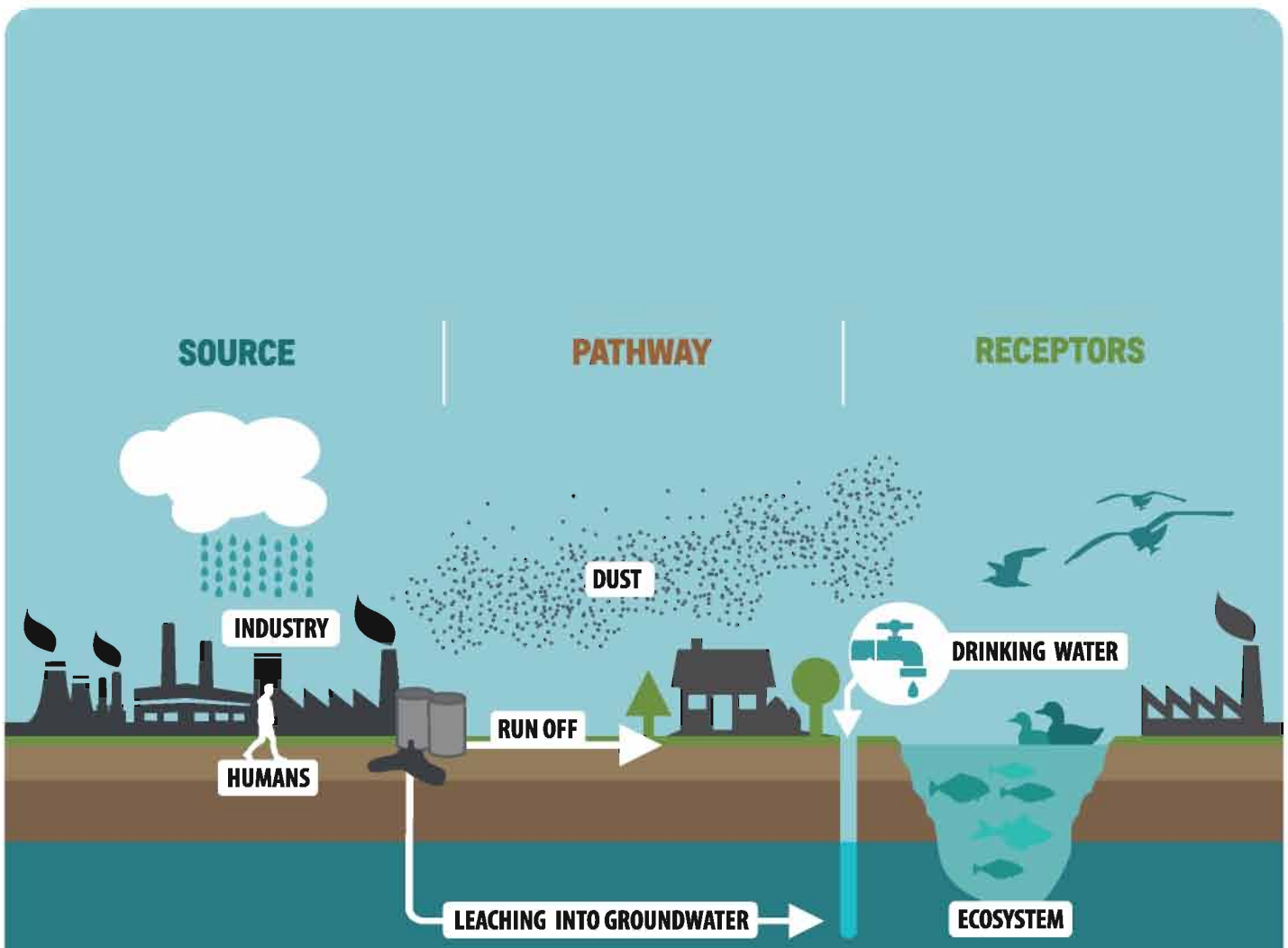


Assistance to the Republic of Serbia in the Implementation of MEAs and EU Obligations through Improvement of Pollution Monitoring of Soil Quality at Industrial Sites

Foreword

Foreword by the Italian Ministry for the Environment, Land and Sea

Through this project, the Italian Ministry for the Environment, Land and Sea (IMELS) is proud to have increased environmental cooperation with the Serbian Environment Protection Agency (SEPA) and the Ministry of Agriculture and Environmental Protection of the Republic of Serbia. The project "Assistance to the Republic of Serbia in the Implementation of MEAs (Multilateral Environmental Agreements) and EU Obligations through Improvement of Pollution Monitoring of Soil Quality at Industrial Sites" co-finances a wider programme promoted by UN Environment and the Global Environmental Facility (GEF), which aims at promoting land management through a cross-sectorial approach. Creating synergies with other funds and programmes is key for avoiding dispersal of efforts and pursue effective and well-focused actions.

The IMELS co-financing project, which aims at strengthening local administrators' technical knowledge and capacities with regard to soil monitoring and requalification, is pivotal not only to the redevelopment of local industrial contaminated areas but also to the accomplishment of the EU acquis and thus to the overall goal of Serbia's integration into the European Union.

The project has proved how joining efforts for a common goal can boost the achievement of concrete results. In this regard, the role that UN Environment – Vienna office plays in the Wester Balkans area is decisive in supporting countries to deliver environmental policies through an inter-sectorial approach involving different levels and departments of the Public Administration. Our strong and long-lasting partnership is testimony to the effectiveness of their work.

This brochure summarizes the contents of the technical trainings held in Italy and Serbia, including field visits on contaminated sites in Serbia, where a wide range of topics were discussed in details, e.g. methodology of conducting risk assessment, implementation safety rules, concrete application of advanced analytical methods on contaminated sites etc.
Such insight and know-how transfer was provided by experts from Italian agencies and institutions (ISPRA, ENEA, ISS and INAIL) to whom we are grateful for their valuable contribution to the success of the project.
Likewise, the project has greatly benefitted from the extremely positive and can-do attitude of the Serbian Environment Protection Agency and the Serbian Ministry of Agriculture and Environmental Protection.

The project's positive outcomes represent a solid foundation for further intensifying cooperation and exchange with Serbia in the field of environmental protection and sustainable development, in a joint effort for achieving goals set by the most recent international environmental agendas.

Paolo Angelini
Head of Delegation to the Alpine Convention
Responsible for bilateral cooperation in the Balkan region
Italian Ministry for the Environment, Land and Sea

Foreword

Foreword by UN Environment – Vienna Programme Office

The co-financing project *"Assistance to the Republic of Serbia in the Implementation of MEAs and EU Obligations through Improvement of Pollution Monitoring of Soil Quality at Industrial Sites"* granted by the Italian Ministry of Environment, Land and Sea represents a further milestone of mutual cooperation between UN Environment and Italy in the field of environmental protection and sustainable development in the Western Balkans.

This co-financing project, jointly implemented throughout 2016 by UN Environment Vienna Programme Office and a number of Italian and Serbian institutions, aimed at assisting the Serbian Environment Protection Agency (SEPA) in becoming a certified laboratory for soil sampling and supported Serbian colleagues in the purchase of laboratory equipment for soil quality analysis and instrument for data storage. The project also looked into safeguarding SEPA staff members' personal security while investigating polluted sites by assisting in the acquisition of high standards Personal Protective Equipment (PPE) items.

A strong component on capacity building and exchange of experiences between the two countries was assured also thanks to the active participation of several Italian institutions in the joint training including, the Institute for Environmental Protection and Research (ISPRA), the National Agency for New Technologies, Energy and Sustainable Economic Development (ENEA), the National Institute for Health (ISS) and the Institute for Insurance against Accidents at Work (INAIL). In this context, training and field visits were held both in Italy and Serbia.

Summarised in this brochure, the reader will find a selection of valuable slides selected during the joint Italy-Serbia training organised in April, September and November 2016 from presentations held by Italian experts, including insights from Serbia.

UN Environment looks forward to continuing the fruitful cooperation with the Italian Ministry of Environment, Land and Sea, the Ministry of Agriculture and Environmental Protection of Serbia, and the Serbian Environment Protection Agency in the field of soil pollution monitoring.

Harald Egerer
Head
UN Environment – Vienna Programme Office

Foreword

Foreword by Serbian Environmental Protection Agency

The joint Italy-Serbia study visits and capacity building training organized throughout 2016 were an excellent opportunity for cooperation, learning and exchange of national experiences on soil quality deterioration and pollution monitoring. The activities were part of the targeted support by the Italian Ministry of Environment, Land and Sea to the UN Environment/GEF project *"Enhanced Cross-Sectoral Land Management though Land Use Pressure Reduction and Planning"* to which Serbian Environmental Protection Agency (SEPA) is a partner and a beneficiary.

The joint sessions provided us with a better understanding of conventional and innovative methods for investigating soil pollution, environmental reporting in accordance with EU standards, preparatory activities for remediation, risk assessment procedures with a specific focus on application of PRA.MS methodology, on-site safety measures and personal protective equipment for field investigations, among other.

I would therefore like to extend my gratitude to the Italian Ministry of Environment, Land and Sea for financial support and overall guidance, Italian Ministry of Foreign Affairs for providing an insight into work of the Crisis Unit, City of Rome for opening its doors and showing our team good practice examples, and last but not least - Italian expert institutions ENEA, ISPRA, ISS and INAIL for sharing their valuable expertise and experiences.

I am also grateful to the UN Environment team for organizing and facilitating these beneficial sessions in Serbia and Rome. UN Environment is seen a solid driver of environmental activities in Serbia and we recognize UN Environment's continuous support in developing capacities of SEPA as a national institution for environmental monitoring and reporting.

Thanks to the project, SEPA National Laboratory will improve its performance with the new analytical instrument for soil sample analysis and personal protective equipment identified together with Italian experts, as well with a server for data storage that will allow us to upgrade our IT system and include data and information needed for establishing the Cadastre of Contaminated Sites.

I am looking forward to our continued cooperation with the Italian Ministry of Environment, Land and Sea, and stand ready to further support UN Environment efforts in Republic of Serbia.

Filip Radovic
Director
Serbian Environmental Protection Agency

About UN Environment - GEF Project

A Global Environment Facility (GEF) funded project *"Enhanced Cross-sectoral Land Management through Land Use Pressure Reduction and Planning"* aims at providing the lacking methodologies, knowledge and coordination mechanisms for sustainable and integrated management of soil as a natural resource. The project started in October 2015 and is executed by UN Environment Europe Office – Vienna Programme Office.

The objective of this project is development of instruments and mechanisms for integrated land use management, remediation, and capacity development to reduce pressures on land as a natural resource from competing land uses in the wider landscape and to support reversal of land degradation. This will be accomplished through a number of activities which will have positive early, intermediate and long term results and impacts.

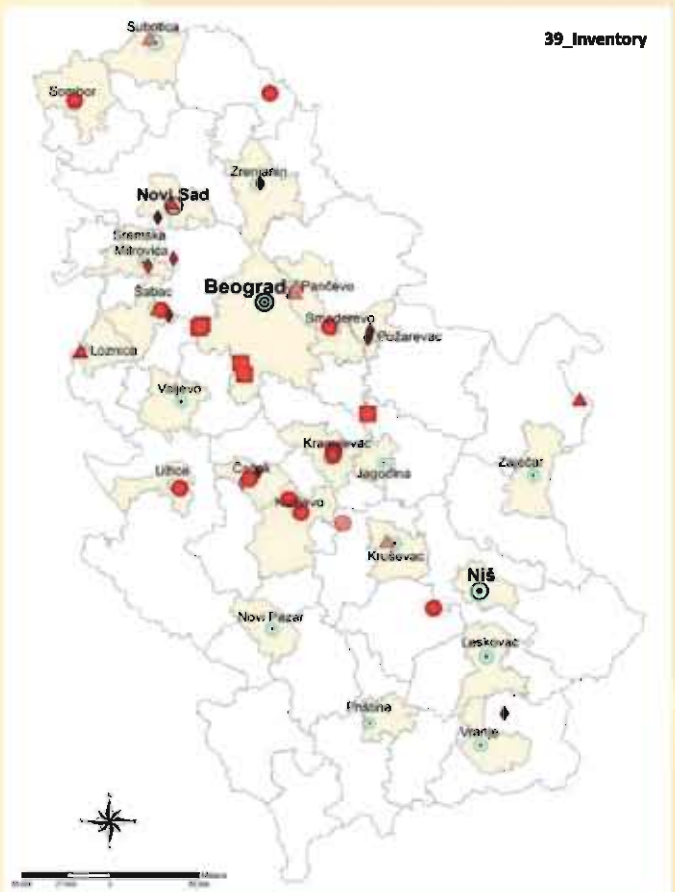


Figure 1. Location of 39 industrial sites (energy production, chemical industry, metal industry, and other) selected from the Inventory of Contaminated Sites for site investigation

Early and intermediate positive results include a number of policy documents and tools for application such as Environmental and Health Risk Assessments, cadastre of degraded "hotspots", an Integrated Land Planning and Management Framework etc.. Expected long term positive impacts include: remediation and amelioration of degraded "hotspots" and improved soil quality and capacity for utilization, enhanced pollution control and reduced pollution impact on the ecosystem and human health as a whole, prevention of further soil loss and maintenance of its quality, especially in the fields of industry, mining, power production and agriculture which are major economic drivers in Serbia.

About the Italian co-financing Project

In the frame of the fruitful bilateral cooperation between Italy and Serbia on environmental protection and sustainable development, the Italian Ministry of Environment Land and Sea granted a contribution to the UN Environment/GEF project through a co-financing initiative entitled *"Assistance to the Republic of Serbia in the Implementation of MEAs and EU Obligations through the Improvement of Pollution Monitoring of Soil Quality at Industrial Sites".*

The project aims at expanding and extending the scope of application of the UN Environment / GEF project by helping Serbia to set up a national soil pollution monitoring system in compliance with the major international environmental agreements (i.e. the UN Convention to Combat Desertification, the UN Sendai Framework Convention on Risk Reduction) and with the EU environmental standards.

The Italian Ministry of Environment, Land and Sea, together with a number of Italian National specialized agency, such as the Institute for Environmental Protection and Research (ISPRA), the National Agency for New Technologies, Energy and Sustainable Economic Development (ENEA), the Italian Health Institute (ISS) and the Institute for Insurance Against Accidents at Work (INAIL), provided its technical assistance to the Serbian counterparts, both the Ministry of Agriculture and Environmental Protection and the Serbian Environment Protection Agency – SEPA.

Training courses and field visits have been organised in order to strengthen the Serbian national capacities for monitoring soil quality and identifying pollution at industrial sites. The project also supported accreditation of SEPA as national laboratory for soil sampling and analysis and provided Serbian colleagues with relevant technical laboratory equipment, such as an Atomic Absorption Spectrometer, Data server storage system and Personal Protective Equipment (PPE) for SEPA staff members investigating contaminated sites.

Industrial contaminated sites in Serbia

Industrial production used to be one of the most dominant economy drivers in the Republic of Serbia. During the past two decades, many of industrial facilities were shut down as a result of a bankruptcy which consequently led to abandonment of these sites and lack of subsequent maintenance. Depending on the type of industrial production, large amounts of different types of chemicals, hazardous substances and waste was left unsupervised. According to the National Inventory of contaminated sites, out of 709 potential sources of pollution, contamination has been confirmed at 128 sites.

About the Serbian Environment Protection Agency

The Serbian Environmental Protection Agency (SEPA) is a legal entity within the Ministry of Agriculture and Environmental Protection, responsible for:

- Development, coordination and management of the **National information system** for environmental protection (monitoring of the state of environmental factors through environmental indicators, the registry of pollutants, etc.);
- The implementation of the national monitoring of air and water quality, including the implementation of prescribed and harmonized programs for air quality, surface water and ground water aquifer and precipitation;
- Management of **National Laboratory;**
- The collection and compilation of environmental data, processing and preparation of reports on the state of the environment and implementation of environmental policy;
- The development of procedures for the processing of environmental data and their assessment;
- Keeping data on best available techniques and practices and their implementation in the field of environmental protection;
- Cooperation with the European Environment Agency (EEA) and the European Network for Information and Observation (EIONET), as well as other duties specified by law.

SEPA operates with a vision to ensure integrated monitoring, establish comprehensive Information system and to enable more timely, accurate and transparent reporting. With only 71 employees, SEPA performs professional tasks related to:

- Creation of the reports
  - Annual State of the Environment Report according to the National List of Indicators
  - Thematic reports (Air quality, Water quality, State of Soil, Biodiversity, Waste Streams, Economic Instruments, etc.)
- Creation of the "Cadaster of contaminated sites"
- Managing the National laboratory which performs:
  - physical and chemical analysis of air, water, sediment and soil parameters
  - assessment of toxicological parameters using the ICP/MS, GC/MS, LC/MS, LC-QTOF/MS
  - assessment of biological elements of water quality
  - quality management system ISO/IEC 17025:2006
  - callibration of automatic air quality stations
- Managing the National Register of Pollution Sources (PRTR Register, including emission to air, water, soil, waste management, special waste streams, CLRTAP and GHG reporting)
- Environmental monitoring
  - Air Quality (real time) - 40 automatic stations, 1 mobile station, 158 analyzers and meteo sensors, 1,245.000 data per year

- o Pollen (weekly) - 19 stations, monitoring of 24 plant species
- o Surface water (daily reporting stations) - 84 profiles on rivers, 5 lakes, 60 piezometers, app. 10,000 samples and app. 250,000 parameters per year
- o Soil (annual) - Inventory of contaminated sites, monitoring program near industrial sites

Project support in accreditation of soil sampling methodology

SEPA is currently undergoing the process of accreditation of soil sampling methodology. Soil sampling has been recognized as an important activity of institution such as SEPA which continuously performs monitoring and reporting on the state of soil on the overall territory of Republic of Serbia. From 2015, SEPA is accredited for performing:

- physical and chemical a testing of water (surface water, ground water), soil and sediments (river and lake sediments), ambient air (precipitation);
- biological testing of water (surface water);
- sediments sampling;
- ambient air sampling;
- surface water sampling.

The goal of obtaining accredited soil sampling methodology is to cover the entire process of soil monitoring within one institution. Process of soil sampling, sample analysis and interpretation of results will improve efficiency and accuracy in reporting, which is under SEPA's jurisdiction according to legal acts.

Project overview

	UN Environment - GEF	Italian co-financing project
Project objective	To develop instruments and mechanisms for integrated land use management, remediation, and capacity development to reduce pressures on land as a natural resource from competing land uses in the wider landscape and to support reversal of land degradation	To support national institutions in the implementation of Multilateral Environmental Agreements through strengthening of the existing institutional framework and capacity building
Areas of intervention	Development of Integrated Land Management Framework and instruments and mechanisms for its implementation at all levels, capacity building of national and local stakeholders, investigation of industrial hotspots, awareness raising, networking	Institutional strengthening and pilot intervention, Capacity building and technical assistance, Environmental information and data collection
Target beneficiaries	National, provincial and local government, other stakeholders	Ministry of Agriculture and Environmental Protection, Serbian Environment Protection Agency
Financing institutions	Global Environment Facility (GEF)	Italian Ministry of Environment, Land and Sea
Implementing Agency	UN Environment	UN Environment
National Partners	Ministry of Agriculture and Environmental Protection, Ministry of Mining and Energy, Serbian Environmental Protection Agency, Provincial Secretariat for Urbanism and Environmental Protection, Serbian Chamber of Commerce and Industry, Institute for Field and Vegetable Crops, Soil Science Institute, Public Health Institute	ISPRA, ENEA, ISS and INAIL
Project duration	36 months (October 2015 – October 2018)	16 months (December 2015 – March 2017)

APRIL
FIELD VISIT

12-14 April, Rome, Italy

Summary

1st Italy-Serbia training

Rome, 12 - 14 April 2016

The First Italy - Serbia training took place on 12-14 April 2016 in Rome. The Serbian delegation, led by the State Secretary Mrs Stana Bozovic, visited several Italian institutions working on environmental protection and soil quality monitoring and analysis. The training programme included visits to the Ministry of Environment, Land and Sea and the Ministry of Foreign Affairs and International Cooperation, which provided the delegation with an institutional overview.

The Serbian technical delegation, composed by seven national experts from the Sector for Environmental Protection of the Ministry and the Serbian Environment Protection Agency (SEPA), visited the Italian National Agency for New Technologies, Energy and Sustainable Economic Development (ENEA), the Italian National Institute for Health (ISS) and the Italian Institute for Environmental Protection and Research (ISPRA). During the training sessions, the most advanced analytical methods for monitoring of soil quality were presented and jointly discussed.

„This visit was recognized as an excellent opportunity to hear and learn more about experience, activities and current practice in environmental protection institutions of the Republic of Italy. Meetings in the Ministry of the Environment, Land and Sea and Ministry of Foreign Affairs opened the possibility of realizing mutual cooperation in the field of improving environmental protection practice in the Republic of Serbia. Our team also had very constructive consultations with representatives from the National Agency for New Technologies, Energy and Sustainable Development (ENEA) on the application of the methodology for determining the degree of mobility of elements in the soil. Experts from the Public Health Institute (ISS) offered their assistance in the field of application of risk assessment to human health. A representative of the sector for the protection of land of the Institute for Environmental Protection and Research (ISPRA) gave the proposal for a potential professional training on XRF device as well as for joint activities in the analysis of soil samples. Proposals of interest to future activities of the SEPA were related to assistance in creating the "National guidance for risk assessment", "Specification of the input parameters for the risk assessment", "Screening matrix for the remediation technology" as well as "Instructions for defining the background concentration"", said Nemanja Jevtic, project associate at SEPA.

ISTITUTO SUPERIORE DI SANITÀ

ISPRA
Istituto Superiore per la Protezione e la Ricerca Ambientale

ENEA
Agenzia nazionale per le nuove tecnologie, l'energia e lo sviluppo economico sostenibile

Ministero degli Affari Esteri

MINISTERO DELL'AMBIENTE
DELLA TUTELA DEL TERRITORIO E DEL MARE

UN environment

gef

First Italy – Serbia Training in the frame of the project *"Assistance to the Republic of Serbia in the Implementation of MEAs and EU Obligations through Improvement of Pollution Monitoring of Soil Quality at Industrial Sites"*

12 -14 April, Rome, Italy

Agenda

11 April 2016	
Arrival at Fiumicino Airport at 19:35	
Dinner at hotel at 21:00	
12 April 2016	
Meeting venue: Italian Ministry of the Environment, Land and Sea - IMELS Directorate for Sustainable Development, Environmental Damage, European Union and International Affairs Via Cristoforo Colombo 44, Rome, Italy	
09.30-10.00	Institutional greetings by Mr. Paolo Angelini, Italian Ministry of Environment, Land and Sea and Dr. Stana Bozovic, Undersecretary of State – Serbian Ministry of Agriculture and Environmental Protection
10.00-10.30	Mr. Salvatore D'Angelo, Italian Ministry for the Environment, Land and Sea - Presentation of the Italian co-financing project
10.30-11.00	Mr. Filip Radovic, Serbian Environment Protection Agency - SEPA - Director
11.00-11.30	Mr. Luca Cetara, EURAC Research, Italian delegation to the Alpine Convention - Financing the Environment Sector in Serbia
11.30-12.00	Ms. Eden Weldeyesus, EURAC Research, Italian delegation to the Alpine Convention - EU Macro-regional Strategies
12.00-12.30	Mr. Massimo Sargolini, University of Camerino - ADRION Programme
12.30-13.00	Ms. Daniela Versino, Italian Ministry of Infrastructure and Transport - URBACT Programme
13.00-14.30	Lunch and transfer

Meeting venue: Italian Ministry of Foreign Affairs and International Cooperation Directorate General for Development Cooperation Directorate for the European Union – Unit for the Balkan Region Piazzale della Farnesina 1, Rome, Italy	
15.00-18.00	Mr. Andrea Orizio – Head of the Unit of the Balkan Region
20.30	Official opening dinner with ministries officials
13 April 2016	
Meeting venue: Italian National Agency for New Technologies, Energy and Sustainable Economic Development – ENEA Lungotevere Thaon di Revel 76, Rome, Italy	
09.30-09.45	Ms. Marina Leonardi - Welcoming remarks and presentation of ENEA
09.45-10.00	Ms. Dragana Vidojevic – Soil Monitoring and Reporting in the Republic of Serbia
10.00-10.20	Ms. Giovanna Armiento, Mr. Massimo Angelone – Heavy Metals Mobility in Soils: Conventional and Innovative Methods
10.20-10.40	Ms. Chiara Alisi, Ms. Anna Rosa Sprocati – Design and Evolution of a Tool-box for Assisted Phytoremediation Strategies at Mining Sites
10.40-11.00	Mr. Paolo Clemente – Prevention of Natural Risks and Mitigation of their Effects
11.00-11.20	Ms. Violeta Lazic – LIBS Spectroscopy at ENEA
11.20-12.30	Discussion and final remarks
13.00-14.30	Lunch and transfer
14 April 2016	
Meeting venue: Italian Institute for Environmental Protection and Research – ISPRA Via Vitaliano Brancati 48, Rome, Italy	
09.00-09.30	Mr. Enrico de Zorzi – Welcoming remarks and ISPRA presentation
09.30-10.15	Mr. Carlo Jacomini – Soil Monitoring in Italy: State of the Art and Applications
10.15-11.00	Mr. Marco Falconi – Innovative Characterization Techniques, Risk Assessment and Remediation Technologies
11.10-11.30	Ms. Mariaconcetta Giunta – ISPRA Tasks and Activities in Environmental Reporting and Related Indicators
11.30-12.15	Ms. Luciana Sinisi – The 2015 Guidelines for Integrated Environmental and Health Impact Assessment in Environmental Procedures Edited by Italian System of Environmental Protection Agencies
12.15-13.00	Discussion and final remarks
13.00-14.30	Lunch and transfer to Fiumicino airport

INNOVATIVE APPROACHES AND ON-SITE ANALYTICAL METHODS FOR THE PRELIMINARY EVALUATION OF SOIL CONTAMINATION AND RELATIVE RISKS

Ms Giovanna Armiento
Mr Massimo Angelone
Ms Maria Rita Montereali
Ms Elisa Nardi

ENEA
Environmental Biogeochemistry Laboratory
April 16, Rome, Italy

Selection of Training Material Content

"In this presentation, ENEA experts are introducing new scientific approaches for site characterisation, mapping and monitoring."

ENEA
Agenzia nazionale per le nuove tecnologie, l'energia e lo sviluppo economico sostenibile

Total content...

The "total" concentration of elements in soils provides scarce information on the real risk to humans and the environment, even if, usually, it is the only criterion on which the accepted meaning of "contaminated" on "not contaminated" is based.

...vs mobility

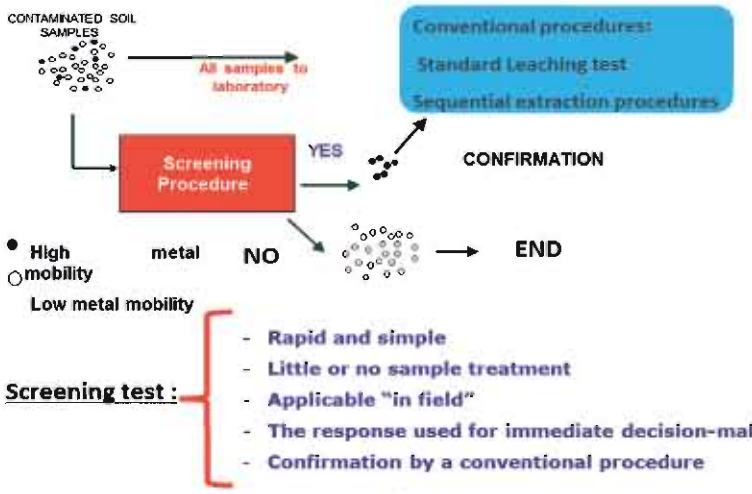
Toxicity, bioaccumulation and **mobility**, all depend on the chemical form of an element.

In unpolluted soils and sediments, the elements are mainly present in scarcely mobile forms, usually "trapped" in silicates and other minerals.

As a result of environmental processes and human activity, fractions of the elements can be mobilized in a more accessible form.

3

SCREENING TEST



4

INNOVATIVE CHARACTERIZATION TECHNIQUES, RISK ASSESSMENT AND REMEDIATION TECHNOLOGIES

Mr Marco Falconi

ISPRA
Istituto Superiore per la Protezione e la Ricera Ambientale

April 16, Rome, Italy

Selection of Training Material Content

"In this presentation, ISPRA expert provides description of innovative on-field measurement techniques and explains how to calculate risk and site-specific target level, how to select adequate remediation technology and how to define background level of metals in soil and groundwater."

ISPRA
Istituto Superiore per la Protezione e la Ricerca Ambientale

Risk and Site Specific Target Level (SSTL)

Forward Analysis – *Calculation of Risk R*

$$R = CRS \times FT \times EM \times T$$

Backward Analysis – *Calculation of the Site Specific Target Level (SSTL)*

$$CSR = \frac{C_{POE-acc}}{FT}$$

Remediation Technology screening Matrix

| | Composti Inorganici | | | | | | | Composti Organici | | | | | | |

Undersecretary Dr. Bozovic at Italian Ministry of Environment, Land and Sea
12 April 2016, Rome

Visit at the Italian Health Institute
13 April 2016, Rome

Italian National Agency for New Technologies, Energy and Sustainable Economic Development–ENEA
13 April 2016, Rome

Visit at Italian National Agency for New Technologies, Energy and Sustainable Economic Development–ENEA
13 April 2016, Rome

List of participants

Name	Institution
Ms. Stana Bozovic	Ministry of Agriculture and Environmental Protection, Republic of Serbia
Ms. Jasmina Muric	Ministry of Agriculture and Environmental Protection, Republic of Serbia
Ms. Sandra Nedeljkovic	Public Investment Management Office, Republic of Serbia
Mr. Filip Radovic	Serbian Environment Protection Agency - SEPA
Mr. Aleksandar Dragisic	Institute for Nature Conservation, Republic of Serbia
Mr. Sladjan Velinov	Agency for Protection Against Ionising Radiation and Nuclear Safety, Republic of Serbia
Mr. Slobodan Puzovic	Provincial Secretariat for Environmental Protection and Sustainable Development, Republic of Serbia
Ms. Snezana Kuzmanovic	Ministry of Agriculture and Environmental Protection, Republic of Serbia
Ms. Biljana Filipovic	Ministry of Agriculture and Environmental Protection, Republic of Serbia
Mr. Milan Stevanovic	Ministry of Agriculture and Environmental Protection, Republic of Serbia
Ms. Dragana Vidojevic	Serbian Environment Protection Agency - SEPA
Mr. Milenko Jovanovic	Serbian Environment Protection Agency - SEPA
Ms. Natasa Bacanovic	Serbian Environment Protection Agency - SEPA
Ms. Branislava Dimic	Serbian Environment Protection Agency - SEPA
Mr. Nemanja Jevtic	Serbian Environment Protection Agency - SEPA
Ms. Lana Jovanovic	Serbian Environment Protection Agency - SEPA
Mr. Pier Carlo Sandei	UN Environment - Vienna Office
Ms. Aleksandra Siljic Tomic	UN Environment - Vienna Office
Mr. Filippo Montalbetti	UN Environment - Vienna Office
Mr. Paolo Angelini	Italian Ministry of Environment, Land and Sea
Mr. Salvatore D'Angelo	Italian Ministry of Environment, Land and Sea
Mr. Luca Cetara	EURAC Research
Ms. Eden Weldeyesus	EURAC Research
Mr. Massimo Sargolini	University of Camerino
Ms. Daniela Versino	Italian Ministry of Infrastructure and Transport
Mr. Andrea Orizio	Italian Ministry of Foreign Affairs and International Cooperation
Mr. Grammenos Matrojeni	Italian Ministry of Foreign Affairs and International Cooperation
Mr. Thomas Botzios	Italian Ministry of Foreign Affairs and International Cooperation
Ms. Marina Leonardi	Italian National Agency for New Technologies, Energy and Sustainable Economic Development – ENEA
Ms. Giovanna Armiento	Italian National Agency for New Technologies, Energy and Sustainable Economic Development – ENEA
Mr. Massimo Angelone	Italian National Agency for New Technologies, Energy and Sustainable Economic Development – ENEA
Ms. Chiara Alisi	Italian National Agency for New Technologies, Energy and Sustainable Economic Development – ENEA
Ms. Anna Rosa Sprocati	Italian National Agency for New Technologies, Energy and Sustainable Economic Development – ENEA
Mr. Paolo Clemente	Italian National Agency for New Technologies, Energy and Sustainable Economic Development – ENEA
Ms. Violeta Lazic	Italian National Agency for New Technologies, Energy and Sustainable Economic Development – ENEA
Ms. Eleonora Beccaloni	Istituto Superiore di Sanita' - ISS
Ms. Mario Carere	Istituto Superiore di Sanita' - ISS
Mr. Enrico de Zorzi	Italian Institute for Environmental Protection and Research – ISPRA
Mr. Carlo Jacomini	Italian Institute for Environmental Protection and Research – ISPRA
Mr. Marco Falconi	Italian Institute for Environmental Protection and Research – ISPRA
Ms. Mariaconcetta Giunta	Italian Institute for Environmental Protection and Research – ISPRA
Ms. Luciana Sinisi	Italian Institute for Environmental Protection and Research – ISPRA

SEPTEMBER FIELD VISIT

6-8 September, Belgrade, Sabac and Loznica, Serbia

Summary

2nd Italy – Serbia training

Belgrade, Sabac and Loznica, 6 – 8 September 2016

The Second Italy – Serbia training took place on 6-8 September 2016 in Serbia. Italian and Serbian experts – members of the multidisciplinary working group consisted of seven institutions - participated in a joint workshop on soil contamination in industrial sites. During the workshop, ENEA and ISPRA delegates delivered presentations on Italy's national expertise, by setting a precise focus on the Italian approach toward the implementation of risk assessments for human health and environment and on how to determine site specific targets. Participants also discussed the contents of the draft Questionnaire on determining contaminated sites and a quick overview of industrial sites of Sabac and Loznica, which were subject to joint investigation. In the frame of the study tour, joint delegation paid a visit to the City Hall of Sabac and City Authority of Loznica, followed by the visits to the former "Zorka-non-ferrous metallurgy" site and former chemical industry site "Viscose", heavily polluted industrial sites in the outskirts of Sabac and Loznica, respectively. At this occasion, Italian and Serbian experts jointly performed soil sampling and scanning with XRF analyzer device, results of which were presented and discussed during the subsequent training in Rome.

"Meeting in the Serbian Ministry of Agriculture and Environmental Protection between Italian and Serbian experts, was an opportunity to discuss on further project activities related to two potentially contaminated industrial sites, "Viskoza" in the city of Loznica and "Non-ferrous Metallurgy" in the city of Sabac. On this occasion, a brief review of the potential application of environmental and human health risk assessment was made, which is an important part of the process of prioritizing these sites for rehabilitation and remediation. Field trip to factories "Viskoza" and Zorka "Non-ferrous Metallurgy" provided an opportunity to exchange knowledge and experiences in the process of identification of contamination originating from industrial activities on-site. Several soil samples were taken and analyzed using handheld XRF device which proved to be an excellent method for the preliminary identification of soil contamination.", said Dragana Vidojevic, Head of Sector for Indicators and Reporting, SEPA.

ISPRA
Istituto Superiore per la Protezione e la Ricerca Ambientale

ENEA
Agenzia nazionale per le nuove tecnologie, l'energia e lo sviluppo economico sostenibile

Chemical industry "Viskoza", Loznica

Factory „Viskoza" is located in the city of Loznica close to the residential area with 5,000 inhabitants and at about 1 km from the Drina River. Due to a bankruptcy, production of viscose and cellophane has ceased in the beginning od 2010. Large quantities of substances that were once used in production are now stored in the aboveground and underground reservoirs which are found to be in poor condition. Lack of maintenance of factory inventory caused spillage and leakage of harmful substances from those reservoirs. There are no warning signs nor notices in places where hazardous waste has been stored.

Hazardous substances that have been identified on the location include:

- **Carbon disulfide**
  - approximately 60 t partly stored in reservoirs and partly in the sludge at the bottom of the surrounding pool
  - very poor condition of equipment for fluid transport and equipment for access to the reservoirs
- **Green liquor**
  - 150 t stored in above-ground reservoir
- **Black liquor**
  - approximately 600 m^3 stored in cylindrical reservoirs of NaOH, Na_2S and lignin
  - by-product in cellulose production process made
  - in October 2013, app. 400 m^3 of black liquor has leaked from the reservoir which can still be found in collectors as well as on surrounding roads and land
- **Furfural ($C_5H_4O_2$)**
  - 200 t of coagulated furfural stored in two half-full reservoirs
- **Waste fuel oil**
  - 20 t stored in reservoirs that have been positioned in the concrete bund
  - installations within the station for fuel oil transportation, along with machinery and equipment, has been cut off and sold
  - traces of spilled fuel oil are visible in the station building, canal next to the building and surrounding land.

Previous investigations and soil analysis have shown exceedances in limit values of heavy metals (Pb, Zn, Cu, Ni, Hg and As), pH, sulphides, and sulphates. Analysis of soil samples was performed by the Public Health Institute Belgrade in 2014. Soil samples were taken at 3 locations: next to the reservoirs from which black liquor has leaked previously, agricultural soil next to the wastewater treatment facility where the leakage also occurred, and a control sample on agricultural land at the 50m distance from the wastewater treatment facility. Analysis of soil performed in 2016 using handheld XRF device has shown elevated values of Ni, Co, Cr, Mo, Ba, Mo, V, and Th.

Chemical industry "Non-ferrous Metalurgy", Sabac

Factory „Non-ferrous Metallurgy" is located within the Zorka working zone „Istok" in the city of Sabac. The production process was shutdown after a bankruptcy but the large amounts of substances from production can still be found in the facilities and on the surrounding land of the factory. Due to the immediate vicinity of Sava River, groundwater is to be found at only one meter below the surface. Therefore, the possibility of groundwater contamination and also contamination of Sava River is one of the major concerns in this location. Another concern and reason for immediate action is reflected in the proximity of a large number of schools, health facilities and residential area with 10,000 inhabitants at a distance of about 1 km.

Problem areas and hazardous substances identified on the location include:

- **Landfill of jarosite waste**
  area of 2 ha with 500,000 t of jarosite waste
- **Zinc sulfate ($ZnSO_4$)**
  4 t stored in factory facilities
- **Pyralene waste**
  the large amount stored in factory facilities
- **Pb/Ag precipitate**
  approximately 900 t

Analysis performed on soil samples collected near the factory showed an elevated concentration of Pb, Cd, Zn, Cu, Hg, As and B. In 2014, Public Health Institute Belgrade performed analysis of the soil samples collected at 50 m from the factory, the results showing that Pb, Cd, Zn, Cu, Ni and As exceeded remediation values. On-site analysis of soil performed in 2016 using handheld XRF device shown elevated values of heavy metals such as Pb, Cu, Zn, Cd, Mo, As, Sb, Ag, Ba, Se, Th, and V.

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Second Italy – Serbia Training in the frame of the project *"Assistance to the Republic of Serbia in the Implementation of MEAs and EU Obligations through Improvement of Pollution Monitoring of Soil Quality at Industrial Sites"*

6-8 September 2016, Belgrade, Sabac and Loznica, Serbia

Agenda

6 September 2016	
Meeting venue: Ministry of Agriculture and Environment, Republic of Serbia	
12.00-12.30	Registration and coffee break
12.30-14.00	Workshop (Session I) - Welcome and opening of the workshop – Dr. Stana Bozovic, Undersecretary Of State, Serbian Ministry of Agriculture and Environmental Protection - ENEA's role and activities - Overview – Giovanna Armiento, ENEA - Short introduction of ISPRA expertise – Marco Falconi, ISPRA - Short introduction of SEPA mandate – Filip Radovic, SEPA - Multidisciplinary Expert Working Group – "tour de table" - Planning and preparation of the field mission Nemanja Jevtic, project associate, SEPA associate, SEPA
14.00-15.00	Coffee break with cocktail lunch
15.00-16.30	Workshop (Session II) - How to conduct risk assessments? – Mr. Marco Falconi, ISPRA - Potential application of Risk assessment of contaminated sites in Serbia – Lana Jovanovic, project associate, SEPA - Determining site specific target level, the Italian approach – Marco Falconi, ISPRA
16.30	Departure to Sabac and accommodation in hotel

7 September 2016	
Meeting venue: Municipality of Sabac and Zorka chemical industry	
09.00-10.00	Meeting with the Mayor and Local Authority of Sabac – Nebojsa Zelenovic, Mayor of the City of Sabac
10.00-12.30	Field investigation at chemical industry "Zorka – Obojena Metalurgija"
12.30-14.00	Visit to "Hemofarm" wastewater treatment plan
14.00-15.30	Lunch
15.30-17.00	Workshop (Session III) - Innovative characterisation techniques: portable XRF for soil pollution scanning - Marco Falconi, ISPRA - Analysis of the state in chemical industry "Zorka – Obojena Metalurgija" and discussion on the Methodology for investigation and environmental/health risk assessment at potentially contaminated sites – all participants
8 September 2016	
Meeting venue: Municipality of Loznica and Viskoza chemical industry	
09.00-10.00	Meeting with the Local Authority of Loznica - Tomislav Arnautovic, Member of Loznica City Council
10.30-13.00	Field investigation at chemical industry "Viskoza"
13.00-14.00	Wrap-up and lunch
14.00	Departure to Belgrade/Belgrade airport

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PLANNING AND PREPARATION OF THE FIELD MISSION

Nevena Aleksic
Project associate for communications
Nemanja Jevtic
Project associate for soil data proccesing

SEPA
Serbian Environmental Protection Agency
September 06, Belgrade, Serbia

Selection of Training Material Content

"In this presentation, SEPA project associates are explaining the process prior to the field mission, elaborating the difficulties with the Questionnaire and introducing specific features of Sabac and Loznica sites."

Republic of Serbia
MINISTRY OF AGRICULTURE AND ENVIRONMENTAL PROTECTION
ENVIRONMENTAL PROTECTION AGENCY

HOW TO CONDUCT RISK ASSESSMENT

Mr. Marco Falconi

ISPRA

Istituto Superiore per la Protezione e la Ricera Ambientale

September 06, Belgrade, Serbia

Selection of Training Material Content

"In this presentation, ISPRA expert explains the soil contamination process, introduces the objectives of main site investigation as well as soil and groundwater sampling procedure."

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Objectives of main site investigation

1. Find areas potentially contaminated C>GSV
2. Define final CSM (sources, transport, receptors)
3. Take data for site specific risk assessment
4. Take data for background values
5. Emergency measures

Single core sample

POTENTIAL APPLICATION OF RISK ASSESSMENT FOR CONTAMINATED SITES IN SERBIA

Lana Jovanovic
Section for Indicators and Reporting
SEPA
Serbian Environmental Protection Agency
September 06, Belgrade, Serbia

Selection of Training Material Content

"In this presentation, SEPA project associate introduces objectives and benefits of risk assessment for a contaminated site and elaborates application of preliminary risk assessment model for identification of problematic areas."

Republic of Serbia
MINISTRY OF AGRICULTURE AND ENVIRONMENTAL PROTECTION
ENVIRONMENTAL PROTECTION AGENCY

Benefits of risk assessment

Inventory of sites with potential impact on environment and on human health

↓

Metodology for risk assessment on national level

↓

Problem areas identification on European level (EIONET)

↓

Better allocation of resources for remediation of contaminated sites

www.sepa.gov.rs

Risk assessment for contaminated sites

Human health risk assessment is the process by which the adverse (toxicological) effects of a chemical on humans are evaluated or estimated based on the available knowledge about the chemical.

HAZARD IDENTIFICATION	DOSE–RESPONSE RELATIONSHIPS	EXPOSURE ANALYSIS	RISK CHARACTERISATION
• Existing chemicals present on investigated site that may cause adverse effects.	• Estimation of the quantitative relationship between exposure (or dose) and adverse effect from laboratory experiments or epidemiological studies.	• Estimation of the intensity, frequency and duration of exposure to the hazards, transportation and fate of contaminants.	• Evaluation and conclusions of the result from the previous steps. • Form of expert judgement that should include a description of the distribution of risk in an exposed population.

RISK COMUNICATION ← RISK MANAGAMENT ↩

www.sepa.gov.rs

Italian and Serbian experts consult on best practices for the identification of contamination in the factory Zorka "Non-ferrous Metallurgy", Šabac
7 September 2016, Sabac

Marco Falcone (ISPRA) and Nemanja Jevtić (SEPA) discuss the results obtained after soil scanning performed with handheld XRF Analyzer (Niton™ XL3t970 GOLDD+), factory Zorka "Non-ferrous Metallurgy", Šabac
7 September 2016, Sabac

Pb/Ag precipitate next to the building, factory Zorka "Non-ferrous Metallurgy", Šabac
7 September 2016, Sabac

Italian and Serbian experts taking tour of the area of factory "Viskoza" in Loznica
8 September 2016, Loznica

Poor condition of reservoirs in "Viskoza", Loznica
8 September 2016, Loznica

List of participants

Name	Institution
Ms. Giovanna Armiento	Italian National Agency for New Technologies, Energy and Sustainable Economic Development – ENEA
Mr. Massimo Angelone	Italian National Agency for New Technologies, Energy and Sustainable Economic Development – ENEA
Mr. Marco Falconi	Italian Institute for Environmental Protection and Research – ISPRA
Mr. Michele Fratini	Italian Institute for Environmental Protection and Research – ISPRA
Mr. Bozidar Djokic	Geological Survey of Serbia
Mr. Dragan Cakmak	Soil Science Institute - Belgrade
Mr. Momir Boljanic	Ministry of Agriculture and Environmental Protection, Republic of Serbia
Ms. Snezana Kuzmanovic	Ministry of Agriculture and Environmental Protection, Republic of Serbia
Mr. Ivica Nikolic	Republic Hydromet Service of Serbia
Mr. Filip Radovic	Serbian Environmental Protection Agency - SEPA
Ms. Dragana Vidojevic	Serbian Environmental Protection Agency - SEPA
Mr. Milenko Jovanovic	Serbian Environmental Protection Agency - SEPA
Ms. Lana Jovanovic	Serbian Environmental Protection Agency - SEPA
Mr. Nemanja Jevtic	Serbian Environmental Protection Agency - SEPA
Ms. Nevena Aleksic	Serbian Environmental Protection Agency - SEPA
Mr. Nebojsa Vukovic	Public Health Institute - Belgrade
Mr. Milan Milutinovic	Public Health Institute - Belgrade
Mr. Milorad Zivanov	Institute for Field and Vegetable Crops - Novi Sad
Mr. Nebojsa Zelenovic	Mayor of the City of Sabac
Mr. Tomislav Arnautovic	Member of Loznica City Council
Mr. Kamuran Samar	Euronews
Mr. Pier Carlo Sandei	UN Environment - Vienna Office
Ms. Aleksandra Siljic Tomic	UN Environment - Vienna Office
Mr. Filippo Montalbetti	UN Environment - Vienna Office

NOVEMBER FIELD VISIT

22-25 November, Rome, Italy

Summary

3rd Italy – Serbia training

Rome, 22 – 25 November 2016

The Third Italy - Serbia training took place on 22-25 November 2016 in Rome, and saw the participation of a delegation composed by Serbian technical experts on soil pollution monitoring and health risk assessment from the Serbian Environment Protection Agency (SEPA) and the Public Health Institute of Belgrade. The training was hosted by of the two specialized institutions, such as Italian Institute for Insurance Against Accidents at Work (INAIL), and the Italian National Agency for New Technologies, Energy and Sustainable Economic Development (ENEA) and benefited from the active participation of experts from the Italian Institute for Environmental Protection and Research (ISPRA).
The training builds on the previous joint sessions held in April and September and was structured in six different sessions, with the aim to enhance the exchange of national experiences on soil contaminated sites and associated issues, and provide training on the Best Available Techniques (BAT) and methodologies for assessing the potential contaminated industrial sites in Serbia. The delegation had the chance to visit the contaminated site of Malagrotta, a former deposit of hydrocarbons in the outskirts of Rome, and learn more on remediation activities.

"Representatives from the Italian Institute for Insurance against Accidents at Work (INAIL) provided us with valuable information and suggestions on protective equipment that is needed for the field missions in the process of investigating the contaminated areas, with special regard to the little-known sites with the high potential risk of exposure to harmful substances. Field trip to Malagrotta refinery deposit was excellent opportunity to get acquainted with the extensive preparation for remediation activities and the final steps of the remediation process on site. The subject of major importance for the Serbian team was the development of a Conceptual Site Model and soil sampling scheme, since the sampling schemes are to be developed in the coming period for identified industrial sites in Serbia. SEPA staff had the opportunity to discuss the results of analysis of soil samples collected back in September from industrial areas of Loznica and Sabac and received important information and advice from Italian experts from the National Agency for New Technologies, Energy and Sustainable Economic Development (ENEA). Experts from Italian Environment Protection Agency (ISPRA) and ENEA introduced the application of PRA.MS, the methodology for preliminary risk assessment of contaminated areas and presented a successful example from Italy. This exercise was relevant for gathering important information for application of preliminary risk assessment methodology to industrial sites in Serbia. The development of a Conceptual Site Model for Sabac and Loznica industrial sites, based on available data and information collected and prepared for this visit, was extensively discussed with Italian experts and the next steps in data collection were agreed", said Milenko Jovanovic, Head of Department for Indicators, Reporting and IT system, SEPA.

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Third Italy – Serbia Training in the frame of the project *"Assistance to the Republic of Serbia in the Implementation of MEAs and EU Obligations through Improvement of Pollution Monitoring of Soil Quality at Industrial Sites"*

22 -25 November, Rome, Italy

Agenda

22 November 2016	
Arrival at Fiumicino Airport at 19:25	
Dinner at hotel	
23 November 2016	
Meeting venue: Italian Institute for Insurance against Accidents at Work – INAIL Department of Technological Innovations and Safety Plants, Products and Anthropic Settlements Via Fontana Candida 1, Rome, Italy	
09.30-12.30	**Session I** Safety Rules and Measures on Workplace, Safety Equipment while Investigating Potentially Contaminated Sites
09.30-10.30	Ms. Elisabetta Bemporad, Ms. Simona Berardi – Chemical Risks to Workers' Health in Contaminated Sites
10.30-11.30	Mr. Alessandro Ledda, Ms. Elisabetta Bemporad, Ms. Simona Berardi – A Review of Collective Protective Measures for Workers in Contaminated Sites
11.30-12.30	Mr. Sergio Malinconico – Safety and Health in Asbestos Contaminated Sites
12.30-14.00	Lunch
14.00-17.00	**Session II** Presentation of Mobile Laboratories for the Evaluation of Asbestos Risks, including Illustration of On-board Equipment and Concrete Application – Mr. Sergio Malinconico, Mr. Alessandro Ledda
20.00	Dinner

24 November 2016	
Meeting venue: Malagrotta refinery deposit Via di Ponte Galeria 253, Rome, Italy	
09.30-12.00	**Session III** Visit to contaminated site of Malagrotta refinery deposit and presentation of remediation techniques Mr. Mauro Prinate (Syndial), Mr. Francesco Lia (Syndial), Ms. Simona Martelli (Municipality of Rome), Mr. Isidoro Bonfa' (Municipality of Rome)
12.00-12.45	Transfer to ENEA Casaccia Research Centre
Meeting venue: Italian National Agency for New Technologies, Energy and Sustainable Economic Development – ENEA Casaccia Research Centre Via Anguillarese 301, Rome, Italy	
13.00-14.00	Lunch
14.00-17.30	**Session IV** Sampling demonstration Discussion on process of accreditation for sampling and information needed Ms. Giovanna Armiento, Mr. Massimo Angelone - Italian National Agency for New Technologies, Energy and Sustainable Economic Development – ENEA
20.00	Dinner
25 November 2016	
Meeting venue: Italian Ministry of Environment, Land and Sea – IMELS Directorate for Sustainable Development, Environmental Damage, European Union and International Affairs Via Cristoforo Colombo 44, Rome, Italy	
09.30-13.00	**Session V** Development of a Conceptual Site Model for Sabac and Loznica industrial sites, based on available data and information Mr. Marco Falconi, Mr. Michele Fratini - Italian Institute for Environmental Protection and Research – ISPRA
13.00-14.00	Lunch
14.00-15.30	**Session VI** Application of PRAMS Methodology for Risk Assessment and Discussion on Successful Example form Italy and Application to Industrial Sites in Serbia Mr. Marco Falconi, Mr. Michele Fratini - Italian Institute for Environmental Protection and Research – ISPRA
16.00	Transfer to Fiumicino airport

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"PERSONAL PROTECTIVE EQUIPMENT " FOR WORKERS IN CONTAMINATED SITES

Alessandro Ledda
INAIL
Istituto Nazionale per L'assicurazione Contro gli Infortuni sul Lavoro
November 23, Rome, Italy

Selection of Training Material Content

"In this presentation, INAIL expert introduces requirements for Personal Protective Equipment (PPE) in accordance with EU Directives, as well as levels and classes of protection, and provides guidance on how to select adequate PPE."

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PPE: EU directives

Actually the **directive 686/89**, regulates the manufacture and marketing and establishes:

- The PPE must satisfy the basic health and safety requirements laid down in Annex II;
- the manufacturer has possibility of referring to the harmonised standards or EEC technical standards;
- The printing of EC mark to each PPE manufactured;
- The EC product declaration of conformity.

The PPE Directive 686 was one of the first New Approach Directives and is now over 20 years old. In order to reflect current technologies and processes for developing and bringing PPE to the market, it is in the process of being superseded by a **new PPE Regulation (EU) 2016/425**.

The **main changes** in the new PPE Regulation (EU) 2016/425 are:

- Moving hearing protection from Category II to Category III,
- Moving life jackets from Category II to Category III PPE
- Issuing a Declaration of Conformity with each PPE or at least a link to where it can be obtained
- A compulsory maximum five-year certificate validity
- Responsibilities outlined for importers and distributors (traceability of PPE)
- Bespoke (hand made) PPE covered in the Regulation.

PPE Levels and classes of protection

The Directive provides for **three "categories" of PPE** depending on the gravity of risks from which they are intended to protect:

I category – low risk level: **Simple design PPE.** PPE in this category is designed to protect users against minimal risks. These include as examples:

- superficial mechanical injury;
- contact with water or cleaning materials of weak action;
- contact with hot surfaces not exceeding 50°C;
- damage to the eyes due to exposure to sunlight;
- atmospheric conditions that are not of an extreme nature.

II category – medium risk level: **Intermediate PPE.** Category II includes risks other than those listed in Categories I and III;

III category – high risk level: **Complex design PPE**. PPE falling under this category includes exclusively the risks that may cause very serious consequences such as death or irreversible damage to health. Risks include:

- substances and mixtures which are hazardous to health
- atmospheres with oxygen deficiency
- harmful biological agents
- ionizing radiation ...

SAFETY AND HEALTH IN ASBESTOS CONTAMINATED SITES

Dott. Sergio Malinconico
INAIL
Istituto Nazionale per L'assicurazione Contro gli Infortuni sul Lavoro
November 23, Rome, Italy

Selection of Training Material Content

"In this presentation, INAIL expert explains the relevance of analysing and monitoring environmental matrixes contaminated with asbestos and introduces measures for working safely in asbestos contaminated sites."

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Asbestos: Carcinogen Category 1A

They are all classified as carcinogens by the International Agency for Research on Cancer (IARC).

According to EC Regulation 1272/2008 "on classification, labeling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006", asbestos belong to:

- ✓ **Carcinogen Category 1A** – known to have carcinogenic potential for humans, classification is largely based on human evidence.

Environmental monitorings

Prior to the sampling of materials, an inspection program should be finalized, which can be summed up as follows:

- ✓ Search for and checking of available technical documentation on the site.
- ✓ Directly inspect site to identify friable materials.
- ✓ Check the state of friable materials to provide an initial evaluation of fibers dispersion potential.
- ✓ Sample suspected friable materials, and send to a specialist laboratory for the analytical confirmation of the presence and content of asbestos.
- ✓ Map zones in which materials containing asbestos are present.
- ✓ Register all collected information in ad hoc folders, to be kept as documentation.

Asbestos Threshold Limit Values

Environmental Matrix	Application	Threshold Limit Value	Sampling	Analytical Method
AIR	Workplace (e.g. remediation)	**100 f/l**	Personal	**PCOM**
	Asbestos Risk Assessment in buildings	**20 (f/l)**	Environmental	**PCOM**
		2 f/l	Environmental	**SEM**
	Atmospheric Emissions e.g. at chimney	**0,1 mg/m3 or 2 f/l**		**Gravimetric (microscopy)**
SOIL	Contaminated soil	**1000 mg/Kg**		**XRD - FTIR**
LIQUIDS	Contaminated liquids	**30 g/m^3 (2 f/ml = 0,1 mg/m^3)**		**Gravimetric**
QUARRIED AND MINED MATERIALS	Inert and natural materials	**Release index < 0,1**		

CHEMICAL RISKS TO WORKERS HEALTH IN CONTAMINATED SITES

E. Bemporad
S.Berardi

INAIL
Istituto Nazionale per L'assicurazione Contro
gli Infortuni sul Lavoro
November 23, Rome, Italy

Selection of Training Material Content

"In this presentation, INAIL experts introduce steps in assessment of a contaminated site, including risks thereof originating from hazardous chemicals and carcinogens present at site."

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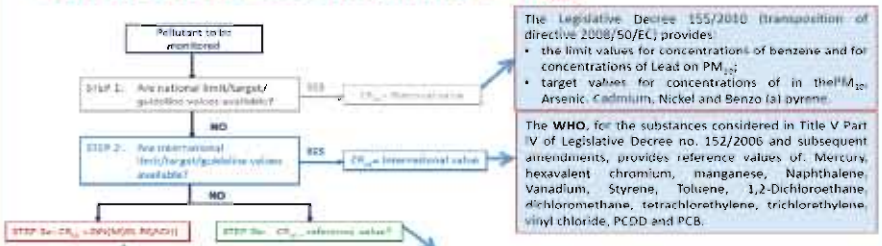
RISKS IN SITES WITH UNKNOWN CONTAMINATION

SOURCE OF HAZARD	RISK
SAFETY RISKS	
Risks from the environment	
Presence of scraps in the soil	Punctures or cuts
Traumatic contact with wastes, tanks, drums, pipes, ducts	
Falls or slides from the wall of a dump or a landfill	Fall, burying
Risks due to presence of hazardous substances	
Ignition of pools of biogas inside a dump	Fire or Explosion
Ignition of flammable liquids in buried drums	
Ignition of flammable, combustible or biodegradable wastes	
Spontaneous self-combustion of buried flammable, combustible or biodegradable wastes	
Absence of oxygen (presence of biogas in confined spaces, e.g. sumps)	Asphyxia
Rupture of drums or tanks containing corrosive substances	Burn
HEALTH RISKS	
Risks from exposure to chemical agents	
Presence of leachate from a dump or a landfill	Dermal contact
Presence of hazardous and carcinogenic/mutagen chemical agents in the soil or in wastes	Vapors inhalation Dust inhalation Dermal contact
Presence of asbestos as airborne asbestos fibers	Dust inhalation
Risks from exposure to physical agents	
Presence of orphan sources or radioactive wastes	Ionizing radiations
Risks from exposure to biological agents	
Presence of biological agents in the soil or in wastes (e.g. viruses, Bacteria, fungi, parasites)	Inhalation Dermal contact

Criteria for the determination of CR_{aria}



CR_{ov} can coincide with ***Derived No (Minimum) Effect Level****, estimated in the context of REACH Regulation, referrinmg to the specific target* ***"population"****, for chronic systemic effects (or local effect if more cautionary) by inhalation*

The application of the risk analysis procedure (Leg. Decree no. 152/2006) in backward mode, selecting the most conservative value among those identified for carcinogenic and non-carcinogenic effects.

$$CR_{aria}\left[\frac{\mu g}{m^3}\right] = \frac{TR}{EM_{ind} \cdot SF_{oral}} \times 10^3$$ **Carcinogenic effect**

$$CR_{aria}\left[\frac{\mu g}{m^3}\right] = \frac{TTIQ}{EM_{ind}} \frac{RfD_{oral}}{} \times 10^3$$ **Toxic effect**

Personal Protective Equipment at Italian Institute for Insurance against Accidents at Work - INAIL
23 November 2016, Rome

Visit to Malagrotta refinery
24 November 2016, Rome

Group photo at Malagrotta refinery
24 November 2016, Rome

List of participants

Name	Institution
Ms. Dragana Vidojevic	Serbian Environment Protection Agency - SEPA
Mr. Milenko Jovanovic	Serbian Environment Protection Agency - SEPA
Ms. Nevena Aleksic	Serbian Environment Protection Agency - SEPA
Mr. Zoran Stojanovic	Serbian Environment Protection Agency - SEPA
Ms. Lana Jovanovic	Serbian Environment Protection Agency - SEPA
Mr. Nemanja Jevtic	Serbian Environment Protection Agency - SEPA
Mr. Milan Milutinovic	Public Health Institute Belgrade
Ms. Aleksandra Siljic Tomic	UN Environment - Vienna Office
Mr. Filippo Montalbetti	UN Environment - Vienna Office
Mr. Alessandro Ledda	Italian Institute for Insurance against Accidents at Work – INAIL
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Ms. Simona Martelli	Municipality of Rome
Mr. Isidoro Bonfa	Municipality of Rome
Mr. Mauro Priante	Syndial
Mr. Francesco Lia	Syndial
Ms. Giovanna Armiento	Italian National Agency for New Technologies, Energy and Sustainable Economic Development – ENEA
Mr. Massimo Angelone	Italian National Agency for New Technologies, Energy and Sustainable Economic Development – ENEA
Mr. Paolo Angelini	Italian Ministry of Environment, Land and Sea
Mr. Marco Falconi	Italian Institute for Environmental Protection and Research – ISPRA
Mr. Michele Fratini	Italian Institute for Environmental Protection and Research – ISPRA

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Republic of Serbia
MINISTRY OF AGRICULTURE AND
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ENVIRONMENTAL PROTECTION AGENCY

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Assistance to the Republic of Serbia in the Implementation of MEAs and EU Obligations through Improvement of Pollution Monitoring of Soil Quality at Industrial Sites