To enable estimation of time-integrated external doses to persons staying in an inhabited area radioactively contaminated by aerosols and gases released in connection with a large nuclear power plant accident, additional knowledge to that described in the first part of this paper is needed on the post-deposition migration of different types of contaminants on the various relevant types of environmental surface. This part of the paper describes how the migration processes are modelled dynamically in the European standard inhabited area dose model, ERMIN, and presents the newest parametric datasets. It is explained how the total information in both parts of the paper may be used to estimate doses received over time by populations in radioactively contaminated inhabited areas.