

PROGRESS REPORT OF THE INTERDEPARTMENTAL COMMITTEE ON THE REDEVELOPMENT OF
CONTAMINATED LAND, 1979

1. Introduction

The Interdepartmental Committee on the Redevelopment of Contaminated Land (ICRCL) was set up in 1976 following the involvement of the Department of the Environment, and the Department of Health and Social Security, in giving advice about the health hazards which might be involved in the redevelopment of a number of individual sites. These sites included for example a tannery in Kent, a former sewage farm in Leicestershire and the former Woolwich Arsenal, which was to become the site of Thamesmead. It was foreseen that there would be increasing pressure to develop old industrial sites for housing, schools or amenity purposes, particularly in the major towns and cities. The Committee was seen as a mechanism for the co-ordination of the advice being given by different Government Departments and in particular for translating medical advice into practical ameliorative or remedial measures.

The Committee consists of representatives of the Department of the Environment (DOE), the Welsh Office (WO), the Department of Health and Social Security (DHSS), the Health and Safety Executive (HSE) and the Ministry of Agriculture, Fisheries and Food (MAFF). The main concerns of the Committee are human health and safety and wider environmental effects. It has been found necessary however, to broaden the interests of the Committee to take some cognisance of other problems, such as constructional problems and the durability of building materials, as these can have an indirect bearing on human health and safety, and the quality of life.

The terms of reference of the Committee include requirements to develop, and co-ordinate advice and guidance on human health hazards arising in connection with the re-use of contaminated land; to develop and co-ordinate advice regarding possible remedial measures; to make such advice available to local authorities; and to advise the Department of the Environment as to the appropriateness of the methods selected by local authorities; and to identify research needs. A Circular (DOE 49/77, WO/77) announcing the setting up of the Committee was sent to local authorities in June 1977.

It was decided at a meeting held in November 1978, that it would probably be helpful to local authorities and others involved in the development or investigation of contaminated sites, to publish a brief account of the Committee's activities during its early years and its plans for the future. At present much of its actions is reactive "fire-fighting" but the ultimate aim is to provide the information and guidance which will enable a positive programme to be carried out and thereby bring sites, which might otherwise remain derelict, back into beneficial use.

2. The Functioning and Composition of the Committee

As stated above the Committee includes representatives of the Welsh Office, DHSS, MAFF, HSE and Department of the Environment. Within DOE the membership is wide to provide a coverage of appropriate expertise and administrative interests and includes the Environmental Protection Group of Directorates, housing Directorates, planning Directorates (responsible for the administration of Derelict Land Grants), the Property Services Agency (PSA) and the Building Research Establishment.

In practice the Committee has met at six monthly intervals. In between meetings the business of the Committee is carried forward by the Secretary, with the assistance of individual members of the Committee as necessary.

It is intended that the membership of the Committee, should for the time being, continue to be restricted to government, and quasi-government organisations. No formal advisory groups have so far been set up but it is anticipated that a number of informal groups may be established to advise on specific problems as the work of the Committee progresses. The Secretary arranges for informal consultation during the preparation of notes of guidance etc.

Although Northern Ireland and Scotland are not represented directly on the Committee, Committee papers are sent to the Northern Ireland Department of the Environment and the Scottish Development Department. The Committee's advice and assistance is in practice available throughout the United Kingdom.

3. The Size of the Problem

It is very difficult to estimate the area of land which must be considered as potentially contaminated and thereby warranting careful appraisal, and in due course, remedial or ameliorative measures. The significance of the problem can perhaps be judged by the facts that: most of the sites being considered for development by the Greater London Council are considered to require investigation for possible contamination and one Borough in the West Midlands, considers all its potential development land is 'suspect' in one way or another. In general former dockland areas, railway, gas works and iron or steel-making land can be 'suspect'. Although attempts have been made to quantify the amount of 'surplus' land held by the nationalised industries no firm information is available. The rapid decline in the number of operational gas works should be noted: from about 1000 on nationalisation in 1949 to only 170 by 1969; with the introduction of natural gas further closures followed and the industry changed from an emphasis on production to being largely distributive. It would be difficult to find out what has happened to all these sites. During the last few years about 50% of British Gas sales of land have been to local authorities.

The importance of early identification of problems is indicated by several cases where development has had to be halted when contamination was found after development had started. In some cases development has been halted for prolonged periods and compensation has had to be paid to contractors. In a few cases, the contamination was not identified until after the houses were completed and in a proportion of those, occupied. In such circumstances remedial measures are not only costly but are also a source of considerable inconvenience and embarrassment.

In an attempt to introduce a stronger predictive element into the advice of the committee, it is hoped to carry out a pilot study of a small town, or part of a larger town or city to try to identify all potentially contaminated land and to discover the best sources of information helping to identify problems. It is hoped to include this study in the research programme for 1980/81.

4. The provision of Advice to Local Authorities and Others

Although the Committee is charged with developing general advice it has of necessity, become involved in a large number of individual cases. The main burden of the case work has fallen on the Secretary. Advice has been given to local authorities in the type of investigation required, and in the light of detailed data provided by the local authority - on the nature of potential hazards, the suitability of the land for a particular end-use, and the appropriateness of suggested remedial measures. Site visits have been made in many cases by the Secretary. DHSS has also been represented on occasion, particularly when existing developments are involved. Advice is also given to DOE housing Directorates and Regional Offices on whether the additional costs incurred by the local authority on a housing or derelict land reclamation scheme are justified and the remedial measures adequate. The Committee's advice and the services of its Secretary are free.

Although the Committee's activities are directed towards local authorities, information and assistance is also given to the private sector from time to time.

A total of about 160 individual 'cases' were known to the Committee in April 1979. These cases range from small gas works of less than one hectare in size to a former sewage farm of 800 hectares. The Committee's involvement varies from the provision of general guidance about the hazards which might be presented by a particular type of site to formal approval of stages in the remedial treatment of some of the larger sites. By far the single largest group of sites is former gasworks sites (about 30%); other important categories are sewage farms and works, land-fill sites and scrapyards. There have also been cases of tanneries, garages, chemical works, a former oil storage area, and land contaminated with herbicides.

Sites have been brought to the attention of the Secretary by a variety of sources within local authorities including departments described as: environmental health, estates, surveyors, legal planning, building control, engineers, and architects; consultants to local authorities and District Valuers have also originated enquiries. A number of cases have also been identified by the DOE Regional Offices, when requests have been made for Derelict Land Grants. In a limited number of cases, the Secretary has taken the initiative in approaching a local authority, having been alerted to a potential problem indirectly by personal contacts or by press publicity. Resources are not sufficient however for the Secretary to do this routinely.

It is noticeable that the number of enquiries from the individual authorities in a single conurbation varies greatly. Thus, for example, although the GLC and a number of the London Boroughs now look at all sites as a matter of routine, other Boroughs seem to take a much less rigorous view of the problem. There is certainly no consistent approach throughout the country at the present time.

One of the important factors emphasised in advice about contaminated land is the need for remedial treatment applied to land intended for housing or intensive recreational use to be durable ie to last for at least the lifetime of the houses. Remedial measures must also be 'robust' ie they should not easily be rendered ineffective for example by normal building processes, by subsequent construction activities, or by accidental flooding, such as could arise from a river overflowing its banks or a burst water-main.

When large sites are involved, local authorities are generally advised against a piece-meal approach. It is usually better to make a thorough assessment of the whole of a site so that account can be taken of the contamination in its layout and the allocation of areas to particular end-uses. Thus it may be possible to seal the worst contamination under hard permanent cover, and in contrast identify the areas most suitable for allotments or large gardens.

The case work has been of value to the Committee in providing essential information on the nature of the problems and on practical solutions and will therefore be of great help in drawing up general guidelines and documentation.

The Committee is principally concerned with new developments and is not expected to become involved with the problem presented by existing developments which happen to be on contaminated land, although the standards it sets will inevitably influence the decisions taken on these cases. However, "new developments" has of necessity had to be interpreted flexibly and embraces developments in the process of completion or completed very recently and requiring some form of rescue operation.

It should be noted that the responsibility for sites in the ownership of local authorities; including the conduct of a proper assessment, the provision of adequate environmental protection, and the assurance of the structural integrity of building; rests firmly with the local authority concerned. The Committee can only offer advice and guidance. Liaison has been maintained with the Standing Local Authority Officer's Panel on Land Reclamation.

5. Provision of Permanent Advisory Service

Now that the problem has been fairly clearly defined and with the benefit of several years of case work, the Department of the Environment has given some consideration to how a permanent advisory service on contaminated land for local authorities could be provided, but no decisions have yet been made. It is thought that whilst in the initial years the service to be provided might be free, this would be reviewed once knowledge has become sufficiently well established and documented to reduce the need to treat each case as unique. It might then evolve a system of charging similar to the existing Building Research Advisory Service, which is seen as a useful model for the type of service to be provided.

6. Publications

The Committee has decided that a comprehensive 'state-of-the-art' report should be prepared and published. This report will probably include sections on sources of information about sites, the problems presented by particular types of site and contaminants, guidance on acceptable levels of particular contaminants, a discussion of the legislative background, and a discussion of appropriate remedial or ameliorative measures. The preparation of such a report will take time and in order to meet immediate needs for information and guidance the Committee will be issuing in the interim short notes on particular topics (apart from making information available more rapidly, this piece-meal process of publication will enable some feed-back from the 'customers' (for the information) before the main report is finalised). The first of these documents, some brief notes on gas works sites (ICRCL 2/78) were prepared in February 1978. These were followed in April 1978 by a set of general notes (ICRCL 3/78)² about contaminated land which were originally intended for District Valuers but have subsequently been given a wider circulation and were reproduced in the Materials and Structures Bulletin published by the GLC³. It seemed appropriate to aim some information at valuers as quickly as possible. The measures necessary to overcome potential health hazards or constructional problems can be very costly. These additional costs are likely to be more acceptable if due allowance is made in the initial valuation of the land.

A revised version of these general notes was prepared in January of this year. The original notes on gas works sites have been superseded by a longer, more detailed document (ICRCL 19/79)⁴ and a set of notes on land-fill sites have also been prepared (ICRCL 18/78)⁵. An early edition of the document was circulated for comment to selected organisations and individuals. Many valuable comments were received which were incorporated into subsequent editions. Some notes have also been prepared on former sewage works and farms (ICRCL 23/79)⁷. Other documents are in preparation. These documents are available from the Secretary of the Committee at the address given at the end of this report.

One of the first publications on the use of contaminated land for housing etc was published by the Greater London Council⁶ and this original contribution was drawn on in the preparation of the general notes.

One of the most important subjects on which guidance is urgently needed is acceptable levels of individual contaminants on land intended for particular end uses. Some progress has been made towards providing this guidance but it is not a completely straightforward task. Any limits which are suggested have to have regard to sampling techniques, building processes, practical ameliorative and remedial measures, and the activities likely to take place on the site once development is completed. The limits will have to be appropriate for each of the ways in which human health may be affected, for example, by direct ingestion of contaminated material, by eating contaminated food crops or by skin contact. Phytotoxic effects and other environmental effects also have to be considered: it is of little practical value to set limits which would protect against health effects from ingestion of homegrown vegetables, if the garden in question is barren of all vegetation. Neither can limits be set without consideration being given to appropriate analytical techniques. A paper⁸ discussing this problem was given at a recent conference on contaminated land.

7. Research

The Committee through DOE is supporting research costing about £140,000 per annum, principally into problems associated with toxic metals but also into problems of gas works sites, combustibility of fill materials and hazards presented by methane which may be present in land-fill sites or riverside sites and former dock areas. The results of these various studies will be published in due course.

In addition to Projects specifically on 'Contaminated Land' DOE is funding a number of projects relating to cadmium uptake by vegetables etc which can be expected to produce relevant data. A brief summary of the position on each of the research projects is given below.

7.1 Research at Beaumont Leys, Leicester.

The City Farm, Beaumont Leys, Leicester, was used for several decades as a sewage farm. Disposal of final sewage effluent was by irrigation of the fields through pipes and drains over an area of about 800 hectares. A further 80 hectares, centrally situated, was used for disposal of sludge by spreading and ploughing in. The sewage works was dismantled in 1964 and the land let to tenant farmers. It was subsequently investigated (1970) by ADAS for heavy metals (Zn, Cu and Ni in the main, although Cr was also measured). The maximum "zinc equivalent" calculated on total metals (Zinc equivalent should be calculated on 'available' metals) found was 6,000 mg/kg; in comparison the upper limit of desirability set by ADAS for available metals is 250 mg/kg. The site is being comprehensively developed by Leicester City Council. It remains a critical factor in Leicester's rehousing programme, Leicester being a designated "stress area" for housing.

In view of the known presence of heavy metals in the 'soil' at Beaumont Leys, an extensive sampling and analysis programme was carried out by the City Analyst. The cadmium concentrations in the central area were found to be approximately constant down to a depth of 6 feet, with peaks of up to 51 mg/kg and few samples under 10 mg/kg. More recent analyses have indicated that the sub-soil may not be as contaminated as it was previously thought to be. Few samples from this area contained less than 1,000 mg/kg lead. In the peripheral areas there are a number of localised "hot spots" where lead concentrations up to about 2,000 mg/kg and cadmium concentrations of up to 38 mg/kg are found.

The medical advice agreed between DOE and DHSS is that an individual's exposure to Cadmium should be kept as low as is reasonably practicable, and in any case should not exceed the provisional tolerable weekly limit of 400-500 ug/person/week proposed jointly by the Food and Agriculture Organisations and World Health Organisation (FAO/WHO). In order to put this advice into practice a number of measures have been agreed between DOE and Leicester City Council. These are of two main types: (i) the layout of the site and the allocation of land for particular uses is to take the contamination into account; and (ii) certain physical, ameliorative measures are to be carried out. In addition there is to be some long-term monitoring of the site.

Most of the most highly contaminated areas on the site will be subjected to hard cover (eg under buildings or roads) or covered with less-contaminated soil and grassed over. In areas where housing is being built, soil with cadmium above a certain limit, is selectively removed; the remainder of the top-soil is then stripped and stock-piled for respreading once building is completed. This process of selective removal, stock-piling and respreading is intended to reduce the maximum cadmium content to an agreed limit (5 mg/kg in the case of small domestic gardens - the

average value will of course be below this maximum value) and also to produce a more homogeneous spread of the contamination. In practice it has also resulted in lower average values than anticipated, as some less contaminated sub-soil tends to be mixed with the top-soil during the stripping operation.

A research programme has been started at Beaumont Leys to validate these physical ameliorative measures and to provide long-term monitoring of conditions on the site.

A detailed proposal has been prepared aimed at providing information on two main points:

- i. the effectiveness of the stripping and respreading operations which are being carried out on the site in producing the required lowering of average contamination levels and reductions in maximum values;
- ii. the effectiveness of the cover provided in affording permanent protection and observations on the mobility of the contamination, if any, over a period of time.

Whilst most of the work will consist of field studies on the Beaumont Leys site itself, control field studies will also be carried out on an environmentally similar but uncontaminated site, and on allotment plots on contaminated top-soil and sub-soil established as part of the Liverpool Polytechnic project (see below). The work will consist of three main parts:

- a. direct measurements relating to the stripping and respreading operations;
- b. monitoring of metal ion mobilities by plant uptake studies;
- c. monitoring of metal ion mobilities by direct measurements on soil.

A contract has been placed with the Leicester County Analyst and a start has been made on the first part of the work concerned with the effectiveness of the stripping and respreading operations which are being carried out on this site. Leicester City Council are meeting the direct costs of the sampling and observational programme. Vegetable uptake studies are to be incorporated into the work to be carried out by Liverpool Polytechnic.

7.2 Optimum over depths for sites contaminated with heavy metals.

A programme has been agreed with Liverpool Polytechnic in which a range of vegetables and soft fruits will be grown on various depths of cover (150 to 1200mm) on land contaminated with toxic metals, in particular cadmium. Measurements will be made of the mobility of the contaminating ions through the soil profile and of uptake by plants. The project is planned to last for an initial period of six years but with a possibility of further studies for a much longer period. The aim of the work will be to provide information on the effectiveness of the treatments now being recommended in providing long-term amelioration of potential health hazards;

- i. when the treatment is carried out and maintained to an average 'standard'
- ii. when the treatment is carried out to a low standard.

The agreed programme of work has been developed in association with DHSS and the Agricultural Development and Advisory Service (ADAS) of MAFF. An area of land, about 0.6 hectares in extent, on which the Field Site for the Studies can be established has been provided by Leicester City Council, on the heavily sludged part of the Beaumont Leys site. It is on the edge of what will eventually be a major area of public open space. The City Council is also providing practical assistance in setting up the field site including acting as agent for the Polytechnic in placing and supervising site development contracts. The major part of the work in setting up the field site was completed in April 1979.

7.3 Liverpool University

A programme of work has been agreed with the Environmental Rehabilitation Unit at Liverpool University consisting of three main items:

- i. studies on a number of already reclaimed sites to see if any useful information can be gained on the effectiveness of the remedial measures carried out.
- ii. The construction of experimental plots on a contaminated site to test the effectiveness of various remedial techniques.
- iii. Studies of metal movement through small columns of selected materials - a form of accelerated testing.

The sites studied in the first part of the study will be mainly formerly contaminated derelict sites which have been reclaimed for use as public-open-space. However two or three housing sites may also be looked at. It is hoped that by looking at these sites, some of which may be ten or more years old, some useful information can be obtained about the effectiveness of the remedial measures in preventing movement of the contamination. The main difficulties in such a retrospective study is the probable lack of information available on the degree of contamination etc, at the time the remedial works were carried out.

For the second part of the study, which is being made in co-operation with the Greater London Council, a series of experimental plots have been constructed on a site at Thamesmead. Thamesmead is being built by the GLC on the site of the former Woolwich Arsenal and much of the site is covered by a range of foundry, pyrotechnic, chemical and gasworks wastes. The plots have been constructed using a variety in covering materials applied in varying depths over contaminated ground. Grass and a selection of food crops will be grown in the plots.

7.4 Work on the Combustibility of Fill Materials and Hazards presented by Methane

It is expected that work on these topics will be started at the Fire Research Station during 1979. Although framed mainly in terms of refuse disposal sites, a wider range of fill materials or contaminants will be taken into account in the work. The topics to be covered include the following:

- i. compilation of information on tip fires from existing records, seeking evidence of self heating and common factors which would enable predictions of other fire occurrences to be made;
- ii. determination of the critical temperatures of ignition of a number of sites;
- iii. preparation of a list of sites where building has occurred on waste infill and compilation of fire records and if necessary determination of critical temperatures of ignition of infill. Statistical comparison of results with average fire frequency. Sites of high fire frequency may warrant special investigation;
- iv. determination of the amount of inert material that must be present to inhibit combustion; theoretical heat balance studies; assessment of factors tending to inhibit combustion, eg the degree of ventilation;
- v. studies related to fires on former gas works sites eg combustion of spent oxide which can contain over 40% sulphur.

As far as methane (and other gases is concerned) the research will be directed towards: (i) defining appropriate methods for measuring the amount of gas present and assessing the hazard which it presents; and (ii) devising practical, economic and effective measures which will permit houses and other buildings to be safely constructed where methane or other gases are present on the site itself or in adjacent areas from which they might migrate or determining the factors which would make such buildings unwise.

7.5 Studies relating to gas works sites

A programme of work has been agreed with the Environmental Safety Group at Harwell. Work has already been carried out with the aim of providing information relevant to the disposal of specific gas works wastes such as 'spent-oxide'. The new research will concentrate on two main topics:-

- i. Providing a statement of the types of waste present on gasworks sites and the hazard which they present to human health.
- ii. Assessing the effectiveness of cover and other remedial measures in providing a permanent barrier to contamination and the likely movement of contaminants from below or surrounding areas into any clean fill materials. This will be done using a combination of field and laboratory studies.

8. Conference on Contaminated Land

The proper assessment of contaminated sites often calls for a joint approach involving many specialists including environmental health specialists; engineers, chemists, surveyors, architects, planners, valuers, toxicologists, and experts in plant toxicology.

The Society of the Chemical Industry held a Conference on the Reclamation of Contaminated Land in October 1979 which was held to bring together representatives from those disciplines with an interest in the subject, to help each to understand the others problems, and generally to review the 'state of the art'. The Committee welcomed the decision to hold this Conference and three of its members were members of the organising committee. The proceedings of the Conference will be published.

9. References

1. Anon, 'Mr Rossi's Bookkeeping', Building, 1978 (3 March) 50-51
2. ICRCCL 3/78 "Redevelopment of Contaminated Land", Central Directorate on Environmental Pollution (CDEP, Department of the Environment, 1978).
3. M A Smith, Redevelopment of Contaminated Land, GLC Materials and Structures Bulletin, No 118, 1978 (September).
4. ICRCCL 18/79 "Redevelopment of Contaminated Land: Gas Works Sites", CDEP, 1979.
5. ICRCCL 17/78 "Redevelopment of Contaminated Land: Notes on the Development of Land-Fill Sites", CDEP 1979.
6. W B Chapman, 'Some guidelines on the use of contaminated land,' GLC Materials and Structures Bulletin No 98, 1976 (August/September) 1-8.
7. ICRCCL 23/78 'Redevelopment of Contaminated Land; Notes on Sewage Works and Farms', CDEP, 1979.
8. ICRCCL 24/78 'Standards for the Redevelopment of Contaminated Land', Proc. Conf. Reclamation of Contaminated Land, Eastbourne 1979 (Society of Chemical Industry, to be published).

10. Any queries concerning this report should be addressed to the Secretary of the Interdepartmental Committee on the Redevelopment of Contaminated Land at the following address:

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