SÚRAO | RADIOACTIVE WASTE REPOSITORY AUTHORITY

2019

Annual Report

Radioactive waste repository authority 2019

Mission and principles of the activities of the Czech Radioactive Waste Repository Authority (SÚRAO)

The Czech Radioactive Waste Repository Authority (SÚRAO) is a state organisational unit and, as such, its activities and management are regulated by Section 113 of Act No. 263/2016 Coll., the Atomic Act. SÚRAO's mission is to ensure the safe disposal of current and future radioactive waste in accordance with requirements concerning nuclear safety and the protection of the population and the environment.

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Introduction

Dear readers,

Please allow me via this annual report to acquaint you with our activities and the results achieved in 2019. SÚRAO is a state technical organisation and, as such, is required to conduct its activities transparently and in a predictable manner. This is a key priority for SÚRAO and it will continue to be a priority in the future.

In 2019, SÚRAO operated all three of its low- and intermediate-level waste repositories safely and in accordance with the relevant permits. We continue to devote our attention to the safe operation of our repositories as well as to effective communication with the public in their vicinities. The initial phase of the long-term reconstruction of the Richard repository, which will enhance the efficiency of the disposal of radioactive waste from the industry and research sectors, commenced during the year.

With respect to the preparation work for the future Czech deep geological repository (DGR) for high-level waste and spent nuclear fuel, research work was completed during the year, especially geophysical research, aimed at reducing the number of candidate DGR sites. The main priority of the site selection process remains to determine a demonstrably safe DGR design solution. Particular attention is being devoted to the study of the potential environmental impacts and the technical feasibility of the DGR.

Attention also focused during the year on the recommendation of four of the nine DGR candidate sites for the conducting of further research. In spring, the 2019 Safe and Sustainable Back-end of the Fuel Cycle international conference was held; the conference provided a forum for discussions between both experts and the public on the issue of the deep geological repository programme. Subsequently, the first meeting of the Expert Advisory Panel was held with the aim of opening the site reduction assessment process to professionals and the public. The Panel comprised experts from several Czech authorities and institutions involved in the DGR development programme and representatives from the affected sites.

We continued to keep the public fully informed on all our activities through our information centres, websites, social networks and printed materials.

I would like to thank all SÚRAO's employees and cooperating organisations for their hard work in 2019.

JUDr. Jan Prachař
Managing Director of SÚRAO

Current situation

Current situation concerning radioactive waste disposal

Low- and intermediate-level waste from the nuclear energy sector is disposed of in a surface repository located within the Dukovany nuclear power plant complex; the repository was put into operation in 1995. The total volume of the disposal space of 55,000 m^3 (around 180,000 waste drums) is sufficient for the disposal of all the waste (that meets defined waste acceptability conditions) generated by the Dukovany and Temelín power plants, even in the case of the extension of the operation of the two power plants.

Low- and intermediate-level waste from the industry, research and healthcare sectors is disposed of at the Richard (near Litoměřice) and Bratrství (near Jáchymov) near-surface repositories; moreover, the Dukovany repository can also be partially used for this purpose.

The Richard near-surface repository is located in the former Richard II limestone mine complex (below the Bídnice hill). Institutional waste has been disposed of here since 1964. The total volume of the reconstructed underground areas exceeds 17,000 m^3, and the waste disposal capacity makes up approximately half this volume (the rest consists of service corridors). The robustness of the natural barriers of the facility and the existence of additional former limestone mining areas create ideal conditions for the disposal of radioactive waste both now and into the future.

The Bratrství near-surface repository is intended exclusively for the disposal of radioactive waste containing only naturally-occurring radionuclides. The disposal facility was created by adapting one of the mining tunnels of the former Bratrství uranium mine and comprises 5 chambers with a total volume of approximately 1,200 m^3. It was put into operation in 1974. Nearly all the capacity of the repository has now been filled and its gradual closure is anticipated.

The operation of all the repositories, including the monitoring of the now-closed Hostim repository, is ensured by SÚRAO in accordance with the relevant permits issued by the State Office for Nuclear Safety (SÚJB) and, where necessary, in full compliance with the relevant mining regulation permits.

To a lesser extent, long-term low- and intermediate-level waste is generated that is not acceptable for disposal in currently operational near-surface repositories. Requirements have been set concerning the method and quality of the treatment of such waste for interim storage and subsequent disposal in the future DGR. Such waste is stored both by its producers and by SÚRAO.

High-level waste and spent nuclear fuel (following its declaration as waste) cannot be disposed of in existing repositories; it is expected that it will be finally disposed of in the future DGR. At present, such waste is stored by its producers, all of whom are holders of an SÚJB permit for the storage of these materials.

	Total disposal capacity
Dukovany radioactive waste repository	**55 000 m^3**
Richard radioactive waste repository	**10 249 m^3**
Bratrství radioactive waste repository	**1 200 m^3**

Richard radioactive waste repository

Dukovany radioactive waste repository

Bratrství radioactive waste repository

The percentages indicate the amount of used disposal capacity.

Operation of the Dukovany radioactive waste repository

The Dukovany repository is located within the complex of the nuclear power plant of the same name and is the only surface repository in the Czech Republic. It is also the country's youngest repository; waste has been disposed of here since 1995. In 2019, the operation of the facility was provided by ČEZ, a.s. However, SÚRAO was directly responsible for the acceptance of waste at the repository and certain other activities, particularly inspection and monitoring.

The Dukovany surface repository occupies an area of 1.3 hectares within the Dukovany nuclear power plant complex. It is intended primarily for the disposal of low- and intermediate-level waste from the Dukovany and Temelín nuclear power plants. The total volume of the disposal spaces is 55,000 m^3, which corresponds to approximately 180,000 waste disposal packages (drums).

Every year, an average of two thousand waste disposal packages are accepted and subsequently disposed of at the repository. They contain primarily contaminated protective items, textile materials, paper, electrical installation materials, construction rubble, etc., while other waste is generated via the water management systems of the power plants, consisting of wastewater, sludge and ion exchangers. Since the direct disposal of liquid waste is prohibited, it is necessary to treat this type of waste using special technologies. Wastewater is concentrated using evaporation equipment and the resulting concentrate is solidified using a hardener material, i.e. mostly via so-called bituminisation (fixation in a bitumen matrix). The waste disposal packages are disposed of in concrete chambers, which are backfilled with concrete following filling and closure.

In 2019, a total of 1,413 radioactive waste disposal packages (312.5 m^3) were disposed of at the facility. They were disposed of in chamber D2 and, following its reaching full capacity, in chamber D3. Chamber D2 was backfilled with a concrete mixture in October 2019 and closed.

In 2019, the Dukovany nuclear power plant (EDU) delivered a total of 1,004 radioactive waste disposal packages (217.4 m^3) for disposal, of which 74 packages with unconsolidated waste, 517 packages with bituminised items and 413 packages with used ion exchange sludges reinforced in an aluminosilicate matrix.

The Temelín nuclear power plant (ETE) delivered a total of 403 radioactive waste disposal packages (88.6 m^3) for disposal, of which 44 packages with unconsolidated waste, 349 packages with bituminised items and 10 packages with sludge reinforced in an aluminosilicate matrix.

Six radioactive waste packages (6.5 m^3) containing institutional waste were delivered by ÚJV Řež, a.s.

The regular monitoring of the repository revealed no exceeding of operating limits and conditions during the year. Three inspections by the State Office for Nuclear Safety (SÚJB) also served to confirm the safe operation of the facility.

Basic information on the waste disposed of in 2019 is provided in the following table:

Dukovany repository / operation in 2019

Volume of waste disposed of	m^3 waste disposal package (WDP)	312,5 / 1413
of which from EDU	m^3 / WDP	217,4 / 1 004
of which from ETE	m^3 / WDP	88,6 / 403
of which institutional waste	m^3 / WDP	6,5 / 6
total mass of the waste received	tonnes	420,3

Operation of the Richard and Bratrství repositories and the monitoring of the now-closed Hostim repository

SÚRAO operates two near-surface radioactive waste repositories, Richard and Bratrství. Richard is used for the disposal of institutional waste, while Bratrství is used only for the disposal of waste containing naturally-occurring radionuclides. The Richard facility will take over the role of the Bratrství repository in the future.

The Richard repository has been in operation since 1964 and is used for the disposal of institutional waste generated in the healthcare, industry, agriculture and research sectors. In 2019, 312 radioactive waste disposal packages (67.4 m^3) with a total mass of 103.3 tonnes were disposed of at the Richard repository. One disposal package with radioactive waste was accepted for interim storage.

SÚRAO also operates a test laboratory within the Richard repository complex for the testing of packages/containers for the transport, storage or disposal of radioactive or fissile materials up to a total weight of 3,200 kg, and radioactive substances of special form. Two waste disposal package tests were performed in 2019.

In 2019, SÚRAO obtained the necessary permits, i.e. from the SÚJB and the mining authority in Most, to proceed with the first phase of the reconstruction of the Richard repository, and the supplier, Energie - stavební a báňská a.s., commenced the reconstruction work in the middle of the year and will continue into next year. As part of the reconstruction project, a part of the previously unused underground spaces will be adapted to form disposal chambers in the period 2019–2021.

The Bratrství near-surface repository is intended exclusively for the disposal of waste containing only naturally-occurring radionuclides. It was created via the adapting of one of the mining tunnels of the former uranium mine of the same name to create 5 disposal chambers with a total volume of approximately 1,200 m^3. It was put into operation in 1974. The capacity of the repository is now almost exhausted and its gradual closure is anticipated.

In 2019, 8 radioactive waste disposal packages (1.7 m^3) with a total mass of 2.2 tonnes were disposed of at the Bratrství repository.

The radiation monitoring of these facilities and their surroundings was conducted in 2019 in accordance with the respective approved monitoring programmes. The monitoring of the surroundings of the now-closed Hostim repository continued during the year.

SÚRAO's facilities were inspected during the year by the State Office for Nuclear Safety (3 inspections at the Richard repository and 2 inspections at the Bratrství repository) and the relevant mining authorities (1 inspection at the Richard repository). SÚJB inspectors discovered one violation of regulations during an inspection at the Richard repository. The violation resulted from the application of requirements resulting from recently introduced SÚJB directives that supplemented existing operating regulations. The problem issues were resolved by the end of 2019 and the SÚJB did not impose any sanctions. Further inspections by the SÚJB and the relevant mining authorities during the year determined no further violations of legal regulations.

Basic information on the radioactive waste disposed of in 2019 is provided in the following tables:

Richard repository / operation in 2019

Volume of waste disposed of	m^3 / WDP	67,4/ 312
Mass of the accepted waste	tonnes	103,3
Number of waste containers accepted for interim storage	number	1

Bratrství repository / operation in 2019

Volume of waste disposed of	m^3 / WDP	1,7 / 8
Mass of the accepted waste	tonnes	2,2

Development of the deep geological repository

Development of the deep geological repository

In order to meet the objectives of the Radioactive Waste and Spent Nuclear Fuel Management Concept and updates thereto, i.e. the construction and commissioning of a deep geological repository for HLW and SNF in 2065, it is required that two candidate sites be included in the respective municipal zoning plans. During 2019, SÚRAO completed the geological characterisation and assessment of all nine previously selected sites. A request from SÚRAO's Board to include additional geophysical research data subsequently led to the shifting of the selection of four recommended sites by around one year. The various sites were assessed according to key criteria in the areas of safety, technical feasibility and the impact of the DGR on the environment. The DGR-related research will continue of the preferred sites in the geological survey and research phase and via the detailed examination of the suitability of the sites for the eventual construction of the DGR.

1985 — commencement of operation of Unit 1 of the Dukovany NPP

1992 — commencement of the preparation of the DGR project by ÚJV Řež

1997 — the establishment of SÚRAO via the Atomic Act

2002 — Concept of radioactive waste and spent nuclear fuel management

2003 — publication of 6 potential DGR sites

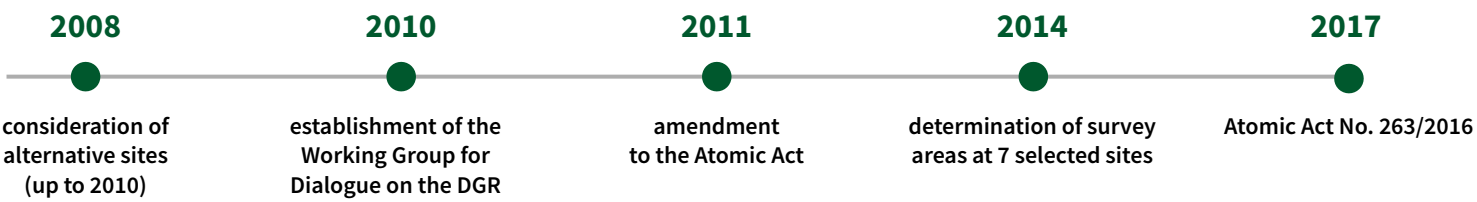
Site selection

The Czech Geological Institute selected potentially suitable areas for the location of the deep geological repository as early as in 1992. Following the further assessment of the selected areas in terms of exclusionary and conditional criteria set out in the then valid SÚJB Decree No. 215/1997 Coll. and related legal and other requirements (e.g. the Nature and Landscape Protection Act), 11 potential sites in three different types of rock were selected in 2002. SÚRAO subsequently selected 6 preferred sites, all of which were located in stable crystalline bedrock areas.

Due to the overwhelmingly negative attitude of local inhabitants to the DGR project, SÚRAO suspended all geological research work at the sites until 2009 in agreement with the Ministry of Industry and Trade (the Government took note of this decision via Government Resolution No. 550 of 2 June 2004).

With this factor in mind, sites were subsequently sought where more favourable conditions could be expected in terms of public acceptance. At the end of 2008, based on a government-approved action plan (Government Resolution No. 1315 of 20 October 2008), SÚRAO initiated the study of a number of military areas in terms of the siting of the deep geological repository. The Boletice military area, in which the Chlum reserve site was defined, was then assessed in more detail. However, the further research of this site was terminated due to a number of complex conflicts of interest (the Šumava Protected Landscape Area, the presence of rare fauna, the proximity of the borders with Austria and Germany, etc.). In 2011, a further site, Kraví hora, was defined in the vicinity of the Dolní Rožínka uranium mine.

Based on requirements set out in the Concept, work commenced in 2014 on the "Assessment of Geological and other Information on selected Parts of the Moldanubian in terms of potential Suitability for the siting of the DGR" project aimed at determining suitable rock blocks for the siting of the DGR in the vicinity of the Czech Republic's two nuclear power plants. In 2017, the



field research work was completed and potentially suitable rock blocks were identified near to both nuclear power plants.

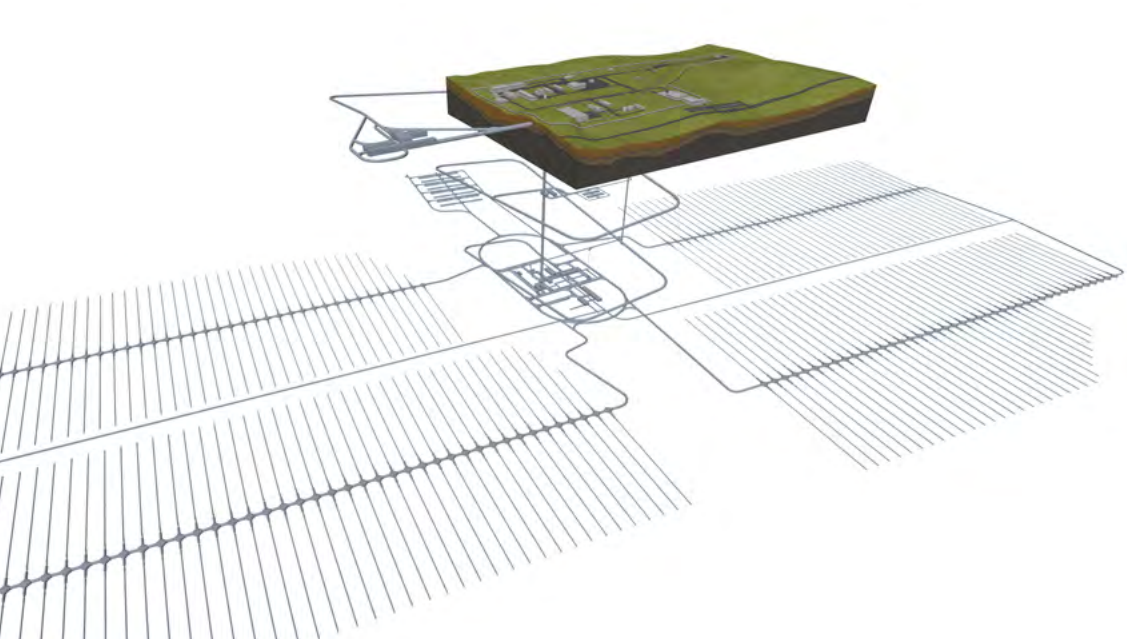
In 2017, the "Geophysical Work" research project was launched aimed at defining the geological structures of all the DGR candidate sites. The main objective concerned the geophysical verification of both the near-surface and deep geological structures in the wider vicinities of the sites in order to enhance the accuracy of the existing geological models and to reduce the uncertainties thereof. The project was successfully concluded in 2019. The geophysical results were interpreted and supplemented by geological research along defined geophysical profiles. This resulted in the expansion of the already extensive geoscience database, which will be used both in the site selection process and in the creation of models for the long-term prediction of geological processes, site stability, etc. In addition, the data will make it possible to optimise, both methodologically and financially, the future geological research work at the selected sites and to determine the location of future exploration boreholes.

The selection of a site suitable for the construction of the deep geological repository involves a number of phases via which the candidate sites are assessed according to a set of criteria and indicators as defined in the SÚRAO MP.22 document. The criteria are based on both the requirements of Czech legislation and IAEA recommendations. Methodology for the application of these criteria has also been developed for the assessment and comparison of the sites.

The number of sites will be reduced based on assessments conducted according to uniform criteria concerning the siting of nuclear facilities (the DGR) which fully take into account technical feasibility, long-term safety and the potential effects of the construction and operation of the repository on the environment. The assessment process will result in the recommendation of preferred sites for the next phase of the development of the DGR. With concern to the expert evaluation process and the transparent provision of information to the sites concerned, the Managing Director of SÚRAO established the so-called Expert Advisory Panel, which commenced its work in mid-November. The first two meetings of the Panel (up to the end of 2019) discussed in detail the above-mentioned methodology for the assessment of the sites.

The next stage will focus on obtaining knowledge from the expected depth of the repository and the wider surroundings of the sites and its interpretation aimed at determining the final and backup sites for the potential construction of the DGR. The more detailed knowledge of the sites, determined on the basis of information obtained from the technical research conducted to date and ongoing research and development, will then allow for the assessment, comparison and subsequent recommendation of the final and backup sites. Moreover, information and data will be acquired that will enable the prediction of the long-term behaviour of the rock mass, groundwater circulation and geological and climatic processes at the sites.

The final site will then be subjected to a detailed geological characterisation so as to ensure that it fully meets the requirements set out for the location of such a facility. The data obtained will be used to demonstrate the fulfilment of the various safety requirements and, thus, to demonstrate that the selected site is suitable for the construction of the DGR. The backup site will be available in case of the discovery of unfavourable conditions at the final site during the construction of the confirmation laboratory.



Project design activities

The concept of the technical design of the DGR, including an estimate of the related construction and operation costs, is set out in the DGR Reference Project and subsequent updates thereof. One of the most important engineered barriers comprises the waste disposal package, concerning which research has been underway since 2013. The final output of the research will comprise the determination of both the design of the spent nuclear fuel disposal package and the materials from which it will be constructed. The project currently considers two waste disposal package design variants, both of which are presently in the verification phase of the research.

With respect to the development of the engineered barriers, SÚRAO has been conducting the Mock-up Josef project since 2010 at the Josef Underground Research Laboratory near the village of Chotilsko in the Příbram region in addition to the DOPAS Plug and Seals project. The aim of the experiments is to verify the properties and behaviour of bentonite barriers.

In 2015, the Research Support for the Project Design of the Deep Geological Repository project was announced, to be conducted by a consortium led by the Czech Technical University in Prague. As part of this project (underway since 2016), research is being conducted aimed at optimising the technical design of the most important technological components of the DGR with regard to technical feasibility, operational safety and economic considerations. In addition, the project is addressing the environmental characteristics of, and the impacts of the construction and operation of the repository on the candidate sites. Siting studies are being prepared for each of the sites based on the situation with respect to potentially suitable rock blocks according to 3D structural-geological models of defined exploration areas and the assessment of the potential environmental impacts of the construction and operation of the DGR. All the resulting documentation, i.e. siting studies, environmental impact studies and safety reports - operational safety, formed background materials for the subsequent compilation of detailed safety reports focusing on long-term safety. In 2019, the various background reports used in the assessment of the sites with respect to the development of the project design were updated based on data obtained from the conducting of geophysical surveys.

Activities concerning the safety assessment of the DGR

In accordance with the Medium-Term Research and Development Plan for the requirements of the siting of the DGR, the Research Support for the Safety Assessment of the Deep Repository project is currently underway. The main output of this project, which was launched in 2014, concerns the interpretation of primary data obtained from the geological characterisation of the candidate sites and the gathering of information, models and arguments for the preparation of safety analyses, based on which the long-term safety of the candidate sites will be assessed. The most important part of the project comprises the preparation of 3D structural-geological, hydrogeological and transport models for all the sites and the preparation of a model safety analysis. Geological, hydraulic and transport models form the basis for the safety assessment of the construction of the DGR at the potential sites. The information obtained from the creation of such models and the preparation of the model safety analysis will allow for the more accurate focusing of the geological exploration at the sites (especially with concern to the drilling of deep boreholes in the more advanced stages of the geological exploration research) and the updating of the R&D programme concerning the selection of sites for the safe disposal of spent nuclear fuel and other radioactive waste, including the gathering of the necessary information on the properties of the SNF and RAW itself, the long-term stability of the engineered barriers and the migration parameters of both the engineered barriers and the rock environment. Background reports on the assessment of the sites in terms of safety were updated in 2019 based on data obtained from geophysical survey research.

Domestic DGR-related in-situ research

The research programme addresses the need to obtain data, arguments and other input documents so as to prove both the feasibility of the DGR at the candidate sites and the long-term safety of the facility via research under both laboratory and underground in-situ conditions. It should be noted that the unique data required for the development of the DGR cannot be obtained other than through underground laboratory research. The success of the DGR project will depend to a great extent on experiments conducted and data obtained in Czech underground laboratories.

SÚRAO has obtained valuable methodological experience from participation in several projects conducted in foreign underground laboratories as well as in its own underground facilities in the Czech Republic, including the Josef Underground Research Centre, which is located around 50 km south of Prague. This underground facility, located in a former mine, has been used by the Faculty of Civil Engineering of the Czech Technical University in Prague for research purposes since 2007. The maximum depth of the facility is 150 m. The northern part of the complex, Mokrsko-západ, is situated in rocks of interest to the DGR programme, i.e. granitoids. SÚRAO uses this facility mainly for the conducting of demonstration experiments aimed at proving the feasibility and behaviour of DGR engineered barriers. An experimental EPSP plug was constructed here as part of the EU DOPAS project, the testing of which continues with the support of SÚRAO. A further major project underway at the facility is the Mock-up Josef experiment which is concerned with the monitoring of the influence of temperature on the bentonite barrier surrounding the waste disposal package.

The Bukov Underground Research Facility (URF) is SÚRAO's most important research facility. The Bukov complex is located in the east of the Czech Republic in the southern section of the Rožná uranium mine at the depth envisaged for the future DGR, and is characterised by geotechnical and geochemical conditions that are very similar to those of the DGR candidate sites.

The URF, located at a depth of 550 m below the surface, serves for SÚRAO as a test site for the verification of the behaviour of the rock environment and various materials at a depth that corresponds to that of the future deep geological repository. The Bukov URF project schedule comprises three distinct phases:

1) Construction (2013–2017)
2) Characterisation (2015–2017)
3) Experimental phase (from 2017)

The research programme is divided into seven basic areas, referred to as REPs (research and experimental plans). The content of the various research areas was defined based on strategic documents compiled by SÚRAO, i.e. the Medium-term Research and Development Plan for the needs of DGR Siting in the Czech Republic 2015–2025 and Requirements, Suitability Indicators and Site Selection Criteria for the Siting of the DGR, as well as on legislative requirements (the Atomic Act) and international recommendations.

The Research of Fracture Connectivity

project, which simulates transport processes in the isolation part of the DGR, commenced in 2019 and a number of hydrogeological monitoring projects and interaction and other experiments continued during the year.

In 2016, based on Government Resolution No. 50/2016 of 25 January 2016, point IV (1), instructing the Minister of Industry and Trade to ensure the fulfilment of the assignments set out in Chapter 8 of Part III of document No. 1617/15, SÚRAO is required to:

a) Inform the government via its annual report on the securing of the financing of the construction of the URF for the upcoming period from the relevant operational programme.

No funding was claimed from the PIK Operational Programme in 2019.

b) Assume the ownership and ensure the management of the URF and assume responsibility for the fulfilment of the respective objectives in accordance with the relevant legislation and related regulations. SÚRAO is required to inform the government on the course of the construction and operation of the URF via its annual report.

In connection with the termination of mining activities at the Rožná mine, a contract was concluded in 2017 between SÚRAO and DIAMO s.p. concerning the operability and routine maintenance of the Bukov URF. This contract ensured the continued operation of those sections of the Rožná mine necessary for the operation of the Bukov URF and established the relationship between the owner of the URF (SÚRAO) and the operator of the Rožná mine (DIAMO s.p.). The contract was concluded for the period up to November 2019 and extended via a contractual amendment up to 2020. Intensive negotiations took place in 2019 on the terms of the continuation of the contract.

c) Inform the government via its annual report on the securing of financing for the construction and operation of the URF in those sections where it is not possible to use funding from the relevant operational programme from the nuclear account maintained with the Czech National Bank, with assessments of both the effective and efficient use of funding in previous years and the funding required (planned) for the upcoming period.

All the construction and research activities conducted in 2019 were financed from the nuclear account on the basis of long-term contracts. A total of CZK 112.6 million was spent on the construction of the URF and CZK 317.5 million on its operation up to the end of 2019. The projects underway in 2019 proceeded in accordance with the respective project plans with no delays or budget increases. With respect to SÚRAO research projects, the scientific research activities set out in the respective contracts are fully compatible with the requirements of the medium-term research and development plan. The efficiency of the operation of the URF will be assessed in 2020 as part of planned negotiations on a follow-up agreement on the operation of the facility with DIAMO s.p.

International cooperation

International institutions play a number of important roles in the field of radioactive waste management, including the initiation of legislative and regulatory changes and the creation of the conditions for experts to meet and exchange information. It is, therefore, of the utmost importance to maintain international contacts and to participate in the activities of such institutions to the maximum extent possible. SÚRAO's international activities can be divided into three categories.

The first category comprises the membership of international organisations such as the International Atomic Energy Agency and the Nuclear Energy Agency (NEA) of the OECD, both of which have European and non-European member countries such as the USA, Canada, Japan, South Korea and China. In 2017, a SÚRAO member of staff was elected chairman of the Crystalline Club expert group (part of the NEA/OECD), the membership of which comprises more than 30 experts from 6 countries whose DGR programmes are considering crystalline rocks as the potential host environment.

Participation in the IGD-TP (Implementing Geological Disposal - Technology Platform) technology platform is also of significant importance for SÚRAO. The IGD-TP identifies strategic research and development priority areas with the vision of the commissioning of the first deep geological repository in the EU by 2025 (Sweden, Finland, France). SÚRAO has its own representative in the IGD-TP Executive Group.

The next category consists of cooperation on international projects that are organised and financed by the European Commission as well as international consortia set up to address particular issues. These projects mostly concern research and development.

The EU EURAD project, with the participation of more than 100 organisations, is one of the most important projects in which SÚRAO is involved. The project commenced in 2019 and the first phase is scheduled to last five years. EURAD will address a wide range of topics related to the disposal of radioactive waste. The European Commission attaches particular importance to the project, hence the participation of organisations from the Czech Republic is seen as both beneficial and of particular significance. The second wave of the EURAD project is currently under preparation. SÚRAO is both actively involved in the project and coordinates the activities of the various Czech third party participants (Czech Technical University, Charles University, ÚJV, a.s., the Institute of Geonics AS CR and the Technical University of Liberec).

A further EU project in which SÚRAO is involved is the BEACON project, which is concerned with the development of bentonite barriers. The aim of the project is to form an understanding of the homogenisation of the bentonite barrier and to determine the requirements for the homogeneity of the barrier from the point of view of long-term safety.

The conducting of joint experiments in foreign underground laboratories (for example in the Grimsel Test Site (GTS)

laboratory in Switzerland) also yields very valuable research results. The main aim of such experiments is to form an understanding of the processes that will occur in DGRs located in crystalline rocks and to obtain data for safety analysis purposes.

Such experiments are usually long term and focus on retarding the transport of radionuclides via diffusion from fractures into the crystalline rock matrix, e.g. the LTD (Long Term Diffusion) experiment, a unique experiment that involves the use of radionuclide tracers in the natural rock environment of the Grimsel facility. The MaCoTe (Material Corrosion Test) experiment, which also involves the participation of SÚRAO, is concerned with the long-term assessment of the rate and mechanism of the corrosion of waste disposal package (WDP) materials under real rock mass conditions. The experiment involves the testing of materials designed in the WDP research and development programme. A further important project underway at the GTS comprises the Hotbent experiment involving the construction of a bentonite barrier at the real DGR scale and the production of barrier components from Czech bentonite (at the industrial scale). One of the main benefits of the experiment comprises the evaluation of the behaviour of Czech bentonite in a real rock environment and its comparison with the DGR research reference bentonite, and the verification of the corrosion properties of the materials that will make up the Czech waste disposal package under real conditions.

SÚRAO is active in many other international projects including: TDB 6 (Thermochemical Database Project), SKB Task Force EBS, SKB Task Force GWFTS, DECOVALEX 2019, CIM and BIOPROTA.

The final category consists of bilateral cooperation, via which SÚRAO shares its know-how with other European and global organisations active in the field of RAW management (waste management organisations – WMO) through the conclusion of memoranda of cooperation.

One example of such cooperation comprises an agreement with the Finnish consortium Posiva Oy/Saanio & Riekkola Oy. The aim is to strengthen the Czech DGR development management structure via the involvement of foreign experience, including ensuring the conditions for related research and development work and the development of technical solutions that demonstrate the feasibility and safety of the DGR at the potential sites considered in the Czech Republic. Memoranda of understanding have also been concluded with German and Romanian organisations aimed at sharing best practices on relevant topics.

Communication with the public

Communication with the public

One of SÚRAO's long-term aims is to increase the general awareness of the existence of radioactive waste and the methods available for its safe disposal in the Czech Republic and abroad. The availability of information on radioactive waste and its management forms a prerequisite for discussions between all the various stakeholders on the method eventually applied for the final disposal of radioactive waste and spent nuclear fuel in the Czech Republic.

Therefore, as every year, SÚRAO's communication activities in 2019 focused on raising awareness of the existence of radioactive waste in the Czech Republic and its safe disposal.

With respect to the areas in which the Richard, Dukovany and Bratrství repositories are located, communication concerned primarily the provision of information on the safe operation of these facilities.

The exchange of information took place as part of regular civil control committee meetings. SÚRAO is a member of the Dukovany Civil Safety Committee, and SÚRAO representatives regularly attend meetings of the committee. In recent years, SÚRAO initiated the establishment of so-called civil control committees for its two operational near-surface repositories, Bratrství and Richard. The motive for the establishment of these committees concerned efforts to strengthen the level of trust between local inhabitants and SÚRAO. The main task of these committees is to conduct independent inspections of the operation of the repositories, to compare them with the relevant international practice and to inform the local public of their findings. The members of the commissions comprise representatives from the affected and surrounding municipalities and the respective regional authorities as well as experts from SÚRAO and the Czech Mining Authority. Several non-scheduled meetings took place during the year at the request of local councils.

A further key task for the SÚRAO communications department concerns the provision of information to the sites that have been selected for the potential location of the future Czech deep geological repository for the permanent disposal of high-level waste and spent nuclear fuel.

Communication with the public in this respect focused primarily on providing information on the planned reduction in the number of sites based on the long-term collection of data and detailed scientific analysis in the fields of geology, hydrology, geophysics, etc. The so-called Expert Advisory Panel on the DGR, established by the Managing Director of SÚRAO, commenced its work in mid-November; each site was invited to nominate two non-voting observers to the Panel.

The key factors considered in the assessment of the candidate sites comprised long-term safety, technical feasibility, environmental impacts and, not least, the attitudes of local inhabitants.

Information meetings with the mayors and other representatives of the sites were held either by prior arrangement or at their direct request.

The Communications department continued to organise conferences and international relations meetings during the year both in the Czech Republic and abroad.

In May 2019, SÚRAO was closely involved in the organisation of the 1st "Safe and Sustainable Back-end of the Fuel Cycle" international conference which took place in Prague. More than a hundred experts from around the world agreed that that the DGR is currently the best option to the isolation of HLW and SNF from the environment. Experts from a range of European and non-European countries presented their experiences, waste concepts and national strategies over the two days of the conference.

As in previous years, an excursion was organised for the mayors and other representatives of the candidate DGR sites and municipalities which host currently operational repositories. Finland was chosen for the September visit due to its having the most advanced DGR construction programme and where the construction of the facility is already underway. A number of journalists from leading Czech media also participated in the visit.

SÚRAO also organised its second summer school during the year. The one-week course for students of technical subjects and the natural sciences once again proved to be popular with participants.

In 2019, SÚRAO continued to publish its quarterly "News from SÚRAO" newsletter, which is distributed directly to all the inhabitants of the candidate DGR sites and the respective municipal authorities.

SÚRAO employs a variety of communication channels, i.e. websites, printed press materials, social network sites, etc.

SÚRAO also regularly provides presentations for elementary and secondary schools so that even the youngest generations are made aware of radioactive waste issues. In 2019, SÚRAO's main information centre was visited by more than 1,000 students, and 600 schoolchildren attended such presentations in schools across the country as part of SÚRAO's educational programme.

SÚRAO is obliged to provide information to the public pursuant to Act No. 106/1999 Coll. on free access to information. In 2019, SÚRAO received 6 requests for the provision of information according to the Act.

Provision of information to the public during 2019 according to Act No. 106/1999 on free access to information:

Number of applications for information under the Act	6
Number of appeals against a ruling	1
Conclusions of proceedings on sanctions for infringement of the Act	–
Other information concerning the implementation of Act No. 106/1999	–

Provision of information to the public during 2019 according to Act No. 123/1998 on the right to information on the environment:

Number of applications for information under the Act	0
Number of appeals against a ruling	0
Conclusions of proceedings on sanctions for infringement of the Act	0
Other information concerning the implementation of Act No. 123/1998	–

Other activities

In addition to the operation of existing repositories and the preparation of the DGR project, SÚRAO is also responsible for the following:

- the monitoring of the impact of its radioactive waste repositories on the environment;
- radioactive waste management and the provision of related services;
- ensuring the safe handling of nuclear materials and other sources of ionising radiation;
- the maintaining of records of radioactive waste and nuclear materials received;
- the administration of charges for the disposal of radioactive waste (in the nuclear account);
- the inspection of the reserves of decommissioning permit holders, including the inspection of contractual conditions governing the maintenance of regulated accounts and the granting of approval for the withdrawal of funds from such reserves;
- the provision of financial contributions to municipalities;
- the provision of subsidies for the disposal of old radiation sources.

Financial management

Financial management

SÚRAO's activities are financed primarily from the Nuclear Account and state budget funds in compliance with the Atomic Act, Article 113, paragraph 6 which sets out rules for the management of radioactive waste disposed of prior to 1 July 1997 and old radiation sources.

SÚRAO is authorised to manage state property and consequently maintains the relevant accounts in pursuance of Act No. 563/1991 on accounting and Decree No. 410/2009 that implements certain provisions of Act No. 563/1991, and according to Act No. 218/2000, on budgetary rules. SÚRAO's budget is determined according to a budget structure defined by Ministry of Finance Regulation No. 323/2002, as amended.

SÚRAO creates no reserves and all its revenues from services provided to radioactive waste producers are deposited in the Nuclear Account.

Utilisation of budget funding in 2019

Item no.	Item (CZK thousand)	Approved budget	Adjusted budget	Budget utilisation	Utilisation percentage
5	Current expenses	358 215,67	358 215,67	258 031,68	72,03
6	Capital expenses	453 858,00	453 858,00	284 448,26	62,67
	Total expenses:	812 073,67	812 073,67	542 479,94	66,80

Expenses are subdivided into current expenses and capital expenses. In addition to items included in mandatory indicators, expenses concerning purchases and services relating to the operation of repositories and the Bukov URF and those ensuing from external consultancy, telecommunications services, transfers to municipalities and administration services are included in current expenses. Expenses relating primarily to the DGR programme including research and development work, the reconstruction of existing repositories and expenses resulting from other partial investment purchases are included in capital expenses. A detailed review of the utilisation of budget funding by individual item, accompanied by a commentary, was submitted to SÚRAO's Board as required.

Assessment of SÚRAO´s performance in 2019

SÚRAO met its responsibilities for the safe and reliable operation of Czech radioactive waste repositories during 2019 as defined in the Atomic Act. Preparations continued for the development of a deep geological repository in which high-level radioactive waste and spent nuclear fuel will be disposed of in the future. Concerning the efficient utilisation of budget funds allocated to external subcontractors, SÚRAO complied with the provisions of Act 134/2016, on the procurement of public contracts and the funds expended were effectively employed for the performance of the tasks of SÚRAO according to the approved budget and plan of activities.

Auditor's report

The financial statements of SÚRAO were subjected to an external audit performed by the 22Hlav, s.r.o. auditing company registered in the list of auditing companies maintained by the Czech Chamber of Auditors (no. 277). The auditor's report is set out in Appendix C.

Annexes

A. Balance sheet as at 31. 12. 2019
B. Profit and loss statement as at 31. 12. 2019
C. Auditor’s report with the Auditor’s opinion
D. Abbreviations used in the report

Annex A: Balance sheet as at 31 December 2019 (CZK thousand)

		Current period			Previous period
		Gross	Correction	Net	
ASSETS		1 947 343,92	530 154,50	1 417 189,42	1 239 771,54
A.	**Fixed assets**	**1 936 157,18**	**530 124,02**	**1 406 033,16**	**1 217 733,88**
I.	Long-term intangible fixed assets	1 303 061,05	354 390,56	948 670,49	760 072,63
II.	Long-term tangible fixed assets	633 082,17	175 733,47	457 348,70	457 647,28
III.	Long-term financial assets	0	0	0	0
IV.	Long-term receivables	13,96		13,96	13,96
B.	**Current assets**	**11 186,74**	**30,48**	**11 156,26**	**22 037,67**
I.	Stocks	418,35		418,35	430,69
II.	Short-term receivables	779,47	30,48	749,00	453,28
III.	Short-term financial assets	9 988,91		9 988,91	21 153,70

LIABILITIES				1 417 189,42	1 239 771,54
C.	**Equity capital**			**1 352 637,37**	**1 116 161,34**
I.	Owned capital and adjustments			860 948,19	860 948,19
II.	Financial funds			3 662,94	2 612,04
III.	Profit/loss account (including unpaid losses from previous years)			-1 155 229,43	-848 174,64
IV.	Budget management income and expenditure account			1 643 255,68	1 100 775,76
D.	**Other sources**			**64 552,05**	**123 610,20**
I.	Reserves			0	0
II.	Long-term payables			2 024,50	1 858,27
III.	Short-term payables			62 527,55	121 751,93

Annex B: Profit and loss statement as at 31 December 2019 (CZK thousand)

Item no.	Item name	Current period Main activity	Previous period Main activity
A.	**Total expenses**	**323 063,17**	**350 600,16**
I.	Expenses from activities	289 731,68	292 119,77
II.	Financial activities	147,24	101,07
III.	Transfer expenses	33 184,24	58 379,31
IV.	Shared tax expenses	0	0
B.	**Total revenues**	**16 008,38**	**27 360,61**
I.	Revenue from activities	15 975,69	27 328,90
II.	Financial revenue	32,69	31,71
III.	Revenue from taxes and charges	0	0
IV.	Transfer revenue	0	0
V.	Revenue from shared taxes	0	0
VI.	SURPLUS/DEFICIT		
1.	Surplus/deficit before tax	-307 054,79	-323 239,55
2.	Surplus/deficit after tax	-307 054,79	-323 239,55

Annex C: Auditor's report with the Auditor's opinion

Auditor's opinion

We have audited the accompanying financial statements of the Czech Radioactive Waste Repository Authority (hereinafter referred to as the "Organisation") prepared in accordance with Czech accounting regulations and consisting of the balance sheet as at 31 December 2019, the profit and loss statement for the year ended 31 December 2019 and the appendix to these financial statements, which provides a description of the significant accounting policies applied and other explanatory information. Details of the Organisation are provided in Note I to the financial statements. In our opinion, the financial statements provide a true and fair view of the assets and liabilities of the Organisation as at 31 December 2019 and of the costs, revenues and operational results for the year ended 31 December 2019 in accordance with Czech accounting regulations.

We conducted the audit in accordance with the Act on Auditors, Regulation (EU) No. 537/2014 of the European Parliament and of the Council and the standards of the Chamber of Auditors of the Czech Republic, which comprise international standards on auditing (ISA), supplemented and modified by the related application clauses. Our responsibility defined by these regulations is described in more detail in the Auditors' Responsibility for Auditing the Financial Statements section. In accordance with the Auditor Act and the Code of Ethics adopted by the Czech Chamber of Auditors, we are independent of the Organisation and have fulfilled other ethical obligations arising from these regulations. We believe that the probative information collected gives an adequate basis for forming our opinion.

Other Information Provided in the Annual Report

In accordance with Section 2b) of the Act on Auditor information, other information means all information provided in the Annual Report in addition to the financial statements and the Auditor's Report. The management of the Organisation is responsible for any other information provided.

Management responsibility for the financial statements

Our objective is to obtain reasonable assurance on whether the financial statements as a whole are free from material misstatement, whether due to fraud or error, and to issue an auditor's report that outlines our opinion. While a reasonable level of assurance comprises a high level of assurance, it is not a guarantee that the audit performed in accordance with the above regulations will in all cases reveal all significant (material) misstatements in the financial statements. Irregularities may arise as a result of fraud or error and are considered material if it can be reasonably assumed that, individually or collectively, they would influence the economic decisions made by users on the basis of the financial statements.

We are obliged to inform the Managing Director, inter alia, of the planned scope and timing of the audit and of any significant findings made during the audit, including any major deficiencies identified in the internal control system.

22HLAV s.r.o.
member of the international association of independent professional companies

MSI Global Alliance, Legal & Accounting Firms
Všebořická 82/2, 400 01 Ústí nad Labem
Czech Chamber of Auditors authorisation no. 277

Ing. Jan Černý
Czech Chamber of Auditors authorisation no. 2455

Prague, 29 April 2020

Annex D: Abbreviations used in the report

AS CR	Czech Academy of Sciences
BEACON	Bentonite Mechanical Evolution project, programme EC H2020, https://www.beacon-h2020.eu/
BIOPROTA	Research project on the migration of radionuclides into the biosphere, https://www.bioprota.org/
CIM	Research project on carbon and iodine migration in cement (GTS), https://www.grimsel.com/gts-phase-vi/
DECOVALEX	Development of Coupled models and their Validation against Experiments research project on modelling, https://decovalex.org/
DGR	Deep geological repository
DOPAS	Full-Scale Demonstration of Plugs and Seals research project, http://www.posiva.fi/dopas
EBS	Engineered Barrier System
EC	European Commission
EDU	Dukovany nuclear power plant
EPSP	Experimental Pressure and Sealing Plug, part of the DOPAS experiment conducted in the Czech Republic, http://www.posiva.fi/en/dopas/wp_3/experiment_2_epsp
ETE	Temelín nuclear power plant
EU	European Union
EURAD	Research project, programme EC H2020, https://www.ejp-eurad.eu/about-eurad
GTS	Grimsel Test Site, https://www.grimsel.com/
GwTFS	Groundwater Flow and Transport of Solutes research project
HLW	High-level waste
HotBent	High Temperature Effects on Bentonite Buffers research project, https://www.grimsel.com/gts-phase-vi/
IAEA	International Atomic Energy Agency
IGD-TP	Implementing the Geological Disposal of radioactive waste Technology Platform, https://igdtp.eu/
ISA	International Standards on Auditing,
LTD	Long Term Diffusion research project, https://www.grimsel.com/gts-phase-vi/ltd/ltd-introduction

MaCoTe	Material Corrosion Test research project, https://www.grimsel.com/gts-phase-vi/macote-the-material-corrosion-test/macote-introduction
Mock-up Josef	Research project, https://ceg.fsv.cvut.cz/vyzkum/projekty/2011-2015-mock-up-josef
OECD/NEA	Atomic Energy Agency of the Organisation for Economic Cooperation and Development, https://www.oecd-nea.org/
RAW	Radioactive waste
REP	Research and experimental plan
SKB	Swedish company for the management of nuclear waste
SNF	Spent nuclear fuel
SÚJB	State Office for Nuclear Safety
SÚRAO	Czech Radioactive Waste Repository Authority
TDB	Thermochemical Database research project, https://www.oecd-nea.org/dbtdb/
URF	Underground research facility
WDP	Waste disposal package

SÚRAO's Board

SÚRAO´s Board is an advisory body established by the Ministry of Industry and Trade. The main task of the Board is to supervise the cost-effective and efficient use of funds. Board members are appointed by the Minister of Industry and Trade and include representatives of state administration authorities, radioactive waste producers and the public.

Mr. René Neděla (chairperson)
Ministry of Industry and Trade

Mr. Ladislav Štěpánek
ČEZ, a.s.

Mr. Radim Blaheta
Head of the Institute of Geonics of the Czech Academy of Sciences

Mr. Martin Holý
Ministry of the Environment

Ms. Hana Slavíčková
Ministry of Finance

Mr. Vladimír Černý
Rouchovany town council

Mr. Pavel Gryndler
Litoměřice town council

Mr. Bohdan Zronek
ČEZ, a.s.

Mr. Daniel Jiřička
ÚJV Řež, a.s.

Mr. Radek Trtílek
ÚJV Řež, a.s.

Mr. Martin Ďurďovič
Institute of Sociology of the Czech Academy of Sciences

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SÚRAO | RADIOACTIVE WASTE REPOSITORY AUTHORITY

Published in 2020 by SÚRAO
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