

SECTION 6 ADEQUACY OF DATA FOR ACHIEVING OBJECTIVES OF THE SRA

The adequacy of data for achieving objectives for the SRA is assessed for each line of evidence. The evaluations are presented in the following sections.

6.1 ADEQUACY OF CHEMISTRY DETECTION LIMITS IN SEDIMENTS FOR COMPARISONS TO SEDIMENT QUALITY BENCHMARKS

The adequacy of chemistry measurements for comparing sediment concentrations to available sediment quality benchmarks requires that detection limits are suitably low relative to the benchmarks. Table 6.1-1 summarizes information for nondetect values for individual COPCs in all 219 sediment samples collected from Pearl Harbor for the SRA. The table presents information for the following items.

- Total number of sediment samples with nondetect values for a particular COPC.
- Maximum and minimum values for nondetect concentrations.
- The SQB (i.e., ER-L) for the COPC.
- Ratio of the maximum nondetect value to the ER-L.
- Number of nondetect sample values in various ranges above the ER-L (i.e., 1-2, 2-5, 5-10, 10-50, 50-100, and 100-200 times the ER-L).

The table indicates that most COPCs have relatively small numbers of samples with nondetect concentrations above the ER-L. Furthermore, the majority of the nondetect exceedances are generally a factor of 5 or less above the ER-L. The most exceedances in terms of both numbers of samples and magnitudes of exceedances occur for dieldrin, which is characterized by a very low ER-L (i.e., 0.02 micrograms per kilogram [$\mu\text{g}/\text{kg}$] dry weight of sediment).

6.2 ADEQUACY OF NEGATIVE CONTROLS FOR TOXICITY MEASUREMENTS IN SEDIMENTS

Toxicity measurements for evaluating sediment COPC-toxicity relationships are obtained with toxicity measurements from multiple batches of test organisms for both amphipod survival and echinoderm fertilization. To generate comparable toxicity values from multiple batches of test organisms, individual sample values are corrected for their associated negative control value. As described in Section 3.2, negative controls involve exposing the test organism to a clean test matrix (i.e., native sediments from the area in which amphipods were collected; clean seawater for echinoderm fertilization). The intent in correcting a sample survival or fertilization value for its associated negative control is to yield a final value that accounts for differences in responsiveness of test organisms to stressors (e.g., COPCs) between batches of test organisms. As an example, an amphipod survival value of 60% in a field sample is adjusted to 66.7% if the survival in the associated negative control is 90% (i.e., 60% divided by 90% yields 66.7%).

As an additional consideration for negative control corrections, when acceptance criteria for negative controls are not achieved (i.e., negative control values are lower than the method acceptance criterion of 90% for amphipod survival and 70% for echinoderm fertilization), field samples are corrected for the desired acceptance criterion value rather than the actual negative control value. Ideally, tests for field samples are rerun if the survival or fertilization in an associated negative control is below the desired value. However, results for a negative control are not known until the conclusion of the laboratory test (e.g., 10 days from the start of tests for amphipod survival). At the same time, maximum method specified holding times for sediments from time of collection until initiation of a test in the laboratory are not to exceed 14 days (documented in final Quality Assurance Project Plan; USN 1996b). Consequently, reruns for samples in which initial negative controls did not meet desired survival or fertilization acceptance criterion could not be accommodated without exceeding the prescribed 14-day holding time. Therefore, the approach adopted for adjusting toxicity results for samples with negative controls below desired survival or fertilization acceptance criterion values involved correcting field sample values for the acceptance criterion value rather than the actual

control value. For example, a measured amphipod survival of 60% in a field sediment sample is corrected to 66.7% rather than 70.6% if the survival in the associated negative control is 85% (i.e., 60% divided by the acceptance criterion of 90% for a corrected value of 66.7% rather than 60% divided by 85% for a corrected value of 70.6%). Use of the criterion-correction approach rather than the preferred negative-control-correction for situations in which negative control criteria are not achieved yields lower survival/fertilization values (i.e., greater toxicity indication), which is appropriate for the highly conservative approach used for the SRA. Application of the criterion-correction approach when appropriate was performed with the informal concurrence of the IRWG.

Summaries of frequencies of field samples and magnitudes of occurrences for negative controls within and below desired levels for amphipod survival and echinoderm fertilization are presented in Table 6.2-1. The table includes information for numbers of field samples associated with negative controls meeting the desired method acceptance criterion values (i.e., associated field sample values are corrected for their associated negative control value) and below desired values (i.e., associated field sample values are corrected for the method acceptance criterion negative control value of 90% or 70% for amphipod survival or echinoderm fertilization, respectively).

6.3 ADEQUACY OF CHEMISTRY DETECTION LIMITS IN WILD-CAUGHT TISSUE AND SEDIMENT SAMPLES FOR BIOACCUMULATION HQS GENERATED WITH LOWEST NOAEL OR NOAEL-EQUIVALENT TRVS

Adequacies of chemistry measurements for generating bioaccumulation HQs for the SRA require that detection limits are suitably low relative to HQs generated with the lowest NOAEL or NOAEL-equivalent TRVs. To assess adequacies of chemistry detection limits, upper-bound bioaccumulation EPVs for nondetect measurements in specific sample types (i.e., composite benthic macroinfauna, epibenthic crabs, tilapia, goatfish, and sediments) are used to generate appropriate HQs. Specifically, maximum nondetect values are identified for each of the full tissue data sets for composite benthic macroinfauna, epibenthic crabs, tilapia, and bandtail goatfish. These maximum tissue nondetect values are divided by lowest NOAEL or NOAEL-equivalent TRVs for critical

body residues in crustacea or fish, as appropriate (i.e., TRVs in Tables 3.3.1-1 and 3.3.1-2) to generate maximum nondetect HQs for each aquatic receptor. The maximum tissue nondetect values are also used to assess maximum nondetect exposures to bird receptors by generating maximum nondetect EPVs for a particular tissue forage item using allometric equations in Section 4.2. In addition to the tissue nondetects, the maximum nondetects for sediments from water depths of 0 to 2 meters are also applied to the allometric equations for waterbirds and shorebirds (Section 4.2) to generate maximum nondetect EPVs for incidental ingestion of sediment by the birds. The exposure scenarios for all bird receptors (i.e., ingestion media types) have been summarized in Table 2.3-1. All bird EPVs for ingestion of maximum nondetect values for specific tissue forage items or incidental sediment are divided by lowest NOAEL or NOAEL-equivalent TRVs for bird ingestion doses (Table 3.3.2-1) to generate maximum nondetect HQs for each bird receptor and exposure scenario. Maximum nondetect HQs below 1 for aquatic and bird receptors based on maximum nondetect chemistry measurements infer adequacy of chemistry data sets for assessing potential bioaccumulation risk for COPCs for the SRA.

Table 6.3-1 presents information for the maximum HQs for nondetect chemistry measurements for each receptor and exposure scenario. The table summarizes information for adequacy of maximum nondetect measurements into the following categories.

- OK-all detect – Chemistry measurements are adequate because the data set contains no nondetect values.
- OK: $\text{max.nd/crit.conc.} < 1$ – Chemistry measurements are adequate because the HQ for the ratio of the maximum nondetect to the lowest NOAEL or NOAEL-equivalent TRV (max.nd/crit.conc.) is below 1.
- unc: $\text{max.nd/crit.conc.} = [\text{value}]$ – Adequacy of chemistry measurements may be uncertain (unc) because the HQ for the ratio of the maximum nondetect to the lowest NOAEL or NOAEL-equivalent TRV (max.nd/crit.conc.) is 1 or

greater; the actual maximum HQ is indicated in the [value] term. COPCs exceeding an HQ of 1 are highlighted in gray on the table.

- dg-no TRV – Adequacy of chemistry measurements cannot be assessed and is identified as a data gap because of the absence of a TRV for the COPC (dg-no TRV).
- dg-no value – Adequacy of chemistry measurements cannot be assessed and is identified as a data gap because chemistry values are not available for the COPC in the appropriate matrix type (dg-no value).
- dg-not measured – Adequacy of chemistry measurements is not assessed and is identified as a data gap because measurements were not appropriate for the COPC in the appropriate matrix type (dg-not measured).

In addition to the above designations for each COPC, the table summarizes the number of COPCs that fall into each of the above categories for each receptor and exposure scenario. The latter information indicates that only small numbers of COPCs are associated with uncertain adequacy for chemistry measurements (i.e., the category of “unc: max.nd/crit.conc.=[value]”) for instances with sufficient information to assess adequacy for HQs.