

RECENT TRENDS IN THE IMPACT OF LIQUID RADIOACTIVE WASTE DISCHARGES FROM SELLAFIELD TO THE IRISH SEA

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ABSTRACT

The amounts of liquid radioactive waste discharged from the British Nuclear Fuels plc (BNFL) Sellafield site have changed in recent years, principally as a result of new plant and effluent treatment facilities. This paper describes the main changes in discharges and trends in results of marine environmental monitoring, together with the radiological significance in terms of effective dose to the potentially critical group of local fish and shellfish consumers.

INTRODUCTION: THE 1994 REVISED SELLAFIELD AUTHORISATION

Discharges to the Irish Sea of low level liquid radioactive waste from Sellafield are authorised under the Radioactive Substances Act 1993. The authorisation was revised in 1994⁽¹⁾ to take account of a number of developments on the Sellafield site and ICRP-60 radiological protection criteria. The developments included: the proposed start-up of the Thermal Oxide Reprocessing Plant (THORP); operation of the Enhanced Actinide Removal Plant (EARP); diversion of waste containing ^{14}C from a gaseous to a liquid stream to reduce overall radiological impact; and further decommissioning operations. The new authorisation reduced the discharge limits of nuclides of greatest radiological significance and treated by EARP (such as ^{106}Ru , ^{137}Cs and the actinides), but to allow the new developments, increases in limits were authorised for some nuclides of low radiological significance. Additional ^3H and ^{129}I would be produced by THORP. Increases in limits were authorised for ^{90}Sr and ^{99}Tc to allow processing through EARP of decay-stored concentrates; these nuclides have lower removal efficiencies than the actinides. Increases were also authorised for ^{14}C to allow the diversion scheme and for ^{60}Co to permit further decommissioning.

CHANGES IN DISCHARGES FROM 1990 TO 1997

The trends in discharges of selected radionuclides from 1990–97 are shown as the histograms in Figures 1-7. EARP began commissioning in early 1994, and ^{137}Cs discharges (Figure 1) decreased, although these were also dependent on the performance of the site ion-exchange effluent plant (SIXEP), which treats fuel element storage pond effluents. As a result of EARP operation, discharges of ^{106}Ru (Figure 4), $^{239}\text{Pu} + ^{240}\text{Pu}$ (Figure 5) and ^{241}Am all decreased; for example, $^{239}\text{Pu} + ^{240}\text{Pu}$ reduced from about 0.8 TBq y^{-1} for 1990-93 to about 0.1 TBq in 1997. Diversion of the ^{14}C stream resulted in increased discharges from a pre-existing level of about 2 TBq y^{-1} to about 8 TBq y^{-1} in 1994 and 11 TBq y^{-1} in 1996 (Figure 2). Discharges of ^{60}Co (Figure 6) increased from a level of about 0.1 TBq y^{-1} for 1990-94 to levels fluctuating

