The European Union's Tacis programme

BLACK SEA INVESTMENT FACILITY

Report

Management of the contaminated soils in

Ukraine and Russian Federation

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Warning

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The concept of the Tacis Project: Black Sea Investment Facility

The main environmental question of the region is: How to reduce the stream of pollution in the Black Sea?

There are 6 countries bordering the Black Sea: Bulgaria, Romania, Ukraine, Russia, Georgia, and Turkey. Three of them are candidates to the adhesion to European Union; three of them are eligible to the Tacis Programme. The candidate countries and the new member states with the help of the European Union, particularly in the framework of programmes of co-operation in the Danube's catchment, do a lot of efforts. But these efforts should stay insufficient without the same efforts in the NIS.

The European Union estimated it should be useful to push these projects and their financing and launched the BSIF Programme. The Black Sea Investment Facility provides studies in aim to facilitate the funding of projects allowing a reduction of the pollution of the Black Sea by the International Financing Institutions.

The target groups

Beneficiary Countries

The beneficiary countries of this investment facility are the three CIS countries bordering the Black Sea (Georgia, Russia and Ukraine), plus Moldova which is also connected to the Black Sea via its river basins.

IFIs: International Financing Institutions

IFIs involved in the BSIF programme:
World Bank – International Bank for Reconstruction and Development
EBRD – European Bank for Reconstruction and Development
BSTDB – Black Sea Trade and Development Bank
EIB - European Investment Bank

Organisations of the co-operation already existing

BSC Black Sea Commission
BSEP Black Sea Environmental Programme
DABLAS (Danube & Black Sea) Task Force
JEP (Joint Environment Programme) (TACIS)
2001 Regional Environment Programme (EBRD)
Bangkok Facility (EC & EBRD)
MISP (Municipal Investment Support Programme)
GEF Strategic Partnership on the Danube/Black Sea Basin
BSERP Black Sea Ecosystem Recovery Project

Bilateral Donors

Canada, Denmark, France, Germany, Japan, Switzerland, United Kingdom, USA

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1. Introduction

When one speaks of contaminated lands on the territory of the former USSR, Tchernobyl is the tree that hides the forest. The world community focuses this exceptional case of large soil contamination by radionuclides. It mobilises a lot of teams of scientists and engineers and it's the matter of a lot of cooperation programmes between West and East. It is a catastrophe. But who knows that the diffuse pollution of the water resource by contaminated sites causes in these countries more than 100 000 deaths per year and the same order of genetic malformations?

The former USSR didn't pay attention to the pollution generated by the anthropogenic activities. The inventory made in 1993 in Russia (quoted further) revealed that the water resource was contaminated on almost 25 % of the territory. The most often identified situation was the existence of 170 000 illegal dumpsites of industrial waste. In fact, each plant had its own dumpsite. In parallel the military-industrial complex had its own lands completely closed to any investigation and used for the production of armaments and ammunitions, for the tests of a lot of weapons, rockets, and so. The agriculture has used pesticides and fertilizers. The breakdown of USSR and the deep economical depression stopped the use of pesticides and fertilizers that nobody could buy any more. It also reduced the tests and trainings of the army. The industry reduced its production and a lot of plants disappeared. But the pollution remains. And we're not qualified to speak about nuclear contamination.

After the accession to independence of the Soviet Socialist Republics, each country inherited more or less of the same situation. After some fifteen years, the ways to manage the situation differ for each one. A common parameter is that the economical crisis forbade doing anything: there were a lot of other priorities. But in parallel, we must remain that the EU countries didn't really pay attention to this problem before the 90s. The USA begun the movement with the high level of contamination of the military-industrial complex and they created the Superfund which helped to develop methodologies, techniques and at last a market.

The contamination of sites is a real problem for all these countries. The countries disposing of a large territory feel less sharply the question: 25 % of the territory of Russia contaminated means that 24 times the French territory is not contaminated! It's cynic but realistic when it's to define priorities for the country. The link between the contamination of soils and the public health throughout the contamination of the water resource is not yet in the mind of the authorities. The countries disposing of a small territory, and/or expecting a development of the tourism (as bordering the Black Sea), are more sensitive to the question, even if they have not yet the means to do something.

The main questions that the countries will have to solve or to decide are:

- Techniques and methodologies for the inventory of the contaminated sites;
- Legal framework of the status of the contaminated sites: property of the land, responsibility of the former users of the land, authorized activities according to defined levels of contamination, monitoring of the contaminated sites;
- Administrative framework of the inventory: taking into account there's no cadastre and the more often no right to ownership of the land;
- Laboratories of analysis: investment in modern equipment necessarily linked with the recognition of the international standards (and by the way adhesion to ISO and CEN);
- Development of a local engineering of reconnaissance works;
- Development of a local industry of remediation of the sites.

2. The market of contaminated sites

2.1. Due Diligence

We must say that it's almost the only one existing market in the countries we target. Russia, Ukraine, and in a minor way Georgia and Moldova, are attracting foreign investments. For a long time the rules for foreign investments have not been fair and each one knows a lot of anecdotes about what happened to one or other. The Legal Due Diligence is a western practice that begins to appear in the negotiations for foreign investment[1]. For the moment, the main objective is to determine the true value of the assets. The more often the premises and the equipments are overvalued by the local partner and the necessity of an independent valuation appears progressively.

The soil contamination is a hidden defect of the transaction. But the question is the economical value of the contamination for the buyer. And this question lays on two subsidiary questions: what is the economical stake of the situation of pollution? who is responsible of this pollution?

The economical stake depends of the regulation. For the moment the economical stake is a fine that is calculated in a sophisticated manner but that remains relatively low. By precaution, it happens several cases when the investor asked a study and decided to remedy the site (some constructions of hotels in Moscow). But all that must be agreed by the partners in terms of value of the pollution and for the Eastern part it is negligible.

The responsibility of the effects of the pollution should be to the former operator of the site. The national regulations say also that in case the operators disappeared, it's the State. But all this debate is a matter of negotiation within the frame of the negotiation of the partnership.

The cadastre didn't exist in the Former USSR. Since 1991, it's a colossal task to establish a cadastre in the NIS. Till today, the Ukrainian Law on land property has not been promulgated because it's not yet possible to register the property of the land. The Municipality can allow a right to use the land but it may happen a lot of surprises. This question doesn't simplify the rights and duties about the pollution of soils.

For the next years, the foreign investments should continue to develop, perhaps with a higher rate in Ukraine, Georgia, Moldova, than in Russia. After some bad experiences, the negotiation of partnership should become more and more rationale. Within this frame, the audit of pollution of sites and soils should be more and more often taken into account in the Legal Due Diligence exercise.

But a question will remain. The national legal and regulatory procedures of audit of soils and sites are not at the international state of art. Between partners, it's easy to agree that the audit will respect international norms and rules of art and to define them with the operator of the audit. But studies applying these "foreign" norms and rules of art cannot constitute evidences for the national courts which recognize only the local norms.

2.2. Inventory

It's often spoke about the Russian inventory of 1993. In fact there's the combination of two works.

The Global Assessment of Soil Degradation led by the Dokuchaev Soil Institute in 1988-89 was limited to degradation of agricultural lands (urban territories, forests and permafrost areas were not considered). Another disadvantage resulted from the fact that GLASOD aimed to compile a degradation map “manually”. This led to many cartographic restrictions, as well as generalization and loss of collected information presented in tabular and paper formats. There was an enormous discrepancy between the amount of soil degradation data collected and their acceptability and practical application. Soil degradation was not widely discussed before, as officially at that time the Former USSR did not have widespread ecological problems.

The basic data were collected and published in Government (national) reports on the status and use of land in Russia (Government Report, 1993). The collection of data has been entrusted to the regional level of the administrations of environment. These administrations have known in Russia a continuous train of reforms since 1991: Ministry of Environment, State Committee of Water, Presidential Committee of Environment, Ministry of Ecology, Ministry of Natural Resources, and so, and so. Each time, these

[1] Alina Plioutch, Volkov & Partners, "What is Due Diligence" , August 2005

reforms have resized the organisation of the involved administrations at the regional level, with changes of heads of departments, changes of premises, problems of budget[2]. The Inspectors were let free to define by themselves what is a contaminated site. The more often were only considered so the dumpsites of industrial waste.

Actually, methodologies have been standardized for the analyse of potential contaminated sites. These methodologies have been developed with a theoretical point of view. For instance, an Inspector asked us what to do with a high level of concentration of lead detected in the gardens around a plant. The plant was a crystal plant and the milling and the grinding were equipped with air aspiration without filter at the exhaust, so the plant was spreading crystal dust containing 25% Pb_2O_5. There was no risk for the vegetable production but perhaps there was a risk for the breathing of the neighbours. If we apply the French methodology of risks and impacts analyse, it was a problem of air pollution and not a problem of contaminated soils, even if there was a lot of lead in the soil.

At least, if everybody is equal in front the Law, some are more or less equal than the others. The oil and gas monopolies have polluted (and continue to pollute) the soils in the extraction areas, the pipeline networks, the storage facilities. Only a minority of cases appear in the inventories[3].

The investigations are limited to the superficial soil. For the moment, the impact on the underground water is not systematically investigated.

For the next years, as only Russia has already a process of inventory, the other countries should begin to inventory the contaminated sites. An international assistance will be necessary to implement methodologies and to transfer know-how.

A key-point is to adopt multi-level strategies: exhaustive inventory of potential contaminated sites; qualification of the sites with a grid and grading of the priorities; impact assessment of the top ranking hazardous sites; prioritization of the remediation of sites within an action programme and funding of the programme.

2.3. Diagnostics

It's current to see that waters samples are directly put in empty mineral water bottles. It's even the usual way. It's clear that the procedures "on the field" (and not "in the papers") are far from the Western and international norms. There's only to consider the package of ASTM norms on geostatistical data, boreholes, sampling, conservation and transport of samples, analyses in laboratory, and so. The more often the Inspectors take samples with a shovel and plastic bottles and the laboratory has only reactives and coloured indicators. Let's add that topographical maps (1/25 000 and 1/10 000) exist but are classified "secret" by the Ministry of Defence.

The investigations are made by the Inspectors of Environment and they have no means for that. It exist companies able to drill boreholes and equipped for that. They work mainly for the projects and the studies of civil survey works. They could intervene on the field but who will pay for that?

It's why the investigations are limited to the surface layer (0-20 cm) and with several random samplings.

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[2] RBK. 20.05.2004, Moscow. Within the RF government a federal body of environmental, technological and nuclear control is going to be created, said today the RF prime minister Mikhail Fradkov at the meeting of the government.

In his opinion, such agency will make it possible to avoid a conflict of interest between ministries and bodies of control that used to be a part of ministries.

It took the government four years to realize that abolishing an independent environmental service was a mistake. It was done on the 17th of May 2000: it was one of the first decrees by President Putin that abolished Goscomecologia. During all these years non-governmental organizations were proving that such a decision was a mistake. However, lobby of oil producing companies was stronger.

The current attempt to restore the state environmental control is praise-worthy, but we shouldn't create illusions for ourselves. The influence of companies that are selling out Russian natural resources is becoming stronger and stronger every year. There is little hope that a newly created body of control will be able to really control the situation. Nevertheless, we still hope for the best.

[3] Chaque année, près de 15 millions de tonnes de pétrole s'échappent des pipelines qui acheminent le pétrole de l'ouest de la Sibérie vers l'Europe occidentale. Construites du temps de l'Union soviétique pour alimenter l'Allemagne de l'Est, ces infrastructures sont aujourd'hui vétustes et surtout mal entretenues. Résultat : les habitants boivent de l'eau et consomment des poissons contaminés pas les hydrocarbures. Sur certains sites le sol est tellement imprégné de pétrole que le paysage est devenu lunaire. Pourtant cette pollution n'est pas une fatalité : il suffirait que les grandes compagnies occidentales qui bénéficient de cette manne venue de l'Est investissent les fonds nécessaires pour colmater les principales fuites du pipeline et dépolluer les sols. Les populations locales sont prêtes à mettre la main à la patte. Avec des moyens dérisoires, elles ont déjà récolté près de 50 tonnes de brut autour de la ville de Nizhnevartovsk.

A Western diagnostic is an impact assessment: identification of the contaminant, target of contaminations, pathways of contamination, plan of sampling, sampling, analyses, modelling of the contamination, analyses of the risks for health and environment. It's the job of specialized companies and they are full equipped for that or call for subcontractors. The study is paid by the polluter, or by the State if the site is "orphan". More and more all operations are described in norms (ISO, CEN, ASTM) or guidelines (BRGM).

For the next years, it will depend of the evolution of the national regulations and of the adhesion to the international standard organisations (ISO, CEN). The enterprises are economically recovering. Progressively, they should be able to pay for an assessment of their pollutions. In several regions, it's already the case of air pollution. The regulations should follow the economical recovery and step by step impose impact assessment studies. The Western know-how should find opportunities to apply its methodological advance. There's also possibilities to develop cooperations with the regional engineering companies which have skills in the drilling works.

2.4. Remediation

For the moment, there's no facilities for the remediation of contaminated soils. Some scientific institutes are working on phyto-remediation and there's a true local know-how.

Science studies the soils for around two centuries. The main concepts have been elaborated during the last 100 years from the works of V.V. Dokuchaiev and others in Russia. These scientists shown that the soils are natural bodies that develops according to environmental factors. Two main concepts appeared: pedology considers the soil as a natural body, and is less insisting on its immediate use; edaphology studies the soil focusing on superior plants. The pedologists study and classify the soils as they are in the natural environment; the edaphologists study the properties of the soil according to the production of food and fibers[4].

In 1910, the phytoremediation for the treatment of soils contaminated by heavy metals originates in Russia with the publishing of the works of Vernadsky (the biosphere). The study of the bio-geo-physical flows between the soils (lithosphere), the vegetals (biocenose) and atmosphere drives to define the rules of calculation of bioaccumulation of heavy metals in vegetals. The Laboratory of Applied Ecology of Ural in Ekaterinbourg (directed for several decades by Tamara Chibrik) demonstrated the impact on human health of the "technogene" areas in most of the Russian great urban areas.

In 1980 USSR launched a national directive about phytoremediation and put in the 5-year Plans a programme of "phyto-cultivation" of the contaminated industrial soils that treat more than 1.4 mln ha between 1980 and 1990.

In 1990, the Russian Ilya Raskin, inspiring from former soviet scientific works on phytoaccumulation (trapping and fixation of heavy metals by the biomass of plants) develops a concept of phytoextraction. The first companies of de-pollution by plants appear. The first patents are registered after a fifty scientific studies.

Usual techniques as venting, containment, ex site remediation of soils, are not offered on the market.

For the next years, the development of the market will depend of: the economical recovery of the enterprises; the capacity of the administration to proceed to or to impose diagnostics; and the evolution of the regulations.

2.5. Equipments

We cannot forget the equipments. Former USSR has let a lot of very skilled geologists, engineers and technical teams for drilling works. The equipments are old and rustic but they know to make drillings.

There's no topographical data and even no boundary stones. So the positioning by GPS should quickly develop.

Russian software developers are among the best of the world. Quite all the development team of Waterloo Hydrologic (Visual Groundwater, Visual Modflow, etc.) is Russian. So the development of local software for the modelling of sites and pollutions should quickly satisfy the needs of the market.

[4] Canadian Encyclopaedia

The weakest point is the chain from the sampling to the results of the analyses. There's a big backwardness in the procedures, the methods, the equipments. These countries should push the development of modern laboratories. For the moment, there are only the laboratories of the administration (Inspection of Environment and Service of Sanitary Epidemiology). It will be necessary to favour the implementation of private laboratories (first level analyses paid by the enterprises), the modernization of the laboratories of the administration (counter-expertises) and to define a national reference laboratory (arbitration and definition of the procedures and methods). The certification of the laboratories should be easier by a national recognition and a full and fair application of the ISO 17025 standard.

3. Ukraine

3.1. Definition

There is no specific definition for contaminated sites and land in the Ukrainian Law. The contamination of soils is defined as the state of a soil regarding the quality required for the use of the soil which is mainly focused on agricultural use. The only text is an instruction to the State Inspection for the assessment of damages which defines:

Land pollution: Revelation of foreign or unauthorised appearance in the aerobic zone of one or more ingredients (or their combination) which may worsen the productivity and quality of the biota.

Land littering: Availability on the territory of the sites of foreign matter and subjects.

This definition is more ideological than technical. The agrarian ideology considers the land as a national treasury and all that follows is axed on the compensation of the damages to the fertility of the land.

The only purpose of the regulation is the assessment of the damages that will be claimed for a monetary compensation. Anyway, there are no facilities able either to treat contaminated soils or to restore contaminated sites.

3.2. Inventory

Ukraine has not made any inventory of the contaminated sites on its territory. As everywhere on the territory of the former USSR, nobody paid a particular attention to the question of the pollution of the soils. Classically, the agriculture has used a lot of chemicals; the army has used lands for its industry and for the training, spreading chemicals; each plant used its own landfill for its waste; the mining industry and the metallurgy have let slag heaps. Since the independence, nobody has had the means of a policy of contaminated sites.

In 1994, the Ministry of Environmental Protection and Nuclear Safety developed a guidance document describing the general objectives of the National Environmental Audit Programme and the general procedure. Major objectives were defined as:

- The identification of potentially contaminated areas.
- The assessment of the extent of contamination.
- The calculation of necessary remediation measures.
- The definition of criteria to avoid emergencies in the future.
- The carrying out of remediation activities at identified contaminated areas.

The general procedure consists of:

- Definition of those sites which need to be audited and in which order.
- Lays down which data and documents that need to be checked.
- Lays down the workers safety measures during the audits.
- Special procedures for those sites, where violations of previous inspections are identified.

During the audit, the following documents shall be checked:

- Ownership documents.
- Documents concerning the sewage system.
- Maps specifying water treatment facilities.
- The environmental certificate of the site.
- Any plan defining measures to minimise negative environmental impacts.
- Licenses for the exploitation of natural resources; i.e. wastewater emissions, and air emissions.
- Documents concerning accident prevention and emergency plans.

However[5], along the National Environment Audit Programme, 43 military sites were registered as being potentially contaminated. The programme is valid for both civil and military facilities. A key feature of the programme is to inspect the facilities on an annual basis.

In practise only very few sites have been audited. In total, the 43 sites were audited and registered as potentially contaminated. The largest sites among these were:

- The air base of Uzen, with a total surface area of 5 km².
- A variety of airbases close to the cities Poltava and Lutsk.
- The marine base of Sevastopol.

The contamination of soil with pesticides has the most complex character. Here, the most hazardous factor is the presence of persistent chlororganic pesticides. In Ukraine, more than 20% of the soil in the used land contain DDT and products of the degradation of this. 4% are contaminated by hexachloro-cyclohexane.

Also, the contamination from the petrochemical industries and related to the use of mineral oil products is doubtless a problem in Ukraine. The basic sources of contamination are oil refineries (6), airbases and some other Soviet Army objects, network of transit and international oil pipelines (more than 6000 km), and numerous sites of production, storage and transportation of mineral oil products (more than 300 objects).

Today, 133 of 197 large water works in Ukraine are located in zones which also have potential sources of oil contamination. Contamination has already been detected at more than 150 water works located in the rural territories. It is estimated, that the contaminated land area exceed 30000 ha. Concerning the airbases (43), soil and groundwater on practically all of these is heavily contaminated by light hydrocarbon fractions.

Some of the contaminated sites (e.g. in the towns of Lutsk, Zaporozhye, Stryi and Uzin) need urgent remediation due to the risk the contamination pose to the water supply in the areas.

On basis of the urgent character of the potable water supply problem, a three year scientific and technical program has been developed by joint co-ordinated efforts of the National Academy of Science, the Ministry of Environmental Protection and Nuclear Safety, and the State Committee on Geology. The programme is entitled “realisation of the control, estimation and forecasting of the situation of petrochemical contamination of ground water in Ukraine”. One of the results of this programme will be the development of methodologies for scientifically reasonable and ecologically safe remediation of contaminated land. With the support of the ministry, new technological elements are developed for remedial activities. Here, development has especially focused on biological technologies for degradation of petroleum contamination. Development of investigation methods has also been included in the programme.

3.3. Accidents

It exists a procedure in case of accidental pollution of the soil. All the operations are managed by a department of the Department of the Oblast of the Ministry of Ecology and Natural Resources (DOE). The general objective is to assess the damages of the pollution.

3.3.1. Investigations

When the DOE is informed of an accident of pollution, it goes on place and checks the extension of the pollution:

- Estimation of the contaminated area by visual control;
- Estimation of the penetration of the pollution by visual control; the DOE is not equipped with an auger and uses for that a common shovel, so the investigation is limited to a depth of 0.50 m;
- Identification of the contaminant product by collection of the available information about the circumstances of the accident.

[5] Management of Contaminated Sites and Land in Central and Eastern Europe, Ad Hoc International Working Group on Contaminated Land, reported by Jens Nonboe Andersen, DANCEE, 2000

3.3.2. Sampling

The DOE takes samples of the contaminated soils. The Ministry published in 2004 "Guidelines for sampling".

The sampling includes samples of the background. The aim is to compare the "contaminated" soils with their previous state. By the way, the main objective is to provide evidences that there's a gap between the former state of the soil and the state after the accident of pollution.

3.3.3. Analyses

In Ukraine, there are practically no specifications on acceptable residual concentrations of contaminants in soil. Maximum allowable concentrations are, however, defined for a variety of compounds for water and air (groundwater and surface water).

A site-specific approach is applied for the assessment of soil contamination, considering general environmental conditions, the type and extent of contamination, and the future land use.

The DOE uses a list of maximal rates for specific chemicals. This list is from 1982 and has not been updated since[6].

It must be said that the means of analyse of the laboratories give rise to another questions. The existing equipment of these laboratories is sized for % or ‰ investigations using chemical reagents dosage methods. Nowadays, regulations and investigations for pollutions require ppm (part per million) if not ppb (part per billion) analysis. These corresponding equipments are not available in the laboratories of the Inspection. The existing laboratories use Ukrainian standards, describing the methods in accordance with their equipment. The analysis with modern laboratory equipments are described in international standards (ISO), European standards (CEN) or national standards. For the moment, these international standards are not recognized by the Ukrainian office of standardisation. The result is that the levels to be investigated can be determined only with equipments using methods which are not recognized by the national standardisation organisation and by the way the results are not conclusive for the courts.

3.3.4. Procedure

The objective is to determine the cost of the pollution. There are 2 standards established in 1984: General and local contamination; Out of emergency situations. The Inspection must apply the procedure defined by the Ministry[7]. This procedure defines contaminants classes with a list that mixes chemical elements and commercial brands of pesticides, fertilizers, products, and so.

The estimation of the damages is done by the Department of Land Resources of the DOE. Eventually the case is transmitted to the Court. The best result is the payment of the damages but there's no work of remediation because there's no facility able to treat the contaminated soils.

In some cases, funding can be made available from the environmental budgets of the regions.

3.4. Controls

The Inspection of the Environment makes inspections of the plants. Within this frame, they may sample the soils around the waste storage and it concerns mainly the mineral waste (mines, steel plants). In this case, the objective is to understand the flows of pollution of the water resource, which is an acute problem in several regions.

3.5. Projects

The procedure of permitting of the projects of new facilities includes an assessment of the impact on environment. It includes an obligation to check the quality of the soils. It may happen to find contaminated soils when the project is scheduled to be on a former industrial site but in the current state of the practice:

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[6] See " Information note 2-04-02 pages.1-9: MAXIMUM ALLOWABLE CONCENTRATION OF CHEMICAL SUBSTANCES IN SOIL (MAC) (USSR 1980-1987)" in Annex

[7] See "Order of the Ministry of Environment Protection and Nuclear Safety of Ukraine N° 171of 27.10.97: METHODOLOGY for definition of the scope of damages caused by contamination and littering of land resources resulting from violation of environment legislation" and "Circular of Ministry of ecology and Natural Resources: Procedure of assessment of the damages" in Annex

there's no official methodology for these studies; nobody can check the results provided by the petitioner; and nobody could say what to do in case a contamination should be found.

3.6. Sales of land

In case of sale of a former industrial site, there's no obligation to investigate the contamination of the soil.

4. Russian Federation

4.1. Definition

Official publications refer to contaminated sites as spots or areas which pose a risk to the environment and which are not necessarily of the same size as the property. This definition is very general.

The protection of nature is a national problem in Russia according to the Constitution of the Russian Federation. The following acts form the legal basis for the management of contaminated sites and land. They include decisions of the Government of Russia but also numerous decisions of the Government of the former USSR which are still applied:

- The law "about the protection of atmospheric air" (1982).
- "The earth code" (1991).
- The law "about the ecological expert evaluation" (1995).
- The law "about soil amelioration" (1996).
- Decision about soil monitoring (1982).
- Decision about standards for pollutants emitted to the atmosphere (1981).
- Decision about standards for pollutants emitted to the environment (1992).
- Decision about contaminated soil (1992).
- Decision about the monitoring of the environment (1994).

There are a number of normative methodological instructions, which regulate different types of this activity. The National Committee of the Environment Protection has worked these out.

In 1993, a requirement to carry Environmental Audits at military sites on an annual basis was laid down per law in decree N° 406-1993.

4.2. Inventory

The first attempt to combine soil degradation data collected by different ministries and institutes of Russia was undertaken by Dokuchaev Soil Institute in 1988-89 in the frame of the project on Global Assessment of Soil Degradation (GLASOD). Since then, numerous publications concerning negative human impacts on soil have appeared in scientific and public journals describing types of degradation, their nature, severity, rate of change, extent, and consequences. The basic data were collected and published in Government (national) reports on the status and use of land in Russia (Government Report, 1993).[8]

The GLASOD project was limited to degradation of agricultural lands. Thus, several other widespread forms of soil deterioration taking place in Russian forests and permafrost areas were not considered. Another disadvantage resulted from the fact that GLASOD aimed to compile a degradation map “manually.” This led to many cartographic restrictions, as well as generalization and loss of collected information presented in tabular and paper formats. There was an enormous discrepancy between the amount of soil degradation data collected and their acceptability and practical application. Soil degradation was not widely discussed before, as officially at that time the Former USSR did not have widespread ecological problems.[8]

The control of the main groups of contaminants in soil is performed according to the program of the soil monitoring. The results of the soil monitoring are presented in the annual national reports "the land status utilisation in Russia", which have been published regularly since 1993.

During the identification of potentially contaminated sites, the tasks of the Environment Authorities are:

- Detailed definition of the location of the potentially contaminated sites and estimation of the quantity of contamination and assessment of the risks involved.
- Definition of fines for environmental misdemeanours, issue a requirement to the polluter.

[8] Land Degradation, Vladimir Stolbovoi, IIASA & RAS, 2002

- Control of the remediation of the environmental damage and supervision of the remediation activities.
- To issue an environmental certificate after remediation.
- To implement measures for the protection of the environment. The environmental authorities can force the polluter by law to comply with the clean-up requirements. It is noted that this also applies to the military.

The scientific institutes of the academies of science and the academies of the agricultural science at the universities of Russia take an active part in working out strategies of nature protection and in preparing instructive documents dealing with soil protection.

The soil status in the industrial centres is monitored on local and regional levels. An overall ecological monitoring is also performed in Russia. The aim of the overall monitoring is the control of areas, which are far from local sources of pollution, and therefore receive pollution by long-distance transport (including transboundary pollution).

The arable land is contaminated at the highest degree in areas surrounding the industrial centres. As a rule, the soil is contaminated in 5-km zones around these centres. The main sources of contamination are the enterprises dealing with energy production, metallurgy and transportation.

Within the soil monitoring program, the selective control of 1997 showed that 3% of the total area of the arable land is contaminated by heavy metals. Due to reduced plant production in Russia, this area has not increased during the last years. However, at the same time the area of contaminated land did not decrease. Here, contaminated soil is defined as soil with contents of Pb, Cd, Cr or Sn exceeding the background levels 10 – 40 times. Furthermore in the industrial regions, the arable soil is contaminated by dioxins. Commercial fertilisers have been suspected as source of heavy metals in the arable soils, but no evidence of this has been found.

The soil of almost 3% of the arable land is also contaminated with pesticides. It is estimated that high levels of DDT, metaphos and trephlan are present in the soil in these areas.

The problem of soil contamination caused by the oil industry is very important for Russia. Due to the numerous accidents, this type of contamination is rather widespread within the oil production sector e.g. the number of oil spill accidents in West Siberia during 1995-97 amounts to some thousands.

4.2.1. Identification of Potentially Contaminated Sites and Areas

The Russian Federation has a standard procedure regarding environmental certification of the state of potentially contaminated soils. They concern the different types of soil resources: arable lands, pasture, forest lands and so on. The arable lands are investigated more detailed. There are some dozen of documents, which regulate the investigation methods of the identification of potentially contaminated soils. The list includes more than 50 normative acts of the Russian Federation, more than 40 documents of the State Committee of the Environmental Protection and Hydrometeorology, and the same number of documents of some other Ministries (Health service, Agricultural service, Transport, Statistics and so on), near 50 State Standard documents, and more than 500 Instructions, which conclude the description of the methods of soil samples selection and their laboratory analyses.

It is planned to determine the different types of the contaminants: heavy metals, pesticides, oil and oil-products, and radionuclides. The different demands are made to the soils of the different types of utilisation. Pesticides are controlled in the arable soils, and the points of soil sampling are usually distributed evenly. Heavy metals are determined in soils predominantly around the industrial sources of contamination and according to the distance from these. The analytical methods are standardised. The certification is made on the base of the critical standard levels of each type or pollutants.

4.2.2. Investigation of Contaminated Sites and Areas

Areas for detailed investigations are selected. Afterwards, specification of the distribution of contaminants, risk assessment, and drafting of remediation plan is made.

There is no standard procedure for the detailed investigation of contaminated sites, if not several GOST standards inherited from the former USSR.

A lot of cooperation programmes are associating Russian institutes and western know-how, funded by international funds. The scope is currently estimated to 25% of the Russian territory that is 17 mln km². It's clear that it will require colossal efforts. For the moment, the first goal is to define Russian methodologies for the investigations and the inventory.

4.3. Analyses

Critical levels of e.g. heavy metals in soil are estimated on basis of a sanitary-hygiene approach. The aim of the approach is the protection of humans from the impact of contaminants. However, now it is clear, that the major aim of the estimation of critical contaminant levels in the environment (including soil) should be the protection of the ecosystems in general including humans as part of this.

The Ministry of the Environment and its corresponding regional departments are responsible for remediation targets. Clean-up criteria are in general defined according to the previewed land use. For the moment, no means have been allocated to this task.

4.4. Polluters and Site Owners

The polluter pays principle is applied. The polluter has the possibility to pay compensation instead of taking care of the remediation himself. The liability is hence transferred to the recipient of the compensation.

4.5. Market

International grants are funding demonstration projects as:

Year	Title	Content	Amount	Fund
2000-2003	Chemical Weapons Environmental Conversion (preparation for the decontamination of the lewisite production facility and its surrounding area at OAO Kaprolaktam)	Studies and pilot thermal desorption plant	4.25 mln€	Tacis

5. Ukrainian Regulation

Order of the Ministry of Environment Protection and Nuclear Safety of Ukraine N° 171of 27.10.97: METHODOLOGY for definition of the scope of damages caused by contamination and littering of land resources resulting from violation of environment legislation

Circular of Ministry of ecology and Natural Resources: Procedure of assessment of the damages

Information note 2-04-02 pages.1-9: MAXIMUM ALLOWABLE CONCENTRATION OF CHEMICAL SUBSTANCES IN SOIL (MAC) (USSR 1980-1987)

GOST 17.4.3.01-83: NATURE PROTECTION - SOILS - GENERAL REQUIREMENTS FOR SAMPLING

GOST 17.4.4. 02-84: SOIL PROTECTION – SOILS - METHODS OF SAMPLING AND PREPARATION OF SOIL FOR CHEMICAL, BACTERIOLOGICAL, HELMINTHOLOGIC ANALYSIS