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GEOLOGICAL SURVEY OF SLOVENIA
Dimičeva ulica 14, 1000 Ljubljana

REPUBLIC OF SLOVENIA
MINISTRY OF THE ECONOMY

Kotnikova 5, 1000 LJUBLJANA

BULLETIN
MINERAL RESOURCES
in Slovenia 2009

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GEOLOGICAL SURVEY OF SLOVENIA
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GEOLOŠKI ZAVOD SLOVENIJE
GEOLOGICAL SURVEY OF SLOVENIA
Dimičeva ulica 14, Ljubljana

REPUBLIC OF SLOVENIA
METAL ORE DEPOSITS MAP

AUSTRIA
HUNGARY
ITALY
CROATIA
CROATIA

Remšnik (Pb, Zn, Cu, Ag)
Kopa (Fe)
Mežica - Topla (Zn, Pb)
Mežica - Mučevo (Zn, Pb)
Mežica - Kotlje (Pb, Zn)
Mežica - Peca (Pb, Zn, Mo)
Mežica - Graben (Pb, Zn)
Mežica - centralno rudišče (Pb, Zn, Mo)
Savske jame (Fe)
Šancetova ruda (Zn, Pb, Ba)
Belščica (Fe)
Begunjščica I (Mn)
Stegovnik (Zn, Cu, Pb, Hg)
Korošica (Zn, Pb)
Podljubelj (Hg)
Rudno polje - Pokljuka (Fe)
Bohinj - Rudnica (Al)
Knape (Pb, Zn)
Vancovec (Mn)
Počenska gora (Mn)
Sv. Valentin (U)
Škofje - Cerkno (Cu)
Sovodenj (Cu)
Žirovski vrh (U)
Knapovže (Pb, Zn, Hg)
Idrija (Hg)
Podlipa (Al, Fe)
Kopitov grič (Al, Fe)
Rjavi grič (Al, Fe)
Kozina (Al)
Puharje - Šoštanj (Zn, Pb)
Lepa njiva (Sb)
Bric (Fe)
Felicijan (Fe)
Kamniška Bistrica (Al)
Kokarje - Žifernik (Al)
Vranja peč (Al)
Galicija (py)
Zavrh (Pb, Zn)
Železno (py)
Gloše (Fe)
Drava - Fala (Au)
Mura – Vučja vas (Au)
Drava – Sv. Marko pri Ptuju (Au)
Marija Reka (Hg, Pb, Ba)
Češnjice (Zn, Pb, Cu)
Trojane – Kraljev rov (Sb)
Rudnica I (Fe)
Ponoviče (Zn, Pb)
Maljek (Pb, Zn)
Zavrsnik (Pb, Zn)
Zagorica (Pb, Zn)
Sitarjevec - Litija (Pb, Zn, Hg, Cu, Ba)
Lokavec (Pb, Zn)
Fužine (Fe)
Bohor (Zn, Pb)
Cerovec – Ledina (Pb, Zn)
Hrastno (Fe)
Pleše (Pb, Zn, Hg, Ba)
Makronog (Pb, Zn)
Škovec (Tržišče) (Pb, Zn)
Logarje (Al)
Hrast (Al)

JESENICE
MURSKA SOBOTA
MARIBOR
PTUJ
CELJE
KRANJ
LJUBLJANA
NOVA GORICA
POSTOJNA
NOVO MESTO
KRŠKO
KOČEVJE
KOPER

Adriatic sea

EXPLANATION KEY

SIZES AND SHAPES OF ORE DEPOSITS

- Small ore veins
- Large stratiform ore deposits
- Small stratiform ore deposits
- Large irregular ore deposits
- Small irregular ore deposits

ORE CHEMISTRY

Sulfides

- Cu, py (pyrite)
- Pb, Zn, subordinated Mo, Ba, Hg, Cu
- Hg, Sb, subordinated Pb, Ba

Oxides, carbonates, native metals

- Fe, Mn
- U
- Al, subordinated Fe
- Au

N W E S

0 5 10 20 30 40 Km

In 2008 Slovenia had no active metal ore mines.

Adapted by: Tomaž BUDKOVIČ
Adapted from "Metallogenic map of SR Slovenia"
(Authors: F. DROVENIK, M. DROVENIK, U. PREMRU,
F. MIKLIČ, M. BIDOVEC, M. KARER, 1980)
Design and digital cartography: Matija KRIVIC
Ljubljana, 2009

Topography: Void-filled seamless SRTM data V1, 2004,
International Centre for Tropical Agricultura (CIAT),
CGIAR-CSI SRTM 90m Database: http://srtm.csi.cgiar.org

MINERAL RESOURCES

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FOREWORD

Dear Reader,

It seems that each year is shorter and shorter, and although this is not really the case, another year has already passed and we have released already the **second** edition of the bulletin MINERAL RESOURCES. It is also available on http://www.geo-zs.si .

Last year was strongly marked by the continued economic crisis in Slovenia, the European Union and the world, which is also evident in the substantial decrease in production of mineral resources (considering the years of conjuncture). In Slovenia, the drop was nearly 30 % compared to 2007. Regarding the structure of mineral resources production in Slovenia, this points to the difficult state of the construction business, which we can follow in the media practically on a daily basis. The lasting trend of the previous year is still continuing and we are not yet seeing much recovery.

The field of mineral resources has also been marked in the past year by a lively debate regarding changes and additions to mining legislation, which came to a climax in July 2010 with the ratification of the Mining Act (ZRud-1). The law became effective in August, and will come into force as of 1 January 2011.

At the European Union level, the past year was a year of intensive work for two working groups (group I – critical mineral resources; group II – best practice transmission in the area of forming policies/ directions, furthering spatial planning, procedures for issuing permits and the exchange of geological expertise). The working groups were organised within the Raw Materials Supply Group – RMSG. In July 2010 they published their reports, which can be found on the website of the Commission:
http://ec.europa.eu/enterprise/policies/raw-materials/critical/index_en.htm
http://ec.europa.eu/enterprise/policies/raw-materials/sustainable-supply/index_en.htm.

Some good news from the last year is absolutely the increased number of active European projects in the field of mineral resources. Some Slovene researchers and experts are also participating as partners in some of these. We will give a report on one of these projects in this issue.

I hope and expect that next years there will be a more optimistic outlook on the future, primarily on the basis of renewed economic momentum, as well as faster societal development.

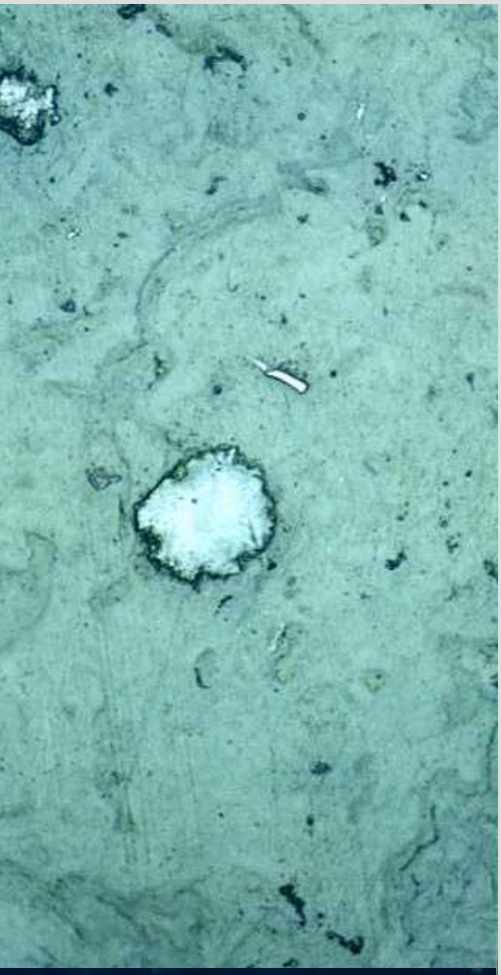
In closing, I wish to thank my colleagues, the contributing authors, for their part in the release of this bulletin and I invite the readers to take it in their hands, read it and send the editors their comments, whether complimentary or critical.

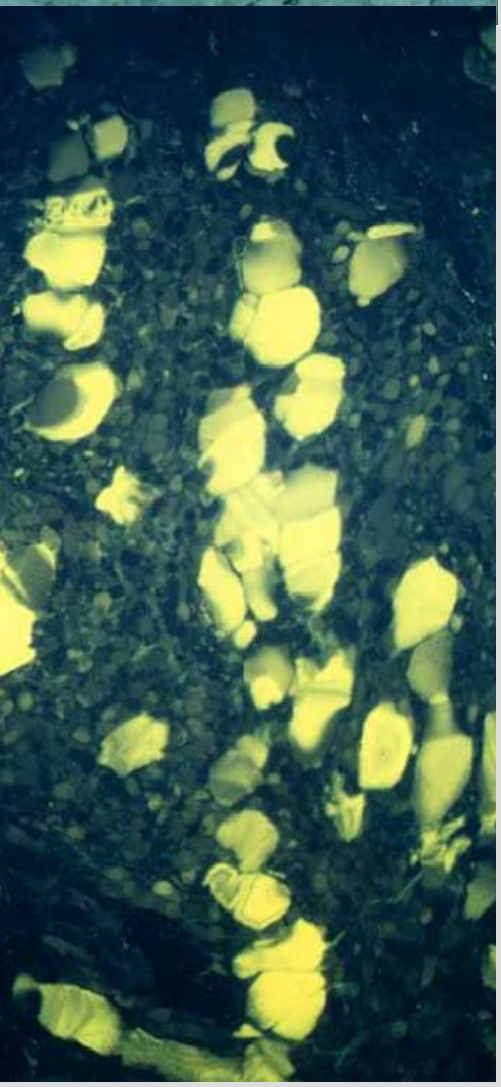
BEST WISHES!

Dr. Slavko V. Šolar
Editor

Ljubljana, August 2010

Cover print: Quarry Sadinja vas, Photo by: Ana Burger
Other photos by: Ana Burger, Vida Pavlica, Miloš Markič, Stelios Mavrigiannakis





INTRODUCTION

Dear Reader,

Before you is the 6th bulletin of Mineral Resources in Slovenia, which presents to you a summary of the state of affairs for the year 2009. The bulletin has, as in past years, come about through the cooperation of experts from the Geological Survey of Slovenia and the Division for Mining under the Directorate for Energy at the Ministry of the Economy of the Republic of Slovenia. Through its contents it can also prove to the broader public the usefulness of carrying out public geological services for mining purposes in Slovenia, which the Geological Survey of Slovenia performs for the Directorate for Energy at the Ministry of the Economy of the Republic of Slovenia.

That the above-mentioned work is not an end in itself is attested to by the fact that mineral resources are gaining importance every day. While it is true that non-metal mineral resources and some energy resources, which represent the bulk of the activities of public geological services for mining purposes, are more or less connected to a narrower area of extraction and therefore have less of a globally strategic value, they are just as important for economic development as metal mineral resources and the majority of fossil fuels, for which these assertions do not hold true. It is precisely because of this fact that the tasks in the framework of public geological services play an important role in the development of Slovenia.

Greater challenges are faced by mineral resources of the other group (rare and metallic mineral resources, as well as the majority of fossil fuels), which Europe does not extract enough of to satisfy the tremendous need, so therefore must import them. Here, however, it faces competition from the USA, China, Russia, Australia and Japan, who are also participating in the »natural resource arms race«. The competition is tough and fierce, and above all long-term, as it demands tying up financial investments in exploration, which only yields results after a time lapse. Future owners and exploiters of strategic resources will undoubtedly shape and control the development of 21st century technology. A clear example is rare earth metals, such as lithium, yttrium and lanthanides, which are unavoidable in the development of low-carbon technology and for the production of equipment connected with it. At the moment, China has a monopoly on the extraction of rare earth metals, as it controls 95 % of the supply. This fact presents a serious threat to other advanced societies because of their limited access to these mineral resources. In the face of ever-increasing pressure from competitors in the field of »natural resource arms race«, the EU must seriously ask itself about the urgency and scope of strategic moves connected with this question. The EU is substantially behind in this area, so decisive action is strongly desired and desperately needed. Only time will tell how well the EU will know how to capitalise on its more friendly relations in the areas and countries, or rather to the people of these places, where deposits of these strategic mineral resources are.

In light of all this, certain responses or moves clearly present themselves as a solution. The European Union has already adopted some of these measures, such as the acceptance of the report on mineral resources (*Communication on the Raw Materials Initiative »Meeting our critical needs for growth and jobs in Europe«*) or the analysis that was carried out on 14 critical mineral resources for the needs of the EU (*Report forecasts shortages of 14 critical mineral raw materials*) by a group of experts. Besides looking for new sources of mineral resources and energy sources, decreasing their use and of course recycling both lend themselves as alternative or complementary solutions. Aware of the coming problems with managing mineral resources in Europe and in Slovenia, we at the Geological Survey of Slovenia also try to be as actively involved as possible in seeking out solutions for these problems, and are strongly supported in this endeavour by the Directorate for Energy at the Ministry of the Economy of the Republic of Slovenia. As such, we are coordinating the European project SARMa, which operates in the area of Southern and South-eastern Europe. In addition, we are also actively participating in several other European projects concerning the problems surrounding mineral resources – EO-Miners in EuroGeoSource and energy sources – T-JAM in TransEnergy.

In the same way that a society is a dynamic form, so is the reflection of its work, as presented in this bulletin. Each and every discovery is both mysterious and interesting. In unveiling its secrets and studying its content, I wish you a great sense of satisfaction and much interesting reading.

BEST WISHES!

Dr. Marko Komac, Ph.D.
Director
Geological Survey of Slovenia

Ljubljana, August 2010

Mining activities in Slovenia fall under the **Ministry of the Economy, Directorate for Energy.**

On the web page of the Ministry of the Economy (http://www.mg.gov.si/en/), among other items posted from the area of the mining, are descriptions of the procedures for obtaining individual permits, as well as access to the application form for interest in the Issuance of Mining Rights. Information about current events and news that involves this ministry is also posted on the page.

The main activities of the Directorate for Energy related to mining are:

- Managing procedures relating to mining rights
- Issuing permits and consents within the jurisdiction of the Ministry according to the Mining Act
- Deciding on entries into the registry of persons authorised for mining and keeping the registry in electronic form and hard copy
- Coordination of the programme for the gradual closure of the Trbovlje-Hrastnik Mine, and the programme for the long-term rehabilitation of disused mining facilities for the purposes of the exploitation of hydrocarbons in the north-eastern part of Slovenia
- Preparation for implementing regulations in the area of mineral resources management at all stages
- Preparation of the draft national programme and plans for the management of specific mineral resources
- Management and coordination of particularly demanding administrative procedures and projects

The three main activities are issuing permits according to the Mining Act, granting mining rights and other administrative procedures.

Permits from the Mining Act

1. Permits from Article 48 of the Mining Act

The following permits are issued on the basis of Article 48 of the Mining Act:

- Permit for exploration
- Permit for exploitation
- Permit for ceasing exploitation
- Permit for conducting activities
- Permit for the use of facilities and equipment

The above-mentioned permits are issued for all mineral resources with the exception of crushed stone, gravel, sand, silt, clay, flysch, marl, pottery, ceramic and brick clay, for which permits are issued at the regional administrative offices having jurisdiction over the area on the basis of Paragraph 2 of Article 48 of the Mining Act.

In accordance with Article 48 of the Mining Act, only permits under points 4 and 5 of Article 48 of the Mining Act are issued for the execution of mining activities that do not directly relate to exploration and exploitation of mineral resources, namely the permit for conducting activities and the permit for the use of facilities and equipment.

2. Permits from Article 51 of the Mining Act

In cases specified by Article 51 of the Mining Act, a permit from points 1, 2, 3 and 4 of Article 48 of the Mining Act may be issued through an expedited procedure as one complete permit.

In the expedited procedure at least two procedures from the preceding paragraph are combined, such that the issuing procedure for permits from points 1, 2 or 3 of Paragraph 1 of Article 48 of the Mining Act are combined with the procedure for issuing the permit for conducting activities from point 4 of Paragraph 1 of Article 48 or from Article 50 of the Mining Act (e.g. the permit for exploration and the permit for conducting activities in the exploration, the permit for exploitation and the permit for conducting activities in exploitation, the permit for ceasing exploitation and the permit for conducting activities in ceasing exploitation).

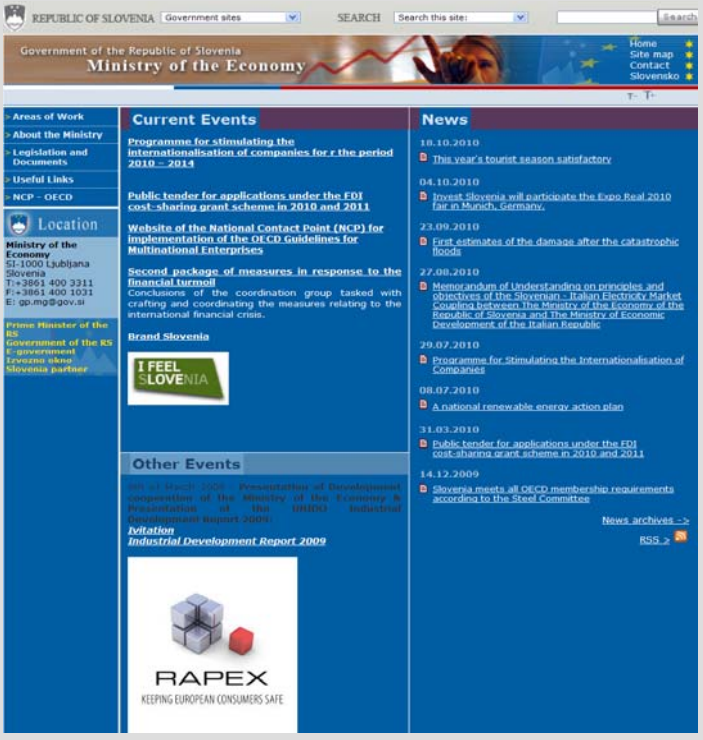
Procedure for granting mining rights

The exploitation of mineral resources is conducted in an exploitation area, the size of which is determined by the act on granting mining rights (Article 12 of the Mining Act). The right to mining may be obtained with a concession, which is issued by the Government of the Republic of Slovenia (Article 13 of the Mining Act).

Other administrative procedures

Decision-making in administrative procedures not connected with exploration and exploitation of mineral resources are also conducted and overseen.

On the basis of the decrees within the Mining Act, the Spatial Planning Act and the Construction Act, various approvals, opinions and guidelines are issued.



STATE OF AFFAIRS IN THE FIELD OF MINERAL RESOURCES IN SLOVENIA IN 2009

Overview of Slovenia's mineral resources

In Slovenia, we can find energy resources, metallic and non-metallic mineral resources in the given geological conditions. **Energy resources** include coal (black and brown coal, as well as lignite), radioactive mineral resources (uranium), oil and natural gas, along with geothermal energy. Coal-rich areas include the Velenje basin, the Zasavje tertiary basin, the Krško-Brežice field and northeastern Slovenia. Potential deposits for uranium ore lie in the areas of Žirovski Vrh and the wider Škofja Loka region. There are several potential areas with oil and natural gas: the Mura depression, the Slovenian coastal region, the Alpides and the Dinarides and isolated tertiary basins. Around 16 % of the land of Slovenia has geothermal prospects. Potential areas are the Pannonian basin, the Rogaška-Celje-Šoštanj basin, the Krško-Brežice basin, the Planina-Laško-Zagorje basin and the Ljubljana basin. On the metallogenetic map of Slovenia, around 200 sites of **metallic mineral resources** are marked, dozens of which are mining sites (deposits); the rest are finds (occurences). Potential economic significance can be attributed primarily to sites of mercury, lead and zinc, copper, antimony, iron and bauxite. **Non-metallic mineral resources** of higher market value (industrial minerals and rocks) that could be exported are only moderately represented. Non-metallic mineral resources of lesser value prevail (mineral resources for the industry of building materials and construction), which we take advantage of primarily for our own use or enrich them and use them in semi-manufacturing and manufacturing. Domestic non-metallic mineral resources are used in construction, the ceramic industry, the metallurgy and metalworking industry, for environment and water purification, the glass working industry, farming, the food industry and so on.

Mining has a long tradition in Slovenia and its own position on a worldwide scale. In the past, this meant the exploitation of a significant quantity of mercury in Idrija, whereas today it involves the technologically perfected underground extraction of lignite in Velenje. In recent times we have been closing underground mines of energy resources and metallic mineral resources; only mines (surface mines) of non-metallic mineral resources and individual underground coalmines are left. Coal production is only carried out today at the Velenje Lignite Mine and at the Trbovlje-Hrastnik Brown Coal Mine.

The following description of Slovenian coalmines is taken from Markič (2007 Bulletin). We know of dozens of sites of coal extraction within the territory of Slovenia, from very small sites, which had only regional significance, to a number of full-blown coalmines, where in the past we mined anywhere from tens of thousands to hundreds of thousands of tons of coal per year; in Trbovlje quantities also reached above one million tons (1 Mt) and in Velenje over 5 Mt. Our exploitation of coal,

whose beginnings reach back to the second half of the 18th century in the time of Maria Theresa's reign and the era of the Enlightenment, to its height in the 19th and 20th centuries, has changed with time and geography.

Even exploration was undertaken with varying intensity in different periods, but excavation and accompanying technologies of mining which took place primarily underground, though in some areas also on the surface, particularly improved. After World War II and until the beginning of the 1960s, production of coal in Slovenia grew quickly, from around 2 to nearly 6 Mt per year. This was followed in the 1980s by increased production to approximately 6.75 Mt annually, but with a lower level of quality, below 10 MJ/kg. In the 1990s we closed the coalmines at Laško, Zagorje, Senovo and Kanižarica and considerably decreased domestic production of coal to under 5 Mt per year, while somewhat raising its energy quality as well as introducing some cleaner burning procedures in thermal energy structures.

Today only two coalmines are still in operation in Slovenia: the Trbovlje-Hrastnik Brown Coal Mine and the

Velenje Lignite Mine, for which production in the year 2009 amounted to over 0.5 Mt of brown coal (Trbovlje-Hrastnik) and 3.9 Mt of lignite (Velenje).

The uranium mine at Žirovski Vrh, which is the only newly opened underground mine in Slovenia since the Second World War, has been in the process of closing since 1991. The production of mercury ore in Idrija was ended in 1991. In Mežica the last tons of lead and zinc ore were mined in 1994. Otherwise, the mines in Idrija and Mežica have been in the process of closing down since 1987 and 1988 respectively.

From the brief preceding description of the situation in Slovenia, the potential of mineral resources and the overall economic state, a pronounced dynamic of change can clearly be seen: the closing of centuries-old metal mines, smaller underground coalmines and uranium mines, the strategic preservation of two coalmines and the marked emphasis on mineral resources for building and the construction industry. In view of the trends until now of increased exploitation and programmes for economic development, primarily in the area of infrastructure construction (roads, railways, apartment buildings), we can predict a need for individual non metallic mineral resources, first of all in construction, with others also coming into play in the long term after 2010. Mineral resources for construction, which will be extracted by surface mining, will remain an important factor in the national economy and development in the future as well.

We conclude that in the year 2009 there was a total of 225 areas with mining rights, of those, 219 exploitation and 6 exploration areas, with 26 different mineral resources. These areas were administered by 168 mining right holders.

Slavko V. Šolar, Andreja Senegačnik

OVERVIEW OF DATA ON PRODUCTION, RESERVES AND RESOURCES OF NONMETALS

Types and distribution of mineral resources in Slovenia

We know about many more types of mineral resources in the territory of Slovenia than have been exploited in the past or in 2009. In that year, according to data from the Ministry of the Economy (by the Reporting Form), the following types of mineral resources were exploited and explored:

– ENERGY
  - brown coal, lignite, oil and natural gas, geothermal energy

– METALS

– NONMETALS
  - lake chalk (production until 2003), bentonite, chert, quartz sand, calcite, tuff, industrial dolomite, ceramic clay, brick clay, natural stone (limestone, tonalite, other natural stones), raw materials for the lime and cement industry (limestone and marl for industrial purposes), crushed limestone, dolomite, magmatic and metamorphic rocks (meta-diabase, keratophyre, andesite and andesite tuff, serpentinite), gravel and sand.

– MINERAL RESOURCES - OTHER
  - sea salt

We can classify mineral resources in a number of ways. In Slovenia we divide mineral resources into:

– ENERGY
– METALS
– NONMETALS
  - mineral resources for the manufacturing industry and other uses (industrial minerals and industrial rocks)
  - mineral resources for the industry of construction materials
  - aggregates
– MINERAL RESOURCES - OTHER

Explanation of the tables

The source of the data on production, reserves and resources for the years 2004 - 2009 is the data from the Geological Survey of Slovenia's »Database of Reporting Forms of Mineral Resources«. The database is compiled on the basis of the Reporting Forms for declaring the base of produced mineral resources, the size of the exploitation and exploration areas and the measures for cleaning up the consequences resulting from the mining, and the forms regarding the state of reserves and resources of mineral resources. The holders of mining rights submit the completed forms for their areas once a year to the ministry presiding over mining. Prior to 2004 we used data from the »Statement of Reserves and Resources of Mineral Resources in the Republic of Slovenia« from the Republic Commission for Determining Mining Reserves and Groundwater (henceforward, the Commission). Data regarding territorial units (statistical regions) and population are data from the Statistical Office of the Republic of Slovenia.

In the tables sites are taken into account, therefore including sites without production or without reserves and resources. The site is presented for the year the valid exploitation or exploration area was declared at the Commission (until 2003) or in the Database of Reporting Forms (from 2004 onwards).

The Commission's data on reserves and resources of all mineral resources of various categories and classes has been separated into only two parts for our purposes, namely *reserves* and *resources*. At the current time reserves can be exploited, whereas resources, for a variety of reasons, can not (insufficient exploration, unprofitability, technical-technological infeasibility). Therefore, in the following text reserves are classified into economically viable reserves types A, B and C_1; among resources, into conditionally economically viable and economically unviable reserves types A, B and C_1 and resources, type C_2. Reserves and resources have been measured only in exploitation and exploration areas. Regarding the recorded resources D_1 and D_2, it is our opinion that they were not evaluated within legally approved exploitation and exploration areas and we have not included them among resources.

Slavko V. Šolar, Jože Štih, Andreja Senegačnik

GEOLOŠKI ZAVOD SLOVENIJE
GEOLOGICAL SURVEY OF SLOVENIA
Dimičeva ulica 14, Ljubljana

MINERAL DEPOSITS WITH MINING RIGHTS IN SLOVENIA - 2008

AUSTRIA
HUNGARY
ITALY
CROATIA
Adriatic Sea

JESENICE
KRANJ
LJUBLJANA
NOVA GORICA
POSTOJNA
KOPER
CELJE
MARIBOR
MURSKA SOBOTA
PTUJ
KRŠKO
NOVO MESTO
KOČEVJE

Sotina
Kuštanovci I
Konjišče II
Ivanci
Dobrovnik
Bakovska cesta B
Bakovska cesta A
Lipovci
Nedelica
Dokležovje
Melinci
Krapje
Babinci
Lakoš
Gorče pri Libeličah
Šentvid pri Vuzenici
Bezena
Selnica ob Dravi II
Selnica ob Dravi I
Dogoše
Duplek
Hoče
Rače 2
Prepolje
Pleterje I
Pleterje II
Janežovci
Polskava
Hardeška šuma
Jurkovec
Pragersko
Josipdol
Gostenčnik
Mežica (Žerjav)
Sele pri Slovenj Gradcu
Mrak
Batič
Ovčar (Jovan)
Kotnik
Krajnc
Hren
Klemenc
Loška gora I
Cezlak
Cezlak II
Cezlak I
Obrovnik
Korže
Ovčar
Loška gora II
Velenje
Paka
Selo pri Velenju
Stranice
Brezje pri Oplotnici
Gračič
Konjiška gora
Pletovarje
Poljčane
Bela
Zg. Gabernik
Zagaj II
Zagaj I
Stojno selo
Kokra (Zgornje Jezersko)
Rudno polje
Ribno
Peračica
Graben
Goruše
Kamna Gorica
Kamna Gorica
Rovtarica
Brezovica pri Kropi
Bitenjska planina
Martinček
Bistrica pri Naklem
Srpenica
Ladra
Haber
Ter
Poljane
Hom
Andraž
Podgora
Velika Pirešica
Zaloška Gorica
Zaloška Gorica
Zadobrova
Šmiklavž
Stahovica
Stahovica
Stahovica
Črna
Godič
Rudnik
Liboje
Lukovica
Križate
Moravče
Lipovški vrh
Borovnik
Ušeniško
Ušeniško
Retje - Plesko
Retje - Plesko
Boben
Trbovlje - Hrastnik
Trbovlje - Hrastnik
Rečica
Rečica
Žusem
Žamerk
Vodule
Hrastje
Zidani Most
Šonovo
Rakonca
Bizeljsko
Bizeljsko (Gradišče)
Zala v Davči
Reteče
Laharn
Gorenja vas
Hotavlje
Visoko
Lajše I
Lajše II
Vehar - 1
Rodež
Perunk
Deskle
Lastivnica
Malin dol
Lazna
Mrzla rupa
Podutik
Bradeško - Zadobje
Grdadolnik
Lesno Brdo
Drenov Grič
Čelo pri Vrhniki
Kmetov pruh
Draga pri Cerovici
Draga
Ježce I
Ježce II
Vetrnik
Sadinja vas
Pleše pri Škofljici
Šmarje - Sap
Podsmreka
Zabukovje I
Zabukovje II
Grahovica
Log II pri Sevnici
Gunte
Globoko
Globoko
Globoko
Tržišče
Červivec
Zavratec 1 in 2
Bučka
Jersovec II
Dolenje Laknice
Stari Grad
Vrbina - Brežice
Ravno
Solkan
Kresni grič
Žala
Šebalk
Košovnik
Mivšek
Verd
Maček
Okroglica I
Okroglica II
Okroglica II
Renče
Opatje selo
Rubije
Štanjel
Gorjansko
Kopriva
Kazlje
Tomaj
Razdrto
Laže I
Šmihel - Bukovje
Podskrajnik
Želše
Klanci
Predstruge
Vrhpeč
Čemše
Klek
Polhovica - Prapreče
Premagovce
Soteska
Zalog
Štebih
Cerov Log
Mala gora
Kot pri Ribnici I
Kot pri Ribnici II
Prigorica
Lesično
Mali Medvejk
Doline
Debela Griža pri Povirju
Lipica II
Lipica I
Bezovščina
Elerji pri Škofijah
Premančan
Črni Kal - Črnotiče
Črni Kal
Griža pri Rižani
Strunjan
Sečovlje (Lera in Fontanigge)
Topli vrh
Brezovica
Vrčice
Bereča vas
Laze
Koprivnik
Mozelj II
Mozelj I
Kočevska Reka
Čeplje
Suhor pri Vinici
Hrast pri Vinici II
Hrast pri Vinici I

EXPLANATION KEY

Nahajališče Exploitation area
Nahajališče Exploration area

Energy resources
- Coal

Industrial minerals and rocks
- Bentonite
- Calcite
- Chalk
- Quartz sand
- Tuff
- Industrial dolomite
- Chert
- Ceramic clay
- Fire resistant clay

Construction materials
- Brick clay
- Brick marl
- Natural stone - limestone
- Natural stone - tonalite
- Natural stone - other
- Limestone for lime and cement
- Cement marl

Aggregates
- Crushed stone - limestone
- Crushed stone - dolomite
- Crushed stone - metamorphic and magmatic rocks
- Gravel and sand

Mineral resources - other
- # Sea salt

Murska depresija
- Exploitation area - oil and natural gas
- Exploration area - oil and natural gas
- Exploration area - geothermal energy
- Exploration area - oil, natural gas, geothermal energy

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International Centre for Tropical Agricultura (CIAT),
CGIAR-CSI SRTM 90m Database: http://srtm.csi.cgiar.org

0 5 10 20 30 40 Km

Geological Survey of Slovenia
Dimičeva ulica 14
Ljubljana, SLOVENIA

MINERAL RESOURCE PRODUCTION IN SLOVENIA

(in metric tons)

		1983	1988	1993	1998	2003	2006 *	2007	2008	2009
Bentonite				20	447	187	130	130	160	104
Calcite			142.208	105.402	103.000	119.606	271.509	273.745	348.152	405.467
Kaolin		67.290	35.514	20.171						
Chalk		17.942	4.740	2.090	945	607				
Quartz sand		650.295	861.579	374.164	518.755	449.733	278.041	295.667	289.529	215.065
Tuff			109.000		84.101	84.333	88.013	90.319	109.949	58.062
Industrial dolomite							294.645	299.177	177.715	146.214
Chert		26.910	30.744	17.477	18.200	20.824	15.445	16.745	21.648	16.695
Ceramic clay		67.490	172.740	152.268	98.588	79.900	86.443	78.221	32.200	9.478
Industrial minerals and rocks		**829.927**	**1.356.525**	**671.592**	**824.036**	**755.190**	**1.034.226**	**1.054.004**	**979.353**	**851.085**
Brick clay		607.942	1.034.168	883.420	632.696	573.584	638.329	706.866	420.360	235.348
Building stone	limestone	9.456	34.830	54.321	31.474	38.942	52.459	47.983	71.260	73.156
	tonalite (granodiorite)	27.000	29.344	21.600	54.478	30.850	56.587	65.715	67.400	39.787
	other		9.318	2.465	1.139	5.713	24.392	27.124	21.959	21.573
Building stone		36.456	73.492	78.386	87.091	75.505	133.438	140.822	160.619	134.516
Raw materials for lime							2.089.495	2.082.593	1.631.391	1.221.197
Raw materials for cement		1.533.912	1.249.387	1.520.954	1.479.644	1.400.423	1.324.803	1.489.625	1.684.258	1.188.493
Construction materials		**2.178.310**	**2.357.047**	**2.482.760**	**2.199.431**	**2.049.512**	**4.186.065**	**4.419.906**	**3.896.628**	**2.779.554**
Crushed stone	limestone	2.549.348	4.714.443	4.620.273	6.748.784	6.623.054	7.242.777	7.134.305	7.541.043	6.284.804
	dolomite	891.376	3.402.742	3.068.666	4.502.498	8.391.079	6.712.996	6.909.947	7.291.259	7.175.362
	other				99.963	26.207	257.546	235.002	150.258	149.562
Crushed stone		3.440.724	8.117.185	7.688.939	11.351.245	15.040.340	14.213.319	14.279.254	14.982.560	13.609.728
Sand and gravel		1.466.141	3.455.355	2.668.860	2.440.115	3.437.911	6.871.519	8.549.960	4.506.076	3.001.291
Construction materials – aggregates		**4.906.865**	**11.572.540**	**10.357.799**	**13.791.360**	**18.478.251**	**21.084.838**	**22.829.214**	**19.488.636**	**16.611.019**
NON METALS		**7.915.102**	**15.286.112**	**13.512.151**	**16.814.827**	**21.282.953**	**26.305.129**	**28.303.124**	**24.364.617**	**20.241.658**
brown coal							587.912	483.417	488.828	510.769
lignite							3.932.842	4.037.766	4.008.442	3.921.746
coal							**4.520.754**	**4.521.183**	**4.497.270**	**4.432.515**
oil							284	344	174	138
gas condensate							154	167	104	105
gas							3.751	3.078	2.348	2.317
oil and gas							**4.189**	**3.589**	**2.626**	**2.560**
sea salt							1.624	3.029	535	2.924

* Coal, oil, gas and sea salt are recorded in this table since 2004.


Photo: Miran Beškovnik, Velenje Lignite Mine

Number of sites of non metals in Slovenia with and without production in exploitation areas by year

		1983	1988	1993	1998	2003	2006	2007	2008	2009
Bentonite			1	1	1	1	1	1	1	1
Calcite			1	1	1	1	1	1	1	1
Kaolin		1	3	3	3					
Chalk		2	1	1	1	1	1	1	1	1
Quartz sand		12	7	10	9	7	7	7	7	7
Tuff			2	2	2	1	2	1	1	1
Industrial dolomite							3	3	1	1
Chert		3	1	1	1	1	1	1	1	1
Ceramic clay		2	6	7	6	6	6	5	5	4
Industrial minerals and rocks		**20**	**22**	**26**	**24**	**18**	**22**	**20**	**18**	**17**
Brick clay		6	11	10	7	7	8	9	8	6
Building stone	limestone	3	2	3	4	6	11	13	12	11
	tonalite (granodiorite)	1	2	2	1	2	2	2	3	3
	other	2	3	5	4	9	15	15	15	14
Building stone		6	7	10	9	17	28	30	30	28
Raw materials for lime							6	6	6	6
Raw materials for cement		4	6	7	6	4	5	5	5	5
Construction materials		**16**	**24**	**27**	**22**	**28**	**47**	**50**	**49**	**45**
Crushed stone	limestone	7	20	24	22	25	24	29	27	27
	dolomite	8	31	36	30	88	101	100	95	96
	other				2	4	6	8	6	6
Crushed stone		15	51	60	54	117	131	137	128	129
Sand and gravel		10	28	30	22	32	36	37	33	32
Construction materials – aggregates		**25**	**79**	**90**	**76**	**149**	**167**	**174**	**161**	**161**
NON - METALS		**61**	**125**	**143**	**122**	**195**	**236**	**244**	**228**	**223**

Geological Survey of Slovenia
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NON METALS RESERVES IN SLOVENIA

(in metric tons)

		1983	1988	1993	1998	2003	2006	2007	2008	2009
Bentonite			1.130.073	1.130.053	1.127.591	176.313	175.725	175.539	181.415	181.267
Calcite			6.500.358	6.048.374	7.609.551	5.167.995	5.477.447	5.192.297	4.829.639	4.407.278
Kaolin		1.770.330	2.277.432	2.131.780	0					
Chalk		4.531.170	2.564.396	3.666.281	4.613.068	4.609.878	4.609.878	4.609.878	4.609.878	0
Quartz sand		22.016.828	26.414.361	27.349.780	25.533.023	20.049.072	18.758.679	17.209.458	18.649.704	17.518.742
Tuff			2.448.511	2.021.998	1.474.575	2.885.409	2.572.582	2.468.715	4.394.518	4.327.747
Industrial dolomite							8.800.737	8.793.590	6.857.913	7.027.249
Chert		1.930.320	266.556	172.861	576.590	490.992	412.641	386.880	375.335	342.690
Ceramic clay		15.567.716	24.140.907	24.594.991	11.992.994	3.594.473	3.735.402	5.173.745	4.410.827	4.265.338
Industrial minerals and rocks		**45.816.364**	**65.742.594**	**67.116.118**	**52.927.392**	**36.974.132**	**44.543.091**	**44.010.102**	**44.309.229**	**38.070.311**
Brick clay		17.040.042	33.405.130	51.530.276	11.054.904	22.533.978	22.375.460	22.046.548	10.551.336	9.734.392
Building stone	limestone	1.307.118	9.375.917	9.631.643	5.485.933	5.394.506	5.237.058	5.171.934	5.499.571	5.444.177
	tonalite (granodiorite)	5.993.460	6.657.398	5.940.340	6.084.974	6.957.139	6.825.298	6.759.582	6.925.657	6.885.869
	other	1.503.638	2.439.715	3.523.851	3.631.370	2.569.868	2.283.476	2.260.078	2.489.065	2.470.287
Building stone		8.804.216	18.473.030	19.095.834	15.202.277	14.921.513	14.345.832	14.191.594	14.914.293	14.800.333
Raw materials for lime							85.407.301	81.964.170	86.896.853	82.571.246
Raw materials for cement		82.584.965	111.011.205	126.557.151	94.028.998	66.973.262	44.287.874	42.757.697	40.963.436	39.698.393
Construction materials		**108.429.223**	**162.889.365**	**197.183.261**	**120.286.179**	**104.428.753**	**166.416.467**	**160.960.009**	**153.325.918**	**146.804.364**
Crushed stone	limestone	260.924.949	420.997.551	407.042.962	345.954.722	211.860.322	186.027.334	176.604.902	167.006.530	177.431.167
	dolomite	17.410.019	128.054.857	123.927.918	123.149.775	153.442.411	141.137.919	140.470.975	112.442.037	119.087.095
	other				102.086	2.774.079	1.473.887	4.218.015	4.179.785	3.108.258
Crushed stone		278.334.968	549.052.408	530.970.880	469.206.583	368.076.812	328.639.140	321.293.892	283.628.352	299.626.520
Sand and gravel		20.406.589	63.227.742	39.080.471	18.019.921	34.241.209	57.756.643	50.359.420	46.148.792	39.602.741
Construction materials – aggregates		**298.741.557**	**612.280.150**	**570.051.351**	**487.226.504**	**402.318.021**	**386.395.783**	**371.653.312**	**329.777.144**	**339.229.261**
NON - METALS		**452.987.144**	**840.912.109**	**834.350.730**	**660.440.075**	**543.720.906**	**597.355.341**	**576.623.423**	**527.412.291**	**524.103.936**

Sustainable Aggregates Resource Management
SARMa

South East Europe Programme Project
2009 – 2011

Earth scientists, geologists and others are involved not only in fundamental research projects, but also in applied projects. Most applied projects are multidisciplinary and have as their goal the solution of different open and ongoing challenges that society faces. An important set of these projects deals with the provision of an adequate and secure supply of raw materials. Within such projects, many questions are addressed by scientists and experts, who are able to utilize their knowledge to collect relevant data, analyze that data and compile it into comprehensive information that provides a solid basis for sound decision-making. Earth scientists can best perform these tasks when they are aware of the need for information, the potential contribution of geology and other disciplines, and the prevailing societal paradigm of sustainable development. Consider, for example, the case of aggregates (crushed stone, sand and gravel), which are crucial for infrastructure and construction. Their importance and role in society has evolved over time, and the last few decades have seen dynamic changes. Parallel to these changes, the role of aggregate resource experts has also changed due to the requirements for data and information related to resources. In the increasingly complex world that we face, more and more diverse geological and other information is required; not only information on deposit quantity and quality, but also other geo-oriented information that supports the economic, environmental and social aspects of deposits, quarry development, and the whole mine life cycle.

Many countries are rich in aggregates, but supply is not coordinated, which is the case within South East Europe. Among the many challenges are illegal and destructive quarries, unclaimed sites, limited recycling, and community opposition. Primary aggregates can only be extracted where they occur; however, quarrying has had environmental and social impacts, including inefficient usage of water and energy, air pollution, and community disruption. These have given the industry a negative image, intensified by illegal quarrying, limited recycling of construction and demolition (C&D) wastes, and minimal use of quarry and industrial by-products.

Scientists and experts form a major part of the project team of the South East Europe project entitled "Sustainable Aggregates Resource Management". The main objectives of the project are to develop a common approach to sustainable aggregate resource management (SARM) and sustainable supply mix (SSM) planning at three scales to ensure an efficient and secure supply in South East Europe. SARM is efficient, low socio-environmental impact, quarrying and waste management. SSM promotes the use of multiple sources of aggregates, including recycled wastes and industrial by-products (slag) that together maximize the net benefits of aggregate supply across generations. At the site level, the issues are high environmental impacts, limited recycling, the need for stakeholder consultation and capacity building, and lack of social license to operate. At the regional/national level, the issues are policies and regulations affecting aggregates that do not address resource and energy efficiency or EU guidelines, preclude the use of recycled materials and industrial by-products, and fail to address aggregate consumption in long-term sustainable development and spatial planning. The transnational issues are lack of capacity and lack of coordination on aggregates production and transport between nations.

The project partnership has all the expertise and authority to implement the planned results and objectives. The relevance of this project deserves recognition for a number of reasons. First of all, its geographical coverage: it involves 14 partners in 10 countries of the SEE area. Secondly, it includes partners from old EU member states, new member states, and candidate countries. This will assure knowledge transfer and best practice transmission to zones with less experience in SARM and SSM, which will enable better cohesion of SEE countries in aggregates management and supply. Thirdly, the competence and expertise of the partners, not only in resources, but also with environmental issues, must not be overlooked. Fourthly, vertical coverage in different countries of activities at different scales (i.e., different zones for fieldwork, model development, and pilot implementation) will facilitate transnational activities and knowledge transfer from experts to stakeholders at the policy and implementation levels in different countries. Finally, it encourages continuing partnership among project members and observers representing ministries in charge of mining, regional authorities, chambers of commerce and industry. Geological surveys, institutes and faculties work regularly as experts and policy advisors with government and industry and combine up-to-date knowledge and expertise in the area of aggregates. All have on-going relationships with decision-making bodies in their countries and prepare strategic documents for authorities. In addition, eight decision-making bodies are included that all have sector extraction areas under their rule and want to participate actively in these challenges. Emphasis will be given to capacity building activities that will be possible by combining the expertise of the partners. The partners have experience in projects and raising public awareness in order to manage the project and disseminate output and results. The partners have made a long-term commitment by expressing the intention to establish a regional centre for SARM in SEE. During the course of the project, the partnership was enriched by a pool of stakeholders, a group of interested parties that have access to partnership meetings, events and documents and can actively contribute their experience.

The project partnership has the required expertise for implementing the project, achieving the objectives and producing the planned outputs. These include: recommendations on environmentally and socially acceptable quarrying, prevention of illegal quarrying, quarry waste management and opportunities for increasing the rate of recycling quarry waste and construction and demolition waste, implementation of relevant EU legislation and aggregates policy and management; manuals on SARM and SSM at the regional, national and transnational spatial scales, and methodology of life cycle assessments in the primary and secondary aggregates sectors.

The project will end with an international conference on aggregates management and supply September 20 – 22, 2011 in Ljubljana, Slovenia. Project progress can be observed on our website: http://sarmaproject.eu

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