



# SÚRAO

RADIOACTIVE  
WASTE REPOSITORY  
AUTHORITY



**ANNUAL  
REPORT  
2016**



## SÚRAO'S MISSION

The Radioactive Waste Repository Authority (SÚRAO) is a state organisation and its activities and management are regulated by Article 113 of Act 263/2016 (the Atomic Act). SÚRAO's mission is to ensure the safe disposal of existing and future radioactive waste in compliance with the requirements of nuclear safety and human and environmental protection.

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**Jiří Slovák**  
**Managing Director**

## **MANAGING DIRECTOR'S INTRODUCTION**

Dear friends, colleagues, ladies and gentlemen,

The Radioactive Waste Repository Authority (SÚRAO) has fulfilled its principal mission – statutory responsibility for the safe disposal of all radioactive waste produced in the Czech Republic – since 1997, of which the continued safe operation of our three repositories provides ample proof. The Authority occupies an important position in the overall radioactive waste management system and is well prepared for the challenges it will face in the future.

Via this Annual Report we aim to provide you with an update on both our activities and results achieved in 2016.

All three repositories for low-level and intermediate-level waste were operated in compliance with relevant licences. With the aim of improving the quality and standards of waste disposal, a variant study for the reconstruction of the Richard repository was completed the objective of which consisted of the assessment of the technical options of repository reconstruction aimed at ensuring improvements in terms of safety and safe operation after 2025. We continue to devote particular attention to existing repositories and their safe operation as well as to transparent communication with the public at the local level. 2016 was the first year of activity of the Richard Civic Control Commission which comprises representatives of the town of Litoměřice and surrounding communities and the Ústí-nad-Labem region.

Concerning the preparation of the deep repository for high-level waste and spent nuclear fuel, the first stage of geological investigation work was carried out with the aim of reducing the number of sites from 7 to 3 – 4. The main focus of the site selection process will always be on the safest possible design. Each stage of the site assessment process and the gradual reduction in their number will comprise detailed data analysis which proves that repository construction at the locality is feasible and that the safety requirements correspond both to statutory requirements and international recommendations. In 2016, SÚRAO applied for the extension of the validity of investigation area status; proceedings in this matter have not yet been completed.

An integral part of the future decision on candidate sites and the final site will consist of the acceptability of the future design by the affected communities. SÚRAO has always strived to deal with the municipalities concerned in an open and transparent way. The municipalities are kept regularly informed of the progress of the DGR project via its "News from SÚRAO" newsletter and at joint meetings with municipality representatives. Statutory contributions amounting to nearly CZK 72 million were paid during 2016 to those communities in whose areas investigation areas for specific encroachment into the Earth's crust have been identified.

The construction of SÚRAO's Bukov Underground Research Facility, which will provide arguments, data and characteristics for the safety assessment of the future deep repository from depths in the rock environment considered for DGR construction, continued during the year. In addition, regime measurements, initial research work and experimental projects commenced. The development of a disposal container represents a particularly important project in the field of engineered barriers and it will exert a substantial impact on the technical, safety and economic design of the future DGR disposal system. The disposal container must comply with all requirements concerning lifetime and safety. SÚRAO is active in a number of international research projects both at the bilateral and multilateral levels and SÚRAO's participation in the Steering Committee of the IGD-TP technology platform (Implementing the Geological Disposal of Radioactive Waste Technology Platform) has proved particularly important in this respect.

Due to active involvement in international cooperation including with the French agency ANDRA, it is generally acknowledged that the Authority's level of prestige has increased considerably. Two Memoranda of Understanding were signed during the year with POSIVA, the Finnish agency and SOGIN, the Italian agency for radioactive waste disposal.

I consider the activities of the Working Group for Dialogue on the Deep Repository to be a great success despite its holding only two meetings during 2016 and the resignation of representatives from a number of localities. As a result of Working Group for Dialogue on the Deep Repository discussions over a total of six years, a preliminary Draft Act was prepared relating to the involvement of municipalities in the deep repository for high-level waste siting process. This Draft was subsequently included in the Government's legislation plan to be completed by mid-2018.

Finally, allow me to say that, as in previous years, SÚRAO successfully fulfilled its mission in 2016. We continued to operate our radioactive waste repositories safely and in compliance with international standards and, in cooperation with leading Czech experts and foreign colleagues, we continue to closely follow and, where relevant, subsequently implement the latest research and development trends in the field of radioactive waste management.

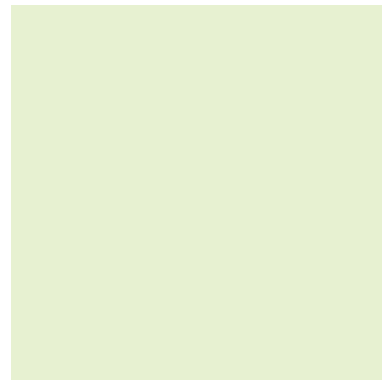
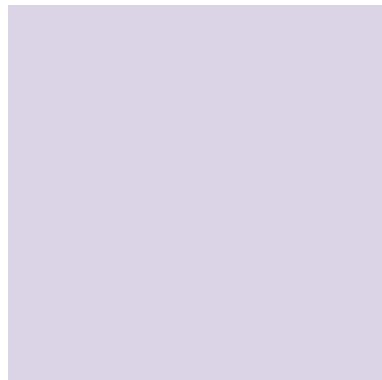
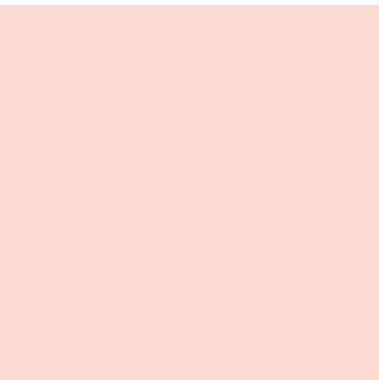
It is my pleasure once again to express my thanks to all SÚRAO's employees without the unstinting efforts and invention of whom we would not have been able to achieve such highly satisfactory results.

A handwritten signature in black ink, appearing to read "Jiří Štěpánek". The signature is fluid and cursive, with the first name "Jiří" and last name "Štěpánek" clearly distinguishable.

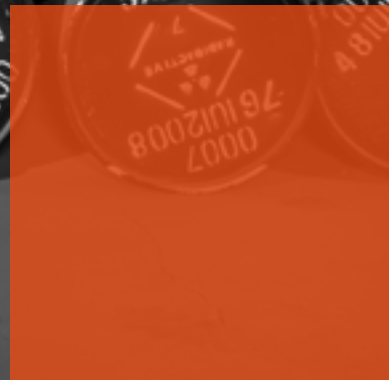
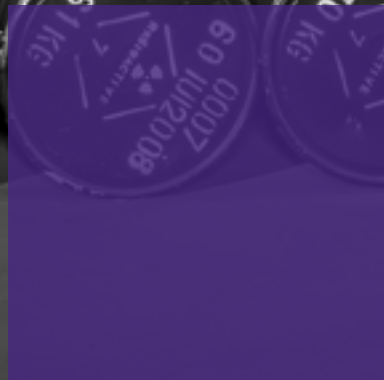


# Radioactive waste

Radioactive waste is generated by the medical, research and industrial sectors as well as by nuclear power plants producing electricity. More than 19,000m<sup>3</sup> of radioactive waste has been safely disposed of to date.









# CURRENT SITUATION IN RADIOACTIVE WASTE MANAGEMENT

Low-level and intermediate-level waste make up the largest category of radioactive waste in terms of volume. This type of waste, liquid or solid, is generated during the operation and decommissioning of nuclear reactors and when dealing with ionising radiation sources and, since its radioactivity level decreases considerably after a few hundred years, it can be disposed of in near-surface repositories. The technology for the processing and conditioning of such radioactive waste prior to its disposal is well-established and is fully implemented in the Czech Republic.

Low-level and intermediate-level waste generated at nuclear power plants is stored at a surface disposal facility located within the Dukovany nuclear power plant complex. The facility's total disposal capacity of 55 000m<sup>3</sup> (around 180,000 drums of 200 litres each) is able to accommodate all the waste that it is estimated will be generated at the Dukovany and Temelín NPPs, provided that the waste meets acceptability criteria, as well as that low-level and intermediate-level waste which will have to be stored following the decommissioning of both nuclear power plants.

Low-level and intermediate-level waste generated by the industrial, research and medical sectors is disposed of at the Richard and Bratrství repositories; in addition, the Dukovany repository is partly utilised for this purpose.

The Richard repository was constructed on the site of the former Richard II limestone quarry. Institutional waste has been disposed of at this repository, which has a total RW disposal volume of 10,249m<sup>3</sup>, since 1964. Using experience of repository operation to date, it is envisaged that it will be possible to expand the disposal capacity of the Richard repository by adapting currently unused space within the existing repository complex. SÚRAO has, in the past, adapted several mined spaces at the Richard facility for repository use and, based on experience gained, predicts that adaptation could be completed within two years of the issuance of the relevant licence by the State Office for Nuclear Safety (SÚJB).

The Bratrství repository is designed for the disposal of waste containing naturally occurring radionuclides. It was constructed in one of the mined cavities of a former uranium mine and contains five chambers with an overall capacity of approximately 1,200m<sup>3</sup>. The facility was put into operation in 1974. The capacity of the Bratrství repository will soon be fully utilised and it is envisaged that the disposal of waste at this repository will end in around 2020. The operation of all Czech repositories, including the monitoring of the now-closed Hostim repository, is managed by SÚRAO in compliance with the relevant licences granted by the SÚJB and, in the case of the Richard and Bratrství repositories, in compliance with permits and licences issued in accordance with mining regulations.

A certain amount of long-lived low-level and intermediate-level waste is also generated which cannot be disposed of in existing near-surface facilities. For this type of waste, special requirements are in place concerning the method and quality of the conditioning necessary for its storage and subsequent disposal in a deep geological repository (DGR). This waste will be stored in adapted storage areas at the Richard repository up to the time of the commissioning of the deep repository.

High-level waste and spent nuclear fuel classed as waste, will also be disposed of in the future DGR. Nevertheless, waste producers reserve the right to decide on its potential further use. Until such time as the DGR becomes operational, this waste will be stored by its producers.



**OPERATION OF THE DUKOVANY REPOSITORY**

The Dukovany repository is operated by SÚRAO through ČEZ, the Czech power company, on a contractual basis (in accordance with the Atomic Act 18/1997, as amended, Article 26). The acceptance of waste to be disposed of at this repository and certain other responsibilities, such as inspection, are carried out directly by SÚRAO in compliance with limits and conditions for the safe operation of the Dukovany repository and other documents issued by SÚRAO or ČEZ, the contractor.

Normal repository operation during the year included an inspection of buildings and equipment, the maintenance of buildings, land, machinery and electrical equipment, radiation protection, physical protection, emergency preparedness and nuclear safety.

In 2016, the repository accepted 1510 disposal packages containing radioactive waste (332m³) of which 1357 metal 200-litre drums, 10 MOZAIK type disposal packages, 86 storage pallets each with a volume of 0.4m³, 52 items of unpacked waste and 5 non-standard disposal packages. Disposal packages containing radioactive waste were placed in vaults D05 and D08.

The Dukovany NPP (EDU) delivered for disposal a total of 996 waste disposal packages (203m³), of which 414 disposal packages of bituminised waste, 150 disposal packages of unstabilised waste and 432 waste disposal packages of used ion exchangers and sludges solidified into an aluminosilicate matrix.

The Temelín NPP (ETE) delivered for disposal 384 waste packages (77.6m³), of which 289 waste packages of bituminised waste, 10 waste disposal packages of used ion exchangers and sludges solidified into an aluminosilicate matrix and 85 waste packages of unstabilised waste.

The Nuclear Research Institute Řež (ÚJV Řež) delivered for disposal 78 waste packages (40.5m³), of which 63 storage pallets of unstabilised waste, 10 MOZAIK type disposal packages containing waste solidified by means of cementation and 5 non-standard waste packages of unstabilised waste. In addition, 52 waste packages of unpacked lump waste (10.9m³) were delivered from ČEZ.

The monitoring of the repository and the surrounding areas was performed in accordance with the approved monitoring programme; no breach of the limits and conditions for the safe operation of the Dukovany repository were detected during the year.

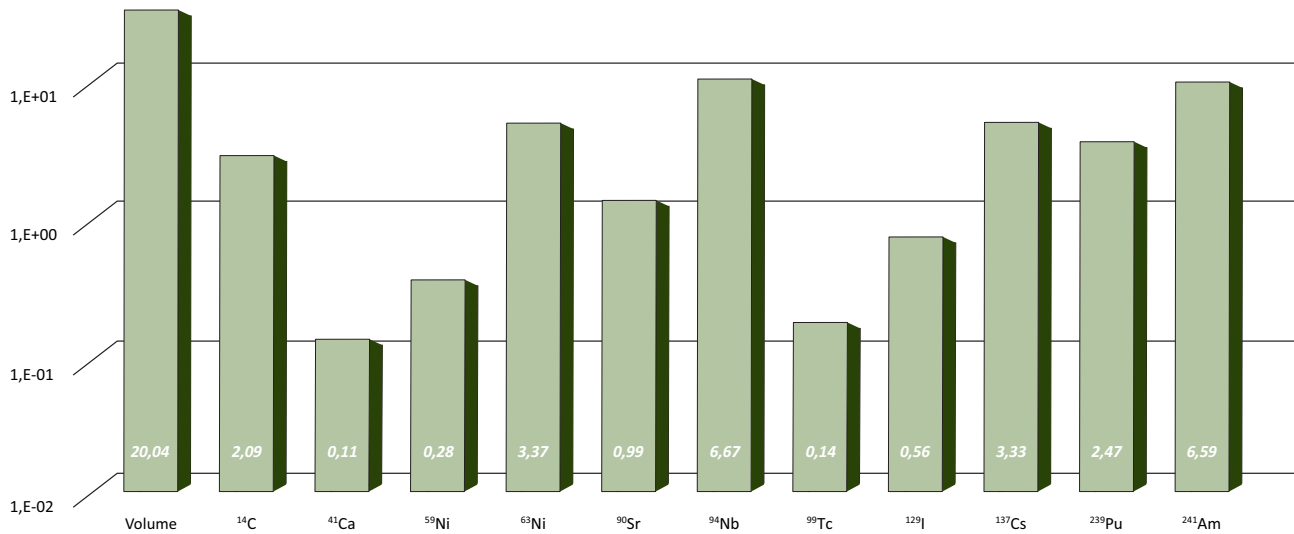
Four inspections were conducted by the SÚJB at the Dukovany repository in 2016. During an inspection performed in June 2016, the SÚJB discovered a breach of limit condition 6.7 concerning random checks of the mass of accepted packages containing radioactive waste. The relevant administrative proceedings initiated by the SÚJB had not been concluded by the end of 2016. SÚRAO submitted a written report on this finding and simultaneously adopted corrective measures aimed at remedying the non-compliance identified.

Basic information on waste disposed of during 2016 is provided in the following table:

Dukovany repository during 2016:		
Volume of waste disposed of	m³ of waste packages (WP)	332 / 1510
of which from EDU	m³ / WP	203 / 996
of which from ETE	m³ / WP	77.6 / 384
of which institutional waste	m³ / WP	51.4 / 130
Mass of the accepted waste	T	493



Overview of the utilisation of the volume and inventory limits of the Dukovany repository as at 31 December 2016



Utilisation (%), Dukovany repository

		Limit	Utilisation [%]
Volume	[m <sup>3</sup> ]	55,000	20.9
<sup>14</sup> C	[bq]	1.00E+13	2.24
<sup>41</sup> Ca		3.00E+11	0.10
<sup>59</sup> Ni		3.00E+12	0.29
<sup>63</sup> Ni		3.50E+13	3.60
<sup>90</sup> Sr		1.00E+13	1.07
<sup>94</sup> Nb		3.00E+10	8.13
<sup>99</sup> Tc		1.00E+12	0.14
<sup>129</sup> I		1.00E+11	0.56
<sup>137</sup> Cs		3.00E+14	3.92
<sup>239</sup> Pu		6.00E+09	2.47
<sup>241</sup> Am		1.00E+10	6.63

## OPERATION OF THE RICHARD AND BRATRSTVÍ REPOSITORIES

Both nuclear facilities – the Richard and Bratrství repositories – were operated by SÚRAO during 2016 in compliance with the relevant licences issued by the State Office for Nuclear Safety (SÚJB) and the Czech Mining Authority (ČBÚ). Normal operation of both repositories covered the inspection of the mined cavities, the maintenance of buildings and equipment, machinery, electrical fittings and land. SÚRAO was also responsible, in accordance with the relevant SÚJB licences, for the physical protection, radiation protection, emergency preparedness and nuclear safety of these repositories.

In 2016, 467 waste packages containing radioactive waste (115.3m<sup>3</sup>) were disposed of at the Richard repository with a total mass of 157t. In addition, 1 waste package was accepted for disposal (0.13m<sup>3</sup>).

63 waste packages were disposed of at the Bratrství repository with a total volume of 13.6m<sup>3</sup> and a total mass of 22t.

The geotechnical and hydrogeological parameters of the Richard and Bratrství repositories were monitored regularly throughout the year. Both facilities were operated in compliance with the relevant statutory safety requirements and legal regulations. Radiation monitoring of the repositories and surrounding areas was carried out in accordance with approved monitoring programmes.

SÚRAO's performance was supervised during 2016 by the SÚJB (four inspections at the Richard repository and two inspections at the Bratrství repository) and the relevant mining supervisory bodies (three inspections, of which one comprehensive inspection at the Richard repository and one inspection at the Bratrství repository). No deficiencies affecting safe operation were detected during the inspections.

The test laboratory at the Richard repository is used to test containers designed for the transport, storage and disposal of nuclear material and radioactive emitters (with a mass of up to 3,200kg) as well for the testing of radioactive substances of special form. One B(U)-type transport container and one A-type container were tested during the year. The laboratory also provided consultancy services to container users and manufacturers throughout the year. The laboratory's total income for 2016 amounted to CZK 201.8 thousand. The Richard repository is currently being used for the temporary management of certain defined radioactive waste (according to an SÚJB Decision issued in compliance with the Atomic Act 18/1997, Article 26, paragraphs 3j and 3k and Article 31, paragraph 4).

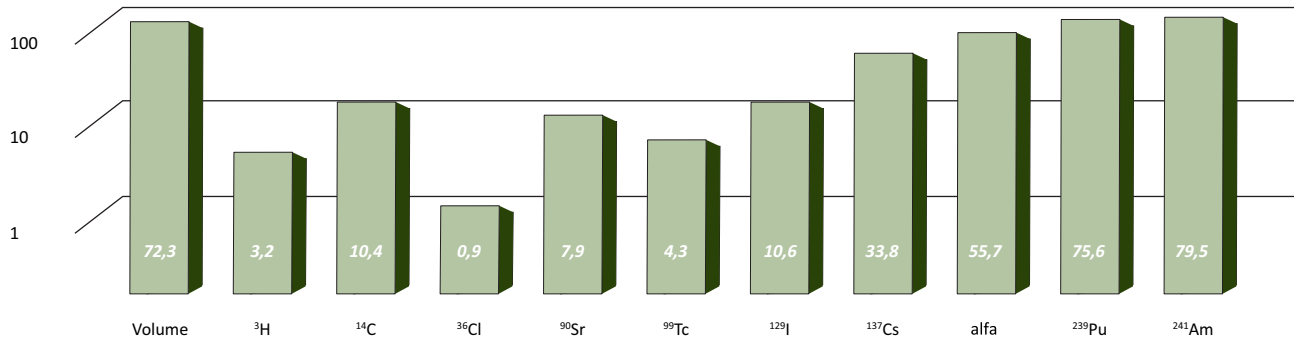
A variant study for the reconstruction of the Richard repository was completed in 2016 concerning the assessment of the technical potential for repository reconstruction and aimed at ensuring the enhancement of the safe operation of the facility post 2025 and the eventual implementation of a technically feasible and economically optimised design variant which will meet all requirements concerning the repository's long-term safety. Preparations for the drawing up of the implementation documentation for the reconstruction and overall modernisation of the Richard repository were launched during the year (modifications to the repository's existing facilities).

Basic information on the waste disposed of during 2016 is provided in the following tables:

Richard repository in 2016:		
Volume of waste disposed of	m <sup>3</sup> / WP	115.3 / 467
Mass of the accepted waste	T	157
Number of waste containers accepted for disposal	Number	1
Bratrství repository in 2016:		
Volume of waste disposed of	m <sup>3</sup> / WP	13.6 / 63
Mass of the accepted waste	T	22



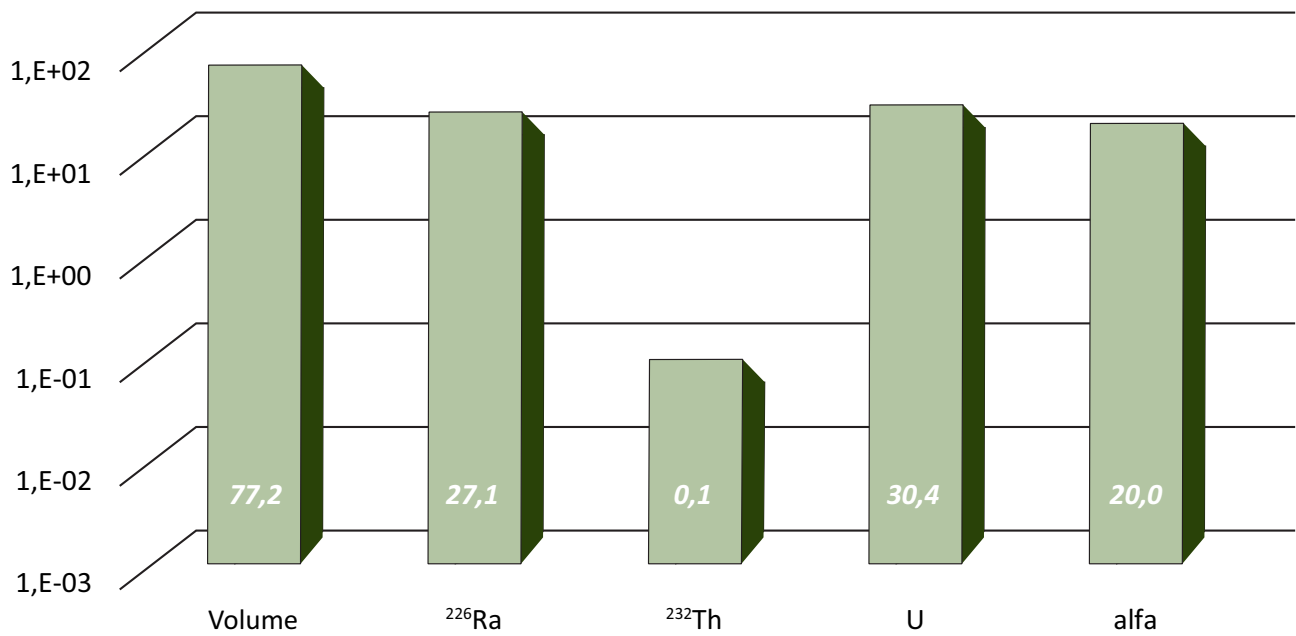
Overview of the utilisation of the volume and inventory limits of the Richard repository as at 31 December 2016



Utilisation (%), Richard repository

		Limit	Utilisation [%]
Volume	[m <sup>3</sup> ]	10,249	72.26
<sup>3</sup> H	[Bq]	1.00E+15	3.23
<sup>14</sup> C		1.00E+14	10.41
<sup>36</sup> Cl		1.00E+12	0.91
<sup>90</sup> Sr		1.00E+14	7.89
<sup>99</sup> Tc		1.00E+11	4.34
<sup>129</sup> I		2.00E+08	10.64
<sup>137</sup> Cs		1.00E+15	33.78
alfa		2.00E+12	55.65
<sup>239</sup> Pu		5.00E+12	75.60
<sup>241</sup> Am		1.30E+13	79.46

Overview of the utilisation of the volume and inventory limits of the Bratrství repository as at 31 December 2016



Utilisation (%), Bratrství repository

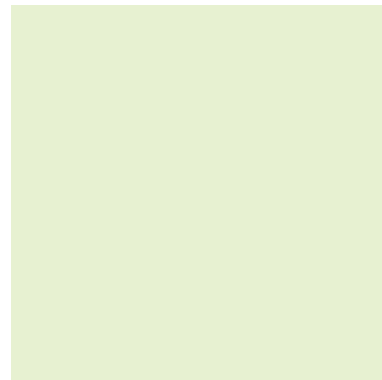
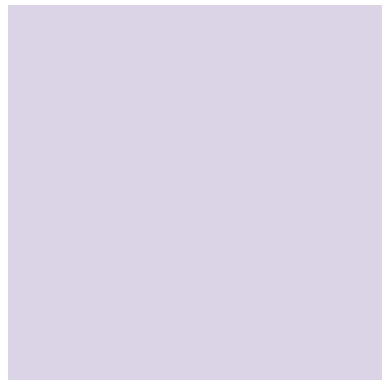
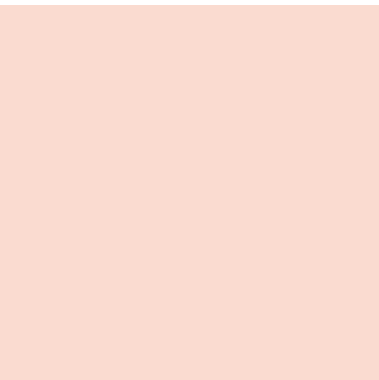
		Limit	Utilisation [%]
Volume	[m³]	1,200	77.24
<sup>226</sup> Ra	[Bq]	5.00E+12	27.06
<sup>232</sup> Th		3.00E+12	0.10
U		2.00E+12	30.43
alfa		1.00E+13	20.02

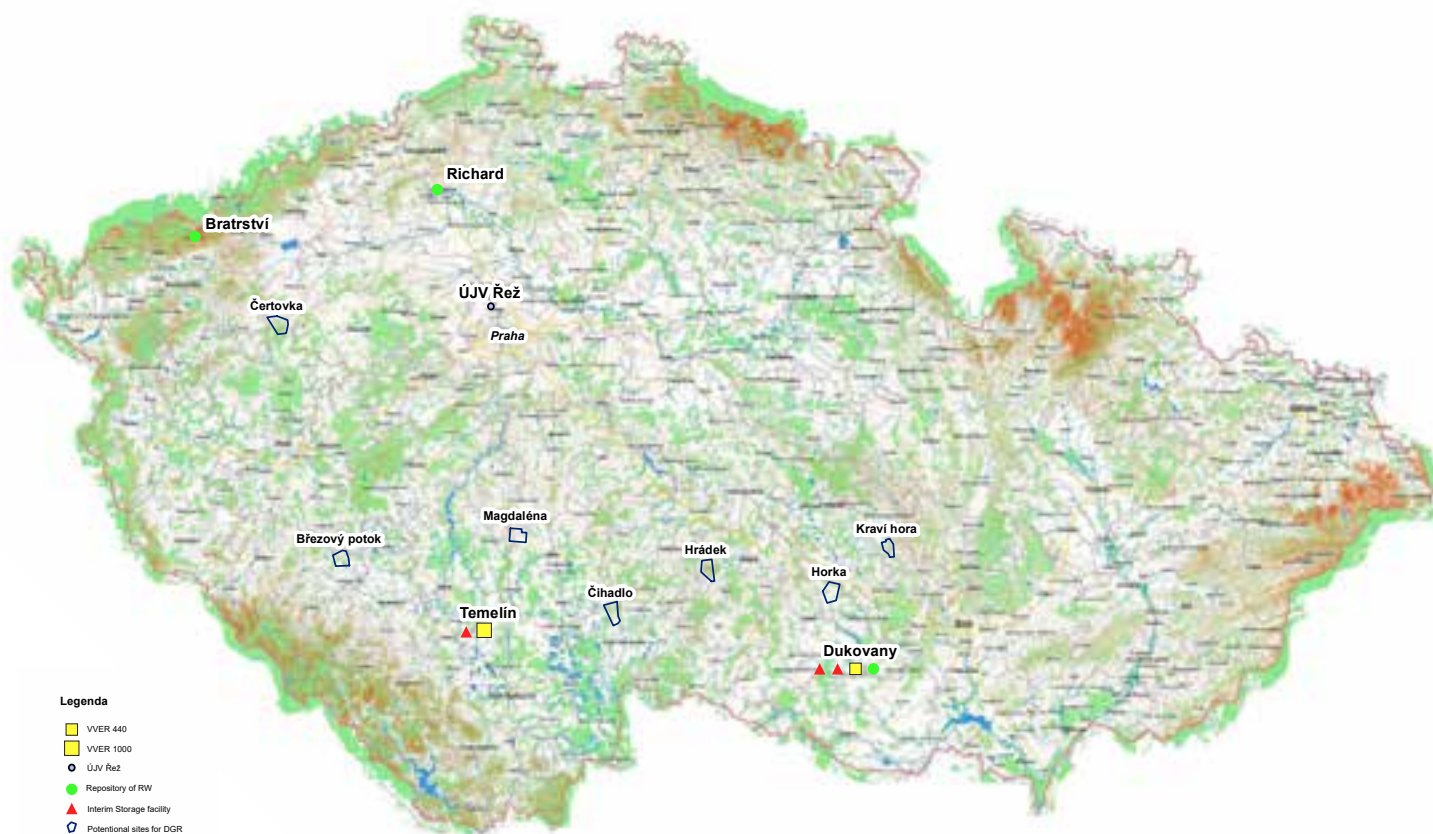




# High-level waste

The operation of both electric power and research nuclear reactors generates spent nuclear fuel which, currently, is safely stored in specially-designed facilities. Once it has been officially declared to be waste, SÚRAO will ensure its secure disposal in a deep geological repository. At present, SÚRAO is conducting investigation work at seven sites selected for the potential siting of the deep repository, as well as verifying a further two alternative sites in the vicinity of nuclear power plants.







## LICENCING AND RADIATION PROTECTION

The main aim of activities related to the licensing procedure and radiation protection is to ensure repository operation and radioactive waste management compliance with the provisions of the Atomic Act 18/1997 and relevant Regulations, primarily SÚJB Regulation 307/2002 on radiation protection.

The licensing procedure for the Richard, Bratrství and Dukovany repositories is carried out every five years unless the SÚJB decides otherwise or unless no changes occur in repository operation or in the properties of waste disposed of which might have an impact on the fulfilment of radiation protection requirements. The basic documentation required for the licensing procedure is prepared in compliance with the Atomic Act 18/1997. The safety report makes up the basic document which proves the safety of the repository in terms of the staff employed at the facility, the general public and the environment. The scope of the safety report is specified in methodological instructions issued by the SÚJB and based on recommendations from the International Atomic Energy Agency (IAEA) in Vienna. The radiation burden of staff members, the public and the environment is assessed using regularly verified procedures and as part of a number of international programmes. Computing tools and computer programs standardised by an SÚJB commission are used for safety analysis purposes.

**“ Repository safety is ensured provided set limits and criteria for the safe operation of such facilities and/or the safe management of radioactive waste, based on the results of safety analysis and approved by the SÚJB, are observed. ”**

Radiation protection activities make up one element of the system for the protection of persons and the environment against the detrimental impact of ionising radiation the main reason behind which is to prevent the release of radionuclides into the environment and the occurrence of emergency situations. The risk of danger to human life and health and the environment must be kept as low as possible with reasonable consideration for the economic and social aspects involved. The maximum acceptable level of risk corresponds to dose limits and other dose restrictions defined by SÚJB Regulation 307/2002 on radiation protection.

The licence for the Dukovany repository is effective until 15 December 2017, for the Richard repository until 31 December 2018 and for the Bratrství repository until 15 December 2018.

The fulfilment of requirements relating to radiation protection (as defined by Regulation 307/2002) has been verified during the monitoring of all the repositories including the now-closed Hostim repository. No radiation protection breach occurred during the year. SÚRAO cooperated closely with outside contractors working at its repositories in terms of organising training courses and regular safety inspections as well as with concern to regular inspections of compliance with requirements concerning radiation protection at SÚRAO's facilities. With concern to statutory requirements for radiation protection, SÚRAO co-operated closely with the SÚJB during their facility inspections and supervised the subsequent correction of any deficiencies

identified relating to the observance of set limits, criteria for the safe operation of repositories, radioactive waste management and radiation protection. Requirements defined in SÚJB Regulation 318/2002 on the emergency preparedness of nuclear installations and facilities containing ionising radiation sources and on requirements concerning the content of the internal Emergency Plan were satisfied and appropriate measures aimed at correcting any deficiencies identified relating to emergency preparedness were implemented.

### **MAINTAINING AN INVENTORY OF ACCEPTED RADIOACTIVE WASTE AND NUCLEAR MATERIAL**

SÚRAO is responsible (according to the Atomic Act 18/1997, Article 26, paragraph 3d) for maintaining an inventory of accepted radioactive waste and its producers. Detailed rules are set out in Regulation 307/2002 on radiation protection. Records of accepted radioactive waste were maintained by SÚRAO both in paper and electronic form.

An inventory of nuclear material is maintained in compliance with SÚJB Regulation 213/2010 on maintaining an inventory and performing the inspection of nuclear materials and on the reporting of data required by the regulations of the European Communities. Nuclear materials are stored at the Richard repository at which the appropriate physical protection level is ensured as required by SÚJB Regulation 144/1997 on the physical protection of nuclear materials and nuclear installations and their categorisation. SÚRAO submits to the European Commission (EC), on a monthly basis, reports on the amount of radioactive materials disposed of and copies of these reports are submitted to the SÚJB. An inspection associated with the physical inventory of nuclear materials is held annually with the participation of EC and IAEA (International Atomic Energy Agency) representatives.

## **MINING SAFETY**

The operation of the Bratrství and Richard underground repositories is authorised based on licences which allow “specific encroachment into the Earth’s crust” issued in compliance with the Mining Act on mining operations and certain other licences issued in compliance with the Mining Operations Act.

Both repositories were operated throughout the year in compliance with relevant legal regulations and licences issued by the Czech Mining Administration and the SÚJB as well as various internal operational regulations, limits and conditions.

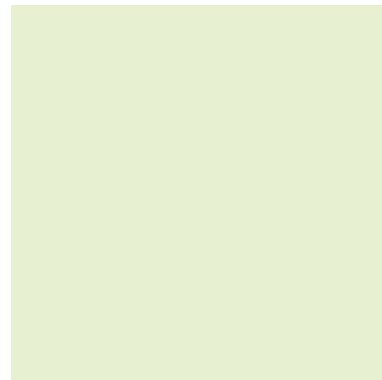
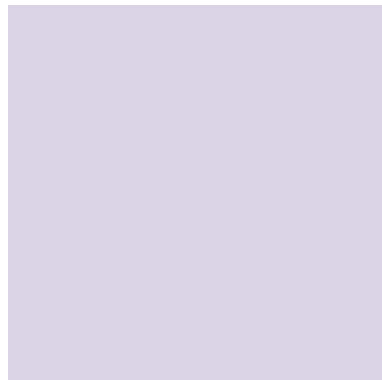
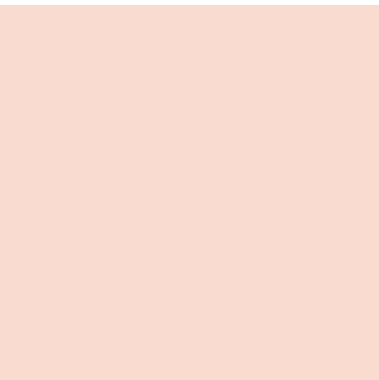
Emergency preparedness exercises relating to the coordination of occupational safety were held throughout the year at both the Richard and Bratrství repositories in accordance with the Emergency.

Compliance with requirements concerning mining safety was verified at the Richard repository in September 2016 by the Regional Mining Authority in Most. A comprehensive review was carried out in the form of five review commissions covering all the underground and above-ground operations performed at the Richard repository, i.e. occupational safety and operations management, mining safety and occupational health protection, machinery and transport technology, surveying and geology.



# Institutional waste

Radioactive waste is also generated outside the power sector by the industry, health, research and agriculture sectors – in short, wherever radionuclides and ionising radiation are used. This concerns mostly low-level and intermediate-level waste. Roughly 150m<sup>3</sup> of institutional waste is produced annually which must be isolated from the environment.









# DEVELOPMENT OF A DEEP GEOLOGICAL REPOSITORY FOR HIGH-LEVEL WASTE AND SPENT NUCLEAR FUEL

**// The “Concept of Radioactive Waste and Spent Nuclear Fuel Management in the Czech Republic” stipulates that radioactive waste and spent nuclear fuel classed as waste which cannot be disposed of at existing repositories be finally disposed of in a deep geological repository. //**

The construction of such a repository in the Czech Republic is envisaged. The safety of the waste disposed of will be ensured by means of a system of both engineered and natural (geological) barriers which are able to isolate radionuclides contained in the waste from the environment until their concentration is reduced to a level which does not pose any risk to any component of the biosphere. Various potential options for the design of the repository are set out in the Reference Project for a Deep Geological Repository of 1999 and the updated version of 2011 available on SÚRAO's website ([www.surao.cz](http://www.surao.cz)).

## SITE SELECTION

Potentially suitable sites for deep repository construction were selected by the Czech Geological Institute in 1992. Following a further assessment of deep repository candidate sites in terms of both excluding and prerequisite criteria set out in SÚJB Regulation 215/1997 valid at that time and further relevant legislation (e.g. the Conservation of Nature and Landscape Act), 11 potentially suitable sites situated in three different rock types were identified from which SÚRAO subsequently selected 6 sites situated in stable granite formations. Following the completion of this phase of the selection process, geological research work commenced at the sites in the second half of 2003 with the aim of collecting more detailed geological data in order to reduce the surface area of each candidate site. Work carried out before 2004 was considered geological research (in terms of Act 62/1988 on geological work practices). An evaluation of the work performed was completed in 2005.

However, in view of the overwhelmingly negative public attitude to the project, SÚRAO, following agreement with the Ministry of Industry and Trade, suspended all geological work at the sites until 2009 (the Government, by means of Decision No. 550 of 2 June 2004, accepted the suspension).

Consequently, sites were searched for with potentially more favourable public attitudes to the project. The investigation of former military areas was launched by SÚRAO at the end of 2008 in compliance with its plan of activities approved by the Government (Government Decision No. 1315 of 20 October 2008). The Boletice former military area was assessed in particular detail. In addition, an area close to a currently operational uranium mine at Dolní Rožínka (Kráví hora) was added to the list of candidate sites.

For the same reason, a competitive dialogue on the theme of the “assessment of geological and other information on selected parts of the Bohemian Moldanubian zone with respect to potential suitability for DGR siting” commenced in 2015. As a result of the competitive dialogue process, two sites were selected based on preliminary geological information covering an area of 40km<sup>2</sup> each,

one in the vicinity of the Dukovany NPP and the other near the Temelín NPP. The objective of the work is to compile an evaluation of geoscientific and other information regarding DGR siting, the assessment of potential conflicts of interest, the determination of proposals for investigation areas covering approximately 20 – 25km<sup>2</sup> and the drafting of a preliminary study concerning DGR siting.

Any decision on the protection of a rock mass suitable for DGR siting via the identification of investigation areas for specific encroachment into the Earth's crust (Article 17 of Act 44/1988, as amended) must be preceded by detailed research and/or geological investigation work. Consequently, investigation areas were identified at the Březový potok, Čertovka, Čihadlo, Horka, Hrádek, Magdaléna and Kraví hora localities. Applications were submitted in 2013 for the first investigation stage (site selection stage without technical operations) and the decisions came into force in mid-2015.

Presentations on the methods to be used in the geological investigation work were provided for the wider public in each of the selected localities. Work continued in 2016 in particular with concern to obtaining basic geological, hydrogeological and geotechnical data which will form the basis for the preparation of synthetic geoscientific models, particularly geological, hydrogeological, transport, geochemical and, possibly, other descriptive models of the localities required for safety analysis purposes and the preparation of feasibility studies.

SÚRAO subsequently applied for the extension of the validity of the investigation area status; proceedings in this respect are ongoing.

The site assessment stage will be concluded in 2018 with the evaluation of each site according to common criteria regarding the suitability of DGR siting, the repository's long-term safety, possible requirements concerning the potential impacts of the repository's construction and operation on the environment as well as the socio-economic impact of the repository's construction and operation on community development plans and the living conditions of local people. Work will continue on four preferred localities which will include a further investigation stage and a detailed examination of the suitability of the sites for the construction of the deep repository.

The assessment stage at the four selected localities will aim at obtaining relevant knowledge of the rock characteristics at the depth anticipated for repository construction with the objective of determining two candidate localities, one of which will be selected as the final locality and the other as a reserve locality for DGR siting. SÚRAO is working hard to meet the deadline set by the Concept of Radioactive Waste and Spent Nuclear Fuel Management in the Czech Republic, i.e. with concern to the identification of a final locality in 2025, the drawing up of a formal proposal accompanied by the positions of the communities concerned to be submitted to the Government for approval and an application for site protection at the preferred locality. Obtaining the relevant data from depths anticipated for DGR construction depends not only on technical considerations but also on the granting of permission for the establishment of investigation areas at the localities concerned. Experience to date has shown that procedural issues will probably make up the key factor in terms of meeting the milestones set out in the Concept.

The following table provides an overview of localities currently considered to be potentially suitable for deep repository siting for which investigation areas have been approved (and concerning which decisions have come into force), the municipalities concerned and the amount of statutory financial contributions (in 2016).



An overview of localities potentially suitable for deep repository siting, the relevant investigation areas and the amount of annual statutory financial contributions provided to the municipalities concerned according to the Atomic Act 18/1997

Locality	Region	Municipality	Investigation area, km <sup>2</sup>	Annual contribution
Čertovka	Ústí-nad-Labem	Blatno	13.424151	CZK 4,000,000
	Ústí-nad-Labem	Lubenec	9.499686	CZK 3,449,906
	Plzeň	Tis u Blatna	4.787860	CZK 2,036,358
	Plzeň	Žihle	1.359414	CZK 1,007,824
Total			29.071111	CZK 10,494,088
Magdaléna	South Bohemia	Jistebnice	17.437767	CZK 4,000,000
	South Bohemia	Nadějkov	4.785981	CZK 2,035,794
	South Bohemia	Božetice	1.349120	CZK 1,004,736
Total			23.572868	CZK 7,040,530
Horka	Vysočina	Hodov	9.600379	CZK 3,480,114
	Vysočina	Rohy	5.371884	CZK 2,211,565
	Vysočina	Oslavička	3.414927	CZK 1,624,478
	Vysočina	Budišov	2.928363	CZK 1,478,509
	Vysočina	Nárameč	2.254690	CZK 1,276,407
	Vysočina	Vlčatín	1.865850	CZK 1,159,755
	Vysočina	Osové	1.034598	CZK 910,379
	Vysočina	Rudíkov	0.990977	CZK 897,293
	Vysočina	Oslavice	0.798283	CZK 839,485
Total			28.259951	CZK 13,877,985
Čihadlo	South Bohemia	Lodhéřov	14.878511	CZK 4,000,000
	South Bohemia	Deštná	5.213349	CZK 2,164,005
	South Bohemia	Světce	3.642110	CZK 1,692,633
	South Bohemia	Pluhův Žďár	2.356508	CZK 1,306,952
Total			26.090478	CZK 9,163,590

Locality	Region	Municipality	Investigation area, km²	Annual contribution
Březový potok	Plzeň	Chanovice	6.579339	CZK 2,573,802
	Plzeň	Velký Bor	8.562038	CZK 3,168,611
	Plzeň	Pačejov	2.924166	CZK 1,477,250
	Plzeň	Maňovice	2.829812	CZK 1,448,944
	Plzeň	Olšany	1.353224	CZK 1,005,967
	Plzeň	Kvášňovice	0.864983	CZK 859,495
Total			23.113562	CZK 10,534,069
Hrádek	Vysočina	Rohozná	7.184791	CZK 2,755,437
	Vysočina	Nový Rychnov	6.074868	CZK 2,422,460
	Vysočina	Miličov	2.968314	CZK 1,490,494
	Vysočina	Hojkov	4.308423	CZK 1,892,527
	Vysočina	Cejle	2.020374	CZK 1,206,112
	Vysočina	Dolní Cerekev	1.755480	CZK 1,126,644
Total			24.312250	CZK 10,893,675
Kráví hora	Vysočina	Střítež	5.775041	CZK 2,332,512
	South Moravia	Drahonín	3.474158	CZK 1,642,247
	Vysočina	Moravecké Pavlovice	3.427197	CZK 1,628,159
	Vysočina	Bukov	1.830774	CZK 1,149,232
	Vysočina	Věžná	2.168012	CZK 1,250,404
	Vysočina	Sejřek	0.330972	CZK 699,292
	Vysočina	Milasín	0.069181	CZK 620,754
	South Moravia	Olší	0.033889	CZK 610,167
Total			17.109224	CZK 9,932,767





## DESIGN ACTIVITIES

The technical design of the repository including an estimate of the costs involved in construction and operation is contained in the Reference Project for a Deep Geological Repository (DGR) and the updated version thereof according to which the waste disposal container forms one of the engineered barriers. In this context work commenced in 2013 on a project concerning the materials to be used for, and the structural design of, a waste disposal container for spent nuclear fuel. Two structural waste disposal container designs were proposed as part of the project; both are currently in the design verification stage.

**“ The “Mock-up Josef” project, concerned with the verification of engineered barriers, has been underway since 2010 at the Josef Underground Research Facility near Chotilsko in the Příbram region. The aim of the project is to research in detail the properties and behaviour of bentonite barriers in deep repositories. The project involved the construction of a realistic model of a supercontainer which was emplaced in a disposal well sunk in part of the Josef underground facility. ”**

A project entitled “Research Support for the Design of the Deep Repository”, carried out by a consortium led by the Czech Technical University in Prague, was launched in 2015. As part of the project, work is underway on the optimisation of the design of selected important technological systems within the deep repository complex in terms of technical feasibility, operational security and economic considerations. The project involves the assessment of the environmental characteristics of, and the impact of the construction and operation of the repository on, candidate sites. A feasibility study is underway for each site as is the assessment of the environmental impacts of the potential construction and operation of the repository. The two documents will form the basis for reducing the total number of sites.

## **ACTIVITIES CONCERNING THE ASSESSMENT OF DGR SAFETY**

The “Research Support for DGR Safety Assessment” project was prepared in compliance with the “Medium-term Research and Development Plan for Deep Repository Siting” report. The main objective of the project, launched in 2014, is to interpret primary data, gather information, and formulate models and further arguments for the preparation of a number of safety analyses to be used in the assessment of the long-term safety of repository siting at all the potential sites. The main part of the project consists of the development of 3D structural-geological, hydrogeological and transport models for all the selected sites which will form the basis for the safety assessment of repository construction at those sites. Information obtained from the models will enhance geological investigation work at the sites concerned and assist in determining the positioning of deep boreholes which will be drilled in the advanced stages of geological investigation. The project also provides the information required for the refinement of data on the properties of spent nuclear fuel and radioactive waste, on the long-term stability of engineered barriers and the migration parameters of the rock environment.

## **GENERIC RESEARCH FOR DGR DEVELOPMENT**

A generic research programme the objective of which is to gather data, arguments and input documentation for the assessment of the feasibility of deep repository construction at candidate sites as well as proof of overall DGR feasibility is under way at SÚRAO’s underground facilities and via participation in other relevant projects (e.g. at the Grimsel Test Site in Switzerland).

The Josef Underground Research Facility, situated approximately 50km south of Prague, is one such facility operating in the Czech Republic. Situated in an abandoned mine, the Faculty of Civil Engineering of the Czech Technical University in Prague opened this underground laboratory, the maximum depth of which is 150 metres, in 2007. The northern part of the facility, known as “Mokrsko-Západ”, consists of granitoid rocks. SÚRAO uses this facility primarily for demonstration experiments aimed at proving engineered barrier behaviour (e.g. the DOPAS and Mock-Up experiments).

A second facility, the Bedřichov tunnel situated in the Jizerské mountains and consisting of a water supply conduit is also employed for generic research purposes. The tunnel, bored through granite of the Krkonoše-Jizera pluton, is 2,600 metres long and is located at a depth of up to 150 metres below the earth’s surface. Research conducted at the facility primarily concerns special hydrogeological study methodologies and related numerical modelling as well as the long-term monitoring of selected characteristics of the rock mass.

The most important underground facility, however, in terms of research on the future development of the Czech DGR, consists of the Bukov Underground Research Facility (URF) situated in the south part of the Rožná uranium mine.



## BUKOV UNDERGROUND RESEARCH FACILITY

The development of the Bukov Underground Research Facility (URF) continued in 2016. While the underground facility forms part of the former Rožná uranium mine complex, it is situated outside the mine operational area. The underground part of the Bukov URF is situated at a depth of 550m beneath the earth's surface in a crystalline rock environment geologically similar to the candidate sites for DGR construction. The Bukov URF will provide data for the verification of the rock characteristics at DGR depth and for development and demonstration experiments aimed at the verification of DGR technical feasibility.

Bukov URF construction commenced in 2013 and will be completed in 2017. Work to date included the driving of an access shaft with a total length of 300 metres, the building of the appropriate infrastructure and the preparation of support facilities for specialist scientific teams. In parallel with construction, the first stage of an experimental programme entitled the Complex Geological Characterisation of the Bukov URF Underground Facility is underway. The research programme is aimed at gathering the unique support data required for a description of the rock environment, the provision of information for the evaluation of potential DGR localities and the validation of rock environment description methodologies. The programme is made up of a number of parts, i.e. geological, hydrogeological, geotechnical and transport studies. The experimental programme to be carried out in future years reflects the Research and Development Plan prepared by SÚRAO for the period 2015 to 2025 and the various required parameters as evaluated in the site selection process. Based on these requirements, the following areas of research have been defined:

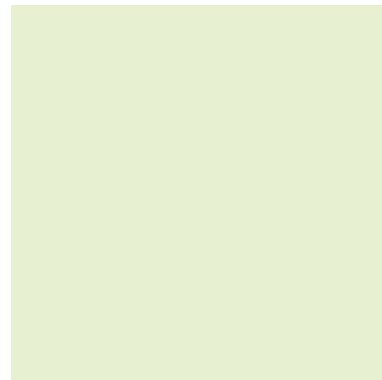
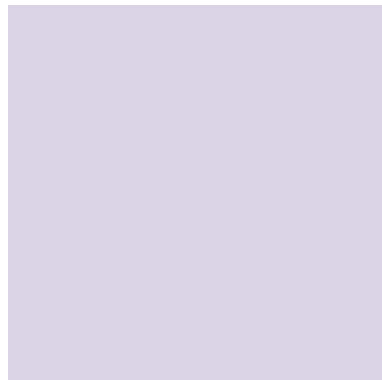
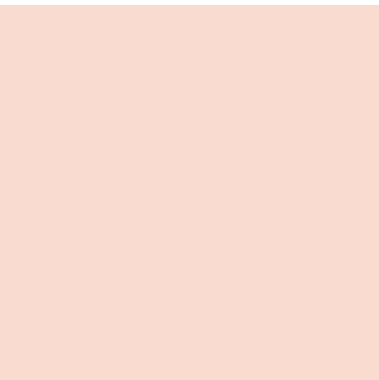
- Pilot characterisation of the rock aimed at verifying the methodology of the creation of 3D Geo/GT/hG models of the locality. This programme has already been launched.
- Testing of methods for the long-term monitoring of processes underway at repository depth and a programme concerned with the development of methodologies and the obtaining of a long-term data series concerning the behaviour of the rock environment (hydrogeology, seismicity, temperature, microbial contamination etc.).
- Testing of models of groundwater flow and radionuclide transport via rock fractures in the future deep repository, a programme concerned with determining the quantitative parameters of the hydrogeological and transport regimes at repository depth and the verification of the accuracy of computational tools and methodologies using real data.
- Testing of the impact of the rock environment at repository depth on changes in the properties of the envisaged engineered barriers and a research programme concerned with the evaluation of the robustness and design of the engineering solutions and the development of materials for the engineered barriers.
- Testing of the origin and development of excavation damaged zones caused by excavation in crystalline rocks and the impact of zones damaged by the construction of underground facilities on the parameters of the rock environment at repository depth.
- Testing of the impact of the rock mass on the construction of the various individual underground facilities of the deep repository and the optimisation of the mechanism of underground facility construction aimed at improving the efficiency of the structural design of the underground part of the deep repository.
- Demonstration experiments. Comprehensive experiments concerned with a number of impacts simultaneously and the testing of partial designs (prototype repository, handling experiments and others).





# Richard

The Richard repository serves for the disposal of institutional waste generated in the health, industry, agriculture and research sectors. The repository is located in an abandoned limestone mine complex near the town of Litoměřice. The repository has ideal isolation properties due to the existence of thick and stable impermeable rock layers both above and below the underground passageways.









## INTERNATIONAL PROJECTS

International institutions coordinate a number of events concerned with the field of radioactive waste management, instigate new legislative and regulatory procedures and, not least, create a meeting place for professionals and for exchanging information. It is, therefore, of the utmost importance to maintain contacts and to engage to a reasonable extent in the activities of these institutions, particularly those activities organised under the umbrella of the IAEA, OECD/NEA and EC.

International cooperation is of particular importance in terms of research and development concerned with deep repositories, and a number of countries (e.g. Sweden, Finland, France and Switzerland) are well advanced in this respect. Joint research activities at the bilateral and international levels and the use of common resources and knowledge, principally linked with European research and development framework programmes, provide results much more quickly than single-country research programmes. SÚRAO takes every opportunity to link up with those organisations which can offer both experience and know-how. For this reason, SÚRAO has signed an agreement with the Finnish company Posiva Oy in consortium with Saanio & Riekkola Oy. The objective of the cooperation is to strengthen the management structure of the deep repository development programme in the Czech Republic, with the maximum involvement of foreign experience and including the opportunity for the conducting of related research and development work, and to jointly prepare a technical design for the DGR aimed at the verification of its feasibility and safety under conditions prevailing at the candidate sites in the Czech Republic.

Participation in the IGD-TP platform (Implementing Geological Disposal of Radioactive Waste Technology Platform), which has identified strategic priority research and development topics for the forthcoming time period including the implementation of the EU's first deep repositories planned for 2025 (Sweden, Finland and France) has proven particularly important in this respect. DOPAS, an IGD-TP technology platform project, which is being conducted by a consortium made up of ANDRA/Nagra, Posiva, SKB, SÚRAO/ČVUT/ÚJV, NDA and GRS/DBE and coordinated by Posiva, is of primary importance. The project involved the design and construction of deep repository sealing plugs in situ and the study of a wide range of processes which will occur within the engineered barriers following SNF disposal, and will provide the data required for the assessment and verification of repository safety as well as demonstrate the feasibility of the use of sealing materials available in the Czech Republic (Rokle-type bentonites). Experiments were performed by Czech partners in the DOPAS project at the Josef Facility and ÚJV Řež laboratories. Measuring equipment was installed in a sealing plug constructed in the Josef underground complex and data collected aimed at evaluating the long-term behaviour of this crucial engineered barrier.

**“ SÚRAO is also involved in the MoDeRn European project concerned with setting the targets of a monitoring programme for the deep repository. ”**

The CAST project concerned with the behaviour of carbon-14, one of a group of critical radionuclides, under deep repository conditions is supported by the European Commission.



SÚRAO specialists continued to be involved in the PETRUS III project concerned with the education of young specialists in the field of radioactive waste disposal.

In addition, Czech specialists are involved in projects organised by the IAEA and the OECD/NEA with the participation of non-EU countries including the USA, Canada, Japan, South Korea, China and Switzerland.

Very valuable results are obtained e.g. from joint experiments conducted at foreign underground laboratories (e.g. the Grimsel laboratory in Switzerland) the main objectives of which are to gain an understanding of the processes at work in deep radioactive waste repositories situated in crystalline rocks and to gather data for safety analysis purposes. The LTD – Long Term Diffusion – experiment, concerned with the retardation of the transport of radionuclides via rock fractures into the crystalline rock matrix, is a globally unique experiment involving the study of radionuclide behaviour in the natural environment. A further two projects are currently underway involving SÚRAO's participation one of which is concerned with the long-term monitoring of structural-tectonic changes in a crystalline rock massif over a set time period and the potential impact on the long-term stability of the massif (the LASMO – Large Scale Monitoring – experiment). The second experiment involves the long-term assessment of the speed of, and mechanisms surrounding, the corrosion of materials under real rock mass conditions (the MaCoTe – Material Corrosion Test – experiment). Materials suggested by the "Research and Development of a Waste Container" programme are being used in the experiment. The aim of SÚRAO's involvement in these experiments is to gain the knowledge and experience required for the performance of similar experiments in the Czech Republic.

During the year, SÚRAO continued cooperation with NAGRA on a project entitled the "Use of Experience of the Swiss Grimsel Underground Laboratory (Grimsel Test Site – GTS)" with the conducting of experiments at the Bukov URF. NAGRA, the national agency responsible for radioactive waste management in Switzerland as the operator of the GTS is the main coordinator and implementer of all the various experiments conducted at the facility. Thus, it is anticipated that SÚRAO will benefit significantly via the transfer of practical and long-term experience concerning the preparation of research activities, experiment realisation and underground facility operation.

The EBS Task force joint international research project continues with the involvement of the Technical University (TU) in Liberec and ÚJV Řež. The project is focused on modelling and experimentation concerned with the long-term stability of bentonites in the buffer layer. The project is being coordinated by SKB.

The Decovalex 2015 international project was concluded during the year and its continuation under the name Decovalex 2019 has been approved. The objective of the project is to validate the computing tools used in the modelling of near-field processes and to develop tools for the modelling of related processes which are expected to occur in deep repositories.



## PUBLIC RELATIONS

As in previous years, public relations activities focused on improving awareness of the existence of radioactive waste in the Czech Republic and its safe disposal.

Public relations with respect to the currently operational Richard near Litoměřice, Dukovany and Bratrství near Jáchymov repositories primarily concerned the operation of local information centres, the distribution of information materials and regular meetings with local public representatives. Some information meetings are held as part of regular sessions held by so-called civil security committees (the Richard Civic Control Commission and the Dukovany Civic Security Commission), while others are held at the request of local councils. The creation of a similar Jáchymov Civic Control Commission is under preparation. The main reason for the creation of these commissions is related to our ongoing efforts to strengthen mutual confidence between the public, currently operational repositories and SÚRAO as the managing authority. The main task of the commissions is to carry out independent checks of the operation of radioactive waste repositories, to compare the results with relevant international practice and to provide the public with information on the knowledge gained. Members of the commissions consist of representatives of the communities concerned and their surroundings and specialists from SÚRAO and the relevant Mining Authority. SÚRAO's objective is to increase the levels of mutual confidence and understanding, respect and social responsibility between SÚRAO and the public.

Direct communication with the public concerning the development of the deep repository focused in 2016 mainly on the provision of information to the public on current geological investigation work carried out at the 7 localities preselected as suitable for deep repository siting and within which investigation areas. The opportunity to meet with experts was again offered to local people in order for them to discuss any topic they found of interest and a number of local councils took advantage of this offer during the year.

Based on the Geological Act and the Atomic Act 18/1997, statutory contributions were paid amounting to CZK 72 million (see table on pages 22-23) to all those communities within whose boundaries investigation areas have been identified. At the end of the year, SÚRAO applied for the extension of the validity of investigation area status at all 7 localities for a further two years.

SÚRAO organised several information meetings with the chairmen of town councils in the vicinity of the Dukovany and Temelín NPPs where geological research is underway with the aim of collecting relevant data on selected geological and other criteria. Comprehensive information on the various projects was sent to the chairmen of the town councils concerned and SÚRAO is committed to keeping all of them fully informed on the progress of current research via joint meetings.

During 2016, work on the new Atomic Act (No. 263/2016) was concluded and the Act became effective on 1 January 2017. The implementing Government Decree newly defines the rate of contributions to be paid to the Nuclear Account and increases contributions to the communities concerned for ongoing investigation work and the operation of existing repositories.

SÚRAO continued the publication and distribution of its "News from SÚRAO" quarterly newsletter to individual households at all the deep repository candidate localities.

The Working Group for Dialogue on the Deep Repository (the Dialogue WG), the objective of which is to contribute towards the transparency of the process of the identification of a suitable locality for the deep repository for spent nuclear fuel

and high-level waste, whilst respecting the interests of the public and the increased active participation of the municipalities concerned in this process, held only two meetings during 2016. The activities of the group were significantly influenced by the resignation of representatives of a number of localities and the gradual loss of a quorum. Mr. Jan Mládek, the Minister of Industry and Trade, invited chairmen of the town councils of the localities preselected as suitable for deep repository siting together with Dialogue WG members to a meeting at the Ministry of Industry and Trade with the aim of clarifying the attitudes of individual municipalities to the continuation of the siting process and the activities of the Dialogue WG itself. Subsequently, the municipalities were invited to express their attitudes to participating in direct dialogue with State authorities and involvement in tackling certain issues associated with the siting process. The current positions of individual municipalities is shown in the following table:

Locality	Region	Municipality	Interested in dialogue	Involvement in the anti-repository platform
Čertovka	Ústí-nad-Labem	Blatno	Yes	Not
	Ústí-nad-Labem	Lubenec	Not	Not
	Plzeň	Tis u Blatna	Yes	Not
	Plzeň	Žihle	Yes	Not
Magdaléna	South Bohemia	Jistebnice	Not	Yes
	South Bohemia	Nadějkov	Not	Yes
	South Bohemia	Božetice	Not	Yes
Horka	Vysočina	Hodov	Not	Not
	Vysočina	Rohy	Not	Not
	Vysočina	Oslavička	Not	Not
	Vysočina	Budišov	Not	Not
	Vysočina	Nárameč	Not	Not
	Vysočina	Vlčatín	Not	Not
	Vysočina	Osové	Not	Not
	Vysočina	Rudíkov	Not	Not
	Vysočina	Oslavice	Not	Not



Locality	Region	Municipality	Interested in dialogue	Involvement in the anti-repository platform
Čihadlo	South Bohemia	Lodhéřov	Yes	Not
	South Bohemia	Deštná	No response	Not
	South Bohemia	Světcene	Not	Yes
	South Bohemia	Pluhův Žďár	Not	Yes
Březový potok	Plzeň	Chanovice	Not	Yes
	Plzeň	Velký Bor	Not	Yes
	Plzeň	Pačejov	Not	Yes
	Plzeň	Maňovice	Not	Yes
	Plzeň	Olšany	Not	Yes
	Plzeň	Kvášňovice	Not	Yes
Hrádek	Vysočina	Rohozná	Not	Not
	Vysočina	Nový Rychnov	Not	Not
	Vysočina	Milíčov	Not	Not
	Vysočina	Hojkov	Not	Yes
	Vysočina	Cejle	Not	Yes
	Vysočina	Dolní Cerekev	Yes	Not
Kraví hora	Vysočina	Střítež	Yes	Not
	South Moravia	Drahonín	Not	Not
	Vysočina	Moravecké Pavlovice	Yes	Not
	Vysočina	Bukov	Not	Not

One of the undoubted achievements of the Working Group consisted of the preparation (in cooperation with representatives of non-governmental organisations and experts selected by community representatives) of draft legislation relating to the involvement of communities in the process of the siting of the deep repository. The draft was subsequently submitted to the Government Legislative Council. The Government authorised the Minister of Industry and Trade to create a working group which would consider the suggestions provided in the position outlined by the Government Legislative Council and prepare new draft legislation which the Ministry would then submit to the Government by 30 June 2018. Discussions at the Dialogue WG also contributed significantly to the preparation of a proposal concerning uniform criteria for the assessment of localities in the stage involving a reduction in their number to four.

A socio-economic analysis of the localities identified as suitable for the construction of the deep repository was performed in 2016 with the aim of collecting data for the assessment of the localities in terms of various socio-economic aspects in the communities concerned. The analysis focused on the economic and social concerns of individual communities in all 7 localities (the analysis of population composition, infrastructure, services, property prices, etc.); a descriptive study which provided a description of individual localities was subsequently compiled on the basis of the results.

The provision of information on radioactive waste and repositories to all those interested makes up one of SÚRAO's prime objectives. SÚRAO utilises all possible communication channels – from the publication of its "News from SÚRAO" and press releases through a new website and social network profiles to information corners and centres throughout the country. SÚRAO organises regular lectures for elementary and secondary schools so that even the youngest generations have a basic awareness of the various issues involved. Its main information centre was visited by nearly 700 students from secondary and elementary schools in 2016 and nearly the same number of students received information in their classrooms as part of SÚRAO's educational programme.

SÚRAO has a statutory obligation to provide information according to Act 106/1999 on free access to information. 13 applications for information under the Act were received during 2016.

#### **Provision of information to the public during 2016 according to Act 106/1999 on free access to information**

Number of applications for information under the Act	13
Number of appeals against a ruling	1
Conclusions of proceedings on sanctions for infringement of the Act	-
Other information concerning the implementation of Act 106/1999	-

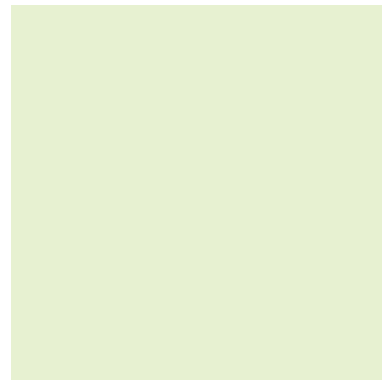
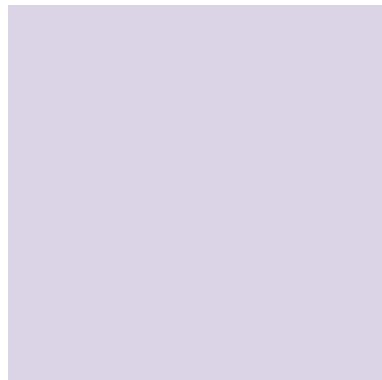
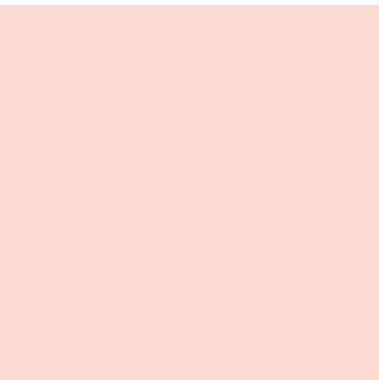
#### **Provision of information to the public according to Act 123/1998 on free access to information on the environment**

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 123/1998	-



# Dukovany

The Dukovany surface disposal facility covers 1.3 hectares within the Dukovany NPP complex and is designed for the disposal of low-level and intermediate-level radioactive waste generated at the Dukovany and Temelín NPPs. Approximately 400m<sup>3</sup> of such waste is disposed of at the facility annually.









## MANAGERIAL, TECHNICAL AND ADMINISTRATIVE MATTERS

In addition to those outlined above, SÚRAO is involved in a wide range of additional activities either in connection with its main area of business or as required by relevant legislation.

### **ADMINISTRATION OF NUCLEAR ACCOUNT FUNDS**

The administration of Nuclear Account funds was governed in 2016 by the Atomic Act 18/1998, Article 27, Government Decree 416/2002 on the scale of charges and manner of payment by radioactive waste producers to the Nuclear Account and on annual contributions to local communities, and Act 280/2009 (the Tax Code). Detailed records were kept on individual contributors to the Nuclear Account (in compliance with Government Decree 416/2002, Article 3).

### **PAYMENTS BY PRODUCERS OF RADIOACTIVE WASTE FROM NUCLEAR REACTORS**

Pursuant to Government Decree 416/2002, Article 1, ČEZ contributed in 2016 CZK 1,205,182,400 while the yearly contribution made by the Research Centre Řež amounted to CZK 661,600. Both amounts were paid in regular monthly instalments which were made directly to the Nuclear Account.

### **PAYMENTS BY OTHER PRODUCERS OF RADIOACTIVE WASTE**

Other waste producers, as specified in Article 2 of Government Decree 416/2002, paid their charges following acceptance of their waste for disposal by SÚRAO. Payment notices were issued to each waste producer (based on a contract between SÚRAO and the respective waste producer) upon acceptance of the radioactive waste accompanied by the relevant waste acceptance documentation. The total sum paid in 2016 amounted to CZK 22,541,400.

Disposable funds in the Nuclear Account were invested by the Ministry of Finance in the financial market (in compliance with the Atomic Act 18/1997, Article 27). Revenue received from financial investment totalled CZK 342 million.

Nuclear Account assets as at 31 December 2016 amounted to CZK 25.4 billion at Government long-term bond nominal value.

## **AUDITING LICENSEES' DECOMMISSIONING RESERVES**

SÚRAO is responsible (according to the Atomic Act 18/1997, Article 26, paragraph 3h) for ensuring, by means of an audit, that relevant licence holders honour their obligation (Atomic Act 18/1997, Article 18, paragraph 1h) to create financial reserves for the future decommissioning of their facilities.

Audits were conducted in 2016 at 13 organisations comprising a total of 32 facilities which were found to meet the following conditions:

- the organisation concerned is obliged to accumulate decommissioning reserves in compliance with the Atomic Act 18/1997;
- the organisation is in possession of certification verifying its decommissioning cost estimate;
- the verified decommissioning cost estimate exceeds CZK 300,000.

Audits aimed at verifying the accumulation of financial reserves were conducted under the same rules as in the previous year. Audits were performed in cooperation with the respective licence holders and requests by SÚRAO for supplementary documentation were duly met. No serious breaches were discovered during the audits. Protocols of audits performed of individual licence holders were drawn up containing the audit results, the amount of accounting reserves and the amount of funds deposited in dedicated escrow bank accounts.

A summary report on audits performed in 2016 aimed at verifying the creation of financial reserves for the future decommissioning of nuclear plants and other nuclear facilities was duly prepared and presented to SÚRAO's Board and subsequently to the SÚJB in accordance with SÚRAO Statutes.



## INTERNATIONAL COOPERATION

SÚRAO, in a similar way to organisations in other countries which are committed to tackling radioactive waste issues in a responsible manner, is involved in the activities of a number of international organisations. Mutual cooperation, consisting of the exchange of information and direct participation in both practical scientific experiments and the activities of a number of international institutions, forms an integral part of what SÚRAO considers a serious approach to issues surrounding radioactive waste and the nuclear programme in general.

The European Commission, the IAEA (International Atomic Energy Agency) and OECD/NEA (Nuclear Energy Agency of the Organisation for Economic Co-operation and Development) represent the main sources of information, instigate legislative and regulatory change and coordinate the majority of events concerned with the field of radioactive waste management internationally. The Czech Republic is a signatory to the IAEA Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management. SÚRAO, together with the SÚJB, is responsible for the fulfilment of requirements deriving from the Convention.

SÚRAO, in cooperation with the IAEA, is a full member of DISPONET, a network of operators of low-level and intermediate-level waste repositories. Radioactive waste management issues are also handled by the OECD/NEA, specifically by the RWMC, its Radioactive Waste Management Committee. This committee is organised in the form of internal and external working groups. SÚRAO specialists represent the Czech Republic in the IGSC (the Integration Group for Safety Case) and the FSC (Forum on Stakeholder Confidence) working groups.

SÚRAO is active in a number of research and development projects financed by the European Commission both as a mediator and provider of support for the participation of Czech firms and research institutions in such projects. Participation in the IGD-TP platform which has identified strategic priority research and development topics for the forthcoming time period which will include the implementation of the EU's first deep repositories planned for 2025 (Sweden, Finland and France) is particularly important in this respect. SÚRAO enjoys direct and active representation in the IGD-TP Executive Group. Since 1998 SÚRAO has been involved in the activities of the so-called Club of Agencies which, under the patronage of the European Commission, makes up a voluntary platform for the informal exchange of information concerning radioactive waste management.

The most significant area of cooperation at the international level consists of the development and verification of methods for the assessment of repository safety and the demonstration of deep geological repository feasibility. Thus SÚRAO experts are able to take advantage of proven, technically reliable and widely-recognised methods and tools for the long-term forecasting of repository system behaviour.

Bilateral cooperation with partner organisations in other countries is very beneficial for SÚRAO, particularly participation in specific subprojects conducted at partner research facilities. SÚRAO has signed a number of international framework agreements e.g. with Nagra (Switzerland) and Posiva (Finland) and also cooperates on a number of subprojects with SKB (Sweden). In addition, Czech specialists are involved in projects organised by the IAEA and the OECD/NEA with the participation of non-EU countries including the USA, Canada, Japan, South Korea, China and Switzerland.

## **PERSONNEL, MATERIAL AND TECHNICAL MATTERS**

The plan of activities for 2016 contained 62 approved work positions. When necessary, certain work for SÚRAO is supplied for the fulfilment of specific tasks or in the form of one-off or fixed-term employment contracts. SÚRAO's staff attended various training courses in compliance with legislative requirements; these courses related to obligatory professional training, the further improvement of qualifications and language training.

**“ SÚRAO fulfilled its obligation as set out in Act 435/2004 (the Employment Act) specifying the proportion of handicapped persons in the total number of employees. ”**

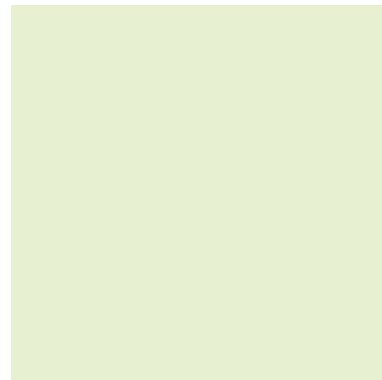
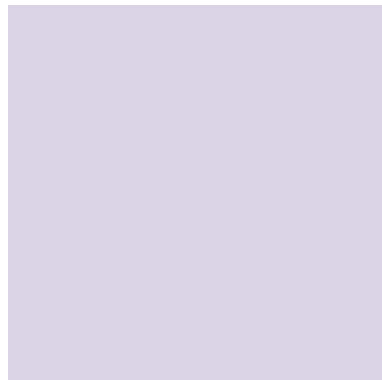
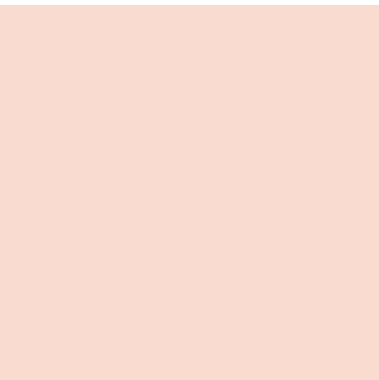
SÚRAO has established a cultural and social fund in compliance with Regulation 114/2002 which is used to assist its employees in terms of the cost of meals and state contributory supplementary pensions.

Since the end of 2000 SÚRAO's headquarters have been located in a completely refurbished Interior Ministry building at Dlážděníá Street 6, Praha 1 and since 2012 it has leased additional office space in a neighbouring building at Dlážděníá Street 4.



# Bratrství

The Bratrství repository was constructed in part of the underground area of an abandoned uranium mine of the same name and is employed for the disposal of institutional radioactive waste containing only naturally-occurring radionuclides. Waste of this category is produced during the decommissioning of certain types of emitters in the health and research sectors.







## FINANCIAL MANAGEMENT

SÚRAO's activities are financed primarily from the Nuclear Account and Ministry of Industry and Trade funds in compliance with the Atomic Act 18/1997, Article 28, paragraph 1 which sets out rules for the management of radioactive waste disposed of prior to the Act coming into force.

SÚRAO is authorised to manage state property and consequently maintains the relevant accounts in pursuance of Act 563/1991 on accounting, Act 218/2000 on budgeting rules, and implementing Regulation 410/2009. SÚRAO's budget is determined according to a budget structure defined by Ministry of Finance Regulation 323/2002, as amended.

SÚRAO creates no reserves and all its revenues from services provided to radioactive waste producers as well as unused budget funding (provided as transfers) are returned to the Nuclear Account.

### Utilisation of Budget Funding in 2016 (CZK thousand)

Item No.	Item	Approved budget	Adjusted budget	Budget utilization	Utilization percentage
<b>5</b>	<b>Current expenses</b>	<b>192,600</b>	<b>192,600</b>	<b>189,211</b>	<b>98.2</b>
501	Wages and salaries	27,290	27,410	27,829	101.5
502	Other remuneration	1,650	1,650	1,528	92.6
532	Non-investment transfers to municipal budgets	84,000	84,000	83,937	99.9
<b>6</b>	<b>Capital expenses</b>	<b>207,300</b>	<b>207,300</b>	<b>131,249</b>	<b>63.3</b>
61	Asset acquisitions and related expenses	207,300	207,300	131,249	63.3
	<b>Total expenses</b>	<b>399,900</b>	<b>399,900</b>	<b>320,460</b>	<b>80.1</b>
<b>4</b>	<b>Transfers received</b>	<b>394,900</b>	<b>394,900</b>	<b>325,000</b>	<b>82.3</b>
411	Non-investment transfers from the central budget	187,600	187,600	187,000	99.7
421	Investment transfers from the central budget	207,300	207,300	138,000	66.6
	Funding through chapter 322 of the MPO	5,000	5,000	5,090	101.8
	<b>Total revenues</b>	<b>399,900</b>	<b>399,900</b>	<b>330,090</b>	<b>82.5</b>

Note: Items 411 and 421 consist of transfers from the Nuclear Account; CZK 5,090,100 was received as a transfer from the budget of the Ministry of Industry and Trade. In transfers received, funds transferred to the Nuclear Account (payments by small RW producers and other Authority revenues) are not included. Revenues from the Nuclear Account which exceed current year expenses are transferred back to the Nuclear Account at the beginning of the following year.



Expenses are subdivided into current expenses and capital expenses. In addition to items included in mandatory indicators, expenses concerning purchases and services relating to repository operation and expenses ensuing from external consultancy, telecommunications 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, has been submitted on a continuous basis to SÚRAO's Board.

The exceeding of the utilisation of budget funding in item 501 is in compliance with Article 25, paragraph 1b of Act 218/2000 on budgeting rules. Funds to cover these expenses were transferred from the reserve fund.

The balance sheet is shown in Annex A, the profit and loss account in Annex B.

## **EVALUATION OF SÚRAO'S PERFORMANCE**

SÚRAO met its responsibilities for the safe and reliable operation of Czech radioactive waste repositories during 2016 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 137/2006 on public contracts and Act 134/2016 on the procurement of public contracts. Funds were employed efficiently and in compliance with the budget in order to fully meet the targets set out in the yearly plan of activities.



## BALANCE SHEET AS AT 31 DECEMBER 2016

(CZK THOUSAND)

	Current period		Net	Previous period
	Gross	Correction		
<b>Assets</b>	<b>1,169,961</b>	<b>416,860</b>	<b>753,102</b>	<b>624,629</b>
<b>A. Fixed assets</b>	<b>1,140,435</b>	<b>416,860</b>	<b>723,575</b>	<b>602,336</b>
I. Intangible fixed assets	644,870	268,833	376,037	289,020
II. Tangible fixed assets	495,550	148,027	347,524	313,302
III. Long-term financial assets	0	0	0	0
IV. Long-term receivables	14	0	14	14
<b>B. Current assets</b>	<b>29,527</b>	<b>0</b>	<b>29,527</b>	<b>22,293</b>
I. Stocks	1,038	0	1,038	861
II. Short-term receivables	543	0	543	620
III. Short-term financial assets	27,946	0	27,946	20,812
<b>Liabilities</b>			<b>753,102</b>	<b>624,629</b>
<b>C. Equity capital</b>			<b>700,096</b>	<b>594,201</b>
I. Owned capital and adjustments			<b>861,752</b>	<b>730,495</b>
II. Financial funds			2,288	3,349
III. Profit/Loss account			-203,520	-174,128
IV. Budget management income and expenditure account			39,575	34,485
<b>D. Liabilities</b>			<b>53,006</b>	<b>30,429</b>
I. Reserves			0	0
II. Long-term payables			0	0
III. Short-term payables			53,006	30,429

# PROFIT AND LOSS ACCOUNT AS AT 31 DECEMBER 2016

(CZK THOUSAND)

Item No.	Item	Current period Main activity	Previous period Main activity
	<b>A. Total expenses</b>	<b>237,643</b>	<b>228,715</b>
I.	Expenses from activities	128,973	120,965
II.	Financial expenses	152	150
III.	Transfer expenses	108,517	107,600
IV.	Shared tax expenses	0	0
	<b>B. Total revenues</b>	<b>208,251</b>	<b>185,874</b>
I.	Revenues from activities	24,426	21,036
II.	Financial revenues	0	4
III.	Revenue from taxes and charges	0	0
IV.	Transfer revenue	183,825	164,834
V.	Revenue from shared taxes		
VI.	SURPLUS/DEFICIT		
1.	Surplus/deficit before tax	-29,391	-42,841
2.	Surplus/deficit after tax	-29,391	-42,841



## AUDITORS' OPINION

We have audited the financial statements of the Radioactive Waste Repository Authority (SÚRAO) prepared in compliance with the accounting regulations effective in the Czech Republic and comprising the balance sheet as at 31 December 2016, the profit and loss account [a statement of changes in equity and the cash flow statement] as at 31 December 2016, and annexes to the financial statements which include a detailed description of the methods employed and other explanatory information. In our opinion, the financial statements give a true and fair view of the assets and liabilities of the accounting entity as at 31 December 2016 as well as the costs, revenue and profit/loss [and cash flow] for 2016 in compliance with the accounting regulations effective in the Czech Republic.

### **BASIS FOR THE AUDITOR'S OPINION**

The audit has been conducted in accordance with the Czech Auditor Act and the standards of the Czech Chamber of Auditors which comprise International Standards on Auditing (ISA) supplemented and modified by related application clauses. In accordance with the Auditor Act and the Code of Ethics adopted by the Czech Chamber of Auditors, we are independent of the Radioactive Waste Repository Authority (SÚRAO) 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**

Other information means all information provided in the Annual Report in addition to the financial statements and our auditor's report. The management of the accounting entity is responsible for any other information provided.

### **MANAGEMENT'S RESPONSIBILITY FOR THE FINANCIAL STATEMENTS**

The management of the Radioactive Waste Repository Authority (SÚRAO) is responsible for compiling financial statements which provide a true and fair view in accordance with the accounting regulations effective in the Czech Republic and for such an internal control system which the management regards as necessary for the compilation of the financial statements that are free from material misstatement, whether due to fraud or error.

### **AUDITORS' RESPONSIBILITY FOR AUDITING THE FINANCIAL STATEMENTS**

Our objective is to gain reasonable assurance that the financial statements are free from apparent material misstatements due to fraud or mistake and to issue an auditor's report containing our opinion.

Our responsibility is to identify and assess the risks of the significant (material) misstatement of the financial statements due to fraud or error, to design and implement audit procedures to address these risks and to obtain sufficient and appropriate probative evidence to provide a basis for expressing our opinion. It is also our responsibility to assess the appropriateness of the accounting rules used, the reasonableness of the accounting estimates made and the information the management of the accounting entity stated in the Annex to the financial statements.

Zdenka Fraňová  
auditor

Czech Chamber of Auditors registration number 2006

# SÚRAO'S BOARD

The activities of SÚRAO are supervised by its Board, the membership of which comprises representatives of the Ministry of Industry and Trade, the Ministry of Finance and the Ministry of the Environment, major radioactive waste producers and the general public. SÚRAO's Board, by means of its decisions and recommendations, takes an active part in the activities of SÚRAO.

## IN 2016 SÚRAO'S BOARD CONSISTED OF THE FOLLOWING MEMBERS:

**Ms. Lenka Kovačovská** (Chairwoman), Deputy Minister at the MPO;

**Mr. Ladislav Štěpánek** (Vice-Chairman of the Board), a member of the Board of Directors at ČEZ;

**Mr. Ladislav Havlíček**, Head of the Strategy and Fuel Cycle Department at ČEZ;

**Ms. Zdeňka Vojtíšková**, Economist at the MF;

**Mr. Pavel Gryndler**, Environment Department of the Litoměřice town council;

**Mr. Vítězslav Jonáš**, Chairman of the "Energy Třebíčsko Region" Association, Member of the Dukovany local council;

**Mr. Bronislav Grulich**, Chairman of the Jáchymov town council;

**Mr. Karel Křížek**, CEO of ÚJV Řež;

**Mr. Štěpán Svoboda**, Head of the Research & Development Centre at Chemcomex Praha.



# CONTACTS

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# ABBREVIATIONS USED

**ČBÚ:** Czech Mining Authority

**ČVUT:** Czech Technical University in Prague

**DGR:** deep geological repository

**DOPAS:** pan-European Full-scale Demonstration of Plugs and Seals Experiment

**HBZS Most:** the Principal Mining First-Aid Station in Most

**IAEA:** International Atomic Energy Agency

**MF:** Ministry of Finance

**MPO:** Ministry of Industry and Trade

**MŽP:** Ministry of the Environment

**NPP:** nuclear power plant

**OECD/NEA:** Nuclear Energy Agency of the Organisation for Economic Co-operation and Development

**RW:** radioactive waste

**SKB:** Swedish Nuclear Fuel and Waste Management Company

**SNF:** spent nuclear fuel

**SÚJB:** State Office for Nuclear Safety

**SÚRAO:** Radioactive Waste Repository Authority

**ÚJV Řež:** Nuclear Research Institute Řež

**URF:** underground research facility



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