Conversions Used To Place Pollutant Limits in the Same Units

1) Conversions for Inorganic Pollutants

Pollutant limits originally expressed in RSCs were converted to RPcs using the following equation.

\[ RP_c = RSC \times AWSAR \times 0.001 \times SL \]

where:

- \( RP_c \) = cumulative reference application rate of pollutant in biosolids (kg-pollutant/ha-land)
- \( RSC \) = reference concentration of pollutant in biosolids (mg-pollutant/kg-biosolids DW)
- \( AWSAR \) = annual whole biosolids application rate (mt biosolids DW/ha/yr)
- 0.001 = conversion factor
- \( SL \) = number of years of site life

The annual whole biosolids application rate (AWSAR) is the maximum amount of biosolids that can be applied to a hectare in a year, as defined in the Part 503 rule. An AWSAR of 10 mt-biosolids DW/ha/yr, which is somewhat higher than the typical application rate of 7 mt, and a site life of 100 years, a reasonable maximum site life, were used. Therefore:

\[ RP_c = RSC \times 0.001 \times 10 \times 100 \]

Because of the factors used, the RPcs for Pathways 3, 5, and 7 are the same numbers as the analogous RSCs, but the units differ. The RPcs and RSCs for inorganics are shown in Chapter 4, Table 11.
2) Conversions for Organic Pollutants

Pollutant limits originally expressed in RSCs were converted to \( R_{P_a} \)s using the following equation:

\[
R_{P_a} = RSC \times AWSAR \times 0.001
\]

where:

- \( R_{P_a} \) = reference annual application rate of pollutant (kg-pollutant/ha/yr)
- \( RSC \) = reference concentration of pollutant in biosolids (mg-pollutant/kg-biosolids DW)
- \( AWSAR \) = annual whole biosolids application rate (mt-biosolids DW/ha/yr)
- 0.001 = conversion factor

Therefore, based on the same assumption regarding the AWSAR discussed above (10 mt-biosolids DW/ha/yr):

\[
R_{P_a} = RSC \times 10 \times 0.001
\]

A “site life” was not used for degradable organic pollutants (as it was for inorganics above) because for organics that degrade, there is no limit on site life. The \( R_{P_a} \)s and RSCs for organics are shown in Chapter 4, Table 11.

3) Additional Useful Conversions

Additional conversions derived from the above two conversions were useful for comparing pollutant limits, including:

**For inorganics:**

\[
R_{P_i} = \frac{R_{P_a}}{0.01} = 100 \times R_{P_a}
\]

**For organics:**

\[
R_{P_a} = \frac{R_{P_i}}{100}
\]

4) Equation Used To Express Pollutant Limit as a Soil Concentration

\[
RLC = \frac{RP}{MS \times 10^{-9}}
\]

where:

- \( RLC \) = allowed soil concentration of pollutant (µg-pollutant/g-soil DW)
- \( RP \) = reference application rate of pollutant (kg-pollutant/ha-land)
- \( MS \) = \( 2 \times 10^9 \) g/ha (assumed mass of soil in upper 15 cm)
- \( 10^{-9} \) = conversion factor (kg/µg)