Appendix D.2
Ecological Preliminary Remediation Goals

Comments on Behalf of the Lower Passaic River Study Area Site Cooperating Parties Group on the Proposed Plan and Feasibility Study for the Lower Eight Miles of the Lower Passaic River Study Area Portion of the Diamond Alkali Superfund Site

I. SPECIFIC COMMENTS TO 2014 FFS *APPENDIX E: DEVELOPMENT OF PRELIMINARY REMEDIATION GOALS*

A. The ecological preliminary remediation goals (PRGs) are largely based on inappropriate and technically indefensible toxicity thresholds.

1. The ecological PRGs are based on the sediment thresholds, critical body residues (CBRs), and toxicity reference value (TRV) presented in Appendix D, which are inappropriate for establishing cleanup goals for the site. PRGs based on these thresholds are misleading and grossly overestimate risk protective goals.

Most benthic invertebrate sediment thresholds are based on generic sediment quality guideline values from the Effects Range-Median approach and the results of a logistic regression model This approach is not valid for determining the need for remediation because it does not represent site-specific effects observed based on benthic community and toxicity data (see additional comments in Appendix D1).

The benthic invertebrate sediment and tissue PRGs for 2,3,7,8-tetrachlorodibenzo-*p*-dioxin (2,3,7,8-TCDD) are based on technically indefensible invertebrate 2,3,7,8-TCDD sediment thresholds and CBRs that are wholly inappropriate for informing remedial decisions from two studies that are misleadingly cited as site specific (Wintermyer and Cooper 2003; Kubiak et al. 2007) (see comments to these studies in Appendix D1).

The majority of the selected invertebrate and fish CBRs and dietary TRVs used in the Focused Feasibility Study (FFS) ecological risk assessment (ERA) are based on toxicity thresholds without sufficient justification to be evaluated as baseline thresholds. CBRs and TRVs that serve as the basis for the ecological PRGs include thresholds that: cannot be replicated by external reviewers, contain uncertainties that suggest they are inappropriate for establishing baseline risks, evaluate endpoints unrelated to those specified in the Problem Formulation Document (growth, survival, and reproduction), or use unjustified extrapolation factors to derive lower thresholds (see specific CBR/TRV comments in Appendix D1). Several examples of PRGs based on inappropriate thresholds are as follows:

- The lowest ecological sediment PRG for mercury is an estimated sediment threshold derived from the geometric mean of back-calculated tissue concentrations (i.e., the biota tissue PRG), which is based on a mink dietary no-observed-adverse-effects level (NOAEL) and lowest-observed-adverse-effects level (LOAEL) that were reduced by a subchronic-to-chronic factors of 10, even though the NOAEL and LOAEL were supported by chronic data and reproductive effects (a chronic endpoint).
- The lowest ecological sediment PRG for DDx is an estimated sediment threshold derived from the biota tissue PRG, which is based on a literature-based biomagnification factor from herring gulls and the geometric mean of a bird egg NOAEL and LOAEL based on field collected eggs that contained other contaminants in addition to DDx.
- The lowest ecological tissue PRG for TEQ is the geometric mean of a NOAEL and LOAEL for fish behavior based on exposure to a relatively non-toxic dioxin-like congener (PCB 126) and a fish

TEF, which is associated with high uncertainty. NOAELs and LOAELs were based on interpolated values using data from another study and could not be replicated.

2. The use of the "rule of five" as a justification for determining PRGs in order to use the geometric mean of the NOAEL and LOAEL (or high and low TRV value in some cases) to establish a PRG is not appropriate.

Section 2. Ecological Preliminary Remediation Goals, p. 12-3. As stated in USEPA (2007), the rule of five is (1) intended to select a protective value within a wide risk range, (2) is most applicable to deterministic ERAs with limited data, and (3) has its greatest value in determining a point of departure in those risk ranges where there is an order of magnitude or more between the NOAEL and LOAEL. When TRVs are based on appropriate toxicity data from an in-depth evaluation, there is generally a low range between NOAELs and LOAELs. For example, the use of a 5th percentile LOAEL from a species sensitivity distribution is conservative, and intended to be protective of 95% of species.

- In many cases, the LOAEL and NOAEL were derived using extrapolation factors. Four biota PRGs are based on extrapolated LOAELs: mercury/avian diet (UF = 3), mercury/mammal diet (UF = 10), total PCBs/invertebrate tissue (interpolated LOAEL based on concentrations from separate studies), and 2,3,7,8-TCDD/avian diet (UF = 5).
- The use of an extrapolation factor to derive a NOAEL from a LOAEL was commonly used in the FFS ERA and extrapolating between two values, one of which was already extrapolated from the higher value, is indefensible and inappropriate. Five biota PRGs are based on extrapolated NOAELs: mercury/adult fish tissue (UF = 5), mercury/fish embryo tissue (UF = 10), mercury/avian diet (UF = 2), total DDx/adult fish tissue (UF = 5), total DDx/avian diet (UF = 3), and total PCBs/invertebrate tissue (interpolated NOAEL based on concentrations from separate studies).
- Biota PRGs that are based on both an extrapolated LOAEL and NOAEL include: total PCBs/ invertebrate tissue, and mercury/avian diet.

In addition, the use of ecological NOAELs is inappropriate for establishing cleanup levels. As previously stated, NOAELs that have been extrapolated from LOAELs have no technical basis. LOAELs, on the other hand, represent the lowest value for which an adverse effect occurs in the most sensitive species. The LOAEL represents an adverse affect to an individual species, whereas, ecological populations (fish, birds, and mammals) and communities (benthic invertebrates) are the intended entity for protection. Endpoints such as survival, growth, and reproduction affect organisms at the individual level, whereas endpoints such as fecundity, population stability, and growth are measures of the health of populations. The exceedance of a LOAEL does not indicate population-level risks; however, exceedance of LOAELs is often used as a conservative means for evaluation the potential risk to populations.

B. Ecological and human health sediment PRGs are based on inappropriate and overly simplistic models resulting indefensible and meaningless values.

The FFS presents sediment PRGs based both on ecological and human health receptors. These sediment PRGs were derived from tissue PRGs using estimates of bioaccumulation (i.e., a relationship between sediment and tissue). Although it is useful to develop sediment PRGs, care must be taken to ensure that the calculated values are meaningful and take into account the complexity of the Lower Passaic River Study Area (LPRSA). The FFS developed BSAFs and BAFs to estimate bioaccumulation, which assume that all of the chemical uptake is linked to exposure to sediment (i.e., reducing sediment concentration to 0 would results in a tissue concentration of 0). This is overly simplistic and leads to an overestimate of the health benefits associated with sediment remediation. Rather, it is critical that bioaccumulation estimates take into account the various sources of chemicals that impact concentrations present in fish and crab tissue. A site-specific food web model is available and should have been used because it allows for appropriate consideration of consideration of ecological exposure pathways to sediment contaminants.

The draft site-specific food web bioaccumulation model for the LPRSA was available to EPA at the time that this FFS was prepared—why was this model not used to calculate sediment PRGs? How will Region 2 correct the FFS to adjust for errors in its inappropriate and overly simplistic bioaccumulation-sediment regressions and biota-sediment accumulation factors?

C. The background evaluation presented in the FFS is incomplete in that it lacks an evaluation of reference conditions and site-specific fish tissue data collected from above Dundee Dam disregarding the agreed upon approach for conducting the LPRSA remedial investigation and feasibility study (RI/FS) and omitting data explicitly collected for the purposes of risk characterization in the LPRSA RI/FS under the direction of Region 2.

1. <u>The background evaluation fails to evaluate reference data.</u>

Section 3. Identification of background concentrations, p. 3-1. USEPA (1999) states that appropriate cleanup levels (e.g., PRGs) are "dependent on the assessment endpoints selected and the risk assessment measures used including chemical biological data gathered from the range of contaminated locations and compared to the reference locations." Region 2 (USEPA 2013) agreed to the use of specific reference areas (including urbanized areas) for the comparison of LPRSA sediment chemistry, benthic invertebrate community, and sediment toxicity data for the site wide (RM 0 to RM 17.4) baseline ERA, consistent with the *Problem Formulation Document* (Windward and AECOM 2009). By ignoring biological field data from the LPRSA (that was provided by CPG to Region 2) as well as urban reference conditions (agreed upon with Region 2) in characterizing risks to the benthic invertebrate community in the LPRSA, Region 2 has conducted the FFS ERA following a significantly flawed approach that is contrary to its own direction for the LPRSA RI/FS.

2. <u>The derivation of background tissue modeled from background sediment data is inappropriate given that site-specific tissue data are available from above Dundee Dam.</u>

Section 3. Identification of background concentrations, p. 3-1, Tissue. The use of sediment data to model background tissue data is inappropriate given that upstream tissue data are available and were collected specifically for the background evaluation using a Region 2-approved sampling plan (Windward 2012b).

3. <u>The background evaluation ignores the estuarine background regional areas identified by Region 2 for the risk assessment</u>

In agreement with Region 2, the chemistry data available in existing regional data sets in freshwater and estuarine areas from Delaware Bay to southern New England were evaluated to determine if these data were sufficient and appropriate to define a regional background data set for the LPR. These data sources were evaluated to define regional background consistent with USEPA's (2002) definition of "constituents or locations that are not influenced by the releases from a site but represent an influence on the site." Following a review of the existing datasets compiled by the CPG, USEPA (2013) selected the following areas to represent a range of background conditions for the LPR:

- The Passaic River above Dundee Dam (freshwater data from an urban habitat)
- Jamaica Bay (estuarine data from an urban habitat)
- Mullica River (including Great Bay) (estuarine data from an rural habitat)

The FFS fails to acknowledge existing estuarine tissue and sediment background data from regional areas that were identified by USEPA (2013) for the LPR risk assessments.

4. The identification and rationale of which sediment samples from which delineate area included to derive background sediment concentrations is not provided.

Section 3. Identification of background concentrations, p. 3-1, Sediment. Background values could not be verified based on the limited information provided in Appendix E. Based on the limited information presented in the main FFS text, it appears the background sediment dataset was limited to just eight samples (four grab samples and four core samples) above Dundee dam and two sediment trap samples near the dam. Surface sediment was collected and analyzed from between Dundee Dam and 1-80 for evaluation as LPRSA background per the Region 2-approved LPRSA 2012 background sediment sampling plan (Windward 2012a). The approximately 1.4-mile stretch between Dundee Dam and I-80 represents a likely primarily depositional area for sediment impacted by urban sources from the Upper Passaic River, and these sediment chemistry data allow for a comparison of concentrations measured within the LPRSA with sediment concentrations upstream of the LPRSA, which are the result of exposure to off-site sources that are inputs into the LPRSA (Windward 2012a). The FFS definition of background should be consistent with this definition and should include all recent data collected specifically for background evaluation. These data are available from Windward (in prep).

Section 3. Identification of background concentrations, p. 3-1. The rationale for the statistic selected is not described or provided. It appears a mean concentration was used. Identification of a background concentration should be based on the maximum value identified in the background data set, or a value derived from a statistic (e.g., UTL, UPL) that describes the upper bound of the background data set.

5. The background sediment concentrations cannot be reproduced using data and detail regarding the selected dataset provided in the FFS.

Section 3. Identification of background concentrations p. 3-1, Sediment. Background sediment values reported in Table 3-1 of Appendix E could not be reproduced for all chemicals based on the limited description provided in Appendix E. Despite a response (USEPA 2014) to a Freedom of Information Act request directing the use of Data Evaluation Report (DER) 2 (Louis Berger et al. 2014) (Table 3-3) as the data source, numerous inconsistencies were identified which still precluded reproduction of the reported background sediment values. For example:

- The sum of polychlorinated biphenyls (PCBs) reported in Table 3-1 is described as “Total non-dioxin-like PCBs,” but the PCB sum in Table 3-3 of DER 2 is simply identified as “Total PCB.” If Table 3-3 provides the data used for determining background values, then calculated totals should be presented using the same summing rules and components, all of which should be clearly identified.
- The data provided in Table 3-3 includes two water column samples which were not described in the background data description provided in Appendix E. A sample list should be provided for Appendix E to clarify exactly which data were used to define background sediment.
- Some chemical concentrations reported in Table 3-3 are inconsistent with the original data sources published on OurPassaic.org. For example, total PCB for sample LPRP-SCSH-DDL-000018 is presented as 1,500 µg/kg; however, the sum of all congeners in the original source data is 659 µg/kg.
- Metals are reported for sample IDs LPRP-SCSH-DDL-000143 and LPRP-SCSH-DDL-000153 in Table 3-3 which are not included in the original data source published on OurPassaic.org.
- In Appendix C, Table 3-5 presents mean values for a list of sample IDs which is consistent with those described in Appendix E for background use. However, the Total PCB value reported here (420 µg/kg) is not consistent with the reported background value (460 µg/kg).

Even disregarding inconsistencies like the examples above, it was not possible to reproduce all background sediment values by using sample IDs from Table 3-3 and original data sources for those

samples. The background values should be reviewed for accuracy, and the complete supporting data set should be provided in Appendix E.

II. REFERENCES

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