modification is considered reasonable if the costs of its implementation can be justified by its contribution to the safety of the facility.

The modification management programme is implemented in steps, as described in sections 9.8.1.2 to 9.8.1.12.

The management of modification procedures falls within the responsibility of a responsible person appointed by the director; this person:

- manages the engineering aspects in the field of modifications;
- defines the resources needed to implement modifications and proposes the provision of necessary resources to the ARAO director;
- undertakes the financial planning of modifications;
- approves documentation relating to the modifications;
- determines and coordinates powers and responsibilities of involved entities;
- defines the needs to engage external contractors;
- in collaboration with the repository manager, draws up the modification implementation plans;
- appoints the change manager, who is the custodian of modification implementation; and
- represents ARAO in administrative proceedings relating to the modifications.

Implementation of modifications in accordance with the programme and associated implementation procedures and other documents is validated by the ARAO QA/QC department.

9.8.1.2 *Proposed modifications*

Proposals for modifications stem in particular from:

- findings under the implementation of the operating experience feedback programme (local and foreign) and operational indicators;
- repository manager and repository technical department initiatives;
- findings of the quality management system assessments;
- findings under the implementation of the ageing management programme; and
- findings under the administrative body surveillance.

An initiative for a modification may also be tabled by any ARAO employee or qualified subcontractor. Modifications may be temporary or permanent in nature.

Proposals and initiatives for modifications are gathered, assessed and recorded by the engineering sector. The engineering sector also:

- implements the engineering activities in the field of modifications;
- provides design and implementation documents for the purposes of change implementation, directs implementation of changes and post-change testing, and ensures compliance with documentation changes in implementing and completing changes and compliance of the implementation of modifications with regulations and the safety analysis report;
- collaborates with subcontractors in the field of implementation of modifications;
- provides for the review and control of adequacy of relevant documents;
- presents the proposed solutions for modifications to the repository operations board; and
- provides for the drawing up of procurement specifications and bills of materials and works.

In addition to tabling initiatives for modifications, the repository manager's tasks include, in particular:

- collaboration (with the head of the engineering sector) in planning modifications;
- chairing the repository operations board; and
- approving implementation documents and implemented modifications.

9.8.1.3 Assessment of merits of proposed modifications

For any proposed modification, a preliminary assessment of technical feasibility, economical viability and implications on nuclear safety is produced. The evaluation is made by the engineering sector and the decision whether to proceed with the modification or reject it, together with the assessment of the necessary resources, is reported to the ARAO director.

The ARAO director makes the decision whether to proceed with the implementation of the modification or to dismiss its further elaboration.

9.8.1.4 Design of solutions for the modifications

For a foreseen modification, the engineering sector produces:

- a conceptual design of the modification;
- an economic and financial assessment of the modification; and
- an evaluation and classification of the modification in terms of nuclear safety.

On behalf of the operations board, the ARAO director approves the conceptual design of the modification.

9.8.1.5 Assessment and classification of modifications

9.8.1.5.1 Classification of modifications

Each intended modification is classified into one of the following three categories, in line with the assessment of its impact on radiation or nuclear safety:

- modification of category 1 (minor modification, having no impact on radiation or nuclear safety);
- modification of category 2 (modification of little significance, having a minor impact on radiation or nuclear safety); or
- modification of category 3 (significant modification, having a substantial impact on radiation or nuclear safety).

Classification in categories is carried out in accordance with the requirements laid down in Rules JV 9 [11] and directives in guideline PS 1.02 [21].

9.8.1.5.2 Assessment of modifications

For category 2 and 3 modifications, safety assessment is made in accordance with the requirements laid down in Rules JV 9 [11] and directives in guideline PS 1.02 [21].

Safety assessments are not required for modifications found by the safety screening process to be necessary in order to remove a clear error (e.g. typographical errors in documents or the adjustment of equipment to parameters that are already covered in applicable and approved safety analyses). Such modifications are treated as category 1 changes.

Modifications of the operational limits and conditions are treated as category 3 modifications.

If circumstances arise during the operation of a repository that threaten its stable and safe operation, ARAO may implement an urgent temporary modification. Such a modification is treated as a category 1 modification even if the classification process results in its classification as a category 2 modification. ARAO shall notify SNSA of such a modification forthwith.

9.8.1.5.3 Persons conducting assessment and classification of modifications

The head of the RW disposal sector or another person authorised by the ARAO director appoints independent persons who are not immediately involved in the processes of the planning, design or implementation of the modifications to assess and classify the modifications into categories.

Appropriate personnel are drawn in particular from the planning and development sector. The planning and development sector also provides support in planning modifications, in particular in the fields of:

- planning and design;
- safety and other analyses; and
- repository document management.

Safety assessment conformance with safety analyses and other documents relating to nuclear safety is assessed by the safety board.

9.8.1.6 *Safety analyses*

In assessing modifications, safety analyses are applied for those assessed elements for which safety analyses were applied for the purposes of a safety analysis report. Safety analyses serve for continuous monitoring of overall facility risks due to all the implemented modifications and for identifying impacts of a modification on operation, personnel workloads and general assurance of safety.

An increase in risk as a result of modifications may only be permitted in cases where the benefits significantly outweigh the consequences of the increase in risk. Every modification that increases risk is treated as a category 3 modification.

9.8.1.7 *Temporary modifications*

9.8.1.7.1 Restrictions applying to temporary modifications

The number of temporary modifications must be kept to a minimum and their duration determined and documented.

Once a year, ARAO reviews all the temporary modifications in terms of the compliance of the written procedures, the instructions to personnel and other documentation with the approved temporary modification. The review also includes an assessment of further need for temporary

modification, the removal of a temporary modification or requalification as a permanent modification.

9.8.1.7.2 Emergency temporary breach of the operational limits and conditions

In the event of a threat to the health or safety of the general public or the personnel at an installation, ARAO may submit an application for a temporary breach of the operational limits and conditions to SNSA.

9.8.1.8 Preparation of documentation

In cases of modifications involving new construction or reconstruction according to the Construction Act (ZGO-1), documents are prepared in accordance with said Act.

9.8.1.9 Review, verification and approval of a modification

9.8.1.9.1 Review

Documents to support planning and implementation of modifications are reviewed by:

- the modification manager;
- the engineering sector;
- the repository technical department;
- the radiation protection service; and
- the occupational health and safety commissioner.

9.8.1.9.2 Verification

Verification involves checking of calculations, design solutions, analyses and other contents of the modification that are important for nuclear safety.

Verification is carried out by competent staff of the departments listed in the preceding section.

9.8.1.9.3 Confirmation and approval

On behalf of the operations board, the repository manager confirms the implementation documents for the modification. The documents are also confirmed by the head of the engineering sector.

Documentation is deemed approved once approved by the ARAO director.

9.8.1.10 Notification and reporting modifications

ARAO notifies and informs SNSA of all the intended modifications in accordance with the requirements laid down in Rules JV 9 [11] and directives in guideline PS 1.02 [21].

ARAO also notifies SNSA of any emergency temporary breaches of operational limits and conditions mentioned in section 9.8.1.7.2.

9.8.1.11 Implementation of modifications

Only approved modifications (cf. section 9.8.1.9) may be implemented.

Modifications are implemented in accordance with the requirements laid down in Rules JV 9 and directives in guideline PS 1.02 [21].

Implementation of modifications (installations, construction) is supported by the repository technical department.

9.8.1.12 Completion of modifications

The modification is completed:

- upon completion of the activities being the contents of the modification;
- upon completion of the inventory of the implemented new situation or the project of executed works;
- upon completion of revisions of documents relating to nuclear safety, radiation protection and environment protection;
- upon completion of identification of the changes to the repository operation documents;
- upon obtaining the permit to operate or use the object being the contents of the modification; and
- once the business matters relating to the implementation of the modification are settled.

The modification completion details are compiled by the modification manager. He/she reports the findings to the head of the engineering sector and to the repository manager.

9.8.2 BRINGING A MODIFICATION INTO EFFECT

On behalf of the operations board, the repository manager confirms the adequacy of the implemented modification.

Informing of the staff on implemented modifications is a constituent part of regular staff training.

9.8.3 MANAGEMENT OF DESIGN

Any modifications of design solutions being a consequence of findings in the scope of operation are managed and implemented in accordance with the modification management programme.

9.8.4 TEMPORARY MODIFICATIONS

Temporary modifications are managed in accordance with the document "Nadzor sprememb na odlagališču" [20] and described in section 9.8.1.7 of this document.

9.9 QUALIFICATIONS AND COMPETENCIES OF THE REPOSITORY STAFF

All persons actively participating in the operational activities at the repository site must have completed appropriate training arranged by ARAO. The training also covers topics in the fields of radiation protection, occupational health and safety, fire protection, emergency actions, and physical safety [22] (paragraph 6.51).

Persons of key significance for repository operations are qualified and trained in compliance with the general provisions and provisions laid down in section IV.3 of Rules JV 4 [23].

Training is governed by the document "Uposabljanje" [24], which is summarised here below.

The document "Uposabljanje" 24 includes:

- basic education and required qualifications for the workers involved in works important for the LILW repository safety (requirement of the Ionising Radiation Protection and Nuclear Safety Act, [6]Article 62);
- strategy of training the workers involved in works important for the LILW repository safety (requirement of Rules JV4, [23]Article 5);
- a ten-year plan of staff recruitment in the areas important for radiation and nuclear safety (requirement of the Rules JV5, [12]Article 64);
- a programme of professional training the workers involved in works important for the LILW repository safety (requirement of Rules JV4, [23] Article 5, and Rules SV8, [25]Article 30).

In view of graded approach, all the above-listed contents are consolidated in a single document. If in the future a need arises for separate elaboration of the contents, they will be developed in a separated manner.

9.9.1 STRATEGY OF TRAINING OF THE LILW REPOSITORY STAFF

Pursuant to legislation, the operator must ensure, throughout the repository operating lifetime, an adequate number of qualified workers with appropriate basic education and training and provide for their regular updating training, qualification and drilling in all the activities relating to radiation and nuclear safety. The operator must keep a sufficient staff of suitably trained personnel who are familiar with the repository design bases and the design and operation of the repository in all its states, including emergencies, prepare project briefs and acceptance criteria for outsourcing of radiation and nuclear safety-related works to subcontractors, supervise execution of such works, and assess them after acceptance. The requirements for an adequate number of qualified personnel derive from legislation, in particular from the Ionising Radiation Protection and Nuclear Safety Act [6].

For the purposes of repository operation, ARAO will have to recruit additional workforce. At the latest by the commencement of repository construction, at least four persons will have to be recruited, these with a natural sciences or engineering background. Prior to this, ARAO will implement a new job classification and reorganisation. For the purposes of drawing up reference and other documents, in this phase of the project, the repository is assumed to be an autonomous sector and expert tasks necessary for the purposes of repository and central storage to be carried out in a special sector in ARAO (technical-engineering sector).

Employees in the positions of repository manager, head of waste conditioning, and disposal and equipment operator will receive practical training in facilities already operated by ARAO and comparable facilities abroad and will be closely involved in the operations of the public service of radioactive waste management, in particular in the tasks relating to the establishment of the disposal service.

Repository employees will, in particular, be involved in the management and execution of technological procedures and will have to meet the requirements of the rules on conditions to be met by workers involved in safety-related works in nuclear and radiation facilities (Rules

JV4) [23]. A minimum of four such workers are necessary at the repository: one repository manager, one RW conditioning and disposal technologist, and two equipment operators. In addition to the above job positions, a logistician and maintenance technicians will be needed.

In the field of operating repositories, the JV4 rules recognises the above job positions as important for nuclear and radiation safety and provides for the option that, depending on the repository complexity and volume of works, such jobs and tasks are assigned to one or several persons meeting the conditions. Considering optimisation, i.e. plans to carry out all the radioactive waste (RW) treatment in the Krško nuclear power plant, the function of the repository RW treatment technologist will be slightly different. Thus the repository will need a RW conditioning and disposal technologist, while the function of the RW treatment technologist will be carried out by the Krško nuclear power plant technologist.

In addition to the above job positions, the Ionising Radiation Protection and Nuclear Safety Act [6], in Article 34, places an operator of radiation practice who operates a nuclear facility under obligation to set up, for the purposes of implementation and planning ionising radiation protection measures, a special radiation protection organisational unit, which is responsible for the implementation of radiation protection measures. For the staff of such organisational units, the professional qualifications are laid down in Rules SV8 [25], in its Chapters IV and V, as follows:

- head of the radiation protection organisational unit;
- workers in the radiation protection organisational unit.

ARAO has its own radiation protection organisational unit – radiation protection service (SVS), which is set up as a common service for several facilities operated by ARAO. SVS functions independently from other ARAO organisational unit and reports directly to the ARAO director. In its present structure, ARAO has one head of SVS and one worker in the organisational unit. For the purposes of repository, an additional worker is envisaged in the radiation protection organisational unit, while the head of the organisational unit will be shared by all the facilities operated by ARAO.

9.9.2 CONDITIONS FOR PROFESSIONAL QUALIFICATIONS FOR WORKERS AND CONTENTS OF THE PROGRAMMES

In this document, the conditions for professional qualifications for the workers and contents of the programmes are defined only for those workers involved in works and tasks important for repository safety and for the SVS workers.

For the existing job positions, conditions are defined in the ARAO job position classification and in the professional training programmes.

For new job positions, such as the maintenance technician or logistician, the requirements will be defined through the new job position classification. At that time, the programme of initial and continual professional training will be drawn up for these job positions as well. All the workers in job positions will have to be proficient in the areas of radiation protection, execution of internal procedures and work instructions, occupational health and safety, security, and rescue measures in emergencies. It will be possible to lay down the requirements regarding special knowledge and licences once the working means to be used by the workers are specified in more detail for the repository project.

Responsibility for adequate proficiency and professional training of workers of outside organisations or contractors rests with the employers of such workers. Prior to contracting any works to outside organisations, ARAO will check the qualifications and competencies of the organisation for the works to be contracted. ARAO will make safety instructions to be applied within the range of repository known to the outside contractor workers in advance. Each contractor will have to confirm, by signing, its professional qualifications for the works to be undertaken and its regular undergoing proficiency tests in the areas of occupational health and safety and fire protection, in line with the risk assessment carried out by its employee.

The security service workers will be trained in accordance with the Private Security Act [26], the Rules on safeguarding against fire [27] and the Rules on the physical protection of nuclear facilities, nuclear and radioactive materials, and the transport of nuclear materials [28]. Security services will be contracted to an outside provider, who will also assume responsibility for the training of its workers in accordance with the above regulations. The service provider will also provide for security screening of its workers in accordance with the Ionising Radiation Protection and Nuclear Safety Act [6].

A worker is deemed qualified for his/her job position provided that he/she fulfils the following conditions:

- GENERAL REQUIREMENTS;
- SPECIAL REQUIREMENTS;
- PRACTICAL TRAINING;

In more detail, these requirements are presented in the reference document "Usposabljanje" [24].

9.9.3 PROCEDURE OF PROFESSIONAL COMPETENCY VERIFICATION AND GRANTING OF LICENCES

Repository manager

For the repository manager, RW treatment/disposal technologist and repository equipment operator, the procedures of professional competency verification are laid down in Rules JV4 [23] in its Article 8.

Verification of professional competency of the repository manager is carried out by a commission appointed by SNSA, which also issues the licence.

Workers

Workers complete their training in the field of ionising radiation protection by taking a written examination compiled by the training provider.

Workers in organisational units for radiation protection complete their training in the field of ionising radiation protection by taking a professional examination comprising a written and/or oral part. The oral part of the examination is taken before an examination commission.

In-house training

For periodic in-house trainings, the training provider draws up protocols, which are filed by the ARAO human resource department. Shorter group or individual in-house trainings or trainings with other organisations are recorded by the individual in his/her training records, which is available at the ARAO document portal. Certificates issued by outside authorised organisations are recorded and filed by the human resource department in the employees' personal folders.

9.10 HUMAN FACTOR – CONSIDERATION OF HUMAN FACTORS

In the next phases, a programme of consideration of human factors will be developed as laid down by guidelines PS 1.03 [29] and a description produced of the organisational form to ensure efficient execution of tasks.

The topic of consideration of human factors is elaborated in the documentary part of the ARAO safety culture management system. General provisions of the ARAO management system also apply to the repository [9].

9.11 OPERATING EXPERIENCE FEEDBACK PROGRAMME

Operating experience feedback is described in the reference document “Spremljanje obratovalnih izkušenj” [30] and summarised in this chapter of the draft safety analysis report.

The document “Spremljanje obratovalnih izkušenj” [30] defines the contents and basic elements of the programme and the drawing up of the draft programme of operating experience and operating indicators feedback.

ARAO follows its own and international operating experience relating to LILW repository operation, new findings acquired from research and development, amendments to regulations and standards, and instructions from manufacturers and their associations and international organisations and systematically evaluates and applies them.

ARAO will implement the operating experience and operating indicators feedback process in accordance with its operating experience feedback programme.

9.11.1 ORGANISATION OF THE OPERATING EXPERIENCE AND OPERATING INDICATORS FEEDBACK

9.11.1.1 *Personnel involved in operating experience feedback*

The activities of operating experience and operating indicators feedback are managed and executed by the LILW repository sector. Further participants in this are the radiation protection service, the QA/QC service and other ARAO organisational units responsible for the execution of activities relating to operating indicators.

9.11.1.2 *Operating experience feedback infrastructure*

Infrastructure for the purposes of implementation of operating experience feedback activities is provided by the LILW repository sector. Infrastructure includes a workpost (premises) and means of work (office workpost, work desk, computer).

9.11.1.3 *Adopting of decisions and implementation of measures*

Based on operating experience and operating indicators feedback, ARAO adopts decisions regarding measures to upgrade safety or measures to prevent repetition of occurrences or deterioration of radiation or nuclear safety.

Proposal of measures is drawn up by the head of the LILW repository and approved by the ARAO director.

9.11.2 OPERATING EXPERIENCE AND OPERATING INDICATORS FEEDBACK PROGRAMME

9.11.2.1 *General*

The operating experience feedback programme ensures that occurrences at the repository are identified, recorded, reported to appropriate decision-making levels and examined within ARAO and that appropriate corrective measures are adopted to prevent repetition of similar occurrences. The programme further regulates the method of notifying the regulatory body. The programme is drawn up in compliance with the requirements of Rules JV9, [11] Article 7.

9.11.2.2 *Type, scope and criteria for data collection*

In the scope of the operating experience and operating indicators feedback programme, the following data are collected and analysed:

- data on in-house operating experiences;
- data on international operating experiences; and
- repository operating indicators.

9.11.2.3 Method of collecting and storing information on in-house and international operating experience

In-house operating experience

Data are collected for occurrences and states relating to nuclear safety-related SSCs. The list of safety-related SSCs is presented in the document "Projektne osnove" [14].

For a particular SSC, data include:

- description of an abnormal occurrence (operating anomaly), emergency or event that might have adverse impacts on safety;
- parameters addressed in operational limits and conditions; and
- SSC operating indicators.

International operating experience

Data on international operating experiences are collected for reference foreign LILW repositories. For reference foreign LILW repositories, data on at least the following are tracked:

- disposal containers or disposal packages;
- storage units and filling materials in storage units;
- monitoring of sinking water; and
- internal transport or relocations.

Individual SSC data include, in particular, description of an abnormal occurrence (operating anomaly), emergency or event that might have adverse impacts on safety.

Operating indicators are defined in the reference document [30].

9.11.2.4 Method of evaluating the information collected

On a periodic basis, the collected information is discussed and evaluated by the operating experience feedback working group.

Discussed data are classified as either repository nuclear safety-related data or non-repository nuclear safety-related data.

If data collected on a periodic basis are found to be nuclear safety-related and relating to an occurrence with significant adverse impacts on nuclear safety, this is forthwith reported to SNSA and, within 60 days of the receipt of data on occurrence, the data are analysed and a report on the occurrence is drawn up.

If data are found to be nuclear safety-related and relating to a state or occurrence with no significant adverse impacts on nuclear safety (an operating anomaly), such data are analysed within half a year of their receipt.

For data not related to nuclear safety, the analysis deadline is determined by the head of the LILW repository sector.

9.11.2.5 Methods used to analyse the information collected

Data analyses are performed in accordance with written procedures.

Analyses, including proposals for corrective and preventive measures and a protocol, are carried out by the operating experience feedback working group.

Analysis results also include proposals for corrective and preventive measures and deadlines for their implementation.

A note is drafted on the completed analysis and forms a constituent part of the occurrence record.

9.11.2.6 Method of implementation of preventive or corrective measures

Findings of analyses and proposed measures are reported to the persons responsible for the repository operation, maintenance, technical support, quality management, professional training and physical security.

The proposed measures relating to changes in the repository are addressed by the engineering sector, this in accordance with the provisions of the document "Nadzor sprememb na odlagališču" [20].

Other proposals are approved and implemented in accordance with the general provisions of the ARAO management system.

Informing all the repository employees of operating experience and operating indicators feedback information and of associated reports is a constituent part of the repository staff's basic training.

When requests for several corrective actions are made at the same time, priority is given in accordance with the safety significance of the affected SSC.

9.12 DOCUMENT AND RECORD CONTROL

All the documents and records relating to operation shall be controlled. Document and record control is elaborated in the reference document "Hranjenje dokumentov in zapisov" [31], which also lays out the requirements concerning procedures and instructions and their lists. According to the graded approach, procedures will be developed in the next phases of repository design and construction. Procedures envisaged for the repository operation phase are defined in section 9.4 of this document.

9.12.1 FORMATS OF WRITTEN PROCEDURES FOR RADIOACTIVE WASTE MANAGEMENT

Formats of written procedures for radioactive waste management are laid out in the following annexes to JV7 [32]:

- "Scope and contents of written procedures for radioactive waste management" (JV7, Annex 1) [32] and
- "Keeping of the central register (of radioactive waste)" (JV7, Annex 3) [32].

Documents drawn up in accordance with JV7 Annex 1 [32] must have a front page comprising the document title, the revision number, the title of the organisation having drawn up the document, and the names and surnames of persons involved in its drawing up, review and approval, their signatures and dates of signing. Each document page must be marked with a page number, the total number of pages, the document designation or title, and indication of any revision.

Procedure and instruction documents will be drawn up in accordance with the methods established at ARAO for drawing up documents and in accordance with the quality assurance programme as laid down in PSs.

9.12.2 KEEPING OF RECORDS AS A CONSTITUENT PART OF WRITTEN PROCEDURES

Implementation procedures for activities and works will also cover the keeping of the following records:

- records of disposed radioactive waste (the records of disposed radioactive waste are a constituent part of the application for repository closing);
- records of entry and movement within the repository (following the Ionising Radiation Protection and Nuclear Safety Act, Article 119.c) [6] (entries into the safety (controlled/protected) zone), list of employees within the safety zone);
- records of accesses to confidential information (reception and insight in the confidential document, register of employees having access to confidential information);
- records of personal doses (following the Ionising Radiation Protection and Nuclear Safety Act, Article 33) [6];
- records of clearance of radioactive substances (UV1, Article 7, point 4) [33].

The records include objective evidence of implemented activities.

Responsibilities for maintenance and administration of the records and the locations and times of storing them will be defined by procedures and documented in the records.

9.12.3 DOCUMENT CHANGES AND CONTROL

The documents relating to the LILW repository operation will be controlled (keeping them and use). Document changes will be reviewed, stored and approved in the same manner as the original documents. The primary document valid and controlled is the document in electronic form stored at the specified location, resp. the ARAO electronic portal.

9.13 OCCASIONAL SHUTDOWN OF OPERATION

The set of repository operating states includes the standby phase [12], i.e. a repository phase in which acceptance and disposal of LILW is suspended for a period of time and only activities necessary to ensure safety, security and monitoring are carried out in an optimised scope.

In accordance with the disposal dynamics described in section 9.1.1.1 of this document, a standby phase is planned for the repository between 2025 and 2050. The phase is defined in more detail in the reference document "Obdobje mirovanja" [34] and in the conceptual design [35] and is summarised below.

9.13.1 DESCRIPTION OF THE STANDBY PHASE (INTERRUPTION OF OPERATION)

9.13.1.1 Standby phase periods

Repository standby phase is the operational state of the repository in which the facility is brought to a state corresponding to a longer interruption of operation and during which no disposal or other major work is carried out at the repository.

The standby phase operational state comprises three periods:

1. preparation of the repository for the standby phase;
2. the repository standby phase period;
3. preparation of the repository for the resumption of acceptance of waste.

The activities under each of the periods are described below. All the activities will be carried out in accordance with written procedures.

Preparation of the repository for the standby phase

Preparation of the repository for the standby phase comprises the following activities:

1. bringing waste already disposed into a state that meets nuclear and radiation requirements and requirements for the long-term standby state. These activities are carried out in accordance with the directions laid out in safety analyses and include, in particular:
 - a. the placing of containers with low contact doses and low-activity LILW in the last (top) layer of containers;
 - b. the laying of temporary (i.e. for the duration of the standby phase) or permanent layers (e.g. concrete slabs) over the last layer of placed containers;
 - c. provision of passive and permanent drainage of water that might penetrate through the silo wall or might emerge for other reasons on the surface of waste already placed;
2. preparation of systems and devices for the standby phase – these activities include, in particular:
 - a. conservation of devices that will not be used in the course of the standby phase but are envisaged to be used upon the re-start of the repository and
 - b. permanent or temporary removal of devices and machines that will not be used in the course of the standby phase and will be reinstalled at the repository in the course of preparations for resuming acceptance of waste (e.g. forklift and measuring equipment);
3. bringing the overall repository into a state that will ensure safe and economical standby phase operation – these activities include, in particular:
 - a. decontamination of any potentially contaminated surfaces (to the maximum reasonable extent) and shielding of radiation sources to ensure the conditions

- to allow the area subject to radiation protection requirements to be as small as possible and defined;
- b. setting up temporary additional technical security measures to allow optimisation of the extent of physical security;
 - c. removal of all flammable and other hazardous substances or allowing the presence of such substance only in quantities necessary for standby phase operations; and
 - d. release or removal, from devices that will not be used in the course of the standby phase, of water or other media that might have adverse impacts on the condition of devices and facilities through freezing, corrosion or other unfavourable effects.

Preparation of the repository for the standby phase will take one year.

Repository standby phase period

Upon completion of the activities to prepare the repository for the standby phase, the repository will enter the standby phase.

In the standby phase period, and in the period of preparation for the standby phase and the period of preparation for re-start of operation, the following activities will be carried out at the repository:

1. monitoring of inflow, sampling and analysis, pumping out any water sinking into the silo;
2. radioactivity monitoring and other kinds of monitoring (e.g. of underground water, meteorological monitoring, etc.) in an (reduced) extent adequate for standby phase requirements;
3. radiation protection;
4. physical security;
5. maintenance, inspections and surveillance; and
6. administrative and servicing activities.

In addition to the above-listed activities, activities relating to ageing process management and operating experience feedback will also be carried out.

Organisational structure in the standby phase will be similar to the in the operating phase, but with a reduced number of staff. The organisational structure will be defined in more detail in the subsequent phases of the project.

Preparation of the repository for the re-acceptance of waste

Preparation of the repository for the re-acceptance of waste comprises the following activities:

1. bringing the silo into a state that allows for further disposal – these activities include, in particular:
 - a. removal of any temporary protective layer laid over the last level of placed containers and termination of other temporary measures;
 - b. verification of the condition of disposed containers, the silo wall, the equalisation layer and other elements of the disposal system and assessment of their fitness for further disposal; and
 - c. verification of the drainage system and bringing the drainage operation mode into that for the silo filling phase;

2. preparation of systems and devices for continued waste disposal – these activities include, in particular:
 - a. de-conservation, inspection and testing of devices that were not used in the course of the standby phase and
 - b. reinstallation of devices that were removed in the phase of preparation for the standby phase, including their inspection and testing;
3. bringing the facility into the state that allows further acceptance of waste – these activities include, in particular:
 - a. establishing appropriate zones in terms of radiation protection, including verification and installation of measuring devices, markings and access restrictions, removal of shields that were mounted for the purposes of the standby phase;
 - b. removal of temporary solutions relating to physical security, verification of devices and measures for the purposes of physical security in the phase of acceptance of waste;
 - c. provision of tools, personal protection equipment, equipment and materials for the purposes of sampling and other equipment, and materials for the purposes of repository operation; and
 - d. inspection, servicing and commissioning of all servicing and auxiliary devices that were not used in the course of standby phase.

Preparation of the repository for re-acceptance of LILW will take one year.

9.13.2 STATES OF THE REPOSITORY FACILITY IN THE STANDBY PHASE (POTENTIAL EMERGENCIES)

In general, the facility states are defined in its conceptual design, i.e. the document “Projektne osnove za odlagališče NSRAO Vrbina, Krško – faza PVO” [14].

In the standby phase, which is a specific operating state, foreseen (operating) activities at the repository, described in section 9.13.19.13.1, will be carried out in accordance with operational limits and conditions described in the reference document “Obratovalni pogoji in omejitve” [3] and in Chapter 11 of this draft safety analysis report and apply to the standby phase.

Possible operating occurrences in the standby operating phase include in particular:

- exceeded authorised dose limit due to liquid discharges;
- loss of off-site power supply;
- failure of the pump station in the silo and by the control pool;
- failure of the fire alarm system;
- failure of the fire protection system; and
- failure of devices for measuring releases and radiological monitoring.

Of the design basis events relevant from the point of view of operation, the only event considered in the standby phase is explosion.

9.13.3 ORGANISATIONAL STRUCTURE IN THE REPOSITORY STANDBY PHASE

Also in the standby phase, the organisational structure of repository operations follows the general directions for operation organisational structure – reference document “Obratovanje” [1].

In the repository standby phase, the roles of ARAO sectors and services and the roles of the repository organisational units are regulated by special organisational procedures.

9.13.4 IMPLEMENTATION OF THE STANDBY PHASE OPERATING STATE

9.13.4.1 general

Implementation of the standby phase operating state complies with operational limits and conditions [3].

Activities that have impacts on safety are carried out by authorised persons from the technical department in accordance with the authorisations granted by the repository manager.

9.13.4.2 Planning of standby phase operating state

The repository standby phase operating state is carried out in accordance with the periodic plan approved by the ARAO director.

9.13.4.3 Management of design

Any changes of design solutions being a consequence of findings in the scope of the standby phase are managed and implemented in accordance with the modification management programme.

9.13.4.4 Requirements for SSCs in the standby phase

Requirements for SSCs in the standby phase, covering in particular:

- SSC control, testing and operational status,
- temporary modifications,
- SSC maintenance,
- handling and storage, and
- management of measuring and testing equipment,

are implemented, in the standby phase, in the same manner as in other operating states – reference document “Obratovanje” [1].

9.13.4.5 SSC ageing management

For the purposes of the standby phase, the SSC ageing management programme, in particular the programme of geodetic and technical monitoring of civil engineering SSCs, will be adjusted to the requirements and circumstances of implementation of the standby phase activities and will be defined in written procedures.

9.13.4.6 Operational monitoring

For the purposes of the standby phase, the operational monitoring programme will be adjusted to the requirements and circumstances of implementation of the standby phase activities and will be defined in written procedures.

In the course of the standby phase, the operational monitoring of radioactivity will be carried out as an optimised form of operational monitoring in the periods of acceptance and disposal of LILW, as is specified in the document “Obratovalni monitoring radioaktivnosti” [18] and also summarised in Chapter 15 of this document.

9.13.5 PROCEDURES

9.13.5.1 General

All activities relevant for safe management and operation of the repository standby phase will be carried out in accordance with written procedures.

Written procedures for the standby phase are a constitutive part of the overall set of repository operational procedures, i.e. the activities are arranged in a unified written procedure for all operating states.

Below follows a list of administrative and implementing procedures that govern the standby phase. The entities issuing written procedures for the standby phase are the same, by areas, as in the case of other procedures.

9.13.5.2 Administrative procedures

- organisational rules for the repository and its organisational units in the repository operational state of standby phase;
- procedure of training for the standby phase;
- procedure of monitoring of ageing processes in the standby phase;
- procedure of operating experience feedback;
- procedure of physical security in the standby phase;
- procedure of radioactivity monitoring in the standby phase;
- procedure of radiation protection in the standby phase.

9.13.5.3 implementation procedures

- programme of preparation of the repository for the standby phase and implementing procedures;
- programme of the operation of the standby phase and implementing procedures;
- programme of preparation of the repository for the restarting of operation and implementing procedures.

9.13.5.4 Procedures to be taken in emergency operational states

Emergency operational states are described in the procedures regulating the repository standby phase. Furthermore, these procedures lay out measures to prevent emergencies and their remedying (defence in depth). Emergency operational state remedying and control measures affecting important parameters, capabilities and operation of key equipment are described in the operational limits and conditions [3] and in Chapter 11 of this document.

9.13.5.5 Procedures to be taken in emergency design basis events and accidents

Actions in the event of a plane crash (that also apply, in terms of content, in the event of a terrorist attack with explosives involved) are regulated in a uniform procedure applicable in all operational states.

REFERENCES

- [1] "Obratovanje", reference document for the draft safety analysis report, NSRAO2-POR-020-01, 02-08-001-003, NRVB 5X/M23. IBE d.d., 2016.
- [2] *Radiation Protection and Nuclear Safety Act (ZVISJV)*, (Official Gazette of the RS, Nos. 102/2004 – official consolidated version, 70/08 – ZVO-1B, 60/2011 and 74/2015)
- [3] "Obratovalni pogoji in omejitve", reference document for the draft safety analysis report, NSRAO2-POR-027-00 02-08-011-003. IBE, 2016.
- [4] "Merila sprejemljivosti RAO za odlagališče NSRAO", reference document for the draft safety analysis report, NSRAO2-POR-014-00 02-08-011-003. ARAO, 2016.
- [5] *Ordinance on amendment of the Ordinance on the transformation of the public enterprise Agency for Radwaste Management, Hajdrihova 2, Ljubljana, into a public service agency.* (Official Gazette of the RS, No. 113/09).
- [6] *Radiation Protection and Nuclear Safety Act (ZVISJV)*. (Official Gazette of the RS, Nos. 102/2004 – official consolidated version, 70/2008 – ZVO-1B, 60/2011 and 74/2015).
- [7] *Decree on safety and health protection at work at temporary and mobile construction sites.* (Official Gazette of the RS, No. 83/05), 2005.
- [8] *Fire Safety Act (ZVPoz)*. (Official Gazette of the RS, Nos. 3/07 – official consolidated version, 9/11 and 83/12).
- [9] *Spremljanje in nadzor varnostne kulture.* SP 07-01, ARAO.
- [10] ARAO, "Formati in sezname postopkov in navodil", reference document for the draft safety analysis report, NSRAO2-POR-010-00 02-08-011-003, rev. 1, 2016.
- [11] *Rules on the operational safety of radiation and nuclear facilities (JV9)*. (Official Gazette of the RS, No. 81/16).
- [12] *Rules on radiation and nuclear safety factors (JV5)*. (Official Gazette of the RS, No. 74/16).
- [13] "Ukrepanje v primeru izrednega dogodka na odlagališču NSRAO", reference document for the draft safety analysis report, NSRAO2-POR-007-00 02-08-011-003. ARAO, Simona Sučić, 2016.
- [14] *Projektne osnove za odlagališče NSRAO Vrblina, Krško – faza presoje vplivov na okolje, Revizija 2 02-08-011-002/NSRAO2-POR-013-01.* ARAO, 2018.
- [15] "VZDRŽEVANJE, PREGLEDI, NADZOR IN PRESKUŠANJE", reference document for the draft safety analysis report, NRVB---5X/26, NSRAO2-POR-023-00 02-08-011-003. IBE, 2016.
- [16] *Navodilo za umerjanje in preizkušanje delovanja merilne opreme ARAO za izvajanje meritev ionizirajočega sevanja.* ND-RZ-13, ARAO.
- [17] *Navodilo za izvajanje obdobjnih preizkusov delovanja in preizkusov delovanja merilne opreme ARAO.* ND-RZ-14, ARAO.
- [18] "Obratovalni monitoring", reference document for the draft safety analysis report, NSRAO2-POR-028-00 02-08-011-003. IBE d.d., 2016.
- [19] "Nadzor procesov staranja", reference document for the draft safety analysis report, NRVB---5X/29; NSRAO2-POR-026-00 02-08-011-003. IBE d.d., 2016.
- [20] "Nadzor sprememb na odlagališču", reference document for the draft safety analysis report, NRVB---5X/27; NSRAO2-POR-024-00 02-08-011-003. IBE, 2016.
- [21] *Praktične smernice – Obravnava sprememb v sevalnem ali jedrskem objektu.* PS 1.02,

version 1., SNSA, 2012.

- [22] *Near Surface Disposal Facilities for Radioactive Waste*, No. SSG-29. IAEA, 2014.
- [23] *Rules on the provision of training for workers at radiation and nuclear facilities (JV4)*. (Official Gazette of the RS, No. 32/11).
- [24] *"Usposabljanje", reference document for the draft safety analysis report, NSRAO2-POR-004-01, 02-08-011-003*. ARAO, 2016.
- [25] *Rules on the obligations applying to entities conducting radiation practices and holders of ionising radiation sources (SV8)*. (Official Gazette of the RS, Nos. 3/17 and 8/17).
- [26] *Private Security Act (ZZasV-1)*. (Official Gazette of the RS, No. 17/11).
- [27] *Rules on safeguarding against fire*. (Official Gazette of the RS, Nos. 107/07 and 92/10).
- [28] *Rules on the physical security of nuclear facilities, nuclear and radioactive materials, and the transport of nuclear materials*. (Official Gazette of the RS, Nos. 17/13 and 76/17 – ZVISJV-1).
- [29] *Praktične smernice PS 1.03- Vsebina varnostnega poročila za odlagališče nizko in srednje radioaktivnih odpadkov*. 2012.
- [30] IBE NRVB---5X1028, *"Spremljanje obratovalnih izkušenj"*, reference document for the draft safety analysis report, NSRAO2-POR-025-00 02-08-011-003, 2016.
- [31] *"Hranjenje dokumentov in zapisov"*, ARAO reference document, NSRAO2-POR-006-00 02-08-011-003. 2016.
- [32] *Rules on radioactive waste and spent fuel management (JV7)*. (Official Gazette of the RS, No. 49/06).
- [33] *Decree on activities involving radiation (UV1)*. (Official Gazette of the RS, No. 8/17).
- [34] *"Obdobje mirovanja"*, reference document for the draft safety analysis report, NSRAO2-POR-021-00 02-08-011-003. IBE d.d., 2016.
- [35] *Odlagališče NSRAO Vrbina, Krško, Idejna zasnova Rev.C*. 2016.