COMMITTEE ON
THE CHALLENGES OF
MODERN SOCIETY

EPA 542-R-05-027
July 2005
www.epa.gov/tio
www.cluin.org
www.nato.int/ccms

NATO/CCMS Pilot Study

Prevention and Remediation Issues in Selected Industrial Sectors: Mega-Sites

2005 ANNUAL REPORT

Number 273

NORTH ATLANTIC TREATY ORGANIZATION

2005
Annual Report
NATO/CCMS Pilot Study

Prevention and Remediation Issues
in Selected Industrial Sectors:
Mega-Sites

Fairmont Château Laurier Hotel, Ottawa, Canada
June 12-15, 2005

July 2005

NOTICE

This Annual Report was prepared under the auspices of the North Atlantic Treaty Organization=s Committee on the Challenges of Modern Society (NATO/CCMS) as a service to the technical community by the United States Environmental Protection Agency (U.S. EPA). The report was funded by U.S. EPA=s Office of Superfund Remediation and Technology Innovation. The report was produced by Environmental Management Support, Inc., of Silver Spring, Maryland, under U.S. EPA contract 68-W-03-038. Mention of trade names or specific applications does not imply endorsement or acceptance by U.S. EPA.

CONTENTS

INTRODUCTION

The Council of the North Atlantic Treaty Organization (NATO) established the Committee on the Challenges of Modern Society (CCMS) in 1969. CCMS was charged with developing meaningful programs to share information among countries on environmental and societal issues that complement other international endeavors and to provide leadership in solving specific problems of the human environment. A fundamental precept of CCMS involves the transfer of technological and scientific solutions among nations with similar environmental challenges.

This document reports on the third meeting of the Pilot Study on Prevention and Remediation Issues in Selected Industrial Sectors. The purpose of the pilot study is to define and explore best practices for reducing the health and environmental impact on soil and groundwater from industrial sectors of interest (e.g., metals mining, organic chemical production, gasworks, and fertilizer manufacturing) as well as other unique site "types" (e.g., old landfills, privatization sites [i.e., facilities transitioning from former state ownership in certain categories], mega-sites [i.e., large scale former industrial and mining facilities], and shoreline sediment sites). The pilot study will explore the techniques and technologies for preventing and avoiding discharge to soil and groundwater as well as measurement and remediation for that industry sector or site type. It seeks to engage industry and other private sector organizations at the transnational level in sharing and evaluating technical information. In reviewing case studies as well as experience from the previous CCMS pilot study on contaminated land and other sources, the proposed pilot study may be able to assess or benchmark "what is easy to clean," "what is difficult to clean," and "what is impossible, at reasonable cost, to clean." The unique contribution of the pilot study would be measured by its ability to synthesize information regarding best practices, successes and failures, and uncertainties for the sectors of interest.

The third meeting of the Pilot Study was held in Ottawa, Canada from June 12 – 15, 2005. This meeting dealt with the issues of mega-sites (i.e. former industrial or other properties not able to be addressed by traditional risk management strategies due to their scale.) Twenty-one technical papers fell under the broad topics of former military sites, former industrial production, harbors and rivers, and risk assessment. Seven countries gave Tour de Table presentations–summaries of the state of the development of waste and/or contaminated land programs in their respective countries. The United States is the lead country for the Pilot Study, and 19 other countries participated in the meeting. This report is a set of abstracts of the presentations at the meeting. In addition, a CD containing all presentation materials (e.g.. power point slides) from this meeting and the two previous meetings is available.

This report is available online at http://www.nato.int/ccms/ and http://www.cluin.org/ottawa. CD ordering information can be found at the latter web site. General information on the NATO/CCMS Pilot Study may be obtained from the country representatives listed at the end of the report. Further information on the presentations in this document should be obtained from the identified presenters.

Walter W. Kovalick, Jr., Ph.D.
Director

ABSTRACTS–OTTAWA MEETING

MEGA-SITES: FORMER MINING SITES

RISK MANAGEMENT AT GIANT MINE, NWT

W.S. Mitchell
Canada

1. ABSTRACT

Recently, mine operations at Giant Mine in Canada's Northwest Territories ceased after 56 years of gold mining that established the mine as the most prolific producer of gold in the Territories. When the former owner, Royal Oak Mines was forced into receivership in 1999, Indian and Northern Affairs Canada (INAC) became actively involved in the care and maintenance of the mine to protect human health, safety and the environment. With the assistance of a Technical Advisor group of consultants, INAC is currently developing a remediation plan for the site. In the interim, until remediation can be implemented, care and maintenance, including risk mitigation activities at the mine site are continuing.

The roasting process used to the extract some 7 million ounces of gold from refractory Giant mine ore yielded almost 237,000 tonnes of byproduct arsenic trioxide dust that was collected in a bag house. This large volume of arsenic trioxide dust that is a highly soluble and toxic form of arsenic is sealed in 15 underground mine workings/chambers. On surface, numerous hazards exist, including four separate tailings impoundments, a sludge pond, settling pond and associated dams. Most buildings on site are in an advanced state of disrepair and will eventually be demolished. Risks associated with a group of buildings known as the roaster complex are of particular concern because these buildings are heavily contaminated with arsenic trioxide dust and loose fibrous asbestos. Around the mine site arsenic and hydrocarbon contaminated soils present additional risks, as do numerous pits and underground openings throughout the site.

As the federal government's number one contaminated site a source of funding has been obtained from the federal contaminated sites accelerated action plan. This presentation will describe the remediation options development process of the entire Giant Mine property leading to a project description for regulatory approvals and implementation.

2. CONTACT

W.S. Mitchell
Indian and Northern Affairs Canada
email: mitchellb@inac.gc.ca

LA COMBE DU SAUT: THE RESTORATION OF A FORMER ARSENIC POLLUTED GOLD MINE APPLYING A COMBINATION OF TECHNIQUES: CONFINEMENT, PHYTOSTABILISATION AND RUN OFF WATER MANAGEMENT

Patrick Jacquemin, Jolanda Boisson, Ann Ruttens, Georges Pottecher, Jaco Vangronsveld
France

1. ABSTRACT

For one century, in La Combe du Saut - Aude – France, 15 million tonnes of ore were extracted and treated to produce gold and arsenic trioxide. This activity caused large contamination and ceased in 2004. ADEME was charged in 1999 of the remediation of a part of the site.

2.4 million m^3 of polluted material were identified. The topsoil arsenic concentration can reach in some places 100 000 mg/kg. Pollution is transferred by run off water erosion, slow underground water through the waste, dust by the wind. Transfer routes to man were considered for three categories of inhabitants and the calculation shows that sanitary risks are too high for the population.

The treatment of the site must decrease the pollution flows by the both vectors (water and dust). It was decided in 2003 to complete a combination of techniques to achieve these results. Because of the large size of the site and the large quantity of polluted material, the mastering of the total cost of the remediation has priority. The remediation combines different techniques: evacuation of highly polluted waste, confinement of the second part of polluted material, covering of a part with clean soil, classical revegetation and phytostabilisation of 20 hectares.

After excavation, the arsenic concentration in the top soil will still be in the order of several $g.kg^{-1}$. Because it is primordial to succeed with the final revegetation, phytostabilisation will be completed to control erosion and residual arsenic transfer, combined with the optimisation of the water collection system (LIFE-Environment project DIFPOLMINE).

The programme will be accompanied by a specific long term monitoring plan in order to conclude on the benefits of the technique. Corrective actions or revaluation the soil use restrictions will have to be discussed all along the post management.

2. CONTACT

Patrick Jacquemin
ADEME Languedoc Roussillon
Résidence Antalya
119, avenue Jacques Cartier
34965 Montpellier cedex 2
France
email: patrick.jacquemin@ademe.fr

LARGE ABANDONED MINE SITES

Michael Nahir, Michael van Aanhout
Canada

1. ABSTRACT

The concept of risk management is not new to the management of abandoned mine sites and other contaminated sites – indeed it is a key requirement of federal government policy on contaminated sites. However, in practice it is typically applied at a technical level in decision-making around specific clean-up standards and remediation approaches. Over the past 5 years the Indian and Northern Affairs Canada (INAC) Northern Affairs Contaminated Sites Program has become one of the largest contaminated sites management programs in the country. The program has an objective of reducing the federal government's contaminated sites liability in the North - currently over $800 million, and is spending about $60 million/year. As the complexity and scale of sites in the Northern Affairs Program (NAP) contaminated sites inventory have increased, there has been a collective understanding that existing risk management tools did not provide enough detail and transparency to ensure that risks are identified and addressed in a consistent manner. Recognizing this, the program has initiated a risk management process to achieve the following objectives:

- To provide a consistent methodology for developing an inventory and evaluating the many different types of risk at contaminated sites under the control of NAP;
- To provide a process to ensure that no high risk items are "falling through the cracks"; and
- To provide a basis for prioritizing risk mitigation or control activities within and among sites.

The approach at INAC involved forming an advisory group of key project and program managers, preparing key elements of a risk management procedure drawing on federal government and department policy and industry best practice, testing the procedure elements at two significant sites, reviewing lessons learned, and refining the procedure for implementation.

This presentation provides an overview of this approach and addresses the concepts and considerations to applying risk management strategically at the portfolio/inventory level including, including:

- Establishing the risk management process;
- Identifying hazards and events using risk scenarios;
- Risk Estimation and/or Risk Rating;
- Risk Evaluation - Deciding to mitigate or accept risk;
- Control/Action; and
- Monitoring.

2. CONTACT

Michael Nahir, P. Eng., M. Eng.
Indian and Northern Affairs Canada
email: michael.nahir@pwgsc.gc.ca

MEGA-SITES: FORMER MILITARY SITES

ELIMINATION OF THE "LIUBASHEVKA" ROCKET FUEL STORAGE SITE: AS AN EXAMPLE OF ENVIRONMENTALLY SAFE DEMILITARIZATION OF MILITARY SITES

Petro Nakhaba
Ukraine

1. ABSTRACT

The presentation will provide an overview on the implementation of the Heptyl Infrastructure Elimination Project in Ukraine that was a part of the Cooperative Threat Reduction Program (CTR) jointly led by the U.S. DOD and Ukrainian MOD. It will provide the equipment and services required to demilitarize Rocket Fuel Storage Sites (RFSS) by neutralizing and dismantling the infrastructure required to support the Strategic Nuclear Forces of Ukraine

Phase I
(Initiated in January 2001 - Completed in October 2002)

- Completed Rocket Fuel Transportation from Seven RFSS to the Shevchenkovo RFSS
- Completed Physical and Environmental Site Surveys at Eight RFSS
- Completed Operational Testing on MOD Incineration Equipment

Phase II
(Initiated in October 2002 – Completed in August 2004)

- Neutralization and Incineration of Contaminated Soil, Heptyl and Samin Rocket Fuel Residuals from Tanks and Piping
- Cutting of Cleaned Tanks, Pipes and Steel Structures
- Demolition and Burial of Brick and Concrete Support Structures on Sites, including Hazardous Waste (contaminated debris)
- Grading of Sites and Post Dismantlement Environmental Survey (Site Restoration)
- The Environmental Assessment Report provides data with interpretation for all environmental protection activities related to Phase II of the Liubashevka Rocket Fuel Storage Site (Liubashevka RFSS) Elimination.

The main objectives of Environmental Monitoring during the Phase II work and the Post-Dismantlement Environmental Site Assessment were to ensure worker health and safety, to prevent accidental hazardous spills due to neutralization and dismantlement activities, and to verify that the site has not been additionally contaminated during the course of demilitarization activities.

**** Heptyl** – **Unsymmetrical dimethylhydrazine (UDMH)** (1,1-Dimethylhydrazine) is a hypergolic rocket fuel ingredient, often used in combination with the oxidiser, nitrogen tetroxide. UDMH is toxic, and can explode in the presence of oxidisers.*

2. CONTACT

Petro Nakhaba
email: nakhaba@cleanwave.org

PRESENTATION ON THE FORMER FORT DEVENS SITE

Virginia Lombardo
United States

1. ABSTRACT

Located 35 miles west of Boston, Fort Devens is a 9,400-acre former U.S. Army base that operated for over 70 years serving a variety of military purposes. In 1989, EPA listed Fort Devens as a "Superfund Site". In 1991, Fort Devens was targeted for realignment and closure. In 1994, the State of Massachusetts passed legislation to stimulate private sector development at the site and which empowered MassDevelopment with the authority to oversee redevelopment efforts at Devens. In 1996, the base was closed and the transformation of the site for public and private use began.

MassDevelopment worked with the public to establish, in 1994, the Devens Reuse Plan, which focused on sustainability, protecting existing natural ecosystems and working within the confines of know environmental conditions. The Reuse Plan provided critical future use decisions up front to facilitate remediation of contaminated sites.

The environmental condition of the site has been investigated by the Army and over 80 areas of potential contamination have been identified. Two case studies will be discussed.

The Landfill Consolidation effort resulted in the excavation of 6 historic landfills and consolidation of the landfill material into a new, state-of-the-art landfill. This effort resulted in the remediation of the 6 sites, prevented contaminant release to potable groundwater and allowed for expansion of the on-site wastewater treatment plant.

The Grant Housing Area was the location of former military housing. The Reuse Plan identified this area as partial future housing and partial commercial property. Market changes led to the decision to allow for future residential development of this whole site. Expanded site investigation efforts identified that prior to military housing the property was used for munitions training. Extensive characterization of the site is ongoing and UXO clearance operations are ongoing.

2. CONTACT

Virginia Lombardo
U.S. EPA
United States
tel: + 617 918 1754
fax: +617 918 1294
email: lombardo.ginny@epa.gov

CASES OF MAJOR CONTAMINATIONS CAUSED BY MILITARY PRODUCTION AND DISPOSAL

Wolf-Uwe Marr
Germany

1. ABSTRACT

Contaminated sites in Germany show individual histories depending on the period of its origin. The oldest one is situated about 30 km west of Bonn and about 2000 years old; the Romans mined lead out of galena containing sands and later mining did not remediate the site.

On military areas older contaminated sites go exceptionally back to Prussian time, but in main they are products of World War I and II. An example of this type is the Major Training Area Munster North which will be introduced. There the main contaminants are warfare agents of the world wars which were produced and destroyed at the site and left severe contaminations of arsenic in soil and groundwater behind. Conventional remediation would exceed the value of the ground; thus the total remediation costs cannot be expected by the landowner. Thus and by the size of the major training area (25,185 acres) it is comparable to mega-sites. Because of economic viability one should look for innovative remediation techniques such as phytoremediation although former trials with polygonum sachalinense failed. And of course the remediation of mega-sites requires a management in concerted actions. This kind of action should be recommended for other contaminated areas as there are explosive factories and ammunition production sites.

Growing with new contaminated sites and mega-sites, the German army prevent by the use of education and better an environmental friendly training, improved materials and device, and where necessary infrastructural precautions such as dense ground sites and gray water treatment at demolition areas or water treatment of run-off waters based upon scientific reports of total environmental pollutions of military training activities. The main pollutants are heavy metals and explösives. A pilot run of a constructed wetland for the treatment of contaminated run-off waters with explosives will be introduced.

2. CONTACT

Dr. Wolf-Uwe Marr
German MOD
Germany
tel: +49 228 12 3381
fax: +49 228 12 1466
email: wolfuwemarr@bmvg.bund400.de

ARGENTIA, NL - FORMER MILITARY MEGA-SITE

Colin Janes, Glenn Worthman
Canada

1. ABSTRACT

The former U.S. Naval Facility at Argentia, NL occupies an area of approximately 3,660 hectares (9,100 acres) and comprises areas referred to locally as the Northside (peninsula), Southside (occupied), Southside Landfills, Backlands and several outlying areas including the Northeast Arm Recreation Camp (NEAC) in Dunville.

Since 1941, the facility operated under the control of the U.S. Navy under a 99 year lease agreement between the governments of the United Kingdom and United States. During World War II the base accommodated more than 15,000 troops and was the largest overseas base in U.S. inventory. As a result of closure of the base in September 1994, the facility reverted to the Government of Canada, whereupon in 1996/97 Public Works and Government Services Canada (PWGSC) commenced its 10-year, $81M Environmental Remediation project. In 2001 PWGSC transferred legal ownership of the property, including the Port of Argentia, to the Argentia Management Authority (AMA).

The Argentia Remediation project represents one of the most extensive and significant projects of this magnitude in Canada. Work planned and/or completed to date includes demolition and removal of large underground fuel storage tanks with associated pipelines, free product recovery, installation of Multi Phase Vapour Extraction (MPVE) system, containment and stabilization of a large coastal landfill, removal of pond debris, in-situ capping of contaminated pond sediments, construction of on-site hazardous waste containment facility, infrastructure upgrades, removal/disposal of hazardous wastes including unexploded ordinance, systematic dismantling/removal of large buildings, and excavation/mining of a former landfill site referred to locally as the Million Dollar Hole.

In support of the Federal Government's commitment to sustainable development, PWGSC specifications require construction demolition debris including tanks/pipelines, concrete, steel, wood, etc. to be recycled and reused. This has presented unique challenges to PWGSC and the construction industry in Newfoundland and Labrador by applying recycling technologies and equipment to the remediation work at Argentia. It is anticipated that $10 - $12 million per year will be expended to complete the majority of the remediation program by November 2007 with final projected total cost of $106M.

The Inco/Voisey's Bay hydrometallurgical demonstration plant and proposed commercial facility, as well as other ongoing development activities, have presented PWGSC with a number of stakeholder interests involving technical, political, social and economic issues that are associated with remediation and redevelopment of a brownfield site.

2. CONTACT

Colin W. Janes
Public Works and Government Services Canada
Canada
tel: +709 227 4019
fax: +709 227 4024
email: colin.janes@pwgsc.gc.ca

THIS PAGE IS INTENTIONALLY BLANK

MEGA-SITES: FORMER INDUSTRIAL PRODUCTION

REDEVELOPMENT AT THE FORMER BETHLEHEM STEEL FACILITY: STRATEGIES, INNOVATIONS, AND LAND USE

Linda Matyskiela, Randy Roush
United States

1. ABSTRACT

Once, Bethlehem Steel was one of the largest steel producers in the world. Now, the shuttered steel mill is a redevelopment target with a multitude of environmental challenges. A Work Team consisting of USEPA Region 3, the Pennsylvania Department of Environmental Protection, current site owners, and prospective buyers is meeting those challenges with a combination of creative characterization and remediation strategies.

Currently the property is owned by several entities, with redevelopment in various stages of completion. An overall site-plan is in place to bring thousands of jobs to the community, replacing jobs lost when the mill was shuttered. This marketing attracted industrial, commercial and entertainment interests including the Smithsonian Institution.

The 1800-acre site has been sectioned into distinct parcels, based on former use and potential re-use of the land. Numerous remedial tools are being used to address the size and complexity of the site. Characterization of each parcel focuses on exposure pathways using variety of approaches, such as soil gas studies, direct push sampling, and modeling. Cleanup focuses on eliminating exposures with risk assessments, excavation, and capping and other technologies. Groundwater is being addressed site-wide by a monitoring network of over 100 wells.

The Work Team uses a mixture of administrative approaches to encourage redevelopment, namely comfort letters and environmental liability relief. Frequent meetings and information sharing keep the Work Team current and responsive to redevelopment questions. Lessons learned from this project were instrumental in creating a first-of-a-kind agreement between federal and state governments, addressing overlapping environmental interests at clean-up sites.

2. CONTACT

Linda Matyskiela
EPA, Region 3
215-814-3420
email: matyskiela.linda@epa.gov

USE OF BIOLOGICAL METHODS IN REMEDIATION

Kvetoslav Vlk, Robin Tyclt
Czech Republic

1. ABSTRACT

The presentation is aimed to demonstrate possibility and feasibility of implementation of biotechnological remediation techniques in treatment trains. The classical remediation methods like pump & treat, remediation pumping, air-stripping etc. are losing their efficiency with decreasing concentration of pollutants in treated soil and groundwater. The long-term operation and maintenance costs of remediation methods such as pump & treat and air sparging can take years or decades. Implementation of biotechnological methods as a polishing step could make remediation significantly more cost-effective and can reduce site restoration time.

This innovative approach provides cost effective treatment solutions for contaminated soil and groundwater.

The description of successful implementation of biotechnological method during remediation of an industrial facility will be given in detail.

2. CONTACT

Kvetoslav Vlk
Environment Ministry
Vrsovicka 65
10010 Prague 10
Czech Republic
tel: +420 267122765
fax: +420 267126765
email: kvetoslav_vlk@env.cz

REDEVELOPMENT OF FORMER INDUSTRIAL LANDS IN THE AUSTRALIAN CAPITAL TERRITORY

T. Hobbs, P. Sinclair, A. Gorman
Australia

1. ABSTRACT

Within the central portion of the capital city of Australia, Canberra, lies Lake Burley Griffin along the edge of which a A$ 1billion redevelopment project of former industrial lands is in progress. Known as the Kingston Foreshore Development, the project is the most significant urban renewal project to be undertaken in the Australian Capital Territory (ACT). Initiated by the ACT Government, it involves the redevelopment of approximately 40 hectares of historical industrial areas into a significant new consolidated residential/commercial precinct, which has its focus on the waters of Lake Burley Griffin.

Similar to all major urban renewal projects on former industrial lands, one of the key elements of the Kingston Foreshore Development is the remediation of the contamination legacies of the former industrial uses to ensure that the precinct is suitable for the proposed development from health and environmental perspectives.

For a comparatively young city with a limited development history, the legacy of past industrial land uses was somewhat unexpected for government agencies, project developers and financiers. Redevelopment of the site has been achieved through systematic assessment, remediation and auditing of selected land parcels. The project has demonstrated the significant value adding that a well executed site clean-up strategy can have as well as allowed for the incorporation of Ecologically Sustainable Development (ESD) in various design phases.

While not a “mega-site” the project provides a good case study for utilising a staged and multi-tired approach for dealing with larger sites. It also provides a good example of the effectiveness of a collaborative approach between contaminated land consultants, developers and regulatory agencies.

2. CONTACT

Toby Hobbs
tel: 02 6023 3799
fax: 02 6023 3644
email: toby_hobbs@coffey.com.au

ENVIRONMENTAL PROBLEMS RELATED TO INDUSTRIES NEAR CITIES

Kestutis Kadunas
Lithuania

1. ABSTRACT

Environmental contamination by the products of human activity is a global problem and Lithuania is no exception. Soil and groundwater pollution sources (liquid fuel, pesticide and chemical storages, sludge fields, domestic landfills and toxic industrial waste sites, etc.) are widely spread over the territory of the country, creating a regional network of anthropogenical load. Contaminants flow to surface water streams and leach to groundwater aquifers. They do not remain stagnant but migrate with groundwater flux towards the discharge zones. Potential discharge zones are waterworks and water intakes where groundwater drawdown is created due to drinking water abstraction. Management of polluted territories becomes an urgent issue due to the strict requirements of the EU WFD.

Few projects have been carried out where registration of some type of waste sites was performed, such as registration of landfills (636 sites), former military installations (275 polluted sites), etc. There was no overall integrated approach utilised in order to register polluted territories and prepare national ranking and management plan of the sites. Among preliminary registered contaminated sites 384 are surveyed, 68 investigated in detailed way and about 60 remediated.

Registration of pollution sources is an ongoing process in the Geological Survey and territorial investigations are uneven (Table 1). The knowledge of the human pressures above a groundwater body significantly helps to interpret the groundwater quality data. Most common pressures in Lithuania are agriculture, point sources of pollution and groundwater abstraction. Agriculture is responsible for non-point or diffuse pollution, whereas water abstraction may cause indirect groundwater contamination due to a change of the hydraulic regime and groundwater dynamics (a result can be saltwater intrusion), or the mobilisation rate of substances in the unsaturated sediments.

Contaminated sites and industrial plants, old sanitary landfill, and military bases, etc. are possible point sources of pollutants.

Table 1. Known Point Sources of Pollution in Lithuania

Registered	Investigated	Important sources				
		Total	Landfills	Petroleum products	Industrial facilities	Other
3519	412	133	17	103	4	9

It seems like all the territory of Lithuania should be densely covered by point pollution sources but this is due to the scale effect of the map. Total amount of registered point sources equals to 3519 and average distribution is one point source per 18.5 km^2. On the other hand, the impact of pollution sources should not be neglected. As an example approximately 700 of registered potential pollution sources are within the sanitary protection zones of well fields and close to surface water sources.

The concentration of different kind of industrial pollution sources close to living areas may cause serious problems in cases of accident and unsuspected spills. In Lithuania close to cities are situated two biggest fertilizers factories:

AB “Achema” is the biggest nitrogen fertilisers producer in the country and the largest factory that is involved in this type of activity within the Baltic countries.

There are tens of various items in Achema's product list – nitrogen and compound fertilisers, adhesives, paints, resins, industrial gases, other chemical products and intermediates. AB "Achema" numbers over 1 thousand employees; annual fertiliser production exceeds 1 million tons.

AB Lifosa constitutes an integral part of the world phosphorus industry. The exclusive geographical location of the Kedainiai plant has a major impact on the company's present operations and its prospects for the future. AB Lifosa has access to huge natural resources in Russia and unhindered approaches to the European market. In Russia, the Kola apatite is mined – the best phosphate rock in the world. Western Europe is the third largest importer of phosphorus fertilizers world-wide.

Both factories cause threat to surface and groundwater resources of central part of Lithuania.

2. CONTACT

Kestutis Kadunas
Geological Survey of Lithuania
Lithuania
tel: +370 521 362 72
fax: +320 523 361 56
email: kestutis.kadunas@lgt.lt

EU WELCOME PROGRAM: PROJECT REVIEW

THE WELCOME INTEGRATED MANAGEMENT STRATEGY FOR LARGE SCALE HISTORICAL SOIL AND GROUNDWATER CONTAMINATIONS: INTRODUCTION AND EXAMPLE ROTTERDAM HARBOUR REGION

Huub Rijnaarts, Jeroen Ter Meer
Netherlands

1. ABSTRACT

The WELCOME-project was funded by the European Union (FP5, EESD, EVK1-CT-2001-00103) and executed from January 2002 until December 2004. In this project, groundwater, surface water and soil contamination on large (former) industrial sites have been addressed. The extent of contamination at these so-called mega-sites is so large and that complex that they require an integrated cost-effective approach. The project team was built by 13 cooperating partners from four different EU member states and from different backgrounds, namely end-users from the case studies part of the project, research-institutes, universities, and consultants. In addition, input from an international group of end-users with delegates form industry and regulating bodies was achieved by four different interactive sessions along the project duration. The aim of this was to get project results with high scientific quality as well as with practical utility (See website: http//www.EUwelcome.nl/). The goal of the WELCOME project was to make an Integrated Management Strategy (IMS) for Prevention and Reduction of risks to water resources at Contaminated Industrial mega-sites in line with EU water framework and groundwater directives. This has been demonstrated by applications at four mega-site cases:

- Bitterfeld
- Rotterdam Harbour Region
- Antwerp Harbour Region
- Tarnowskie Gory

2. CONTACT

Huub Rijnaarts
TNO
Netherlands
tel: +31 555 493 380
fax: +31 555 493 523
email: huub.rijnaarts@tno.nl

INTEGRATED MANAGEMENT STRATEGY FOR RISK REDUCTION OF GROUNDWATER CONTAMINATION AT TARNOWSKI GÓRY MEGA-SITE

Janusz Krupanek
Poland

1. ABSTRACT

In complex mega-site situations related to site conditions, contaminant characteristics, organization, regulatory aspects and/or considerable costs, an integrated risk-based management approach is recommended to manage the risks for the defined receptors. This approach can be realised by Integrated Management Strategy (IMS) of the EU WELCOME project. This approach was applied for Tarnowskie Góry mega-site. Tarnowskie Góry (near Katowice, Southern Poland) is a large-scale industrial area. The chemical plant had been operating since 1921 and was closed down in 1995. Approximately l.7 mln tons of hazardous waste containing Ba, B, Zn, Cu and Sr have been dumped on the area of 0.3 km^2 The mega-site is located on the border between two, the so-called Major Groundwater Basins (MGWB) that are the source of potable water for the population of some ¾ of million. The site and its surroundings are considered as a mega-site.

The stepwise approach of the IMS comprised mega-site assessment, IMS applicability decision process, definition of mega-site. Conceptual Model (CM) and delineation of Risk Management Zone (RMZ), i.e. an area, in which an impact on groundwater is accepted for a period of time that exceeds the requirements of the European Union law. Basic technological scenarios for the mega-site were identified and combined into preferred Risk Management Scenario (RMS). All information and decisions were consulted and accepted by the Group of Stakeholders (GOS) during the process. The decision on the final management scenario of the Tarnowskie Góry mega-site depends on the access to funds, the elimination of knowledge and technological gaps and the stabilization of environmental regulations. Currently, the scenario S1 - controlled natural attenuation (NA) - is implemented that includes source removal, with simultaneous monitoring of NA processes in groundwater, and control of the hydrological regime. The monitoring focus is on the Triassic aquifers to trace migration of contaminants (pathways) from the dumping site areas (primary sources) and Quaternary sediments (secondary sources) to the groundwater wells (receptors). This monitoring has to be coupled with hydrogeological modeling to create a cost-effective monitoring program for the TG mega-site.

2. CONTACT

Janusz Krupanek, M. Sc
Institute for Ecology of Industrial Areas
st. Kossutha 6, 40-844 Katowice, Poland
tel: +48 32 254 74 13
email: krupanek@ietu.katowice.pl

INTEGRATED MANAGEMENT OF MEGA-SITES: APPROACH FOR THE ANTWERP HARBOUR AND FOR THE HEAVY METAL CONTAMINATED MEGA-SITE AT TARNOWSKIE GÓRY

L. Diels, K. Vanbroekhoven, S. Van Roy, W. Dejonghe, A. Szewczyk,
M. Zabochnicka-Swiatek, J. Szdzuj, G. Malina
Belgium

1. ABSTRACT

In the framework of the 5th FP-project WELCOME an Integrated Management Strategy, IMS was developed for mega-sites. In this paper we discuss shortly the IMS approach to the harbor of Antwerp and in more detail to the heavy metal contaminated site at Tarnowskie Góry in the southern part of Poland in the Silesian Province.

The Tarnowskie Góry site is contaminated by heavy metals (Ag, Zn, Pb, …) and some organics due to medieval mining and chemical activities in the past century. Waste materials related to these activities were dumped around without any environmental concern, which resulted in severe contamination of soils and Quaternary deposits, and pose serious risks to Triassic aquifers. A large remediation project (based on sources removal) has been initiated by the government by constructing a controlled landfill with a capacity of 1.7 million m³. It will contain about 0.8 million m³ of waste materials from the landfills and 0.2 million of waste from the demolition of buildings and infrastructure of the chemical plant, as well as contaminated soils. A drainage system was installed to collect the landfill leachate and to treat it in a treatment plant.

The controlled landfill is estimated to address about 50% of all pollutants present at the site. This means that the other 50% can still threat the environment by spreading of metals via dust, runoff, transport into and within the Quaternary and Triassic aquifers. The Triassic aquifers are the drinking water reservoir for more than 300 000 inhabitants. In the Triassic groundwater a 300% increase of some contaminants was observed within 2.5 years. An extensive study has been started in order to evaluate remediation measures feasible for this mega-site to avoid further spreading of the inorganic elements Zn, B, Ba and Sr in the groundwater.

The unsaturated zone was treated with several additives in order to immobilize the metals and to avoid their uptake by plants and/or infiltration to the groundwater. For this purpose easily available and cheap additives, such as dolomite, compost and zeolites were tested. It was shown by column leaching tests, BIOMET®-sensor and plant uptake tests that a substantial reduction of heavy metals availability could be obtained by adding zeolites to the soil at a dose of 5% (w/w).

Concerning groundwater protection, two approaches for *in situ* immobilization of the metals were tested. The first one was based on the installation of a Permeable Reactive Barrier (PRB) based on adsorption. Several tests were performed to immobilize the elements Zn, B, Ba and Sr specific for the Quaternary aquifer. The results show that the aquifer in se is a very strong geosorbent (~ 80% removal of Zn) and moreover dolomites, fly ash, and peat may be considered as adsorbent materials for removing barium and strontium from contaminated groundwater. However, no sorbent has been found so far to efficiently remove boron. Only the arsenate adsorbing adsorbents Apeyron P-As-XP and Metasorb-As seemed to bind some parts of the boron. A combination of both products showed even a better removal up to more than 60% of the initial B content.

In situ bioprecipitation (ISBP), a process during which sulfate reducing bacteria (SRB) are stimulated and sulfate is reduced to sulfides that concomitantly precipitate the heavy metals, has been tested on both clay and sand aquifer taken from the site. Different C-sources have been added to stimulate the sulfate reducing activity and consequently the metal sulfide precipitation. Sulfate was reduced faster in sand than in clay and in both cases resulted in complete Zn removal. Sr and Ba were not removed but rather released with molasses in both sand and clay. This observation is probably related to a pH decrease in the

microcosms where molasses was supplied. Sequential extraction of the different metals from both clay and sandy aquifer shows immobilisation of Zn (probably removed as metal sulfides) but not for B, Ba or Sr.

For the Triassic aquifer ISBP combined with sorption was evaluated. Zeolites in combination with hydrogen releasing compound (HRC®) or molasses gave the best results for Ba and Sr removal. Under these conditions 35% of B could also be removed although sulfate was rather partially removed. Of these two conditions only zeolite in combination with HRC® resulted in good removal of zinc, although the aquifer in se was again a very strong sorbent (80% removal). Complete Zn removal was observed when the metals remediation compound (MRC®), lactate, and diatomic earth in combination with HRC® or molasses were applied. In these circumstances sulfate was also removed.

In conclusion, experiments performed with Quaternary aquifer samples from the saturated zone showed that the PRB concept based on sorption of metals on selected adsorbents is a feasible technique, and allows to remove all metals, although the removal of B was only possible using a combination of two adsorbents. ISBP showed a potential for removal of the more mobile metals, like Zn, but it did not efficiently remove B, Sr and Ba. However, in the case of Triassic aquifer samples, ISBP combined with specific adsorbents seems promising to deal with the mixed inorganic contamination.

Results will be presented as possible measures to be applied within an integrated management approach for the mega-site in order to reduce risks of further spreading of the contaminants.

2. CONTACT

Ludo Diels
Flemish Institute for Technological Reseach (VITO)
Belgium
tel: + 32 14 33 69 24
fax: +32 14 32 65 86
email: ludo.diels@vito.be

REMEDIATION MANAGEMENT OF MEGA-SITES CONSIDERING THE ECONOMIC UPHEAVAL HAVEN TAKEN PLACE IN EASTERN GERMANY-THE BITTERFELD CASE

Martin Keil, Jochen Großmann, Holger Weiss
Germany

1. ABSTRACT

Content and goals in general

Contaminated industrial and military sites represent not only major ecological risks but also obstacles for economic and social development. This in particular applies to the economic and social development of Eastern Germany, the former communist state "GDR". After the economic breakdown of GDR as left-overs of the state-run industry numerous contaminated sites (several at the mega-site level) remained and had to be remediated in the process of economic recovery. To accomplish a successful remediation job both appropriate remediation scenarios as well as certain administrative and organisational structures are to be set up. The transition from a state-owned, planned to a private, market-orientated economy puts responsibility on public authorities to take care of the implementation of these structures.

Goal of the presentation is to present the fact, that the maintenance and the development of the industry at contaminated sites constitute an essential basis for a sustainable remediation of such sites. On the other hand, a successful site development of contaminated sites can only be achieved by interlinking remediation and site (re-)development. This applies to industrial sites as well as to inner-city sites and of course to sites which are to be remediated in the process of economic recovery of a former state-run economy. The Bitterfeld case is one of the largest mega-sites in Europe and the successful management shows that it is possible to motivate the industry to go on with the existing industrial production or to settle at these sites. Only "living" sites guarantee the sustainability of remediation measures.

The presentation will address the following topics:

- Management of large-scale groundwater contaminations
  - Lack of remediation options acting as constraint for site (re-)development
- Appropriate and use-oriented risk reduction objectives and risk reduction measures
  - Interlinking remediation and site (re-)development
- Mega-site management
  - Stakeholder compromises instead of endless discussions; active management requires an interdisciplinary approach as well as communication strategies
- Involvement of research and development
  - Generation of a scientifically sound knowledge base for both remediation measures and decision support and management systems

Structure of presentation

1. situation at the outset: economic breakdown of GDR, need for economic change, privatisation
2. the Bitterfeld case - former state owned chemical industry, lack of productivity, closing down of most of the plants situated on the site, history of the site, products, open pit lignite mining in the neighbourhood,
3. environmental damages, end of mining activities - rising groundwater table, decision for ongoing industrial activities - remediation while new investors are starting new industrial activities,
4. administrative and organisational premises: exemption of investors, financing of exemptions, setting up of a public authority responsible for certificating exemptions and controlling the remediation process, cooperation with communities
5. site characterisation, extension of contaminations, total clean-up economically and technically not feasible
6. risk assessment; risk based approach
7. remediation scenarios

8. costs; cost-efficiency scenarios for different re-use options
9. mega-site management as challenge for interdisciplinary scientific-technical management and communication strategies for stakeholder involvement
10. complex sites like Bitterfeld require research and development input concerning both adequate remediation and development strategies
11. successful inplementation of R&D results into site management practice at the Bitterfeld mega-site
12. the concept is going to be applied at other mega-sites in Eastern Germany and is further elaborated towards a generally applicable concept for the management of contaminated mega-sites

No. 1 to 4 will be presented by Martin Keil (LAF), 4 to 8 by Dr. Jochen Großmann (GICON) and 9 to 12 by Dr. Holger Weiß (UfZ Leipzig-Halle).

2. CONTACT

Martin Keil
LAF Magdeburg
Germany
email: keil@laf-lsa.de

THIS PAGE IS INTENTIONALLY BLANK

MEGA-SITES: RISK ASSESSMENT

ERA-MANIA DSS: A DECISION SUPPORT SYSTEM FOR SITE-SPECIFIC ECOLOGICAL RISK ASSESSMENT (ERA) FOR CONTAMINATED SITES

Elena Semenzin, Andrea Critto, Claudio Carlon, Miranda Mesman,
Ton AJ Schouten, Michiel Rutgers, Silvio Giove, Antonio Marcomini
Italy

1. ABSTRACT

As result of the increasing demand for the assessment and management of contaminated soils, the site-specific Ecological Risk Assessment (ERA) requires the development of new and effective tools. According to the Weight of Evidence (Burton et al., 2002) and the TRIAD (RIVM, 2001) approaches, the ERA-MANIA Decision Support System (DSS) was developed and implemented in a software in order to improve the ERA procedure and support the expert/decision maker in its assessment. The DSS consists of two modules: “Comparative Test Tables” and “Integrated Ecological Risk Indexes”. The former aims at comparing the different tests or Lines of Evidence (LoEs) belonging to each of the investigated area (chemistry/bioavailability, ecology and ecotoxicology) to guide the expert/decision maker in the choice of the most suitable set of tests to be applied to the case study. The “Integrated Ecological Risk Indexes” module provides qualitative and quantitative tools that allow to assess the terrestrial ecosystem impairment (i.e. the impairment occurring on biodiversity and functional diversity of terrestrial ecosystem) by integrating the heterogeneous information obtained by the LoEs application. Due to the complexity of the procedures (including expert judgments, comparative and weighting criteria, chemical, ecological and ecotoxicological knowledge of the soil system), Multi Criteria Analysis methods were applied in order to handle different sources of information and avoid their loss. The ERA-MANIA DSS was preliminarily applied to the ACNA di Cengio (Italy) contaminated mega-site; additional applications could be useful to test the system in different conditions.

2. CONTACT

Elena Semenzin
Consorzio Venezia Ricerche
Via della Libertà 5-12
Marghera-Venice
Italy
email: amb.cvr@vegapark.ve.it

APPLICATION OF A HUMAN HEALTH RISK ASSESSMENT SOFTWARE TO SUPPORT REVITALIZATION DECISIONS AT POST-INDUSTRIAL SITES

Eleonora Wcislo, Jacek Dlugosz, Marek Korcz
Poland

1. ABSTRACT

Within the Network Oriented Risk assessment by In-situ Screening of Contaminated Sites (NORISC) Project, carried out under the 5th Framework Programme of European Community (http://www.norisc.com/), human health risk assessment (HRA) software was developed for supporting contaminated land revitalisation.

US EPA site-specific risk assessment procedures were mainly adapted in the software. The software is applicable for three typical urban land-use categories: residential, industrial/commercial and recreational.

The NORISC-HRA software allows for:

- calculation of cancer and non-cancer health risks resulting from contaminated soil and groundwater,
- generation of maps of risk zones presenting the spatial distribution of risk resulting from contaminated soil;
- calculation of chemical Risk-Based Concentrations (RBCs) as site-specific preliminary Health-Based Remedial Goals (HBRGs) for soil and groundwater;
- delineation of sub-areas with chemical concentrations in soil below and above the RBCs, i.e., for which remediation or risk management procedures should be undertaken.

RBCs are developed under all considered land use scenarios for the purpose of guiding remedial activities at a site; they may be used during analysis and selection of remedial alternatives.

The NORISC-HRA software was applied to two NORISC test sites: the Balassagyarmat site, Hungary, and the Massa site, Italy. A petroleum filling station was formerly located at the first site, and chemical factory, which manufactured agrochemical products - at the second one. Obtained risk assessment results showed the possibility of the NORISC-HRA software application to different site conditions and different types of contaminants.

Risk results visualized by the NORISC-HRA software may assist in taking appropriate corrective actions to protect human health at these sites and facilitate communication between different stakeholder groups.

2. CONTACT

Eleonora Wcislo
Institute for Ecology of Industrial Areas (IETU)
6 Kossutha St.
40-844 Katowice
Poland
tel: (+48-32) 254 60 31
fax: (+48-32) 254 17 17
email: wci@ietu.katowice.pl

DIOXIN AND FURAN RELEASES AND THEIR RISK ASSESSMENT ON THE POPULATION HEALTH IN SOME REGIONS OF THE RUSSIAN FEDERATION

Sergey Tikhonov
Russia

1. ABSTRACT

Dioxins are a group of extremely toxic substances acting in natural environments as a by-product of some chemical manufactures. They are formed as a microimpurity of various end-products or waste products at high-temperature chemical engineering processes of chlorination of organic substances, burning chlororganic compounds, that conducts to pollution of the natural environment by these substances in manufacture of chlorine and chlorine-containing substances, production of a pulp and paper industry, rubber, and products of thin organic synthesis.

The most dangerous source of formation of compound similar to dioxins – burning of various household, medical and industrial wastes not only on dumps, but also in incinerate furnaces. Organochlorine pesticides brought in ground, exhaust gases of automobiles, products of burning at fires also form pollution of the natural environment.

Within this presentation only the basic path of dioxin ingress into environment was estimated – releases into atmosphere, and dioxin ingress with sewage, solid wastes and products has not been considered.

According to estimation of total PCDD/PCDF releases for Russia, the mid-annual dioxin releases in Russia in 1998-2000 was characterized by the lower value of 6917 g and the upper value of 10835 g (all in TE – toxic equivalent).

In the recently published article "Research of Dioxin Releases in the Baltic Region", total dioxins released into atmosphere were estimated for Poland as 490 g TE/year, and for Estonia, Latvia and Lithuania – 14, 23 and 17 g TE/year, accordingly. Upon this estimation, potential releases across Russia ranged within 1198-1848 g TE per year.

According to this data, dump fires and uncontrollable incinerations are the general sources of dioxins releases.

In opinion of authors, too wide release ranges strongly complicate the use of information. Therefore, when complying national registers of dioxin releases the average data with confidence of “true value” is at least 80%, i.e., 20% of values may fall outside the specified frames is used more often.

This presentation prepared on the basis of results of the Centre for International Projects activity in the framework of Arctic Council Action Programme “Reduction/Elimination of Dioxin and Furan emissions in the Russian Federation with Focus on the Arctic and Northern Regions Impacting the Arctic”.

The half-period of dioxins in ground depending on its characteristic and meteorological conditions amounts from 8 months till 13 years. Dioxins are transferred to long distances through air masses, seeping both in water, and in ground ecosystems, accumulate and concentrate in food chains.

The big danger is represented by long receipt of dioxin and its analogues to an organism in small quantities (in 100 – 1000 times lower than the minimum quantities causing sharp defeat).

Receipt of dioxins to an organism of the person occurs through consumption of the food polluted with them, inhaled air, potable water and through skin integuments.

The carried out researches of the natural environment condition in the Arkhangelsk and Murmansk regions and Republics Komi using the experimental data on releases of dioxins and furans at the concrete manufactures, allow to state the presence of chemical pollution dangerous for the population health.

Practical researches and the analysis of a situation allow one to draw a conclusion. Pollution of atmospheric air by emissions of the industrial enterprises, as well as the presence of cancerogenic substances in ground causes potential risk of development of chronic diseases and increase of death rate of the population.

2. CONTACT

Sergey Tikhonov
Academician of the Russian Academy of Ecology
Director of the Centre for International Projects
Moscow, Russian Federation
email: cip.tse@g23.relcom.ru

THIS PAGE IS INTENTIONALLY BLANK

MEGA-SITES: HARBORS AND RIVER SEDIMENTS

VICTORIA HARBOUR, VICTORIA BC, ROCKBAY REMEDIATION PROJECT BC HYDRO AND TRANSPORT

Robert MacDonald, Scott Tomlinson, Douglas Grimes
Canada

1. ABSTRACT

In 1860 the Victoria Gas Company was founded at Rock Bay and constructed a manufactured coal gas plant to convert coal into gas. The plant established Rock Bay as the powerhouse of Victoria and helped launch Victoria as an industrial city. The Rock Bay plant continued to produce and distribute coal gas for heating and lighting until 1952 when a facility for propane and butane storage was built at the site. With the construction of the natural gas pipeline to Vancouver Island in the late 1980s the facility was decommissioned. Due to the environmental condition of the property, the site has remained largely unused and underutilized since that time.

Like most coal gas plants, the long history of gas production resulted in impacts to soil, groundwater and harbour sediments. This was mainly as a result of releases of coal tar, which was a by-product of the gas production process, and was often disposed on site as fill. Other types of hydrocarbons as well as metals are also found on the site.

This site is located in downtown Victoria, and is only 1.2 km from the Legislative Assembly of BC. The site consists of approximate 3.3 ha of uplands, which is primarily fill, surrounding a small bay, which is 250 m in length and 100 m at its widest point. Although neither BC Hydro nor Transport Canada operated the former facility, they are now the current owners of these impacted properties. Both organizations have identified these properties as surplus to their requirements and wish to remediate the site and allow the properties to be divested with minimal or no residual liability.

Since the early 1990s, BC Hydro and Transport Canada have participated in a joint and cooperative investigation and remedial planning program. This approach ensures that each organization's unique objectives are met while accomplishing significant cost savings through shared service delivery, coordinated implementation and economies of scale. Site investigation at this site commenced in 1988. Numerous investigations into the extent and nature of the contamination, the geology and hydrology, and remedial options have been conducted. By the fall of 2003 a revised Recommended Remedial Strategy was accepted by all the parties, which identified the preferred remedial option to excavate and dispose of uplands soil contamination greater than commercial land use criteria and sediment contaminated greater than special waste criteria.

Due to the urbanized location of the site and the potentially hazardous nature of the coal tar contamination, special considerations were incorporated into the typical remedial planning process. This included: a review and analysis of construction impacts on the community, noise and vibrations studies, an extensive communications and consultation strategy, coordination with adjacent leaseholders, and a complex neighbourhood air quality management plan. The project is coordinated between federal, provincial, and municipal agencies. Further, a comprehensive project governance agreement between BC Hydro and Transport Canada was required for remedial planning and remediation implementation.

Remediation efforts will include the removal of 85% of the uplands to depths of eight metres and 75% of the immediate foreshore, and extensive portions of the floor of the bay, with off site disposal/treatment of contaminated material. The site will be restored to its original configuration. The project cost is currently estimated at $32.1 million. The first of the three stage remedial effort started in September 2004 and will be completed by June 2005. The project will last three years with completion expected by the end of 2007.

2. CONTACT

Robert MacDonald
Project Director, VEEP
Transport Canada
email: macdrk@tc.gc.ca

DEVELOPMENT OF TRANSBOUNDARY COOPERATION IN THE KURAS-ARAS RIVER BASIN

Nino Chikovani
Georgia

1. ABSTRACT

Within the UN ECE Process "Environment for Europe", the South Caucasian Countries Georgia, Armenia and Azerbaijan consolidated their position in the European cooperation in environmental protection, especially after the 5th Pan European Conference of Ministers of Environmental Affairs in May 2003 in Kiev. To assist in this process, the Federal Environmental Agency of Germany (UBA) contributes measurably in offering financial support from the consultant budgets of the Ministry of Environmental Affaires dedicated to EECCA-States.

The Federal Environmental Agency of Germany (UBA) performed a number of projects to support EECCA-States especially for the establishment of international standards in the field of safety installations. The base for those measures is a technical information transfer. The objective of these preparatory activities described bases on the technical specification from UBA dated Marc 12th 2003.

The project aims to ameliorate the international cooperation, especially in respect of increasing environmental security and an effective water management. It enables the transfer of know how collected in Western Europe onto the transnational river basin in Eastern Europe. Further demands in respect of water protection and the reduction of pollution of surface water (for example, Water frame directive and requests according EMAS) should have been taken into consideration.

With the contribution of experts nominated by the involved countries as well as the responsible authorities, industrial plants, selected by using the check list of FEA, have been investigated in 2004 in view of the grade of installation related water protection. At the base of the results, the recommendations of the IKSR/D and the European Standards, necessary technical and organizational measures to enhance the installation related water protection have been proposed. The findings build a perfect knowledge base for the transfer of technical know how in the field of installation and safety engineering to other river basins.

The project takes into consideration the requirement of UNECE in respect to the transboundary effects of industrial averages and recommendations of necessary measures in view of security techniques for plants with a potential risk of water pollution. New check lists for the investigation of sedimentation and tailing ponds in mining companies as well as for the close down of the companies will worked out. For this plants and the close down of industries, recommendations concerning the security techniques are represented and communicated in the international frame of UNECE. In order to organize the project work, functioning and newly established net works within the area and within the UNECE region have been used guaranteeing a permanent and continuous exchange of experiences of the involved authorities and experts. Additionally, the net works allow a stepwise introduction of an objective and transparent cooperation between authorities, experts and NGOs.

Expected results of the project are:

- Definite reduction of water pollution in the Kura river basin caused by industrial accidents
- Development of a system for successive implementation of European standards concerning requirements for safety of industrial plants hazardous to water with the aim of a continual improvement to water protection.
- Technology and information transfer in the field of systems and safety engineering and hazard management
- Improvement of cooperation through the realization of a joint international warning and alarm system for the Kura river basin.

2. CONTACT

Nino Chikovani
Ministry of Environmental Protection and Natural Resources
tel: + (99532) 333 610; (99599) 517 733; (99532) 334082
fax: + (99532) 333952
email: gmep@access.sanet.ge or ninochikovani@hotmail.com

MEGA-SITES: SESSION ON HARBORS AND RIVER SEDIMENTS

Jean-Claude Prevost
Canada

1. ABSTRACT

Parks Canada Agency is the federal government's organization responsible for protecting and enhancing Canada's natural and cultural heritage. It manages a wide range of national assets including national parks, historic sites and canals. One such national heritage asset is the Lachine Canal in Montreal.

The Lachine Canal is at the heart of the industrial revolution in Canada and its development has been closely related to Montreal's industrial fabric. Once a driving force of regional economic development, the rise and decline of the canal canvasses a rich history spanning over a century of urban industrialization which, at the time of the closure of the canal in the late 1950s, left the banks of the canals and its sediments with a legacy of contamination. The closure of the canal also accelerated the economic decline of Montreal's South-West district.

Long recognized as a national historic site, the Lachine Canal is once again a symbol and a driving force in regional economic development and brings a major improvement for the local population quality of life. This renewal has been brought by re-opening the canal to recreational boating activities and by continuing the on-going completion of a linear park. Clean-up of contaminated sites and the long-term monitoring of the canal's sediments are at the core of this unique historic asset which, as part of the Montreal harbour, takes a pivotal role as part of the city's overall objective with regards to its economic, social, cultural and environmental development.

Before re-opening the canal to recreational boating, a Joint Federal-Provincial Environmental Assessment Commission concluded that remediation of the canal sediments was not necessary but the Commission requested an obligation to monitor the impact of works and new activities such as recreational boating and an obligation to prevent any recontamination. On-going monitoring of sediment contamination by underground water, surface line and other external sources is required in light of increasingly popular new recreational activities such as kayaking. The monitoring of water quality and suspended particulates is part of a risk management strategy linked to Parks Canada's goal to offer a quality visitor experience and a secure environment at the Lachine Canal.

2. CONTACT

Jean-Claude Prévost
Parks Canada
tel: +819 934 2506
fax: +819 997 3380
email: jean-claude.prevost@pc.gc.ca

COUNTRY REPRESENTATIVES

Pilot Study Director

Walter W. Kovalick, Jr., Ph.D.
U.S. EPA
Director
Office of Superfund Remediation and
Technology Innovation
Office of Solid Waste and Emergency Response
1200 Pennsylvania Avenue, NW (5102G)
Washington, DC 20460
United States
tel: 703-603-9910
fax: 703-603-9135
email: kovalick.walter@epa.gov

Country Representatives

Mark Hyman
Assisant Secretary
Environment Protection Branch
Department of Environment and Heritage
ACN 056 335 516
142 Wicks Road, NORTH RYDE NSW 2113,
Canberra
Australia
tel: +61 2 6274 1622
fax: +61 2 6274 1640

Harald Kasamas
Ministry of Environment Austria
Stubenbastei 5
A-1010 Vienna
Austria
tel: +431 51522 3449
fax: +431 5131679 1567
email: harald.kasamas@lebensministerium.at

Ludo Diels
Flemish Institute for Technological Reseach
(VITO)
Boerefang 200, B - 2400 Mol
Belgium
tel: + 32 14 33 69 24
fax: +32 14 32 65 86
email: ludo.diels@vito.be

Lisa Keller
Environment Canada
351 St. Joseph Blvd., PVM, .19d' floor
KIA OH3/ Gatineau, Quebec
Canada
tel: 819-953-9370
fax: 819-994-0502
email: lisa.keller@ec.gc.ca

Kvetoslav Vlk
Ministry of the Environment of the Czech
Republic
Vrsovicka 65
100 10 Prauge 10
Czech Republic
tel: +420 267 126 765
fax: +420 267 126 765
email: kvetoslav_vlk@env.cz

Nadine Dueso
ADEME
2 Lafayette Square BP406
F-49004 Angers Cedex 01
France
tel: +33 241 91 40 53
fax: +33 241 91 40 03
email: nadine.dueso@ademe.fr

Andreas Bieber
Federal Ministry for the Environment
Bernkasteler Str. 8
53175 Bonn
Germany
tel: 49/01888-305-3431
fax: 49/018888-305-2396
email: bieber.andreas@bmu.de

Nino Chikovani
Ministry of Environmental Protection and Natural Resources
68A Kostava st. 0171 Tbilisi
Georgia
tel: + (99532) 333 610; (99599) 517 733; (99532) 334082
fax: + (99532) 333952
email: gmep@access.sanet.ge or ninochikovani@hotmail.com

Anthimos Xenidis
National Technical University of Athens 9, Iroon Polytechneiou str
15780 Athens
Greece
tel: 30/210-772-2300
fax: 30/210-772-2168
email: axen@central.ntua.gr

Eamonn Merriman
Environmental Protection Agency
Dublin Regional Inspectorate
Richview,
Clonskeagh,
Dublin 14
Republic of Ireland
tel: 353 1 2680103
fax: 353 1 2680199
email: e.merriman@epa.ie

Francesca Quercia
ANPA- Agenzia Nazionale per la Protezione dell' Ambiente
Via V. Brancati 48
I-00144 Rome
Italy
tel: 39/6-5007-2510
fax: 39/6-5007-2531
email: quercia@anpa.it

Masaaki Hosomi
Tokyo University of Agriculture and Technology
2-24-26 Nakamachi, Koganei, Tokyo 184-8588
Japan
tel: +81 423 88 7070
fax: + 81 423 88 7693
email: hosomi@cc.tuat.ac.jp

Ilgonis Strauss
State Hazardous Waste Management Agency
31 Miera Street,
Salaspils-1
LV-2169
Republic of Latvia
tel: +371 9289498 ; 371 7901212
fax: +371 7901211
email: ilgonis.strauss@bapa.gov.lv

Kestutis Kadunas
Geological Survey of Lithuania
S. Konarskio Str 35,
3123 Vilnius
Lithuania
tel: +370 521 362 72.
fax: +370 523 361 56
email: Kestutis.Kadunas@lgt.lt

Johan van Veen
TNO
PO Box 342, 7300 AH Apeldoorn
Netherlands
tel: +31 55 5493922
fax: +31 55 5493523
email: h.j.vanveen@mep.tno.nl

Janusz J. Krupanek
Institute for Ecology of Industrial Areas
6 Kossutha Street
40-844 Katowice
Poland
tel: +48 32 254 60 31 int 284
fax: +48 32 254 17 17
email: krupanek@ietu.katowice.pl

Eleonora B. Wcislo
Institute for Ecology of Industrial Areas
6 Kossutha Street
40-844 Katowice
Poland
tel: +48 32 254 60 31
fax: +48 32 254 17 17
email: wci@ietu.katowice.pl

Ioan Gherhes
National Environmental Protection Agency
151, Aleea Lacul Morii, sector Vl
Romania
tel: +40-21-4934237
fax: +40-21-4934237
email: ioan.gherhes@anpm.ro

Sergey Tikhonov
Centre for International Projects
Pervomaiskaya str. 58B, app. 104-106
105043 Moscow
Russian Federation
tel:+7 (095) 165 05 62/165 08 90
fax: +7 (095) 165 08 90
email: cip.tse@g23.relcom.ru or tse@eco-cip.ru

Branko Druzina
University College of Health, University of Ljublana
Polyanska 26a, 1000 Lubjljana
Slovenia
tel: +00386 1 300 11 15 ; 520 57 52
fax: +00386 1 300 11 19
email: branko.druzina@vsz.uni-lj.si or branko.druzina@ivz-rs.si

Pablo L. Higueras
Dpt. Ingenieria Geologica y Minera E.U.P.
Almaden University, Castilla-La Mancha
Pl Manuel Meca, 1
13400 Almadén (C. Real)
Spain
tel: 34/926-264-007
fax: 34/926-264-401
email: Pablo.Higueras@uclm.es
website: www.uclm.es/users/higueras

Bernhard Hammer
Swiss Agency for the Environment, Forests and Landscape
CH - 3003 Bern
Switzerland
tel: + 0041 31 322 93 07
fax: +0041 31 323 03 07
email: bernhard.hammer@buwal.admin.ch

Kahraman Ünlü
Middle East Technical University
Environmental Engineering Department
ANKARA 06531
Turkey
tel: +(90) 312 210 58 69
fax: +(90) 312 210 12 60
email: kunlu@metu.edu.tr

Petro Nakhaba
All-Ukrainian Public Organization "Chysta Khvylya "
55B, Oles Honchar St., KYIV, 01054
Ukraine
tel: +380 44 463 7980
fax: +380 44 462 5789
email: nakhaba@cleanwave.org

THIS PAGE IS INTENTIONALLY BLANK

ATTENDEES LIST

Andreas Bieber
Federal Ministry of the Environment
Postfach 12 06 29; 53048 Bonn
GERMANY
tel: +49 1888 305 3431
fax: +49 1888 10 305 3431
email: andreas.bieber@bmu.bund.de

Michael Billowits
Public Works and Government Services Canada
Place du Portage - PDP III - 8b3
11 Laurier Street
Gatineau, Quebec, K1A 0S5
CANADA
tel: +819 956 2128
fax: +819 956 1130
email: michael.billowits@tpsgc.gc.ca

Carl Brown
Environmental Technology Centre
Floor: 03 - Room: 318, 335 River Road
Ottawa, Ontario, K1A 0H3
CANADA
tel: +613 991 1118
fax: +613 991 9485
email: carl.brown@ec.gc.ca

Nino Chikovani
Ministry of Environmental Protection and Natural Resources
68A Kostava st. 0171 Tbilisi
GEORGIA
tel: +(99532) 333 610; (99599) 517 733; (99532) 334082
fax: +(99532) 333952
email: gmep@access.sanet.ge or ninochikovani@hotmail.com

Christian DaSilva
Indian and Northern Affairs Canada
Room 643, 10 Wellington Street
Gatineau, Québec, K1A 0H4
CANADA
tel: +819 997 9242
fax: +819 997 9623
email: dasilvac@ainc-inac.gc.ca

Walter F. Davidson
National Research Council of Canada
1200 Montreal Road, Ottawa
Ontario, K1A 0R6
CANADA
tel: +613 990 0914
fax: +619 993 4291
email: walter.davidson@nrc-cnrc.gc.ca

Ludo Diels
Flemish Institute for Technological Reseach (VITO)
Boerefang 200, B - 2400 Mol
BELGIUM
tel: + 32 14 33 69 24
fax: +32 14 32 65 86
email: ludo.diels@vito.be

Branko Druzina
University College of Health, University of Ljublana
Polyanska 26a, 1000 Lubjljana
SLOVENIA
tel: +00386 1 300 11 15 ; 520 57 52
fax: +00386 1 300 11 19
email: branko.druzina@vsz.uni-lj.si or branko.druzina@ivz-rs.si

Sheila Gariepy
Environment Canada
Place Vincent Massey (PVM) - Floor: 18
351 St Joseph Boulevard,
Gatineau, Québec, K1A 0H3
CANADA
tel: +819 994 3503
fax: +819 953 7253
email: sheila.gariepy@ec.gc.ca

Ioan Gherhes
National Environmental Protection Agency
151, Aleea Lacul Morii , sector VI
Code 060841 Bucharest
ROMANIA
tel: +40-21-4934237
fax: +40-21-4934237
email: ioan.gherhes@anpm.ro

Bernhard Hammer
Swiss Agency for the Environment, Forests and Landscape
CH - 3003 Bern
SWITZERLAND
tel: + 0041 31 322 93 07
fax: +0041 31 323 03 07
email: bernhard.hammer@buwal.admin.ch

Hilburn O. Hillestad
Jacoby Development/Atlantic Station
171, 17th St. Ste 1550
Atlanta, GA, 30363
UNITED STATES
tel: +770 399 9930
fax: +770 206 9150
email: hhillestad@jacobydevelopment.com

Masaaki Hosomi
Tokyo University of Agriculture and Technology
2-24-26 Nakamachi, Koganei, Tokyo 184-8588
JAPAN
tel: +81 423 88 7070
fax: + 81 423 88 7693
email: hosomi@cc.tuat.ac.jp

Patrick Jacquemin
ADEME
Technoparc bat 9 Voie Occitane BP 672 31319
LABEGE CEDEX
FRANCE
tel: + 33(0) 562 241 142
fax: +33(0) 562 243 461
email: patrick.jacquemin@ademe.fr

Blair James
Treasury Board of Canada
L'Esplanade Laurier - Floor: 10EE
140 O'Connor Street
Ottawa, Ontario, K1A 0R5
CANADA
tel: +613 957 0517
fax: +613 957 2405
email: james.blair@tbs-sct.gc.ca

Colin W. Janes
Public Works and Government Services Canada
P.O. Box 4600 St. John's
Newfoundland and Labrador, A1C 5T2
CANADA
tel: +709 227 4019
fax: +709 227 4024
email: colin.janes@pwgsc.gc.ca

Biren Juttun
Public Works and Government Services Canada
Portage III - Floor: 8B3 - Room: 55
Portage III, 8B3, 11 Laurier Street
Mail Stop: 8B3-2 Gatineau, Quebec, K1A 0S5
CANADA
tel: +819 956 2128
fax: +819 956 1130
email: biren.juttun@pwgsc.gc.ca

Kestutis Kadunas
Geological Survey of Lithuania
S. Konarskio Str. 35,
3123 Vilnius
LITHUANIA
tel: +370 521 362 72
fax: +320 523 361 56
email: kestutis.kadunas@lgt.lt

Martin Keil
LAF - Landesanstalt für Atlastenfreistellung
Maxim-Gorki-Strasse 10, D 39108 Magdeburg
GERMANY
tel: +49 391 744 4034
fax: +49 391 744 4070
email: keil@laf-lsa.de

Lisa Keller
Environment Canada
70 Crémazie
Gatineau, Quebec, K1A 0H3
CANADA
tel: + 819 953-9370
fax: +819 994-0502
email: lisa.keller@ec.gc.ca

Walter W. Kovalick, Jr.
U.S. EPA
1200 Pennsylvania Ave. N.W. (5102G)
Washington, D.C. 20460
UNITED STATES
tel: + 703 603 9910
fax: +703 603 9135
email: kovalick.walter@epa.gov

Janusz J. Krupanek
Institute for Ecology of Industrial Areas
6 Kossutha Street
40-844 Katowice
POLAND
tel: +48 32 254 60 31 int 284
fax: +48 32 254 17 17
email: krupanek@ietu.katowice.pl

Robin Kyclt
ENVISAN GEM, a.s.
Radiová 7, (budova VUPP)
102 31 Prague 10
CZECH REPUBLIC
tel: +420 296 792 224
fax: +420 296 792 223
email: envisan@mbox.vol.cz

Cindy Latour
Environment Canada
70 Crémazie
Gatineau, Quebec, K1A 0H3
CANADA
tel: + 819 934 2155
fax: +819 994-0502
email: cindy.latour@ec.gc.ca

Virginia Lombardo
U.S. EPA
1 Congress St., Suite 1100
Boston, MA 02114-2023
UNITED STATES
tel: + 617 918 1754
fax: +617 918 1294
email: lombardo.ginny@epa.gov

Robert K. MacDonald
Transport Canada
620-800 Burrard St. Vancouver, B.C. V6Z 2J8
CANADA
tel: +604 666 5381
fax: +604 666 5545
email: macdrk@tc.gc.ca

Wolf-Uwe Marr
German MOD
BMVg, Postbox 1328, D 53003 Bonn
GERMANY
tel: +49 228 12 3381
fax: +49 228 12 1466
email: wolfuwemarr@bmvg.bund400.de

Linda Matyskiela
U.S. EPA Region 3
1650 Arch Street,
Philadelphia, PA 19083
UNITED STATES
tel: + 215 814 3420
fax: +215 814 3113
email: matyskiela.linda@epa.gov

Vesna McIntyre
Environment Canada
1040 St-Joseph Blvd
Gatineau, Quebec K1A 0H3
CANADA
tel: +819 994 5592
fax: +819 953 8040
email: vesna.mcintyre@ec.gc.ca

William S. Mitchell
Indian and Northern Afffairs Canada
P.O. Box 1500 Yellowknife, NT X1A 2R3
CANADA
tel: +867 669 2434
fax: +867 669 2439
email: mitchellb@inac.gc.ca

Petro Nakhaba
All-Ukrainian Public Organization "Chysta Khvylya "
55B, Oles Honchar St., KYIV, 01054
UKRAINE
tel: +380 44 463 7980
fax: +380 44 462 5789
email: nakhaba@cleanwave.org

Andrea Peters
Treasury Board of Canada
L'Esplanade Laurier - Floor: 10EE
140 O'Connor Street
Ottawa, Ontario, K1A 0R5
CANADA
tel: +613 952 5374
fax: +613 946 3716
email: peters.andrea@tbs-sct.gc.ca

Jean-Claude Prévost
Parks Canada
25 Eddy Street
Gatineau, Quebec, K1A 0M5
CANADA
tel: +819 934 2506
fax: +819 997 3380
email: jean-claude.prevost@pc.gc.ca

Huub Rijnaarts
TNO
PO. Box 342 / 7300 AH Apeldoorn
NETHERLANDS
tel: +31 555 493 380
fax: +31 555 493 523
email: huub.rijnaarts@tno.nl

Randy L. Roush
Pennsylvania Department of Environmental Protection
400 Market Street POB 8471 (RCSOB)
Harrisburg, PA. 17105
UNITED STATES
tel: + 717 787 4941
fax: +717 787 0884
email: raroush@state.pa.us

Barry Stemshorn
Environment Canada
Place Vincent Massey (PVM) - Floor: 15 - Room: 1521A
351 St Joseph Boulevard
Gatineau, Quebec, K1A 0H3
CANADA
tel: +819 997 1575
fax: +819 953 9452
email: stemshorn@ec.gc.ca

Ilgonis Strauss
State Hazardous Waste Management Agency
31 Miera Street,
Salaspils – 1
LV-2169
LATVIA
tel: +371 9289498; 371 7901212
fax: +371 7901211
email: ilgonis.strauss@bapa.gov.lv

Thomas Strassburger
NATO Public Diplomacy Division
Boulevard Leopold III, B-1110 Brussels
BELGIUM
tel: + 32 2 707 4971
fax: +32 2 707 4232
email: t.strassburger@hq.nato.int

Sergey Tikhonov
Centre for International Projects
Pervomaiskaya str. 58B, app. 104-106
105043 Moscow
RUSSIAN FEDERATION
tel:+7 (095) 165 05 62/165 08 90
fax: +7 (095) 165 08 90
email: cip.tse@g23.relcom.ru or tse@eco-cip.ru

Clayton Truax
Public Works and Government Services Canada
Portage III, 8B3, 11 Laurier Street
Gatineau, Québec, K1A 0S5
CANADA
tel: +819 934 1964
email: clayton.truax@pwgsc.gc.ca

Kahraman Ünlü
Middle East Technical University
Environmental Engineering Department
ANKARA 06531
TURKEY
tel: +(90) 312 210 58 69
fax: +(90) 312 210 12 60
email: kunlu@metu.edu.tr

Johan van Veen
TNO
PO. Box 342, 7300 AH Apeldoorn
NETHERLANDS
tel: +31 55 5493 922
fax: +31 55 5493 523
email: h.j.vanveen@mep.tno.nl

Kvetoslav Vlk
Environment Ministry of Czech Republic
Vršovická 65
100 10 PRAGUE 10
CZECH REPUBLIC
tel: +420 267 122 765
fax: +420 267 126 765
email: kvetoslav_vlk@env.cz

Eleonora B. Wcislo
Institute for Ecology of Industrial Areas
6 Kossutha Street
40-844 Katowice
POLAND
tel: +48 32 254 60 31
fax: +48 32 254 17 17
email: wci@ietu.katowice.pl

Holger Weiss
UFZ Leipzig, Dep Groundwater Remediation
Permoserstr. 15; 04318 Leipzig
GERMANY
tel: +49 341 235 2060
fax: +49 341 235 2126
email: holger.weiss@ufz.de

Irene Wolanskyj
Treasury Board of Canada
L'Esplanade Laurier - Floor: 10EE
140 O'Connor Street
Ottawa, Ontario, K1A 0R5
CANADA
tel: +613 941 4261
fax: +613 957 2407
email: wolanskyj.irene@tbs-sct.gc.ca

Glenn Worthman
Environment Canada
6 Bruce Street, Mount Pearl,
Newfoundland and Labrador, A1N 4T3
CANADA
tel: +709 772 4047
fax: +709 772 5097
email: glenn.worthman@ec.gc.ca

Anthimos Xenidis
National Technical University of Athens
9, Iroon Polytechneiou str.
15780 Athens
GREECE
tel: +30 210 772 2300
fax: +30 210 772 2168
email: axen@central.ntua.gr

THIS PAGE IS INTENTIONALLY BLANK

PILOT STUDY MISSION

NATO/CCMS Pilot Study: Prevention and Remediation Issues in Selected Industrial Sectors

1. BACKGROUND TO PROPOSED STUDY

The current NATO Pilot Study on technologies for cleanup of contaminated land was completed in 2002. The pilot study was concluded for several reasons. The primary reason is that general information on technologies, processes, and methodologies for the cleanup of contaminated land and groundwater has been discussed and distributed by the pilot study in its meetings and annual reports. Thus, the goal of the pilot study has been accomplished. There is ongoing interest by participating countries and countries with developing contaminated land programs to continue a dialogue, to focus on specific industrial sectors, and to maintain technical contacts and information flow provided by the current "network" of pilot study participants. Thus, a new pilot study is proposed to allow this long-standing global network on contaminated land to continue.

2. PURPOSE AND OBJECTIVES: NEW PILOT STUDY - SECTORAL APPROACH

Much of the work of the past pilot study on contaminated land has drawn on case studies of technologies applied to a wide variety of industrial and land contamination settings. While useful for explaining the basis for the technology, its costs, and applicability, the information available is not focused on certain problems or site types at a variety of scales, contaminant concentrations, geological conditions, etc. Thus, the current pilot study is a "technologist's" view of characterization and remediation approaches.

Of more relevance to governments, industry, and the remediation services industry is interpretive information about the measurement and clean up of certain contaminants in specific industrial sectors in a variety of hydrogeological settings and levels of severity of risk. In addition, environmental protection has embraced more holistic concepts of preventing problems as a first priority. Thus, methods for preventing pollution (both by process changes and by land use and planning initiatives) coupled with remediation efforts are a priority for new and existing industrial development and for newly industrializing countries. This "integrated" approach can positively affect land and groundwater contamination as well.

Thus, a new CCMS Pilot Study entitled ***Prevention and Remediation Issues in Selected Industrial Sectors*** is proposed. The purpose of the proposed pilot study would be to define and explore best practices for reducing the health and environmental impact on soil and groundwater from industrial sectors of interest (e.g., metals mining, organic chemical production, gasworks, and fertilizer manufacturing) as well as other unique site "types" (e.g., old landfills, privatization sites [i.e., facilities transitioning from former state ownership in certain categories], mega-sites [i.e., large-scale former industrial and mining facilities], and shoreline sediment sites). In reviewing case studies as well as experience from the current pilot study on contaminated land and other sources, the proposed pilot study may be able to assess or benchmark "what is easy to clean," "what is difficult to clean," and "what is impossible, at reasonable cost, to clean."

3. SCOPE OF WORK

The duration of the proposed pilot study is three (3) years. The study would commence by selecting industrial sectors. The pilot study meetings would be devoted to the techniques and technologies for preventing and avoiding discharge to soil and groundwater as well as measurement and remediation for that industry sector or site type. Countries would nominate expert speakers on such topics as industrial operations; problem definition and risk assessment; measurement and monitoring strategies; and remediation approaches for both soil and ground water. These speakers could represent many stakeholders - including industry, government, technologists, and consultants. The pilot study would seek to engage industry and other private sector organizations at the transnational level in sharing and

evaluating technical information. The unique contribution of the pilot study would be measured by its ability to synthesize information regarding best practices, successes and failures, and uncertainties for the sectors of interest.

A typical pilot study meeting would explore topics such as:

- Industry overview and assessment including typical waste stream and contamination issues
- Risk assessment methodologies
- Preparedness and planning issues
- Site characterization and monitoring approaches
- Prevention and remediation strategies including technologies and methodologies
- Institutional, financial, and public participation aspects of prevention and remediation

In addition, countries would be given the opportunity to present a general update of prevention and remediation activities via a *Tour de Table* as well as to provide country-specific industrial sector information. A limited number of countries would be selected to provide these detailed updates at each meeting.

It is proposed that the industrial sector of interest would be matched to the special interests to the potential host country for the meeting. Thus, host countries would have primary responsibility for involving industrial sector representatives and, possibly, developing a field visit to the affected sector.

4. ESTIMATED DURATION

Pilot Study Meetings: September 2003 - September 2005
Completion of Final Report: Spring 2006

5. PRODUCTS

An industrial sector report will be developed after each meeting. These reports will include invited papers from the industrial sector assessments as well as summary information on the monitoring and evaluation of risks and strategies for prevention and remediation. Country update reports will also be included.

6. NON-NATO PARTICIPATION: BALKANS, CENTRAL ASIA AND OTHER DEVELOPING COUNTRIES

In 2001, NATO/CCMS identified key objectives that would assist developing countries. These objectives include:

1. Reducing the impact of military activities

2. Conducting regional studies including cross-border activities

3. Preventing conflicts in relation to scarcity of resources

4. Addressing emerging risks to the environment and society that could cause economic, cultural and political instability

5. Addressing non-traditional threats to security

The proposed pilot study, *Prevention and Remediation Issues in Selected Industrial Sectors*, specifically addresses #4 and also covers aspects of #'s 1, 3, and 5. The proposed pilot study would target specific industrial sectors based upon interests of countries with newly industrializing and developing economies. The study would provide these countries with a base of technical information and with a network of

experts from whom to obtain advice. This proposal offers the opportunity for current pilot countries to continue networking and information sharing, and also provides a focus for discussions driven by partner country needs.

7. REQUEST FOR PILOT STUDY ESTABLISHMENT

It is requested of the Committee on the Challenges of Modern Society that it approve the establishment of the *Prevention and Remediation Issues in Selected Industrial Sectors Pilot Study*.

Pilot Country:	United States
Lead Organization:	U.S. Environmental Protection Agency