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RADIOLOGICAL IMPACT OF REGULAR EMISSIONS FROM INDUSTRIAL SOURCES: COMPARISON OF OPS AND THE TRANSPORT MODEL NPK-PUFF

C.P. Tanzi, A. van Dijk

Elevated concentrations of naturally occurring radionuclides can originate from ore-processing industries. In the Netherlands, an industry is required to apply for an operating permit when the radiological impact caused by its emission exceeds a threshold level in any given year. The Ministry of the Environment requires an evaluation of the compliance to the limit. The radiological impact is assessed by atmospheric dispersion models in addition to measurements in situ. If measurements prove unpractical, modelling is the only alternative. Here two methods – which also differ in the description of the meteorology – are compared for an estuarine site (C.P. Tanzi and S. Bader, HARMO-11).

For an elemental phosphorus plant in the Netherlands, the radiological impact of the emissions is routinely assessed with the OPS (Operational Priority Substance) model (van Jaarsveld, 2004). OPS is a long-term Lagrangian transport and deposition model that describes relations between source and receptors. Concentration and deposition values are calculated for a number of typical situations: the long-term value is obtained by summation of these values, weighted with their relative frequencies. All relations governing the transport and deposition process are solved analytically. The meteorology is based on actual data from stations of the national weather service (KNMI), with the annual average made available to users through a pre-processor.

We compare here the radiological impact derived from the OPS model with NPK PUFF 4.0, the new release. NPK-PUFF is a Gaussian puff model (Verver, G.H.L. and F.A.A.M. de Leeuw, 1992) which uses actual wind fields from the NWP HIRLAM model and calculates air and ground concentrations at receptor points. By modelling the release of a puff from the industrial stack at regular intervals, we can directly compare the dispersion calculated by the two models.