



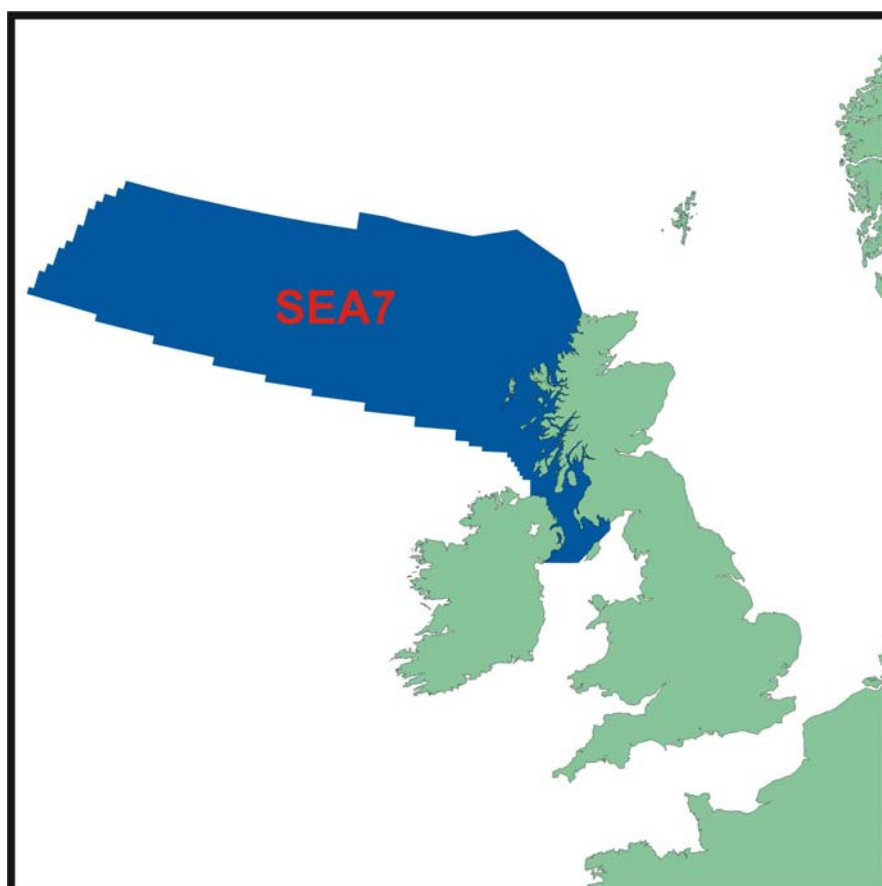
**British
Geological Survey**

NATURAL ENVIRONMENT RESEARCH COUNCIL

DTI Strategic Environmental Assessment Area 7 (SEA7) Contamination of Water and Sediments Metadata

Continental Shelf & Margin Programme

Commissioned Report CR/02/281N



BRITISH GEOLOGICAL SURVEY

COMMISSIONED REPORT CR/02/281 N

DTI Strategic Environmental Assessment Area 7 (SEA7). Contamination of Water and Sediments Metadata

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Foreword

This report is the published product of a study by the British Geological Survey (BGS) for research completed November 2002.

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1 Introduction

This report describes work carried out under commission to the Department of Trade and Industry to compile an inventory of metadata on contamination of water and sediments for Strategic Assessment Area 7 (SEA7). The area concerned is shown in Figure 1. The database of published data has been compiled in EndNote© 6 format and produced on a compact disc. It is largely based on the contractors' experience of work on contamination in the Irish Sea backed up by extensive on-line literature surveys and information from personal contacts.

For a naturally occurring element or compound, contamination can be defined as its presence at a concentration above the natural background level. This background level will itself vary with geological and/or oceanographic conditions and the metadata assembled will thus include papers and reports that give general geochemical data as well as data on specific contamination. For synthetic substances, any presence can be regarded as contamination.

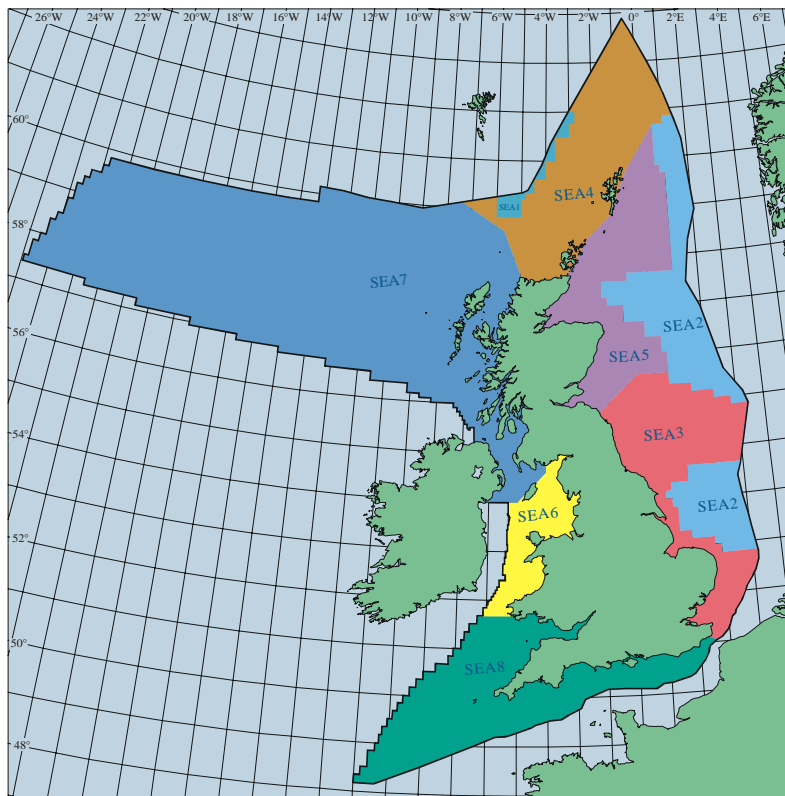


Figure 1. Division of sea areas for strategic environmental assessment

2 Synopsis

Although it is the largest of the sea areas for which a strategic environmental assessment is required, there are relatively few studies of contamination available. Most of the studies that have been carried out are concentrated in the coastal zone and particularly around the Firth of

Clyde. This reflects the generally expected lack of contamination in an area where there is little industrial or urban development, except along the Clyde.

The most comprehensive published dataset for SEA7 is that of Stevenson et al. (1995), which is based on sea bed sediment samples collected by BGS between 1977 and 1986. The area of coverage is shown in Figure 2.

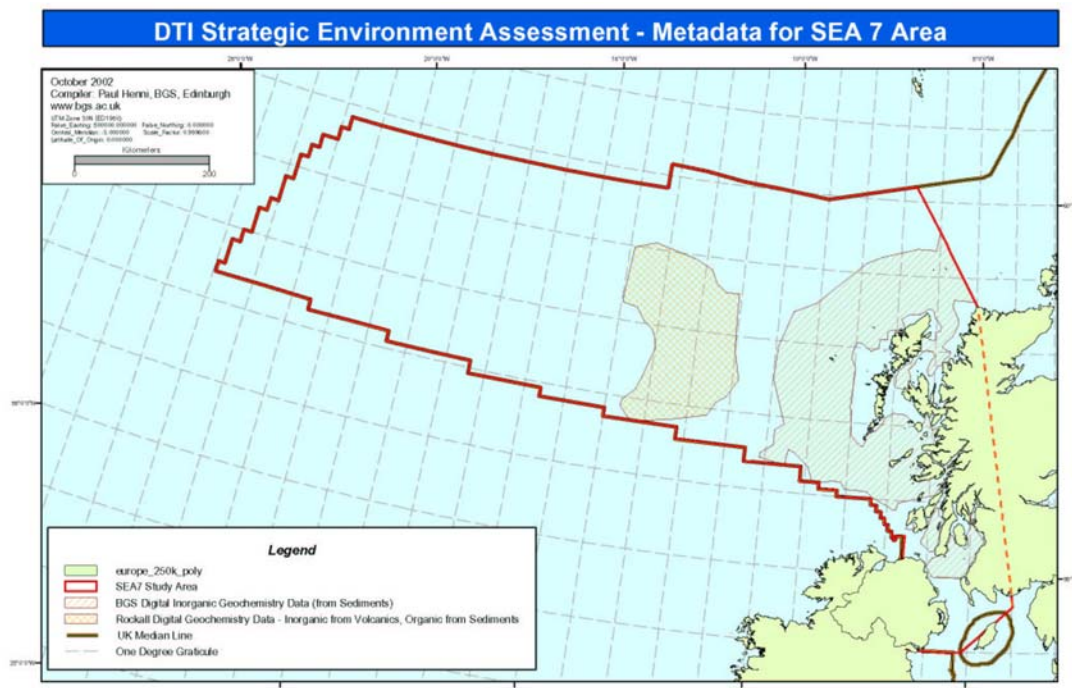


Figure 2. Areas covered by major geochemical datasets

Analysis of the < 2mm fraction of the BGS samples was carried out by direct reading DC arc emission spectrometry to yield data on Al, Ba, Be, Bi, B, Cd, Cu, Cr, Ga, Fe, La, Pb, Li, Mg, Mn, Ni, K, Rb, Si, Sr, Sn, Ti, Y, Zn and Zr. Uranium was determined by delayed neutron activation analysis and Hg by flameless atomic absorption spectrometry. A further BGS holding provides data on Li, Be, V, Cr, Co, Ni, Cu, Zn, Sr, Y, Zr, Mo, Cd, Ba, La, Pb, Mg, Al, P, K, Ca, Ti, Mn, Fe, Na, S, As, Cd, Rb, U and Hg determined by ICP methods after a 'total' digestion, for over 180 samples collected during a survey funded by the Rockall Consortium of oil companies (BGS, 1997). The area surveyed is also shown in Figure 2. The concentration of data in the Clyde region is demonstrated by the distribution of sample points in the Stevenson et al. (1995) study (Figure 3).

A study of metals (Al, Ca, Co, Cr, Cu, Fe, K, Li, Ni, Pb, Sc, Ti, V, Zn and organic C) in Scottish coastal sediments was carried out in the mid to late 1990s by I. M. Davies (Fisheries Research Services, Marine Laboratory, Aberdeen) and co-workers (Davies et al., 1999). This study, described only in the grey literature, covers much the same area as the Stevenson et al. (1995) work. At about the same time Davies and co-workers also reported on trace organic contaminants in Scottish coastal sediments (20 chlorobiphenyls and organochlorine pesticides, including hexachlorobenzene, dieldrin, lindane and total DDT). The organics survey covered a smaller number of sites restricted to the coastal zone and is also reported only in the grey literature. The Fisheries Research Services also describe geochemical and other surveys of the North Channel and northern Irish Sea in the region of the Beaufort's Dyke explosives disposal site (FRS, 1996).

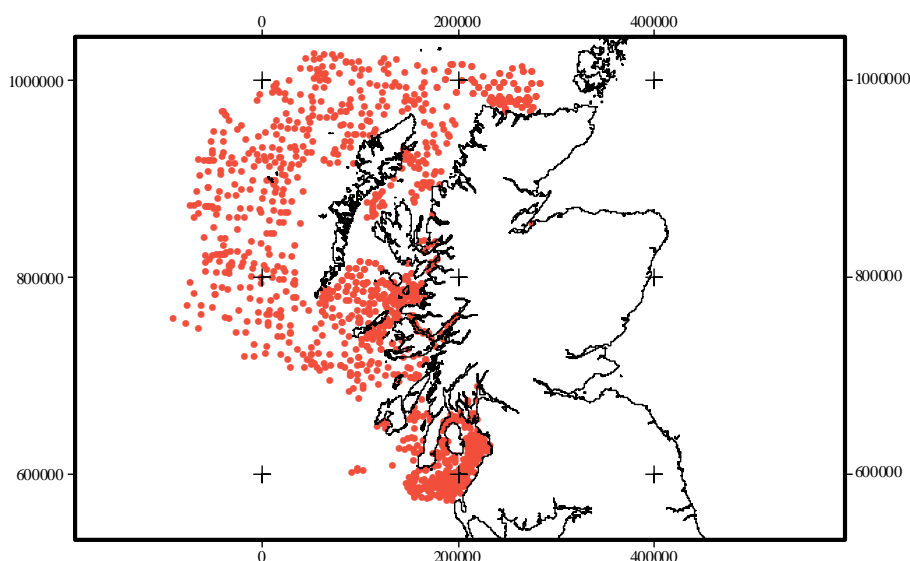


Figure 3. Distribution of sample sites for the Stevenson et al. (1995) dataset

The above surveys, coupled with results from the National Monitoring Programme (e.g. MPMMG, 1998, Balls et al., 1997), should provide a sound basis for a geochemical environmental assessment of SEA7.

3 Methods

Along with previously accumulated personal EndNote © and bibliographic data sets, five online databases were searched in order to compile the inventory. Although this report deals with contamination in SEA7, the contractors were also involved in compiling inventories of both contamination and geology for SEA6 and SEA8. To avoid duplication of effort searches were carried out to cover both subjects and all three areas and the retrievals later sorted into separate EndNote libraries for geology and the contamination of water and sediments in sea areas 6, 7 and 8. Searches were carried out on the basis of geographical and subject matter keywords (see 2.1 below).

Web of Science, GeoRef, GeoArchive, Zetoc and Aslib bibliographic databases were searched for journal, thesis and other references. Each search was repeated with all five databases, because they appear to hold slightly different collections of references.

The **Web of Science** online data set provides web access to ISI Science Citation Index, Social Sciences Citation Index, Arts and Humanities Citation Index, and Index to Scientific and Technical Proceedings.

The **GeoRef** online database, established by the American Geological Institute, has 1.9 million bibliographic references across all geological subject areas. The North American literature has been indexed from 1785 onwards, and other areas from 1933. Journal articles, books, conference volumes, reports, maps etc are all covered. It is particularly good for searches of the geological journal literature.

GeoArchive is an online bibliographic database covering all types of information sources in geoscience, hydroscience, and environmental science. The database is produced by Geosystems (UK) and is provided online by Oxmill Publishing. **Zetoc** provides Z39.50 compliant access to the British Library Electronic Table of Contents. It covers the 20 000 most heavily-requested journal titles from the British Library and 16 000 conference proceedings per year. It contains 15 million items and is updated daily. Items are added within about 3 days of receipt. The database covers from 1993 onwards.

Aslib consists of bibliographic records with abstracts, where available, for UK theses of all types and subjects. It covers theses accepted from years 1970 to 1999 and is the online equivalent of the printed index from volume 21 to 48 and parts 1-3 of volume 49.

EndNote has inbuilt import filters for Web of Science and GeoRef and, using the import filter manager, completed searches from these databases load easily and straightforwardly into EndNote, after downloading and saving as text or word documents. For GeoArchive it was necessary to create an EndNote import filter, which was then saved within the EndNote program filter collection to enable successful imports of the saved, tagged, word documents downloaded from searches. Zetoc was searched from within the EndNote programme using the 'connect and search' function, enabling references to be loaded straight into the EndNote library ready for manual filtering of relevant material. Individual records retrieved from the Aslib database were copied and pasted into a separate document to enable manual entry into the relevant EndNote library.

An EndNote output style was created to provide output in the same format as that specified in the contract for an Excel spreadsheet. Thus in the Notes section of the output: a. gives the location of the data (if known); b. shows whether the data is considered to be essentially free or to entail some cost; c. gives an estimate of the quality of the data; d. provides latitude and longitude limits for maps; and e. contains additional information which might be useful. In the Notes, journal articles, books and book sections are generally considered to be free and the data quality to be high (ranked 3 or higher). Unless there is some departure from this assessment these entries have no specific Notes attached.

4 Sources of metadata

Much of the assembled metadata is based on collections of reports, papers and other databases held at the British Geological Survey (BGS) and at the Centre for Environment Fisheries and Aquaculture Science (CEFAS). These holdings have been supplemented by the searches outlined above. Published BGS and CEFAS reports and grey literature identified in the database will normally be available at BGS and CEFAS (addresses in the accompanying database)

A database of marine environmental research around the British Isles was prepared by CEFAS and BGS in the late 1990s for DETR (now DEFRA) and is described in Rowlatt et al. (1999). The database is available on CD and is referenced under Rowlatt and Ridgway (1999) in the database. A number of other studies have been prepared for DEFRA under the Marine and Land Based Inputs to the Sea (MLIS) programme. These are mostly in the grey literature but a list of relevant topics and bodies carrying out the research can be found on the DEFRA web site (www.defra.gov.uk/environment/marine/mlis/rplist.htm).

The Irish Marine Data Centre (ISMARÉ, Dublin) has an electronic database (Extended EDMED for Ireland) describing data collected by scientists in the waters around Ireland, some of which

are likely to extend into SEA7. This is available on disk from the Irish Marine Data Centre, 80 Harcourt Street, Dublin 2, Ireland (www.marine.ie).

The Irish EDMED database is based on the format used by the British Oceanographic Data Centre (www.bodc.ac.uk), which keeps extensive information on marine environmental datasets held by UK laboratories. The BODC Directory of Marine Environmental Data Sets (BODC, 1995) and website are good starting points for locating a wide variety of data types. The Directory is a product of an Inter-Agency Committee on Marine Science and Technology (<http://www.marine.gov.uk/>) (IACMST) Information Document. IACMST is a UK Government Committee reporting to the Office of Science and Technology and is responsible for the Marine Environmental Data Action Group (MEDAG), which, together with the Marine Environmental Data Co-ordinator, forms the UK Marine Environmental Data (UKMED) Network. The network has set up the [OceanNET](http://www.oceannet.org/) (<http://www.oceannet.org/>) web site as a portal to data and information about the marine environment. OceanNET also contains a new UK Directory of Coastal Data Sets. UKMED is currently funded by the Defence Science and Technology Laboratory (DSTL), Department for Environment, Food and Rural Affairs (DEFRA), the Environment Agency (EA), Fisheries Research Service (FRS), the Met Office, the Natural Environment Research Council (NERC) and the UK Hydrographic Office (UKHO).

The Marine Biological Association (MBA: www.mba.ac.uk) and Plymouth Marine Laboratory (PML: www.pml.ac.uk) also have worked extensively in estuarine and coastal regions around the UK and hold databases of chemical information on waters and sediments.

Relevant data may also be obtained from the Fisheries Research Services, Marine Laboratory, Aberdeen (www.marlab.ac.uk) and from the Scottish Association for Marine Science at Dunstaffnage Marine Laboratory, Oban (www.sams.ac.uk).

UKMIC UK Marine Information Council (www.ukmarine.org) is another potential source of information.

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Appendix 2 Keywords used in searching the bibliographic databases

Irish Sea	Maury Channel	South Uist
Liverpool Bay	Endymion Spur	Barra
Solway Firth	Hatton Bank	Barra Head
North Channel	Hatton-Rockall Basin	Malin Sea
Mersey Estuary	Rockall Plateau	North Minch
Ribble Estuary	Rockall	South Minch
Sellafield	George Bligh Bank	The Little Minch
Straits of Dover	Bill Bailey Bank	Sound of Raasay
Scilly Isles	North Feni Ridge	Inner Sound
Fal	Feni Ridge	Raasay
Tamar	Rosemary Bank	Rona
Falmouth Bay	Wyville	Skye
Cardigan Bay	Thomson Ridge	Monach Island
St Georges Channel	Anton Dohrn Seamount	Rhum
Tremadoc Bay	St Kilda	Eigg
Menai Straits	Hebrides Shelf	Muck
Morecambe Bay	Hebridean Shelf	Tiree
South-West Approaches	Barra Fan	Coll
Celtic Sea	Donegal Fan	Mull
Bristol Channel	Sula Sgeir Fan	Staffa
English Channel	Sula Sgeir	Treshnish Islands
Severn Estuary	Malin Shelf	Skerrymore
Lyme Bay	North Rona	Blackstones Bank
Poole Bay	Butt of Lewis	Mull of Kintyre
Southampton Water	Outer Hebrides	Rathlin Island
The Solent	Inner Hebrides	North Channel
Malin Sea	Scottish Mainland	Ailsa Craig
N.E. Atlantic Ocean	Lewis	Firth of Clyde
Rockall Trough	South Harris	Beaufort's Dyke
Northern Rockall Trough	Benbecula	Luce Bay
N E Rockall Basin	North Uist	Isle of Man

DTI Strategic Environmental Assessment Area 7

Contamination of water and sediments

Dundalk Bay	Watersay Sound	Loch Alsh
Belfast	Loch Resort	Loch Carron
Belfast Loch	The Narrows	Loch Torridon
Clyde	Loch Maddy	Loch Gairloch
Ailsa Craig	Loch Uskavagh	Loch Eive
Bute	Loch Carman	Gruinard Bay
Great Cumbrae	Loch Skipport	Loch Broom
Little Cumbrae	Loch Eynort	Loch Kanaird
Inner Clyde, Clyde	Loch Boisdale	Loch Inver
Enard Bay	Castle Bay	Point of Stoer
Rubha Coiseach	Loch Watersay Sound	Eddrachillis Bay
Edrochillin Bay	Red Point	Loch Lauford
Cape Wrath	Berneray Sound	Loch Inchard
Solan Bank	Shillay Sound	Kilbrannan Sound
Glasgow	Stornoway	Ailsa Craig
Stanton Bank(s)	Loch Grimashadur	Loch Ryan
Geikie Bulge	Loch Luirbost	Stranraer
Darwin Mounds	Sound of Harris	Mull of Galloway
Flannan Trough	Village Bay	Burrow Head
Geikie Escarpment	Loch Bracadale	Peel
Larne	Ardnamuchan Point	Isle of Man
Kishorn	Tiree Passage	Port Erin
Ronan Basin	Loch Scridain	Calk Sound
Hatton Drift	Jura Sound	Port St Mary
Iceland Basin	Firth of Lorne	Castletown Bay
Peach Slide	Oban	Loch Carlingford
Summer Islands	Loch Fyne	Strangford Loch
Priest Island	Loch Long	Donaghadee Sound
Finnan Islands	Loch Linnhe	Ardglass Harbour
Western Island	Loch Faslane	Killough Harbour
Shiant Islands	Greenock	Larne Harbour
Loch Roag	Dumbarton	The Maidens
W. Loch Tarbet	Sound of Mull	Portrush
Pabbay	Loch Sunart	Campbelton Loch
Monach Islands	Sound of Sleat	Sanda Island
Sound of Barra	Loch Hourne	Holy Loch

DTI Strategic Environmental Assessment Area 7

Contamination of water and sediments

Ardrossan	Loch Alsh	Processes
Greenock	Kyleakin	Trace elements
Gourock	Strome Narrows	Continental Shelf
Gareloch	Broadford Bay	
Rhu Narrows	Loch Kishorn	
Faslane	Caol Moire	
Loch Goil	Loch Sheldaig	
Loch Striven	Ayr Bay	
Dunoon	Brodick Bay	
Inchmarnock Water	Irvine Harbour	
Loch Gilp	Troon Harbour	
Loch Tarbet	Ayr Harbour	
Gigha	Ullapool	
Sound of Gigha	Firth of Lorne	
Corryvreckan		
Loch Crinan	Organic contamination	
Loch Etive	Sediments	
Loch Crenan	Contaminants	
Loch Leven	Contamination	
Loch Eil	Stratigraphy	
Ballachulish Bay	Geology	
Lismore Island	Petroleum	
Linn of Morven	Quaternary	
Lynn of Lorne	Holocene	
Loch Ailine	Radionuclides	
L. A'Choire	Seismic	
N. Nevis	Tectonics	
Loch Tudth	PAH	
Sound of Iona	PCB	
Treshnish	Deposition	
Gott Bay	Metals	
Gunna Sound	Hydrocarbon	
Loch Eathama	TBT	
Mallaig	Environment	
Kyle Rhea	Sea floor	
Loch Euich	Metal	

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Annotated references in Endnote© files are on compact disc.

The following references are output from the Endnote format files:

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