A PERSPECTIVE ON PCB LEVELS IN SOIL IN INDUSTRIAL AREAS

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INTRODUCTION

The purpose of this study was to measure the levels of PCBs in soil at a large number of randomly selected background sites, recognised industrial areas in the UK, and areas adjacent to the Rechem Pontypool incinerator, enabling the latter levels to be properly placed into perspective.

Concerns have been expressed in recent years regarding the appropriateness of comparing the level of PCB concentrations found in industrial areas, such as adjacent to the Rechem Pontypool incinerator, with background levels of these materials in soil and grass samples obtained from primarily non-industrial areas of the UK. The simplistic comparison of industrial areas with generally unspoiled and undeveloped areas of countryside appeared inappropriate. Comparison of concentrations of such pollutants in highly developed and industrial areas should better be made with the levels found in comparably impacted areas in different parts of the country, in order to compare with what is more properly an 'industrial background level'.

METHODOLOGY

The experimental methodology employed in this study involved the collection of soil samples, followed by solvent extraction and measurement of total concentration of PCB materials present by high resolution gas chromatography. The procedure and locations for collection of soil samples has been described by Eduljee (1). Additional sampling sites were added to the routine sampling programme in 1989, and results

for four quarterly sampling campaigns between September 1991 and September 1992 were chosen.

The locations of background sites in suburban and remote areas which were not directly impacted by local industry have been previously described (2), and measurements discussed here were made in 1989. The industrial background sites, which would be expected to be directly impacted by industrial operations have been previously described (3), and measurements discussed here were made in April 1992.

Soil samples (~60g) were air dried at 30°C to constant weight (1,2), ground, sieved (2mm mesh) and then Soxhlet extracted with hexane which had been spiked with chloro-naphthalene and decachloro-biphenyl internal standards for twelve hours. The procedure used for liquid chromatography clean-up of concentrated sample extracts was essentially that described by HMIP (4). An additional clean-up step using acid washed copper powder was employed to remove common interference by sulphur.

PCBs were analysed by gas chromatography using a 30m DB1 column in a Hewlett Packard 5890 gas chromatograph with auto-injector and data processing system. External calibration was made using a 1:1:1 mixture of 1242, 1254, and 1260 Aroclors, facilitated by the chloro-naphthalene time marker and decachloro-biphenyl internal standard. Quantification was made with respect to the total concentration of Aroclor in the sample, by reference to twenty five individual congener peaks in both sample and calibration standard.

Comparison was made between industrial, suburban and remote background levels of PCBs in soil, and the twenty five sites adjacent to the Rechem Pontypool incinerator. These latter sites were sub-divided by distance (>500m, 250-500m, <250m) from the incinerator, as originally defined in the August 1991 report on the Panteg Monitoring Project by the Welsh Office (5).

The results of these comparisons are shown in the form of histograms in Figure I. It may be clearly seen that soil levels of PCBs at distances >500m from the incinerator are consistent with the lower portion of South Wales background values, but are somewhat lower than all other areas measured. The middle distance band (250-500m) from the incinerator is seen to be consistent with the higher values observed in the South Wales background, and also with the lower values observed in the industrial background areas. Finally, comparison of the sites closest to the incinerator (<250m) are clearly higher than almost all South Wales background sites,

yet are overlapped at both extremes by values in industrial areas. Clearly the sites closest to the Rechem Pontypool incinerator, and indeed some of those in the middle distance band, are essentially indisguishable from any soil sample collected in an industrial area of the UK.

CONCLUSIONS

In conclusion, the results of the foregoing analyses clearly indicate that from the standpoint of PCB levels in soil, those sites closest to the Rechem Pontypool incinerator are essentially indistinguishable from the industrial background sites which were included in this study. While the presence of a chemical waste incinerator in the Pontypool industrial area makes this region unique, in all other respects the industrial background sites chosen have strong similarities with the Pontypool area, in that they also included various ferrous and non-ferrous smelting activities, and miscellaneous thermal treatment processes. Thus, despite the presence of the Rechem Pontypool incinerator, the levels of PCBs in soil are indistinguishable from other industrial areas in the UK, and we would conclude that the levels of PCBs are thus largely due to activities other than chemical waste incineration.

REFERENCES

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3. *PCBs in the Environment Today,* Proceedings of a Seminar held at Imperial College of Science, Technology and Medicine, London, February 1993, SCS Publications, Biggleswade, Bedfordshire UK.

4. HM Inspectorate of Pollution, *Determination of Polychlorinated Biphenyls, Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans in UK Soils,* November 1989, HMSO London.

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FIGURE I

COMPARISON OF PCB LEVELS IN SOIL ADJACENT
TO THE RECHEM INCINERATOR WITH BACKGROUND LEVELS