APPENDIX I - Resuspension Calculational Models

I.1 Introduction

When a relatively insoluble contaminant has been deposited on a surface, it may again be resuspended into the air and thus become a significant contributor to the inhalation and ingestion pathways to persons at some point in time following deposition of the contaminant.

I.2 Resuspension Models

The resuspension factor, $K_{(t)}$, is a function of the time after a contaminant was deposited on the surface. Therefore, $K_{(t)}$ can be estimated as follows[9]:

$$K_{(t)} = \frac{C_{(t)}}{S}$$

Where:

$K_{(t)}$ = Effective resuspension factor at time, t, (1/meter)

$C_{(t)}$ = Air concentration of resuspended material at time, t, after deposition has been completed, ($\mu g/m^3$ or pCi/m^3)

S = Surface deposition per unit area, ($\mu g/m^2$ or pCi/m^2)

The value of $K_{(t)}$ can be estimated by a simple exponential model as follows[18]:

$$K_{(t)} = K_{(o)} * e^{0.693t/tw}$$

Where:

$K_{(t)}$ = Effective resuspension factor at time, t, (1/meter)

$K_{(o)}$ = Initial resuspension factor at time of impact (t = 0), (1/meter)

t = Time after initial deposition in days, and

t_w = Weathering half-time in days

The air concentration, immediately above the contaminated surface, due to the resuspended material can be estimated as follows[18].

$$C_{(t)} = K_{(t)} * S$$

Where:

$C_{(t)}$ = Air concentration of the contaminant at time, t, ($\mu g/m^3$ or $\mu Ci/m^3$)

$K_{(t)}$ = Effective resuspension factor at time, t, (1/meter)

S = Surface deposition per unit area ($\mu g/m^2$ or pCi/m^2)

The resuspension rate, R, is the fraction of the contaminant on the ground that is resuspended into the air per unit time. The resuspension rate may be multiplied by the amount of the

contaminant in the soil to produce a source term (ST). The concentration of the contaminant in the air for transport downwind from the region of resuspension can be estimated as follows[18]:

$$C_{(t)} = R * A * {}^{?}\!/_{ST}$$

Where:

$C_{(t)}$ = Air concentration of resuspended material at time, t, ($\mu g/m^3$ or $\mu Ci/m^3$)

A = Amount of contaminant in the region, (μg or μCi)

${}^{?}\!/_{ST}$ = Atmospheric dilution factor at point of receptor, (sec/m^3)

R = Fraction of the contaminant on the ground that is resuspended per unit of time, (1/sec).

Standard intake assumptions and metabolic models are appropriate for use in estimating intakes and doses for reference levels and planning purposes. However, for individual dose assessments, any specific individual or facility information available (for example, observed clearance half-times, assumed particle size distribution) should always be incorporated into the models used for estimation of intake and subsequent dose. Models and parameters used in assessments should be thoroughly documented.