Ministry of the Environment of the Slovak Republic

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State of the Contaminated sites in Slovakia

Investment into Your Future

During the years 2008 – 2010 Slovak Environmental Agency implemented the project ***„Regional Environmental Impact Assessment Studies of the Contaminated Sites in Selected Regions"*** within the frame of Operational Programme Environment, forms a component of Priority Axis 4: Waste Management, Operational Objective 4.4: Solution of contaminated sites including their removal.

Operational Programme Environment is a programme document of the Slovak Republic for the exploitation of European Union assistance for the environmental sector for the period of years 2007-2013. Ministry of the Environment of the Slovak Republic is the donor.

Preparing of **publication *„State of the Contaminated Sites in Slovakia"*** is one of the activities of the project cofinanced by Cohesion Fund of the Europa Union. The propagation and information to the public about state of the contaminated sites is objective of the publication.

The comparison of the state-of-the-art contaminated sites in Europe and in Slovakia is a part of the publication and the result of the project *„Systematic identification of Contaminated Sites",* which was a base of the systematic solution of contaminated sites. Thereafter the project *„Regional Environmental Impact Assessment Studies of the Contaminated Sites in Selected Regions"* is presented and new results of the project in sef-governing region are summarised.

Further, presentation *„Information System of the Contaminated sites"* and *„Atlas of Remediation Methods* for *Contaminated sites"* are parts of the publication, too.

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Contaminated sites represent a high risk for the environment and for the human health

The actual environmental legislation covers the protection of nearly all basic environmental compartments, including pollution prevention and deterioration of these compartments. Sustainable development principle is accepted as one of the most important principles of society development in Slovakia, similarly as in the other developed countries around the world. This means such a development that allows for meeting the needs of present generations without endangering the expectations of future generations for satisfaction of their needs. The right for favourable environment is laid down in the Article 44 of the Constitution of the Slovak Republic, saying: "*everyone has the right for favourable environment, everyone is obliged to protect and develop the environment and cultural heritage, nobody is allowed to jeopardise nor deteriorate the environment and natural resources to a higher extent than defined by the law*".

Unfortunately, the situation was different in the past. The human activities were accompanied by huge waste dumps, heavy dark smoke, uncontrolled air, and water and soil pollution resulting in deterioration of ecosystems, loss of biodiversity and impaired human population health from the very beginning of the industrial production. The sites of industrial enterprises were often located in extremely vulnerable natural environment regardless the risk they posed to this environment and regardless of the fact that the society was depended on the drinking water resources from the same areas. Dangerous substances were routinely handled and they were directly or indirectly released into water, soil and rocks. Many of these substances were considered safe for a long period; however, toxic, carcinogenic, mutagenic or other harmful properties were identified thanks to the recently performed research activities. Application of such substances is banned at present, but they are persistent in the receiving environment for a long time, they contaminate the individual environmental compartments and they are considered as real "time bombs" regarding the human population health and the environment.

Contaminated sites described above are entitle *contaminated sites* at present. In addition to the areas of industrial enterprises, contaminated sites are related to high capacity agricultural enterprises, railway depots, harbours and airports, abandoned and buried landfills containing dangerous waste, unsecured pesticide storage sites, fuel storage and pumping sites, areas polluted by military forces, sites damaged by ore mining and many other activities accompanied by a long term uncontrolled handling of dangerous substances.

Describing the contaminated sites, contaminated water, soil and rock environment, deteriorated ecosystems and impaired human health does not pose a great pleasure. However, a special edition publication is coming to your hands, by which we would like to offer you an overview of contaminated sites issues in the Slovak Republic and the European Union, to highlight the risks caused by the contaminated sites, and to emphasise the needs and also the possibilities of the stepwise elimination of such risks. Human health and life are too valuable to allow their jeopardising by processes and impacts that we are able to handle at present. Moreover, leaving the problem over the future generations due to the lack of financial resources, economical crisis or other reasons would resemble the behaviour of an ostrich. We should not forget that the biosphere, a part of which we are, is only a very tiny layer of the Earth that would be only 5 millimetres thick when it is spread evenly over the whole surface of our planet. In the global dimensions it means that all substances that are introduced by humans to the biosphere will - sooner or later - come back via the natural cycling of substances, regardless we want it or not. Thus, when we are talking about waste or contaminated sites and related contamination, it would be naive to consider that these burdens are not any more - or will not become in a near future - a component of this cycle. Everything is related to everything in the nature, therefore contaminated sites induce chain reactions in their neighbourhood with impacts that can be expressed with a delay or even in places where we would never expect them. From these reasons, the Ministry of the Environment of the Slovak Republic implements measures towards an important decrease of negative impacts of the contaminated sites to the environment and to human health during last years, as well as activities oriented to social and political acceptation of this problem. Details of these activities are shown in this special edition publication.

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Contaminated sites – state-of-the-art in Europe and in Slovakia

Contaminated sites in Europe

Investigations performed by the European Environmental Agency by means of the questionnaires distributed in the EEA member states revealed that app. 3 millions of potential pollution sources are present in these countries. The number of identified probable contaminated sites, or contaminated sites reaches app. 1.8 million, and the estimated number of contaminated sites with contamination that was confirmed by surveys is about 250 000. These data will be consecutively justified as many EEA member states including the Slovak Republic perform or even finalize systematic inventory of the contaminated sites at present. The EEA investigation also shown that app. 80 000 of sites were remediated during the last 30 years, and this proportion corresponds to app. 1/3 out of the total number of sites where the contamination was confirmed.

Considering the human activities contributing to the soil contamination and further contamination of rock environment and ground water, considerable differences among the individual EEA member states are obvious. Generally, industrial production and related activities belong to the most important human activities deteriorating the environment. It contributes to the soil contamination by more than 50 % in the countries like Luxembourg, Finland, Denmark and Spain. The average percentage contribution of such activities to soil contamination in Europe is 41.4 %. The second most important activity is municipal waste handling. Percentage contribution of this human activity to soil contamination in Europe is 15.2 % in average. The third position belongs to petrochemical industry, reaching 14.1 %.

The national reports delivered to the EEA in the framework of reporting obligations show that heavy metals form the most frequent soil contaminants reaching 37.3 % of the total contamination, and oil substances form 33.7 %. In addition to oil substances, chlorinated hydrocarbons are the most frequent ground water contaminants. Polycyclic aromatic hydrocarbons, aromatic hydrocarbons and phenols belong to the other important pollutants.

Detailed analysis of the industrial activities that cause soil contamination in the individual countries shows considerable differences among the countries are obvious among the broad spectra of activities that reflect the structure of industry in the particular country, the level of protective measures implementation, different risk assessment as well as different classification of the economical activities. Chemical and metallurgical industry, energy production and petrochemical industry are the most important industrial branches causing soil and rock environment contamination. Uncontrolled spills appearing during handling of chemical substances and chemical preparations leaking from storage tanks and distribution systems, and accidents are the most frequent reasons of soil and rock environment and ground water contamination in the industrial areas. National reports of the individual countries reveal that fuel handling and fuel filling stations are the most frequent contamination sources. For example Luxembourg reports that up to 84 % of pollution originates from filling stations, Latvia reports 61 %, Italy 52 %, Finland 51 %. Petrochemical industry is the most important contamination source in Serbia, mining and processing of minerals in Macedonia. Chemical industry plays the most important role in Slovakia from the contamination danger point of view.

Majority of the EU member states endeavour to apply the "polluter-pays principle" to a maximum extent in the remediation of the contaminated sites, as the generally accepted EU principle. This principle means that the costs of the measures removing the pollution should be born by the subject responsible for the pollution generation. There are also exceptions from this principle - when it is not possible to identify the subject responsible for pollution or to call it for responsibility according to the EU legal acts or legal acts of the member state, or in case when such subject is not able to bear the costs of remediation. App. 35 % of costs for remediation of contaminated sites in the EU framework is covered by public resources according to this principle; the rest belongs to the private sector. In contrary, state undertook the responsibility for contaminated sites in countries like e.g. Czech Republic, Macedonia and Spain, and the remediation costs are covered from the state budget by up to 100 %. The proportion of public resources and private sector is estimated to app. 50 % according to EEA data in 2006. The proportion of public resources covering the contaminated sites was around 80 % according to more recent analyses in 2008.

Considerable financial amounts are invested to studies, remediation and monitoring of contaminated sites. However, in comparison with the total estimated costs needed for management of contaminated sites, this amount represents only 2 % at present. The annual costs of management of the contaminated sites reach app. 12 € per inhabitant in average, and according to the reports of the individual states they vary from 0.7 to more than 20 € per inhabitant. This amount corresponds to 0.7 ‰ GDP (Gross Domestic Product) in average. The highest investments are used for remediation (app. 60 %); the rest is spent for the individual phases of investigation and monitoring (40 %). Nevertheless, it is necessary to bear in mind that the number of sites that should be investigated is significantly higher than the number of sites that should be finally remediated.

Denmark belongs to countries that dominate in field of contaminated sites. App. 55 000 of suspect sites were identified according to preliminary studies (app. 30 000 sites in Slovakia). Further investigations identified 17 765 sites (1 819 sites in Slovakia), complete preliminary survey was performed on 9 317 sites and detailed survey on 7 815 sites. Remediation measures were performed on 9 436 sites. Industrial production is the main contamination source with app. 48 % proportion to the total pollution, and waste landfills make app. 20 % of this amount. The annual expenses for management of contaminated sites were about 97 mil. € in 2004, with proportion of the public resources 51 % (45 % in 1996) and the private sector covered 49 %.

Contaminated sites in Slovakia

Overall 1 819 sites were identified according to the results of the project "Systematic Identification of the Contaminated Sites in the Slovak Republic", that was implemented during years 2006 - 2008 by the Slovak Environmental Agency. At present these sites are registered in the Information System of the Contaminated Sites (www.enviroportal.sk). About 1 200 of these sites permanently represent significant risk for human health and for the environment, and about 100 pose a high risk. Long term hidden and uncontrolled spills of dangerous substances into the environment were occurred in these sites. Many of sites are abandoned at present and there is no responsible subject who could perform remediation measures, as the responsible body does not exist or is unknown. On another sites the production activities have continued in another enterprises, but the usually the company has not sufficient financial sources for remediation, or it is not interested in improvement of the unfavourable state. Fortunately, there are also enterprises that accepted their responsibility for taking measures on contaminated sites during privatisation process. Investigation and remediation were performed on many of them and many sites are monitored. Moreover, the results of the systematic identification of contaminated sites also show that there is not sufficient information about the actual pollution of many suspect sites. Such sites are entitled as *probable contaminated sites*. Total number of them in the Register of the Contaminated sites (RCS - part A) reaches 878 thanks to direct as well as indirect indicators of the site pollution. The following examples of indicators were concerned: a) presence of contamination sources, b) records of state or municipal authorities about pollution of the environment or about inappropriate dangerous substances handling, c) older archived d on pollution gathered by investigation or monitoring activities, d) data from selected environmental databases, e) signs of landscape deterioration, e.g. damage on vegetation, perished organisms, smell, visible presence of oil etc.

Area or site where pollutants enter the individual environmental compartments is considered as contamination source, e.g. illegal landfills, uncontrolled storage sites of chemical substances, industrial facilities and areas, agricultural and military areas, harbours, airports, railways, fuel filling stations and some other distribution pipelines, mining sites, raw material treatment sites, etc.

Magnezitovce- pesticídny sklad (probably contaminated site)

The second group of identified sites is represented by the *contaminated sites* the presence of which was confirmed by investigation surveys. Such sites are entered into the Register of the Contaminated sites RCS - part B (confirmed contaminated sites) and 257 of them were identified till now. Some of them were confirmed only by preliminary geological survey and we still do not know the extent of contamination, which types of pollutants are present in ground water, soil and rock environment, what amounts of these substances are present, which are their concentrations, mobility and other properties. Detailed investigation is necessary on many sites, and it will result in risk analysis as a base for remediation project elaboration. Pollution extent and scope are investigated during the detailed survey of the contaminated site, pollution mobility, its development and changes, characteristics of each of pollutants including their quantitative and qualitative parameters, natural territory conditions are assessed to the extent satisfying the needs of evaluation of pollution mobility and resulting risks including the natural self-purification capacity of the environment. Pollution sources and focal points should be spatially mapped during the detailed survey, background levels of the site should be defined, contamination cloud margins should be verified, concentrations of pollutants in water, soil and rock environment should be statistically evaluated, physical -chemical characteristics important for pollution migration should be verified, detailed ground water flow directions should be verified, and velocity of pollutant spread should be identified.

Risk analysis of the contaminated site is a decisive criterion and tool for assessment of the identified contamination danger, as well as for necessity of remediation and other measures. Risk analysis comprise mainly: site conception model; assessment of risk urgency

that comprise probability of spread of pollution via ground water and probability of ecological risk of polluted soil; and calculation of risk that comprise calculation of risk of the mobility of pollutant in the ground water, calculation of risk to surface water as well as human health risk assessment, when the risk is relevant. The risk analysis results in decision whether the risk level is acceptable for recent or planned land use. If the risk analysis results in finding of unacceptable risk level and remediation of contaminated site are necessary, risk analysis contains also definition of target remediation criteria and proposal of remediation measures or other measures for risk mitigation or elimination. Target remediation criteria are always set out with respect to future site use, and they should respect the real conditions of the particular site.

The third group of the identified sites is represented by *remediated and rehabilitated sites*. Remediation is defined as works performed on rock environment, ground water and soil that are focused on elimination, reduction or limitation of contamination to the acceptable risk limit with regard to actual and future land use. Overall 684 remediated sites were entered into the Register of the Contaminated sites - Part C.

Preliminary risk assessment of the individual sites was included in systematic identification of the contaminated sites. Assessed sites were split into the categories of high, moderate and low risk. App. 100 sites were ranked into the group of high risk, app. 120 into the group of moderate risk. Industrial and municipal landfills have the highest proportion in those two groups (38.1 %). High number of the contaminated sites is related to engineering industry (11.9 %) and petrochemical industry including fuel filling stations (16.2 %). Lower percentage of contaminated sites is related to the chemical industry (4.8 %), however, the most extensive contaminated sites and the highest concentrations of dangerous substances in ground water, soil and rock environment are linked to these sites. Thus, the latter category will represent high financial demands for investigation and remediation activities.

Legislation concerning the contaminated sites

Several European Union directives cover the contaminated sites issue; however, each of them solves the question only partially. The most important water directive is the Directive No. 2000/60/EC of the European Parliament and Council, setting out the framework of the Community activities in the field of water policy with an abbreviated title "Water Framework Directive" (WFD). It was transposed to the Slovak legal system by the Act No. 364/2004 Coll., as amended (Water Act). Reaching of good water status till year 2015 is the main environmental objective of the WFD that means mainly reaching of good ecological and chemical status for the surface water bodies, reaching of good chemical and quantitative status for the ground water bodies, and prevention of deterioration of surface water and ground water bodies. Management plans of river basins serve as tools for reaching the directive goals, which comprise programmes of measures including contaminated sites issues.

Directive No. 2006/118/ES of the European Parliament and the Council from December 12th, 2006, on ground water protection against pollution and quality degradation was transposed into the Water Act this year. The directive concerns the contaminated sites in the Article 5: Identification of significant and sustained upward trends and definition of starting points for trend reversals. Necessity to assess the impact of existing plumes of pollution in ground water bodies caused by point pollution sources and contaminated soils is emphasised in the paragraph 5.

The contaminated site issues are solved to the highest extent in the Soil Protection Framework Directive proposed in 2006, but it was not adopted yet. According to this directive the member states should elaborate a list of contaminated sites, define a mechanism of remediation measures financing, and also to elaborate national remediation strategy for remediation of contaminated sites.

The recent history shows that the actual Slovak legislation does not create sufficient pressure to subjects responsible for contaminated sites, and the responsible persons can not be identified in many cases. Ministry of the Environment of the Slovak Republic therefore started to prepare the Act on contaminated sites in 2003. Regulation of rights and duties of legal bodies and common people during identification, investigation, classification and remediation of the contaminated sites, regulation of responsibility for contaminated sites, as well as competencies of state authorities in field of contaminated sites are the main objectives of this act. The draft act on contaminated sites is highly developed at present, however, it has not adopted yet. One of the reasons is a memorandum undersigned by the Government of the Slovak Republic and the representatives of union of employers under which no acts with impact to the employers will be submitted during the economical crisis. There are also still open comments and objections from the private sector, which form an additional barrier to adoption of the act.

Adoption of the Act No. 569/2007 Coll. on geological works (Geological Act) and its amendments can be considered as certain success - contaminated sites issues were partly incorporated into it. This act represents a legal framework for solution of these issues at present, mostly with regard to utilization of financial resources from the European funds. The act entered into force on November 1, 2009, and it defines the terms as contaminated site, probable contaminated site, geological investigation of the environment including investigation of probable contaminated sites and contaminated sites, remediation of contaminated sites, Information system of contaminated sites and the state remediation programme. No obligation for the holders of contaminated sites results from the provisions of this act. Certain details on contaminates sites will be set out in the Regulation of the MoE SR No. 51/2008 Coll. implementing the Geological Act which is under preparation at present. This regulation will define mainly the performance of the investigation of probable contaminated sites, investigation of contaminated sites, extent and scope of risk analysis of contaminated site, procedures of remediation and Information system of contaminated sites (IS CS). Despite of this basic legislative regulation, the Slovak Republic needs a special act on contaminated sites. Its adoption will allow us to solve the issues in complex, and also to start up the process of removal of contaminated sites in a similar way as in the other European Union member states.

Management of contaminated sites

The issue of contaminated sites was in the following status in 2003, when the Ministry of the Environment of the Slovak Republic started to solve these questions:

- insufficient attention to the issue of contaminated sites during the privatisation process,
- absence of legal regulation,
- absence of high quality complex Information System of the Contaminated Sites,
- absence of harmonised methodology for registration of contaminated sites and their prioritisation,
- non-complex and non-systematic approach to solving of these issues,
- lack of remediation programmes based on the objective assessment of the pollution status, evaluation of health and environmental risks as well as financial needs for their elimination,
- lack of financial resources for investigation and remediation,
- absence of financial mechanisms,
- insufficient social and political awareness of the issues of contaminated sites.

The MoE SR implements certain measures related to the Programme Declaration of the Government that moves the environmental policy in the field of contaminated sites to the phase of unequivocal definition of policy objectives, and to the elaboration of strategy for remediation of contaminated sites. The State Programme of Contaminated Sites Remediation was developed on the basis of thorough analysis of this issue, systematic identification of contaminated sites, preliminary risk assessment and prioritisation. The Government of the Slovak Republic approved it in March 2010. The State Programme represents the basic strategic document for contaminated sites for period of 2010 - 2015. It contains the priorities of contaminated sites, that should be met by objectives and individual activities, which are split into short-term, medium-term and long-term time horizons. It also defines further activities in order to solve the issues of contaminated sites including the estimation of financial budget; moreover, it identifies financial resources for covering of these needs.

Based on the results of the finalised projects and after acceptation of the requirements resulting from the present Slovak and EU legislation, the State Programme defines the following priority objectives: a) to ensure complex and systematic solution of the contaminated sites issue, b) to ensure protection of human health and environment in burdened sites, c) to ensure the implementation of measures resulting from the EU directives, and d) to ensure stepwise removal of contaminated sites and minimisation of the risks resulting from them. These objectives will be reached by improved management of contaminated sites, identification and investigation of probable contaminated sites, detailed investigation of contaminated sites and remediation and monitoring of them. Programme measures of legislative, financial, expert, organisational and awareness / education character are linked to these objectives. The following examples belong to the most important short-term measures:

- to adopt a legal regulation for the field of contaminated sites, as well as related implementation regulation,
- to adopt related methodical instructions and methodical guidelines for contaminated sites,
- to identify, propose and adopt financial mechanisms, to propose economic tools,
- to ensure covering of financial expenses needed for contaminated sites,
- to ensure thorough application of "polluter-pays principle",
- to support research and implementation of innovative investigation and monitoring methods,
- to ensure elaboration of risk analyses for the most risky contaminated sites, ,
- to support research and implementation of innovative remediation technologies,
- to support projects focused on application of the best available techniques during remediation,
- to ensure control of investigation activities,
- to elaborate the Atlas of Remediation Methods for Contaminated sites,
- to elaborate and implement training plan for the employees of governmental and self-governmental authorities for management of contaminated sites,
- to elaborate and implement training plan for project managers of investigation, remediation and monitoring projects,
- to support activities focused on social and political recognition of the issue (e.g. conferences, workshops, information campaigns, publication activities etc.),
- to support projects of environmental education,
- to finalise development of the IS CS, to upgrade and operate it,
- to enable to public to report the suspect sites via IS CS,
- to implement system of assessment, registration and classification of randomly identified suspect sites,
- to ensure meeting of reporting obligations towards the EU.

In addition to these activities, it is necessary to create and find the resources for implementation of the State Programme of Contaminated Sites Remediation. Contaminated sites were appearing during many decades, and the process of their removal will also not be a short story. The solution of these issues will need decades according to present estimates, mainly due to underestimation them in the past and due to absence of financial resources creation. Despite this, these issues should be addressed without delay, as Slovakia joined EU - and it opened possibilities for exploitation of foreign resources, mostly by the Operational Programme Environment which is oriented in "improvement of the environmental status and reasonable exploitation of resources by improvement of development and improvement of the environmental infrastructure of the SR in compliance with EU and Slovak regulations, and in strengthening of the environmental component of sustainable development." Contaminated sites fall under priority axis No. 4 - WASTE MANAGEMENT, operational objective 4.4 Addressing of the issues of contaminated sites including their

removal. This operational objective will be reached by the activities focused primarily on following:

1. Monitoring and investigation of contaminated sites and elaboration of risk analysis (projects oriented to: elaboration of risk analyses, remediation feasibility studies, remediation programmes and audits of contaminated sites; assessment of high priority probable contaminated sites; detailed and additional investigation of contaminated sites of the highest risk in compliance with the defined priorities; regional studies of environmental impacts of contaminated sites; and projects focused on development of monitoring systems for contaminated sites of the highest risk in compliance with the defined priorities;
2. Remediation of the most risky contaminated sites (projects oriented to remediation of the most risky sites in compliance with the defined priorities);
3. Finalisation of the Information System of the Contaminated Sites (implementation of IS CS as a component of public administration information system; development of the Atlas of Remediation Methods as a component of IS CS; projects oriented to public relations, awareness and publicity of the activities related to remediation of contaminated sites).

Investigation and remediation process of contaminated sites was successfully started despite of permanent lack of financial resources for solution of issues related to contaminated sites. Investigation works were implemented in many high-risk sites; numerous high-risk landfills were already remediated, as well as railway depots, contaminated sites after activities of the Soviet Army, agricultural sites and several industrial areas. Private resources, state budget resources as well as Environmental Fund were used for their investigation and remediation. The same resources in parallel with European funds are considered for implementation of the State Programme of Contaminated Sites Remediation.

The objectives we are faced to are ambitious and highly demanding, however, their reaching is unavoidable providing that we want to accommodate healthy environment and to keep it healthy also for future generations. They are demanding also from the financial point of view, human resources and also from the point of view of institutional building in order to ensure proper management of contaminated sites. Not only activities of the Ministry of the Environment SR are necessary for their successful implementation, but involvement and cooperation of other central governmental institutions, support from the business sector and business associations, and public support to a great extent as well.

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Systematic identification of Contaminated sites in Slovakia

Ministry of the Environment of the Slovak Republic (MoE SR) started the systematic identification of such sites - contaminated sites, in order to assess in complex the status of Slovak territory from the point of view of existing sites that could pose a significant risk for human health and the ecosystems according to their pollution, and to prepare a platform for stepwise removal of contamination in Slovakia. Identification of sites requiring urgent remediation according to their potential risk formed a component of these activities, as a basic framework for **State Programme of Remediation of Contaminated sites in SR for years 2010 to 2015.** These works were also oriented in registration of already performed activities in this field, e.g. status of performed remediations and rehabilitations in Slovakia. Slovak Environmental Agency (SEA) coordinated the inventory process during years 2006 - 2008 in the framework of the project **Systematic Identification of Contaminated sites in the Slovak Republic** *(Paluchová et al., 2006 - 2008)* in cooperation with the own specialists and selected organisations, state authorities, self governments as well as specialists from the private sector. SEA managed 25 districts in total, covering the area of app. 13 730 km^2, forming app. 28 % of the Slovak Republic territory. The rest of the territory was covered by cooperation companies, who mapped the situation in 54 districts covering the area of app. 35 305 km^2, forming app. 72 % of the Slovak Republic territory. Partial final report was elaborated for each district containing complete information, a.o. detailed description of recorded sites, but also those sites that were not recorded with justification of the exclusion, and pictures.

Banská Bystrica – lom Podlavice – skládka TKO (probably contaminated site)

Development of Register of Contaminated sites (RCS) was forming one of the project objectives, that is split into RCS - part A (**Probable contaminated sites**), RCS - part B (**Contaminated sites**), RCS - part C (**Remediated and Rehabilitated Sites**). Information System of Contaminated sites (IS CS) was made available on the basis of this register in year 2009, test version of which is accessible on web site www.enviroportal.sk. We would like to introduce to you a transparent overview of inventory outputs in this publication.

Probable contaminated sites

878 probable contaminated sites were recorded in the framework of systematic identification, some of them having a high potential to become a contaminated site, mainly in industrial areas. **125 sites** among all probable contaminated sites were identified as **posing high risk**, and their appearance is caused in a similar proportion by activities like waste landfilling, industrial activities (mainly engineering) and agriculture (mainly storage of pesticides). The highest number of high risk probable contaminated sites was recorded in districts of Vranov nad Topľou, Humenné, Čadca. Prešov region

has the highest number of high-risk sites with probable contaminated site. The financial amount for investigation of probable contaminated sites was estimated to **6.5 mill. – 8.3 mill. €** according to the financial analysis performed by SEA. As the main objective of probable contaminated site investigation is the confirmation of presence of an contaminated site (confirmation of presence of pollution), more or less uniform procedure and extent of works can be considered. Cost of remediation or rehabilitations of the site is certainly not involved in the above sum.

Contaminated sites

257 contaminated sites were recorded in Slovakia in the framework of systematic identification. **95 sites with high risk** were identified on the basis of performed classification of contaminated sites, with statistically highest appearance in districts of Bratislava I – V, Zvolen, Kysucké Nové Mesto, Liptovský Mikuláš, Michalovce, Nové Zámky. The highest number of high-risk sites with contaminated site was identified in region Banská Bystrica. The dominant activities causing the high risk contaminated site are industrial production (mainly engineering and chemical production), as well as distribution and storage of goods. Total cost of investigation, remediation and monitoring of the contaminated sites was estimated to **480 mill. to 715 mill. €** according to the financial analysis performed by SEA. The expenses of investigation and remediation of identified contaminated sites are influenced by uncertainty. The main uncertainty of identification of the total needs for remediation of the contaminated sites is lack of data on many sites, and missing results of works already performed. It is only an estimate, and also cost increase of the individual remediation technologies must be considered as they result from increase of requirements for the technological level, technology reliability and safety.

It can be concluded in general that in case of probable contaminated sites, as well as contaminated sites the sites with medium risk prevailed on the basis of results of the Systematic Identification of Contaminated sites in Slovakia. No site with probable contaminated site or contaminated site was recorded in the districts Turčianske Teplice and Košice III. Most remediated sites or sites with on-going remediation were recorded in districts Michalovce, Rožňava and Bratislava II, highest number of rehabilitaded sites was recorded in districts Liptovský Mikuláš and Poprad.

Remediated and rehabilitaded sites

Remediation was considered when a works were performed that could improve the environmental status during the information gathering in relation to RCS - part C oriented in remediated or recultivated sites; in the context of contaminated sites it means elimination of pollution source (its removal or insulation by underground sealing wall or hydraulic barrier), removal or decontamination of polluted soil, as well as other works leading to decreasing of contamination of soils, river sediments, sludges, ground water, surface water or leaking waters below the defined limits. Set of works aimed at incorporation of landfill into surrounding landscape was considered as rehabilitations. Rehabilitations in most cases comprise development of drainage elements and covering of landfill including vegetation planting. Dumpsites of mining waste were classified in the same way as landfills (piles, sludge beds) and another similar sites. It is also necessary to notice that recording of certain site into this part did not automatically means that this site was or is contaminated site, it only means that remediation (rehabilitations) was or is performed in this site / object. **366 remediated and 318 rehabilitaded sites** were recorded in the framework of the project implementation, and the remediation works are still implemented. It was noticed that contamination source removal, soil excavation and its deposition, ex situ soil methods - biostabilisation and biomobilisation, soil washing (both, ex situ and in situ), bioventing and soil atmosphere extraction (in situ) were the most frequently selected procedures of burden removal in the case of remediated sites. In the case of ground water contamination, remediation pumping and treatment, air stripping, passive barrier application (drainage wall, hydraulic barrier) were the most frequently used methods among the ex situ methods, or eventually air sparging among the in situ methods. Information on rehabilitaded type was also collected for recultivated sites, and 85 dumpsites out of 318 were simply covered in by soil - that can not be considered as sufficient procedure. The sites where probable risk was identified were classified among suspect contaminated sites - in 58 cases in total. This part of the register was also aimed to elaborate an overview on performed remediations and rehabilitations, as well as the expenses of such activities. The total expenses of remediation of the contaminated sites were estimated to **615 mill. €** on the basis of financial analysis. Heterogeneity and different trustworthiness of input data formed the main uncertainty of this estimate.

All data on more than 1 800 sites gathered in the framework of the project were transferred into **Information System of Contaminated sites** *(see article of Pacola, Information System of Contaminated sites).* SEA continues in systematic inventory also in the framework of two projects financed by Operational Programme Environment: **Finalisation of Information System of Contaminated sites**, and **Regional Studies of Environmental Impacts of the Contaminated Sites in Selected Regions**.

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Regional Environmental Impact Assessment Studies of the Contaminated Sites in Selected Regions

Environmental impact assessment of the contaminated sites in the individual self-government regions of the SR is a main objective of the project *„Regional Environmental Impact Assessment Studies of the Contaminated Sites in Selected Regions"*. Elaboration of *„Methodical Instruction for Development of Documents – Regional Environmental Impact Assessment Studies of the Contaminated Sites in Selected Regions* (only as methodical instruction hereinafter), and harmonised elaboration of assessment reports – regional studies are the specific objectives of the project. This methodical instruction of the authors *Auxt, Saxová, Hronec (HES-COMGEO, s. r. o. Banská Bystrica)* was elaborated in January 2009. The individual regional studies for the selected regions have been developed till the end of May 2010 as follows:

- Region Bratislava
- Region Banská Bystrica
- Region Košica
- Region Trnava
- Region Nitra
- Region Trenčín
- Region Žilina
- Region Prešov

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The project *„Regional Environmental Impact Assessment Studies of the Contaminated Sites in Selected Regions"* (implementation period 10/2008 – 5/2010) forms a component of Priority Axis 4: Waste Management, Operational Objective 4.4: Solution of Contaminated sites including their removal, and it belongs under the framework of the group of activities: Monitoring and investigation of Contaminated sites and elaboration of risk analyses.

The project can be used as supporting document for solution of contaminated sites' issues in compliance with strategic and conceptual documents in force, as upgrade of State Programme for Remediation of Contaminated sites, as well as for updating of regional development documents as Programmes of economical and social development of the self-government region or territorial plans of higher territorial units. The project results will also serve as one of base platforms for the decision making process during preparation of OPE projects in the field of contaminated sites. Moreover, the project could facilitate efficient absorption of presently available resources for solving of the problem in question -like OPE, Norwegian Financial Mechanism, Envirofund, LIFE and others.

The objectives of the regional study were as follows:

in the analysis part:

- territory situation assessment especially form the environmental quality point of view, characterisation of the nature including protected areas, landscape pattern, infrastructure,
- regional assessment of the risk of probable contaminated sites (RCS – part A),
- regional assessment of the risk of contaminated sites (RCS – part B),
- regional assessment of the intensity of applied remediation and rehabilitation works (RCS – part C) in the sites in relation to the contaminated site definition.

in the synthesis part:

- proposal of measures including priority setting and time table of investigation in the probable contaminated site, estimate of costs and potential problems related to the performance of the investigations,
- proposal of measures including priority setting for potential state interventions for cases of inactivity of responsible bodies, or priority setting for identification of co-financing from the public resources,
- cost estimate and preliminary time schedule for the needs of co-financing from the public resources,
- priority setting for monitoring activities in compliance with the regional development plan,
- all retrieved information on region will be projected to map outputs that will form the most important, central part of the documentation.

Regional risk assessment of the contaminated sites in the framework of this project comprise synthesis of the basic risk assessment (criterion K), performed in the framework of the project *„Systematic Identification of the Contaminated sites in the Slovak Republic" (Paluchová et al., 2008)*, implemented during years 2006 – 2008, as well as complementary risk assessment (criterion R), implemented directly in the framework of the project *„Regional Environmental Impact Assessment Studies of the Contaminated Sites in Selected Regions"*.

The basic classification of the contaminated sites comprises 3 partial classifications (as calculation modules in the relation database Reg_EZ.mdb), that are structures as follows *(Paluchová, Schwarz, Pilko, 2006)*:

K1 – Classification of contamination diffusion risk into ground water and via ground water

K2 – Classification of risk from volatile and toxic substances for inhabitants

K3 – Classification of risk due to surface water contamination

Resulting classification of the contaminated site (**K**) is then a sum of partial classifications: K = K1 + K2 + K3.

Contaminated sites (CS) will be classified according to the resulting value of (K) after performing of the basic classification into 3 groups:

1) Contaminated sites with low classified risk (less than 35 points),
2) Contaminated sites with moderate classified risk (35 to 65 points),
3) Contaminated sites with high classified risk (more than 65 points).

The principle of complementary risk assessment of the contaminated sites for the region is based on identification of conflict of interests with selected criteria and sub-criteria. The main criteria were as follows:

R1 – relation of the contaminated sites to soil
R2 - relation of the contaminated sites to protected areas
R3 - relation of the contaminated sites to functional territory exploitation
R4 - relation of the contaminated sites to territory economical and social development
R5 - relation of the contaminated sites to the quality of environment.

The main criteria are structured in more detail to R1.1, R1.2.....R2.1, R2.2...R5.1. The resulting complementary assessment of the contaminated site „R" is therefore a sum of criteria: R = R1 + R2 + R3 + R4 + R5, when the main criteria are set out as a sum of sub-criteria: R1 = R1.1 + R1.2 + R1.3 + ...

Synthesis of the basic risk classification of the contaminated sites (K = K1 + K2 + K3) and the complementary assessment of risk of the contaminated site (R = R1 + R2 + R3 + R4 + R5) results in the overall impact (risk) environmental impact assessment of the contaminated site represented by the criterion **V = K + R.**

Contaminated sites (CS) will be classified after overall assessment into 3 groups according to the resulting value (**V**):

1) Contaminated sites with low classification of the risk (less than 50 points),
2) Contaminated sites with moderate classification of the risk (50 – 85 points),
3) Contaminated sites with high classification of the risk (more than 85 points).

New ranking of probable contaminated sites (PCS) and verified contaminated sites (VCS) was identified according to the value of V (V = K + R) in the region:

In addition to the summary values (V) also the ranking of CS was evaluated in relation to the individual compartments, i.e. the most critical compartment for the region and for the individual districts was evaluated from the main criteria point of view:

- number of contaminated sites with risk for water and their ranking (K1 + K3),
- number of contaminated sites with risk for soils and their ranking (R1),
- number of contaminated sites with risk for protected areas and their ranking (R2),
- number of contaminated sites with risk for human population health and their ranking (K2 + R5),
- number of contaminated sites with risk for landscape and socio-economical development and their ranking (R3 + R4).

Priority setting for solutions in the region was performed after overall assessment (so called priority sites), with regards to:

- overall risk level represented by the criterion V = K+R,

but also respecting the partial criteria:

- risk for human population health (K2 + R5),
- risk for water (K1 + K3),
- risk for protected areas (R2),
- risk for landscape and socio-economical development (R3+R4)
- risk for soils (R1).

The following principle for definition of the priority sites was used:

In case when the overall risk (criterion V), risk for human population heal (K2 + R5), risk for water (K1 + K3), risk for landscape and socio-economical development (R3 + R4) reflected individually ranking of given PCS or VCS in the evaluated region, while the particular number of points in terms of limit was not respected, and limitation was given by ten PCS and ten VEB with the highest points in the region instead. When several sites (PCS, VCS) appeared in the limit value of the first ten according to the number of points, the ranking of priority sites was broadened or reduced with regards to the number of such sites in order to avoid excessive rise or excessive decrease of the number of priority sites in relation to the value of 10.

The principle for setting out priority sites in cases of risk for protected areas (R2) was defined by a particular value (limit), where priority sites are defined by the value R2 ≥ 6.

The principle for setting out priority sites in cases of risk for soils (R1) was defined by a particular value (limit), where priority sites are defined by the value R1 ≥ 9.

In addition to the above mentioned priorities for the region also sites that had value of R3 = 6 in relation to the functional territory exploitation (criterion R3) (location of CS on area of existing or proposed residential area or area of recreation and sports), but also sites that were in conflict of interests with the Programme of Economical and social Development of the Territory, especially in relation to development of the industrial parks (location of the CS on the area of existing or proposed industrial park etc.) were proposed as priority sites.

In order to express graphically the environmental impact assessment of the contaminated sites, the following map annexes were developed:

1. Map of the contaminated sites
2. Relation of the contaminated sites to water
3. Relation of the contaminated sites to soil
4. Relation of the contaminated sites to protected areas

5. Relation of the contaminated sites to functional territory exploitation

6. Map of the environmental quality

7. Contaminated sites from the priority setting point of view

An overview of the tools for solution of the contaminated sites and probable contaminated sites in the region forms a component of the project results. The tools for solution of the contaminated sites comprise the following:

- legislative tools,
- strategic and conceptual documents,
- economical tools .

The main risks resulting from existence of the contaminated sites as well as measures for solution of the contaminated sites were characterised for all priority sites. Particular tools for solution of the contaminated sites in the region were proposed for the priority contaminated sites regarding the overall assessment (criterion V).

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Region Bratislava

Region Bratislava with area of 2 054 km^2 (4.2 % of the SR territory) is the smallest region of the country. It comprises 8 districts according to the territorial and administrative organisation pursuant to the Act No. 221/1996 of the Slovak Parliament: Bratislava I – V, Malacky, Pezinok and Senec. Region Bratislava comprises totally 72 municipalities, 6 among them have the status of a town 610 850 inhabitants live in the region Bratislava, this number represents 11.31 % of the total SR population.

Three protected landscape areas interfere with the region Bratislava (PLA) - PLA Dunajské luhy, PLA Malé Karpaty and PLA Záhorie. Their total area covers 502 km^2, being 24 % of the region territory. 53 small-scale protected areas are located in the Bratislava region territory, 8 out of them are national natural reserves (NNR), 22 natural reserves (NR), 1 national natural monument (NNM), 6 natural monuments (NM) and 16 protected areas (PA). Small-scale protected areas cover 40 km^2 (1.93 % of the region territory).

Special protection areas (SPA) and special areas of conservation (SAC) belonging to the NATURA 2000 system represent a specific type of protection. They overlap with the national network of protected areas to a substantial extent. 41 special areas of conservation and 5 special protection areas interfere with the region Bratislava territory. Total area of SACs reaches 284 km^2 (13.8 % of the region territory). Five SPAs in the region Bratislava cover area of 606.68 km^2 (29.5 % of the region territory), overlapping the network of large-scale protected areas by 55 % in SPA Dunajské luhy, 86 % in SPA Malé Karpaty and SPA Morava by 47 %. Region Bratislava has four Ramsar Convention sites: Niva Moravy, Dunajské luhy, PR Šúr, Rudava alluvium.

One protected area of natural water accumulation - protected water management area Žitný ostrov interfere with territory of the region Bratislava with total area of app. 220 km^2 (10.7 % of the region territory).

Protected zone of natural medicinal water resource is determined only in one case in the region Bratislava - Šamorín - Čilistov. Only 43 km^2 (2.1 % of the region territory) interfere with the region Bratislava out of the total area of protection zone – 105 km^2. Neither protected zones of natural resources of mineral table waters, nor protection zones of neither natural medicinal waters, nor spa areas are located in the region Bratislava. Protection zones for water supplies of ground water and surface water resources are determined for majority of water resources exploited as public supplies by the network of water works (springs, water reservoirs, sampling of the surface water streams). Recorded protection zones of the water resources (according to the data from Water Research Institute) in the region Bratislava cover the total area of 170 km^2 (8.3 % of the region territory). Bratislava region territory does not interfere with river basins of water management streams. Total length of the streams with water management importance interfere with the territory of region Bratislava is 507 km.

10 monumental zones are located in the region Bratislava (Bratislava - CMO, Bratislava - Rača, Bratislava - Vajnory, Bratislava - Devínska Nová Ves, Bratislava - Dúbravka, Bratislava - Lamač, Bratislava - Záhorská Bystrica, Bratislava - Rusovce, Marianka, Pezinok) with total area of 12 km^2, 3 monumental reserves (Bratislava, Svätý Jur and Veľké Leváre) with total area of 1 km^2.

The total area of agricultural soil in the region Bratislava (with determined soil quality) is app. 953 km^2 (46.4 % of the region territory). All 9 groups of the soil quality groups determined for SR are represented in the region Bratislava. The highest proportion of the agricultural soil (with information on its quality) is present in district Senec (75.3 % of the region territory), the lowest in the district Bratislava III (24.7 % of the region territory). Soil quality groups 2, 3 and 6 are represented in all district of the region Bratislava except of district Bratislava I (district Bratislava I does not comprise soil quality groups 1 – 9). Soil quality group 2 is the most frequent (456 km^2, 22.2 % of the region territory) and 6 (407 km^2, 19.8 % of the region territory). Quality groups 8 (36 km^2, 1.7 % of the region territory) and 9 (33 km^2, 1.6 % of the region territory) are the less frequent soils, and they are represented in districts Bratislava III - IV, Malacky and Pezinok. Quality group 7 (143 km^2, 6.9 % of the region territory) is present in the districts Bratislava III - IV, Malacky, Pezinok and Senec. Quality group 1 (66 km^2, 3.2 % of the region territory) is present in the districts Bratislava II - IV, Malacky, Pezinok and Senec. Quality group 4 (57 km^2, 2.7 % of the region territory) is present in the districts Bratislava II, III, V, Malacky, Pezinok and Senec. Quality group 5 (52 km^2, 2.5 % of the region territory) is present in the districts Bratislava II, IV, Malacky, Pezinok and Senec. The level of inactivation of contaminants (ability of soil to inactivate contaminants) was - equally as soil quality groups - investigated only in the areas with agricultural soils. Soils with all 5 degrees of inactivation of contaminants are present in the region Bratislava (very low, low, moderate, high, and very high). Soils with moderate inactivation degree are most frequent (510 km^2, 24.8 % of the region territory). Soils with very high degree of inactivation of contaminants are the least frequent (2 km^2, 0.1 % of the region territory).

All 5 determined degrees of environmental quality are present in the territory of the region Bratislava (Environmental Regionalisation of the Slovak Republic, *Bohuš, Klinda et al., 2008*). The largest area is present by the acceptable environment - 540 km^2 (26.3 % of the region territory), moderately deteriorated environment has area of 522 km^2 (25.4 % of the region territory), deteriorated environment has area of 501 km^2 (24.4 % of the region territory), environment highly deteriorated has area of 237 km^2 (11.5 % of the region territory) and high quality environment covers 251 km^2 (12.2 % of the region territory). Highly deteriorated and deteriorated areas are mostly located in a vicinity of larger cities or industrial areas as Bratislava and its surroundings, Malacky, Pezinok, Senec.

8 burdened areas were identified in whole territory of the Slovak Republic in the framework of Environmental Regionalisation of the SR in relation to the degrees of environmental quality (*Bohuš, Klinda et al., 2008*). Bratislava burdened area interferes by 93 % with the region Bratislava, and population reaches app. 468 000 inhabitants.

86 sites with probable contaminated sites, 22 with contaminated sites and 44 remediated and 14 rehabilitated sites were recorded in the region Bratislava in the framework of Systematic Identification of Contaminated sites in the Slovak Republic *(Paluchová et al., 2006 – 2008).* 10 sites with identified contaminated sites belong to high risk group (according to the criterion K) and they were proposed for priority removal.

Updating and data completion were performed as well as additional impact assessment of the contaminated sites to the environment in the framework of Regional Studies of Environmental Impacts of the Contaminated sites for Selected Regions *(Helma et al., 2008 – 2010).* Updated number of the contaminated sites with **88 probable contaminated sites, 22 contaminated sites, 44 remediated and 14 rehabilitated sites** recorded in region Bratislava is one of results of the Regional Study of Environmental Impacts of the Contaminated sites for Selected Regions - region Bratislava *(Okoličányiová et al., 2010)*. 5 sites with contaminated sites belong to high risk according to the basic classification (criterion K) at present and 5 sites belong to high risk also due to overall assessment of the environmental impacts of the contaminated sites (according to criterion V).

Probable contaminated sites in the region Bratislava (RCS - part A)

26 sites with low risk, 57 sites with moderate risk and 5 sites with high risk were recorded out of total number of **88 probable contaminated sites in the region Bratislava** on the basis of the overall assessment of environmental impacts of the contaminated sites (according to criterion V). The highest number of sites was recorded in the district Malacky (28), the lowest number in the district Bratislava I (1 site). Up to 75 sites, i.e. app. 65 % out of the total number of sites with probable contaminated sites are formed by waste landfills, followed by 8 sites with agricultural activities (9 %), transport – 7 sites (8 %), storage and distribution of goods – 6 sites (7 %). The highest number of high risk sites is located in the district Bratislava II (3 sites).

According to the ranking based on the criterion V 5 high risk sites are classified out of 20 most risky probable contaminated sites in the region (V > 85 points) and 15 are classified as moderate risk, however, 3 out of them are closely below the high risk limit (V = 84 points). The first 10 sites are considered as priority probable contaminated sites in the region (i.e. priority ones regarding the necessary solution in the region) where the environmental contamination should be first confirmed or excluded by additional investigation and further when contaminated sites is conformed to implement measures for reduction or elimination of risk for the environment or human population health.

Among 88 probable contaminated sites in the region 2 sites are considered as remediated and/or rehabilitated site too. It means that certain remediation and/or rehabilitation activities were already performed in contaminated sites. In the case of finalisation of demonstrable successful remediation and/or rehabilitation (site without contamination) they will not be considered as probable contaminated sites and they will be recorded only in RCS - part C.

Number of probable contaminated sites according to level of risk

District	Number	Low risk (K)	Moderate risk (K)	High risk (K)	Low risk (V)	Moderate risk (V)	High risk (V)
Bratislava I	1	1	0	0	0	1	0
Bratislava II	15	2	10	3	0	12	3
Bratislava III	8	4	3	1	1	6	1
Bratislava IV	7	4	3	0	3	4	0
Bratislava V	9	4	5	0	2	7	0
Malacky	28	16	12	0	12	16	0
Pezinok	8	5	3	0	4	4	0
Senec	12	3	8	1	4	7	1
Bratislava region	**88**	**39**	**44**	**5**	**26**	**57**	**5**

Legend to the tables:

K – basic (main) risk classification of the contaminated sites reflecting risk of contamination spread into ground water and via ground water, risk of volatile and toxic substances for the inhabitants, risk of surface water contamination (K < 35 - low risk classification, K = 35 to 65 – moderate risk classification, K > 65 - high risk classification).

R – complementary risk classification of the contaminated sites based on its position in relation to soil, to protected areas, to functional land use, to economical and social land development, to the environmental quality.

V – overall impact (risk) assessment of the contaminated sites to the environment V = K+R (V < 50 - low risk classification, V = 50 to 85 – moderate risk classification, V > 85 - high risk classification).

Contaminated sites in the region Bratislava (RCS - part B)

On the basis of overall environmental impact assessment of the contaminated sites (according to criterion V), **10 sites with high risk, 11 sites with moderate risk and 1 site with low risk** out of total number of **22 contaminated sites** were recorded in the region Bratislava. No locality with contaminated site was recorded in the district Senec. Storage and distribution of goods prevailed as a dominant activity - 6 sites (27 %), industrial production - 6 sites (27 %) and waste handling facilities- also 6 sites (27 %).

According to the ranking based on the criterion V 10 high risk sites are classified out of 20 most risky contaminated sites in the region (V > 85 points) and 10 are classified as moderate risk, however, 1 out of them are closely below the high risk limit (V = 83 points). 10 sites are considered as priority high risk contaminated sites that should be removed as soon as possible due to risk for the environment and human population health.

The first four sites with the highest risk according to the overall environmental impact assessment of the contaminated sites (according to criterion V) are the most risky sites also due to the basic classification (according to criterion K) in the region at the same time. In more detailed assessment of risk we evaluated the contaminated sites according to the partial criteria K1+K3 (relation of CS to water), K2+R5 (relation of CS to human health), R1 (relation of CS to soil), R2 (relation of CS to protected areas), R3+R4 (relation of CS to landscape and socio-economical development), entering the environmental impact assessment of contaminated sites.

Sites *B1 (002) B / Bratislava - Staré Mesto - Apollo - širší priestor bývalej rafinérie, B2 (013) B / Bratislava - Ružinov - Slovnaft - širší priestor závodu, B2 (006) B / Bratislava - Ružinov - Gumon - areál závodu* are in addition to the overall impact assessment also priority high risk ones due to risk for water (one site for ground water and surface water, another 2 sites only due to ground water), human population health and landscape and socio-economical development. Site *B2 (020) B / Bratislava - Vrakuňa - Vrakunská cesta - skládka CHZJD* is in addition to the overall impact assessment also priority high risk ones due to risk for soil, human population health and landscape and socio-economical development. Sites *B5 (007) B/ Bratislava - Petržalka - Matador - areál bývalého závodu, B1 (003)B/ Bratislava - Staré Mesto - Chalupkova-Bottova ul. - Chemika - areál závodu, B4 (001)B/ Bratislava - Devínska Nová Ves - kameňolom Srdce, B3 (002)B/ Bratislava - Nové*

Mesto - CHZJD - širší priestor bývalého závodu are in addition to the overall impact assessment also priority high risk ones due to risk for human population health and landscape and socio-economical development. Site *PK (015) B / Pezinok - oblasť rudných baní a starých banských diel* is in addition to the overall impact assessment also priority high risk ones due to risk for water (ground water as well as surface water), and also from protected areas point of view. Site *PK (017) B / Pezinok - Rudné bane - odkaliská* is in addition to the overall impact assessment also priority high risk ones due to risk for water (ground water as well as surface water). Sites *PK (026) B / Svätý Jur - Brestová - skládka s OP* and *PK (001) B / Báhoň - staré koryto potoka - skládka* are classified as moderate risk, they are not priority ones because of the overall impact assessment, but they are priority sites due to risk for soil and human population health. Site *MA (016) B / Pernek - oblasť starých banských diel* is classified as moderate risk, it is not a priority one due to the overall impact assessment, but it is a priority high risk site due to water (ground water as well as surface water) and risk for protected areas. Site *B3 (007) B / Bratislava - Rača - terminál Slovnaft,* is classified as moderate risk, it is not a priority one due to the overall impact assessment, but it is a priority risk site because of risk for ground water and for landscape and socio-economical development. Sites *B2 (007) B / Bratislava - Ružinov - Malý Dunaj - vtokový objekt, PK (006) B / Modra - Hliny - skládka s OP, B2 (005) B / Bratislava - Ružinov - ČS PHM Zlaté piesky, MA (008) B / Kuchyňa - letisko* are classified as moderate risk, they are not a priority ones due to the overall impact assessment, but they are priority risk sites because of risk for ground water, site *PK (006) B / Modra - Hliny - skládka s OP* also for surface water.

All 22 sites pose a risk for ground water (according to criterion K1), 6 out of them cumulate risk for ground water as well as surface water (criteria K1 and K3). Some sites are located in protected water management areas, protected zones of ground water resources or upstream location of ground water resources (as of direction of ground water stream), in a vicinity of water streams with water management importance, often directly on the permeable alluvial sediments. One contaminated site is located in the protected water management area Žitný ostrov - *B2 (013) B / Bratislava - Ružinov - Slovnaft - širší priestor závodu.* Site *B2 (007) B / Bratislava - Ružinov - Malý Dunaj - vtokový objekt* is located app. on the borderline of protected water management area Žitný ostrov. Several mining facilities belonging to the contaminated sites are located in the protection zone of ground water resources or in close vicinity of it *PK (015) B / Pezinok - oblasť rudných baní a starých banských diel*. Site *B5 (003) B / Bratislava - Petržalka - ČS PHM Viedenská cesta* is in a close vicinity or app. on the borderline of the protection zone of ground water resource. App. 70 % of the verified contaminated sites in the region Bratislava is located upstream to the areas with exploited ground water resources.

3 verified contaminated sites are in contact with protected areas in the region Bratislava, located in CHKO Malé Karpaty. Sites of the obsolete mining facilities are in contact with special protection area (SKCHVU014) and special area of conservation - *(MA (016) B / Pernek - oblasť starých banských diel, PK (015) B / Pezinok - oblasť rudných baní a starých banských diel).*

Recognition that up to 11 sites among the 22 contaminated sites are at the same time remediated or rehabilitated sites is considered a positive finding. 3 sites out of 10 priority high risk sites belong there. It means that remediation and/or rehabilitation works were already performed or are performed at present on 50 % of the contaminated sites (30 % of the priority high risk ones). In the cases of finalisation of demonstrable successful remediation and/or rehabilitation (site without contamination) they will not be considered as contaminated sites and they will be recorded only in RCS - part C.

Number of contaminated sites according to level of risk

District	Number	Low risk (K)	Moderate risk (K)	High risk (K)	Low risk (V)	Moderate risk (V)	High risk (V)
Bratislava I	2	0	0	2	0	0	2
Bratislava II	5	0	2	3	0	2	3
Bratislava III	2	0	2	0	0	1	1
Bratislava IV	1	0	0	1	0	0	1
Bratislava V	2	0	1	1	0	1	1
Malacky	3	1	2	0	1	2	0
Pezinok	7	0	6	1	0	5	2
Senec	0	0	0	0	0	0	0
Bratislava region	**22**	**1**	**13**	**8**	**1**	**11**	**10**

The most risky contaminated sites (RCS – part B) in the region

N.	Sites	District	K	R	V
1	***B1 (002) B / Bratislava - Staré Mesto - Apollo - širší priestor bývalej rafinérie***	***Bratislava I***	***94***	***27***	***121***
2	***B2 (013) B / Bratislava - Ružinov - Slovnaft - širší priestor závodu***	***Bratislava II***	***84***	***18***	***102***
3	***B2 (006) B / Bratislava - Ružinov - Gumon - areál závodu***	***Bratislava II***	***74***	***27***	***101***
4	***B5 (007) B / Bratislava - Petržalka - Matador - areál bývalého závodu***	***Bratislava V***	***72***	***24***	***96***
5	***B1 (003) B / Bratislava - Staré Mesto - Chalupkova-Bottova ul.- Chemika - areál závodu***	***Bratislava I***	***68***	***27***	***95***
6	***B2 (020) B / Bratislava - Vrakuňa - Vrakunská cesta - skládka CHZJD***	***Bratislava II***	***67***	***30***	***94***
7	***B4 (001) B / Bratislava - Devínska Nová Ves - kameňolom Srdce***	***Bratislava IV***	***71***	***23***	***94***
8	***B3 (002) B / Bratislava - Nové Mesto - CHZJD - širší priestor bývalého závodu***	***Bratislava III***	***65***	***27***	***92***
9	***PK (017) B / Pezinok - Rudné bane - odkaliská***	***Pezinok***	***70***	***18***	***88***
10	***PK (015) B / Pezinok - oblasť rudných baní a starých banských diel***	***Pezinok***	***62***	***25***	***87***
11	PK (026) B / Svätý Jur - Brestová - skládka s OP	Pezinok	59	24	83
12	MA (016) B / Pernek - oblasť starých banských diel	Malacky	57	16	73

N.	Sites	District	K	R	V
13	B2 (007) B / Bratislava - Ružinov - Malý Dunaj - vtokový objekt	Bratislava II	45	21	66
14	B3 (007) B / Bratislava - Rača - terminál Slovnaft	Bratislava III	44	21	65
15	B5 (003) B / Bratislava - Petržalka - ČS PHM Viedenská cesta	Bratislava V	36	27	63
16	PK (006) B / Modra - Hliny - skládka s OP	Pezinok	54	9	63
17	PK (001) B / Báhoň - staré koryto potoka - skládka	Pezinok	49	13	62
18	B2 (005) B / Bratislava - Ružinov - ČS PHM Zlaté piesky	Bratislava II	39	21	60
19	PK (011) B / Pezinok - ČS PHM - zrušená	Pezinok	36	24	60
20	PK (024) B / Pezinok - Tehelná ul. - tok Mahulianka	Pezinok	36	24	60

Legend to the table:

Priority contaminated sites in the region are marked with boldface, high risk contaminated sites are marked with italics.

Bratislava - Devínska Nová Ves - kameňolom Srdce (contaminated site)

Remediated and/or rehabilitated sites in the region Bratislava (RCS - part C)

44 sites were remediated and 14 sites rehabilitated out of the total number of 58 recorded sites. Storage and distribution of goods dominate regarding the groups of activities - 30 sites (52 %) and fuel tank stations are most frequent among them – 24 (30 %). Waste handling facilities follow – 15 sites (26 %), especially municipal waste landfills – 13 sites (22 %). The highest number of remediated sites was recorded in the districts Bratislava II (12) and Malacky (11) in the region Bratislava, mostly fuel tank stations. The highest number of rehabilitated sites was recorded in the district Senec, mainly due to rehabilitated municipal waste landfills.

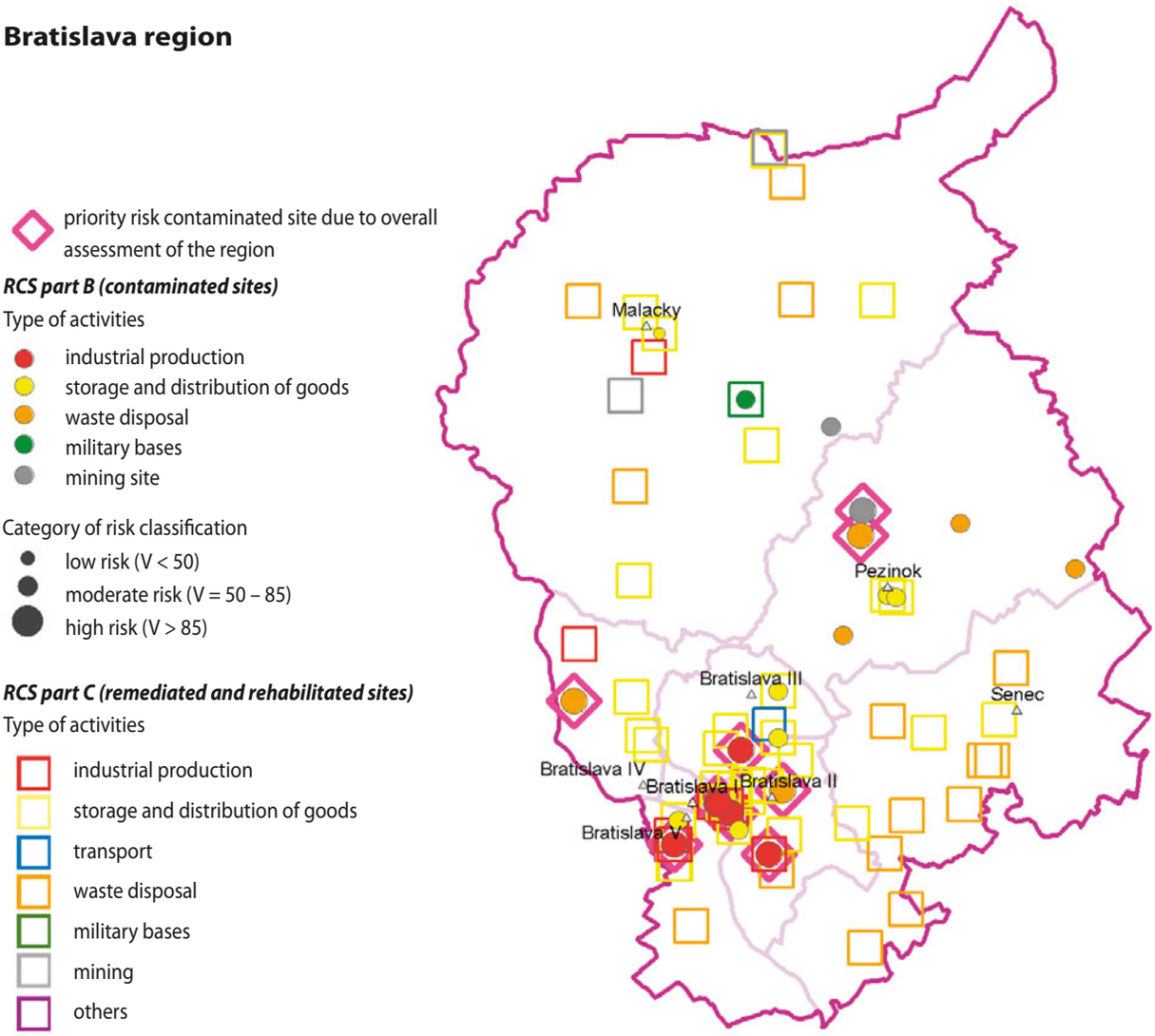
19 sites with finalised remediation and/or rehabilitation out of 58 remediated and/or rehabilitated sites are classified only in RCS – part C, demonstrably without contamination. The resting 39 sites do not meet one some of the above defined conditions. They comprise sites with ongoing remediation, eventually with residual contamination, or sites with lack of data on actual contamination situation, some of them are classified also in RCS – part A or RCS – part B. It is necessary to mention in this context that classification of certain site to RCS - part C did not automatically mean that this particular site was or still is a contaminated site, or any indications of contamination exist. It solely means that remediation and/or rehabilitation of this site was or still is performed, or protection element against pollution spread was installed as a minimum requirement (e.g. physical barrier - underground sealing wall). 13 sites out of the 58 remediated and/or rehabilitated sites are considered also as probable contaminated sites (2 sites) or contaminated sites (11 sites). 3 remediated sites are at the same time also priority high risk contaminated sites *(002) B / Bratislava - Staré Mesto - Apollo - širší priestor bývalej rafinérie, B2 (013)B / Bratislava - Ružinov - Slovnaft - širší*

priestor závodu, B5 (007)B / Bratislava - Petržalka - Matador - areál bývalého závodu. 6 contaminated sites with moderate risk and 20 sites with the highest risk belong to remediated and/or rehabilitated sites in parallel: *B2 (005) C / Bratislava - Ružinov - ČS PHM Zlaté piesky, B2 (007) C / Bratislava - Ružinov - Malý Dunaj - vtokový objekt, B3 (007) C / Bratislava - Rača - terminál Slovnaft, B5 (003) C / Bratislava - Petržalka - ČS PHM Viedenská cesta, PK (011) C / Pezinok - ČS PHM – zrušená, PK (024) C / Pezinok - Tehelná ul. - tok Mahulianka.* Some of the mentioned sites are under ongoing or not finalised remediation (e.g. consecutive works).

Number of remediated and rehabilitated sites in the region

District	Number	Remediated sites	Rehabilitated sites
Bratislava I	2	2	0
Bratislava II	13	12	1
Bratislava III	5	5	0
Bratislava IV	4	4	0
Bratislava V	6	5	1
Malacky	14	11	3
Pezinok	2	2	0
Senec	12	3	9
Bratislava region	**58**	**44**	**14**

Bratislava region



Region Trnava

Region Trnava with the total area of 4 147 km^2 covers 8.46 % of the total Slovakia territory. It comprises 7 districts according to the territorial and administrative organisation pursuant to the Act No. 221/1996 of the Slovak Parliament, with district Dunajská Streda being the largest (1 075 km^2) and district Hlohovec (267 km^2) the smallest one. Other districts are as follows: Trnava, Senica, Galanta, Piešťany and Skalica. Region Trnava comprises totally 267 municipalities, 16 among them have the status of a town. 559 934 inhabitants live in the region Trnava (as of December 31st, 2008), this number represents 10.35 % of the total SR population.

Several large-scale protected areas interfere with the region Trnava. Their total area covers app. 492 km^2, forming app. 11.8 % of the region territory. Four protected landscape areas are comprised (PLA) as follows: PLA Dunajské luhy, PLA Biele Karpaty, PLA Malé Karpaty and PLA Záhorie. 78 small-scale protected areas are located in the territory of the region Trnava, 8 out of them being national natural reserves (NNR), 23 natural reserves (NR), 1 national natural monument (NNM), 20 natural monuments (NM) and 26 protected areas (PA). Small-scale protected areas cover 31 km^2 (0.8 % of the region territory).

Special protection areas (SPA) and special areas of conservation (SAC) belonging to the NATURA 2000 system represent a specific type of protection. They overlap with the national network of protected areas to a substantial extent. 34 special areas of conservation and 7 special protected areas interfere with the region Trnava territory. Total area of SAC reaches 132 km^2 (3.19 % of the region territory) and area of SPA is 548 km^2 (13.2 % of the region territory). 3 Ramsar Convention sites are located in the territory of the region Trnava: Rudava river alluvium, Dunajské Luhy including Číčovské mŕtve rameno, and Morava river alluvium that interfere with the region Trnava by 94 km^2.

One protected area of natural water accumulation interferes with the region Trnava territory – protected water management areas (PWMA): PWMA Žitný ostrov, with area of app. 971 km^2 (23.4 % of the region territory).

Natural medicinal resources Piešťany, Smrdáky and Šamorín - Čilistov are located in the region of Trnava. They together cover area of 225 km^2 (5.4 % of the region territory). Two spa sites (Piešťany and Smrdáky) are located in the region Trnava with summary area of 68 km^2 (1.6 % of the region territory). Protection zones for water supplies of ground water and surface water resources are determined for majority of water resources exploited as public supplies by the network of water works (springs, water reservoirs, sampling of the surface water streams). However, legislative proceedings were not finalised for major part of the defined protection zones. Their records are not harmonised. Especially protection zones of the resources with local importance are recorded only on the lowest level of the water management organisations. Recorded protection zones of the water resources (according to the data from Water Research Institute) in the region Trnava cover the total area of 320 km^2 (7.7 % of the region territory). No river basin of stream with water management importance interferes with the territory of region Trnava. The total length of streams with water management importance reaches 1 333 km.

4 monumental zones are present in the region Trnava: Hlohovec, Piešťany, Skalica and Sobotište, with total area of 3 km^2, and 2 monumental reserves (Plavecký Peter and Trnava) with total area of 0.8 km^2.

The total area of agricultural soil in the region Trnava (with determined soil quality) is app. 3 010 km^2 (72.6 % of the region territory). Among the 9 soil quality groups determined for SR all quality groups are present in the region Trnava. The highest proportion of the agricultural soil (with information on its quality) is present in the district Galanta (82.7 % of the region territory), the lowest in the district Senica (60.2 % of the region territory). Soils from quality groups 1 to 7 are present in all districts of the region. Soil quality group 2 is the most frequent (815 km^2), covering app. 19.6 % of the region territory. Quality group 8 is not present in the districts Dunajská Streda and Galanta, and quality group 9 is not present in the district Dunajská Streda. The level of inactivation of contaminants (ability of soil to inactivate contaminants) was - equally as soil quality groups - investigated only in the areas with agricultural soils. Soils with all 5 degrees of inactivation of contaminants are present in the region Trnava (very low, low, moderate, high, very high). Soils with moderate inactivation degree are most frequent (2 058 km^2, 49.6 % of the region. Soils with very low degree of inactivation of contaminants are the least frequent (5 km^2, 0.1 % of the region territory).

All 5 determined degrees of environmental quality are present in the territory of region Trnava (Environmental Regionalisation of the Slovak Republic, *Bohuš, Klinda et al., 2008*). The largest area is represented by the acceptable environment - 1 611 km^2 (38.8 % of the region territory), moderately deteriorated environment covers 1 316 km^2 (31.7 % of the region territory), deteriorated environment 763 km^2 (18.4 % of the region territory), high quality environment 276 km^2 (6.7 % of the region territory). The smallest area is covered by highly deteriorated environment - 179 km^2 (4.3 % of the region territory). Highly deteriorated and deteriorated areas are mostly located in vicinity of larger cities or industrial centres as Trnava, Piešťany, Dunajská Streda, Hlohovec.

8 burdened areas were identified in whole territory of the Slovak Republic in the framework of Environmental Regionalisation of the SR in relation to the degrees of environmental quality (*Bohuš, Klinda et al., 2008*). Two of them interfere with the region Trnava: Bratislava burdened area with 488 km^2 and app. 468 000 inhabitants interfere by 7 % and Dolnopovažská burdened area with 1 261 km^2 and app. 247 000 inhabitants by 34 % with Trnava region.

84 probable contaminated sites, 33 contaminated sites and 36 remediated and 43 rehabilitated sites were recorded in the region Trnava in the framework of Systematic Identification of Contaminated sites in the Slovak Republic *(Paluchová et al., 2006 – 2008)*. 3 sites with contaminated site belong to high risk group (according to the criterion K) and they were proposed for priority removal.

Updating and data completion were performed as well as additional impact assessment of the contaminated sites to the environment in the framework of Regional Studies of Environmental Impacts of the Contaminated sites for Selected Regions *(Helma et al., 2008 – 2010)*. Updated number of the contaminated sites with **87** identified in the region Trnava **probable contaminated sites, 35 contaminated sites, 38 remediated and 46 rehabilitated sites** is one of results of the Regional Study of Environmental Impacts of the Contaminated sites for Selected Regions - region Trnava *(Némethyová et al., 2010)*. 4 sites with contaminated site belong to high risk according to the basic classification (criterion K) at present, and they also belong among high risk due to overall assessment of the environmental impacts of the contaminated sites (according to criterion V).

Probable contaminated sites in the region Trnava (RCS - part A)

21 sites with low risk, 60 sites with moderate risk and 6 sites with high risk were recorded out of total number of **87 probable contaminated sites** in the region Trnava on the basis of the overall assessment of environmental impacts of the contaminated sites. The highest number of sites (24) was recorded in the district Dunajská Streda, the lowest number in the district Hlohovec (1 site). App. 72 % of the sites with probable environmental risk are represented by waste handling facilities, especially municipal waste landfills (68 %). They are followed by agricultural activity sites with 9 % and dominating dunghills (5 %). Industrial production, transport, storage and distribution of goods have identical proportion – 5 %. District Dunajská Streda has the highest number of high risk sites (3 sites).

According to the ranking based on the criterion V, 6 high risk sites are classified out of 22 most risky probable contaminated sites in the region (V > 85 points) and 16 are classified as moderate risk. 10 out of them are considered as priority probable contaminated sites where environmental contamination should be either confirmed or excluded by additional investigation, and then measures should be implemented in case of contaminated site confirmation towards decrease or even elimination of environmental deterioration or human health damage risk.

Among 87 probable contaminated sites 12 sites are considered as remediated and/or rehabilitated sites. It means that certain remediation and/or rehabilitation activities were already performed in these probable contaminated sites. In the cases when successful remediation and/or rehabilitation was terminated (site without contamination) these sites will not be considered as probable contaminated sites anymore and they will be registered only in RCS - part C.

Number of probable contaminated sites according to level of risk

District	Number	Low risk (K)	Moderate risk (K)	High risk (K)	Low risk (V)	Moderate risk (V)	High risk (V)
Dunajská Streda	24	0	21	3	0	20	4
Galanta	15	2	12	1	2	13	0
Hlohovec	1	0	1	0	0	1	0
Piešťany	12	3	9	0	5	7	0
Senica	18	14	4	0	11	7	0
Skalica	10	2	7	1	1	8	1
Trnava	7	2	4	1	2	4	1
Trnava region	**87**	**23**	**58**	**6**	**21**	**60**	**6**

Legend to the tables:

K – basic (main) risk classification of the contaminated site reflecting risk of contamination spread into ground water and via ground water, risk of volatile and toxic substances for the inhabitants, risk of surface water contamination (K < 35 - low risk classification, K = 35 to 65 – moderate risk classification, K > 65 - high risk classification).

R – complementary risk classification of the contaminated site based on its position in relation to soil, to protected areas, to functional land use, to economical and social land development, to the environmental quality.

V – overall impact (risk) assessment of the contaminated site to the environment V = K+R (V < 50 - low risk classification, V = 50 to 85 – moderate risk classification, V > 85 - high risk classification).

Contaminated sites in the region Trnava (RCS - part B)

On the basis of overall environmental impact assessment of the contaminated sites (according to criterion V), **14 site with low risk, 17 sites with moderate risk and 4 sites with high risk** out of total number of **35 contaminated sites** were recorded in the region Trnava, with the highest appearance in the districts Skalica and Trnava (7 sites). 61 % of the contaminated sites in the region are formed by municipal waste landfills. The second most frequent group of activities – industrial production – reaches 21 %, then storage and distribution of goods with 12 %.

App. 57 % of the sites with probable contaminated site are formed by waste handling facilities, especially municipal waste landfills (37 %) and industrial waste sites (17 %). They are followed by industrial production sites - 20 %, with dominating engineering production (6 %) and metallurgy (6 %). Then storage and distribution of goods follows with 11 %, with dominating storage and distribution of fuels (6 %).

Among 20 most risky contaminated sites in the region, according to the ranking of criterion V, 4 are classified as high risk sites (V > 85 points) and 16 as moderate risk. 12 of the latter sites are considered as priority contaminated sites that should be addressed as soon as possible due to risk of environmental deterioration and human health threatening.

The first four sites with the highest risk according to the overall environmental impact assessment of the contaminated sites (according to criterion V) are the most risky sites also due to the basic classification (according to criterion K) in the region at the same time.

In more detailed assessment of risk we evaluated the contaminated sites according to the partial criteria K1+K3 (relation of CS to water), K2+R5 (relation of CS to human health), R1 (relation of CS to soil), R2 (relation of CS to protected areas), R3+R4 (relation of CS to landscape and socio-economical development), entering the environmental impact assessment of contaminated sites.

Sites *PN (009) B / Piešťany - Chirana* and *PN (008) B / Piešťany - bývalá Tesla* are in addition to the overall impact assessment also priority high risk ones due to risk for water (ground water and surface water), human population health and risk for landscape and socio-economical development. Site *GA (009) / Sereď - Niklová huta - areál bývalého podniku* is in addition to the overall impact assessment also priority high risk one due to risk for water (ground water as well as surface water), soil, and risk for human population health. Sites *PN (011) B / Piešťany - prečerpávacia stanica na ropné látky, PN (010) / Piešťany - kasárne*, *DS (025) B / Zlaté Klasy - skládka TKO* are priority ones due to overall environmental impact assessment of the contaminated sites, and priority high risk sites in parallel due to risk for soil, human population

health and risk for landscape and socio-economical development. Site *GA (010) B / Sereď - Niklová huta - skládka lúženca* is in addition to the overall impact assessment also priority high risk one due to risk for water *(*ground water as well as surface water), and risk for human population health. *PN (007) B / Piešťany - bývalá STS* and *SI (012) B / Skalica - areál bývalých ZVL* are priority sites due to overall environmental impact assessment of the contaminated sites, and priority high risk sites in parallel due to risk for human population health and risk for landscape and socio-economical development. *TT (007) B / Smolenice - areál Chemolak* is priority one due to overall environmental impact assessment of the contaminated sites, and priority high risk site in parallel due to risk for human population health. Site *HC (004) B / Hlohovec - Šulekovo - Fe-kaly* is not priority due to overall environmental impact assessment of the contaminated sites; however, it is a priority high risk site because of risk for water (ground water as well as surface water) and soil.

Sites *HC (005) B / Hlohovec - Šulekovo - skládky TKO, SI B (008) / Holíč - terminál Slovnaft, SI (017) B / Unín - skládka odpadu, SI (018) B / Unín - zberné naftové stredisko Cunín* are priority high risk sites due to risk for water *(*ground water as well as surface water). Site *DS (013) B / Mad - skládka TKO* is priority high risk site due to risk for ground water. Site *GA (018) B / Veľké Úľany - obecná skládka KO* is priority high risk site due to risk for soil. Site *TT (005) B / Majcichov - skládka TKO* is priority high risk site due to risk for landscape and socio-economical development. Moreover, 3 sites that do not belong among the 20 top risk sites in the region belong to priority high risk contaminated sites due to risk for soil: *GA (011) B / Sládkovičovo - ČS PHM Slovnaft, SE (018) B / Rovensko - skládka TKO Výmoľ, TT (008) B / Špačince - skládka TKO.* In contrary, sites *HC (003) B / Hlohovec - priemyselný areál (vrátane bývalej Drôtovne)* and *TT (014) B / Boleráz - skládka TKO* are ranked at position 15 or 19 due to overall environmental impact assessment of the contaminated sites (according to criterion V), but they are not a priority sites due to certain partial criterion.

It is obvious from the above text that many of mentioned sites pose a serious risk especially for ground water and surface water quality. Some of these sites are located in protected water management area, in the protection zones of natural medicinal waters and in protection zones of water resources. Many sites are in close vicinity of streams with water management importance, often directly on permeable alluvial sediments. In the framework of all 35 contaminated sites, a risk of threatening ground water exists, moreover, risk of threatening surface water is realistic in case of 12 sites.

Three sites are located in protected water management area Žitný ostrov: *DS (013) B / Mad - skládka TKO, DS (025) B / Zlaté Klasy - skládka TKO* and *GA (018) B / Veľké Úľany - obecná skládka KO.* The following sites are located in protection zone of water resources: *PN (010) B / Piešťany - kasárne, PN (011) B / Piešťany - prečerpávacia stanica na ropné látky, GA (018) B / Veľké Úľany - obecná skládka KO.* Sites located in the protection zone of natural medicinal resource Piešťany, and in spa area: *PN (009) B / Piešťany - Chirana, PN (008) B / Piešťany - bývalá Tesla, PN (007) B / Piešťany - bývalá STS, PN (010) B / Piešťany - kasárne* and *PN (011) B / Piešťany - prečerpávacia stanica na ropné látky.* The highest value characterising risk for ground water and surface water is assigned to the site *PN (009) B / Piešťany - Chirana,* which is closely followed by the site *PN (008) B / Piešťany - bývalá Tesla.*

Conflict of contaminated site with protected areas was detected in case of special protection area Záhorské Pomoravie - site *SI (018) B / Unín - zberné naftové stredisko Cunín.*

Recognition that 12 sites among the 35 contaminated sites are at the same time remediated or rehabilitated sites is considered a positive finding. This number comprises 2 sites out of 10 priority most risky ones. It means that remediation and/or rehabilitation works were already performed or are performed at present on app. 34 % (20 % of priority ones) of the contaminated site sites. In the cases of finalisation of demonstrable successful remediation and/or rehabilitation (site without contamination) they will not be considered as contaminated sites and they will be recorded only in RCS - part C.

Number of contaminated sites according to level of risk

District	Number	Low risk (K)	Moderate risk (K)	High risk (K)	Low risk (V)	Moderate risk (V)	High risk (V)
Dunajská Streda	2	0	2	0	0	2	0
Galanta	4	1	1	2	1	1	2
Hlohovec	6	3	3	0	3	3	0
Piešťany	5	0	3	2	0	3	2
Senica	4	4	0	0	4	0	0
Skalica	7	3	4	0	3	4	0
Trnava	7	1	6	0	3	4	0
Trnavský kraj	**35**	**12**	**19**	**4**	**14**	**17**	**4**

The most risky contaminated sites (RCS – part B) in the region

N.	Sites	District	K	R	V
1	***PN (009) B / Piešťany - Chirana***	***Piešťany***	***95***	***30***	***125***
2	***PN (008) B / Piešťany - bývalá Tesla***	***Piešťany***	***83***	***27***	***110***
3	***GA (010) B / Sereď – Niklová huta - skládka lúženca***	***Galanta***	***90***	***15***	***105***
4	***GA (009) B / Sereď – Niklová huta - areál bývalého podniku***	***Galanta***	***84***	***18***	***102***
5	*PN (011) B / Piešťany - prečerpávacia stanica na ropné látky*	*Piešťany*	*55*	*27*	*82*
6	*PN (010) B / Piešťany - kasárne*	*Piešťany*	*52*	*27*	*79*
7	*PN (007) B / Piešťany - bývalá STS*	*Piešťany*	*52*	*27*	*79*
8	*DS (025) B / Zlaté Klasy - skládka TKO*	*Dunajská Streda*	*59*	*19*	*78*
9	*TT (007) B / Smolenice - areál Chemolak*	*Trnava*	*64*	*10*	*74*
10	*SI (012) B / Skalica - areál bývalých ZVL*	*Skalica*	*57*	*16*	*73*
11	HC (004) B / Hlohovec - Šulekovo - Fe-kaly	Hlohovec	47	24	71

N.	Sites	District	K	R	V
12	DS (013) B / Mad - skládka TKO	Dunajská Streda	57	13	70
13	SI (018) B / Unín - zberné naftové stredisko Cunín	Skalica	52	14	66
14	GA (018) B / Veľké Úľany - obecná skládka KO	Galanta	54	10	64
15	HC (003) B / Hlohovec - priemyselný areál (vrátane bývalej Drôtovne)	Hlohovec	48	15	63
16	SI (008) B / Holíč - terminál Slovnaft	Skalica	47	13	60
17	TT (005) B / Majcichov - skládka TKO	Trnava	39	21	60
18	HC (005) B / Hlohovec - Šulekovo - skládky TKO	Hlohovec	47	12	59
19	TT (014) B / Boleráz - skládka TKO	Trnava	51	7	58
20	SI (017) B / Unín - skládka odpadu	Skalica	47	10	57

Legend to the table:

Priority contaminated sites in the region are marked with boldface, high risk contaminated sites are marked with italics.

Remediated and/or rehabilitated sites in the region Trnava (RCS - part C)

Zlaté Klasy – skládka TKO (contaminated site)

38 sites were remediated and 46 sites rehabilitated out of the total number of 84 recorded sites. The highest number of remediated sites in the region Trnava was recorded in the district Skalica (11 sites). The highest number of rehabilitated sites was recorded in the district Dunajská Streda (19 sites). Remediation of fuel tank stations dominate from the activity type point of view (23 % sites), and rehabilitation of municipal and industrial waste landfills (51 % sites).

23 sites with finalised remediation and/or rehabilitation out of 84 remediated and/or rehabilitated sites are classified only in RCS – part C, demonstrably without contamination. The resting 61 sites do not meet some of the above defined conditions. They comprise sites with ongoing remediation, eventually with residual contamination, or sites with lack of data on actual contamination situation, some of them are classified also in RCS – part A or RCS – part B. It is necessary to mention in this context that classification of certain site to RCS - part C did not automatically mean that this particular site was or still is contaminated site, or any indications of contamination exist. It solely means that remediation and/or rehabilitation of this site was or still is performed, or protection element against pollution spread was installed as a minimum requirement (e.g. physical barrier - underground sealing wall).

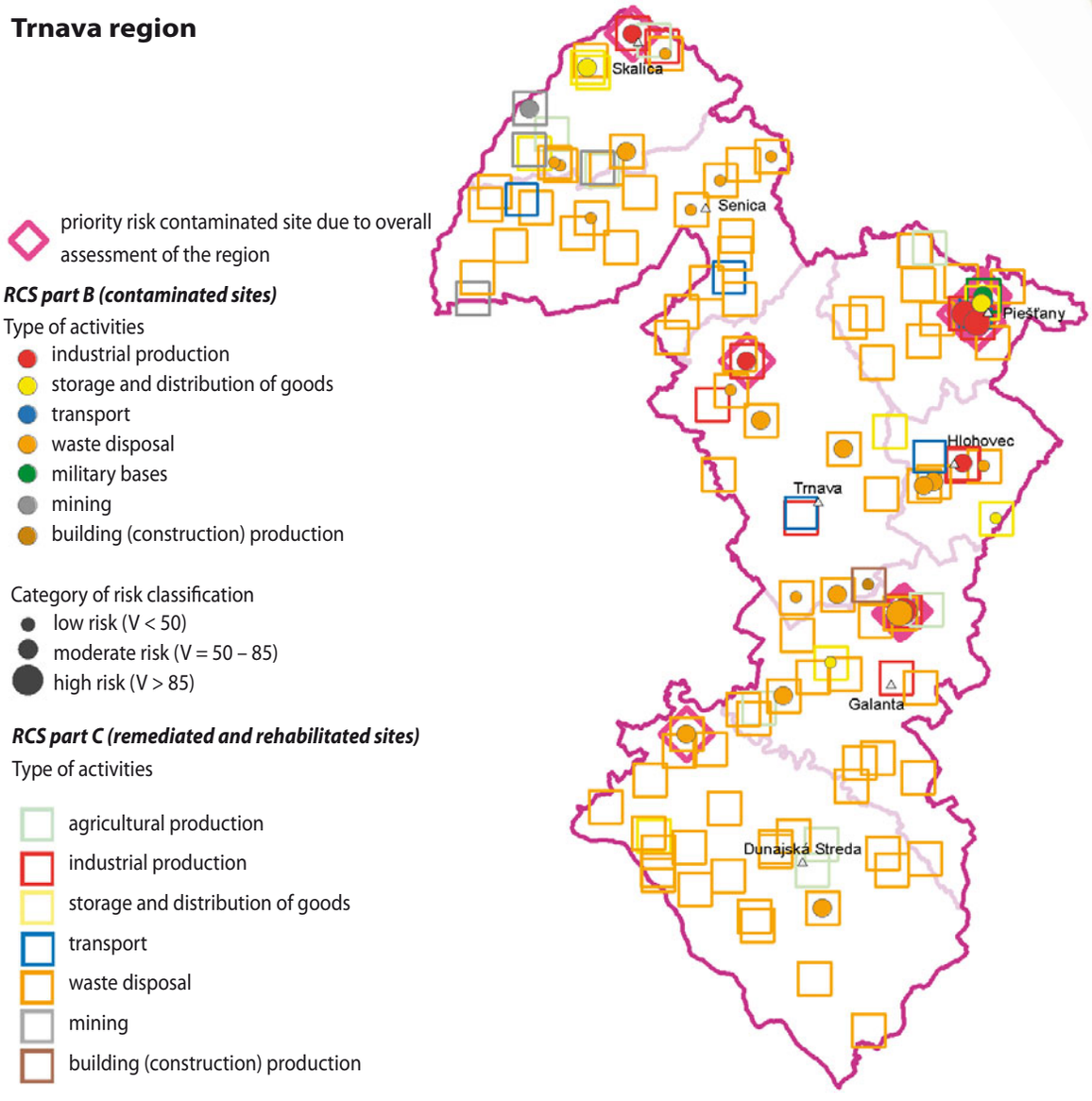
24 sites out of 84 remediated and/or rehabilitated sites are considered probable contaminated site in parallel (12 sites) or contaminated site

(12 sites). 2 remediated sites are priority high risk contaminated site at the same time: *PN (008) C / Piešťany - bývalá Tesla*, *GA (010) C / Sereď - Niklová huta - skládka lúženca.*

The following sites are remediated and/or rehabilitated sites and also contaminated sites: *GA (011) C / Sládkovičovo - ČS PHM Slovnaft, HC (001) C / Hlohovec - areál Zentiva, HC (002) C / Hlohovec - Pastuchov - skládka neaktívnych kalov, HC (004) C / Hlohovec - Šulekovo - Fe-kaly, SE (016) C / Podbranč - skládka TKO Piesečník, SE (018) C / Rovensko - skládka TKO Výmoľ, SI (003) C / Gbely - skládka odpadov (U Tehelne), SI (008) C / Holíč - terminál Slovnaft, SI (015) C / Skalica - skládka Zlatnícka dolina, SI (018) C / Unín - zberné naftové stredisko Cunín.* Some of the mentioned sites are under ongoing or not finalised remediation (e.g. consecutive works).

Number of remediated and rehabilitated sites in the region

District	Number	Remediated sites	Rehabilitated sites
Dunajská Streda	20	1	19
Galanta	11	5	6
Hlohovec	8	6	*2*
Piešťany	7	3	4
Senica	19	9	10
Skalica	14	11	*3*
Trnava	5	3	2
Trnava region	**84**	**38**	**46**



Region Nitra

Region Nitra with the total area of 6 344 km^2 covers 12.9 % of the total Slovakia territory. According to the territorial and administrative organisation pursuant to the Act No. 221/1996 Coll. of the Slovak Parliament the region Nitra comprises 7 districts Komárno, Levice, Nitra, Nové Zámky, Šaľa, Topoľčany and Zlaté Moravce, with 354 municipalities, 15 out of them having the status of a town. 13 % out of the total Slovakia citizens lives in the region Nitra. According to the Statistical Office SR 706 758 citizens lived here as of December 31st, 2008. Average population density in the region is 111.3 inhabitants per km^2, more then Slovakia average.

3 large-scale protected areas interfere with the region Nitra territory with total area of app. 295 km^2 - app. 4.65 % of the region territory. Three protected landscape areas are comprised (PLA): PLA Dunajské luhy, PLA Ponitrie and PLA Štiavnické vrchy.

138 small-scale protected areas are located in the region Nitra territory, 14 among them being national natural reserves (NNR), 43 natural reserves (NR), 19 natural monuments (NM) and 62 protected areas (PA). Small-scale protected areas cover the area of 42 km^2 (0.7 % of the region territory). Special protection areas (SPA) and special areas of conservation (SAC) belonging to the NATURA 2000 system represent a specific types of protection. They overlap with the national network of protected areas to substantial extent. 64 special areas of conservation and 9 special protected areas interfere with the region Nitra territory. Total area of SAC reaches app. 144 km^2 (2.2 % of the region territory) and area of SPA is 685 km^2 (10.7 % of the region territory). 3 Ramsar Convention sites are present in the territory of the region Nitra – Dunajské luhy, Parížske močiare and Poiplie.

No protected water management area is located in the region Nitra territory. Natural medicinal water are located in the region Nitra in the districts Levice and Topoľčany - Dudince (district Levice) and Piešťany (district Topoľčany), as well as natural mineral table waters Santovka (district Levice) and Slatina (district Levice). No spa site and no spa area is related with the region Nitra territory. Region Nitra territory is intersected streams with water management importance and with total length 1 781 km, lower section of which are the most important Slovak rivers as Váh, Nitra, Hron, Ipeľ and part of the tributaries from Žitný ostrov, as well as high number of water channels. Protection zones of ground water and surface water resources are defined for majority of water resources that are use as public water supplies by the network of water companies (springs, water reservoirs, sampling of surface streams). Recorded protection zones of the water resources (according to the data from Water Research Institute) in the region Nitra cover the total area of 461 km^2 (7.2 % of the region territory).

One historical town reserve (Nitra I) and 6 historical reserves (Nitra I, Bátovce, Šahy, Komárno, Topoľčany and Zlaté Moravce) interfere with the region Nitra territory.

The total area of agricultural soil in the region Nitra (with determined soil quality) is app. 4 737 km^2 (74.7 % of the region territory). All 9 groups of the soil quality groups determined for SR are represented in the region Nitra. The highest proportion of the agricultural soil (with information on its quality) is present in district Šaľa (84.9 % of the district territory), the lowest in district Zlaté Moravce (49.4 % of the district territory). Soils from quality groups 2 to 8 are present in all districts of the region. Soils from the quality group 6 are the most frequent 2 (1 100 km^2), being spread on the area of app. 17.3 % of the region territory. Quality group 1 is present in addition to the district Topoľčany in all districts of the region Nitra, and quality group 9 is also present except district Šaľa in all districts of the region Nitra. The level of inactivation of contaminants (ability of soil to inactivate contaminants) was - equally as soil quality groups - investigated only in the areas with agricultural soils. Soils with all 5 degrees of inactivation of contaminants are present in the region Nitra (very low, low, moderate, high, very high). Soils with moderate inactivation degree are most frequent (3 238 km^2, 51 % of the region territory). Soils with very low degree of inactivation of contaminants are the least frequent (2 km^2, 0.04 % of the region territory).

All 5 determined degrees of environmental quality are present in the territory of the region Nitra (Environmental Regionalisation of the Slovak Republic, *Bohuš, Klinda et al., 2008*). The largest area is represented by the acceptable environment – 2 425 km^2 (38.2 % of the region territory), moderately deteriorated environment has area of 1 751 km^2 (27.6 % of the region territory), deteriorated environment has area of 1 238 km^2 (19.5 % of the region territory). The lowest area is covered by the environment of high quality - 477 km^2 (7.5 % of the region territory) and the environment highly deteriorated with area of 451 km^2 (7.1 % of the region territory). Highly deteriorated and deteriorated areas are mostly located in vicinity of larger cities as Nitra, Nové Zámky and Šaľa.

8 burdened areas were identified in whole territory of the Slovak Republic in the framework of Environmental Regionalisation of the SR in relation to the degrees of environmental quality (*Bohuš, Klinda et al., 2008*). Two of them interfere with the region Nitra: Dolnopovažská burdened area with 1 261 km^2, covering 66 % of the region Nitra territory, and Ponitrianska burdened area with 450 km^2, covering 51 % of the region Nitra territory.

119 probable contaminated sites, 39 contaminated sites and 34 remediated and 52 rehabilitated sites were recorded in the region Nitra in the framework of Systematic Identification of Contaminated sites in the Slovak Republic *(Paluchová et al., 2006 – 2008)*. 12 sites with identified contaminated site belong to high risk group (according to the criterion K) and they were proposed for priority removal.

Updating and data completion were performed as well as additional impact assessment of the contaminated sites to the environment in the framework of Regional Studies of Environmental Impacts of the Contaminated sites for Selected Regions *(Helma et al., 2008 – 2010)*. Updated number of the contaminated sites with **128 probable contaminated sites, 34 contaminated sites, 34 remediated and 52 rehabilitated sites** recorded in region Nitra is one of results of the Regional Study of Environmental Impacts of the Contaminated Sites for Selected Regions - region Nitra *(Auxt et al., 2010)***.** 21 sites with contaminated site belong to high risk according to the basic classification (criterion K) at present and 10 sites belong to high risk also due to overall assessment of the environmental impacts of the contaminated sites (according to criterion V).

Probable contaminated sites in the region Nitra (RCS - part A)

14 sites with low risk, 106 sites with moderate risk and 8 sites with high risk were recorded out of total number of 128 sites with probable contaminated site in the region Nitra on the basis of the overall assessment of environmental impacts of the contaminated sites (according to criterion V). The highest number of sites was recorded in the districts Nové Zámky, Nitra, Levice, the lowest number in the district Topoľčany (7 sites). Prevailing position among the total number of 128 of probable contaminated sites is still occupied by facilities for waste handling that form up to 42 %, most of them being located in the district Nitra. Agricultural production has the second position of the most frequent reasons of classification of sites to RCS - part A (24 %).

According to the ranking based on the criterion (V) 8 high risk sites are classified out of 20 most risky probable contaminated sites in the region (V > 85 points) and 12 are classified as moderate risk. 11 out of them are considered as priority high risk contaminated sites (8 with high risk, 3 moderate risk, but closely below the high risk limit - V = 84), where the environmental contamination should be first confirmed or excluded by additional investigation and further when contaminated site is conformed to implement measures for reduction or elimination of risk for the environment or human population health.

Among 128 probable contaminated sites in the region only one site is considered as remediated and/or rehabilitated site *(LV (022) A / Tekovské Lužany - ČS PHM Slovnaft)*. It means that certain remediation and/or rehabilitation activities were already performed in case of contaminated sites.

Number of probable contaminated sites according to level of risk

District	Number	Low risk (K)	Moderate risk (K)	High risk (K)	Low risk (V)	Moderate risk (V)	High risk (V)
Komárno	13	1	12	0	1	12	0
Levice	21	5	14	2	3	15	3
Nitra	27	7	19	1	5	19	3
Nové Zámky	29	2	25	2	1	27	1
Šaľa	14	3	11	0	2	12	0
Topoľčany	7	0	7	0	0	6	1
Zlaté Moravce	17	5	12	0	2	15	0
Nitra region	**128**	**23**	**100**	**5**	**14**	**106**	**8**

Legend to the tables:

K – basic (main) risk classification of the contaminated site reflecting risk of contamination spread into ground water and via ground water, risk of volatile and toxic substances for the inhabitants, risk of surface water contamination (K < 35 - low risk classification, K = 35 to 65 – moderate risk classification, K > 65 - high risk classification).

R – complementary risk classification of the contaminated site based on its position in relation to soil, to protected areas, to functional land use, to economical and social land development, to the environmental quality.

V – overall impact (risk) assessment of the contaminated site to the environment V = K+R (V < 50 - low risk classification, V = 50 to 85 – moderate risk classification, V > 85 - high risk classification).

Nitra - Chrenová, mazutová kotolňa (probable contaminated site)

Contaminated sites in the region Nitra (RCS - part B)

On the basis of overall environmental impact assessment of the contaminated sites (according to criterion V), **3 sites with low risk, 21 sites with moderate risk and 10 sites with high risk** out of total number of **34 contaminated sites** were recorded in the region Nitra, with the highest appearance in the Nové Zámky district. Industrial production dominates, as well as waste handling and transport - mainly railway depots and stations. Even after upgrading of RCS - part B, dominant position among 34 contaminated sites belongs to waste handling sites - 50 %. Second most frequent reason of site classification to RCS - part B is industrial reduction - 20 %. Among 20 most risky contaminated sites in the region, according to the ranking of criterion V, 10 are classified as high risk sites (V > 85 points) and 9 are classified as moderate risk. First 10 sites out of them are considered as priority high risk contaminated sites, that should be addressed as soon as possible due to the risk of environmental deterioration and human health threatening.

The first 4 sites with the highest risk according to the overall environmental impact assessment of the contaminated sites (following criterion V) in the region are also most risky sites from the basic risk classification point of view (following criterion K). In more detailed assessment of risk we evaluated the contaminated sites according to the partial criteria K1+K3 (relation of Cs to water), K2+R5 (relation of CS to human health), R1 (relation of CS to soil), R2 (relation of CS to protected areas), R3+R4 (relation of CS to landscape and socio-economical development), entering the environmental impact assessment of contaminated sites. Site *ZM (013) B / Zlaté Moravce - bývalý areál Calexu* is in addition to the overall impact assessment also priority high risk site from the water pollution potential point of view (ground water as well as surface water), human health, spatial development and socio-economical development. Sites *KN (014) B / Komárno - SPP, NZ (016) B / Nové Zámky - Real - H.M. - terminál* are in addition to the overall impact assessment also priority high risk of the region territory burdens from the human health and spatial and socio-economical development. Site *SA (015) B / Trnovec nad Váhom - skládka RSTO (Duslo)* is in addition to the overall assessment also priority high risk site from the water pollution potential point of view (ground water as well as surface water). Site *NZ (013) B / Nové Zámky - bývalé kasárne SA - Novocentrum* is in addition to the overall assessment also priority high risk site from the spatial and socio-economical development point of view. Sites *NZ (017) B / Nové Zámky - Rušňové depo, KN (012) B / Komárno - Harčáš, NR (012) B / Nitra - bývalé sklady PHM na Novozámockej ceste, KN (001) B / Bajč - skládka TKO, NR (014) B / Nitra - ČS PHM Slovnaft, Chrenová ulica* are in addition to the overall assessment also priority high risk sites from the human health point of view. Site *LV (007) B / Levice - obchodné stredisko Benzinolu* is priority risk site from water pollution potential point of view (ground water as well as surface water), and from spatial and socio-economical development point of view, site *KN (011) B / Komárno - areál po Sovietskej armáde* is priority risk site from the human population threatening point of view, as well as spatial and socio-economical development point of view. Sites *LV (015) B / Pukanec - skládka kalov Hampoch, ZM (001) B / Čierne Kľačany - skládka TKO (pod jabloňovým sadom)* are priority risk sites due to water pollution risk (ground water as well as surface water), site *NZ (023) B / Štúrovo - bývalé JCP, sklad asfaltov a olejov s prevádzkami* is priority risk site due to spatial and socio-economical development threatening. Among the most risky contaminated sites, sites *LV (007) Levice - obchodné stredisko Benzinolu*, *NR (012) Nitra - bývalé sklady na Novozámockej ceste, ZM (001) Čierne Kľačany - skládka TKO (pod jabloňovým sadom)* are located in the protection zones of water supplies. Contaminated sites do not endanger protected areas to a higher extent in the region Nitra. Risk for human population was identified in most sites (22) in the region Nitra. The highest such risk was found in the landfill (*KN (001) B/ Bajč - skládka TKO*). High population density in the region Nitra in parallel with unemployment of exceeding 12 % have important influence to the assessment of the contaminated sites in relation to the regional development. Functional residential and recreation areas are not directly influenced by the contaminated sites to a higher extent. Only in two sites *(KN (014) Komárno - SPP* and *NZ (013) Nové Zámky - bývalé kasárne SA- Novocentrum)* a conflict with areas classified for residence or recreation and sport appeared. Only 9 sites in total are located on industrial areas, areas selected for agricultural production and storage facilities. Only one site *KN (011) B / Komárno - areál po Sovietskej armáde* is located in the existing or proposed areas of industrial parks in the individual districts of the region.

Recognition that up to 13 sites among the 34 contaminated sites are the same time remediated or rehabilitated sites is considered a positive finding. It means that remediation and/or rehabilitation works were already performed or are performed at present on app. 38 % of the contaminated site sites. In the cases of finalisation of demonstrable successful remediation and/or rehabilitation (site without contamination) they will not be considered as contaminated sites and they will be recorded only in RCS - part C.

Number of contaminated sites according to level of risk

District	Number	Low risk (K)	Moderate risk (K)	High risk (K)	Low risk (V)	Moderate risk (V)	High risk (V)
Komárno	6	0	3	3	0	3	3
Levice	5	0	5	0	0	5	0
Nitra	5	0	4	1	0	3	2
Nové Zámky	9	4	3	2	3	3	3
Šaľa	6	0	5	1	0	5	1
Topoľčany	1	0	1	0	0	1	0
Zlaté Moravce	2	0	1	1	0	1	1
Nitra region	**34**	**4**	**22**	**8**	**3**	**21**	**10**

The most risky contaminated sites (RCS – part B) in the region

N.	Sites	District	K	R	V
1	***ZM (013) B / Zlaté Moravce - bývalý areál Calexu***	***Zlaté Moravce***	***87***	***24***	***111***
2	***KN (014) B / Komárno - SPP***	***Komárno***	***74***	***24***	***98***
3	***NZ (017) B / Nové Zámky - Rušňové depo***	***Nové Zámky***	***74***	***24***	***98***
4	***KN (012) B / Komárno - Harčáš***	***Komárno***	***73***	***24***	***97***
5	***NR (012) B / Nitra - bývalé sklady PHM na Novozámockej ceste***	***Nitra***	***67***	***24***	***91***
6	***NZ (016) B / Nové Zámky - Real - H.M. - terminál***	***Nové Zámky***	***68***	***21***	***89***
7	***SA (015) B / Trnovec nad Váhom - skládka RSTO (Duslo)***	***Šaľa***	***71***	***18***	***89***
8	***NZ (013) B / Nové Zámky - bývalé kasárne SA - Novocentrum***	***Nové Zámky***	***58***	***30***	***88***
9	***KN (001) B / Bajč - skládka TKO***	***Komárno***	***66***	***21***	***87***
10	***NR (014) B / Nitra - ČS PHM Slovnaft, Chrenová ulica***	***Nitra***	***63***	***24***	***87***
11	KN (011) B / Komárno - areál po Sovietskej armáde	Komárno	56	24	80
12	NZ (023) B / Štúrovo - bývalé JCP, sklad asfaltov a olejov s prevádzkami	Nové Zámky	58	21	79
13	LV (007) B / Levice - obchodné stredisko Benzinolu	Levice	55	22	77
14	LV (015) B / Pukanec - skládka kalov Hampoch	Levice	61	16	77
15	NZ (015) B / Nové Zámky - mestská skládka TKO	Nové Zámky	54	21	75
16	ZM (001) B / Čierne Kľačany - skládka TKO (pod jabloňovým sadom)	Zlaté Moravce	59	16	75

N.	Sites	District	K	R	V
17	KN (013) B / Komárno - Madzagoš	Komárno	49	24	73
18	SA (014) B / Trnovec nad Váhom - odkalisko Amerika I (Duslo Šaľa)	Šaľa	52	21	73
19	SA (006) B / Neded - areál bývalého PD (QUEEN)	Šaľa	48	24	72

Legend to the table: Priority contaminated sites in the region are marked with boldface, high risk contaminated sites are marked with italics.

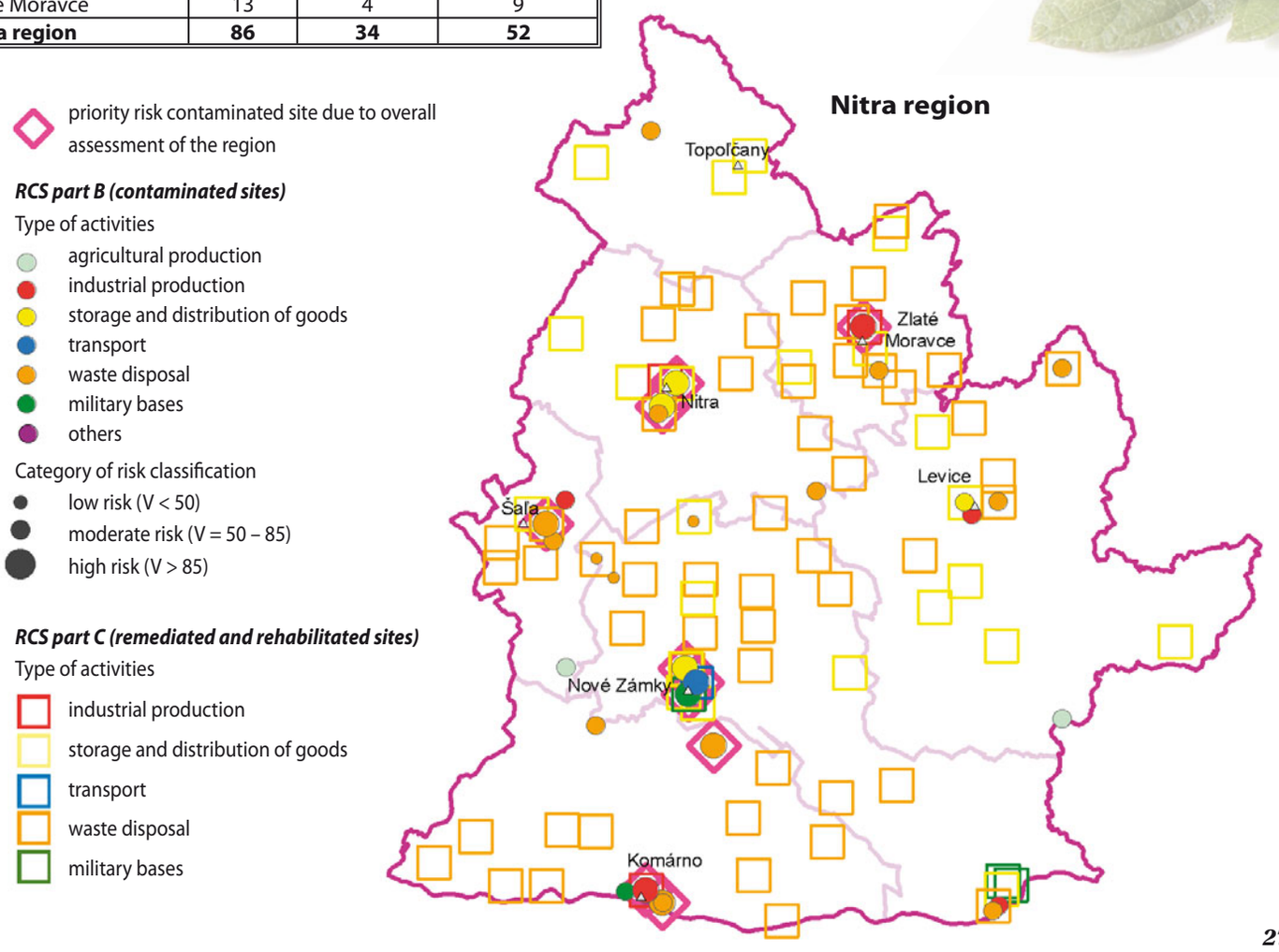
Remediated and/or rehabilitated sites in the region Nitra (RCS - part C)

34 sites were remediated and 52 sites rehabilitated out of the total number of 86 recorded sites. The highest recorded number of remediated sites in the region Nitra was in districts Nové Zámky and Levice. Most remediated sites were identified in districts Nové Zámky and Komárno, where municipal waste landfills remediation dominated.

21 sites with finalised remediation and/or rehabilitation out of 86 remediated and/or rehabilitated sites are classified only in RCS – part C, demonstrably without contamination. The resting 65 sites do not meet one some of the above defined conditions. They comprise sites with ongoing remediation, eventually with residual contamination, or sites with lack of data on actual contamination situation, some of them are classified also in RCS – part A or RCS – part B. It is necessary to mention in this context that classification of certain site to RCS - part C did not automatically mean that this particular site was or still is contaminated site, or any indications of contamination exist. It solely means that remediation and/or rehabilitation of this site was or still is performed, or protection element against pollution spread was installed as a minimum requirement (e.g. physical barrier - underground sealing wall). 14 sites out of 86 remediated and/or rehabilitated sites are at the same time considered probable contaminated site (1 site) or contaminated site (13 sites). 6 remediated sites are at the same time priority high risk contaminated site: *ZM (013) C / Zlaté Moravce - bývalý areál Calexu, KN (014) C / Komárno - SPP, NZ (017) C / Nové Zámky - Rušňové depo, NZ (016) C / Nové Zámky - Real - H.M. – terminál, NZ (013) C / Nové Zámky - bývalé kasárne SA - Novocentrum, NR (014) C / Nitra - ČS PHM Slovnaft, Chrenová ulica.* Most of the mentioned sites are under ongoing or not finalised remediation (e.g. consecutive works).

Number of remediated and rehabilitated sites in the region

District	Number	Remediated sites	Rehabilitated sites
Komárno	12	1	11
Levice	11	7	4
Nitra	15	6	9
Nové Zámky	27	12	15
Šaľa	5	1	4
Topoľčany	3	3	0
Zlaté Moravce	13	4	9
Nitra region	**86**	**34**	**52**



Region Trenčín

Region Trenčín has the total area of 4 502 km^2 (9.2 % of the Slovak Republic territory). It comprises 9 districts according to the territorial and administrative organisation pursuant to the Act No. 221/1996 of the Slovak Parliament, with district Prievidza being the largest and district Myjava the smallest one. Other districts are as follows: Bánovce nad Bebravou, Ilava, Nové Mesto nad Váhom, Partizánske, Považská Bystrica, Púchov, Trenčín. Region Trenčín comprises totally 276 municipalities, 18 among them have the status of a town. 599 859 inhabitants live in the region Trenčín (as of December 31st, 2008), this number represents 11.1 % of the total SR population.

5 protected landscape areas (PLA) interfere with the region Trenčín territory with total area of 953 km^2, representing app. 21.2 % of the region territory. PLA Malé Karpaty, PLA Biele Karpaty, PLA Kysuce and PLA Strážovské vrchy and PLA Ponitrie belong to these protected areas. 138 small-scale protected areas are located in the Trenčín region territory, 15 out of them being national natural reserves (NNR), 48 natural reserves (NR), 3 national natural monuments (NNM), 69 natural monuments (NM) and 3 protected areas (PA). Small-scale protected areas cover 57 km^2 (1.3 % of the region territory).

Special protection areas (SPA) and special areas of conservation (SAC) belonging to the NATURA 2000 system represent a specific type of protection. They overlap with the national network of protected areas to a substantial extent. 26 special areas of conservation and 5 special protected areas interfere with the region Trenčín territory. Total area of SAC reaches 543 km^2 (12.1 % of the region territory) and area of SPA is 570 km^2 (12.7 % of the region territory). No Ramsar Convention site is present in the territory of region Trenčín.

Two protected water management areas (PWMA) are defined in the region Trenčín at present: PWMA Strážovské vrchy and PWMA Beskydy - Javorníky. They cover area of app. 1 075 km^2 (23.9 % of the region territory) in total.

Protection zones of 8 natural medicinal springs and natural springs of mineral table waters lay in the territory of region Trenčín. Namely, protection zones of natural springs of mineral table waters Lúka, Mníchova Lehota and Trenčianske Mitice, protection zones of natural medicinal springs Bojnice, Nimnica, Piešťany, Rajecké Teplice and Trenčianske Teplice. They totally cover an area of 307 km^2 (6.8 % of the region territory). 4 spa towns and 3 spa areas are located in the territory of the region Trenčín with total area of 52 km^2 (1.2 % of the region territory). Protection zones for water supplies of ground water and surface water resources are determined for majority of water resources exploited as public supplies by the network of water works (springs, water reservoirs, sampling of the surface water streams). Recorded protection zones of the water resources (according to the data from Water Research Institute) in the region Trenčín cover the total area of 906 km^2 (20.1 % of the region territory). 3 basins of water management streams interfere with the territory of region Trenčín (Nitrica, Tužina, Papradnianka), with total area of 183 km^2 (4.1 % of the region territory). Total length of the streams with water management importance interfere with the territory of the region Trenčín is 1 279 km.

5 monumental zones are present in the region Trenčín (Beckov, Nové Mesto nad Váhom, Bojnice, Nitrianske Pravno, Lazany) with total area of 1.6 km^2 and 1 monumental reserve (Trenčín) with area of 0.2 km^2.

The total area of agricultural soil in the region Trenčín (with determined soil quality) is only app. 182 km^2 (4.1 % of the region territory). Among the 9 soil quality groups determined for SR all quality groups are present in the region Trenčín. The highest proportion of the agricultural soil (with information on its quality) is present in the district Myjava (5.3 % of the region territory), the lowest in the district Považská Bystrica (3.1 % of the region territory). Soils from quality groups 5 to 9 are present in all districts of the region. Soils from the quality group 9 are the most frequent (45 km^2) and 6 (41 km^2), each of them being spread on the area of app. 1 % of the region territory. Quality group 1 is present only in districts Nové Mesto nad Váhom, Partizánske and Trenčín, with minimum proportion (1 km^2, 0.02 % of the region territory). Quality groups 2 and 3 are present in all districts except the district Považská Bystrica. Quality group 4 is not present in districts Považská Bystrica and Púchov. The level of inactivation of contaminants (ability of soil to inactivate contaminants) was - equally as soil quality groups - investigated only in the areas with agricultural soils. Soils with all 5 degrees of inactivation of contaminants are present in the region Trenčín (very low, low, moderate, high, very high). Soils with moderate inactivation degree are most frequent (87 km^2, 1.9 % of the region territory) and low inactivation degree (77 km^2, 1.7 % of the region territory). Soils with very high degree of inactivation of contaminants are the least frequent (1 km^2, 0.02 % of the region territory).

All 5 determined degrees of environmental quality are present in the territory of region Trenčín (Environmental Regionalisation of the Slovak Republic, *Bohuš, Klinda et al., 2008*). The largest area is represented by the high quality environment – 2 129 km^2 (47.3 %of the region territory), acceptable environment covers area of 1 244 km^2 (27.6 % of the region territory), moderately deteriorated environment has an area of 808 km^2 (17.9 % of the region territory), deteriorated environment has an area of 250 km^2 (5.6 % of the region territory), highly deteriorated environment has an area of 71 km^2 (1.6 % of the region territory). Highly deteriorated and deteriorated areas are mostly located in vicinity of larger cities or industrial centres as Trenčín, Nové Mesto nad Váhom, Púchov, Považská Bystrica, Prievidza, Nováky. 8 burdened areas were identified in whole territory of the Slovak Republic in the framework of Environmental Regionalisation of the SR in relation to the degrees of environmental quality (*Bohuš, Klinda et al., 2008*). Ponitrianska burdened area with 450 km^2 interfere with the region Trenčín by 49 %, number of inhabitants reaching 272 000.

83 probable contaminated sites, 20 contaminated sites and 34 remediated and 14 rehabilitated sites were recorded in the region Trenčín in the framework of Systematic Identification of Contaminated sites in the Slovak Republic *(Paluchová et al., 2006 – 2008)*. 10 sites with identified contaminated site belong to high risk group (according to the criterion K) and they were proposed for priority removal.

Updating and data completion were performed as well as additional impact assessment of the contaminated sites to the environment in the framework of Regional Studies of Environmental Impacts of the Contaminated sites for Selected Regions *(Helma et al., 2008 – 2010)*. Updated number of the contaminated sites with **83 probable contaminated sites, 22 contaminated sites, 34 remediated and 14 rehabilitated sites** is one of results of the Regional Study of Environmental Impacts of the Contaminated sites for Selected Regions - region Trenčín *(Gregor a kol., 2010)*. 13 sites with contaminated site belong to high risk according to the basic classification (criterion K) at present, 10 out of them belonging among high risk also due to overall assessment of the environmental impacts of the contaminated sites (according to criterion V).

Probable contaminated sites in the region Trenčín (RCS - part A)

9 sites with low risk, 57 sites with moderate risk and 17 sites with high risk were recorded out of total number of 83 **probable contaminated sites in the region Trenčín** on the basis of the overall assessment of environmental impacts of the contaminated sites. The highest number of sites (19) was recorded in districts Ilava and Trenčín, the lowest number in the district Bánovce nad Bebravou (3 sites). App. 58 % of the sites with probable environmental risk are represented by waste handling facilities, especially municipal waste landfills (53 %). They are followed by industrial activity sites with 11 % and prevailing engineering activities. Agricultural activities reached 9 %, with dominating dunghills - 7 %. District Trenčín has the highest number of high risk sites (5).

According to the ranking based on the criterion V, 15 high risk sites are classified out of 20 most risky probable contaminated sites in the region (V > 85 points) and 3 are classified as moderate risk, but closely below the high risk limit (V = 85 points). 11 out of them are considered as priority high risk contaminated sites where environmental contamination should be either confirmed or excluded by additional investigation, and then measures should be implemented in case of contaminated site confirmation towards decrease or even elimination of environmental deterioration or human health damage risk.

Among 83 probable contaminated sites in the region 2 sites are considered as remediated and/or rehabilitated sites. It means that certain remediation and/or rehabilitation activities were already performed in these probable contaminated sites. In the cases when successful remediation and/or rehabilitation was terminated (site without contamination) these sites will not be considered as probable contaminated sites anymore and they will be registered only in RCS - part C.

Number of probable contaminated sites according to level of risk

District	Number	Low risk (K)	Moderate risk (K)	High risk (K)	Low risk (V)	Moderate risk (V)	High risk (V)
Bánovce nad Bebravou	3	0	1	2	0	2	1
Ilava	19	0	15	4	0	16	3
Myjava	6	5	0	1	4	1	1
Nové Mesto nad Váhom	10	1	7	2	1	7	2
Partizánske	4	0	2	2	0	2	2
Považská Bystrica	9	1	8	0	1	8	0
Prievidza	8	2	5	1	2	5	1
Púchov	5	0	5	0	1	4	0
Trenčín	19	0	14	5	1	13	5
Trenčín region	**83**	**9**	**57**	**17**	**10**	**58**	**15**

Legend to the tables:

K – basic (main) risk classification of the contaminated site reflecting risk of contamination spread into ground water and via ground water, risk of volatile and toxic substances for the inhabitants, risk of surface water contamination (K < 35 - low risk classification, K = 35 to 65 – moderate risk classification, K > 65 - high risk classification).

R – complementary risk classification of the contaminated site based on its position in relation to soil, to protected areas, to functional land use, to economical and social land development, to the environmental quality.

V – overall impact (risk) assessment of the contaminated site to the environment V = K+R (V < 50 - low risk classification, V = 50 to 85 – moderate risk classification, V > 85 - high risk classification).

Contaminated sites in the region Trenčín (RCS - part B)

On the basis of overall environmental impact assessment of the contaminated sites (according to criterion V), **1 site with low risk, 11 sites with moderate risk and 10 sites with high risk** out of total number of **22 contaminated site** were recorded in the region Trenčín, with the highest appearance in the Prievidza district (7 sites). No contaminated site was recorded in the district Ilava. Waste handling facilities dominate among all groups of activities with 41 %, especially industrial waste landfills (18 %). They are followed by sites for storage and distribution of goods with 18 %, all of them being fuel tank stations in the region Trenčín. Military bases follow (only bases after former Soviet army and transport (railway depots), having identical 14 %.

According to the ranking based on the criterion V 10 high risk sites are classified out of 20 most risky contaminated sites in the region (V > 85 points) and 10 are classified as moderate risk, however, 2 out of them are classified as moderate risk, but closely below the high risk limit (V = 85 points). First 10 sites are considered as priority high risk contaminated sites that should be removed as soon as possible due to risk for the environment and human population health.

The first two sites with the highest risk according to the overall environmental impact assessment of the contaminated sites (according to criterion V) are the most risky sites also due to the basic classification (according to criterion K) in the region at the same time. In more detailed assessment of risk we evaluated the contaminated sites according to the partial criteria K1+K3 (relation of Cs to water), K2+R5 (relation of CS to human health), R1 (relation of CS to soil), R2 (relation of CS to protected areas), R3+R4 (relation of CS to landscape and socio-economical development), entering the environmental impact assessment of contaminated sites.

Sites *PE (004) B / Bošany - skládka koželužní II, PD (005) B / Nováky NCHZ - areál závodu, PD (016) / B Nováky - výhrevňa*

lokomotív, TN (007) B / Nemšová - vojenský útvar, TN (018) B / Trenčín - ČS PHM Trenčín - Záblatie, BN (003) B / Bánovce nad Bebravou - železničná stanica are in addition to the overall impact assessment also priority high risk ones due to risk for water (ground water and surface water) and human population health. Site *PU (006) B / Púchov - ČS PHM Streženická cesta* is in addition to the overall impact assessment also priority high risk one due to risk for water (ground water as well as surface water) and risk for landscape and socio-economical development. Site *PD (010) B / Prievidza - rušňové depo - nádrže* is in addition to the overall impact assessment also priority high risk one due to risk for human health and landscape and socio-economical development. *PE (001) B / Bošany - skládka koželužní* is in addition to the overall impact assessment also priority high risk one because of risk for human health. *NM (008) B / Nové Mesto nad Váhom - areál vojenského útvaru* is in addition to the overall impact assessment also priority high risk one due to risk for landscape and socio-economical development.

PB (006) B / Považská Bystrica - ČS PHM Slovnaft is classified as moderate risk, it is not a priority one due to the overall impact assessment, but it is a priority high risk site due to human health and landscape and socio-economical development risk. Sites *NM (011) B / Nové Mesto nad Váhom - skládka KO Mnešice - Tušková, PU (004) B / Lednické Rovne - skládka Podstránie* are classified as moderate risk, but they are not priority ones due to the overall impact assessment. They are priority high risk sites only due to risk for water (ground water as well as surface water). *PU (003) B / Lednické Rovne - ČS PHM* is a moderate risk site, but it is not a priority site due to overall impact assessment, however, it is priority high risk site because of soil risk. Sites *MY (006) B / Myjava - skládka galvanických kalov - Holičov vrch, PD (013) B / Zemianske Kostoľany - areál podniku Xella* are moderate risk sites, but they are not priority ones due to overall impact assessment. They are priority high risk sites because of human health risk. *NM (012) B / Stará Turá - areál Chirana, PD (002) B / Bystričany - ENO - dočasné odkalisko, NM (004) B / Lubina - skládka KO Palčekové, PD (014) B / Zemianske Kostoľany - ENO - pôvodné odkalisko* belong to 20 most risky contaminated site sites in the region Trenčín according to the overall impact assessment of the contaminated sites, but they are not priority high risk sites according the above mentioned criteria. Site *NM (012) B / Stará Turá - areál Chirana* is the most risky out of them.

It is obvious from the above text that many of mentioned sites belonging to the top 20 most risky according to the overall environmental impact assessment of the contaminated sites pose also serious risk especially due to threaten of ground water and surface water. Some of these sites are located in the protection zones of natural medicinal waters and in protection zones of water resources. Many sites are in a vicinity of water stream with water management importance, often directly on permeable alluvial sediments.

Site *PD (010) B / Prievidza - rušňové depo - nádrže* is located in protection zone of natural medicinal resource Bojnice. Sites *PU (003) B / Lednické Rovne - ČS PHM*, *NM (011) B / Nové Mesto nad Váhom - skládka KO Mnešice - Tušková, TN (007) B / Nemšová - vojenský útvar* are located in protection zone of water resources. *PE (004) B / Bošany - skládka koželužní II, PD(005) B / Nováky NCHZ - areál závodu, PU(006) B / Púchov - ČS PHM Streženická cesta, PU(004) B / Lednické Rovne - skládka Podstránie, NM(012) B / Stará Turá - areál Chirana*, *TN(007) B / Nemšová - vojenský útvar, PE(001) B / Bošany - skládka koželužní, BN(003) B / Bánovce nad Bebravou - železničná stanica, PD(002) B / Bystričany - ENO - dočasné odkalisko* are located in a vicinity of streams with water management importance. Some of the sites are located in residential areas of municipalities, mostly in industrial zones, some of them being located directly in residential zones or their vicinity. Such sites pose a risk of human health threatening or the can pose a barrier to socio-economical development.

Recognition that 7 sites among the 22 econtaminated sites are at the same time remediated or rehabilitated sites is considered a positive finding. This number comprises 3 sites out of 10 priority high risk ones. It means that remediation and/or rehabilitation works were already performed or are performed at present on app. 32 % (30 % of priority high risk ones) of the contaminated site sites. In the cases of finalisation of demonstrable successful remediation and/or rehabilitation (site without contamination) they will not be considered as contaminated sites and they will be recorded only in RCS - part C.

Number of contaminated sites according to level of risk

District	Number	Low risk (K)	Moderate risk (K)	High risk (K)	Low risk (V)	Moderate risk (V)	High risk (V)
Bánovce nad Bebravou	1	-	-	1	0	0	1
Ilava	-	-	-	-	-	-	-
Myjava	1	-	-	1	0	1	0
Nové Mesto nad Váhom	5	1	3	1	0	4	1
Partizánske	2	-	-	2	0	0	2
Považská Bystrica	1	-	1	-	0	1	0
Prievidza	7	1	3	3	1	3	3
Púchov	3	-	-	3	0	2	1
Trenčín	2	-	-	2	0	0	2
Trenčín region	**22**	**2**	**7**	**13**	**1**	**11**	**10**

The most risky contaminated sites (RCS – part B) in the region

N.	Sites	District	K	R	V
1	***PE (004) B / Bošany - skládka koželužní II***	***Partizánske***	***89***	***21***	***110***
2	***PD (005) B / Nováky NCHZ – areál závodu***	***Prievidza***	***86***	***21***	***107***

N.	Sites	District	K	R	V
3	***PD (016) / B Nováky – výhrevňa lokomotív***	***Prievidza***	***77***	***21***	***98***
4	***PD (010) B / Prievidza - rušňové depo - nádrže***	***Prievidza***	***68***	***30***	***98***
5	***TN (007) B / Nemšová - vojenský útvar***	***Trenčín***	***86***	***12***	***98***
6	***TN (018) B / Trenčín - ČS PHM Trenčín - Záblatie***	***Trenčín***	***78***	***18***	***96***
7	***PE (001) B / Bošany - skládka koželužní***	***Partizánske***	***73***	***21***	***94***
8	***PU (006) B / Púchov - ČS PHM Streženická cesta***	***Púchov***	***75***	***19***	***94***
9	***BN (003) B / Bánovce nad Bebravou - železničná stanica***	***Bánovce nad Bebravou***	***72***	***18***	***90***
10	***NM (008) B / Nové Mesto nad Váhom - areál vojenského útvaru***	***Nové Mesto nad Váhom***	***69***	***19***	***88***
11	MY (006) B / Myjava - skládka galvanických kalov - Holičov vrch	Myjava	75	10	85
12	PU (003) B / Lednické Rovne - ČS PHM	Púchov	67	18	85
13	NM (011) B / Nové Mesto nad Váhom - skládka KO Mnešice - Tušková	Nové Mesto nad Váhom	65	18	83
14	PD (013) B / Zemianske Kostoľany - areál podniku Xella	Prievidza	62	21	83
15	PU (004) B / Lednické Rovne - skládka Podstránie	Púchov	66	16	82
16	NM (012) B / Stará Turá - areál Chirana	Nové Mesto nad Váhom	62	18	80
17	PB (006) B / Považská Bystrica - ČS PHM Slovnaft	Považská Bystrica	55	18	73
18	PD (002) B / Bystričany - ENO – dočasné odkalisko	Prievidza	41	24	65
19	NM (004) B / Lubina - skládka KO Palčekové	Nové Mesto nad Váhom	54	10	64
20	PD (014) B / Zemianske Kostoľany - ENO – pôvodné odkalisko	Prievidza	39	24	63

Legend to the table:

Priority contaminated sites in the region are marked with boldface, high risk contaminated sites are marked with italics

Bošany - skládka koželužní (contaminated site)

Remediated and/or rehabilitated sites in the region Trenčín (RCS - part C)

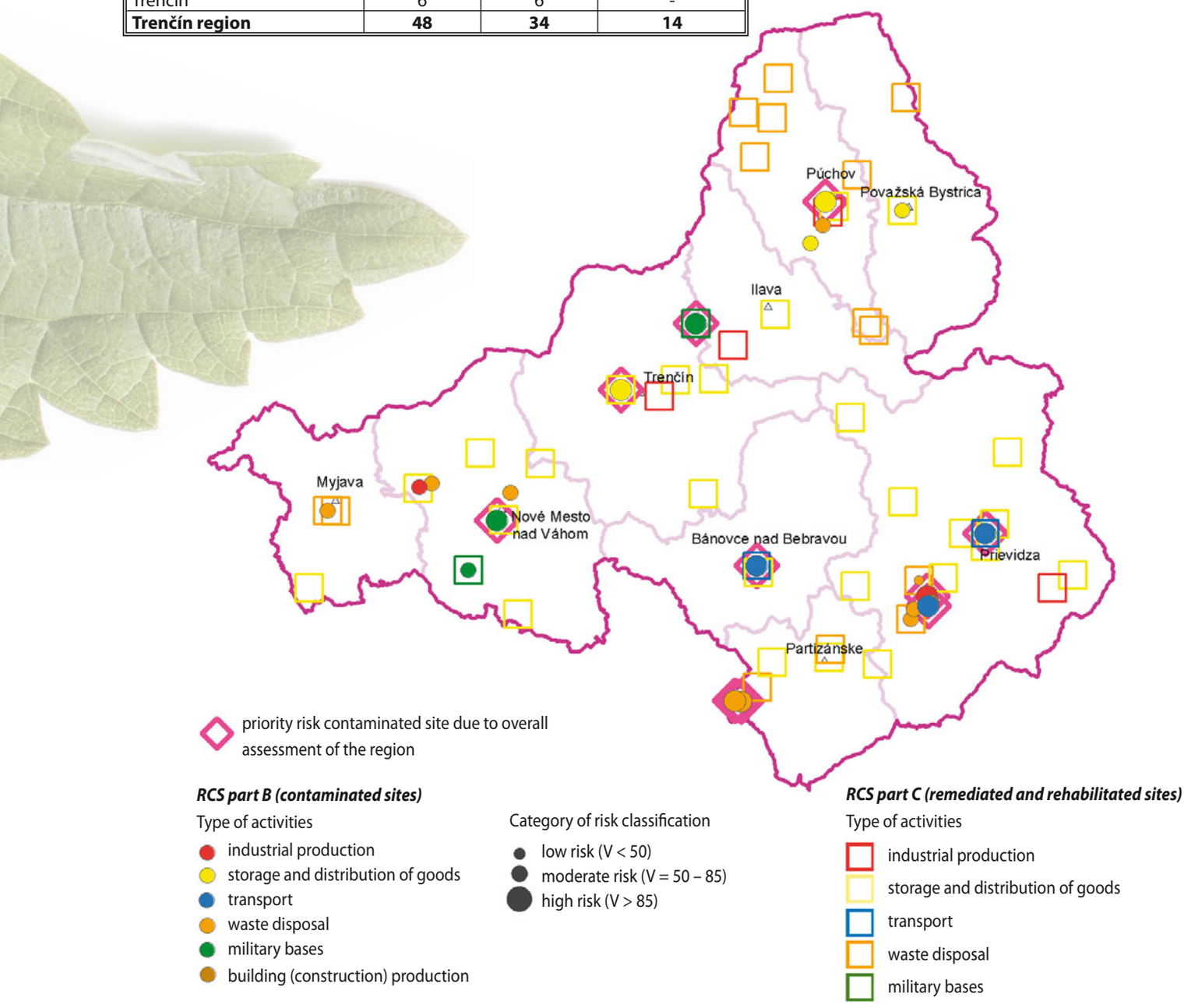
34 sites were remediated and 14 sites rehabilitated out of the total number of 48 recorded sites. The highest number of remediated sites in the region Trenčín was recorded in the district Prievidza (11 sites). The highest number of rehabilitated sites was recorded in the district Púchov (7 sites). Remediation of fuel tank stations dominate from the activity type point of view (54 % sites) and rehabilitation of municipal waste landfills (21 % sites).

28 sites with finalised remediation and/or rehabilitation out of 48 remediated and/or rehabilitated sites are classified only in RCS – part C, demonstrably without contamination. The resting 20 sites do not meet one some of the above defined conditions. They comprise sites with ongoing remediation, eventually with residual contamination, or sites with lack of data on actual contamination situation, some of them are classified also in RCS – part A or RCS – part B. It is necessary to mention in this context that classification of

certain site to RCS - part C did not automatically mean that this particular site was or still is contaminated site, or any indications of contamination exist. It solely means that remediation and/or rehabilitation of this site was or still is performed, or protection element against pollution spread was installed as a minimum requirement (e.g. physical barrier - underground sealing wall). 9 sites out of 48 remediated and/or rehabilitated sites are at the same time considered probable contaminated site (2 sites) or contaminated site (7 sites). 3 remediated sites are priority high risk contaminated sites in parallel: *TN (007) C / Nemšová - vojenský útvar, TN (018) C / Trenčín - ČS PHM Trenčín - Záblatie, BN (003) C / Bánovce nad Bebravou - železničná stanica. NM (003) / Častkovce - areál vojenského závodu Drienka, PB (006) / Považská Bystrica - ČS PHM Slovnaft, PD (002) / Bystričany - ENO - dočasné odkalisko, PD (006) / Nováky - skládka odpadov Brezina* are remediated and/or rehabilitated sites and contaminated sites at the same time. Some of the mentioned sites are under ongoing or not finalised remediation (e.g. consecutive works).

Number of remediated and rehabilitated sites in the region

District	Number	Remediated sites	Rehabilitated sites
Bánovce nad Bebravou	2	2	-
Ilava	2	2	-
Myjava	3	1	2
Nové Mesto nad Váhom	6	6	-
Partizánske	4	3	1
Považská Bystrica	2	1	1
Prievidza	14	11	3
Púchov	9	2	7
Trenčín	6	6	-
Trenčín region	**48**	**34**	**14**



Region Banská Bystrica

Region Banská Bystrica with the total area of 9 455 km^2 (19.28 % of the Slovak Republic territory) is the largest region of the SR. It comprises 13 districts according to the territorial and administrative organisation pursuant to the Act No. 221/1996 of the Slovak Parliament, with district Rimavská Sobota (1 471 km^2) being the largest and district Banská Štiavnica (292 km^2) the smallest one. Other districts are follows: Banská Bystrica, Brezno, Detva, Krupina, Lučenec, Poltár, Revúca, Veľký Krtíš, Zvolen, Žarnovica, Žiar nad Hronom. Region Banská Bystrica comprises totally 516 municipalities, 24 among them have the status of a town. 653 697 inhabitants live in the Region Banská Bystrica (as of December 31st, 2008), this number represents 12 % of the total SR population.

Several large-scale protected areas interfere with the territory of region Banská Bystrica. Their total area reaches app. 2 465 km^2 - app. 26 % of the region territory. Five national parks are comprised (NP): NP Nízke Tatry, NP Veľká Fatra, NP Slovenský kras, NP Muránska planina, NP Slovenský raj, as well as four protected landscape areas (PLA), namely PLA Ponitrie, PLA Poľana, PLA Cerová vrchovina and PLA Štiavnické vrchy. 218 small-scale protected areas are present in the territory of region Banská Bystrica, 34 among them are national natural reserves (NNR), 87 natural reserves (NR), 10 national natural monuments (NNM), 51 natural monuments (NM) and 36 protected areas (PA). Small-scale protected areas totally occupy the area of 129 km^2 (1.4 % of the region territory).

Special protection areas (SPA) and special areas of conservation (SAC) belonging to the NATURA 2000 system represent a specific type of protection. They overlap with the national network of protected areas to a substantial extent. 83 special areas of conservation and 7 special protected areas interfere with the region Banská Bystrica territory. Total area of SAC reaches 1 211 km^2 (12.81 % of the region territory) and area of SPA is 1 507 km^2 (15.9 % of the region territory). Only one Ramsar Convention site is present in the territory of region Banská Bystrica – Poiplie, 3 km^2 of which is laying in the region Banská Bystrica.

6 protected areas of natural water accumulation - protected water management areas (PWMA), interfere with territory of the region Banská Bystrica: PWMA Veľká Fatra, PWMA Nízke Tatry – east, PWMA Nízke Tatry – west, PWMA Upper Basin of Rivers Ipeľ, Rimavica and Slatina, PWMA Muránska planina, PWMA Upper Basin of River Hnilec. They altogether cover the area of app. 1 221 km^2 (12.9 % of the region territory).

Protection zone of 10 natural medicinal springs and natural springs of mineral table waters lay in the territory of region Banská Bystrica. Namely, protection zones of natural springs of mineral table waters Čačín, Klokoč, Tornaľa, Maštinec, Fiľakovo, protection zones of natural medicinal springs Brusno, Číž, Kováčová and Sliač, Sklené Teplice, protection zones of natural medicinal springs and natural springs of mineral table waters Dudince and Slatina. They together cover the area of 479 km^2 (5.1 % of the region territory). 6 spa towns and spa areas are located in the territory of the region Banská Bystrica (Brusno, Číž, Dudince, Kováčová, Sklené Teplice, Sliač) with total area of 110 km^2 (1.2 % of the region territory). Protection zones for water supplies of ground water and surface water resources are determined for majority of water resources exploited as public supplies by the network of water works (springs, water reservoirs, sampling of the surface water streams). Recorded protection zones of the water resources (according to the data from Water Research Institute) in the region Banská Bystrica cover the total area of 860 km^2 (9.1 % of the region territory). Basins of 15 water supply streams interfere with the territory of the region Banská Bystrica (Kamenistý potok, Osrblianka, Vajskovský potok, Jaseniansky, Slatina, Hučava, Smrečník, Vydričný potok, Prochotský potok, Vyhniansky potok, Starohutský potok, Ipeľ, Litava, Klenovská Rimava, Kokavka), total area of which covers 658 km^2 (7.0 % of the region territory), and 129 water streams with water management importance. Total length of the streams with water management importance interfere with the territory of the region Banská Bystrica is 2 190 km.

21 monumental zones are present in the region Banská Bystrica (Babiná, Brezno, Čelovce, Dobrá Niva, Heľpa, Hodruša-Hámre, Horné Plachtince, Jelšava, Kremnica-banské diela, Kremnické Bane, Krupina, Lučenec, Nová Baňa, Polichno, Pavlovce, Ratková, Rimavská Sobota, Rimavské Janovce, Sirk – Železník, Šimonovce, Zvolen) with total area of 5.1 km^2 and 6 monumental reserves (Banská Bystrica, Banská Štiavnica, Kremnica, Sebechleby, Špania Dolina, Štiavnické Bane) with total area of 8 km^2.

The total area of agricultural soil in the region Banská Bystrica (with determined soil quality) is app. 4 460 km^2 (47.2 % of the region territory). Among the 9 soil quality groups determined for SR only quality group 1 is not present in the region Banská Bystrica. The highest proportion of the agricultural soil (with information on its quality) is present in district Veľký Krtíš (65.2 % of the district territory), the lowest is in district (30.4 % of the district territory). Soils from quality groups 5 to 9 are present in all districts of the region. Soils from the quality group 6 are the most frequent (1 335 km^2) and 9 (1 337 km^2), each of them being spread on the area of app. 14.1 % of the region territory. Quality group 2 is present only in districts Krupina and Žarnovica with minimal proportion (4 km^2, 0.04 % of the region territory). Quality group 3 is only in districts Krupina, Žarnovica a Rimavská Sobota, quality group 4 is in districts Krupina, Žarnovica and Rimavská Sobota, Banská Bystrica, Lučenec, Revúca and Veľký Krtíš. The level of inactivation of contaminants (ability of soil to inactivate contaminants) was - equally as soil quality groups - investigated only in the areas with agricultural soils. Soils with all 5 degrees of inactivation of contaminants are present in the region Banská Bystrica (very low, low, moderate, high, very high). Soils with moderate inactivation degree are most frequent (1 766 km^2, 18.7 % of the region territory) and low inactivation degree (1 650 km^2, 17.5 % of the region territory). Soils with very high degree of inactivation of contaminants are the least frequent (23 km^2, 0.2 % of the region territory).

All 5 determined degrees of environmental quality are present in the territory of region Banská Bystrica (Environmental Regionalisation of the Slovak Republic, *Bohuš, Klinda et al., 2008*). The largest area is represented by the high quality environment – 4 374 km^2 (46.3 % of the region territory), acceptable environment covers in area of 2 791 km^2 (29.5 % of the region territory), moderately deteriorated environment has an area of 1 600 km^2 (16.9 % of the region territory), deteriorated environment has an area of 572 km^2 (6.1 % of the region territory), highly deteriorated environment has an area of 117 km^2 (1.2 % of the region territory). Highly deteriorated and deteriorated areas are mostly located in vicinity of larger cities or industrial centres as Banská Bystrica, Zvolen, Žiar nad Hronom, Žarnovica, Nová Baňa, Revúca, Jelšava. Deteriorated evironment was also identified in the vicinity of Brezno, Lučenec, Rimavská Sobota, Poltár, Hnúšťa.

8 burdened areas were identified in whole territory of the Slovak Republic in the framework of Environmental Regionalisation of the SR in relation to the degrees of environmental quality (*Bohuš, Klinda et al., 2008*). Two of them, Pohronská and Jelšavskolubenícka burdened areas belong by 100 % to the territory of the region Banská Bystrica. Pohronská burdened area has an area of 203 km^2 and population around 186 000 inhabitants. Jelšavsko-lubenícka burdened area has an area of 137 km^2 and population around 21 000 inhabitants.

106 probable contaminated sites, 44 contaminated sites and 57 remediated and 34 rehabilitated sites were recorded in the region Banská Bystrica in the framework of Systematic Identification of Contaminated Sites in the Slovak Republic *(Paluchová et al., 2006 – 2008).* 19 sites with identified contaminated site belong to high risk group (according to the criterion K) and they were proposed for priority removal.

Updating and data completion were performed as well as additional impact assessment of the contaminated sites to the environment in the framework of Regional Studies of Environmental Impacts of the Contaminated Sites for Selected Regions *(Helma et al., 2008 – 2010).* Updated number of the contaminated sites with **120 sites identified probable contaminated sites, 43 contaminated sites, 59 remediated and 34 rehabilitated sites** is one of results of the Regional Study of Environmental Impacts of the Contaminated Sites for Selected Regions - region Banská Bystrica *(Helma et al., 2010).* 21 sites with contaminated site belong to high risk according to the basic classification (criterion K) at present, 17 out of them belonging among high risk also due to overall assessment of the environmental impacts of the contaminated sites (according to criterion V).

Probable contaminated sites in the region Banská Bystrica (RCS - part A)

29 sites with low risk, 75 sites with moderate risk and 16 sites with high risk were recorded out of total number of **120 probable contaminated site** in the region Banská Bystrica on the basis of the overall assessment of environmental impacts of the contaminated sites. The highest number of sites (15) was recorded in districts Brezno, Rimavská Sobota, Žarnovica, the lowest number in district Detva (3 sites). App. 38 % of the sites with probable environmental risk are represented by waste landfills, followed by sites with agricultural activities with 21 %, sites with industrial activities 14 % and ore mining 13 %. District Žarnovica has the highest number of high risk sites.

According to the ranking based on the criterion V, 16 high risk sites are classified out of 20 most risky probable contaminated sites in the region (V > 85 points) and 4 are classified as moderate risk, but closely below the high risk limit (V = 83 to 85 points). 11 out of them are considered as priority high risk contaminated sites where environmental contamination should be either confirmed or excluded by additional investigation, and then measures should be implemented in case of contaminated site confirmation towards decrease or even elimination of environmental deterioration or human health damage risk.

Among 120 probable contaminated sites 2 sites are considered as remediated and/or rehabilitated sites. It means that certain remediation and/or rehabilitation activities were already performed in these probable contaminated sites. In the cases when successful remediation and/or rehabilitation was terminated (site without contamination) these sites will not be considered as probable contaminated sites any more and they will be registered only in RCS - part C.

Number of probable contaminated sites according to level of risk

District	Number	Low risk (K)	Moderate risk (K)	High risk (K)	Low risk (V)	Moderate risk (V)	High risk (V)
B. Bystrica	13	2	11	0	2	11	0
B. Štiavnica	7	2	5	0	1	6	0
Brezno	15	5	9	1	4	10	1
Detva	3	1	2	0	1	2	0
Krupina	5	1	2	2	1	2	2
Lučenec	8	5	3	0	4	4	0
Poltár	4	0	3	1	0	3	1
Revúca	6	0	5	1	0	3	3
R. Sobota	15	4	9	2	4	9	2
V. Krtíš	9	4	4	1	5	4	0
Zvolen	8	0	7	1	2	5	1
Žarnovica	15	1	11	3	1	8	6
Žiar n. Hron.	12	4	8	0	4	8	0
Banská Bystrica region	**120**	**29**	**80**	**11**	**29**	**75**	**16**

Legend to the tables:

K – basic (main) risk classification of the contaminated site reflecting risk of contamination spread into ground water and via ground water, risk of volatile and toxic substances for the inhabitants, risk of surface water contamination (K < 35 - low risk classification, K = 35 to 65 – moderate risk classification, K > 65 - high risk classification).

R – complementary risk classification of the contaminated site based on its position in relation to soil, to protected areas, to functional land use, to economical and social land development, to the environmental quality.

V – overall impact (risk) assessment of the contaminated site to the environment V = K+R (V < 50 - low risk classification, V = 50 to 85 – moderate risk classification, V > 85 - high risk classification).

Utekáč – sklárne Clara (probably contaminated site)

Contaminated sites in the region Banská Bystrica (RCS - part B)

On the basis of overall environmental impact assessment of the contaminated sites (according to criterion V), **26 sites with moderate risk and 17 sites with high risk** out of total number of **43 contaminated sites** were recorded in the region Banská Bystrica, with the highest appearance in the Zvolen district. **Low risk site was not recorded**. No site with contaminated site was recorded in district Veľký Krtíš. Industrial production dominates as a reason among all contaminated sites in the region with 33 %, then waste landfills and military areas reaching 19 % each. Among 20 most risky contaminated sites in the region, according to the ranking of criterion V, 17 are classified as high risk sites (V > 85 points) and 3 as moderate risk but closely below the high risk limit (V = 85 points). 12 of the latter sites are considered as priority high risk contaminated sites that should be addressed as soon as possible due to risk of environmental deterioration and human health threatening.

The first three sites with the highest risk according to the overall environmental impact assessment of the contaminated sites (following criterion V) in the region are also most risky sites from the basic risk classification point of view (following criterion K). In more detailed assessment of risk we evaluated the contaminated sites according to the partial criteria K1+K3 (relation of CS to water), K2+R5 (relation of CS to human health), R1 (relation of CS to soil), R2 (relation of CS to protected areas), R3+R4 (relation of CS to landscape and socio-economical development), entering the environmental impact assessment of contaminated sites. Sites *ZC (005) B / Hronský Beňadik - terminál Slovnaft, DT (006) B / Stožok - terminál Slovnaft, ZH (016) B / Žiar nad Hronom - ZSNP - areál skupiny spoločností* are in addition to the overall impact assessment also priority high risk sites from the water pollution potential point of view (ground water as well as surface water) and human health. Moreover, sites *ZH (011) B / Žiar nad Hronom - kalové pole ZSNP, ZV (007) B / Sliač - letisko - juh, ZV (009) B / Sliač - letisko - sever II* are priority high risk sites from the point of view of water protection view (ground water as well as surface water) and human health. Site *BR (011) B / Pohorelá - Strojsmalt Holding* is a priority high risk site not only due to the overall assessment but also thank to soil and protected areas threatening. Site *RS (015) B / Rimavská Sobota - objekty SA* is a priority high risk site not only due to the overall assessment but also due to health risk threatening and from the landscape and socio-economical development point of view. Sites *ZV (011) B / Zvolen - Bučina - čierna impregnácia, BB (006) B / Banská Bystrica - Uľanka - areál Chemika a.s., DT (003) B / Hriňová - ZŤS Hriňová* are a priority high risk sites not only due to the overall assessment but also due to threatening water (ground water as well as surface water. Site *BR (003) B / Brezno - ŽSR Brezno* is priority high risk site due to the overall assessment, however, as regards the partial criteria there is not so remarkable risky in the regional scale. Among the sites that reached 85 to 96 points in the framework of the overall assessment of the contaminated sites, three are high risk priority burdens due to human health risk (*RS (014) B / Rimavská Sobota - areál Slovenských cukrovarov, ZV (014) B / Zvolen - Železničné opravovne a strojárne, BR (009) B / Nemecká - Petrochema Dubová*). It is obvious from the above information that most of the mentioned sites not only belong to 20 most risky sites due to the overall environmental risk assessment of the contaminated sites, but they also pose a serious risk for the region because they threaten ground water and surface water quality. Many of them are located in protection zones of natural medicinal springs and natural springs of mineral waters, in protected water management areas, in a vicinity of important water streams, often directly on their permeable alluvial sediments. Sites *BB (006) B / Banská Bystrica - Uľanka - areál Chemika a. s., BR (015) B / Predajná - skládka PO Predajná I, BR (016) B / Predajná - skládka PO Predajná II* are located in protected water management area. Sites *ZH (016) B / Žiar nad Hronom - ZSNP - areál skupiny spoločností, ZH (011) B / Žiar nad Hronom - kalové pole ZSNP, ZV (007) B / Sliač - letisko - juh, ZV (009) B / Sliač - letisko - sever II* are located in protected zones

of natural medicinal springs. Up to 17 out of 20 most risky sites in the region (except sites in Predajná and Detva) are close to the water stream with water management importance. Some of the sites are located in residential areas of the municipalities, mostly in industrial areas, some of them directly in residential areas or their vicinity. Such sites pose risk for human population health or they can represent a barrier of the socio-economical development.

Recognition that 19 sites among the 43 contaminated sites are at the same time remediated and/or rehabilitated sites is considered as positive finding. Among 12 priority high risk sites this finding concerns 7 sites. It means that remediation and/or rehabilitation works were already performed or are performed at present on 44 % of the contaminated sites (58 % of high risk priority ones). In the cases of finalisation of demonstrable successful remediation and/or rehabilitation (site without contamination) they will not be considered as contaminated sites and they will be recorded only in RCS - part C.

Number of contaminated sites according to level of risk

District	Number	Low risk (K)	Moderate risk (K)	High risk (K)	Low risk (V)	Moderate risk (V)	High risk (V)
B. Bystrica	6	0	5	1	0	5	1
B. Štiavnica	3	1	2	0	0	3	0
Brezno	6	0	1	5	0	3	3
Detva	3	0	0	3	0	1	2
Krupina	1	0	1	0	0	1	0
Lučenec	2	0	2	0	0	2	0
Poltár	1	0	1	0	0	1	0
Revúca	1	1	0	0	0	1	0
R. Sobota	5	0	3	2	0	3	2
V. Krtíš	0	0	0	0	0	0	0
Zvolen	9	0	2	7	0	3	6
Žarnovica	1	0	0	1	0	0	1
Žiar n. Hron.	5	0	3	2	0	3	2
Banská Bystrica region	**43**	**2**	**20**	**21**	**0**	**26**	**17**

The most risky contaminated sites (RCS – part B) in the region

N.	Sites	District	K	R	V
1	***ZC (005) B / Hronský Beňadik - terminál Slovnaft***	***Žarnovica***	***94***	***24***	***118***
2	***DT (006) B / Stožok - terminál Slovnaft***	***Detva***	***95***	***19***	***114***
3	***ZH (016) B / Žiar nad Hronom - ZSNP - areál skupiny spoločností***	***Žiar nad Hronom***	***97***	***15***	***112***
4	***ZH (011) B / Žiar nad Hronom - kalové pole ZSNP***	***Žiar nad Hronom***	***87***	***24***	***111***
5	***ZV (011) B / Zvolen - Bučina - čierna impregnácia***	***Zvolen***	***89***	***21***	***110***
6	***BB (006) B / Banská Bystrica - Uľanka - areál Chemika a.s.***	***Banská Bystrica***	***83***	***24***	***107***
7	***ZV (007) B / Sliač - letisko - juh***	***Zvolen***	***93***	***12***	***105***
8	***BR (011) B / Pohorelá - Strojsmalt Holding***	***Brezno***	***79***	***24***	***103***
9	***ZV (009) B / Sliač - letisko - sever II***	***Zvolen***	***90***	***12***	***102***
10	***BR (003) B / Brezno - ŽSR Brezno***	***Brezno***	***78***	***21***	***99***
11	***DT (003) B / Hriňová - ZŤS Hriňová***	***Detva***	***81***	***18***	***99***
12	***RS (015) B / Rimavská Sobota - objekty SA***	***Rimavská Sobota***	***78***	***21***	***99***
13	*RS (014) B / Rimavská Sobota - areál Slovenských cukrovarov*	*Rimavská Sobota*	*72*	*24*	*96*
14	*ZV (010) B / Zvolen - Bučina - biela impregnácia*	*Zvolen*	*74*	*21*	*95*
15	*ZV (014) B / Zvolen - Železničné opravovne a strojárne*	*Zvolen*	*74*	*21*	*95*
16	*BR (009) B / Nemecká - Petrochema Dubová*	*Brezno*	*73*	*16*	*89*
17	*ZV (012) B / Zvolen - Bučina - stará depónia*	*Zvolen*	*66*	*21*	*87*
18	BR (015) B / Predajná - skládka PO Predajná I	Brezno	69	16	85
19	BR (016) B / Predajná - skládka PO Predajná II	Brezno	69	16	85
20	DT (001) B / Detva - PPS Group	Detva	72	13	85

Legend to the table:

Priority contaminated sites in the region are marked with boldface, high risk contaminated sites are marked with italics.

Remediated and/or rehabilitated sites in the region Banská Bystrica (RCS - part C)

59 sites were remediated and 34 sites rehabilitated out of the total number of 93 recorded sites. The highest recorded number of remediated sites in the region Banská Bystrica was in districts Zvolen and Rimavská Sobota, where fuel tank stations prevailed. Most rehabilitated sites were identified in districts Brezno and Banská Bystrica, where municipal waste landfills remediation dominated.

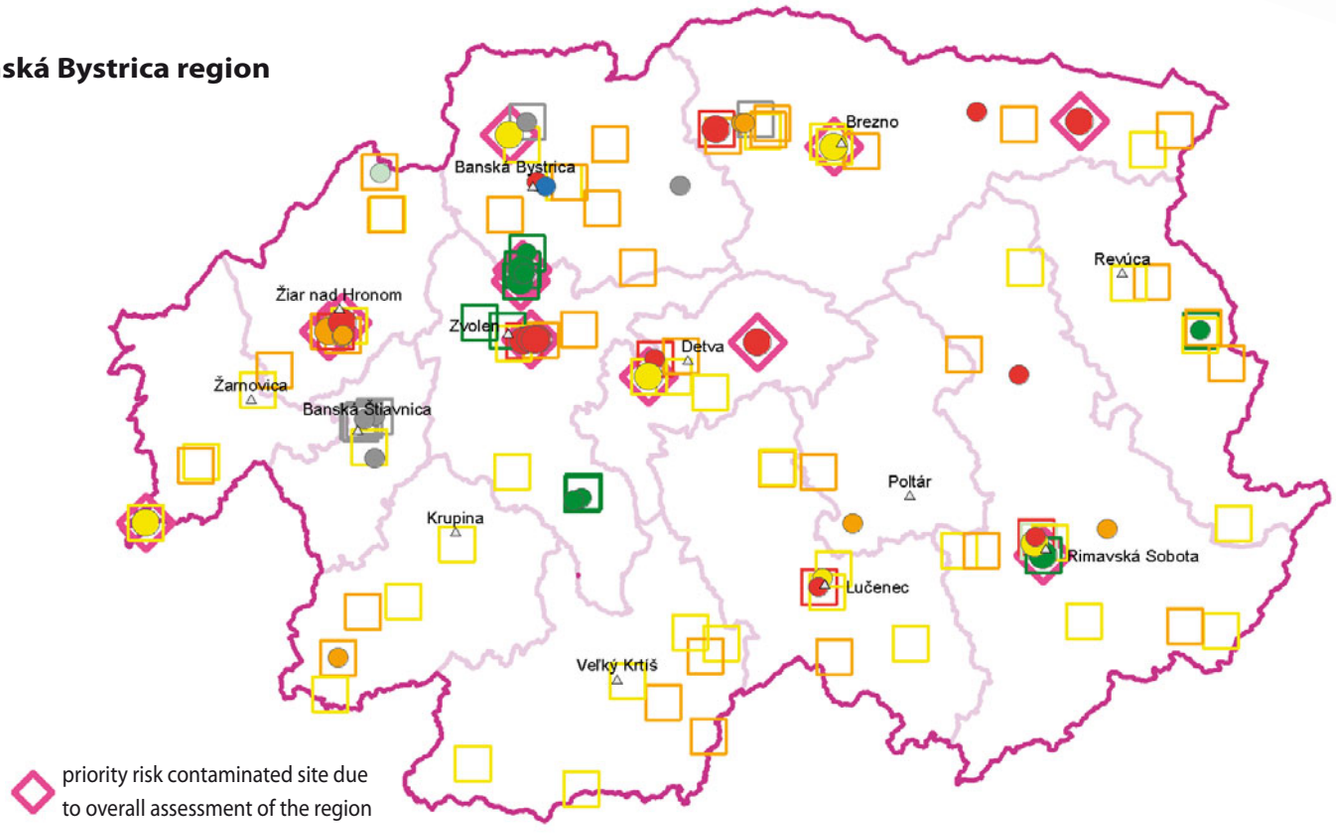
44 sites with finalised remediation and/or rehabilitation out of 93 remediated and/or rehabilitated sites are classified only in RCS – part C, demonstrably without contamination. The resting 49 sites do not meet one some of the above defined conditions. They comprise sites with ongoing remediation, eventually with residual contamination, or sites with lack of data on actual contamination situation, some of them are classified also in RCS – part A or RCS – part B. It is necessary to mention in this context that classification of certain site to RCS - part C did not automatically mean that this particular site was or still is a contaminated site, or any indications of contamination exist. It solely means that remediation and/or rehabilitation of this site was or still is performed, or protection element against pollution spread was installed as a minimum requirement (e.g. physical barrier

- underground sealing wall). 21 sites out of 93 remediated or recovered sites are at the same time considered probable contaminated sites (2 sites) or contaminated site (19 sites). 7 remediated sites are at the same time priority high risk contaminated site: *ZC (005) C / Hronský Beňadik - terminál Slovnaft, DT (006) C / Stožok - terminál Slovnaft ZH (011) C / Žiar nad Hronom - kalové pole ZSNP, ZV (007) C / Sliač - letisko - juh, ZV (009) C / Sliač - letisko - sever II, BR (003) C / Brezno - ŽSR Brezno, RS (015) C / Rimavská Sobota - objekty SA*. In addition to the above mentioned sites *ZV (014) C / Zvolen - Železničné opravovne a strojárne, BR (009) C / Nemecká - Petrochema Dubová* are also remediated and concurrently high risk contaminated sites. The 20 most risky sites in the region are remediated site and contaminated site too: *DT (001) B / Detva - PPS Group*. Most of the mentioned sites are under ongoing or not finalised remediation (e.g. consecutive works).

Number of remediated and rehabilitated sites in the region

District	Number	Remediated sites	Rehabilitated sites
Banská Bystrica	9	4	5
Banská Štiavnica	5	3	2
Brezno	12	6	6
Detva	5	4	1
Krupina	5	3	2
Lučenec	7	6	1
Poltár	2	0	2
Revúca	7	4	3
Rimavská Sobota	10	8	2
Veľký Krtíš	8	5	3
Zvolen	11	9	2
Žarnovica	4	3	1
Žiar nad Hronom	8	4	4
Banská Bystrica region	**93**	**59**	**34**

Banská Bystrica region



priority risk contaminated site due to overall assessment of the region

RCS part B (contaminated sites)

Type of activities

- agricultural production
- industrial production
- storage and distribution of goods
- transport
- waste disposal
- military bases
- mining

Category of risk classification

- moderate risk (V = 50 – 85)
- high risk (V > 85)

RCS part C (remediated and rehabilitated sites)

Type of activities

- agricultural production
- industrial production
- storage and distribution of goods
- waste disposal
- military bases
- mining

Region Žilina

Region Žilina with the total area of 6 809 km^2 (13.88 % of the SR territory) is the third largest region of the SR. According to the territorial and administrative organisation pursuant to the Act No. 221/1996 Coll. of the Slovak Parliament the region Žilina comprises 11 districts, Liptovský Mikuláš district (1 341 km2) being the largest and Kysucké Nové Mesto (173.7 km^2) the smallest one. Other districts are as folows: Bytča, Čadca, Dolný Kubín, Námestovo, Martin, Ružomberok, Tvrdošín, Turčianske Teplice and Žilina. Totally 315 municipalities are located in the region Žilina, 18 out of them having the status of a town. 695 698 inhabitants live in the region Žilina (as of December 31st, 2008) making 12.9 % out of the total Slovakia citizens.

The Žilina region territory is a region with the highest density of protected areas in Slovakia. Protected areas cover 3 748 km^2 out of the total region area of 6 788 km^2, i.e. 55.2 %. Large-scale protected areas, i.e. national parks (NP) including their protection zones cover 35.4 % and protected landscape areas cover (PLA) 19.1 % of the region territory. NP comprise NP Malá Fatra, NP Nízke Tatry, Tatranský NP, NP Veľká Fatra, PLA comprise: PLA Kysuce, PLA Horná Orava and PLA Strážovské vrchy. 169 small-scale protected areas in the region Žilina cover totally 299 km^2, with 36 natural reserves (NR), 57 national natural reserves (NNR), 38 natural reserves (NR), 18 national natural monuments (NNM) and 18 protected areas (PA).

Special protection areas (SPA) and special areas of conservation (SAC) belonging to the NATURA 2000 system represent a specific types of protection. They overlap with the national network of protected areas to substantial extent. Only one special protection area was declared in the region Žilina territory, namely SPA Horná Orava, additional SPAs in the region Žilina are Nízke Tatry, Tatry, Malá Fatra, Veľká Fatra, Strážovské vrchy. Wetlands Mokrade Turca, wetlands Mokrade Oravskej kotliny, River Orava and its tributaries, caves Demänovské jaskyne are enlisted among Ramsar Convention sites in the region Žilina.

The most important tributaries of river Váh in the region Žilina are right bank tributaries Kysuca, Orava, Belá and left bank tributaries Rajčianka, Turiec, and in the central and eastern part of the region Ľupčianka, Štiavnica and Ľubochnianka. 4 protected water management areas are declared in the region Žilina (PWMA) with total area of 2 732 km^2 (40.1 % of the region territory). Namely, PWMA Beskydy - Javorníky, PWMA Stražovské vrchy, PWMA Veľká Fatra and PWMA Nízke Tatry - east.

The following water resources have declared protection zones in the region Žilina at present: Budiš, Záturčie - Fatra, Korytnica a Kláštor pod Znievom. Protection zones of the natural resources of mineral table waters were defined for Budiš, Záturčie - Fatra, Korytnica and Kláštor pod Znievom. Protection zones for natural medicinal waters are defined for Kláštor pod Znievom and Socovce**,** Korytnica**,** Budiš. Protection zones for natural medicinal waters and natural resources of mineral table waters are defined for Kláštor pod Znievom and Socovce**,** Budiš. Altogether, they cover an area of 367 km^2 (5.4 % of the region territory). Protection zones (OP) of the ground water and surface water resources are defined for most of water resources that are use as public water supplies by the network of water companies (springs, water reservoirs, sampling of surface streams). Recorded protection zones of the water resources (according to the data from Water Research Institute) in the region Žilina cover the total area of 1 078 km^2 (15.8 % of the region territory). 21 river basins of water importance streams interfere with in the region Žilina territory (Ipeltica, Demänovka, Ľubochnianka, Nová rieka, Riečka, Mútnianka, Polhoranka, Studený potok, Turiec, Pivovarský potok, Kysuca, Stankovský potok, Oščadnica, Bystrica, Klubínský potok, Petrovička, Štiavnik, Tužina, Nitrica, Vajskovský potok and Jaseniánsky potok), majority of them being located in the districts Liptovský Mikuláš (6) and Čadca (5). The total area of them covers 734 km^2 (10.8 % of the region territory). No water importance streams are present in the districts Žilina, Kysucké Nové Mesto and Dolný Kubín. There are 193 streams with water management importance. Two water reservoirs are located in the region Žilina at present - Nová Bystrica in the district Čadca and Turček in the district Turčianske Teplice. Total length of the streams with water management importance interfere with the territory of region Žilina is 1 584 km.

5 spa sites are present in the region Žilina: Rajecké Teplice, Kunerád, Turčianske Teplice, Korytnica and Lúčky. Spa areas in the framework of the region Žilina are as follows: Rajecké Teplice, Kunerád, Turčianske Teplice, Korytnica, Lúčky, Liptovský Ján and Vysoké Tatry.

Two monumental reserves are located in the region Žilina (Ružomberok - Vlkolínec a Žilina) and 18 monumental zones (Bytča, Klokočov - Do Kršle, Oravský Podzámok, Kysucké Nové Mesto, Hybe, Liptovský Hrádok, Liptovský Ján, Liptovský Mikuláš, Nižná Boca, Partizánska Lupča, Východná, Kláštor Pod Znievom, Martin, Ružomberok, Stankovany - Podšíp, Trstená, Tvrdošín, Rajec).

Total area of agricultural soil in the region Žilina (with determined soil quality) is app. 2 731 km^2 (40.1 % of the region territory). Groups 1 - 3 of the soil quality groups determined for SR are not represented in the region Žilina. The highest proportion of the agricultural soil (with information on its quality) is present in the district Dolný Kubín (51.1 % of the region territory), the lowest proportion on the district Ružomberok (31.7 % of the region territory). Soils from quality groups 6 to 9 are present in all districts of the region. Soils from the quality group 9 (1 311 km^2) are the most frequent, covering an area of app. 19.3 % of the region territory. Quality group 4 is present in the districts Martin and Turčianske Teplice and it covers only 2.32 km^2 (0.03 % of the region territory). Quality group 5 is present in all districts of the region Žilina except of district Námestovo. The level of inactivation of contaminants (ability of soil to inactivate contaminants) was detected also out of the areas with agricultural soil. Soils with all 5 degrees of inactivation of contaminants are present in the region Žilina (very low, low, moderate, high, very high). Soils with low inactivation degree are most frequent (2 141 km^2, 31.4 % of the region territory). Soils with very high degree of inactivation of contaminants are the least frequent (0.1 km^2, 0.001 % of the region territory).

4 out of the 5 determined degrees of environmental quality are present in the territory of the region Žilina (Environmental Regionalisation of the Slovak Republic, *Bohuš, Klinda et al., 2008*). High quality environment has the largest area 5 494 km^2 (80.7 % of the region territory), acceptable environment covers 735 km^2 (10.8 % of the region territory), moderately deteriorated environment covers an area of 442 km^2 (6.5 % of the region territory) and deteriorated environment covers an area of 116 km^2 (1.7 % of the region territory). Highly deteriorated environment was not recorded in the region Žilina. Deteriorated environment is located mostly in vicinity of larger cities or industrial areas as Žilina, Liptovský Mikuláš, Martin and Ružomberok.

8 burdened areas were identified in whole territory of the Slovak Republic in the framework of Environmental Regionalisation of the SR in relation to the degrees of environmental quality (*Bohuš, Klinda et al., 2008*). None of burdened areas interfere with the territory of Žilina region.

117 probable contaminated sites, 31 contaminated sites and 36 remediated and 34 rehabilitated mediated sites were recorded in the region Žilina in the framework of Systematic Identification of Contaminated sites in the Slovak Republic *(Paluchová et al., 2006 – 2008)*. 18 sites with identified contaminated site belong to high risk group (according to the criterion K) and they were proposed for priority removal.

Updating and data completion were performed as well as additional impact assessment of the contaminated sites to the environment in the

framework of Regional Studies of Environmental Impacts of the Contaminated sites for Selected Regions *(Helma et al., 2008 – 2010)*. Updated number of the contaminated sites with **120 probable contaminated sites, 31 contaminated sites, 36 remediated and 34 rehabilitated sites** recorded in region Žilina is one of results of the Regional Study of Environmental Impacts of the Contaminated sites for Selected Regions - region Žilina *(Výboch et al., 2010)*. 18 sites with contaminated site belong to high risk according to the basic classification (criterion K) at present and 13 sites out of them belong to high risk also due to overall assessment of the environmental impacts of the contaminated sites (according to criterion V).

Probable contaminated sites in the region Žilina (RCS - part A)

9 sites with low risk, 88 sites with moderate risk and 23 sites with high risk were recorded out of total number of **120 sites with probable contaminated sites in the region Žilina** on the basis of the overall assessment of environmental impacts of the contaminated sites (according to criterion V). The highest number of sites (32) was recorded in the district Liptovský Mikuláš, no one was recorded in the district Turčianske Teplice. The highest number of probable high risk sites is present in the district Čadca (6).

According to the groups of activities facilities for waste handling prevailed in the region Žilina - 75 sites (63 %) and industrial production - 14 sites (12 %), and in its framework engineering production dominated according to the activity specification - 7 sites. 10 sites (8 %) belonged to the group of activities storage and distribution of goods, where 6 sites were fuel tank stations according to the activity specification.

According to the ranking based on the criterion V, all 20 sites are classified as high risk sites out of 20 most risky probable contaminated sites in the region (V > 85 points). 12 sites out of them we consider as priority high risk probable contaminated sites where additional investigation should confirm or exclude environmental contamination, and further in case of conformation of contaminated site measures should be implemented in order to decrease or to eliminate risk of environmental deterioration or human population health threatening.

20 out of 120 sites with probable contaminated site belong at the same time to remediated and/or rehabilitated sites. It means that certain remediation and/or rehabilitation activities were already performed in case of contaminated sites. In the cases of finalisation of demonstrable successful remediation and/or rehabilitation (site without contamination) they will not be considered as probable contaminated sites and they will be recorded only in RCS - part C.

Kráľová Lehota – skládka (probable contaminated site)

Number of probable contaminated sites according to level of risk

District	Number	Low risk (K)	Moderate risk (K)	High risk (K)	Low risk (V)	Moderate risk (V)	High risk (V)
Bytča	20	0	13	7	0	16	4
Čadca	11	0	2	9	0	5	6
Dolný Kubín	3	0	2	1	0	3	0
Kysucké Nové Mesto	7	0	3	4	0	3	4
Liptovský Mikuláš	32	1	26	5	1	27	4
Martin	6	2	4	0	2	4	0
Námestovo	3	0	3	0	0	3	0

District	Number	Low risk (K)	Moderate risk (K)	High risk (K)	Low risk (V)	Moderate risk (V)	High risk (V)
Ružomberok	16	3	10	3	2	10	4
Turčianske Teplice	-	-	-	-	-	-	-
Tvrdošín	5	0	4	1	0	5	0
Žilina	17	2	13	2	4	12	1
Žilina region	**120**	**8**	**80**	**32**	**9**	**88**	**23**

Legend to the tables:

K – basic (main) risk classification of the contaminated site reflecting risk of contamination spread into ground water and via ground water, risk of volatile and toxic substances for the inhabitants, risk of surface water contamination (K < 35 - low risk classification, K = 35 to 65 – moderate risk classification, K > 65 - high risk classification).

R – complementary risk classification of the contaminated site based on its position in relation to soil, to protected areas, to functional land use, to economical and social land development, to the environmental quality.

V – overall impact (risk) assessment of the contaminated site to the environment V = K+R (V < 50 - low risk classification, V = 50 to 85 – moderate risk classification, V > 85 - high risk classification).

Contaminated sites in the region Žilina (RCS - part B)

On the basis of overall environmental impact assessment of the contaminated sites (according to criterion V), **2 sites with low risk, 16 sites with moderate risk and 13 sites with high risk** out of total number of **31 sites with contaminated site** were recorded in the region Žilina, with the highest appearance in the districts Liptovský Mikuláš (7) and Kysucké Nové Mesto (6). No site with contaminated site was recorded in district Turčianske Teplice. According to the groups of activities facilities for waste handling prevailed in the region Žilina - 16 sites (52 %) and industrial production - 5 sites (16 %), with engineering production dominating according to the activity specification - 4 sites.

Among 20 most risky contaminated sites in the region, according to the ranking of criterion V, 13 are classified as high risk sites (V > 85 points), 7 as moderate risk while 2 out of them are closely below the high risk limit (V = 85 points). First 12 sites out of these 20 sites we consider as priority high risk contaminated sites that should be solved as soon as possible from the environmental deterioration or human population health risk point of view.

The first two sites with the highest risk according to the overall environmental impact assessment of the contaminated sites (following criterion V) in the region are also most risky sites from the basic risk classification point of view (following criterion K). In more detailed assessment of risk we evaluated the contaminated sites according to the partial criteria K1+K3 (relation of EB to water), K2+R5 (relation of EB to human health), R1 (relation of CS to soil), R2 (relation of EB to protected areas), R3+R4 (relation of CS to landscape and socio-economical development), entering the environmental impact assessment of contaminated sites.

Sites *ZA (021) B / Žilina - východné priemyselné pásmo, KM (005) B / Kysucké Nové Mesto - NN Slovakia* are in addition to the overall impact assessment also priority high risk sites from the water protection point of view (ground water as well as surface water), human health as well as from the landscape and socio-economical development point of view. *KM (004) B / Kysucké Nové Mesto - mestská skládka TKO* is in addition to the overall impact assessment also priority high risk site from the water protection point of view (ground water as well as surface water), soil and human health. *LM (018) B / Liptovský Mikuláš - Kožiarske závody*, *TS (001) B / Nižná - OTF - kalové pole Malá Orava* are in addition to the overall impact assessment also priority high risk sites from the human health protection point of view as well as risk for landscape and socio-economical development of the region. *KM (003) B / Kysucké Nové Mesto - KLF - Energetika* is in addition to the overall impact assessment also priority high risk site from the water protection point of view (ground water as well as surface water), as well as risk for landscape and socio-economical development of the region. *CA (002) B / Čadca - ČS PHM Čadca - Horelica* is in addition to the overall impact assessment also priority high risk site from the water protection point of view (ground water as well as surface water) and human population health. Sites *DK (001) B / Istebné - OFZ - haldy trosky, RK (020) B / Ružomberok - terminál Slovnaft* and *DK (003) B / Medzibrodie nad Oravou - STKO Dolný Kubín - Široká* are in addition to the overall impact assessment also priority high risk sites from the human health protection point of view. *KM (002) B / Kysucké Nové Mesto - KINEX-KLF* is a high risk site, but not a priority one due to the overall impact assessment, however, it is a priority high risk site because of water protection (ground water as well as surface water), and also due to risk for landscape and socio-economical development of the region. Site *KM (008) B / Kysucké Nové Mesto - skládka pri SPŠ v meste* is a high risk site but not priority one on the basis of the overall assessment, it is a priority site only due to risk for landscape and socio-economical development of the region. *RK (019) B / Ružomberok - tehelňa* is a high risk site, but not priority one due to the overall assessment, however, it is a priority site from the human population health threatening point of view. Sites *LM (002) B / Dúbrava - štôlne a haldy L. Dúbrava, LM (009) B / Lazisko - odkaliská L. Dúbrava, ZA (012) B / Rajecké Teplice - ČS PHM, KM (011) B / Nesluša - skládka PO a KO I, LM (026) B / Partizánska Ľupča - odkalisko Magurka* are not priority ones from the point of view of the overall assessment, only as risk for water protection (ground water as well as surface water), and all of them are classified as a moderate risk from the overall assessment point of view.

Only 2 sites (*NO (004) / Zubrohlava - kalové pole - ZŤS Námestovo, LM (029) / Podtureň - skládka Žadovica,*) out of 20 most risky contaminated sites in the region are not a priority ones based on ranking according to criterion V and some particular criterion. Both sites classified as moderate risk gained classification points as evenly as risk domination is not obvious regarding some of the particular criteria in the region.

It is obvious from the above that majority of mentioned sites belonging to the top 20 most risky according to the overall environmental impact assessment of the contaminated sites pose also serious risk especially due to threaten of ground water and surface water. Many of these sites are located in the protection zones of natural medicinal waters and resources of mineral waters, in protected water management areas, in a vicinity of water streams with water management importance, often directly on their permeable alluvial sediments. 9 sites out of all verified contaminated sites in the region are located in protected water management areas, while 7 out of 20 most risky sites have such localisation *KM (004) B / Kysucké Nové Mesto - mestská skládka TKO, KM (005) B / Kysucké Nové Mesto - NN Slovakia, CA (002) B / Čadca - ČS PHM Čadca - Horelica, KM (003) B / Kysucké Nové Mesto - KLF-Energetika, KM (002) B / Kysucké Nové Mesto*

- KINEX-KLF, KM (008) B / Kysucké Nové Mesto - skládka pri SPŠ v meste, KM (011) B / Nesluša - skládka PO a KO I. Site *ZA (012) B / Rajecké Teplice - ČS PHM* is located in the protection zone of natural medicinal water resource. Two sites *LM (009) B / Lazisko - odkaliská L. Dúbrava, LM (002) B / Dúbrava - štôlne a haldy L. Dúbrava -* are located in ground water resource protection zone. Up to 10 out of 20 most risky sites in the region are in a vicinity of water stream with water management importance. Some of the sites are located in residential areas of municipalities, mostly in industrial zones, some of them being located directly in residential zones or their vicinity. Such sites pose a risk of human health threatening or the can pose a barrier to socio-economical development.

Recognition that up to 10 sites among the 31 contaminated sites is at the same time remediated or rehabilitated sites is considered a positive finding. It means that remediation and/or rehabilitation works were already performed or are performed at present on app. 32 % of the contaminated sites. In the cases of finalisation of demonstrable successful remediation and/or rehabilitation (site without contamination) they will not be considered as contaminated sites and they will be recorded only in RCS - part C.

Number of contaminated sites according to level of risk

District	Number	Low risk (K)	Moderate risk (K)	High risk (K)	Low risk (V)	Moderate risk (V)	High risk (V)
Bytča	5	0	5	0	0	5	0
Čadca	1	0	0	1	0	0	1
Dolný Kubín	2	0	0	2	0	0	2
Kysucké Nové Mesto	6	0	0	6	0	1	5
Liptovský Mikuláš	7	0	2	5	0	6	1
Martin	-	-	-	-	-	-	-
Námestovo	1	0	0	1	0	1	0
Ružomberok	4	2	1	1	2	0	2
Turčianske Teplice	-	-	-	-	-	-	-
Tvrdošín	1	0	0	1	0	0	1
Žilina	4	2	1	1	0	3	1
Žilina region	**31**	**4**	**9**	**18**	**2**	**16**	**13**

The most risky contaminated sites (RCS – part B) in the region

N.	Sites	District	K	R	V
1	***ZA (021) B / Žilina - východné priemyselné pásmo***	***Žilina***	***95***	***24***	***119***
2	***KM (004) B / Kysucké Nové Mesto - mestská skládka TKO***	***Kys. N. Mesto***	***93***	***24***	***117***
3	***KM (005) B / Kysucké Nové Mesto - NN Slovakia***	***Kys. N. Mesto***	***87***	***24***	***111***
4	***CA (002) B / Čadca - ČS PHM Čadca - Horelica***	***Čadca***	***90***	***18***	***108***
5	***LM (018) B / Liptovský Mikuláš - Kožiarske závody***	***Liptovský Mikuláš***	***85***	***21***	***106***
6	***DK (001) B / Istebné - OFZ - haldy trosky***	***Dolný Kubín***	***84***	***21***	***105***
7	***TS (001) B / Nižná - OTF - kalové pole Malá Orava***	***Tvrdošín***	***78***	***21***	***99***
8	***RK (020) B / Ružomberok - terminál Slovnaft***	***Ružomberok***	***75***	***24***	***99***
9	***KM (003) B / Kysucké Nové Mesto - KLF-Energetika***	***Kys. N. Mesto***	***79***	***19***	***98***
10	***DK (003) B / Medzibrodie nad Oravou - STKO Dolný Kubín - Široká***	***Dolný Kubín***	***82***	***15***	***97***
11	*KM (002) B / Kysucké Nové Mesto - KINEX-KLF*	*Kys. N. Mesto*	*77*	*19*	*96*
12	*KM (008) B / Kysucké Nové Mesto - skládka pri SPŠ v meste*	*Kys. N. Mesto*	*68*	*27*	*95*
13	*RK (019) B / Ružomberok - tehelňa*	*Ružomberok*	*63*	*24*	*87*
14	LM (002) B / Dúbrava - štôlne a haldy L. Dúbrava	Liptovský Mikuláš	73	12	85
15	LM (009) B / Lazisko - odkaliská L. Dúbrava	Liptovský Mikuláš	73	12	85
16	NO (004) B / Zubrohlava - kalové pole - ZŤS Námestovo	Námestovo	72	12	84
17	ZA (012) B / Rajecké Teplice - ČS PHM	Žilina	62	21	83
18	KM (011) B / Nesluša - skládka PO a KO I	Kys. N. Mesto	67	16	83
19	LM (029) B / Podtureň - skládka Žadovica	Liptovský Mikuláš	73	9	82
20	LM (026) B / Partizánska Ľupča - odkalisko Magurka	Liptovský Mikuláš	62	19	81

Legend to the table:

Priority contaminated sites in the region are marked with boldface, high risk contaminated sites are marked with italics.

Remediated and/or rehabilitated sites in the region Žilina (RCS - part C)

36 sites were remediated and 34 sites rehabilitated out of the total number of 70 sites recorded in RCS - part C. The highest number of remediated and/or rehabilitated sites was recorded in the district Liptovský Mikuláš (34 sites).

Waste handling facilities dominate in RCS - part C in the region Žilina according to the groups of activities - 32 sites (46 %) with most frequent municipal landfills among them - 27 sites. Storage and distribution of goods represent the second most frequent activity – 30 sites (42 %) with most frequent fuel tank stations among them - 27 sites.

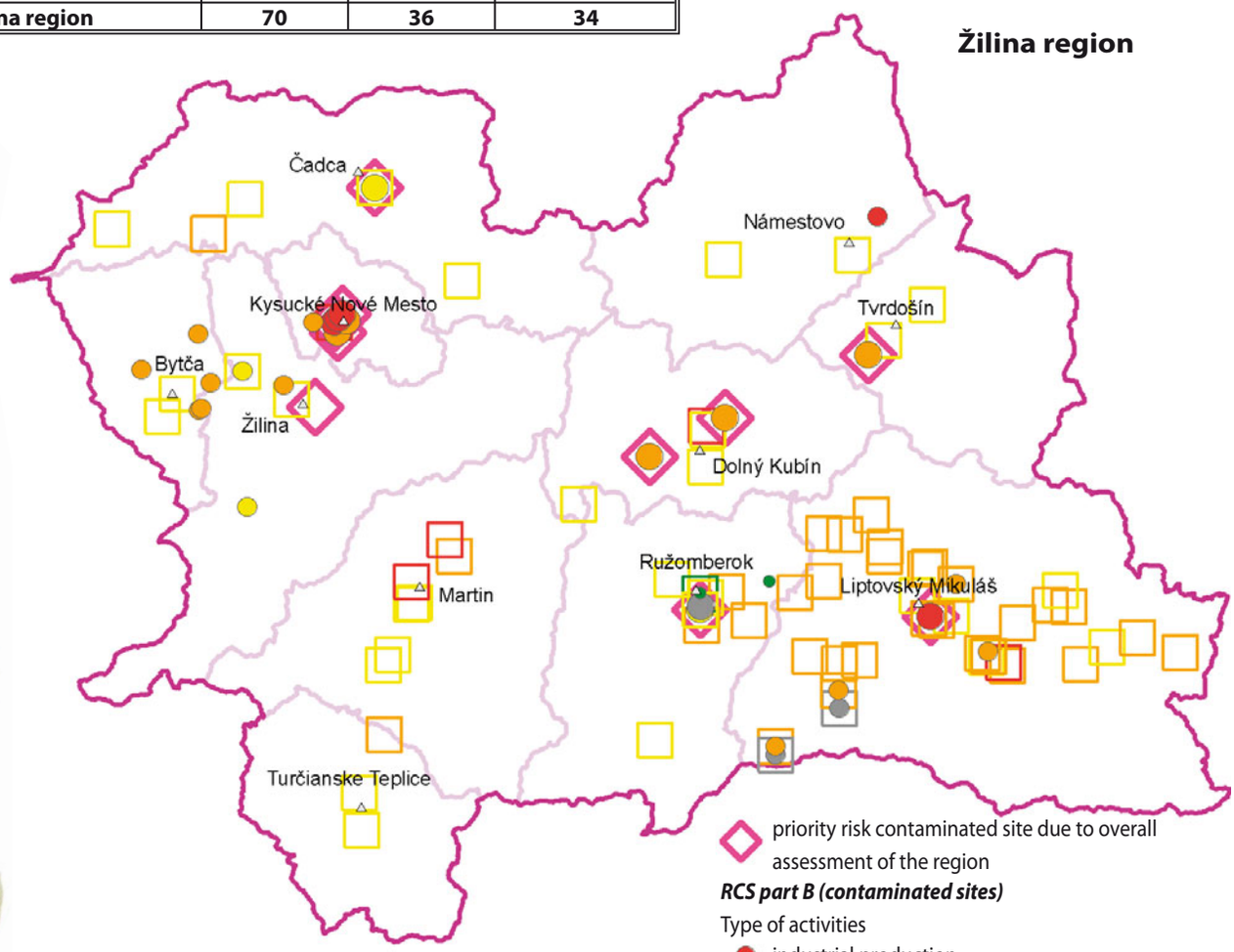
23 sites with finalised remediation and/or rehabilitation out of 70 remediated and/or rehabilitated sites are classified only in RCS - part C, demonstrably without contamination. The resting 47 sites do not meet one some of the above defined conditions. They comprise sites with ongoing remediation, eventually with residual contamination, or sites with lack of data on actual contamination situation, some of them are classified also in RCS - part A or RCS - part B. It is necessary to mention in this context that classification of certain site to RCS - part C did not automatically mean that this particular site was or still is a contaminated site, or any indications of contamination exist. It solely means that remediation and/or

rehabilitation of this site was or still is performed, or protection element against pollution spread was installed as a minimum requirement (e.g. physical barrier - underground sealing wall). 20 sites out of 70 remediated and/or rehabilitated sites are at the same time considered probable contaminated sites and 10 sites as contaminated site: *KM (005) C / Kysucké Nové Mesto - NN Slovakia, CA (002) C / Čadca - ČS PHM Čadca - Horelica, RK (020) C / Ružomberok - terminál Slovnaft.*

In addition to the above mentioned, further remediated and/or rehabilitated sites are at the same time also contaminated sites: *LM (028) C / Partizánska Ľupča - štôlne a haldy Magurka, LM (026) C / Partizánska Ľupča - odkalisko Magurka, LM (002) C / Dúbrava - štôlne a haldy L. Dúbrava, LM (009) C / Lazisko - odkaliská L. Dúbrava, RK (017) C / Ružomberok - kasárne, LM (036) / Veterná Poruba - skládka I, ZA (007) C / Horný Hričov - terminál Slovnaft.* Some of the mentioned sites are under ongoing or not finalised remediation (e.g. consecutive works).

Number of remediated and rehabilitated sites in the region

District	Number	Remediated sites	Rehabilitated sites
Bytča	2	2	0
Čadca	5	4	1
Dolný Kubín	4	4	0
Kysucké Nové Mesto	1	1	0
Liptovský Mikuláš	34	6	28
Martin	7	6	1
Námestovo	2	2	0
Ružomberok	8	5	3
Turčianske Teplice	3	2	1
Tvrdošín	2	2	0
Žilina	2	2	0
Žilina region	**70**	**36**	**34**



Region Prešov

Region Prešov with the total area of 8 974 km^2 (19.3 % of the Slovak Republic territory) is the second largest region of the SR. It comprises 13 districts according to the territorial and administrative organisation pursuant to the Act No. 221/1996 of the Slovak Parliament, with district Poprad (1 105 km^2) being the largest and district Levoča (357 km^2) the smallest one. Others district are as follows: Bardejov, Humenné, Kežmarok, Medzilaborce, Prešov, Sabinov, Snina, Stará Ľubovňa, Stropkov, Svidník, Vranov nad Topľou. Region Prešov comprises totally 666 municipalities, 23 among them have the status of a town. 800 483 inhabitants live in the region Prešov (as of December 31st, 2008), this number represents 14.9 % of the total SR.

In the framework of large-scale protected areas, 5 national parks (NP) interfere with the territory of region Prešov: Tatranský národný park, NP Pieniny, NP Poloniny, NP Nízke Tatry and NP Slovenský raj, as well as and 2 protected landscape areas (PLA): PLA Vihorlat and PLA Východné Karpaty. Their total area covers app. 1 848 km^2, i.e. app. 21 % of the region territory. 187 small-scale protected areas are located in the Prešov region territory, 57 out of them being national natural reserves (NNR), 84 natural reserves (NR), 4 national natural monuments (NNM), 33 natural monuments (NM) and 9 protected areas (PA). Small-scale protected areas cover 417 km^2 (4.7 % of the region territory).

Special protection areas (SPA) and special areas of conservation (SAC) belonging to the NATURA 2000 system represent a specific type of protection. They overlap with the national network of protected areas to a substantial extent. 65 special areas of conservation and 7 special protected areas interfere with the region Prešov territory. Total area of SAC reaches 1 210 km^2 (13.5 % of the region territory) and area of SPA is 2 307 km^2 (25.7 % of the region territory). None Ramsar Convention site is present in the territory of region Prešov.

Three protected water management areas (PWMA) belong to the region Prešov territory: PWMA Nízke Tatry - east, PWMA Horné povodie Hnilca and PWMA Vihorlat. They cover the total area of app. 260 km^2 (2.9 % of the region territory).

The following resources have defined protection zones of the region Prešov at present: protection zones of natural resources of mineral table waters Baldovce, Lipovce (Salvator), Nová Ľubovňa and Starý Smokovec, and protection zones of natural medicinal resources: Bardejov, Sulín, Cígeľka and Vyšné Ružbachy. They cover total area of 177 km^2 (2 % of the region territory). Spa sites with natural medicinal water based on application of natural medicinal water resources Vyšné Ružbachy and Bardejov are located in the region Prešov, as well as spa sites using favourable climatic conditions: Vysoké Tatry and Lučivná. Moreover, the following spa areas are located in the region Prešov: Vyšné Ružbachy, Bardejov, Nový Smokovec, Štrbské Pleso, Tatranská kotlina, Tatranské Matliare, Horný Smokovec, Lučivná, Dolný Smokovec and Tatranská Polianka. Total area of them reaches 507 km^2 (5.7 % of the region territory). Protection zones for water supplies of ground water and surface water resources are determined for majority of water resources exploited as public supplies by the network of water works (springs, water reservoirs, sampling of the surface water streams). However, legislative proceedings for substantial part of defined protection zones were not finalised yet. Their records are not harmonised. Especially protection zones of the resources with local importance are recorded only under the lowest level of water management organisations. Recorded protection zones of water resources (according to the data of Water Research Institute) in the region Prešov cover 2 761 km^2 (30.8 % of the region territory). 43 basins of water management streams interfere with the territory of region Prešov and their total area covers 3 195 km^2 (35.6 % of the region territory). Total length of the streams with water management importance interfere with the territory of region Prešov is 2 181 km.

11 monumental zones are located in the region Prešov (Ľubica, Nižné Repáše, Spišské Podhradie, Torysky, Vysoké Tatry - T. Lomnica, Lipovce - Lačnov, Sabinov, Hniezdne, Stará Ľubovňa, Spišská Belá, Hanušovce nad Topľou) with total area of 2,5 km^2, and 7 monumental reserves (Prešov, Bardejov, Kežmarok, Levoča, Spišské Podhradie - Kapitula, Poprad - Spišská Sobota, Podolínec) with total covered area 3,5 km^2.

The total area of agricultural soil in the region Prešov (with determined soil quality) is app. 3 935 km^2 (43.8 % of the region territory). Among the 9 soil quality groups determined for SR quality groups 1 – 3 are not represented in the region Prešov. The highest proportion of the agricultural soil (with information on its quality) is in the district Levoča (59.1 % of the district territory), the lowest is in district Poprad (25.7 % of the district territory). Soils from quality groups 5 to 9 are present in all districts of the region. Soils from the quality group 9 are the most frequent (1 307 km^2), being spread on the area of app. 14.6 % of the region territory. Quality group 4 is represented only in the districts Humenné, Svidník and Vranov nad Topľou. The level of inactivation of contaminants (ability of soil to inactivate contaminants) was - equally as soil quality groups - investigated only in the areas with agricultural soils. Soils with all 5 degrees of inactivation of contaminants are present in the region Prešov (very low, low, moderate, high, very high). Soils with low inactivation degree are most frequent (2 228 km^2, 24.8 % of the region territory). Soils with very high degree of inactivation of contaminants are the least frequent (11 km^2, 0.13 % of the region territory).

All 5 determined degrees of environmental quality are present in the territory of region Prešov (Environmental Regionalisation of the Slovak Republic, *Bohuš, Klinda et al., 2008*). The largest area is represented by the high quality environment - 5 420 km^2 (60.4 % of the region territory), acceptable environment covers area of 2 006 km^2 (22.3 % of the region territory), moderately deteriorated environment has an area of 975 km^2 (10.9 % of the region territory), deteriorated environment has an area of 418 km^2 (4.7 % of the region territory). Highly deteriorated environment covers the smallest area - 170 km^2 (1.9 % of the region territory). Highly deteriorated environment and deteriorated environment is present mostly in a vicinity of larger cities as Bardejov, Stará Ľubovňa, Poprad, Kežmarok, Prešov, Vranov nad Topľou, Humenné, Stropkov.

8 burdened areas were identified in whole territory of the Slovak Republic in the framework of Environmental Regionalisation of the SR in relation to the degrees of environmental quality (*Bohuš, Klinda et al., 2008*). Three of them interfere with region Prešov: Košice-Prešov burdened area covering 1 044 km^2 and app. 425 000 inhabitants, interfering with the Prešov region by 19 %, Zemplín burdened area covering 1 040 km^2 and 173 000 inhabitants, interfering by 17 %, and Rudno-Gelnica burdened area covering 357 km^2 and 52 000 inhabitants, 5 % interference with the region Prešov.

211 probable contaminated sites, 32 sites with contaminated sites and 48 remediated and 83 rehabilitated sites were recorded in the region Prešov in the framework of Systematic Identification of Contaminated Sites in the Slovak Republic (*Paluchová et al., 2006 – 2008*). 16 sites with contaminated site belong to high risk group (according to the criterion K) and they were proposed for priority removal.

Updating and data completion were performed as well as additional impact assessment of the contaminated sites to the environment in the framework of Regional Studies of Environmental Impacts of the Contaminated Sites for Selected Regions (*Helma et al., 2008 – 2010*). Updated number of the

contaminated sites with **215 probable contaminated sites** identified in the region Prešov with**, 32 contaminated sites, 49 remediated and 83 rehabilitated sites** is one of results of the Regional Study of Environmental Impacts of the contaminated sites for Selected Regions - region Prešov (*Mikita et al., 2010*). 48 sites with contaminated site belong to high risk sites according to the overall classification (criterion V) at present, representing an increase by 1 site in comparison with 47 sites with contaminated site belonging to high risk sites according to the basic classification (according to criterion K).

16 sites with contaminated site belong to high risk according to the basic classification (criterion K) at present, 14 out of them belonging among high risk also due to overall assessment of the environmental impacts of the contaminated sites (according to criterion V).

Probable contaminated sites in the region Prešov (RCS - part A)

8 sites with low risk, 159 sites with moderate risk and 48 sites with high risk were recorded out of total number of **215 probable contaminated sites** in the region Prešov on the basis of the overall assessment of environmental impacts of the contaminated sites (according to criterion V). The highest number of sites (39) was recorded in the district Vranov nad Topľou. Relatively high occurrence of sites was recorded also in the districts Bardejov (29) and Poprad (22). The lowest number of sites was recorded in the district Sabinov (4 sites). More than 54 % of all sites with probable contaminated sites comprise facilities for waste handling, especially municipal waste landfills (49 %). They are followed by sites with agricultural activities - 15 %, with dominating storage and distribution of agrochemicals (7 %). 12 % of sites are formed by storage and distribution of goods with prevailing fuel tank stations (5 %). The highest number of high risk sites is located in the district Vranov nad Topľou (11 sites).

According to the ranking based on the criterion V, all 24 high risk sites are classified out of 24 most risky probable contaminated sites in the region (V > 85 points). 11 out of them are considered as priority high risk contaminated sites where environmental contamination should be either confirmed or excluded by additional investigation, and then measures should be implemented in case of contaminated site confirmation towards decrease or even elimination of environmental deterioration or human health damage risk.

Among 215 probable contaminated sites, 41 sites are considered as remediated and/or rehabilitated sites. It means that certain remediation and/or rehabilitation activities were already performed in these probable contaminated sites. In the cases when successful remediation and/or rehabilitation was terminated (site without contamination) these sites will not be considered as probable contaminated sites any more and they will be registered only in RCS - part C.

Number of probable contaminated sites according to level of risk

District	Number	Low risk (K)	Moderate risk (K)	High risk (K)	Low risk (V)	Moderate risk (V)	High risk (V)
Bardejov	29	0	24	5	1	25	3
Humenné	20	1	12	7	1	12	7
Kežmarok	16	0	11	5	0	12	4
Levoča	13	1	11	1	2	10	1
Medzilaborce	10	0	9	1	1	8	1
Poprad	22	0	16	6	1	18	3
Prešov	13	0	10	3	0	4	9
Sabinov	4	0	4	0	0	3	1
Snina	14	0	10	4	0	12	2
Stará Ľubovňa	11	0	8	3	1	8	2
Stropkov	8	0	7	1	0	7	1
Svidník	16	0	12	4	0	13	3
Vranov nad Topľou	39	4	28	7	1	27	11
Prešov region	**215**	**6**	**162**	**47**	**8**	**159**	**48**

Legend to the tables:

K – basic (main) risk classification of the contaminated site reflecting risk of contamination spread into ground water and via ground water, risk of volatile and toxic substances for the inhabitants, risk of surface water contamination (K < 35 - low risk classification, K = 35 to 65 – moderate risk classification, K > 65 - high risk classification).

R – complementary risk classification of the contaminated site based on its position in relation to soil, to protected areas, to functional land use, to economical and social land development, to the environmental quality.

V – overall impact (risk) assessment of the contaminated site to the environment V = K+R (V < 50 - low risk classification, V = 50 to 85 – moderate risk classification, V > 85 - high risk classification).

Contaminated sites in the region Prešov (RCS - part B)

On the basis of overall environmental impact assessment of the contaminated sites (according to criterion V), **18 sites with moderate risk and 14 sites with high risk out of total number of 32 contaminated sites** were recorded in the region Prešov, **none of the sites had low risk**.

The highest number of contaminated sites, especially contaminated sites with high risk was recorded in the districts Bardejov (4) and Vranov nad Topľou (4). No contaminated sites was recorded in the districts Levoča and Prešov. Waste handling sites dominate among the contaminated sites in the region with 69 %, municipal waste landfills being the most frequent (50 %). Industrial activity sites follow with 16 %.

Among 20 most risky contaminated sites in the region, according to the ranking of criterion V, 14 are classified as high risk sites (V > 85 points) and 6 as moderate risk. One is classified as moderate risk site, but closely below the high risk limit (V = 85 points). 12 of the latter sites are considered as priority high risk contaminated sites that should be addressed as soon as possible due to risk of environmental deterioration and human health threatening.

Bystré - bývalá tehelňa TEMAKO (probably contaminated site)

In more detailed assessment of risk we evaluated the contaminated sites according to the partial criteria K1+K3 (relation of CS to water), K2+R5 (relation of CS to human health), R1 (relation of CS to soil), R2 (relation of CS to protected areas), R3+R4 (relation of CS to landscape and socio-economical development), entering the environmental impact assessment of contaminated sites.

Priority high risk site *BJ (004) B / Bardejov - areál podniku JAS Bardejov* is in addition to the overall impact assessment also priority site from the water pollution potential point of view (ground water as well as surface water), soil, human health as well as landscape and socio-economical development points of view. Sites *VT (020) B / Nižný Hrabovec - odkalisko Bukocel, SB (004) B / Rožkovany - mrak chlór. uhľovodíkov, KK (004) B / Kežmarok - OKTAN, BJ (007) B / Bardejov - elektrická stanica (ES), BJ (005) B / Bardejov - areál SNAHA v.d., BJ (003) B / Bardejov - areál Bardejovských strojární (ZŤS)* are in addition to the overall impact assessment also priority high risk sites from the water pollution potential (ground water as well as surface water), socio-economical development and human health points of view. Sites *VT (024) B / Poša - odkalisko Chemka Strážske* and *VT (018) B / Merník - ortuťové bane* are to the overall impact assessment priority high risk sites from the water pollution potential (ground water as well as surface water) and human health points of view. Site *VT (021) B / Nižný Hrabovec - skládka v areáli firmy Bukocel* is in addition to the overall impact assessment also priority site from the human health as well as landscape and socio-economical development points of view. *PP (015) B / Svit - skládka Chemosvit* and *SP (008) B / Stropkov - obaľovačka* are high risk sites, however, they are not priority ones regarding the overall assessment. They are priority sites because of risk for landscape and socio-economical development. Site *HE (017) B / Udavské - obaľovačka bitúmenových zmesí* is high risk site, but it is not a priority one regarding the overall assessment, it is priority site because of human population health point of view. Sites ranked at positions 15 to 19 in the framework of overall assessment according to the criterion V: *SV (001) B / Belá nad Cirochou - skládka TKO, SV (008) B / Snina - stará riadená skládka odpadov, SP (006) B / Stropkov - areál TESLA Stropkov, KK (009) B / Spišská Belá - skládka Za potokom, SL (009) B / Stará Ľubovňa - skládka Skalka* pose a moderate risk, nevertheless, they are priority ones from the landscape and socio-economical development points of view.

It is obvious from the above description that majority of mentioned sites belonging to the top 20 most risky according to the overall environmental impact assessment of the contaminated sites pose also serious risk especially due to threaten of ground water and surface water. Some of them are located in the river basins of water management streams, in protection zones of water resources. Many sites are in a vicinity of streams with water management importance, often directly on their permeable alluvial sediments. Up to 12 sites out of all contaminated sites are located in the basin of water management streams. 6 sites out of 20 most risky contaminated sites fall among them: *BJ (004) B / Bardejov - areál podniku JAS Bardejov, BJ (005) B / Bardejov - areál SNAHA v. d., BJ (007) B / Bardejov - elektrická stanica (ES), BJ (003) B / Bardejov - areál Bardejovských strojární (ZŤS), SP (006) B / Stropkov - areál TESLA Stropkov, SP (008) B / Stropkov - obaľovačka.* 4 sites out of 7 contaminated sites in the region Prešov, located in the protection zones of water resources, belong to 20 most risky sites: *BJ (004) B / Bardejov - areál podniku JAS Bardejov, BJ (005) B / Bardejov - areál SNAHA v. d., BJ (007) B / Bardejov - elektrická stanica (ES), BJ (003) B / Bardejov - areál Bardejovských strojární (ZŤS).* Up to 10 out of 20 most risky sites in the region are in a vicinity of water stream with water management importance: *BJ(004) B / Bardejov - areál podniku JAS Bardejov, BJ(003) B / Bardejov - areál Bardejovských strojární (ZŤS), VT(020)B Nižný Hrabovec - odkalisko Bukocel, BJ(005) B / Bardejov - areál SNAHA v. d., KK (004) B / Kežmarok - OKTAN, SB (004) B /Rožkovany - mrak*

chlórovaných uhľovodíkov, VT(021)B Nižný Hrabovec - skládka v areáli firmy Bukocel, HE(017)B Udavské - obaľovačka bitúmenových zmesí, PP (015) B / Svit - skládka Chemosvit, SP (008)B / Stropkov - obaľovačka, PP (021) B / Veľký Slavkov - skládka Pod farmou. Some of the sites are located in residential areas of municipalities, mostly in industrial zones, some of them being located directly in residential zones or their vicinity. Such sites pose a risk of human health threatening or the can pose a barrier to socio-economical development.

Recognition that up to 15 sites among 32 contaminated sites are at the same time remediated or rehabilitated sites is considered a positive finding - 3 sites out of 10 priority high risk sites. It means that remediation and/or rehabilitation works were already performed or are performed at present on app. 47 % of the contaminated sites (30 % of priority high risk sites). In the cases of finalisation of demonstrable successful remediation and/or rehabilitation (site without contamination) they will not be considered as contaminated sites and they will be recorded only in RCS - part C.

Number of contaminated sites according to level of risk

District	Number	Low risk (K)	Moderate risk (K)	High risk (K)	Low risk (V)	Moderate risk (V)	High risk (V)
Bardejov	6	0	2	4	0	2	4
Humenné	4	0	2	2	0	2	2
Kežmarok	3	0	2	1	0	2	1
Levoča	0	0	0	0	0	0	0
Medzilaborce	1	0	1	0	0	1	0
Poprad	2	0	1	1	0	1	1
Prešov	0	0	0	0	0	0	0
Sabinov	1	0	0	1	0	0	1
Snina	3	0	2	1	0	3	0
Stará Ľubovňa	1	0	1	0	0	1	0
Stropkov	4	0	2	2	0	3	1
Svidník	2	0	2	0	0	2	0
Vranov nad Topľou	5	0	1	4	0	1	4
Prešov region	32	0	16	16	0	18	14

The most risky contaminated sites (RCS – part B) in the region

N.	Sites	District	K	R	V
1	***BJ (004) B / Bardejov – areál podniku JAS Bardejov***	***Bardejov***	***96***	***27***	***123***
2	***BJ (003) B / Bardejov – areál Bardejovských strojární (ZŤS)***	***Bardejov***	***97***	***24***	***121***
3	***VT (020)B Nižný Hrabovec – odkalisko Bukocel***	***Vranov nad Topľou***	***99***	***21***	***120***
4	***BJ (005) B / Bardejov – areál SNAHA v. d.***	***Bardejov***	***97***	***19***	***116***
5	***KK (004) B / Kežmarok - OKTAN***	***Kežmarok***	***91***	***22***	***113***
6	***VT (024)B Poša – odkalisko Chemka Strážske***	***Vranov nad Topľou***	***95***	***18***	***113***
7	***BJ (007) B / Bardejov – elektrická stanica (ES)***	***Bardejov***	***87***	***25***	***112***
8	***SB (004) B /Rožkovany - mrak chlórovaných uhľovodíkov***	***Sabinov***	***92***	***19***	***111***
9	***VT (018)B Merník – ortuťové bane***	***Vranov nad Topľou***	***90***	***21***	***111***
10	***VT (021)B Nižný Hrabovec – skládka v areáli firmy Bukocel***	***Vranov nad Topľou***	***80***	***27***	***107***
11	*HE (017)B Udavské – obaľovačka bitúmenových zmesí*	*Humenné*	*79*	*21*	*100*
12	*PP (015) B / Svit - skládka Chemosvit*	*Poprad*	*73*	*19*	*92*
13	*SP (008)B / Stropkov – obaľovačka*	*Stropkov*	*72*	*19*	*91*
14	*HE (010)B Myslina – stará skládka TKO*	*Humenné*	*75*	*15*	*90*
15	SP (006)B / Stropkov – areál TESLA Stropkov	Stropkov	66	19	85
16	SV (008)B / Snina – stará riadená skládka odpadov	Snina	66	16	82
17	KK (009) B / Spišská Belá - skládka Za potokom	Kežmarok	63	15	78
18	SV (001)B / Belá nad Cirochou – skládka TKO	Snina	62	15	77
19	SL (009) B / Stará Ľubovňa - skládka Skalka	Stará Ľubovňa	64	12	76
20	PP (021) B / Veľký Slavkov - skládka Pod farmou	Poprad	61	12	73

Legend to the table:

Priority contaminated sites in the region are marked with boldface, high risk contaminated sited are marked with italics

Remediated and/or rehabilitated sites in the region Prešov (RCS - part C)

49 sites were **remediated** and **83 sites rehabilitated** out of the total number of 132 sites. Remediated fuel tank stations form up to 27 % of all sites recorded in RCS – part C. The highest number of remediated sites in the region Prešov was recorded in the district Poprad. The highest number of rehabilitated sites was recorded in the districts Poprad and Vranov nad Topľou. Rehabilitated municipal waste landfills form up to 59 % of all sites recorded in RCS – part C, less percentage belongs to industrial waste landfills (4 %).

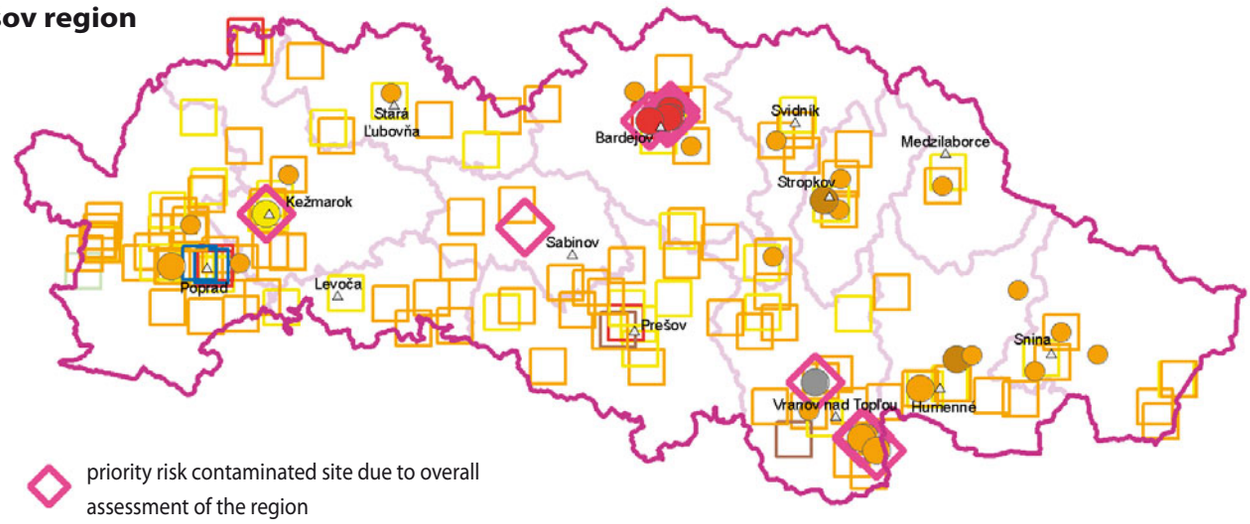
14 sites with finalised remediation and/or rehabilitation out of 132 remediated and/or rehabilitated sites are classified only in RCS – part C, demonstrably without contamination. The resting 118 sites do not meet one some of the above defined conditions. They comprise sites with ongoing remediation, eventually with residual contamination, or sites with lack of data on actual contamination situation, some of them are classified also in RCS – part A or RCS – part B.

It is necessary to mention in this context that classification of certain site to RCS - part C did not automatically mean that this particular site was or still is a contaminated site, or any indications of contamination exist. It solely means that remediation and/or rehabilitation of this site was or still is performed, or protection element against pollution spread was installed as a minimum requirement (e.g. physical barrier - underground sealing wall). 41 out of 132 remediated and or rehabilitated sites are considered as probable contaminated sites or contaminated sites (15 sites). 3 remediated sites are priority high risk contaminated sites in parallel: *KK (004) C / Kežmarok - OKTAN, BJ (007) C / Bardejov - elektrická stanica (ES), BJ (003) C / Bardejov - areál Bardejovských strojární (ZŤS). (010) C / Myslina - stará skládka TKO* is remediated site and high risk contaminated site in parallel. *SV (008) C / Snina - stará riadená skládka odpadov, PP (021) C / Veľký Slavkov - skládka Pod farmou, KK (009) C / Spišská Belá - skládka Za potokom* are remediated and or rehabilitated sites and contaminated sites at the same time. Some of the mentioned sites are under ongoing or not finalised remediation (e.g. consecutive works).

Number of remediated and rehabilitated sites in the region

District	Number	Remediated sites	Rehabilitated sites
Bardejov	11	5	6
Humenné	8	3	5
Kežmarok	12	5	7
Levoča	7	2	5
Medzilaborce	2	1	1
Poprad	33	13	20
Prešov	15	8	7
Sabinov	5	0	5
Snina	7	2	5
Stará Ľubovňa	7	3	4
Stropkov	4	1	3
Svidník	6	2	4
Vranov nad Topľou	15	4	11
Prešov region	**132**	**49**	**83**

Prešov region



priority risk contaminated site due to overall assessment of the region

RCS part B (contaminated sites)

Type of activities

- industrial production
- storage and distribution of goods
- waste disposal
- mining
- building (construction) production
- others

Category of risk classification

- moderate risk (V = 50 – 85)
- high risk (V > 85)

RCS part C (remediated and rehabilitated sites)

Type of activities

- agricultural production
- industrial production
- storage and distribution of goods
- transport
- waste disposal
- building (construction) production

Region Košice

Region Košice with the total area of 6 753 km^2 (13.77 % of the SR territory) is the fourth largest region of the SR and it lies in the south-eastern part of Slovakia. It comprises 11 districts according to the territorial and administrative organisation pursuant to the Act No. 221/1996 of the Slovak Parliament, district Košice - surroundings being the largest (1 533 km^2) and Košice III (21 km^2) the smallest one. Additional districts are as follows: Gelnica, Košice I, Košice II, Košice IV, Michalovce, Rožňava, Spišská Nová Ves, Sobrance and TRC Sišov. 440 municipalities are in the region Košice, 17 among them have the status of a town. 774 103 inhabitants live in the Region Košice (as of December 31st, 2008), this number represents 14 % of the total SR population.

Several large-scale protected areas interfere with the territory of region Košice. 2 national parks (NP) are located in the territory of Košice region or partially interfere with it - NP Slovenský raj and NP Slovenský kras, with total area of 488 km^2 in the region territory and two protected landscape areas (PLA) - PLA Vihorlat and PLA Latorica, with total area of 341 km^2 in the region territory. Protected areas of the above mentioned categories cover totally app. 13 % of the total region Košice territory. Altogether, 130 small-scale protected areas were declared in the region territory as of May 31st, 2009 in categories national natural reserve, natural reserve, national natural monument, natural monument and protected area, as follows: 40 national natural reserves, 47 natural reserves, 23 national natural monuments, 15 natural monuments and 5 protected areas. Small-scale protected areas cover an area of 97 km^2 (1.4 % of the region territory).

Special protection areas (SPA) and special areas of conservation (SAC) belonging to the NATURA 2000 system represent a specific type of protection. They overlap with the national network of protected areas to substantial extent. In the region Košice territory actually 5 declared SPAs and 4 proposed (p) SPAs are present, and 47 pSACs. Total area of SACs is 741 km^2 (11 % of the region territory) and SPAs 743 km^2 (11 % of the region territory). 4 Ramsar sites are located of the region Košice territory - national natural reserves Senné rybníky, Latorica, Domica and Tisa river alluvium.

4 protected water management areas were declared in the region territory (PWMA), 3 out of them are located or interfere with district Rožňava, the others interfere with districts Košice - surroundings, Spišská Nová Ves, Sobrance and Michalovce: PWMA Slovenský kras - Plešivecká planina - (district Rožňava), PWMA Slovenský kras - Horný vrch (districts Rožňava, Košice - surroundings), PWMA Horné povodie Hnilca (districts Rožňava, Spišská Nová Ves) and PWMA Vihorlat (districts Michalovce, Sobrance).

Protection zone of natural mineral table water springs was declared in the region with protection of degree II and III, laying in the territory of district Rožňava for the site Tornaľa. In addition, climatic spa Štós is located in the region territory. Protection zones for water supplies of ground water and surface water resources are determined for majority of water resources exploited as public supplies by the network of water works (springs, water reservoirs, sampling of the surface water streams). Recorded protection zones of the water resources (according to the data from Water Research Institute) in the region Košice cover the total area of 642 km^2 (9,5 % of the region territory). Basins of 27 water supply streams importance are located in of the region territory or interfere with it. The highest number of water supply basins is in districts Gelnica, Košice – surroundings, Spišská Nová Ves and Rožňava. Total length of the streams with water management importance interfere with the territory of region Košice is 1 693 km.

One town conservation reserve Košice is declared of the region territory and 12 conservation zones (Gelnica, Smolník, Medzev - former city district Nižný Medzev, Turnianska Nová Ves, Vyšný Medzev, Michalovce, Rožňava, Lúčka, Štítnik, Spišská Nová Ves, Spišské Vlachy, Markušovce).

The total area of agricultural soil in the region Košice (with determined soil quality) is app. 3 416 km^2 (50.6 % of the region territory). Among the 9 soil quality groups determined for SR quality groups 1 to 3 are not present in the region Košice. The highest proportion of the agricultural soil (with information on its quality) is present in the district Trebišov (75.8 % of the district territory), the lowest proportion is in the district Košice I (15.9 % of the district territory). Soils from quality groups 6 to 9 are present in all districts of the region. Soil of quality group 6 (1 158 km^2) is most frequently, it is covering the area equal to app. 17.2 % of the region territory. Quality group 4 is in the districts Košice - surroundings, Michalovce, Rožňava, Sobrance, Spišská Nová Ves and Trebišov with area of only 30 km^2 (0.5 % of the region territory). Quality group 5 is present in each district of Košice region except of district Košice III. The level of inactivation of contaminants (ability of soil to inactivate contaminants) was - equally as soil quality groups - investigated only in the areas with agricultural soils. Soils with all 5 degrees of inactivation of contaminants are present in the region Košice (very low, low, moderate, high, very high). Soils with moderate inactivation degree are most frequent (1 441 km^2, 21.3 % of the region territory). Soils with very low degree of inactivation of contaminants are the least frequent (39.6 km^2, 0.6 % of the region territory).

All 5 determined degrees of environmental quality are present in the territory of region Košice (Environmental Regionalisation of the Slovak Republic, *Bohuš, Klinda et al., 2008*). The largest area is represented by the moderately deteriorated environment 1 638 km^2 (24.3 % of the region territory), deteriorated environment covers an area of 1 434 km^2 (21.2 % of the region territory), high quality environment covers 1 232 km^2 (18.3 % of the region territory), acceptable environment covers an area of 1 228 km^2 (18.2 % of the region territory) and highly deteriorated environment area of 1 217 km^2 (18 % of the region territory). Highly deteriorated and deteriorated is especially in a vicinity of bigger cities, eventually industrial centres as Košice, Trebišov, Michalovce, Sobrance and Gelnica.

According to Environmental Regionalisation of the Slovak Republic (*Bohuš, Klinda et al., 2008*), region Košice interferes with 3 burdened areas: Rudniansko-gelnická burdened area, Košicko-prešovská burdened area and Zemplínska burdened area. Rudniansko-gelnická burdened area with population of app. 52 500 and area of 357 km^2 interferes with region Košice by 95 %. Košicko-prešovská burdened area with app. 424 000 inhabitants and area 1 044 km^2 interferes with region Košice by 81 %. Zemplínska burdened area with app. 173 000 inhabitants and area of 1 040 km^2 interferes with region Košice by 83 %.

72 sites with probable contaminated sites, 21 sites with contaminated sites and 77 remediated and 44 rehabilitated sites were recorded in the region Košice in the framework of Systematic Identification of Contaminated sites in the Slovak Republic *(Paluchová et al., 2006 – 2008).* 6 sites with identified contaminated sites belong to high risk group (according to the criterion K) and they were proposed for priority removal.

Updating and data completion were performed as well as additional impact assessment of the contaminated sites to the

environment in the framework of Regional Studies of Environmental Impacts of the Contaminated Sites for Selected Regions *(Helma et al., 2008 – 2010)*. Updated number of the contaminated sites with **83 probable contaminated sites, 27 contaminated sites, 81 remediated and 44 rehabilitated sites** is one of results of the Regional Study of Environmental Impacts of the Contaminated Sites for Selected Regions - region Košice *(Bočková et al., 2010)*.

8 sites with contaminated sites belong to high risk according to the basic classification (criterion K) at present, 7 out of them belonging among high risk also due to overall assessment of the environmental impacts of the contaminated sites (according to criterion V).

Probable contaminated sites in the region Košice (RCS – part A)

9 sites with low risk, 57 sites with moderate risk and 17 sites with high risk were recorded out of total number of **83 probable contaminated site in the region Košice** on the basis of the overall assessment of environmental impacts of the contaminated sites (according to criterion V). The highest number of sites (14) was recorded in districts Košice – surroundings and Trebišov, the lowest number in district Sobrance (5 sites). Waste handling has a dominant position regarding the type of activities – 39 out of the total number of 83 PCS are municipal or industrial waste landfills, representing up to 47 % form all probable contaminated sites in the region. Most of them are located in the district Košice - surroundings (11) and Trebišov (9), followed by districts Michalovce, Spišská Nová Ves, Rožňava, Sobrance, Košice II. Agricultural production (13 %) and ore mining (12 %) occupy the next position regarding the reason of the most frequent classification of sites into RCS– part A. District Spišská Nová Ves has the highest number of probable high risk sites.

According to the ranking based on the criterion V, 17 high risk sites are classified out of 20 most risky probable contaminated sites in the region (V > 85 points) and 3 are classified as moderate risk, but closely below the high risk limit (V = 83 to 84 points). 2 out of 83 probable contaminated sites are considered as remediated and/or rehabilitated sites. It means that certain remediation and/or rehabilitation activities were already performed in these probable contaminated sites. In the cases when demonstrably successful remediation and/or rehabilitation was terminated (site without contamination) these sites will not be considered as probable contaminated sites any more and they will be registered only in RCS- part C.

Number of probable contaminated sites according to level of risk

District	Number	Low risk (K)	Moderate risk (K)	High risk (K)	Low risk (V)	Moderate risk (V)	High risk (V)
Gelnica	7	0	7	0	0	5	2
Košice I – IV	4	0	3	1	0	1	3
Košice – okolie	14	2	11	1	2	10	2
Michalovce	13	3	9	1	2	9	2
Rožňava	13	4	9	0	2	11	0
Sobrance	5	0	4	1	0	5	0
Spišská Nová Ves	13	0	11	2	1	7	5
Trebišov	14	0	12	2	2	9	3
Košice district	**83**	**9**	**66**	**8**	**9**	**57**	**17**

Legend to the tables:

K – basic (main) risk classification of the contaminated sites reflecting risk of contamination spread into ground water and via ground water, risk of volatile and toxic substances for the inhabitants, risk of surface water contamination (K < 35 - low risk classification, K = 35 to 65 – moderate risk classification, K > 65 - high risk classification).

R – complementary risk classification of the contaminated sites based on its position in relation to soil, to protected areas, to functional land use, to economical and social land development, to the environmental quality.

V – overall impact (risk) assessment of the contaminated sites to the environment V = K+R (V < 50 - low risk classification, V = 50 to 85 – moderate risk classification, V > 85 - high risk classification).

Contaminated sites in the region Košice (RCS – part B)

On the basis of overall environmental impact assessment of the contaminated sites (according to criterion V), **2 sites with low risk, 18 sites with moderate risk and 7 sites with high risk** out of total number of **27 contaminated sites** were recorded in the region Košice, with the highest appearance in the Michalovce district. No contaminated sites was recorded in district Sobrance. Contaminated sites in the region Košice are represented dominantly by waste handling facilities (9) - municipal and industrial waste landfills, sludge deposits and one deposit of liquid / paste wastes that form 33 % of all contaminated sites (RCS - part B) in the region. Industrial production is another dominating group of activities (8), that is represented by metallurgy and engineering, gas industry, production of chemicals, finishing of metals and energy production, and it forms 30 % of all contaminated sites in the region. Activities like ore mining (4), storage and distribution of goods (3), transport (2) and military bases (1) are less frequent in the region.

Among 20 most risky contaminated sites in the region, according to the ranking of criterion V, 7 are classified as high risk sites (V > 85 points), 13 as moderate risk while 1 out of them is closely below the high risk limit (V = 85 points).

The first eight sites with the highest risk according to the overall environmental impact assessment of the contaminated sites (following criterion V) in the region are also most risky sites from the basic risk classification point of view (following criterion K), with only slightly exchanged position of them. In more detailed assessment of risk we evaluated the contaminated sites according to the partial criteria K1+K3 (relation of CS to water), K2+R5 (relation of CS to human health), R1 (relation of CS to soil), R2 (relation of CS to protected areas), R3+R4 (relation of CS to landscape and socio-economical development), entering the environmental impact assessment of contaminated sites. Sites *GL (006) B / Smolník - ťažba pyritových rúd, KS (012) B / Poproč - Petrova dolina, K1 (003) B / Košice - Ťahanovce - terminál Slovnaft* are in addition to the overall impact

assessment also priority high risk sites from the point of view of 3 partial criteria in the framework of Košice region - from the point of view of water protection view (ground water as well as surface water) and human health as well as from the landscape and socio-economical development point of view. *SN (003) B / Krompachy - Halňa, TV (005) B / Čierna nad Tisou - prekládková stanica, GL (011) B / Prakovce - skládka PO - Depónia II* are in addition to the overall impact assessment also priority high risk sites from the point of view of threatening human population health and landscape and socio-economical development. *MI (021) B / Pozdišovce - objekty bývalých štátnych hmotných rezerv* is a priority high risk site due to water protection (ground water as well as surface water) and human health. Priority risk sites due to water protection (ground water as well as surface water) in addition to the overall impact assessment: *MI (023) B / EVO Vojany - centrálna časť areálu, SN (006) B / Rudňany - ťažba pyritových rúd* is in addition to the overall impact assessment priority risk site because of human population health threatening. Site *K4 (002) B / Košice - Juh - VSS Košice* is a priority risk site because of water protection (ground water as well as surface water) and in relation to landscape and socio-economical development, however, it does not belong to the top 10 priority sites with the highest risk as regards the overall impact assessment. Sites *RV (011) B / Plešivec - retenčné nádrže* GL (010) B / *Prakovce - skládka PO* and *KO - Depónia I, K2 (003) B / Košice - Šaca - okolie areálu U. S. Steel* pose priority risk only from the water protection point of view (groundwater as well as surface water). Site *KS (008) B / Medzev - Strojsmalt* is a priority risk due to landscape and socio-economical development. Sites *MI (005) B / Maťovské Vojkovce - rušňové depo Maťovce, K2 (002) B / Košice - Šaca - areál U. S. Steel* are priority risk sites because of human population health threatening. Site *MI (011) B / Strážske - Chemko - časť výrobného areálu* is a priority risk due to landscape and socio-economical development.

All 27 sites comprise certain risk for ground water and 23 sites risk for surface water out of the total number 23 contaminated sites. Cumulative risk of contamination of both, surface and ground water appears in 23 sites. No contaminated site is located in the protection zone of water resource. One site in district Rožňava is located in the protection zone of natural medicinal resource and natural mineral water resource: *RV (011) B / Plešivec - retenčné nádrže.* The highest value of partial criterion K1+K3 was calculated for the site *MI (023) B / EVO Vojany - centrálna časť areálu.*

Threatening of soil is relatively low in the region Košice. High risk contaminated sites with R ≥ 9 is not present in the region Košice. Contaminated sites do not threaten protected areas to a higher extent in the region Košice. Additional investigation shown that value R2 ≥ 6 was never reached. However, conflicts appear even in cases when site does not belong to 20 top risk ones in the region: 2 sites are located in Special Protection Areas *MI (003) B / Jovsa - skládka komunálneho odpadu - Vihorlatské vrchy, SN (014) B / Rudňany - ťažba pyritových rúd - Volovské vrchy*, in the territory of spa - 1 site *KS (008) B / Medzev - Strojsmalt* - spa area Štós and in eco-stabilisation landscape elements - 4 sites - *MI (004) B / Lastomír - skládka TKO* crosses biocorridor of region importance Laborec, *SN (003) B / Krompachy - Halňa* - regional biocorridor Hornád, *K4 (001) B / Košice - Juh - stará plynáreň* - biocorridor of supregional importance Hornád, *GL (012) B / Smolník - ťažba pyritových rúd* - regional biocorridor Malý Rybník. Large-scale and small-scale protected areas do not contact the contaminated sites, nor areas of community importance, Ramsar sites or monumental reserves.

Recognition that 8 sites among 27 contaminated sites are at the same time remediated and/or rehabilitated sites is considered a positive finding. It means remediation and/or rehabilitation works were already performed or are performed at present on 30 % of the contaminated sites. In the cases of finalisation of demonstrable successful remediation and/or rehabilitation (site without contamination) they will not be considered as contaminated sites and they will be recorded only in RCS- part C.

Number of contaminated sites according to level of risk

District	Number	Low risk (K)	Moderate risk (K)	High risk (K)	Low risk (V)	Moderate risk (V)	High risk (V)
Gelnica	3	0	1	2	0	1	2
Košice I – IV	5	0	4	1	0	4	1
Košice –okolie	2	0	1	1	0	1	1
Michalovce	10	2	6	2	2	7	1
Rožňava	4	1	3	0	0	4	0
Sobrance	0	0	0	0	0	0	0
Spišská Nová Ves	2	0	1	1	0	1	1
Trebišov	1	0	0	1	0	0	1
Košice district	**27**	**3**	**16**	**8**	**2**	**18**	**7**

The most risky contaminated sites (RCS – part B) in the region

N.	Sites	District	K	R	V
1	***GL (006) B / Smolník - ťažba pyritových rúd***	***Gelnica***	***96***	***30***	***126***
2	***SN (003) B / Krompachy - Halňa***	***Spišská Nová Ves***	***82***	***30***	***112***
3	***KS (012) B / Poproč - Petrova dolina***	***Košice - okolie***	***84***	***27***	***111***
4	***K1 (003) B / Košice - Ťahanovce - terminál Slovnaft***	***Košice I***	***83***	***27***	***110***
5	***TV (005) B / Čierna nad Tisou - prekládková stanica***	***Trebišov***	***83***	***24***	***107***
6	***GL (011) B / Prakovce - skládka PO - Depónia II***	***Gelnica***	***76***	***24***	***100***
7	***MI (021) B / Pozdišovce - objekty bývalých štátnych hmotných rezerv***	***Michalovce***	***78***	***16***	***94***
8	**MI (023) B / EVO Vojany - centrálna časť areálu**	**Michalovce**	**67**	**18**	**85**
9	**SN (006) B / Rudňany - ťažba pyritových rúd**	**Spišská Nová Ves**	**60**	**20**	**80**
10	**RV (012) B / Rožňava - mrak chlór. uhľovodíkov pri kasárňach**	**Rožňava**	**62**	**15**	**77**
11	K4 (002) B / Košice - Juh - VSS Košice	Košice IV	49	27	76

N.	Sites	District	K	R	V
12	RV (011) B / Plešivec - retenčné nádrže	Rožňava	60	15	75
13	MI (004) B / Lastomír - skládka TKO	Michalovce	50	24	74
14	MI (005) B / Maťovské Vojkovce - rušňové depo Maťovce	Michalovce	59	15	74
15	GL (010) B / Prakovce - skládka PO a KO - Depónia I	Gelnica	50	24	74
16	K2 (003) B / Košice - Šaca - okolie areálu U. S. Steel	Košice II	49	21	70
17	KS (008) B / Medzev - Strojsmalt	Košice – okolie	48	22	70
18	MI (011) B / Strážske – Chemko – časť výrobného areálu	Michalovce	45	24	69
19	K4 (001) B / Košice - Juh - stará plynáreň	Košice IV	41	27	68
20	K2 (002) B / Košice - Šaca - areál U. S. Steel	Košice II	46	21	67

Legend to the table:

Priority contaminated sites in the region are marked with boldface, high risk contaminated sites are marked with italics.

Krompachy - Halňa (contaminated site)

Remediated and/or rehabilitated sites in the region Košice (RCS - part C)

121 sites were originally classified as RCS - part C, their number increased after updating to 125. 81 remediated and 44 rehabilitated sites are recorded out of these 125 sites in the region. Storage and distribution of goods dominates among the individual types of activities in the region (38 %) and waste handling facilities (35 %) out of all remediated and/or rehabilitated sites in the region. Industrial production follows (10 %), namely energy production, military bases, transport (5 %) and agricultural production (4 %). 3 sites after construction activities and one ore mining sites were remediated and/or rehabilitated among the other types of activities.

74 sites with finalised remediation and/or rehabilitation out of 125 remediated and/or rehabilitated sites are classified only in RCS - part C, demonstrably without contamination. The resting 51 sites do not meet one some of the above defined conditions. They comprise sites with ongoing remediation, eventually with residual contamination, or sites with lack of data on actual contamination situation, some of them are classified also in RCS - part A or RCS - part B. It is necessary to mention in this context that classification of certain site to RCS - part C did not automatically mean that this particular site was or still is contaminated site, or any indications of contamination exist. It solely means that remediation and/or rehabilitation of this site was or still is performed, or protection element against pollution spread was installed as a minimum requirement (e.g. physical barrier - underground sealing wall).

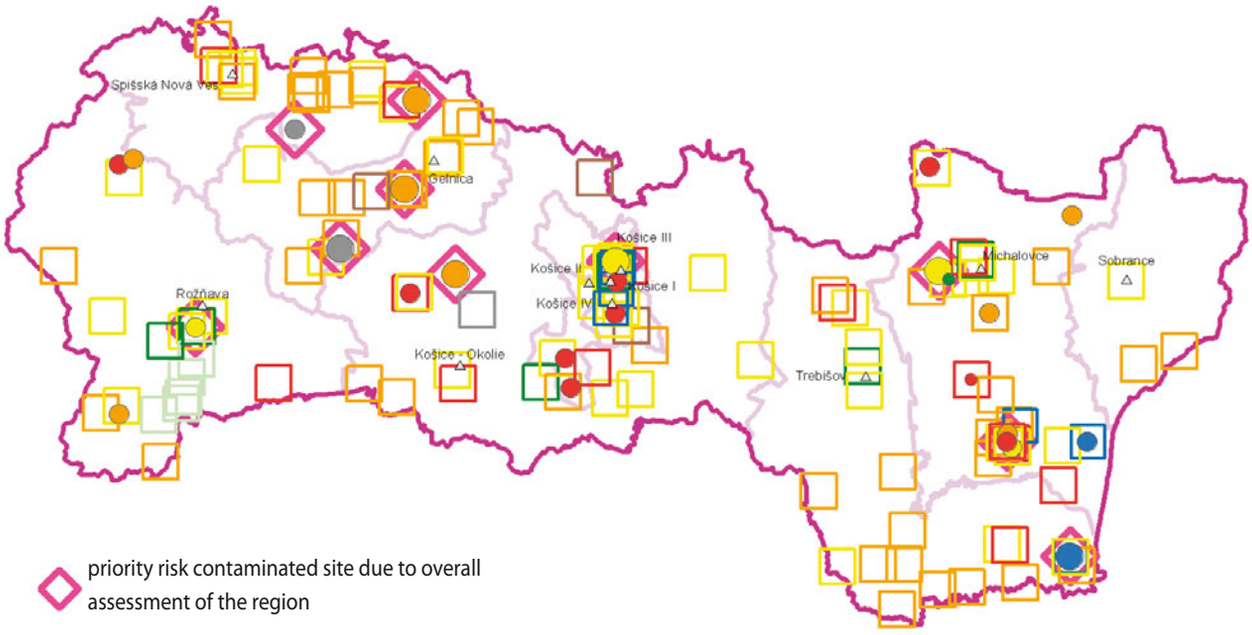
19 sites out of 125 remediated and/or rehabilitated sites are considered as probable contaminated sites at the same time (9 sites) or contaminated sites (10 sites). 4 remediated and/or rehabilitated sites are in parallel a priority high risk contaminated sites: *K1 (003) C / Košice*

- Ťahanovce - terminál Slovnaft, TV (005) C / Čierna nad Tisou - prekládková stanica, GL (011) C / Prakovce - skládka PO - Depónia II, MI (023) C / Vojany - centrálna časť areálu. GL (004) / Prakovce - skládka PO a KO - Depónia I, KS (008) / Medzev - Strojsmalt, MI (004) / Lastomír - skládka TKO, MI (005) / Maťovské Vojkovce - rušňové depo Maťovce, MI (017) / Vojany - prevádzka SWS Vojany are in parallel remediated and/or rehabilitated sites and moderate risk contaminated sites. *MI (001) / Budkovce - prečerpávacia stanica ropy* is remediated and at the same time low risk contaminated sites. Most of the mentioned sites are under ongoing or not finalised remediation (e.g. consecutive works).

Number of remediated and rehabilitated sites in the region

District	Number	Remediated sites	Rehabilitated sites
Gelnica	13	4	9
Košice I – IV	19	18	1
Košice – okolie	14	11	3
Michalovce	23	16	7
Rožňava	17	14	3
Sobrance	3	1	2
Spišská Nová Ves	15	7	8
Trebišov	21	10	11
Košice region	**125**	**81**	**44**

Košice region



priority risk contaminated site due to overall assessment of the region

RCS part B (contaminated sites)

Type of activities
- industrial production
- storage and distribution of goods
- transport
- waste disposal
- military bases
- mining

Category of risk classification
- low risk (V < 50)
- moderate risk (V = 50 – 85)
- high risk (V > 85)

RCS part C (remediated and rehabilitated sites)

Type of activities
- agricurtural production
- industrial production
- storage and distribution of goods
- transport
- waste disposal
- military bases
- mining
- building (construct) production

Information System of the Contaminated Sites

Information System of the Contaminated Sites (IS CB) serves for collection of data and for providing of information on the contaminated sites. Its development represents one of the outputs of the project ***Systematic Identification of Contaminated sites in the Slovak Republic*** that was implemented by the Slovak Environmental Agency during years 2006 - 2008 under responsibility of Ministry of the Environment SR (MoE SR). The test operation of the IS CS is available at url address http://enviroportal.sk/environmentalne-zataze/ since the beginning of year 2009. The presentation interface is integrated into the web portal Enviroportal. What inspired us to integrate IS into the Enviroportal framework? In the sense of development concept of IS in the sector of MoE SR for the years 2008 - 2013 it is defined as second level portal of the central portal of public administration, so called sector portal for the environmental sector. Information and services related to the issues of the contaminated sites (CS) under responsibility of the Ministry of the Environment should be offered in transparent and accessible form by this portal. However, the same information and services will be shared by the common interface also by the central portal of the public administration in the future (CPPA).

Searching for information in the registers of IS CS

Information on distribution, character and predicted risk level of the identified CS were gathered during implementation of the project Systematic Identification of Contaminated sites in SR and this information were entered into Register of Contaminated sites (RCS) in parallel. This register became an integrated part of the developed IS CS. The sites are classified into three basic registers under RCS:

a) RCS – part A, containing records of probable contaminated sites,
b) RCS – part B, containing records of contaminated sites,
c) RCS – part C, containing records of remediated and recultivated sites..

The actual version (May 2010) of RCS contains information on 1 645 sites, with 878 sites listed among RCS – part A, 257 sites among RCS – part B and 684 sites among RCS – part C. 174 sites are parallel recorded in two sections of RCS at present, i.e. 83 sites under RCS parts A and C, and 91 sites under RCS parts B and C.

During the creation of presentation interface allowing retrieving information in the mentioned registers by the standard (unauthorised) user we applied procedure that could distinguish two types of potential users:

- on one hand there is so called conservative user we left the option of traditional information retrieval in the registers by pre-defined attribute filters (*Figure 1 – Attribute search*). The retrieved information is shown in tables from which the user can refer to into the screen offering the information on two levels of detail,

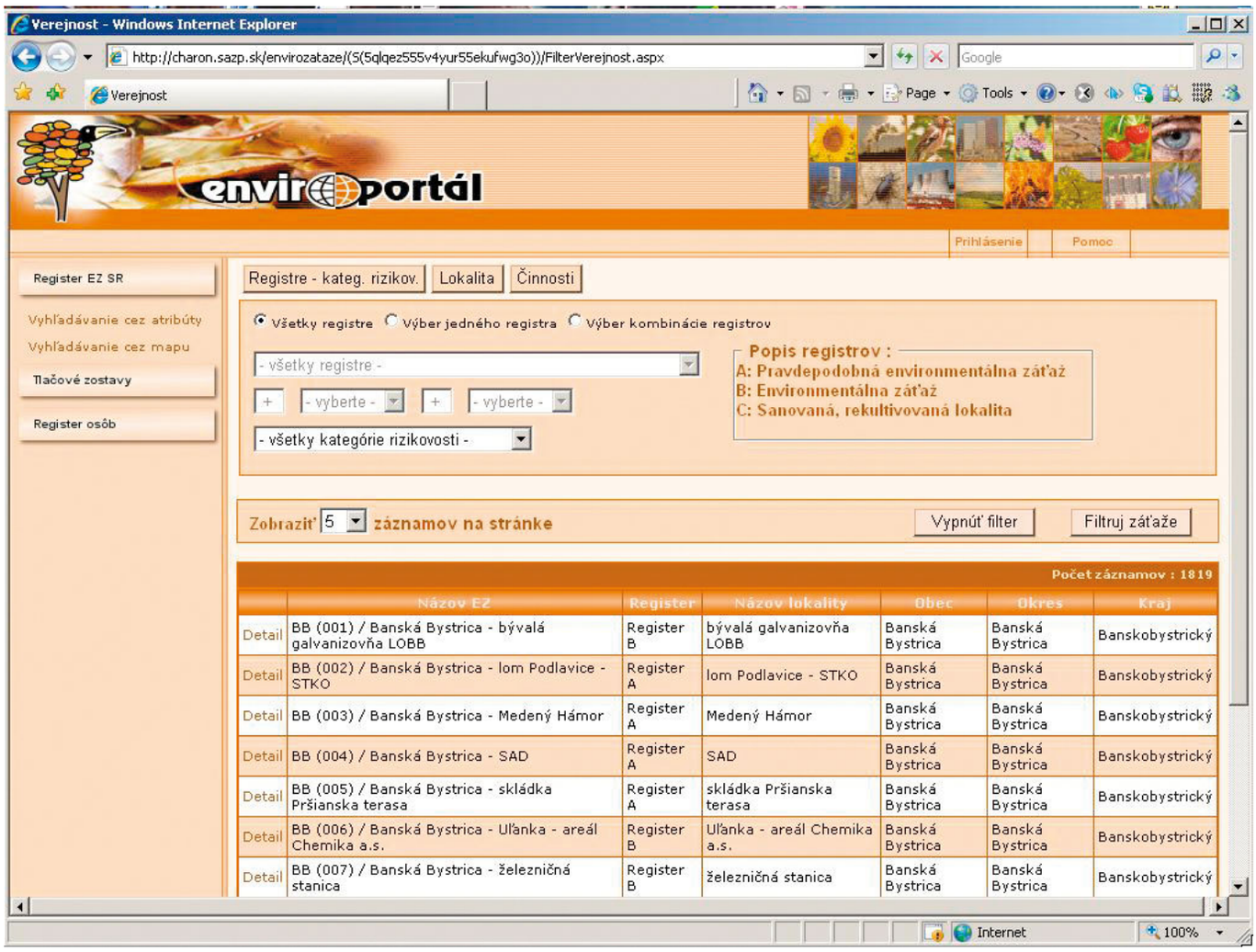


Figure 1Attribute search

- on the other hand the existence of so called "smart user" who is opened to the new forms of web presentation, who experiments more with the information and who is able to process also geographical information convinced us to create a new presentation interface (*Figure 2 – Searching over maps (spatial search)*). We incorporated simple tools to this interface that can process the information also via geographic area

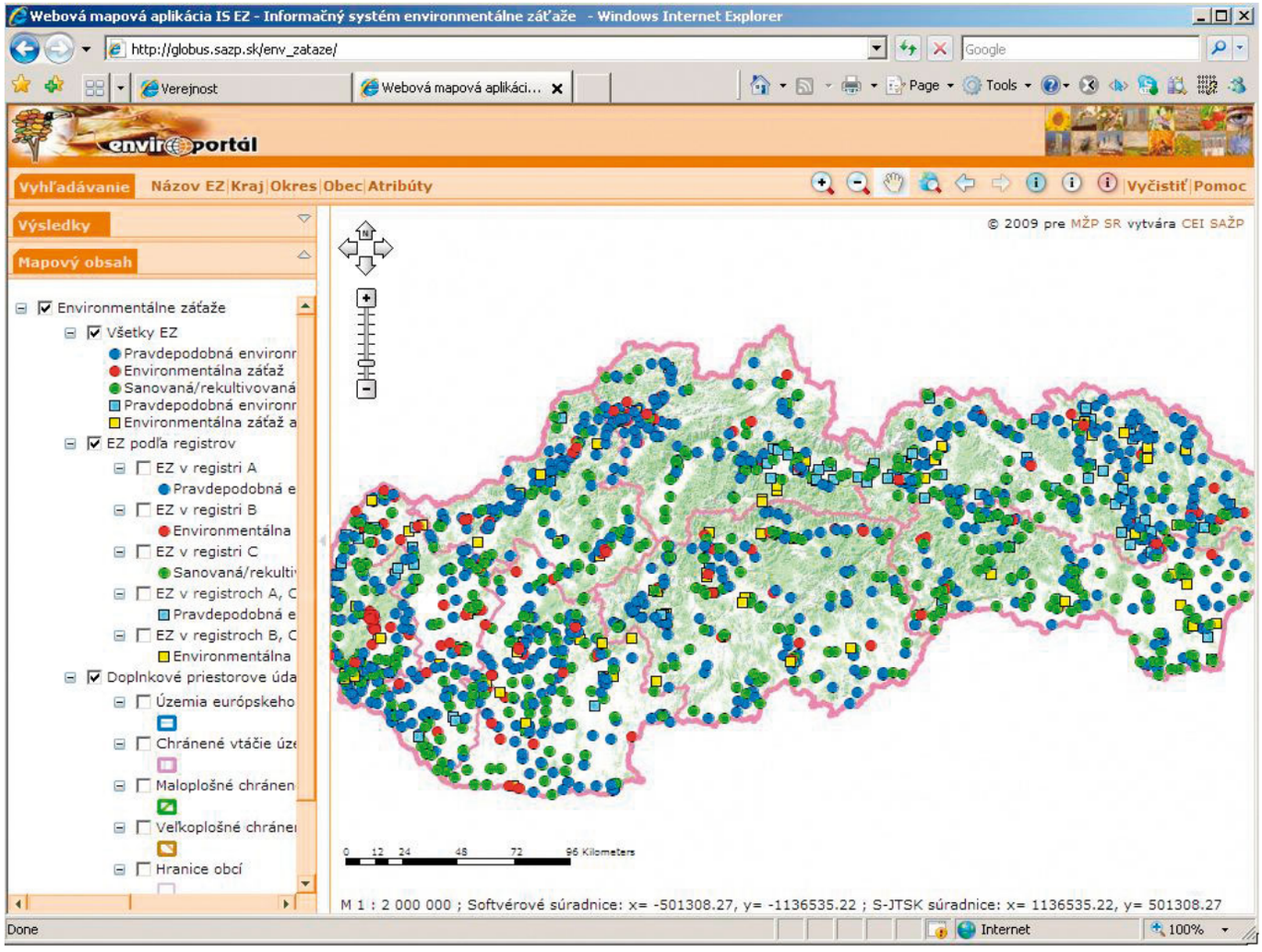


Figure 2 Searching over maps (spatial search)

It is extremely interesting for the conventional user who is search data on CS that both above mentioned presentation interfaces are mutually linked. By simple reference the user can click from the level of retrieved information in the form of detailed register listings (attributes) to the level of presentation of the retrieved objects on the interactive map. The mutual link of both presentation interfaces certainly works also in the opposite direction.

Interface for search, search filters, generated lists

The basic interface screen allows for searching of registers by definition of input parameters (entering of parts of retrieved expressions, selection form pre-defined lists). It is split to the filter section and section of displaying retrieved information into list (table). Retrieval using a filter is separated into three separate substantial sectors: a) searching according to incorporation of CS to the individual register sections and according to risk category of CS (category of risk is expressing urgency of investigation, monitoring or remediation activities and it is specified only for CS listed among RCS parts A and B), b)searching according to geographical, administrative units under borders of which the CS was recorded, c) searching according to the activity due to which the CS was generated. The filters operate by so-called intersection mode, i.e. the information will be gathered only in case when all selected parameters are met.

Displaying of information detail

Data on registered CS are complex and their presentation on the level of a single screen would not provide an easy survey. Displaying of CS data in two detail levels was therefore proposed. The user will define the retrieval by setting of filters. System will display the list (table) of all CS that correspond to the retrieval criteria. CS in the displayed list is identified by its own name, classification to the register and geographical localisation on the level of basic administrative units. Screen with CS information sorted into substantial blocks appears after clicking to the url reference "Detail". A group of data describing substantially the given block was selected for each block (e.g. block "Implemented measures" is described by type of works and supplier who performed the works). The user can refer to the next level of detail where he can gather more detailed information.

Gathering of detailed information on CS by refer the user the user into the screen with a higher detail level is allowed only for CS classified into RCS parts B and C at present. Presentation of detailed information for CS classified into RCS part A is blocked for general public. The reason for blocking of the detailed listings is that the causer or holder of EB entered by the annotator (usually the owner or operator of the site) is not legally responsible, i.e. it does not exists de iure (process of administrative procedure was not performed during which the regional environmental authority defined the responsible person). It is necessary to notice in parallel that for CS classified into RCS part "A" exceeding of risk criteria was not unequivocally identified. Exceeding of these criteria can only be confirmed by performance of investigation works or monitoring of the site in question. Certain risk of misuse of goodwill of the causer appears during publication of data on the site listed among RCS part A, which could lead to judicial delays. This information is of course available in the IS CS part that is accessible for authorised users - representatives of state and self government authorities or annotators authorised for updating of information.
Information on sites classified into RCS parts B and C are available for standard user only to limited extent, and they are categorised into the following substantial blocks:

- **General data** – data on the site, activity characteristics and CS, holder of CS. Also pictures gathered during the EB identification process, important documents issued during the CS lifecycle, i.e. during implementation of different activities, during the administrative procedure, important notifications, minutes, reports etc. You will find also data on annotator who is bearing the responsibility for accurate filling of the registration form. Regarding the registered documents it is necessary to notice that the standard user will reach only the list of documents, he will not be able to read their content. This service is opened only for a user who has permission to reach so called authentificated zone.

- **Natural conditions characteristics** – data on site relief, hydrological and geological composition and important data on CS appearance on sites classified as protected areas comprising biotopes of community and national interest, bird biotopes including migrating species.

- **CS classification** – data are displayed to the standard user only for site classified as REB part B. Classification means assessment of risk level of CS for human health and ecosystems. It can be understood as very schematic risk analysis. Risk assessment was performed for all CS classified as RCS part A and B and it can be based on verified (B) or predicted (A) data. The risk is expressed by an absolute value on the basis of which the site is classified into one of the categories - site with low, moderate or high risk. The level is always sum of absolute values of three independently performed classifications: risk classification of migration to ground waters and via ground waters, risk classification of volatile and toxic substances, risk classification of contamination of surface waters.

- **CS categorisation** – data are displayed only for site classified as RCS part C. The site was classified into category on the basis of implemented remediation and recultivation activities. In the case of recultivation activities, three categories are distinguished under coarse classification - illegal landfills, landfills operated under special conditions, and legal landfills. In the case of remediated sites also the following was considered during their classification: project documentation availability, extent of remediation activities and presence of monitoring system.

- **Implemented activities** – data on performed investigation, remediation and recultivation activities, but also data on performed risk analysis. In the case of remediation works, detailed overview of implemented remediation methods is displayed in compliance with the categorisation elaborated by the European Environmental Agency (EEA).

Web-based map application

As it was mentioned above, the application interface allows for searching of information with help of attribute filters, and it is closely linked with the interface that works with spatial information in the form of interactive maps and developed functionality above these maps. GIS client uses digital map product entitled SVM 50 as a basis for geo-spatial visualisation of data on location of EBs. The basic data structures of this digital map product enriched by supplementary information in the form of border lines of the administrative units and border lines of protected areas. Displaying of supplementary spatial data is not automatic, their visualisation depends on the wishes of the user. Default displaying of location of all sites can be changed - in structure according to their classification into the individual RCS parts by switching on or switching off the corresponding map layers in the window "Map content". Only the simplest tools are shown for working with the map that allow for zooming in and zooming out, moving of map, identification of elements of switched on or switched off layers, attribute searching of subjects and returning to the basic scale level 1:2 000 000. We tried to make the work with interactive map as easy as possible by avoiding use of many complicated tools. Similarly, we relieved the spatial identification of elements from exhaustive listing of information on the site. The user gathers only the listing of most important attributes via the tool "Identification of features (CS name, local name of the site, list of activities that caused CS, classification into the individual RCS parts). When interested, the user can gather detailed information on CS thank to the mentioned link of two independent presentation interfaces by clicking on url reference "Registered as".

It is necessary to state a concluding notice: the user can perform also an attribute query or he can search the elements on the map. The user will specify the name of administrative unit by its selection from the list of regions or districts, eventually by entering the name of municipality or particular contaminated site (the record ignores capitals and diacritic marks). If the search is successful, name of unit category by which the element(s) was searched will be displayed in the window "Results" (e.g. municipality), it is followed by name of layer in which the result was found (e.g. border lines of the municipalities) and the name of the element itself is shown lastly (e.g. Zvolen). Right mouse click onto the items in the window "Results" will show contextual window with tools. Clicking onto the button "Zoom in selected elements" in the window "Results" will display the border lines of wanted administrative unit in the map section of the interface (*Figure 3– Attribute identification of elements and their map visualisation*). Detailed description of this functionality with many demonstrations can be found by regular user in the section "Help" of the presentation interface of the GIS client.

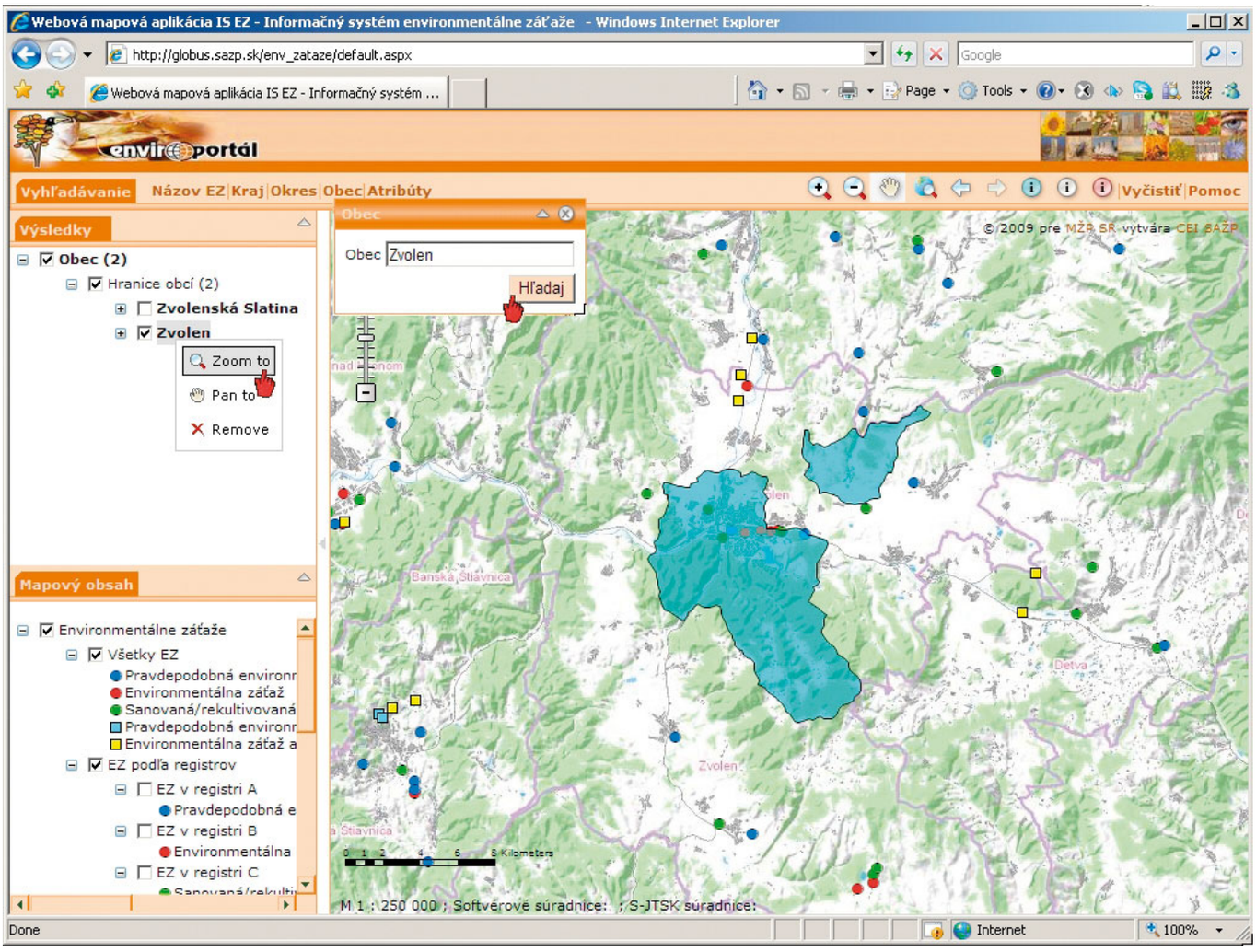


Figure 3 Attribute identification of elements and their map visualisation

Printouts

The standard user is interested not only to retrieve and evaluate the information in the individual REB parts but also to print it out or to send it to another person. Each user can generate the print out as unofficial output in the section "Printouts" (*Figure 4 – Printout*). The output is generated in HTML format or in another usual format for sharing of documents - PDF (Portable Document Format). User himself defines the content of printout. Generation of printout is performed in four steps: 1. site selection for which the printout is needed, 2. selection of data that should be involved in the printout, 3. entering of verification code for printout generation, 4. export of the output the document of pdf format. We created additional service "Printout tutorial" for the users who are not sure in the application of the individual steps of printout generation under the option "New printout", and this service helps the user to reach the same required output by an interactive approach.

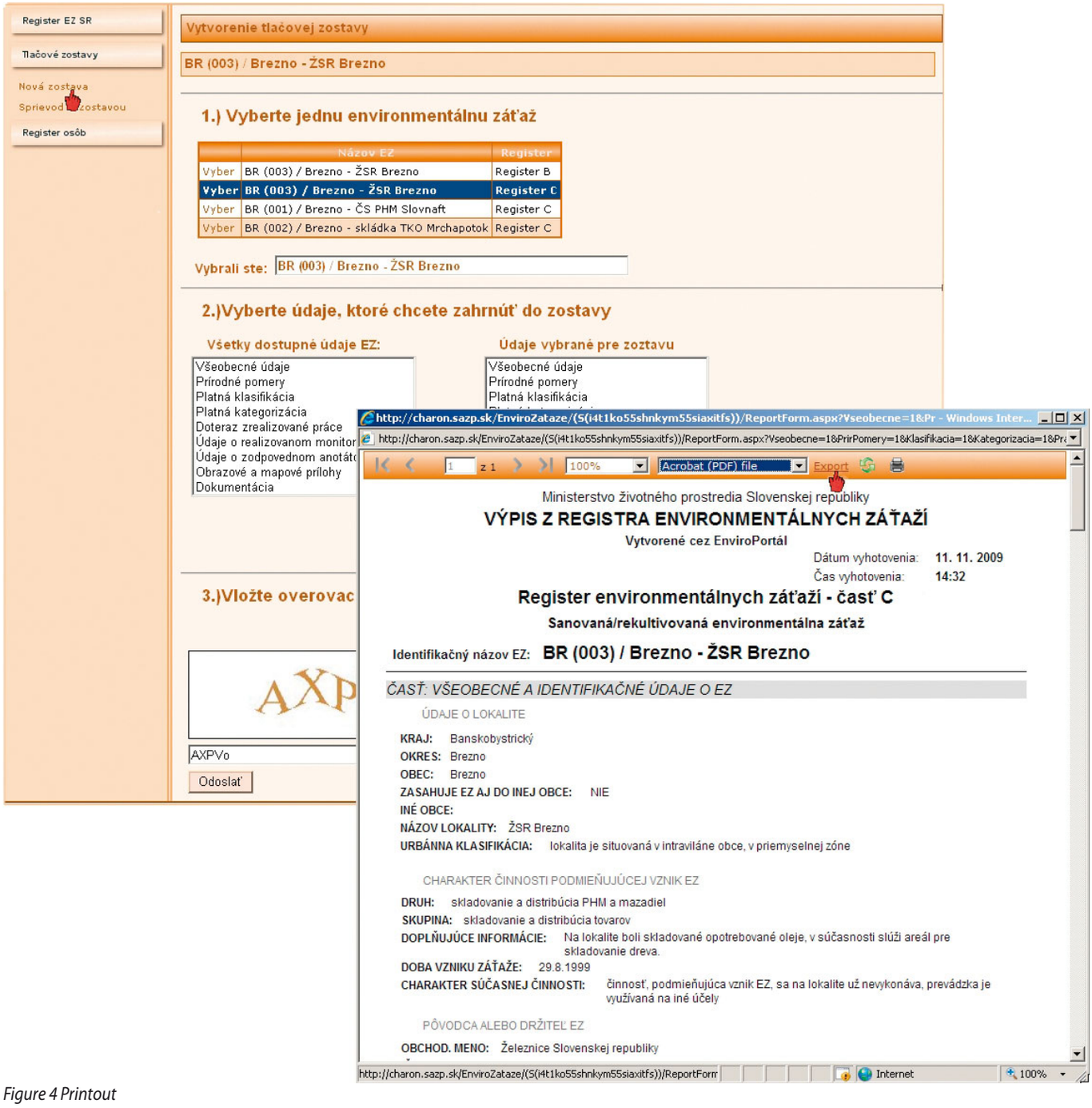


Figure 4 Printout

What to expect in the future

IS CS development is related to the project *Finalisation of the Information System of Contaminated sites,* which is implemented in the framework of Operation Programme Environment. This project comprises activities oriented in reaching of the following objectives:

- Accessibility of IS EB to handicapped persons, especially to users with visual handicap. This accessibility is based on implementation of regulation on standards for ISVS (Information Systems of Public Administration (No. MF/013261/2008-132 on addressing the issues of accessibility of web pages to SR citizens with handicap.
- Full operation of IS CS including annual upgrade of presentation interface and functionality according to the requirements of the MoE SR (years 2009 – 2013). Offering of services to the broad public via Enviroportal and EnviroInfo.
- Monitoring and updating of information in the individual RCS parts by obliged persons and ensuring of their mutual consistence.
- Finalisation of IS CS linkage to the other information systems under operation.
- Complex analysis of requested documents, elaboration and publishing of requested forms according to the requirements of MoE SR.

Information and education campaign for state administration employees forms a separate segment of the project, especially for regional environmental authorities, Slovak Environmental Inspection, self-governments (mainly higher territorial units and municipalities), specialists for contaminated sites from other ministries.

Ing. Erich Pacola, PhD.,
Slovak Environmental Agency,
Banská Bystrica

Atlas of Remediation Methods for Contaminated Sites

In December 2008 the State Geological Institute of Dionýz Štúr launched the project of Atlas of Remediation Methods for Contaminated Sites (Atlas), which is funded by the European Union - European Union Cohesion Fund under the Operational Programme Environment.

Atlas Compilation

The contaminated sites in the Geological Act amendment (Act No. 569/2007 Call on Geological Works) are defined as territory pollution caused by human activity, which poses a serious risk to human health or the rock environment, groundwater and soil with the exception of environmental damage. To reduce the negative impacts of polluted or contaminated sites on humans and other components of the environment numerous remediation procedures have been currently developed in order to remove contaminants from the environment (especially from the ground and groundwater), or to reduce the risk to an acceptable level (remediation limit).

Research and development of innovative technologies that help to achieve good results in a shorter remediation time and lower costs continues steadily. For this reason it was necessary to create a comprehensive, transparent publication of existing methods as a tool for selecting appropriate remediation methods based on the nature of pollutants, the rock environment in which the contamination occurs, the time needed for effective implementation of the method, the effectiveness of a selected method and economic inputs (indicative estimate of the cost of the remediation).

Remediation Methods

The project objective is a knowledge processing of methods for contaminated sites remediation and their summary in the form of Atlas, which will become a component of the Information System on Contaminated sites and will provide data for the National Programme of Contaminated sites Remediation.

The Development of Information System of the Contaminated Sites is based on the systematic identification of contaminated sites in Slovakia, which took place in the scope of the geological project during the period of May 2006 until the end of 2008. A component of the Information System of Contaminated Sites will become the register (Atlas) of remediation methods. At present, there is no publication that would provide comprehensive information on available remediation methods and technologies, as well as new trends and innovative approaches for remediation of contaminated sites. The total envisaged number of analysed remediation methods of contaminated sites is eighty. Included will be the remediation methods of unsaturated zone of solid materials, groundwater and soil air and, accounting for the site of remediation methods implementation, ex situ as well as in situ, which have recently become increasingly popular. In addition to the description and the principles of individual remediation methods of contaminated sites the Atlas will also contain recommendations for the use of remediation methods for specific types of pollutants, their effectiveness, advantages and limitations, as well as examples of implementation of various remediation methods. In brief, the Atlas deals with the essential requirements for surveillance and monitoring of contaminated sites, and legislative regulations for the remediation of contaminated sites. The Project completion is scheduled for November 2010. The project will include the following activities:

- Professional studies for elaboration of remediation methods of environmental loads, in which approximately eighty remediation methods will be processed based upon own investigations, searching works, professional translations of recent expert studies abroad. This concerns the remediation methods of soil, alluvial sediments and sludge, both in-situ and ex situ, methods for remediation of groundwater and surface water (in-situ and ex situ), methods of soil air remediation, nanotechnologies and innovative remediation methods for rock environment. Based upon expert studies, there will be elaborated information on the combination and integration of remediation methods for selected groups of pollutants, most widely appearing contaminants and the characteristics of used data required for remediation of groundwater, surface water, leachiest and rock environment.
- Processing of the survey of remediation methods of contaminated sites in Slovakia on the basis of the implemented remediation. The knowledge and experience from the remediation methods in Slovakia will be gathered, along with the information on their effectiveness, costingness and consume time. This part of the Atlas will be valuable background information and practical implications of remediation works, especially from Slovakia, but also from Bohemia.
- The compilation of the Atlas of Remediation Methods for Contaminated Sites, its printing and digital processing. The printed version of the Atlas will provide the possibility of rapid obtaining of basic information about theoretical and practical issues of implementation of remediation methods. The Atlas printouts will complement the electronic version, which will serve as a flexible electronic information source, with the possibility of its further extension, update and supplement.

Workshop

The project will organize training workshop on remediation methods, to be held in September 2010; updated information about the project are published on the website www.geology.sk . The Atlas of Remediation Methods for Contaminated Sites will become a part of the Information System of the Contaminated Sites and it will provide the information to the general public through Enviroportal (www.enviroportal.sk). It will be complemented continuously by innovative new technologies and knowledge and experience from remediation implemented in Slovakia and worldwide.

Project results

The Atlas of Remediation Methods for Contaminated Sites will be published in hard copy form and distributed among the competent authorities and offices of municipalities and towns throughout the Slovak Republic:

- state administration officials, particularly district environmental offices, the Slovak Environmental Inspection;
- professional institutions dealing with contaminated sites issues.

We believe that the project results will contribute to improving public access to information on the remediation of contaminated sites and will foster the quality and participation in environmental decision-making.

We strongly hope that the National Programme of Contaminated Sites Remediation, along with the information retrieved from the Atlas of Remediation Methods will optimize the remediation costs, will accelerate its implementation and increase its effectiveness. The resulting effect will be the overall enhancement and improved environment in the Slovak Republic, which will help increase the quality of life for all of us.

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State of the Contaminated sites in Slovakia

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