

*November 1998*  
*Evaluation Framework*

## **Appendix 9-B**

# **ILLUSTRATION OF BIOASSAY INTERPRETATION GUIDELINES**

**Illustration of Solid Phase Interpretation Guidelines**

Following is an example of the application of the solid phase interpretation guidelines to three DMMUs. Results for the negative control and the reference sediment are included for comparison to test sediment treatments and to illustrate the application of performance standards. Results have been expressed as means plus or minus the standard deviation.

Table 9A-1 illustrates that the performance standards for the negative control and reference sediment were met for all three bioassays, and that the results were acceptable for decision making.

Test DMMU-1 shows that all three biological responses were within the guidelines for suitable material. The amphipod test mortality was less than 30 percent over reference; sediment larval normalized combined mortality and abnormality was less than 30 percent over reference; and *Neanthes* growth rate was greater than 50 percent of reference. None of these were significantly different from reference. This DMMU would be suitable for aquatic disposal.

Test DMMU-2 illustrates an example of a two-hit bioassay failure. Both the amphipod and sediment larval responses are less than the single-hit response guideline, but are significantly different than reference responses, and therefore considered hits under two-hit guidelines. The *Neanthes* growth rate response is greater than 50 percent of reference and is not significantly different than reference. This DMMU would be judged to be unsuitable for aquatic disposal based on the significance of the amphipod and sediment larval responses relative to reference sediments.

Test DMMU-3 illustrates an example of a single two-hit response with no corroborating hits from the other two bioassays. It shows an amphipod response less than 20 percent over the control response, less than 10 percent over reference and not statistically different from reference. The sediment larval response is greater than 20 percent over control but is less than 15 percent over reference and not statistically different from reference. In the *Neanthes* test, the growth rate response is greater than 50 percent of the reference, but is statistically different from reference (two-hit response, requiring another bioassay hit for DMMU failure). This DMMU would be judged suitable for aquatic disposal because there are no corroborating hits from the other two bioassays.

DMMU-4 exhibits "single hits" for all three bioassays, each exceeding the numerical comparison guidelines for the negative control and reference and are statistically different from reference sediments. The individual results for each of these bioassays fails disposal guidelines for aquatic disposal for the "single-hit" response, and this DMMU is unsuitable for aquatic disposal.

**Table 9A-1  
 HYPOTHETICAL PROJECT INTERPRETATION EXAMPLE**

<b>TREATMENT</b>	<b>AMPHIPOD TEST (% mortality)</b>	<b>SEDIMENT LARVAL TEST (% NCMA)</b>	<b>NEANTHES GROWTH TEST (mg/individual-day) (% of reference)</b>	<b>DMMU SUITABILITY</b>
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Negative control	4 ± 1	0 <sup>1</sup>	0.7 ± 0.06 3 ± 1 % mortality <sup>2</sup>	
Reference sediment	16 ± 4	7 ± 3	0.66 ± 0.07	
DMMU-1	17 ± 5 <sup>ns</sup>	10 ± 4 <sup>ns</sup>	0.62 ± 0.06 <sup>ns</sup> (93.9%)	Suitable
DMMU-2	25 ± 2*	21 ± 3	0.59 ± 0.05 <sup>ns</sup> (89.4%)	Unsuitable
DMMU-3	19 ± 3 <sup>ns</sup>	21 ± 6 <sup>ns</sup>	0.55 ± 0.1 (75.8%)	Suitable
DMMU-4	33 ± 4	36 ± 4	0.41 ± 0.08 (62.1%)	Unsuitable

1 For clarity the negative seawater control has been normalized (i.e., set to zero). The actual combined mortality and abnormality for the seawater control was 23%. Therefore, the seawater control met its performance standard of ≤ 30% combined mortality and abnormality.

2 The test met the performance standard of ≤ 10% mortality.

ns - not statistically significant.

\* - statistically significant response relative to the reference sediment. Shaded portions of the table highlight test results which indicate that the DMMU is considered a hit under either the single-hit or two-hit guidelines for unconfined open-water disposal.