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Cefas contract report SLBA1 Marine material disposal – Part II FEPA

Radiological Assessment of Dredging Application for Oldbury Power Station (2010)

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Authors: K. S. Leonard and P. A. Smedley

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RADIOLOGICAL ASSESSMENT OF DREDGING APPLICATION FOR OLDBURY POWER STATION (2010)

Summary

In 2010, Magnox North Limited lodged a FEPA licensing application to carry out a dredging program for a period of 3 years involving the disposal at sea of 59,900 m^3 of sediment from Oldbury Power Station in South Gloucestershire.

In England, the MMO administers a range of statutory controls that apply to marine works on behalf of the Secretary of State for Environment, Food and Rural Affairs (Defra), this includes issuing licences under the Food and Environmental Protection Act (FEPA), 1985 (United Kingdom - Parliament, 1985) for the disposal of dredged material at sea. Licences for disposals made in Scottish waters and around the coast of Northern Ireland are the responsibility of the Scottish Government (Marine Scotland) and the Department of Environment (NIEA), respectively. As of 1 April 2010 licences for Welsh waters are the responsibility of WAG.

Using the conservative generic radiological assessment procedure developed by the IAEA, to convert radionuclide concentrations in dumped material into radiation doses due to dumping, the total derived total doses to individual members of the crew and public were 4.8 μSv/year and 1.5 μSv/year, respectively. The total collective dose to individual members of the crew and public was 0.035 manSv/year. The values for individual members of the crew and public, and the collective dose, were within the *de minimis* criteria of 10 μSv/year (individual doses) and 1 manSv/year (collective dose), respectively.

Since the conservative generic radiological assessment procedure indicated that doses received were below recommended limits, a subsequent more detailed case specific assessment was not necessary. Therefore, from radiological considerations, there is no objection to this material being dredged and dumped.

Assessment details

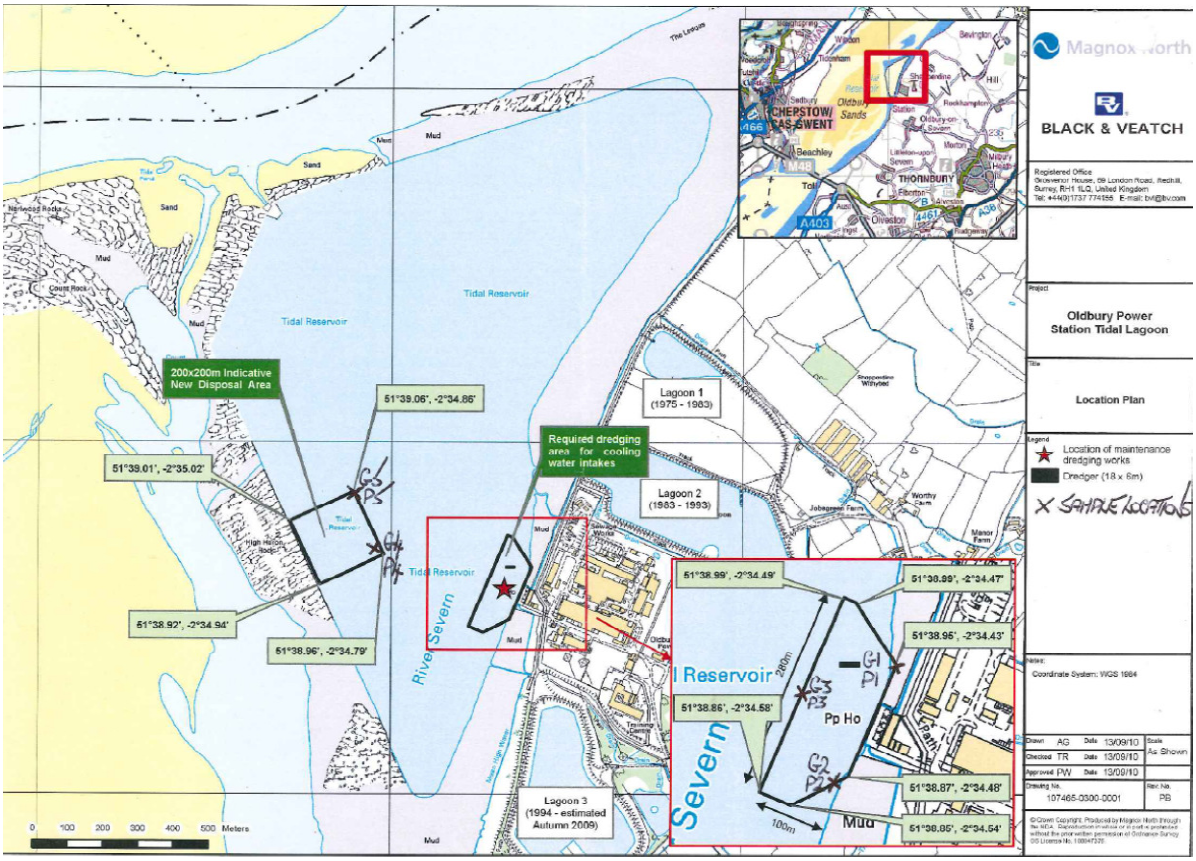
In 2010, Magnox North Limited lodged a FEPA licensing application to carry out a dredging program for a period of 3 years involving the disposal at sea of 59,900 m^3 of sediment from

Oldbury Power Station in South Gloucestershire. As part of the radiological assessment of the proposed operation, five surface sediment samples (P1–P5, inclusive) were collected in September 2010. Sampling locations were:

P1 – Dredge Area A (silt), P2 – Dredge Area B (silt), P3 – Dredge Area C (pebbles), P4 – New Disposal Area A (silt), P5 - New Disposal Area B (silt).

These locations are illustrated in Figure 1, together with the proposed new disposal "box" area.

Figure 1. Study Area (Oldbury Power Station) and Sampling Locations (P1 –P5)



Following freeze-drying and homogenisation, radionuclide assay at the Cefas Lowestoft Laboratory was achieved by γ counting samples on a high purity Ge detector. The results are summarised in Table 1.

Table 1. Radioactivity in sediment dredged from Oldbury Power Station, October 2010

Sample Location	Specific activity (Bq/kg, dry weight)					
	^{60}Co	^{137}Cs	^{226}Ra (via ^{214}Pb)	^{232}Th (via ^{228}Ac)	^{238}U (via ^{234}Th)	^{241}Am
P1	< 0.5	21	21	29	37	< 1.5
P2	< 0.5	9	26	31	42	< 0.5
P3	< 0.7	11	16	19	24	< 0.6
P4	< 0.8	28	25	34	44	< 0.8
P5	< 0.3	8	23	31	43	< 1.4
***Average**	**0.6**	**15**	**22**	**29**	**38**	**1.0**

*Average determinations use < results as positively measured values to produce a conservative estimate (rounded up)

The specific activity of the artificial radionuclides (e.g. ^{137}Cs and ^{241}Am) in these samples was typical of muddy sediments from the combined effects of discharges from the site, other nuclear establishments discharging into the Bristol Channel and weapons testing (and possibly a small Sellafield derived component), being enhanced above background levels outside the Irish Sea. The Sellafield component is a legacy of large discharges from the Sellafield Limited reprocessing plant (formally British Nuclear Fuels) at Sellafield in the 1970s.

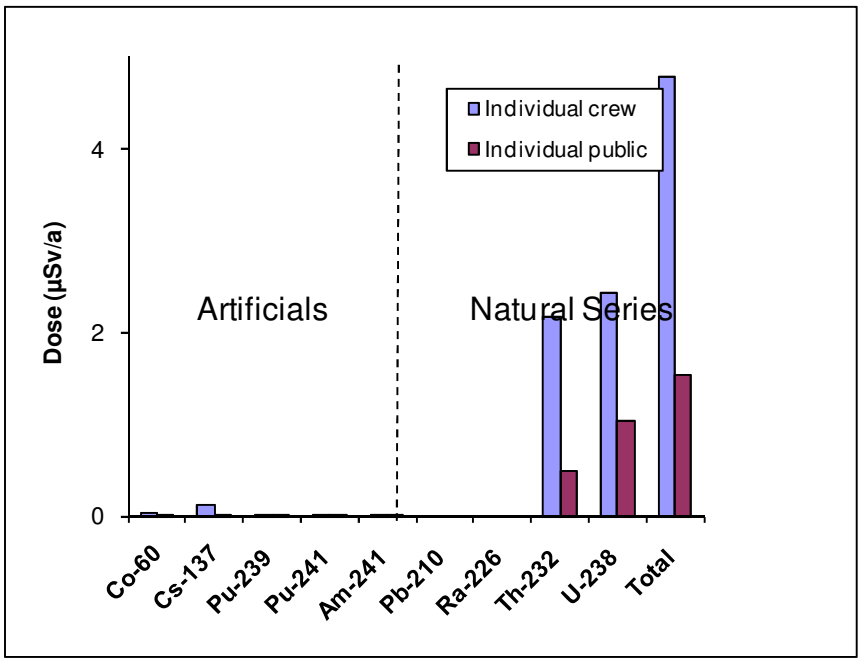
In addition to the nuclides detected by gamma spectrometry, sediment in Oldbury is known to contain activities of Pu radionuclides. The ^{241}Am data were used to derive estimates for ^{239,240}Pu and ^{241}Pu, assuming their activity was proportional to the ratio in the time integrated Sellafield discharges. This approach is reasonable given that both radionuclides are highly particle-reactive, hence the fate following discharge is similar. The activity for ^{210}Pb was derived using data for ^{226}Ra and assuming secular equilibrium.

Under the London Convention, only materials with *de minimis* levels of radioactivity may be considered for dumping. Using the conservative generic radiological assessment procedure developed by the IAEA (IAEA, 2004), to convert radionuclide concentrations in dumped material into radiation doses due to dumping, the total derived total doses to individual members of the crew and public were 4.8 µSv/year and 1.5 µSv/year, respectively. The total collective dose to individual members of the crew and public was 0.035 manSv/year. The

values for individual members of the crew and public, and the collective dose, were within the *de minimis* criteria of 10 µSv/year (individual doses) and 1 manSv/year (collective dose), respectively.

The dose estimates for individual crew/public (by nuclide), derived using the generic IAEA model, are shown in Figure 2.

Figure 2. Assessment of dose to individual members of crew and the public arising from at Oldbury Power station (Doses were derived using average activities listed in Table 1.)



Since the conservative generic radiological assessment procedure indicated that doses received were well below recommended limits, a subsequent more detailed case specific assessment was not necessary. All the derived total dose values were less than the *de minimis* criteria of 10 µSv/a and 1 manSv/a for individual and collective dose, respectively.

Therefore, from radiological considerations, there is no objection to this material being dredged and dumped.

References

IAEA (2004). Sediment distribution coefficients and concentration factors for biota in the marine environment. Tech. Rep. Ser. No. 422, IAEA, Vienna.

United Kingdom - Parliament, 1985. Food and Environment Protection Act, 1985. HMSO, London.

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Head office
Centre for Environment, Fisheries & Aquaculture Science
Pakefield Road, Lowestoft,
Suffolk NR33 0HT UK

Tel +44 (0) 1502 56 2244
Fax +44 (0) 1502 51 3865

Web www.cefas.defra.gov.uk

Centre for Environment, Fisheries & Aquaculture Science
Barrack Road, The Nothe
Weymouth, DT4 8UB

Tel +44 (0) 1305 206600
Fax +44 (0) 1305 206601

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