

Realization of the National Disposal Facility for Radioactive Waste in Bulgaria – 16611

Enrique Biurrún *, Ira Stefanova **, Emiliano Gonzalez Herranz ***

* Senior Advisor, DBE TECHNOLOGY GmbH

** SERAW

*** Westinghouse Electric Spain SAR

ABSTRACT

Radioactive waste is generated in the Republic of Bulgaria from the operation and decommissioning of the country's nuclear power plants and from other sources in research, medical applications, and the industry. The need for building a National Disposal Facility (NDF) is recognized by the Bulgarian government and described and justified in its Environment Impact Assessment Decision. The Bulgarian State Enterprise for Radioactive Waste Management (SERAW) is endeavoring to build a near-surface repository for short-lived low- and intermediate-level radioactive waste (SL-LILW) to discharge its statutory responsibilities in waste management is. The European Union (EU) finances the establishment of the NDF through the Kozloduy International Decommissioning Support Fund (KIDSF).

After an international tendering procedure, SERAW placed a contract for the development of the design of the NDF to the Consortium of Westinghouse Electric Spain S.A.R and DBE TECHNOLOGY GmbH of Germany, with ENRESA, the Spanish National Waste Management Agency providing technical review and support. Two Bulgarian companies participate also in the project as subcontractors – EQE Bulgaria and to a lesser extent KK-Project. The repository project official name is "Technical Design and ISAR Preparation for the National Disposal Facility at Bulgaria", usually abbreviated as "R-Project 5". After obtaining SERAW's approval for the preferred repository conceptual design variant, the R Project 5 focused on developing the Technical Design on the one hand, and on preparing the Intermediate Safety Analysis Report (ISAR) to demonstrate the safety and suitability of the proposed NDF design on the other.

These documents were handed over to the Bulgarian Nuclear Regulatory Authority (BNRA) as well as to the different authorities involved in the comprehensive licensing process required for nuclear facilities in the country. The corresponding permits have mostly been received or are expected for early 2016. In the last quarter of 2015 the procurement procedure for repository construction as turn-key project was started with the pre-qualification of possible constructors for the Phase I repository realization on a lump sum contract basis. Repository construction is now expected to start in 2016, with the start of waste disposal now scheduled for around 2020.

With the realization of the Bulgarian National Disposal Facility an important milestone for waste disposal in the European Union is about to be achieved. This paper is a sequel of previously presented papers on the NDF construction, now including details of the complex licensing process that this disposal facility underwent, now in its final

stages.

INTRODUCTION

In the framework of the accession treaty to the European Union the Republic of Bulgaria committed itself to the early shutdown and decommissioning of the four WWER 440/230 reactors of the Kozloduy Nuclear Power Plant. To deal with the resulting waste that will now arise much earlier than originally planned. Bulgaria has intensified its efforts to establish a repository for SL-LILW, which constitute the bulk of the waste requiring disposal in a radioactive waste repository. A comprehensive, country-wide site selection process identified the Radiana site, adjacent to the Kozloduy NPP, as the most advantageous repository location. As the SL-LILW is amenable for surface disposal, the "National Disposal Facility" (NDF) has been planned as near-surface, engineered repository, having the Spanish El Cabril facility as reference repository design. The National Disposal Facility is a project of national importance in Bulgaria and is part of the updated National Strategy for management of spent nuclear fuel and radioactive waste until 2030.

As previously mentioned, Bulgaria is supported in this endeavor by a compensation mechanisms established by the EU, the KIDSF. The fund is managed on behalf of the EU by the European Bank for Reconstruction and Development. With the NDF Bulgaria will join the countries operating repositories for SL-LILW, thus complying with IAEA's Joint Convention prescriptions for sustainable waste management.

After an EU-wide call for tenders, SSERAW awarded in October 2011 the contract for the design and licensing of the Bulgarian SL-LILW repository to the above mentioned international Consortium. The scope of services covered by the contract included the elaboration of the Conceptual Design, the Technical Design, and Intermediate Safety Assessment Report (ISAR) for the NDF. In addition, the Consortium was to provide all the needed technical support to SERAW during the NDF licensing process. As of end of 2015, the repository Conceptual Design, the Technical Design (basis of the repository licensing) and the ISAR have been approved by most of the pertinent Bulgarian authorities. Final discussions and clarifications required by BNRA were conducted in early December 2015; the final decision of the regulatory body is expected for the first quarter of 2016. Meanwhile, the site preparation for construction is well underway.

REPOSITORY LICENSING

Licensing of a radioactive waste repository in the Republic of Bulgaria requires a complex process comprising separate licenses pursuant to different legal instruments that rule the use of land and spaces, the environmental impact of any industrial facility and/or construction works, as well as nuclear matters. Ancillary permits concern the site security, the fire protection, and the protection of the groundwater.

The NDF is specifically defined as nuclear facility by the "Act on the Safe Use of Nuclear Energy" /1/ (ASUNE); § 1, number 55 of ASUNE's Supplementary Provisions states that "nuclear facility is each radioactive waste management facility". Correspondingly, the NDF is to be licensed as per the ASUNE requirements. In

addition, as all industrial facility construction or infrastructure works in Bulgaria, the requirements of the Act on Territory Arrangement also apply. The responsible licensing authority for the NDF as nuclear facility is BNRA. Responsible organization for licensing of the NDF as per the requirements of the Act on Territory Arrangement is the Ministry of Regional Development and Public Works (MRDPW). The investment proposal on establishment of the NDF is also subject to an Environmental Impact Assessment (EIA). The responsible authority for issuing decisions on EIA is the Bulgarian Ministry of Environment and Waters (MEW).

Licensing under the Act on the Safe Use of Nuclear Energy

The ASUNE assigns all the responsibility for the management of any radioactive wastes outside the places of their generation to SERAW, which is thus responsible for handling, treating, conditioning, storage, and disposal of all radioactive waste generated in the Republic of Bulgaria. This includes the waste arising during operation and decommissioning of the Kozloduy Nuclear Power Plant (KNPP) any future NPP, as well as all radioactive waste resulting from nuclear applications in research, medicine, and the industry. To discharge these responsibilities SERAW must among other activities provide appropriate facilities for the ultimate disposal of the waste. The fundamental decision on the NDF construction was made by the Council of Ministers Decision No. 683 dated July 25, 2005 directing SERAW to implement all measures and steps required for the establishment of the NDF. With a subsequent act, the Council of Ministers Decision No. 898 of December 8, 2011, the Bulgarian government declared the NDF to be built on the Radiana site, Municipality of Kozloduy, as "*National Facility*" according to the Act on State Property and as "*Facility of National Importance*" pursuant to the Act on Territory Arrangement. Later the government of Bulgaria declared the NDF to be a "*Strategic Facility for the National Security*" by the Council of Ministers Decision No. 3 of January 10, 2013. Thereupon the Radiana site land ownership was transferred to SERAW for establishing the NDF.

The stages followed in the NDF licensing procedure pursuant to ASUNE were the following:

Permit for Site Selection

An application for a permit for selecting a repository site was submitted by SERAW to BNRA in 2005. Following a 9 months lasting review process the agency issued a permit for site selection in May 2006. The repository siting process underwent the following single steps pursuant to the Regulation on the Safe Management of Radioactive Waste:

- (1) Development of a concept for disposal and planning of the activities for site selection
- (2) Data collection and analysis of the candidate repository areas, including:
 - a. Screening and evaluation of the whole Bulgarian territory, identifying large areas with favorable conditions to host a repository
 - b. Selection for in depth study of prospective sites within the favorable areas that meet the predetermined siting criteria

- (3) Comprehensive characterization of the potentially suitable sites and selection of the preferred one
- (4) Site confirmation

In line with the requirements of the Regulation on the Safe Management of Radioactive Waste the activities in each phase were detailed in an activity plan including the activities' objectives, their sequence; the requirements and recommendations (national and international) to be considered, the procedures developed; and a detailed activities schedule. SERAW implemented the activities after plan approval by BNRA under the Authority close supervision. The siting studies were finalized with the selection of the Radiana site, adjacent to the Kozloduy NPP, within the term of the Kozloduy Municipality (Figure 1).



Fig. 1. Radiana Site South of the Kozloduy NPP

NDF Design Permit

The application for receiving a permit for design of the NDF was submitted to BNRA in December 2011; the Design Permit was issued on May 4th, 2012 /2/. As usual, the permit included conditions that must be complied with in the repository design process. The validity period of the permit was 3 years, until May 3rd, 2015; each step of the design process was to be reported to BNRA.

During the design stage the designer Consortium first developed a Conceptual Design for the NDF in two variants. Thereafter a Technical Design for the preferred variant and the Intermediate Safety Assessment Report were developed. The application for approval of the Technical Design in line with the requirements of the Regulation on the Procedure for Issuing Licenses and Permits for Safe Use of Nuclear Energy was

submitted to BNRA end of April 2015. The ASUNE limits the duration of the regulatory review to nine months. The NDF Technical Design is to be formally accepted by an order of approval issued by the Chairman of the BNRA, which will also approve the site selection.

NDF Construction Permit

SERAW can only start the NDF construction when a formal Construction Permit has been granted by BNRA. Precondition hereto is an approved Technical Design. SERAW has to formally request BNRA to issue the Construction Permit. Pursuant to the Regulation on the Procedure for Issuing Licenses and Permits for Safe Use of Nuclear Energy among others the following documents must be attached to this application: preliminary general schedule for implementing the construction and assembling works; the repository technical design; a description of SERAW's management system for the construction works. BNRA will issue the Construction Permit for the time period stated in the preliminary schedule. The Construction Permit is expected to contain certain conditions, among them it will specify requirements for reporting during construction.

NDF Commissioning Permit

The NDF commissioning requires a formal Commissioning Permit. The commissioning activities may cover inactive and active tests (tests with actual radioactive waste packages) or only active tests depending on the complexity of the nuclear facility. The commissioning activities are considered preliminary activities immediately preceding the NDF routine operation and therefore most of the documents that shall govern the routine operation must have been previously developed or obtained. This comprehensive set of documents includes among many others: the Permit for Use of the NDF under the Territory Arrangement Act; the commissioning program; the management system for NDF operations; the technical specifications for operation containing the operation's limits and conditions; the program for site and environmental radiation monitoring, etc. The results of the commissioning process must be reported to BNRA. The Authority then confirms by site inspections whether and how the requirements and conditions of the Commissioning Permit have been implemented.

License for NDF Operation

The operation of the NDF will be subject to a formal license pursuant to ASUNE issued by BNRA. Core elements of SERAW's application for issuing the license for NDF operation will be a Final Safety Assessment Report that takes into account the actually implemented repository design as well as the experience in regard to working procedures gained during the NDF commissioning. In line with ASUNE, the operational license shall be issued for a period of up to 10 years. Core element for renewal of the license thereafter will be an upgraded Safety Assessment Report that takes into account the actual operational experience.

Licensing under the Territory Arrangement Act

The Territory Arrangement Act rules the relations between government and public in regard to spatial planning, design, and construction of buildings, facilities, and infrastructure in Bulgaria. It prescribes also certain restrictions on ownership for development purposes. In regard to establishment of the NDF, the act rules the feasibility studies (urban planning), as well as the facility design, construction, and non-radioactive commissioning. The final step is the hand out of a Permit for Use of the NDF, issued pursuant to the Territory Arrangement Act by a State Commission specially appointed to review all aspects of the as-built repository and of the construction process.

Detailed Spatial Plan – Plan for Regulation and Construction

All the territory of the Republic of Bulgaria is subject to urban planning. Correspondingly, SERAW was directed to develop a "Detailed Spatial Plan – Plan for Regulation and Construction for National Disposal Facility at Radiana site". The Plan was prepared according to the requirements of the Regulation No 8 of June 14, 2001 for the Scope and Content of Development Schemes and Plans. As the NDF is a National Facility, the plan was reviewed by the National Expert Council on Territory Arrangement and Territory Policy. After the plan approval by this council, MRDPW issued in January 2013 its Spatial Plan Order of Approval. The approved special plan represents also a permit for design; therefore, a separate design permit under the Territory Arrangement Act is not required.

Design of the NDF

The NDF design shall follow the provisions of the mentioned Detailed Spatial Plan – Plan for Regulation and Construction which constitutes the formal design permit of MRDPW. In line with the prescriptions of the Ordinance No. 4 of May 21, 2001 On the Scope and Content of Investment Projects, the design process covers the following steps:

- (1) Development of the Conceptual Design
- (2) Development of the Technical Design (design for licensing)
- (3) Development of the Detailed Design (design for construction)

The implementation of the different steps by the engineering consortium was directed by SERAW as facility owner. As demanded by the Territory Arrangement Act, at the conceptual design stage different design options were developed, compared, and the most favorable option selected. This variant was further developed to Technical Design level following, in regard to scope and content, the specific prescription of the Ordinance No.4 of May 21, 2001. The Technical Design requires, before approval by MRDPW, endorsement by several authorities and utilities, such as the Fire Safety Authorities; the Ministry of Health (radiation protection); the Ministry of Internal Affairs (site security); the State Agency for Technical Supervision; Electricity Utilities, and Water and Sewage Utilities. Since the NDF is a National Facility, the Technical Design must be reviewed and approved by the National Expert Council on Territory

Arrangement and Territory Policy. In addition, due to the characteristics of the facility an independent review and evaluation of the Technical Design in regard to compliance with the essential requirements of the Territory Arrangement Act is a mandatory part of the application for design approval by MRDPW.

Construction of the NDF

MRDPW may only issue a permit for construction after approval of the investment project by all the mentioned authorities. Pursuant to the Territory Arrangement Act the permit may be issued based on the approved Conceptual Design, Technical Design, or Detailed Design as requested by the investor. The NDF Construction Permit will be issued based on the approved Technical Design. The Detailed Design will be developed by the NDF constructor. This design, as well as the as-build documentation, will be subject to approval by MRDPW.

During the NDF construction strict control over the execution must be implemented: (1) Independent supervision in regard to the requirements of the Territory Arrangement Act; (2) Designer supervision by the developer of the Technical Design; (3) SERAW's supervision as facility owner. The NDF will be considered constructed as required by the Territory Arrangement Act if all commissioning test are successful, the NDF is accepted by the State Acceptance Commission, and the Permit for Use is issued by MRDPW. BNRA and the Ministry of Environment and Waters (MEW) are part of the State Acceptance Commission

Licensing under the Environmental Protection Act

Licensing under the Environmental Protection Act focuses on the Environmental impact Assessment (EIA) process, which must be carried out at an early project development stage. The Bulgarian Environmental Protection Act has been harmonized with the pertinent EU Directives. The EIA process includes the following steps: (1) A wide consultations with the public and stakeholders on scope and content of the particular EIA; (2) Notification of the neighboring Republic of Romania of the planned activity under Article 3 of the Convention on EIA in Transboundary Context; (3) Notification according to Article 2 of the Regulation on Conditions and Procedures for Assessing the Compatibility of Plans, Programs, Projects and Investment Proposals with the Object and Purpose of Conservation of Protected Areas; (4) Development and approval of scope and content of the EIA report. The EIA process may continue only in case the quality of the EIA report is positively evaluated by MEW. The report is then submitted to the consideration of stakeholders who can express their opinions in public hearings. SERAW and the team of independent experts provide responses to any objections to the municipalities where public hearings were held for publication and to MEW for evaluation and information of the Romanian stakeholders. Finally the EIA Report is reviewed by the Supreme Expert Council on Environment previous to the final decision on EIA, by MEW.

MEW strictly controls compliance with any conditions prescribed in the EIA Decision during NDF construction, commissioning, and operation. A positive EIA Decision is a requirement for implementation. An approval of the selected site and the technical

design, as well as the mentioned permits for construction, can only be granted by BNRA and MRDPW after MEW has made a positive EIA Decision.

REPOSITORY DESIGN WORK

The NDF design work began in October 2011. Initially, two repository conceptual designs were developed considering the particular characteristics of the Radiana site, which is located on the terraces of the Danube River valley's south rim. The most favorable variant was selected by means of a formal multi-attribute analysis with evaluation criteria such as operational and long-term safety, environmental impact, constructability, initial investment, and operational costs. SERAW approved the most favorable alternative on December 2012. Immediately thereafter the consortium started the development of the comprehensive Technical Design package needed to license the repository. The design work was ruled by the mentioned Ordinance No. 4 that set up the legal basis for the NDF design including all related facilities located inside the site fence. The design package prepared by the consortium and delivered to the client in Revision 3 in April 2015 included more than 11,000 pages of text and about 1100 maps, building plans, and technical drawings. As of December 2015 the package is being considered by BNRA and MRDPW for approval.

Concurrent to the Technical Design, the Consortium also developed the Intermediate Safety Analysis Report (ISAR). The ISAR documents the safety evaluation conducted for the NDF in terms of both operational and post-closure safety. The ISAR convincingly shows that the Technical Design, including the planned operation of the facility, will be safe and in compliance with all the applicable regulations.

The Technical Design is structured following Bulgarian requirements for investment projects into 19 separate Design Parts. Additionally, each Design Part of the Technical Design documentation may be further subdivided into the corresponding structure, system, or component of the facility, resulting in the case of the NDF in up to 23 separate subparts per Design Part. Further details on the comprehensive design package were included in a previous paper presented at WM'2015 /3/.

SERAW approved Revision 1 of the NDF Technical Design in April 2013. The acceptance included comments from both SERAW and their Expert Technical Council. Subsequently Revision 2 of the Technical Design was prepared both to address the comments from Revision 1 and for submittal to BNRA and MRDPW for approval. The Consortium handed over the English version of the Technical Design Revision 2 to SERAW on October 2013. A Bulgarian language version of the Technical Design Revision 2 was submitted to the Bulgarian Authorities on September 2014.

Concurrent with the Bulgarian Authorities review of the Technical Design (Revision 2), SERAW engaged an independent consultant to conduct review to assess the designs conformity with requirements of the Bulgarian Territory Arrangement Act. The main objective of this additional review was to assess the Technical Design in terms of compliance with the Detailed Spatial Plan, evaluate consistency between the separate design parts of the project, verify the engineering calculations, and

assess compliance with the subsidiary Bulgarian requirements including among others requirements related to constructability and operational safety.

THE BULGARIAN NATIONAL DISPOSAL FACILITY

Repository Engineering

The engineering of the NDF follows as reference facility the design of the El Cabril repository operated by ENRESA in Spain. The main difference with other near-surface facilities in the European Union is the retrievability of the waste packages, which is a requirement of the Bulgarian authorities. The repository includes facilities grouped into two zones:

- Disposal zone, in which the disposal cells are located
- Buildings zone, in which the Waste Reception and Buffer Storage (WRBS) Building, the site administration, the control room and ancillary and support buildings and facilities are located

Figure 2 shows an artist view of the repository facilities, with the building area in the foreground.

The Disposal Zone will be built in three phases each separated by approximately 20 years. Each phase will entail the construction and subsequent operation of three identical disposal platforms, which will include two parallel rows of eleven disposal cells and the associated infrastructure for waste disposal and water management. The disposal cells will rest on a massive, 5 m thick loess-cement cushion to provide adequate foundation stability. Each platform will host 6,336 waste packages (WPs) corresponding to about 20 years of repository operation. The total disposal capacity of the NDF will be 19,008 waste packages.



Fig. 2. Artist view of the NDF

The disposal cells will be monolithic, reinforced concrete rectangular boxes with two interior walls dividing each disposal cell into three chambers. Each disposal cell will have capacity for disposal of 288 WPs with 96 packages per chamber, emplaced in four layers of 8 by 3 WPs. The external dimensions of the disposal cells will be 20.15 m long by 17.05 m wide. Immediately after filling to capacity, the cells will be sealed by a reinforced concrete closure slab. The height of a full and sealed disposal cell measured from the foundation level to the top will be 9.45 m. During WP disposal and the construction of the concrete roof slab the disposal cells will remain covered by a mobile roof, which also bear the overhead crane used to emplace the waste packages and to construct the closure slab. The mobile roof will provide weather protection during all operations.

The Building Zone will contain the entire management and support infrastructure needed to operate the NDF. The main structure will be the Waste Reception and Buffer Storage (WRBS) Building, which will serve for receiving transport vehicles carrying the WPs. The packages will be unloaded and inspected for acceptance, and then placed in interim storage or immediately sent to the cell area for disposal. The WRBS Building will provide buffer capacity for up to 120 WPs to allow optimizing the WP flow to the disposal cells.

The NDF will also include the auxiliary buildings and infrastructure necessary for repository operation:

- Access Control Building – provides access control for personnel and transport vehicles to and from the NDF site at the site boundary
- Administrative Building – provides working space for NDF administration
- Laboratories – provide equipment for carrying out laboratory analyses of samples from contamination tests and environmental probes
- Auxiliary Buildings –garages and various workshops as well as an industrial section containing facilities for power equipment and other auxiliary systems
- General Services Building – regulates access to the radiologically controlled areas of the WRBS Building and spaces for radiation protection purposes

The separate buildings will be connected by a central corridor that provides space for piping and cables.

Repository Operation

The NDF will have a single main access that links the Kozloduy NPP road at the northern fence of the site with the Building Zone, thus providing a direct access for the WPs delivered to the site. Waste packages will be received at the WRBS Building's loading/unloading area. After carrying out the site acceptance tests (contamination and external dose rate) the WPs will be either transferred by overhead crane to the buffer storage area or directly loaded onto an internal transport cart. The cart will be towed through an internal route to the assigned disposal cell for emplacement. The overhead crane in the mobile roof will lift the waste package from the cart and will hoist it to its pre-assigned disposal position in the disposal cell.

Once the cell has been filled to capacity, the reinforced concrete closure slab will be constructed to permanently seal the disposal cell. Thereafter, the mobile roof will be relocated to the next disposal cell in the row. The final engineered barrier, a multi-layer earthen cover, will be emplaced after all the disposal cells have been filled and closed. This long-term cover will prevent or greatly limit the intrusion of water into the disposal cells throughout a mandated 300 surveillance period. The multilayer cover combined with the loess-cement cushion will prevent or greatly limit and retard the release of radionuclides into the accessible environment.

Repository Implementation

A staggered construction approach has been adopted. The NDF will be built in three phases:

- The auxiliary installations and the first platform of disposal cells will be built during the first phase, planned to last from 2016 to 2020. This will allow starting disposing of waste until around 2040.
- During a second and a third phase the NDF will be expanded through the construction of additional cells and their respective infrastructure to reach its full disposal capacity.

The NDF layout allows for construction of additional disposal cells simultaneously with the disposal operations. A separate access from the northeast corner of the site will be used for construction to avoid interference with waste disposal. This road will also

serve as emergency exit route. The security fence surrounding the NDF will maintain separation until construction has been completed.

The NDF service life will be divided into three periods including:

- The Operational Period (during which waste disposal is carried out) spanning 60 years
- The Closure Period assumed to last up to 15 years
- The Institutional Control Period lasting 300 years

During the closure phase the multi-layer cover will be built and the auxiliary buildings and infrastructure not necessary for the further institutional control will be decommissioned. During the institutional control period surveillance and control of the site will continue, with maintenance or repair interventions being carried out whenever necessary. The activity content of the NDF will be effectively limited by means of the Waste Acceptance Criteria so that the site can be released for any use without radiological restrictions after the end of the institutional control period.

ISAR

As previously stated, the license for repository construction requires completion of an Intermediate Safety Analysis Report (ISAR). The ISAR shall assess the behavior of the disposal facility and, in particular, the NDF potential radiological impact on humans and the environment. The report shall consider all potential pathways for radionuclide release into the environment and the resulting health effects. The ISAR shall provide convincing proof that the NDF design, as laid down in the Technical Design documents, and the planned operations are safe in accordance to all the applicable regulations taking into account:

- Characteristics of the site
- Characteristics of the wastes to be disposed of
- Planned activities and personnel involvement
- Characteristics of the risks associated with the NDF

A preliminary version of the ISAR was handed over to SERAW in October 2012 to initiate the review process by BNRA. A first round of comments by the authorities as well as some updates of important regulations by the Bulgarian government required some modification to the Technical Design and to the ISAR leading to a first revision. After incorporating supplementary design changes and further assessment justifications required by the authorities the Consortium issued two further revisions, which Revision 3 being the currently valid document that was finally discussed with BNRA in December 2015.

CONCLUSIONS

SERAW approved with comments in November 2013 the NDF Technical Design for submittal to the licensing authorities. After a detailed review process between SERAW and the Consortium, the document was deemed adequate for the intended purpose and a Bulgarian language version was prepared. This version, as well as a translated version of the ISAR, was submitted in October 2014 to the various Bulgarian

authorities and ministries involved in the complex licensing process detailed above. Thereafter, the Bulgarian language versions of the Technical Design and the ISAR were submitted to BNRA for its review and approval.

The BNRA has meanwhile finished its review with the technical support of international experts according to an approved review program. The permits by the mentioned ancillary authorities have been received, including a positive EIA statement by MEW. The next milestone will be the nuclear construction license by BNRA and as the final step the construction license by the Ministry of Regional Development and Public Works MRDPW.

In the last months a comprehensive Technical Specification for Construction was prepared by the Consortium for SERAW to start the tendering process for repository construction. The final construction permit and the conclusion of the tendering process with beginning of repository construction are now expected for the first half of 2016.

REFERENCES

- 1 Act on the Safe Use of Nuclear Energy (ASUNE). Bulgarian State Gazette 26/29.03.2011, effective as of 30.06.2012
- 2 "Permit for the design of a nuclear facility for radioactive waste management – National Disposal Facility (NDF)" of May 4th, 2012, issue by the Bulgarian Nuclear Regulatory Authority.
- 3 Biurrun, E.; et. al. Licensing of the National Repository for LILW Waste in Bulgaria. WM'2015, Paper # 15609.