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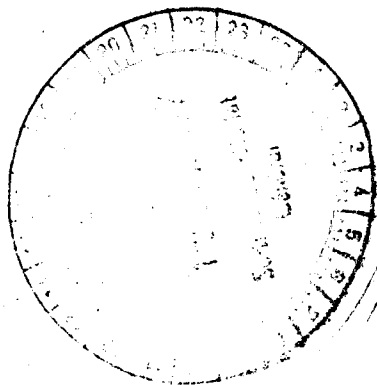
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Brussels, 6 January 1977

Proposal for a
COUNCIL DECISION FOR

adopting a research programme in the field of
Treatment and Use of Sewage Sludge
(concerted action)

(submitted to the Council by the Commission)



COM(76) 711 final

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Research programme in the field of
"Treatment and Use of Sewage Sludge"
(Concerted Action)

I. Introduction

Research in the field of sewage sludge processing was the subject of COST Project 68, which ran from 1972 until 1974. This project covered only part of the problems related to the environmental impact of the sludges produced during waste water treatment.

Research in this field was therefore included in the 2nd Environmental Research Programme of the European Economic Community (Indirect Action), approved by the Council of Ministers on 15 March 1976. In view of the experience gained during the implementation of COST Project 68, research on treatment and use of sewage sludge is to be executed as a Concerted Action; interested non-member countries will be invited to participate.

II. Evaluation of COST Project 68 and conclusions

COST Project 68 "Sewage Sludge Processing", based on an Agreement signed in Brussels on 23 November 1971, started on 1 August 1972 and ended officially on 31 July 1974. Since most of the national projects were financed until the end of 1974 practical work went on until this date.

The following countries participated in the project :

<u>Member countries</u>	<u>third countries</u>
Denmark	Yugoslavia
Germany	Norway
France	Switzerland
Italy	Sweden
The Netherlands	Finland
United Kingdom	Turkey
Belgium	

The aims of the projects were limited to some selected aspects of sewage sludge treatment and disposal. The three main topics were

.../:

- a) standardization of characteristic values of sludge,
- b) elaboration of methods for the characterization of sludge parameters,
- c) comparative tests of combined sludge-refuse incinerators.

Details on the implementation of the project and the major results are comprehensively dealt in the Final Report (Document EUCO/SP/48/75).

Since COST Project 68 was one of the first attempts to coordinate European research within the framework of COST, there was some delay in getting it off the ground, and the running time of only two years was certainly too short, to achieve all of the rather ambitious goals success, and all participants agreed that a follow-up programme is set at the beginning. The Project is, however, considered to be a success, and all participants agreed that a follow-up programme is highly justified, from the viewpoint of the scientific needs as well as the exercise of international collaboration. There is general agreement among the participating scientists that the scope of a follow-up programme should be broader. In particular the environmental problems of sludge use should be covered.

Based on recommendations of the Management Committee of Project 68 and on their own study of the subject, the Services of the Commission prepared an outline of a new project, which was submitted to the Scientific and Technical Research Committee (CREST) in early 1975.

Based on a recommendation from CREST, the Council of Ministers in March 1975 recognized the Community Interest of this research.

Following this, an expert committee discussed in detail the research needs, taking into account an inquiry on sludge disposal and use in the interested countries and an inventory of ongoing national research.

The recommendations of this expert committee, prepared over 3 meetings (23 June, 26 September, 4 December 1975), are given hereafter. The programme was approved by the Advisory Committee on Programme Management for Environmental Research on 4 March 1976.

III. Definition of the problem.

During the purification of waste-water up to 700 kg sewage sludge (°) (corresponding to 30-40 kg dry matter) per year and inhabitant are produced; to this huge amount large quantities of bio-degradable industrial sludges (from breweries, food industry, etc...) have to be added. These sludges contain about 95% water; they are difficult to handle from a technological point of view. Improper disposal of

(°) the amount depends on the treatment procedure, and varies from about 300 kg (digested sludge) to about 700 kg (raw primary and secondary sludge).

sewage sludge causes serious environmental problems (odour nuisance, water pollution by run-off, eutrophication, microbial pollution, heavy metal contamination); disposal at sea or on land, so far widely used, will therefore come under closer supervision, as will incineration causing air pollution.

It would be desirable to solve these problems by improving sewage sludge processing in order to obtain products which can be used in agriculture or for land reclamation, minimizing pollution and disposal cost. The fact that the price of inorganic fertilizers has a tendency to increase will favour these goals.

Research in this field should therefore, in principle, aim at

- the improvement of treatment processes in order to obtain "marketable" products,
- a thorough assessment of environmental problems related to land use of sewage sludge, including hygienic and esthetic aspects,
- reducing cost of sludge treatment and disposal.

Research concerning sludge processing and sludge use is complicated by a number of important analytical problems; due to the complex nature of sludge, many of these are still unsolved, or current methods are unsatisfactory. Therefore, high priority is attributed to research into the methodology of sludge characterization.

IV. Proposal of a new programme

A) General considerations

In many places, for economical reasons, sewage sludge is still disposed of at sea or on land without further treatment. The ecological consequences are not yet fully assessed, but it goes for granted that alternative solutions have to be promoted.

Incineration of sludge was deemed for a long time to be the best solution of the sludge problem, and was one of the main scopes of Project 68, but recent developments (rising energy cost, need for recycling of raw materials) indicate that sludge incineration will be limited in the future to certain geographical situations; further research was not recommended.

The advisability of including research on the industrial use of sludges, e.g. in the fabrication of construction materials, was also explored; it was concluded, that this is mainly industrial research, and that the amounts which can be industrially used are relatively small. The evolution in this field should be closely followed, and relevant research possibly included at a later stage.

It is generally recognized that the most practicable solution for sludge disposal is its use in agriculture and for land reclamation, ect... Therefore all research aiming at the elimination of

constraints to land spreading are of primary importance. These constraints are mainly

- hygienic aspects
- odour nuisance
- content of pollutants, in particular heavy metals and persistent organic compounds, which may influence quality and quantity of crops with obvious consequences for the food chain
- possible negative effects on soil quality after continued application
- contamination of ground and surface water

An economic use on land, however, requires further on-plant treatment at low cost. Considerable work has been done already, but technical processes are far from being perfect and need further reduction in cost.

In principle, the processing of "raw sludge" as it is produced in waste water treatment plants, has to aim at

- a reduction of quantity and volume, to be achieved by degradation of organic matter and/or removal of water,
- a reduction of the polluting potential, including sanitary aspects and, in particular, the elimination of bad odours.

Two subsequent procedures are applied

- anaerobic and aerobic digestion ("stabilization"),
- mechanical dewatering.

In order to increase the (direct or indirect) "economic" value of the final product, further processing, e.g. composting of sludge, is practised.

B) Topics of Research

For practical reasons the programme proposal given in the following is subdivided into 4 main headings :

- 1) Sludge stabilization and odour problems
- 2) Dewatering of sludge
- 3) Problems related to sludge characterization (pollutants, microbiology)
- 4) Environmental problems related to land use of sewage sludge

There is, of course, an overlap between these fields, and the attribution of items is in some cases arbitrary. The list is not ranked by priority.

1. Sludge stabilization and odour problems

- 1.1. Odour characterization and objective odour measurement
- 1.2. Relationship between odour nuisance and "degree of stability"
- 1.3. Definition and analytical procedures for the determination of other parameters for the "degree of stability" and their links to odour nuisance (in part continuation of COST Project 68), in particular
 - content of total organic matter
 - lipid content
 - protein content
 - carbohydrate content
 - enzyme activities and other biochemical parameters
 - H₂S formation
 - redox potential
 - oxygen uptake
 - gas formation
- 1.4. Comparative evaluation of different stabilization procedures
 - anaerobic stabilization
 - aerobic stabilization
 - chemical stabilization

In view of the aims mentioned above (reduction of quantity and volume reduction of polluting potentials) and in view of their effects on dewatering properties and sludge use.

2. Problems related to mechanical sludge dewatering

- 2.1. Basic research on water binding forces for a better understanding of the colloidal state of sludge, location of electrical charges, Zeta potential, etc...., and their importance for the action of flocculants.
- 2.2. Development of analytical procedures and their standardization for the prediction of dewatering properties (continuation of COST Project 68), in particular
 - empiric tests for "centrifugability"
 - particle size distribution
 - specific filtration resistance
 - their connection with already standardized tests, e.g. viscosity or capillary suction time.

3. Problems related to the use of flocculants, for economic reasons considered to be of primary importance, in particular
 - standard flocculation agents for test purposes
 - flocculating properties of polymers as a function of their chemical nature
 - preparation and stability of flocculant solutions
 - optimum use of flocculants and of combination thereof as a function of sludge characteristics and dewatering techniques
 - optimum timing of flocculant addition
 - possible harmful effects of flocculants on the environment

2.4. Evaluation of thickening and dewatering equipment

3. Analytical problems related to sludge treatment and use

3.1. Characterization of pathogens in sewage sludge

3.2. Critical evaluation of the efficiency of disinfection procedures, in particular

- pasteurization
- disinfection by irradiation
- sonication

3.3. Research into content and chemical state of pollutants in sludge, in particular of heavy metals and persistent organic compounds and the establishment of standardized analytical methods for their determination (in part continuation of COST Project 68)

3.4. Influence of industrial wastes introduced to waste water purification plants on pollutant content.

4. Environmental Problems related to land use of sewage sludge

4.1. Product quality

4.1.1. Special processing of sludge for agricultural use (e.g. composting together with refuse),

4.1.2. Improvement of disinfection procedures

4.1.3. Removal of heavy metals and other pollutants

4.2. Effects of sludge application

4.2.1. Transfer of pollutants to plants as a function of their chemical state in relation to different soil characteristics, and harmful effects on vegetation

4.2.2. Critical evaluation of the effects of long range application of sludge or processed sludge (compost) on soil quality, and effects on ground water

4.2.3. Optimum land use of sewage sludge in general, and, in particular, of sludges from dephosphatation plants.

V. Duration of the Programme

A duration of 3 years is proposed for this programme.

VI. Implementation of the programme

The project is implemented as a "concerted action" within the framework of the Environmental Research Programme of the European Communities. Non-member countries will be invited to participate. In principle member countries should subject all ongoing or planned government sponsored research projects covered by the programme to a co-ordination within the framework of the concerted action and inform the other participating countries on results, planning, etc. ... A Research Coordination Committee is established, in which the member countries and Commission are represented by a delegate, who may be assisted by experts.

Provisions will be made for an adequate representation of participating non-member countries on this Committee.

The competences of the Advisory Committee on Programme Management for Environmental Research cover also the implementation of this programme; this Committee is, in particular, duly qualified for giving this research its proper place within the overall environmental research programme of the European Communities.

The Research Coordination Committee is the body in which the exchange of information between the member countries and the Commission is staged.

Beyond this, the terms of reference of this Committee are essentially

- to assist in the co-ordination of the national research projects executed in this field and to advise the executing laboratories in order to avoid unnecessary duplication as well as not to leave any gaps in the programme;

- to advise governments and the Commission with regard to research needs in this field;

- to evaluate the results of research and to draw conclusions with regard to their applications;

- to promote exchange of experience between the scientists involved by organizing symposia, etc. ...;

- to promote the dissemination of knowledge.

1. Financial Volume

The financial volume of the research in this field in the member countries is estimated at 6 m.u.a. for a 3-year period. This figure is based on estimates of the present annual volume of ongoing research projects, as communicated by the experts.

The inventory of ongoing research projects indicates that, with a few exceptions, all member countries would contribute research in 4 research fields.

The cost of co-ordination, on charge of the Community budget, is estimated at 140.000 u.a. for the 3 years period.

COUNCIL DECISION FOR

adopting a research programme in the field of
Treatment and Use of Sewage Sludge
(concerted action)

The Council of the European Communities,

HAVING REGARD to the Treaty establishing the European Economic Community,
and in particular Article 235 thereof;

HAVING REGARD to the proposal of the Commission;

HAVING REGARD to the opinion of the European Parliament;

WHEREAS by virtue of Article 2 of the Treaty, the Community has been assigned the task of promoting throughout the Community a harmonious development of economic activities, a continuous and balanced expansion and an accelerated raising of the standard of living;

WHEREAS in its declaration of 22 November 1973, the Council of the European Communities has approved the principles and objectives of a Community environmental policy and the general description of the actions to be undertaken at Community level;

WHEREAS the Council stressed in its Resolution of 14 January 1974 on an initial outline programme of the European Communities in the field of science and technology that an appropriate approach should be adopted towards the whole range of available ways and means including concerted actions in an effort to ensure maximum effectiveness while endeavouring to obtain a fair allocation of tasks among the laboratories and research bodies in the Community and the Member states and that whenever it proves desirable cooperation with non-member countries should be made possible;

WHEREAS in its decision of 15 March 1976 the Council has approved a second environmental research programme;

WHEREAS a Community concerted research action in the field of treatment and use of sewage sludge is likely to contribute effectively to the achievement of the above mentioned aims, in particular with regard to the reduction of environmental pollution and to the economic use of resources;

WHEREAS the Member Countries carry out research in this field, and agree to subject this research, the volume of which is estimated at about 6 m.u.a., to a coordination on Community level for a period of 3 years.

WHEREAS the Treaty has not provided the necessary powers for this purpose;

WHEREAS the Scientific and Technical Research Committee (CREST) has given its opinion with regard to the Commission proposal;

HAS DECIDED

Article 1

for a period of 3 years

The Community implements/a concerted research action in the field of Treatment and Use of Sewage Sludge within the framework of its Environmental Research Programme. This action consists in the co-ordination at Community level of research which is described in Annex I and which forms part of the national research programmes of the Member States.

Article 2

The financial contribution by the Community to the realisation of the co-ordination action will be determined in the budgetary procedure. It is estimated at 140.000 u.a., the unit of account being defined according to the financial regulation in force.

Article 3

To assist the Commission in the carrying out of the coordination action and the Member States in the execution of the research projects in the context of this coordination, a Research Coordination Committee "Treatment and Use of Sewage Sludge", hereinafter referred to as "the Committee", is hereby established.

The terms of reference and the composition of this Committee are defined in Annex II.

The Committee shall draw up its rules of procedure. Its secretariat will be provided by the Commission.

Article 4

(a) In accordance with a procedure to be adopted by the Commission in agreement with the Committee, the Member States shall exchange regularly all useful information concerning the execution of the research covered by the coordination action. This information shall be treated as confidential if requested by the Member State which provides it.

(b) The Commission shall prepare yearly progress reports on the basis of the information supplied.

(c) At the end of the coordination period, the Commission in agreement with the Committee, shall forward to the Member States/a report on the execution and results of the coordination action. and to the European Parliament

The Commission shall publish this report six months after it has been forwarded, unless a Member State objects.

In this case the report shall be distributed, at their request, solely to the institutions and undertakings carrying out on the territory of Member States, a research activity justifying access to the knowledge resulting from the performance of the research covered by the Community coordination action. The Commission, in agreement with the Committee, may make provisions that the report remains confidential and is not passed to third parties.

Article 5

The Community may, under the conditions laid down in Article 228 of the Treaty establishing the European Economic Community, conclude agreements with other States involved in European co-operation in the field of Scientific and Technical Research (COST) to permit them to participate in the coordination action which is the subject of this Decision.

Article 6

Annex I to this Decision may be amended by the Council, on a proposal by the Commission, after consulting the Committee, in the event of a substantial change in the financial or technical conditions governing the research which is covered by the coordination action.

Article 7

This Decision comes into force on the day of its publication in the Official Journal of the European Communities.

Done at

date

For the Council
The President

Annex I to the Draft Council Decision on a research programme in the

Field of Treatment and Use of Sewage Sludge

(concerted action)

The work will be carried out with the main purpose of acquiring scientific and technical knowledge required for the implementation of the Programme of Action of the European Communities of the environment. The research will cover the following topics:

<u>Research topics</u>	<u>Division of research work among member states</u>							
	B Lux	BRD	DK	F	I	IRL	NL	UK
1) Sludge stabilisation and odour problems:								
- definition and determination of "degree of stability" and relationships to odour nuisance			x	x				x
- comparative evaluation of stabilisation procedures		x	x		x			
2) Problems related to sludge dewatering:								
- research on water binding forces							x	
- development and standardisation of methods for the assessment of dewatering properties	x	x		x	x			x
- problems related to the use of flocculants		x		x				x
- comparative evaluation of thickening and dewatering equipment					x		x	
3) Analytical problems related to sludge treatment and use:								
- characterisation of pathogens and evaluation of disinfection procedures	x	x	x					
- characterisation and determination of pollutants (heavy metals, persistent organic compounds) in sludge and development of standardised analytical methods	x			x			x	x

Research topics

Division of research work among
member states

<u>B</u>	<u>BRD</u>	<u>DK</u>	<u>F</u>	<u>I</u>	<u>IRL</u>	<u>NL</u>	<u>UK</u>
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4) Environmental problems related to sludge use:

- special processing of sludge for agricultural use (e.g. composting) including the improvement of disinfection procedures and pollutant removal
- transfer of pollutants to plants and harmful effects on vegetation
- effects of long range sludge application on soil quality and ground water
- optimum land use of sludge, including sludge from dephosphatation plants

	x		x	x			
		x	x			x	x
x	x		x		x		x
	x		x			x	x

Annex II to the Draft Council Decision
on a research programme in the field of
Treatment and Use of Sewage Sludge
(concerted action)

TERMS OF REFERENCE AND COMPOSITION OF THE RESEARCH COORDINATION COMMITTEE
"TREATMENT AND USE OF SEWAGE SLUDGE"

1. The Committee shall:

- 1.1 Contribute to the optimum execution of the programme by giving its opinion on all of its aspects on request from the Commission and on its own initiative.
 - 1.2 Evaluate the results and draw conclusions as regards to their application.
 - 1.3 Insure the exchange of information and dissemination of data and knowledge relating to the programme.
 - 1.4 Keep abreast of the relevant research being done in the participating states and in other countries.
2. The Committee's reports and opinions shall be transmitted to the Commission and to the participating States. If necessary, minority opinions may also be mentioned.
 3. The Committee is composed of one representative from each participating State who will be responsible for coordinating the national contribution to the programme, and also one from the Commission. Each representative may be accompanied by experts.
 4. The Committee shall designate its Chairman for a period of one year.