

N61414.AR.001864
NAB LITTLE CREEK
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LETTER TRANSMITTING REGULATORY COMMITTEE'S RESPONSE TO U S EPA REGION
III'S COMMENTS ON DRAFT BACKGROUND INVESTIGATION REPORT DATED
SEPTEMBER 2000 NAB LITTLE CREEK VA
12/4/2000
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December 4, 2000

Ms. Mary Cooke
US Environmental Protection Agency
1650 Arch Street
Philadelphia, PA 19103

Subject: Responses to Comments
Background Investigation Draft Report
NAB Little Creek, Virginia Beach, VA
Navy Clean II Contract N62470-95-D-6007, CTO 148

Dear Ms. Cooke:

On behalf of LANTDIV, this letter provides responses to the comments that EPA provided on the Draft Background investigation for NAB Little Creek dated September 2000.

GENERAL COMMENTS

Comment 1:

It appears from the report that the only comparison of on-site data to background data will be the UTL. It was the understanding of the EPA from the response to comments dated May 15, 2000 that in addition to the UTL, population to population comparisons were to be made. The EPA recommends that this be clarified in the report, including a description of possible statistical tests.

Response:

Section 4.3 will be added to the report to address the general approach for use of the background data. The following is the proposed content of Section 4.3 in the Final Background Report:

The statistical analysis of background data will be used to better identify and assess site-related contamination. For site data collected as part of the Site Screening Process, a risk screening evaluation will be conducted through a qualitative comparison to established risk screening criteria (Federal and State criteria). Risk evaluations will include using the most current EPA Region III Risk Based Concentrations, and applying one-tenth the RBC value for non-carcinogens to account for multiple contaminants. For data collected as part of a Remedial Investigation, a quantitative risk assessment will be conducted. For parameters that pose a potential risk (risk screening) or are identified risk drivers through the quantitative risk assessments, background data will be used to identify release-

related constituents of concern. Maximum concentrations of site data will be compared to the background upper tolerance limits and central tendency statistics. Additionally, population to population comparisons will also be conducted. Samples collected from reference or background areas will be used in two ways in the evaluation of on-site contamination.

First, upper tolerance levels, which define an upper bound of concentrations that could be expected in areas unimpacted by the facility, will be used to identify individual samples from on-site that potentially exceed background conditions. These specific locations will be identified in order to assess whether exceedence locations cluster in an area or are interspersed throughout the portion of the site being evaluated. Spatial interpretation of UTL exceedances requires judgmental decisions but is an indication of whether elevated levels suggest a random process as opposed to a release.

Second, reference samples will be used in population-to-population comparisons between the on-site and reference sample results to determine if the sampled areas differ, overall. Typical methods applied include parametric or non-parametric comparisons of the two populations, as performed with a t-test or Mann-Whitney test, respectively. The population-to-population comparisons are of greater relevance in parameters where reference UTLs are exceeded in one or more on-site samples. While possible, it is unlikely that population-to-population comparisons will show statistically significant differences if no individual on-site values exceed the reference UTL.

Best estimates of central tendency [e.g., mean in normally or lognormally distributed data or median where data follow neither theoretical distribution], including a two-sided confidence interval for the estimates, have been provided for parameters that were detected in background samples. These estimates have been provided for a context against which to evaluate the ranges of observations and the upper bound UTLs. While the intervals provide a useful, informal first step in comparison to on-site results, the formal population-to-population tests [described above] of background against individual areas being evaluated are the critical determinants as to exceedance of background levels.

Comment 2:

Antimony and cyanide (for total metal analysis) and copper (for both total and dissolved metal analysis) were reported in the groundwater samples at concentrations not substantially above levels in blanks (B-flag) or as not detected (U-flag) in Table 3-1. This limits the development of any statistic for these metals in Table 4-3. Please discuss this limitation in Section 4.1.3.

Response:

Section 4.1.3 will be revised to include the following:

Limitations are inherent in statistical analyses of data with a limited sample size and low frequency of detection. There is increased uncertainty with central tendency and upper bound statistics based on low frequency of detection results. Additional uncertainty is present when results are influenced by the detection of a constituent in quality control blank sample. These results are considered non-detects in the data validation process, and the value qualified with a "B" may be different from the detection limit value (qualified "U").

Total cyanide in groundwater background samples was reported by the laboratory as non-detects (11 samples, all reported as nondetected at 2 ug/L). Similarly, four dissolved metals (beryllium, cadmium, lead and mercury), the majority of pesticide/PCBs (27 of 28 parameters quantified), semivolatile organic (57 of 59 parameters) and volatile organic (40 of 41 parameters) have been reported as not-detected. In all cases, the reporting limit was constant for all samples quantified.

Four other parameters (antimony, total and dissolved copper and di-n-butylphthalate), a portion of background groundwater sample results were qualified by the laboratory to indicate the presence of a constituent in quality control blank samples. Such qualified data (designated "B"), while reported at levels which exceed limits of detection in samples not impacted by blank contamination, are treated as non-detects and have been summarized in Table 4.1 with frequency of detections of 0.00.

The following summarizes groundwater results that were qualified as "B" and "U" for the referenced parameters:

Parameter	"B" Qualified Data		"U" Qualified Data	
	N	Range [ug/L]	N	Range [ug/L]
Antimony total	8	10.7 - 61	4	4.9
Copper total	8	2.6 - 19.1	4	1.7
Copper dissolved	8	3 - 15.5	4	1.7
Di-n-butyl phthalate	9	3 - 55	3	3

In these cases, it would not be inappropriate to use the maximum reported nondetect as a comparative value for on-site samples. Use of the B-qualified value would not be appropriate. Use of background data for non-detected results in comparison to site results is addressed in greater detail in Section 4.3.

Additionally, Section 4.3 will include a discussion of used of background results reported as non-detects or qualified "B" due to blank contamination, as follows:

4.3.1 Constituents Reported as Undetected

Comparison of non-detected results from background data with respect to on-site sample results is appropriate to assess relative levels associated with reported detection limits. Presumably, the detection limits from on-site and reference samples would have achieved the same level of analytical sensitivity. In which case, if all on-site samples are reported as non-detects, at comparable or lower limits of detection, it may be concluded that the on-site results do not differ from reference collections.

Interpretation is more difficult when on-site samples contain one or results that have been detected. In some cases, particularly organic quantification, it is not uncommon for parameters which are identified as "present" in the sample to be reported at concentration less than the practical quantitation limit (typically qualified as estimated or "J" values by the analytical lab). In most of these cases, it the constituent is not a substantive problem in terms of potential site contamination. Second, at the other end of the spectrum, if all results for one of these parameters has been reported as detected in all on-site samples, at levels which are substantively above the reported detection limit, on-site impacts are likely.

For situations, where only a portion of on-site results have been reported as detected, the interpretation more complex. While statistical tests, particularly the nonparametric methods, can be used to identify statistically-significant differences in the populations, it is important to identify spatially where detections occur. The decision as to whether the detections represent a release will, ultimately, depend upon the magnitude and spatial distribution of the detected and nondetected levels.

4.3.2 Parameters with "B" Qualified Results.

For parameters that have been reported as detections qualified to note that the parameter was also detected in a quality control blank sample, the results are treated as non-detects. However, the value qualified with a "B" may be substantively different from detection limit values (qualified "U") for the same parameter. In these cases, it would be appropriate to use the maximum reported nondetect (qualified "U") as a comparative value for on-site samples. Use of the B-qualified value would not be used.

Comment 3:

Consideration should be given to including the box-plots for soils and groundwater data as attachments to this document and not only referencing them and having to search for them in a separate Technical Memorandum.

Response

Agree. Box-plots will be included as Appendix C in the Final Background Report.

SPECIFIC COMMENTS

Comment 4:

Section 1.0, Page 1-1, Bullets: Please add a new bullet to indicate the objective of developing population statistics for each soil type and groundwater.

Response:

The following bullet will be added to Section 1:

- Establish central tendency statistics
- obtain adequate background data for use in population (background) to population (Site) statistical analysis.

Comment 5:

Section 3.2.2, Page 3-3, first paragraph: There is a reference to a Table 3-3 in this paragraph. The report reviewed does not have a Table 3-3, can one be provided or should the reference be removed?

Response:

The referenced table should be Table 3-2. Section 3.2.2 will be revised to reference Table 3-2.

Comment 6:

Table 4-3: Please provide additional information in this Table on the population statistics of the sample set. Minimum and maximum detected, standard deviation, coefficient of variation, any additional information to indicate the spread or variability of the data will help.

Response:

Table 4-3 will be revised to include the estimate of central tendency, mean (normal distribution) or median (non-parametric) statistic and the 95 percent confidence intervals for central tendency. Section 4.1.3 has also been revised to note that if data follow a theoretical distribution, calculated values (particularly the UTL) derived from statistics from the sample results, can legitimately extend beyond the range of observations. If data follow no theoretical distribution, estimated values (including the UTL) are constrained to lie within the range of observed values.

Comment 7:

Section 4.2.4, Page 4-7, last paragraph: The method of handling parameters that were non-detect in the background sampling is ambiguous. It is unclear if any detection of these parameters would indicate a release, or a comparison would be based on the average of reported non-detects. Please clarify any recommendations.

Response:

Parameters not detected in background soil samples or detected at a very low frequency (highlighted in Table 4-6) were not tested for normality of distribution or further evaluated for point interval estimates as the results would essentially be a statistical analysis of detection limits. Because some of these parameters are present in background, it would not be appropriate to identify any site detection as indicative of a site release. This is complicated by the fact that for some inorganic parameters (selenium, antimony, cadmium, and cyanide) several results were qualified with a "B" due to detections in quality control blank samples.

For parameters not detected in background, it is recommended that comparisons to site data be based on the minimum of reported background non-detects ("U" qualified). Table 4-4 identifies for all parameters, the frequency of detection and mean concentration of detected and non-detected (at the detection limit) results, standard deviation and coefficient of variation. Table 4-4 also includes the maximum and minimum detection limits.

Comment 8:

Section 4.2.5, Page 4-8, last paragraph: Please indicate that population to population comparisons will also be undertaken between background and site data to identify potential release-related contaminants of concern.

Response:

Section 4.3 has been added to the report to address use of background data. Additionally, Section 4.2.5 will be revised to include the following:

Point interval estimates of the upper tolerance limit and central tendency, including the 95 percent confidence interval, characterize parameter specific background soil quality. Comparison of these point interval estimates with site data will be made to more effectively identify release-related contaminants of concern. In addition, population to population comparisons can be conducted to assess any population differences between site data and background data.

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Comment 9:

Table 5-2: Please add the point-interval estimates for the means and 95% confidence interval for each soil type to this summary table.

Response:

Table 5-2 will be revised to include the point-interval estimates for the means and 95% confidence interval for each soil type.

Sincerely,

CH2M HILL



Donna Caldwell

Project Manager

c: Mr. Robert Schirmer/LANTDIV
Mr. Bruce Beach/EPA Region III
Mr. Scott J. MacEwen /CH2M HILL
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