



Economic and Social Council

Distr.
GENERAL

TRADE/CHEM/AC.1/6
1 July 1999

Original: ENGLISH

ECONOMIC COMMISSION FOR EUROPE

COMMITTEE FOR TRADE INDUSTRY ENTERPRISE DEVELOPMENT

AD HOC GROUP OF EXPERTS ON THE CHEMICAL INDUSTRY

Pilot Project Demonstrating the Environmental
Clean-up of Selected Sites Polluted by Chemicals

QUESTIONNAIRE

relating to the issuance of the second edition of the Compendium of
Soil Clean-up Technologies and Soil Remediation Companies

1. Within the framework of the Pilot Project Demonstrating the Environmental Clean-up of Selected Sites Polluted by Chemicals (further referred to as "pilot project"), the Working Party on the Chemical Industry, at its fifth session held in Geneva in September 1995, decided to issue a compendium of decontamination technologies and specialized companies (ECE/CHEM/101, para. 17).
2. In September 1997 the *Compendium of Soil Cleanup Technologies and Soil Remediation Companies* was issued as a sales publication of the United Nations, and was very well received. Some 20 technologies and over 550 companies were included in that edition.
3. Considering the success of the first edition, the ECE ad hoc Group of Experts on the Chemical Industry requested the secretariat to up-date the Compendium and issue a second edition. In order to do this, the secretariat required additional resources. A joint project with the United Nations Industrial Development Organization (UNIDO) has thus been established, in which the International Centre for Science and High Technology of UNIDO in Trieste, Italy (ICS-UNIDO) and ECE will cooperate on the publication of the second edition.

4. The purpose of the present questionnaire is to ask Governments, professional organizations, chemical federations, and companies to assist in the completion of the compendium of technologies, and to establish a list of companies capable of cleaning up contaminated soils by using one or more of the technologies described.

5. The compendium will be widely disseminated among Governments, private and public companies and local authorities; in brief, all decision makers having problems with polluted soils. Hence, it is important that all decontamination companies in ECE member countries be mentioned in the compendium of companies.

6. Respondents are requested to send their replies, using the format shown in Part 2 of this questionnaire, and preferably on diskette or by E-mail, **before 15 September 1999** to:

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Trade Division
United Nations Economic Commission for Europe
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On request, the secretariat will send an E-mail or diskette version of the questionnaire to persons interested.

Part 1: Technologies

7. The list below refers to decontamination and remediation technologies which have become established in the commercial soil remediation sector. There are many companies offering clean-up with these methods and a reasonable operating history has been built up over a wide geographic area. Numerous remediation research topics and innovative techniques are also being investigated, though these are not listed here.

8. In general, remediation technologies can be grouped into categories using physical, chemical or biological methods. The various techniques usually work well when applied to a specific type of soil pollution, though no readily-available treatments were identified that could clean all types of pollutants. Due to the complex nature of many polluted soils (e.g. a "cocktail" of hydrocarbons and heavy metals, or pesticides and spilled fuels), it is frequently necessary to apply more than one technique to soil from a particular location to reduce the concentrations of pollutants to acceptable levels.

9. The following list presents two broad categories; *ex situ* and *in situ*, and under these headings the technologies are grouped according to the basic method used - chemical, physical or biological.

I. *EX SITU* TECHNOLOGIES

A. Physical methods

1. Incineration
2. Thermal desorption
3. Soil vapour extraction
19. Separation
20. Excavation and disposal

B. Chemical methods

4. Soil washing
5. Solidification/Stabilization/Sorption/
Chemical fixation
6. Dehalogenation
7. Solvent extraction
8. Chemical and photochemical
reduction/Oxidation

C. Biological methods

9. Land farming
10. Bioreactors/Microbial filters

II. *IN SITU* TECHNOLOGIES

A. Physical methods

11. Soil vapour extraction/Air sparging/Stripping
12. Thermally-enhanced soil vapour extraction
13. Containment systems/Reactive walls/Barriers
14. Electro-reclamation
21. Landfill cap

B. Chemical methods

15. Soil flushing
16. Stabilization/Solidification/Sorption/
Chemical fixation

C. Biological methods

17. Bioremediation
18. Phytoremediation
22. Natural attenuation

Most of the above technologies are described in the first edition of the *Compendium*. Some combinations of methods are known by different names, e.g. bioventing is a combination of soil vapour extraction and bioremediation.

10. A company may be able to offer a remediation technology specified in one of the categories, but not yet as a “full service” remediation (i.e. the company is either developing their capability to practice the method, or it has a limited experience with applying the technique). For each technology cited, please indicate the degree of development for the method using the letter codes indicated below:

- a = Our company has applied this technology on many sites. We have extensive experience with this technique.
- b = Our company has applied this technique in the field, but on a limited basis, or on a small scale only. It is not one of our “main” techniques.
- c = We are currently investigating this technology. We have performed pilot studies and/or one or two small field applications. We are currently building our capacity to apply this technique and expect to be able to offer it among our services within the next year.

Companies should indicate their degree of development/experience for each technology they offer. For example “1a” would indicate “extensive experience with incineration”, “10b” would indicate “limited capability with ex situ bioreactors”, etc.

Part 2: Company details

For Governments, organizations and federations

11. In your country (Governments) or in your organization (professional association of clean-up companies) or in your federation (national chemical federations), are there companies which, on a commercial basis, are performing cleanup operation(s) mentioned in the introduction of this questionnaire? If so, please include their name and the code of their technology(ies) in the form at the end of this questionnaire. Please also mention the size of the company (number of employees in clean-up technologies and annual turnover).

For companies

12. Some technologies are known only under their brand name. Please make sure that companies which are recorded by the trade name of their process are also properly categorized according to the list in para. 9 above. If some technologies are not mentioned in the list, please add those names in full, but not as a trade name. Please complete the data as fully as possible, and use the additional space for any affiliated companies that are not already listed independently.

13. **For responses by e-mail or diskette:** please remit electronic responses to this questionnaire as a separate file preferably in MS Word or WordPerfect and containing only the requested data as shown below. Each field should end with a backslash (\); if there is no data for a particular field please do not omit the backslash.

Format for company response on diskette or via E-mail:

Company name\ street address (first line)\ street address (second line)\ post code, including country symbol\ city\ country\ contact person\ position\ telephone number\ fax number\ e-mail address\ website address\ code(s) of technologies employed\ approximate number of employees engaged in remediation activities

As an example, for the sample company in the attached form, the text file should be submitted as follows (continuous text):

CLEANTECH, S.A.\789, rue de Berne\|CH-1202\Geneva\Switzerland\Mr. Cleantech\Technical Director\+41-22-999 20 10\+41-22-999 20 20\cleantech@clean.com\www.cleantech.com\1a,8c,13a\150

Any additional company information should be sent as a separate file, not integrated with the above format.

* * *

COMPANY INFORMATION FORM

Country:	Date:
Name of respondent:	Name of company, organization or Government Dept:
Address:	Telephone:
.....	Fax:
.....	E-mail

For Governments, Federations, etc., please list companies, with names, addresses, and codes of the technologies (according to para. 9) currently in use. For individual companies, please provide the requested information about your own activities and that of any affiliated companies. Please photocopy this form if more companies are to be listed.

Company name and contact details	Codes of technologies used and level of development		Number of persons employed in clean-up technologies
<p style="text-align: center;"><i>Example:</i></p> <p><i>Company:</i> CLEANTECH, S.A. <i>Address:</i> 789, rue de Berne CH-1202 Geneva (Switzerland) <i>Contact person/position:</i> Mr. Cleantech, Technical Director <i>Telephone:</i> +41-22-999 20 10 <i>Fax:</i> +41-22-999 20 20 <i>E-mail:</i> cleantech@clean.com <i>Website:</i> www.cleantech.com</p>	1	a	150
	8	c	
	13	a	
<p><i>Company:</i> <i>Address:</i> <i>Contact person/position:</i> <i>Telephone:</i> <i>Fax:</i> <i>E-mail:</i> <i>Website:</i></p>			
<p><i>Company:</i> <i>Address:</i> <i>Contact person/position:</i> <i>Telephone:</i> <i>Fax:</i> <i>E-mail:</i> <i>Website:</i></p>			

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<i>Company:</i> <i>Address:</i> <i>Contact person/position:</i> <i>Telephone:</i> <i>Fax:</i> <i>E-mail:</i> <i>Website:</i>			

Responses to this questionnaire should be made before **15 September 1999** by e-mail or on diskette using the format outlined in paragraph 13 above. For written responses, please use the form below. Please send to:

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CH-1211 Geneva, Switzerland

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