

M00263.AR.001392
MCRD PARRIS ISLAND
5090.3a

U S NAVY RESPONSE TO U S EPA COMMENTS ON DRAFT PRELIMINARY
ASSESSMENT/SITE INVESTIGATION REPORT SITE 14 MCRD PARRIS ISLAND SC
4/1/2012
NAVFAC SOUTHEAST

**EPA COMMENTS ON THE DRAFT
PRELIMINARY ASSESSMENT/SITE INVESTIGATION REPORT FOR SITE 14
MARINE CORPS RECRUIT DEPOT
PARRIS ISLAND, SOUTH CAROLINA
APRIL 2012**

GENERAL COMMENTS:

1. **Comment:** The report inappropriately makes conclusions regarding the necessity of investigations of CERCLA sites associated with outfalls. All references to CERCLA sites not needing investigation based on the outcome of sediment and/or storm water investigations at outfalls which drain the CERCLA site should be removed from the report. All CERCLA sites must be investigated as called for during the normal CERCLA process. Please modify the report to address this issue.

Response: The conclusions regarding the necessity of further investigation at any particular outfall were not intended to negate further investigation at any particular CERCLA site. The recommendations stating no further investigation is recommended relate to the outfall itself. Those conclusions were drawn on multiple lines of evidence as stated in the conclusions or recommendations per outfall. Regardless, the Navy has decided to conduct Preliminary Assessments/Site Inspections (PA/SI) at Sites listed in the FFA that have not yet been investigated. Those sites include 39, 46, 47, 48 (PA only), and 49. Based on the results of the Site 14 PA/SI, a Remedial Investigation (RI) will be completed at Site 54. RIs have already been conducted at Sites 5, 9, 16, 27, 55, 32, and 45. Data collected at the outfalls draining these sites will be used by the Partnering Team when developing Long Term Monitoring (LTM) Plans for these Sites, if LTM is required by the decision document. No new data will be collected as part of a Site 14 investigation.

2. **Comment:** The report should evaluate and make recommendations pertaining to the sample data from the NPAO data set which was determined to be outliers. Since these are not typical of anthropogenic impacts, then an evaluation such as was conducted on the PAO data should be conducted on the NPAO outliers to determine if they may represent potentially significant impacts from unknown sources. Please modify the report to address this issue.

Response: The decision to pull outliers from the NPAO data set was not made based on the notion that anthropogenically influenced concentrations measured at any particular NPAO are atypical or represent potentially significant impacts from unknown sources. An outlier was removed from the NPAO data set based on statistical testing and professional judgment. The decision making was completed in an effort to develop a conservative background data set. The chemicals that were measured above criteria at the NPAOs are typical of anthropogenic influence and based on the characteristics of the outfalls themselves, the concentrations are within a range that does not trigger further investigation. The Draft Final Site 14 PA/SI includes a comparison of the PAO data to the NPAO data including all of the NPAO data. In evaluating the results based on this comparison, it is clear that when the outliers were removed from the NPAO data set in the Draft PA/SI Report that the recommendations are in fact more conservative than if the outliers were not removed.

3. **Comment:** The report is confusing in that analytical results are not evaluated in a consistent manner followed through from beginning to end. It would be helpful if for each outfall, evaluations by receptor category (human health versus ecological) followed a COPC from initial identification through to a final recommendation by receptor category by outfall and by media. The final result should be a list of COPCs for a specific outfall for human health potential impacts from sediment, human health potential impacts from storm water, ecological potential impacts from sediment, and ecological potential impacts from storm water; with a recommendation for each regarding

whether or not additional investigation is recommended, and when and where that additional investigation should take place (see below). Please modify the report to address this issue.

Response: The way the data and conclusions were presented in the report was well planned. In a consistent manner, the data were evaluated as such:

1. NPAO data was presented in comparison to criteria in an effort to put the NPAO data set into context. In other words, it is important to realize that there are exceedances, as expected, at the NPAOs. This is because the outfalls are anthropogenically influenced.
2. The NPAO data set was statistically evaluated and based on the test results and professional judgment, outliers were removed from the data set and two times the mean of each analyte within the NPAO data set was established as background.
3. The PAO data was compared to background and human health and ecological criteria in order to identify exceedances.
4. The human health evaluation stopped there and the ecological evaluation went a step further. This is because the receptors of concern at the outfalls are ecological. Therefore, an ecological evaluation was completed and ecological COPCs were selected. COPCs were not identified for human health receptors.
5. The ecological COPCs per outfall were then compared statistically to the NPAO data set in order to determine if the results were statistically similar or different.
6. The outcome of the statistical evaluation was then used with the Conceptual Site Model information to determine if ecological COPC are site related and if further investigation at a particular outfall may be necessary and what type of investigation is required per FFA site.

Text has been added to the conclusions section to clarify that no human health COPCs were selected. Only exceedances were identified. The conclusions have been refined based on the Navy's commitment to conduct PA/SIs at sites that have not previously been investigated and to state that any data collected during the Site 14 PA/SI will be used to evaluate the CERCLA site that is drained by that outfall. No new data will be collected in association with Site 14.

4. **Comment:** Due to apparent inconsistencies in the report, insufficient clarity in the decision-making process, limited number of samples taken at PAO sites, and various stages of investigation at the related CERCLA sites, at this point EPA cannot agree with excluding from any further consideration the possible need for additional samples at outfalls associated with known CERCLA sites during the investigation of those CERCLA sites. Therefore, although the Site 14 Report may recommend no further investigation for the outfalls, the data should be referred over for use and consideration in the other CERCLA site investigations.

Response: While the Navy believes that the decision making and evaluation of the data was consistent throughout the report, it is agreed that the data will be referred over for use and consideration during CERCLA investigation by site, and not during any further investigation associated with Site 14.

5. **Comment:** Subsequent to submittal of this report, the Navy has mentioned the intention of the Navy to conduct additional investigation for Site 14 under an Extended Site Investigation (ESI). It is unclear if the Navy intends all of the further investigation recommended in the report to be conducted as part of the ESI, or only part of it. Please clarify this issue in the appropriate sections of the report, especially Section 8.

Additionally, considering this potential ESI, EPA offers the following:

- a. **Comment:** EPA would like to discuss the potential outcomes of any additional investigation under Site14 for outfalls associated with other CERCLA sites, and whether any of the outcomes actually benefit the Navy with respect to completing investigations. It appears the majority of the outfalls recommended for additional investigation are

potentially related to CERCLA sites which we already know need additional investigation. The work plan indicated that exceedances which could potentially be related to a CERCLA site would be addressed with that CERCLA site. The data should be referred over for use and/or consideration in that investigation regardless of what recommendation is made in the Site 14 report or what additional data is gathered. EPA suggests the Navy consider referring the outfall data for these sites now, rather than conducting additional investigation for these outfalls in a Site 14 ESI, unless it is a matter of funding being available now, but not later. (Also see comment 4 above.)

Response: Section 8 has been revised to clarify the recommendations and path forward for the outfalls associated with sites listed in the FFA. As stated in previous responses, a Site 14 ESI will not be conducted; rather, the data collected during the Site 14 PA/SI will be used to evaluate the sites the PAOs are associated with.

- b. **Comment:** Additional investigation may be appropriate under “Site 14” for those exceedances which may be the result of NPAO outliers and/or any concentration (NPAO or PAO) which is significantly elevated above background and screening levels, but not obviously potentially related to another CERCLA site. A measure for what constitutes “significantly elevated” may need to be agreed to by the team on a case-by-case basis. The report does not currently address these exceedances. However, in accordance with decisions made during scoping of the Site 14 work plan, these elevated hits were to be considered for additional investigation under Site 14. Please modify the work plan to address this issue and determine if any additional investigation should be conducted under a Site 14 ESI.

Response: The concern is understood; please see response to comment number 2.

6. **Comment:** Many outfalls had exceedances which were evaluated as being “significantly greater than the NPAO concentrations”, but were eliminated from concern because they were not potentially related to another CERCLA site. A few of these will likely be captured and addressed in 4b above. However, many will likely remain as exceedances of some level of significance but may not warrant further investigation. Perhaps a contaminant class-specific evaluation/discussion (e.g. why might “metals” or “pesticides” or “PAHs” be elevated at these outfalls at levels outside the range of the NPAO, and why is it or isn’t it appropriate to not consider them any further) of these exceedances would be appropriate. Is there anything that can be learned from this data that may be useful outside of CERCLA but perhaps within MCRD’s Natural Resources office, or Public Works construction management office, or in the Base Master Plan for development (e.g. setting per acreage limitation goals for asphalt in future development)? For completeness in evaluation and for clarity in the public record, address these exceedances in Section 8 of the report, Conclusions and Recommendations.

Response: The concern is understood; please see the responses to comments 1-5.

7. **Comment:** The outlier analysis of the NPAO data does not include all information specified in EPA’s Data Quality Assessment: Statistical Methods for Practitioners (DQA). The DQA identifies five steps in treating extreme values:
- a. Identify extreme values that may be potential outliers.
 - b. Apply statistical test.
 - c. Scientifically review statistical outliers and decide on their disposition.
 - d. Conduct data analysis with and without statistical outliers.
 - e. Document the entire process.

The Draft PA/SI report cites the DQA and the above steps, but additional information is needed to

provide the information to support the conclusions as follows:

- The Draft PA/SI does not thoroughly support the scientific decisions regarding the disposition of statistical outliers. The document states that
“statistical tests like Rosner’s Test, Dixon’s Test, and Tukey’s Outlier Test are useful tools for identifying outliers in a data set, they need to be used in conjunction with visual tools, an evaluation of the nature of the data (frequencies of detection), and the application of the Conceptual Site Model (CSM) for each outfall to ultimately decide whether a specific value should be considered an outlier.”
However, no application of such considerations is provided. The general rationale appears to be that the NPAOs are not impacted by Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) site releases, and therefore would have a naturally occurring, normal distribution of contaminants. However, analysis of NPAO data led to the exclusion of one outfall, Outfall 305, from the data set, illustrating the acknowledgement and possibility of “real” elevated concentrations. In general, data points should never be removed from any data set (background or otherwise) solely on the basis of an outlier test unless an independent weight of evidence indicates that the data points are not representative of the underlying population of interest.
- The Draft PA/SI does not indicate that the effects of removing statistical outliers were assessed. It is unclear whether the impacts were evaluated and what decision process was used to validate decisions to exclude or retain statistical outliers. Removal of an outlier changes, among other things, the mean, variance and possibly the distribution of a data set, as well as the numerical output of any statistical test. The different output may or may not impact conclusions, but a discussion of the decision process and consideration of data sets with and without the outliers would further clarify the outlier analysis.
- The outlier analysis is not thoroughly documented. As mentioned above, effects of including or excluding statistical outliers are not discussed. In addition, it is unclear whether efforts were made to transform non-normally distributed data sets. Within Section 6.1.2 Identified Outliers, no specific reasoning is provided other than “...should be considered outliers.” To promote clarity, all steps taken, rules applied and test/principle followed for identifying outliers should be added to Section 6.1.1 and 6.1.2.

Response: The 3-sigma rule was the primary tool that was used to identify outliers in the NPAO data set. Additional tests, such as Rosner’s, Dixon’s, and Tukey’s were used as supporting information along with graphical displays of the data.

The results of Rosner’s, Dixon’s, and Tukey’s Outliers for determining statistical outliers in the NPAO data set were provided in Appendix E of the report. The text directs the reader to Appendix E to see the summary of the results of the statistical analysis. The R Development Core Team statistics software program (Version 2.15.0) was used.

When assessing the NPAO data set, the maximum detected concentrations of 14 of 18 PAHs at Outfall 305 were identified as outliers. Therefore, based on professional judgment, it was decided to exclude the Outfall 305 results rather than just the individual PAHs from the NPAO data set. The Navy agrees that data should not be wantonly removed from a data set. However, the Navy believes that this is a more conservative approach for evaluating “background.”

The report did not illustrate the impacts of the effects of removing statistical outliers from the data set. The Navy recognizes that removing outliers from a data set changes the statistical parameters, and possibly the distribution of the data set. If no outliers were removed from the NPAO data set, there could only be a decrease in the number of ecological COPCs at the PAOs for sediment and storm water. The following tables indicate which chemicals would no longer be identified as COPCs at the PAOs if the original NPAO data set were used:

Outfall	No Longer COPCs in Storm Water	No Longer COPCs in Sediment
106	No Change	PAHs
358	No Change	No Change
405	No Change	alpha-Chlordane
408	No Change	4,4'-DDD, 4,4'-DDE, PAHs
457	alpha-Chlordane, gamma-Chlordane	Zinc, 4,4'-DDD, Total DDT
555	alpha-Chlordane, gamma-Chlordane	PAHs
567	No Change	No Change
592	No Change	Total DDT
601	No Change	No Change
608DNF	No Change	PAHs
636B	No Change	Zinc, 4,4'-DDD, Total DDT, PAHs
881	No Change	No Change

In the original analysis, a log transformation of the data was not conducted. The revised outlier analysis includes log transformations to determine if data exhibited a log normal distribution before moving on to nonparametric outlier analyses. This will replace the output for Appendix E.

Text changes addressing this comment will be presented in the responses to “specific” comments.

8. **Comment:** The figures in Section 6.0, Analytical Results and Summary, do not refer to the appropriate screening tables. Further, several of the screening tables include incorrect units of measure for storm water. To promote clarity in the screening results and spatial presentation of the data, the discrepancies between the figures and tables should be addressed along with the discrepancies in the units of measure for storm water criteria. The discrepancies are highlighted below.

- Figures 6-1 through 6-4: The figures include a footnote that states that the criteria used for screening are presented in Table 6-1. However, the screening criteria for sediment and storm water are presented in Tables 6-3 and 6-5.
- Tables 6-4: This table list storm water criteria in units designated as milligrams per kilogram (mg/kg) for metals, and micrograms per kilogram ($\mu\text{g}/\text{kg}$) for pesticides, polycyclic aromatic hydrocarbons (PAHs) and semivolatile compounds; however, for water, the units should be expressed in units of volume (e.g, milligrams per liter (mg/L), micrograms per liter ($\mu\text{g}/\text{L}$)).
- Figure 6-5: The figure includes a footnote that states that the criteria used for screening are presented in Table 6-2. However, the background screening criteria for metals in sediment and storm water are presented in Table 6-3.
- Table 6-3: This table lists storm water criteria in units designated as mg/kg for metals and $\mu\text{g}/\text{kg}$ for pesticides and PAHs; however, for water, the units should be expressed in units of volume such as mg/L or $\mu\text{g}/\text{L}$.
- Figures 6-5 through 6-13: The figures include a footnote that states that the criteria used for screening are presented in Table 6-2. However, the screening criteria for sediment and storm water are presented in Tables 6-3 through 6-5.

Response: The discrepancies between the figures and tables along with the discrepancies in the units of measure for storm water criteria have been addressed. The revised figures and tables are presented in the D2 PA/SI Report.

9. **Comment:** COPCs were identified based on screening against human health and ecological criteria as well as ecological statistical evaluations. However, final COPCs recommended for

further evaluation considering these three analyses are not clearly summarized in Section 8.0 or Table 8-1. Consequently, Section 8.0 is unclear on which media (storm water and/or sediment) and which COPCs by media require further investigation. For example, Section 7.6.2.3 Statistical Conclusions identifies the ecological COPCs in storm water and sediment, however, Table 8-1 does not clearly specify the master list of COPCs based on the three evaluations. Examples of these inconsistencies are provided below:

- a. Outfall 106: The statistical evaluation in Section 7.6.2.3 indicates there are no COPCs in storm water and polychlorinated biphenyls (PCBs) are the only ecological COPC in sediment. According to the conclusions discussed in Section 8.1, arsenic, PCBs and PAHs were COPCs based on human health risk. However, Table 8-1 only lists PCBs in sediment as requiring further investigation and not arsenic or PAHs. Clarification is warranted to explain if arsenic and PAHs are captured under another site or whether the concentrations represent a new release, or if other lines of evidence can be provided to discount arsenic and PAHs altogether from further evaluation.
- b. Outfall 358: The statistical evaluation in Section 7.6.2.3 identified zinc as a storm water ecological COPC and chromium and mercury as ecological COPCs in sediment. According to Section 8.1, arsenic and vanadium in sediment and delta-hexachlorocyclohexane (gamma-BHC in storm water were COPCs based on the human health screening. However, Table 8-1 only lists chromium and mercury in sediment as requiring further investigation and does not include zinc in storm water or any of the human health COPCs. Clarification is warranted to explain why zinc and the human health COPCs do not require further investigation. Zinc in stormwater appears to be addressed by outfall 608DNF see Table 8-1.
- c. Outfall 405: The statistical ecological evaluation in Section 7.6.2.3 identifies aldrin and gamma-BHC as storm water COPCs and pesticides and PAHs as COPCs in sediment. According to Section 8.1 Conclusions, PAHs and pesticides were identified as sediment COPCs based on human health risk. However, Table 8-1 lists dichlorodiphenyltrichloroethane (DDT) as a storm water COPC which was not identified previously in the ecological statistical evaluation or in the conclusions discussed in Section 8.1. Clarification is warranted to explain why DDT has been selected as a storm water COPC.
- d. Outfall 457: The statistical ecological evaluation in Section 7.6.2.3 and Table 7-1 Statistical Summary of PAO and NPAO Data Comparisons, identifies lead as a storm water COPC, while Section 8.1 identifies lead as an ecological and human health COPC for storm water. Further, Section 8.2 recommends further investigation of lead. However, Table 8-1 does not list lead for the contaminants that are recommended for further investigation. It is recommended that lead be included in Table 8-1 to support the recommendations in Section 8.2.
- e. Outfall 592: The statistical ecological evaluation in Section 7.6.2.3, Table 7-1, and Section 8.1 identifies PAHs as sediment COPCs. However, Section 8.1 then states that Outfall 592 is not recommended for further investigation because PAHs are not part of the conceptual side model (CSM) for the site. Clarification is warranted to explain whether PAHs may be captured under another site, represent a new release, are an outlier, or if other lines of evidence can be provided to discount PAHs altogether from further evaluation.
- f. Outfall 608DNF: Section 8.1 indicates that Outfall 608DNF PAHs were identified as human health COPCs in sediment. However, because PAHs are not part of the CSM for the site, they are not recommended for further investigation. Clarification is warranted to explain whether PAHs may be captured under another site or whether the concentrations

represent a new release are an outlier, or if other lines of evidence can be provided to discount PAHs altogether from further evaluation.

To support further risk management decisions at Site 14, it is recommended that the conclusion sections specify and identify the COPCs within each outfall's storm water and sediment which require further investigation based on the three evaluations.

Response: Table 8-1 has been updated to clearly identify human health exceedances, ecological COPCs, and recommendations for further investigation. Additionally current phase of investigation for each of the associated CERCLA sites has been added.

Recommendations made in the Draft Site 14 PA/SI have been updated. In the Draft Final Site 14 PA/SI it is recommended that sites associated with the PAOs will be evaluated outside of Site 14. For sites that have not yet been investigated the data collected during the Site 14 PA/SI will be used in conjunction with data collected during the PA/SI for that site and presented in the site PA/SI report. For Sites 9, 16, 27 and 55 and Site 45, outfall data collected during the Site 14 PA/SI will be used during the development of LTM Plans for the respective sites, if LTM is required by the decision document. Sediment and surface water data collected from the outfall associated with Site 5 will be used in evaluation of Site 5. No further sediment and storm water data will be collected as part of Site 14.

SPECIFIC COMMENTS:

- 10. Comment:** Executive Summary, Page ES-2: The first paragraph on Page ES-2 of the Executive Summary describes how the non-process area outfalls (NPAOs) drain residential areas, parking lots, sidewalks, and grassy areas, and are considered to be anthropogenically influenced. According to the discussion presented in Section 6.1, Non-Process Area Outfall Data Set, Page 6-1, the NPAOs may also drain areas that include underground storage tanks (USTs) or oil/water separators. For consistency and completeness, revise the text on Page ES-02 of the Draft Preliminary Assessment/Site Investigation Report for Site 14 – Storm Sewer Outfalls, for the Marine Corps Depot, Parris Island, South Carolina dated July 2012 (Draft PA/SI) to clearly indicate that NPAOs may also drain areas including USTs and/or oil/water separators.

Response: The text in the Executive Summary and Section 4.3 has been changed to state: "Non-Process Area Outfalls (NPAOs) drain residential areas, parking lots, sidewalks, grassy areas, underground storage tanks (USTs) and oil/water separators and are considered to be anthropogenically influenced. "

- 11. Comment:** Executive Summary, Page ES-3: The last paragraph on Page ES-3 summarizes the outfalls that are recommended for further investigation at any process area outfall (PAO) and includes Outfalls 106, 358, 608DNF, 405, and 555. However, based on the site investigation (SI) data, Outfall 457 is also recommended for further investigation. For completeness and consistency revise the Executive Summary to include Outfall 457 in the summary of outfalls recommended for further investigation.

Response: The executive summary (page ES-3) has been revised include recommendations to conduct a PA/SI at Sites 46, 47 and 49, which are drained by Outfall 457. In addition, because an RI has already been performed at Sites 9 and 16, which are also drained by the basin associated with Outfall 457, data collected at the outfall will be used to develop a LTM Plan for these sites if one is required by the decision document.

- 12. Comment:** Table 4-1, Outfall Sampling Design and Rationale, Page 1 of 12: Table 4-1 indicates that oil/water separators #1938 and #1885 are located in PAOs associated with Outfalls

358 and 405, respectively. However, Table 4-2, Installation Restoration and Munitions Response Program Site Associated with Site 14 – Storm Water Outfalls, indicates oil water separator (OWS) 22 is associated with Outfall 358. Additionally, Table 4-3, Process Area Outfalls and Potentially Discharged Wastes, indicates OWS 19 is associated with Outfall 405. OWS 19 is depicted in Figure 5-1, Northwest Quadrant Outfall Locations, located near Outfall 405 and OWS 22 is depicted in Figure 5-2 Northeast Quadrant Outfall Locations, located near Outfall 358. Revise the Draft PA/SI to ensure that the respective OWS designations are consistently reported across all tables, figures and text and are consistent with Table 10-2, MCRD Parris Island Oil/Water Separators Locations and Description, of the Site 14 SI Work Plan (Tetra Tech, 2011).

Response: Tables 4-1, 4-2, and 4-3 have been updated to report oil water separators as presented in Figures 5-1 and 5-2.

13. **Comment:** Section 5.1.2, Storm Water Sampling, Page 5-2: The second paragraph indicates geochemical parameters were measured prior to the collection of storm water samples. The text refers the reader to sample log sheets presented in Appendix A-3, Storm Water Sample Log Sheets, for the specific geochemical data recorded. However, in order to assess the comparability of the specific geochemical parameter results, the storm water geochemical data that were recorded should be tabulated and the table included in the Draft PA/SI. Revise the Draft PA/SI to address this issue.

Response: The geochemical data provided in Appendix A-3 has been tabulated and has been added to the Draft-Final Site 14 PA/SI report as Table 5-3.

14. **Comment:** Section 5.2, Deviations from the Work Plan, Page 5-5: This section discusses the deviations from the Site 14 SI Work Plan (Tetra Tech, 2011) that occurred during SI field activities. The text discusses the locations where sediment samples and storm water samples could not be collected and explains the reasons for the deviation. However, the Draft PA/SI does not further address the noted deviations. As such, it is uncertain whether the deviations resulted in data gaps that would impact the adequate determination of the presence or absence of sediment and storm water contamination originating from identified Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) sites at MCRD Parris Island. Revise the Draft PA/SI to address this issue.

Response: See response to comment #1. The Navy has decided to conduct PA/SIs at Sites listed in the FFA that have not yet been investigated. Any potential data gaps will be filled during the PA/SIs.

15. **Comment:** Section 6.1, Non-Process Area Outfall Data Set, Page 6-1: This section discusses the NPAOs that drain residential and other areas of storm water that have been in contact with parking lots, sidewalks, and grassy areas and may also drain areas that include USTs or OWSs and are considered to be anthropogenically influenced. However, Section 6.1 does not discuss which NPAOs contain USTs and/or OWSs or identify which outfalls service these areas. As such, it is not clearly understood how the NPAOs that service drainage basins containing USTs and/or OWSs could be considered anthropogenically influenced areas. For example, if polynuclear aromatic hydrocarbons (PAHs) were detected at levels exceeding screening criteria, it is not certain whether the contamination is the result of parking lots, etc., or the USTs, OWSs. To ensure that these NPAO areas where USTs and/or OWSs are located are adequately investigated, revise the Draft PA/SI to address this issue.

Response: Table 4-1 identifies NPAO outfalls that were included in the Site 14 PA/SI. Outfall 758 is the only NPAO outfall that was identified that drains an area with an OWS (OWS 16).

16. **Comment:** Section 6.1.1 Outlier Test, Page 6-2: Section 6.1.1 states that the appropriate hypothesis tests were chosen based on the recommendations in the DQA, and correctly states that the DQA does not have a recommendation for an outlier test when 1) the data are not normally distributed and 2) the sample size is less than 50. The report then states that “Tukey’s rule of thumb” was used in these cases. However, there is no indication that efforts were made to transform data to achieve a normal distribution. According to the DQA, “If the data are not normally distributed, then either transform the data, apply a different test, or consult a statistician.” If a normal distribution were attained, the appropriate statistical test could then be applied. If transformations were attempted, a discussion of transformation efforts should be added to promote clarity. If no efforts to transform data were conducted, such efforts should be considered to include a statistical test rather than Tukey’s outlier test.

Response: The outlier analysis has been rerun to include a logarithmic transformation before moving on and using nonparametric analyses. The revised statistical analysis has been included in Appendix E. The following text is included before the last sentence of the third paragraph on page 6-2 (6th paragraph in Section 6.1.1):

“If the Shapiro Wilks test indicates that the data were not normal, then the data were logarithmically transformed and tested again for normality using the Shapiro Wilks test. If the data were not lognormally distributed, then either Dixon’s Outlier or Tukey’s rule of thumb test were applied to the data.”

17. **Comment:** Section 6.1.1 Outlier Test, Page 6-2: Section 6.1.1 states that Tables 6.1 and 6.2 summarize the values that correspond to the mean plus 3 standard deviations (3-sigma rule), which can be used to identify outliers. However, the table does not indicate which, if any, outliers were identified with this method. Additional explanation of the use of the 3-sigma rule, in the text and Tables 6.1 and 6.2 would promote clarity.

Response: Section 6.1.1 was reorganized and revised to clarify the use of the 3-sigma rule for identifying outliers. After paragraph 3, the text has been revised as follows:

“A statistical outlier analysis was conducted on the sediment and storm water NPAO data at MCRD Parris Island Site 14. The data for each analyte may or may not approximate a normal distribution. However, for the purposes of the continued outlier review, a general assumption was made that the data were collected from what would be expected to be a normal distribution. If the NPAOs are unimpacted by CERCLA site releases, then metals would be expected to be present at naturally occurring concentrations and PAHs and pesticides would be present as a result of normal anthropogenic activities, with no specific area targeted for excessive contamination. If more samples were collected from the area, the analytical results would likely approximate a normal distribution.

The 3-sigma rule states that for a normal distribution, nearly all values lie within 3 standard deviation units of the mean. Approximately 68 percent of all values in a normally distributed population lie within 1 standard deviation unit, approximately 95 percent of all values lie within 2 standard deviation units, and 99.7 percent of all data lie within 3 standard deviation units. To use this principle as a test for outliers, a value greater than 3 standard deviation units of the mean can be considered an outlier. Tables 6-1 and 6-2 summarize the values which correspond to the mean plus 3 standard deviation units for sediment and storm water, respectively. It should be noted that the outlier evaluation was only performed on three groups of chemical analytes including metals, PAHs, and pesticides. It is assumed that measured PCB, semi-volatile

(excluding PAHs), and volatile chemical results are not representative of typical anthropogenic influence and are considered to be contaminants associated with a potential release.

In addition, hypothesis tests were used to evaluate whether the three greatest measured concentrations of each analyte within the NPAO data set were statistical outliers. Due to the relatively small sample's size (two samples were collected from one location at each NPAO), only the three greatest measured concentrations for any particular analyte were evaluated for potential outliers. The appropriate hypothesis tests were chosen based on the recommendations in USEPA's Data Quality Assessment: Statistical Methods for Practitioners. Rosner's Outlier test was used when there were at least 25 samples and the data without the suspected outlier(s) were normally distributed, and Dixon's Extreme Value test was used when there were less than 25 samples and the data without the suspected outlier(s) were normally distributed. USEPA's Data Quality Assessment: Statistical Methods for Practitioners does not have a recommendation for an outlier test when the data are not normally distributed and the sample size is less than 50. Therefore, Tukey's rule of thumb was used to identify outliers when the data was not normally distributed. Tukey's rule of thumb identifies outliers as any concentration greater than 1.5 times the Interquartile range (difference between the 75th percentile and the 25th percentile). The Shapiro Wilks normality test was used to test for normality. All hypothesis tests were conducted using a five percent significance level. If the Shapiro Wilks test indicated that the data were not normal, then the data were logarithmically transformed and tested again for normality using the Shapiro Wilks test. If the data were not lognormally distributed, then either Dixon's Outlier or Tukey's rule of thumb test were applied to the data. Results from the hypothesis tests are provided in Appendix E.

While statistical tests like Rosner's Test, Dixon's Test, and Tukey's Outlier Test are useful tools for identifying outliers in a data test, they ought to be used in conjunction with visual tools, an evaluation of the nature of the data (frequencies of detection), and the application of the Conceptual Site Model (CSM) for each outfall to ultimately decide whether a specific value should be considered an outlier. Graphical displays (box plots, normal q-q plots, and histograms) were used to visually inspect the data for potential outliers. Then, the results of these statistical tests were used to identify analytes as potential outliers for further consideration."

- 18. Comment:** Section 6.1.2 Identified Outliers, Page 6-3: Section 6.1.2 does not provide specific reasoning behind the identification of outliers. To promote clarity, additional discussion is needed given the use of various statistical tests, the 3-sigma principle, and the need for subsequent scientific reasoning for the acceptance of an outlier determination.

Response: Section 6.1.2 generally identifies the statistical outliers. A clearer rationale has been provided in Section 6.1.1 on how they are identified. (See Response to Comment #17.)

The first sentence in Section 6.1.2 has been changed to read:

"The 3-sigma rule and professional judgment, with supportive evidence from results of statistical outlier tests and graphical displays, was used to identify the outliers in the NPAO data set."

At the end of the sediment and storm water sections, the following tables have been added to identify the parameters, with their corresponding concentrations and sample locations that were identified as outliers.

"The following table lists the parameter concentrations in sediment that were identified as outliers and the corresponding sample locations:

SEDIMENT				
S14OF-758-SD-0103	COPPER	M	105	MG/KG
S14OF-305-SD-0103	MANGANESE	M	479	MG/KG
S14OF-501-SD-0103	MANGANESE	M	507	MG/KG
S14OF-758-SD-0103	THALLIUM	M	1.7 U	MG/KG
S14OF-349BN-SD-0001	VANADIUM	M	37.9	MG/KG
S14OF-758-SD-0103	ZINC	M	16200	MG/KG
S14OF-305-SD-0001	1-METHYLNAPHTHALENE	PAH	49	UG/KG
S14OF-305-SD-0103	1-METHYLNAPHTHALENE	PAH	17 J	UG/KG
S14OF-305-SD-0103	2-METHYLNAPHTHALENE	PAH	4.6 J	UG/KG
S14OF-305-SD-0001	2-METHYLNAPHTHALENE	PAH	32	UG/KG
S14OF-305-SD-0001	ACENAPHTHENE	PAH	430 J	UG/KG
S14OF-305-SD-0103	ACENAPHTHENE	PAH	180	UG/KG
S14OF-305-SD-0103	ACENAPHTHYLENE	PAH	16 U	UG/KG
S14OF-305-SD-0001	ACENAPHTHYLENE	PAH	14 U	UG/KG
S14OF-305-SD-0001	ANTHRACENE	PAH	770 J	UG/KG
S14OF-305-SD-0103	ANTHRACENE	PAH	310	UG/KG
S14OF-305-SD-0103	BAP EQUIVALENT-HALFND	PAH	3225.5	UG/KG
S14OF-305-SD-0001	BAP EQUIVALENT-HALFND	PAH	4643	UG/KG
S14OF-305-SD-0103	BENZO(A)ANTHRACENE	PAH	2400	UG/KG
S14OF-305-SD-0001	BENZO(A)ANTHRACENE	PAH	3600	UG/KG
S14OF-305-SD-0001	BENZO(A)PYRENE	PAH	3200	UG/KG
S14OF-305-SD-0103	BENZO(A)PYRENE	PAH	2200	UG/KG
S14OF-305-SD-0103	BENZO(B)FLUORANTHENE	PAH	3100	UG/KG
S14OF-305-SD-0001	BENZO(B)FLUORANTHENE	PAH	4400	UG/KG
S14OF-305-SD-0001	BENZO(G,H,I)PERYLENE	PAH	1800	UG/KG
S14OF-305-SD-0103	BENZO(G,H,I)PERYLENE	PAH	1200	UG/KG
S14OF-305-SD-0103	BENZO(K)FLUORANTHENE	PAH	1300	UG/KG
S14OF-305-SD-0001	BENZO(K)FLUORANTHENE	PAH	1900	UG/KG
S14OF-305-SD-0001	CHRYSENE	PAH	4000	UG/KG
S14OF-305-SD-0103	CHRYSENE	PAH	2500	UG/KG
S14OF-305-SD-0103	DIBENZO(A,H)ANTHRACENE	PAH	260	UG/KG
S14OF-305-SD-0001	DIBENZO(A,H)ANTHRACENE	PAH	330	UG/KG
S14OF-305-SD-0001	FLUORANTHENE	PAH	8900	UG/KG
S14OF-305-SD-0103	FLUORANTHENE	PAH	5100	UG/KG
S14OF-305-SD-0103	FLUORENE	PAH	180	UG/KG
S14OF-305-SD-0001	FLUORENE	PAH	390	UG/KG
S14OF-305-SD-0001	INDENO(1,2,3-CD)PYRENE	PAH	2900	UG/KG
S14OF-305-SD-0103	INDENO(1,2,3-CD)PYRENE	PAH	2000	UG/KG
S14OF-305-SD-0001	NAPHTHALENE	PAH	60	UG/KG
S14OF-305-SD-0103	NAPHTHALENE	PAH	12 J	UG/KG
S14OF-305-SD-0103	PHENANTHRENE	PAH	3500	UG/KG

SEDIMENT				
S14OF-305-SD-0001	PHENANTHRENE	PAH	7400	UG/KG
S14OF-305-SD-0001	PYRENE	PAH	10000 J	UG/KG
S14OF-305-SD-0103	PYRENE	PAH	6700 J	UG/KG
S14OF-305-SD-0001	TOTAL PAHS HALFND	PAH	50119	UG/KG
S14OF-305-SD-0103	TOTAL PAHS HALFND	PAH	30954.6	UG/KG
S14OF-605-SD-0103	4,4'-DDD	PEST	170	UG/KG
S14OF-605-SD-0103	4,4'-DDE	PEST	90	UG/KG
S14OF-605-SD-0103	4,4'-DDT	PEST	56	UG/KG
S14OF-551-SD-0103	ALPHA-CHLORDANE	PEST	350 J	UG/KG
S14OF-551-SD-0103	GAMMA-CHLORDANE	PEST	280 J	UG/KG
S14OF-605-SD-0103	TOTAL DDT HALFND	PEST	316	UG/KG

The following table lists the parameter concentrations in storm water that were identified as outliers and their corresponding samples:

STORM WATER				
S14OF-723-ST	ALUMINUM	M	108000	UG/L
S14OF-723-ST	BERYLLIUM	M	2.2	UG/L
S14OF-544-ST	COPPER	M	298	UG/L
S14OF-723-ST	IRON	M	69500	UG/L
S14OF-723-ST	LEAD	M	136	UG/L
S14OF-723-ST	NICKEL	M	21.6 J	UG/L
S14OF-723-ST	VANADIUM	M	148	UG/L
S14OF-723-ST	ALPHA-CHLORDANE	PEST	0.69 J	UG/L
S14OF-723-ST	ENDOSULFAN II	PEST	0.13	UG/L
S14OF-723-ST	GAMMA-CHLORDANE	PEST	0.57	UG/L
S14OF-723-ST	HEPTACHLOR EPOXIDE	PEST	0.18	UG/L"

19. Comment: Section 6.1.2 Identified Outliers, page 6-3: The second paragraph of Section 6.1.2 summarizing the outliers in sediment recommends that data from Outfall 305 be excluded from the NPAO data set because most of the outliers for PAHs were identified in samples collected from this outfall. However, the disposition of Outfall 305 is not further discussed in the Draft PA/SI report. For example, it is unclear if Outfall 305 should be reclassified as a PAO or whether further evaluation will occur to determine if it should be a PAO associated with a CERCLA site or if the PAHs are from anthropogenic sources (e.g., parking lot). The Draft PA/SI report should explain how Outfall 305 will be addressed, as the disposition of this outfall is unclear since it is no longer considered a NPAO.

Response: When assessing the NPAO data set, the maximum detected concentrations of 14 out of 18 PAHs at Outfall 305 were identified as outliers. Therefore, based on professional judgment, it was decided to exclude the Outfall 305 results rather than just the individual PAHs from the NPAO data set. The Navy agrees that data should not be wantonly removed from a data set. However, the Navy believes that this would be a more conservative approach for evaluating "background." The Navy does not believe that Outfall 305 should be reclassified as a PAO.

Based on review of CERCLA sites at MCRD Parris Island and associated outfalls, Outfall 305 is not associated with any currently identified CERCLA sites. Based on the size of Outfall 305

(2.5 feet in diameter), the metal back flow preventer that is clogged with dead marsh grass, and the industrial nature of MCRD Parris Island, it is believed that anthropogenic PAHs are deposited close to the outfall. PAHs concentrations in this outfall are likely greater than those observed in other NPAO outfalls due to flow restriction and sediment deposition around the outfall.

- 20. Comment:** Section 6.2.1, Metals, Storm Water, Page 6-7: The first paragraph on Page 6-7 indicates lead concentrations exceeded the maximum contaminant level (MCL) of 15 micrograms per liter ($\mu\text{g/L}$). However, the 15 $\mu\text{g/L}$ drinking water standard for lead is based on an “action level” and not an MCL. Revise the text as appropriate.

Response: It is understood that the MCL itself (15 $\mu\text{g/L}$) is based on an “Action Level”; however it is listed as an MCL on EPA’s website presenting the federal MCLs.
<http://water.epa.gov/drink/contaminants/index.cfm>

- 21. Comment:** Section 7.6.2 Statistical Methodology, Page 7-11: Section 7.6.2 states that the “comparative statistical method involved a graphical evaluation and a hypothesis test comparing the central tendency (mean/median) concentrations and a hypothesis test comparing the right tails (largest values). The graphical evaluation consisted of visual inspection of boxplots, normal probability plots and histograms.” This information suggests that conclusions regarding the data appear to rely on visual inspection of graphical presentations of the data rather than inferences made from the statistical outputs. While informative, inspection of such graphics does not justify inferences in the place of statistical tests. For example, the paragraph about probability plots states that “if there is grouping of the two data sets then data sets are most likely different.” The statistical test is what gives credibility to the reporting of whether two data sets are significantly different. It is recommended that less emphasis be placed on visual inspections and more emphasis be placed on the application of appropriate statistical tests. Note that it is acceptable to place emphasis on visual inspection of graphics in cases where statistical tests could not be conducted due to limited data sets.

Response: The text has been clarified to indicate that statistical outputs of the hypothesis tests provided the primary basis for determining whether PAO concentrations were significantly greater than NPAO concentrations. The purpose of graphical displays and evaluation is to help illustrate and support the conclusions of the statistical test and ensure that quantitative analysis is consistent with the data sets, i.e., a reality check.

The first sentence has been revised to state:

“This section describes the results of the hypothesis tests and the graphic displays that were used to compare process area and non-process area data.”

Overall, for the sake of clarity, Sections 7.6.2.1 and 7.6.2.2 have been switched, Section 7.6.2.1 is Hypothesis Tests and Section 7.6.2.2 is Graphical Displays. If there is a priority on hypothesis test results rather than graphical displays, then hypothesis tests should be discussed first.

- 22. Comment:** Section 7.6.2 Statistical Methodology, Page 7-11: This section states that one-half the detection limit was used for non-detected concentrations (i.e., censored data) for the hypothesis tests, but does not provide a reference or justification for this rule. The decision about how censored data are included can have a great effect on statistical outcomes. An explanation of the rationale for using the detection limit and inclusion of any references would add clarity to this section. See page 53 of the DQA document for additional discussion.

Response: The last sentence of Section 7.6.2 states: “One-half the detection limit was used for non-detected concentrations for the graphical displays; the full detection limit was used for non-detected concentrations for the hypothesis tests. “

23. **Comment:** Section 7.6.2.2 Hypothesis Tests, Page 7-12: This section describes the hypothesis tests applied to the data sets, all of which are non-parametric. However, the basis for selecting non-parametric tests is not provided. Because parametric tests generally have more statistical power than nonparametric tests, it is recommended that the use of nonparametric tests in the analysis be explained.

Response: The data were tested using the Shapiro Wilks test to determine if the data follow a normal distribution. If the data followed a normal distribution and there were less than 15 percent nondetect values, then a parametric hypothesis test was conducted; otherwise, a nonparametric test was conducted. This test was run and it was determined that nonparametric tests were the appropriate test to be used for the hypothesis tests.

After the 3rd sentence in paragraph 1 of Section 7.6.2.2 (now Section 7.6.2.1), the following text has been added:

“The data were tested using the Shapiro Wilk test to determine if the data follow a normal distribution. If the data followed a normal distribution and there were less than 15 percent nondetect values, then a parametric hypothesis test would be conducted; otherwise, a nonparametric test would be conducted. This test was run and it was determined that nonparametric tests, such as the Wilcoxon Rank Sum Test and the Gehan Test, were the appropriate tests to be used for the hypothesis tests.”

24. **Comment:** Section 8.1, Conclusions, Outfall 106, Pages 8-1 and 8-2: The text in this section indicates that based on the conceptual site model (CSM) for Site 39 and 48, a CERCLA related release would most likely result in metals and polychlorinated biphenyls (PCBs) in sediment and/or storm water. Arsenic and Aroclor-1262 were identified as exceeding human health criteria and background at Outfall 106. Table 8-1, Process Area Outfalls COPC [Contaminant of Potential Concern] Analysis, recommends that further investigation of Outfall 106 consist of PCB analysis of sediment samples. However, metals analysis was not recommended in the table although arsenic in sediment exceeded the applicable screening criteria. Currently, Table 8-1 and/or the text do not indicate whether a statistical evaluation of metals in sediment was conducted to determine if concentrations are consistent with NPAO or PAO concentrations. If concentrations are indicative of PAO, then sampling for metals (i.e., arsenic) in sediment is warranted. Revise the Draft PA/SI to address this issue.

Response: Table 8-1 has been updated to clearly identify human health exceedances, ecological COPCs, and recommendations for further investigation. Additionally, the current phase of investigation for each of the associated CERCLA sites has been added.

Recommendations made in the Draft Site 14 PA/SI have been updated. In the Draft Final Site 14 PA/SI it will be recommended that Site 39 and 48 be evaluated outside of Site 14. Data collected from Outfall 106 including human health exceedances and ecological COPCs will be used in conjunction with soil and groundwater data collected during respective PA/SI investigations at Site 39 and Site 48.

25. **Comment:** Section 8.1, Conclusions, Outfall 408, Page 8-2: The text in this section indicates that based on the CSM for Sites 9, 16, 46, 47 and 49, a CERCLA related release would most likely result in paint waste and pesticides. Statistical analysis concluded that the concentrations of pesticides that were identified as COPCs in sediment were not statistically greater than the

NPAO concentrations. As such, Table 8-1, Process Area Outfalls COPC Analysis, recommends no further investigation of Outfall 408. However, arsenic and PAHs were identified as exceeding human health criteria and background at Outfall 408. Based on the CSM for Site 9, metals contamination as result of the release of paint waste is possible. Currently, Table 8-1 and/or the text do not indicate whether a statistical evaluation of metals in sediment was conducted to determine if concentrations are consistent with NPAO or PAO concentrations. If concentrations are indicative of PAO concentrations, then sampling for metals (i.e., arsenic) in sediment is warranted. Revise the Draft PA/SI to address this issue.

Response: Table 8-1 has been updated to clearly identify human health exceedances, ecological COPCs, and recommendations for further investigation. Additionally current phase of investigation for each of the associated CERCLA sites has been added.

Recommendations made in the Draft Site 14 PA/SI have been updated. In the Draft Final Site 14 PA/SI it will be recommended that Sites 9, 16, 46, 47 and 49 be evaluated outside of Site 14. Data collected from Outfall 408 including human health exceedances and ecological COPCs will be used in conjunction with soil and groundwater data collected during respective PA/SI investigations at Sites 46, 47 and 49. Additionally, data collected during the Site 14 PA/SI will be used during the development of the LTM Plans for Sites 9 and 16, if LTM is required by the decision document.

- 26. Comment:** Section 8.2 Recommendations, Page 8-6: Section 8.2 does not discuss the further investigation required for stormwater at Outfall 358, despite the conclusions presented in Section 8.1 and Table 8-1, which identified zinc to be further investigated in stormwater. It is recommended to include Outfall 358 in Section 8.2 with proposed investigatory actions or revising the previous conclusions in Section 8.1 to explain why metals do not require further investigation.

Response: Table 8-1 has been updated to clearly identify human health exceedances, ecological COPCs, and recommendations for further investigation. Additionally, the current phase of investigation for each of the associated CERCLA sites has been added.

Sediment and surface water data collected in Outfall 358 will be used to evaluate of Site 5. No further sediment and storm water data will be collected as part of Site 14.

- 27. Comment:** Table 8-1, Process Area Outfalls COPC Analysis: The table indicates that the zinc PAO concentrations for storm water were greater than the NPAO concentration at Outfall 358. However, the recommended further investigation does not include analysis of zinc in storm water. The text in Section 8.1, Conclusions, on Page 8-2 states that the COPCs identified in storm water were collected in a manhole upgradient of Site 5 and are not believed to be site related. For clarity and completeness, Table 8-1 should be revised to note why the zinc surface water exceedances at Outfall 358 were not carried forward and recommended for further investigation.

Response: See response to Comment #26.

Table 8-1 has been updated to clearly identify human health exceedances, ecological COPCs, and recommendations for further investigation. Additionally, the current phase of investigation for each of the associated CERCLA sites has been added.

Sediment and surface water data collected in Outfall 358 will be used to evaluate Site 5. No further sediment and storm water data will be collected as part of Site 14.