### 5.6.4 Treatment Alternative 4

There are two biological degradation alternatives. One method to demonstrate the organic reduction efficiency (R) and the organic biodegradation efficiency ($R_{bio}$) are both equal to or greater than 95 percent.

Organic reduction efficiency (R) calculations are described above in Section 6.5.2. $R_{bio}$ is calculated using the following equation:

$$R_{bio} = F_{bio} \times 100\%$$

(Equation 5-10)

*Additional information regarding biological treatment is available in the following documents: Biological Treatment Units Case Study and Solutions to Biological Treatment Case Study.*

In order to meet the second format, the actual mass of volatile organics reduced through biological process ($MR_{bio}$) must be greater than or equal to the calculated required mass removal rate for the wastes entering the biological unit. If either of these formats are met, no further control is required for the treated wastes.

The required organic mass removal rate (RMR) calculations are described above in Section 5.6.2. The actual organic mass biodegradation rate ($MR_{bio}$) is calculated using the following equation:

$$MR_{bio} = E_b \times F_{bio}$$

(Equation 5-11)

Where: $MR_{bio}$ =Actual organic mass biodegradation rate, kg/hr

Eb =Waste organic mass flow entering the process, kg/hr

$F_{bio}$ =Fraction of organic biodegraded as determined using the procedure specified in 40 CFR 63, Appendix C

There are several advantages associated with treatment alternative 4. One advantage is that the use of aerobic biodegradation in uncovered units is permitted for units that meet specified treatment criteria. The $R_{bio}$ option may be appropriate for cases where a large number of waste streams are combined for central waste treatment. The $MR_{bio}$ option is not waste stream specific and does not require a 95 percent reduction for every waste stream, only aggregated volatile organic mass of the untreated waste.