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Date: January 3, 1995

Mr. Dave Forsythe
Atlantic Division, Naval Facilities Engineering Command
Environmental Quality Division
Code: 1822
Building N 26, Room 54
1510 Gilbert Street
Norfolk, Virginia 23511-2699

Re: Norfolk Naval Base, Virginia
Camp Allen Landfill
Review of draft *Baseline Risk Assessment*

Dear Mr. Forsythe:

The U.S. Environmental Protection Agency (EPA) has preliminarily reviewed the Navy's draft *Baseline Risk Assessment* for the Camp Allen Landfill, located at the Norfolk Naval Base, Norfolk, Virginia. Based upon that review, we offer the following comments on behalf of the FWS, NOAA, and EPA:

Introduction:

Overall, the usefulness of the Ecological Risk Assessment (ERA) for evaluating the threat posed to aquatic receptors is limited. The scope of the evaluation is site-specific to the Area A drainage ditch system and the Area B pond. There is no offsite evaluation of the drainage pathway to Willoughby Bay as was previously recommended by EPA. In fact, the current version of this document is not very different from the former version, dated August 1993, and in many areas it conveys little information concerning ecological risk. EPA cannot concur with the conclusion that site activities have not resulted in adverse impacts on ecological resources simply because sufficient evidence to support the conclusion is greatly lacking. In addition, the following specific points are made regarding the quality of the document:

1) contradictory statements are made regarding the probability of impacts;

2) there is no discussion of uncertainties associated with this risk assessment;

3) conclusions are drawn based on broad over emphasis of field observations (not even measurements);

4) the cumulative impacts due to exposure to multiple site- related contaminants of concern (COCs) are not discussed;

5) although this risk assessment is essentially based on a relative comparison with criteria and screening levels, the actual ratio calculations (*i.e.*, Hazard Quotients) were never made;

6) COCs for which no standards were available were ignored, as if they were incapable of posing risk;

7) no accounting is included for biomagnification of high K_{ow}, lipophilic organics and potential food-chain exposures;

8) endangered species known to be present (at least occasionally on-site) are not included in the assessment;

9) the document claims an assessment endpoint of "the integrity of aquatic life", yet there is no assessment of reproductive success despite the large exceedance of standards by numerous estrogen disrupters;

10) likewise, there is no Ecological Effects Assessment for COCs (*i.e.*, a Hazard Assessment) which would have suggested that reproductive endpoints should be considered;

In fact, given the measurement endpoints and the approach used, to claim that the integrity of the aquatic environment is assessed is misleading. The Hazard Quotient style of risk estimation has numerous shortcomings - not the least of which is that "risk" can only be examined within the context of the benchmark used. For many of the COCs and the benchmark of AWQC, that basis is lethality. This does not provide assurance of a viable population capable of reproducing.

Benthic macroinvertebrates are classified down to their family. Taxa richness, number of individuals, and density are calculated, but species diversity and biotic indices are not. Based on the benthic macroinvertebrate community, the ERA noted that it is possible that the station is being adversely impacted to some degree by Camp Allen Landfill, but that "these low level impacts cannot be evaluated without further data" (page 6-18). Recommendations should be made regarding further ecological sampling.

The ERA is of little value because of the limited scope of the investigation. Because concentrations of contaminants in surface water and sediment in Camp Allen Landfill drainage ditches exceeded Federal AWQC and NOAA sediment screening guidelines, further downgradient sampling should be conducted to determine whether or not migration to aquatic habitats is occurring.

The location of Willoughby Bay suggests that abundant populations of aquatic, including trust, species may occur regularly near the site. Based on the contaminant concentrations in the drainage ditch surface water and sediment, there is a potential threat to aquatic resources. Therefore, sampling of the sediment and surface water along the drainage pathway to Willoughby Bay is recommended to determine whether or not contaminants are migrating from Camp Allen Landfill to Willoughby Bay. Analyses should include the full suite of TAL/TCL contaminants, grain size, and TOC analysis of sediments. Future benthic macroinvertebrate evaluation should identify individuals to the genus or species level so that more sensitive indices can be included. A literature search of the pollution tolerance of the benthic species would also aid in assessing whether or not adverse effects have occurred. In addition, toxicity tests should be considered, especially if downgradient surface water and sediment samples detect contaminants at concentrations exceeding NOAA sediment screening guidelines or USEPA AWQC.

In prior communications, we have noted that maps which show the Bousch Creek area watershed and delineate the surface water pathways from the wetlands and drainage ditches near Camp Allen landfill to Willoughby Bay. Watershed maps would also be beneficial in evaluating the threat posed by other Norfolk Naval Base sites such as the Building LP-20 site.

Specific Comments:

The following comments refer exclusively to Section 6 and may not be in proper order, but all comments relate to shortcomings of the risk assessment. The comments are arranged inconsistently as pages and Section numbers.

On page 6-1, the types of information needed to evaluate ecological risk are identified. It is stated that ecological surveys are necessary to establish if adverse ecological effects have occurred, and that toxicological information is necessary to evaluate the potential effects of the detected chemical constituents on the ecological receptors. These types of information are needed in ecological risk assessment, however, this information was either not collected or not utilized in this investigation.

On page 6-2, it was stated that risk to terrestrial receptors was based on qualitative information. In particular, data indicating "the **presence** of wetlands, threatened or endangered species, and sensitive environments at the site was obtained and evaluated." This information should have been used in conjunction with levels of contamination data and potential ecological receptor pathway exposures.

The assessment endpoint used to characterize ecological risk was "the integrity of aquatic and/or terrestrial life." As defined in "The Ecological Risk Assessment Guidance for Superfund", assessment endpoints are explicit expressions of the actual environmental values that are to be protected. The assessment endpoint chosen in this investigation is too broad and cannot be assessed with the data collected, which was predominately qualitative (i.e., visual observations of gross anomalies, death, illness, or vegetative stress, occurrence of reproduction, etc.).

Potential risks to receptors were based largely on visual observations, and comparisons to contaminants which exceeded surface water and sediment criteria and guidelines. No actual risk calculations were conducted in this investigation. Risk should have been calculated using exposure estimates and screening ecotoxicity values which are based on site specific data and specific ecological receptors. Hazard Quotients also could have been calculated based on known "lowest observable adverse effects" and "no observable adverse effects" data in conjunction with exposure data. "The Ecological Risk Assessment Guidance for Superfund" should have been consulted.

The Ecological Exposure Characterization (Section 6.3) largely ignores biomagnification as an potential/likely route for contaminant exposure throughout the food chain. This is an important route, given the detection of bioaccumulative organic pollutants and mercury, which should be discussed.

In Section 6.4.1 Only chemicals that had positive detection and state or federal AWQC were evaluated for risk. Other contaminants (for which no AWQC exist) which may have been present (and we were unable to tell which, since no copies of raw data were provided) were ignored, as if they were incapable of posing risk. These comments also apply to the Sediment Screening Value Section (6.4.2).

Section 6.4.3.2 - Station BC05 should not be referred to as "background" because too many questions exists regarding its appropriateness as a background station.

The last sentence in Section 6.5.1 erroneously concludes that since AWQC criteria were "only minimally exceeded, the potential risk to aquatic life is expected to be low". The legal ramifications of exceeding AWQC (by any level of exceedance) have not been discussed: AWQC are clear ARARs and should be adhered to at the point of compliance. Next, the exceedances were not "minimal" in many cases - environmental levels exceeded acute criteria by one order of magnitude and chronic criteria by over two orders of magnitude. Although this risk assessment has taken a comparative approach, the contractors have obviously not completed the process and calculated Hazard Quotients. The sentence should be either removed or rectified to reflect the correct conclusions.

Although Section 6.5.2 is included in the Risk Characterization portion of the chapter and ends with the statement that "impacts to aquatic life .. are considered probable", there is no conclusion regarding risk (similar to that for water samples, however erroneous, as noted above).

The inadequacy of the benthic data (see Section 6.5.3) is discussed in greater detail below. However, this section mistakenly attempts to insinuate that the samples were not dominated by pollution tolerant species, when in fact, they were. Moreover, this section fails to note that there was a lack of pollution intolerant species - an observation that would have supported the claims that the benthic community is not significantly impacted (sections 6.6 and 6.7). This entire section needs re-writing to reflect the fact that the benthic community data is difficult to interpret due to poor design and confounding factors.

Observations of animals present on-site (see Section 6.5.4) has been extended to conclude that "the animals ... appeared to be healthy." The conclusion that observations of animals that lack gross external pathological abnormalities or do not exhibit other obvious, observable symptoms is evidence that they are "healthy" is not supportable. Likewise, this section claims that "reproduction is taking place" based on the observation of egg laying or nest building. Again, this is an extreme overstatement of conditions. There is no evidence that these

eggs were successfully fertilized, developed normally, and produced viable progeny- the true endpoint of reproduction. These conclusions are unsubstantiated and must be deleted from this section and section 6.6.6 as well.

Section 6.5.5 ends with the insinuation that there can be no risk to the endangered peregrine falcon since "the birds on which they feed appear to be healthy". There is no data on the potential dose of bioaccumulative contaminants which the falcons may be exposed to by feeding on such "healthy" birds. This section should conclude only that the falcons are present on-site and this environmental receptor is not addressed at all by this risk assessment.

Functional, qualitative evaluations of wetlands (see Section 6.5.6) were not conducted as part of this assessment, Therefore, the conclusion presented in this section is unsubstantiated. This section should state only that wetlands are present on-site. Section 6.6.8 should be changed accordingly as well.

Section 6.6 claims to be a summary of risk characterization, yet it deals, primarily, only with observations made at single sampling stations. There is no overall statement regarding the risk or impact of the site on surrounding aquatic environments.

Despite the earlier statement (in 6.5.2) that impacts were "probable", Section 6.6.2 now claims that effects at station BC02 are only considered "possible" based on comparison with ERLs and ERMs. Furthermore, this assignment of probability is based only on a binary outcome (i.e., less or greater than ERL or ERM). If the actual degree of exceedance of any of these screening levels is considered - by one to two orders of magnitude for all organic COCs reported - the probability of impacts is greatly enhanced. These same concerns apply to Section 6.6.3 which addresses station BC03.

There is no scientific evidence to substantiate the statement made in Section 6.6.7. This section should be re-written to say only that this risk assessment does not include the endangered falcons.

Benthic macroinvertebrates are the most commonly used fauna in ecological assessments of contaminants. When properly performed, these surveys can provide a means to establish that adverse ecological effects have occurred. The data collected from the current investigation was poorly presented and inconclusive. It was stated on page 6-16, that station BC01 was used as a reference location. As indicated, station BC01 may be impacted from other sources of contamination (page 6-16). Therefore, station BC01 should not be used as a background station. Additionally, the habitat characteristics of station BC01 are different from the other stations (page 6-17) and may therefore render it unsuitable for comparisons. Station BC04 was used as a background station for comparison to station BC05. The selection of BC04 was based on results from chemical analysis. It was, however, stated on page 6-14 that there were chemicals detected at station BC04 (and all other stations) which were dropped from risk considerations because they did not have a published Virginia Water Quality Standard or Ambient Water Quality Criteria. It cannot be inferred that lack of criteria equals lack of toxicity. A thorough literature review should be conducted to determine toxicity information on positively detected chemicals. This information should be used when determining whether to retain a chemical as a potential contaminant of concern and in risk calculations.

The EPA's "Rapid Bioassessment Protocols (RBP) for Use in Streams and Rivers: Benthic Macroinvertebrates and Fish" was reportedly consulted before conducting the biosurveys. The RBP II for family-level classification was performed, however, the adequate assessment of biological condition for RBP II requires the use of a tolerance classification for differentiating among responses of the benthic community to contaminants. This was not sufficiently performed in this investigation. It was stated that the *Tubificidae* family were the most representative of all families, and that this family is often present in organically polluted areas (page 6-17). It was stated that *Tubificidae* are also characteristic species for the habitat type located at the sampling stations. From this information, the conclusion is that impacts cannot be evaluated without further data. We concur, and recommend additional studies, but these can be carried out in a phased approach, with those sampling stations connected with the ecological risk assessment taking highest priority. Work can be scheduled for post ROD phases as well, with a commitment from the Navy to carry out post-remedial work as needed.

In section Section 6.7, the claim is made that "the benthic community is characteristic of an aquatic ecosystem that has minor impacts from both contaminant exposure and natural conditions [and] this benthic community exhibited spatial variations within the range of natural population variation in similar environments." There is no reference for this latter statement (in fact, Section 6.5.3 states that "indices used to evaluate the health ... in greater detail were not used"), and the claim is not supported by the data presented. Even the summarization of data reported in this chapter indicates a severely affected benthic community at all stations. However, due to poor design and confounding factors, the nature or etiology of the impacts observed cannot be discerned. The benthic communities reported are characteristic of degraded, organically enriched habitats. The high temperature, low oxygen, and organic matter could all be causes for the observed degradation. Based on the information presented, and the poor design, it is impossible to differentiate the added impact which site-related COCs may contribute. The benthic community information, as a whole, is of no value in this risk assessment. Any conclusions stated in Sections 6.6.1 through 6.6.5 based on this data should be either revised or removed.

Conclusions and Recommendations:

To determine the effects on aquatic life, a combination of instream surveys (either macroinvertebrate or fish studies) and toxicity tests should be conducted. Benthic macroinvertebrates are useful as indicators of water quality because they are sessile, and therefore, well suited for assessing site-specific impacts. Acro-invertebrates are abundant and are relatively easy and inexpensive to collect in terms of time and equipment. Once the biosurveys are completed, additional chemical and biological toxicity testing is necessary to identify the causative agent and to help establish a link between contaminants and adverse ecological responses. Some, but not all, of these studies can be phased into the post-ROD stage, or can be accomplished as a separate RI.

It is recommended that characterizations be completed for the terrestrial, aquatic, and benthic areas where gaps are identified. In addition, a literature search should be carried out for those COCs that do not currently have ecotoxicological values in regulatory form. Under no conditions, however, should LD_{50}s be used!!!

Where soil contamination is found, soil bioassays should be carried out using one of the earthworm tests as well as the lettuce seed elongation test. The results of these can be used in conjunction with density, diversity, and abundance indices for the site and appropriate reference areas to identify, characterize, and assess risks.

As mentioned in the report (page 6-18), species diversity and biotic indices can be calculated. Additionally, toxicity bioassays can be used to determine growth, reproductive, and survival effects associated with exposure to contaminated surface water and sediments. An important consideration to be made in choosing appropriate bioassay tests is the salinity tolerance of the organism. For surface water testing, commonly used organisms include: *Ceriodaphnia dubia, Daphnia pulex* and *D. magna, Pimephales promelas, Oncorhynchus mykiss* and *Salvelinus fontinalis* (freshwater), and *Mysidoppsis bahia, Cyprinodon variegatus, Menidia beryllina, M. menidia, and M. peninsulae* (estuarine and marine). The test species listed can be used in both acute and chronic toxicity testing.

Sediment toxicity tests commonly employ *Hyalella azteca* (estuarrine), and *Chironomus tentans* (freshwater). *Hyalella azteca* reportedly can tolerate salinities as high as 10-25 ppt. *Leptocheirus plumulosus* has also been used in bioassays and can tolerate salinities as low as 2 ppt. Chronic tests only should be used and the appropriate protocols have been worked out for all of these. Juvenile organisms are often more sensitive to contaminants than are adults, therefore, the use of early life stages in toxicity testing is recommended.

Tissue sample analyses can also be performed to help determine the extent of contamination. Fish samples should include species from different niches and trophic levels, thereby allowing for an indication of the water quality and sediment associated hazards from the overall contamination. This would also allow contaminant levels to be assessed quantitatively, since there are EPA and Food and Drug Administration recommended action concentrations available for many fish tissue contaminants. This is important since benthic studies/toxicity testing will give an indication of actual ecological impacts, while fish tissue analysis would give an indication of potential food chain effects.

It is noted that many if not all of EPA's prior comments were left with without response in the document.

This concludes EPA's preliminary comments on the review of the Navy's draft *Baseline Risk Assessment* for the Camp Allen Landfill located at the Norfolk Naval Base. If you have any questions regarding the above, please feel free to call me at (215) 597-1110,

Sincerely,

Robert Thomson

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cc: Bob Davis (USEPA, 3HW13)
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