

NATO-CCMS Pilot Study
Tour de Table - Greece

**Recent Developments on
Contaminated Land in Greece**



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Legislation

- In Greece there is no specific legislation for
 - ✓ Soil
 - ✓ Sediment
 - ✓ Management of contaminated land, however,
- There are several components in Greek law which refer directly or indirectly to
 - ✓ soil
 - ✓ groundwater protection
 - ✓ contamination control



New Legislation

- Non-hazardous wastes: J.M.D. 50910/2727/2003, referring to “*measures and provisions for non-hazardous waste management*”
 - ✓ National Solid Waste management Plan
 - ✓ The gradual elimination of the uncontrolled waste dumps (end of year 2008), for this purpose studies were made during 2005 and 2006 on all uncontrolled waste dump sites
 - ✓ Implementation of a programme for construction of controlled landfills
 - ✓ Closure of uncontrolled landfills
 - ✧ Risk based classification
 - ✧ Provision of guidelines for rehabilitation study and final remediation



New Legislation

- Industrial Hazardous and Non Hazardous Wastes Management
 - ✓ J.M.D. 13588/725/2006 : The first part of the new legislative framework on hazardous waste management (March 2006).
 - ✧ It sets out, among others, the obligations of all operators involved in the management of hazardous waste
 - ✧ Includes provisions for
 - ★ pollution prevention and remediation
 - ★ contaminated sites due to improper management of hazardous wastes.
 - ✓ This legislation has been supplemented with
 - ✧ General Technical Specifications (J.M.D. 24944/1159/2006) for hazardous waste management. They include guidance for the elaboration of a specific study for the rehabilitation of contaminated sites
 - ✧ the respective National Plan (J.M.D. 8668/2007).



Water - Groundwater related activities

- The “Central Water Agency” was established in December 2005, which is the competent authority at national level for the protection and management of surface and ground waters, for the implementation of the framework of Directive 2000/60/EC.
- The “Groundwater Quality Monitoring Programme” was implemented by the Ministry of Environment and Public Works, which aims at the protection of waters against the pollution caused by nitrates from agricultural sources
- A database is being developed about the pressures (potential contamination sources) in each drainage basin



EU legislation

- In the context of EU initiatives, Greece participated actively in the Working Groups designated for the Soil Thematic Strategy and, subsequently, in the consultation stage on the proposal for the new Soil Directive
 - Mine Directive (Directive 2006/21/EC on the management of waste from extractive industries), which entered into force on 1/5/2006.
 - ✓ Completion of the technical requirements for waste characterisation
 - ✓ Determination of any harmonised standards for sampling and analysis methods needed for the technical implementation of this Directive
 - ✓ Identification of technical requirements relating to the definition of weak acid dissociable cyanide and its measurement method
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Mine Directive

- Work by TAC / AHGs – CEN, JRC – ISPRA
- Main issues
 - ✓ Generic guidelines for characterisation of extractive waste
 - ✓ Sampling (revision if required)
 - ✓ Selection/Development of static and kinetic tests for sulphidic wastes
 - ✓ Methods for measuring WAD (easily leachable) cyanide
 - ✓ Inert wastes
 - ✓ Category A waste facilities



Remediation works

- Rehabilitation of old landfills: The work is continued.
 - ✓ Main steps for the implementation of the rehabilitation programme:
 - ✧ Development of a Risk Assessment Methodology
 - ★ to set the priorities for remediation, and
 - ★ to facilitate the selection of rehabilitation measures
 - ✓ Elaboration of Guidelines that were sent to the Municipalities for the preparation of required technical studies:
 - ✧ Preliminary Technical Study to obtain the permits
 - ✧ Final Technical Study to obtain the funding



Rehabilitation of old landfills

The Risk Assessment Methodology

- A simplified procedure based on the “Source-Pathway-Receptor” principle, comprising the following steps:
 - ✓ Evaluation of the “source” taking into consideration (a) the volume and (b) the type of wastes
 - ✓ Evaluation of the “pathway”, i.e., permeability, distance from the aquifer.
 - ✓ Evaluation of the “receptors”, e.g., distance of landfill from drinking water wells, inhabited areas, sensitive ecosystems, etc.



Rehabilitation of old landfills

Matrix M1:

Contamination Source

Waste Volume (m ³)	Excavation materials	Demolition materials	Municipal		Hazardous wastes
			> 30 y	< 30 y	
<1.000	0	5	10	15	45
1.001-5.000	1	7	14	19	47
5.001-10.000	2	10	18	23	49
10.001-20.000	3	13	22	27	51
20.001-50.000	4	15	26	31	53
50.001-100.000	5	17	29	34	54
100.001-500.000	5	19	32	37	55
>500.000	5	20	35	40	55



Rehabilitation of old landfills

Matrix M2:		Pathway		
Distance from aquifer	Permeability, m/sec			
	$K_f < 10^{-6}$	$10^{-4} > K_f > 10^{-6}$	$K_f > 10^{-4}$	
> 10 m	0	4	8	
2 – 10 m	1	5	10	
< 2 m	3	8	13	
Inside the aquifer	9	12	15	



Rehabilitation of old landfills

Matrix M3:						Receptor	
Distance from:	>1000m	501-1000m	101-500m	<100m	inside		
Abstraction of drinking water	0	15	25	25	25	a1	max a
Future abstraction of DW	0	0	0	0	10	a2	
Other water sources	0	0	12	12	25	a3	
Children Playground	0	0	10	10	25	b1	max b
Gardens - Fields	0	0	10	10	20	b2	
Houses-Schools	0	0	10	10	20	b3	
Industries	0	0	0	5	20	b4	
Roads	0	0	0	5	10	b5	
Mines-Quarries	0	0	0	2	10	b6	
Estuaries	0	0	0	2	5		
Surface waters	0	0	2	2	5		
Protected ecosystems	0	0	0	2	4		



Rehabilitation of old landfills

Category	Priority	Score
A	Immediate rehabilitation measures are required (A` priority)	≥ 90
B	Immediate rehabilitation measures are required (B` priority)	70-90
C	Rehabilitation measures should be taken but there is no urgency	30-69
D	There is no need for rehabilitation measures	0-29



Rehabilitation of old landfills

<i>Actions completed (data 28/3/2006)</i>	<i>Percent of sites</i>
Decisions for closure by the Prefecture	87,6 %
Decisions for rehabilitation permits by Regional Authorities	67,6 %
Implementation of rehabilitation measures using only the resources of the Municipalities (no need for external funding)	9,9 %
Rehabilitation projects included in various funding programmes	24,6 %
Rehabilitation projects, ready for inclusion in funding programmes	22,7 %
Rehabilitation activities completed	0,8 %



Remediation of soils in Lavrion



June 17-22, 2007

NATO CCMS Pilot Study Meeting, Ljubljana



Remediation of soils in Lavrion

- Risk based management approach was followed
 - ✓ Sampling
 - ✓ Samples characterisation (analysis, leaching tests, etc)
- Material was disposed of in a landfill in the same area
- Quantity: 112000 m³
- Total cost: 3.5 M EURO



Networks and other EU initiatives

- Provision of information to EIONET on the management of contaminated sites
- Participation in a number of Technological platforms for the 7th Framework programme:
 - European Technology Platform for Sustainable Mineral Resources/ETP-SMR
 - European Construction Technology Platform/ECTP
 - European Technology Platform for Sustainable Development

