



RHODE ISLAND
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

235 Promenade Street, Providence, RI 02908-5767

TDD 401-222-4462

April 26, 2006

Curt Frye, Remedial Project Manager
U.S. Department of the Navy
Northern Division
Naval Facilities Engineering Command
10 Industrial Highway
Code 1823-Mail Stop 82
Lester, PA 19113-2090

RE: Final Sediment and Groundwater Monitoring Report, Old Fire Fighter Training Area, Naval Station Newport, Newport, Rhode Island

Dear Mr. Frye,

The Rhode Island Department of Environmental Management, Office of Waste Management has reviewed the Final Sediment and Groundwater Monitoring Report, Old Fire Fighter Training Area. This document has been labeled as Final as opposed to Draft Final and the cover letter attached indicates that the Navy is submitting the report for informational purposes. Accordingly, the attached comments are submitted to the Navy to document outstanding concerns with the report. Be advised that the Office of Waste Management does not accept the report or any regulatory proposals by the Navy based upon conclusions presented in the report.

If the Navy has any questions concerning the above, please contact this Office at 401-222-2797, ext. 7111.

Sincerely,

A handwritten signature in cursive script that reads "Paul Kulpa".

Paul Kulpa
Office of Waste Management

cc: Matthew DeStefano, DEM OWM
Richard Gottlieb, DEM OWM
Kymberlee Keckler, EPA Region I
Cornelia Mueller, NSN

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**Evaluation of Navy's
Responses to Comments from RIDEM on
Appendix E to the Draft Sediment and Groundwater Monitoring Report,
Old Fire Fighting Training Area
Comments Dated 11/30/06**

General Comment:

The Rhode Island Department of Environmental Management, Office of Waste Management has reviewed the Sediment and Groundwater Monitoring Report, Old Fire Fighter Training Area. In previous correspondence and meetings, the Office of Waste Management raised a number of concerns with respect to the validity of the original forensic study performed at the site and the conclusions generated by that study. The Navy never addressed these concerns. Accordingly, the Office of Waste Management could not approve the report and stated that conclusions presented in that study could not be used as a foundation for decisions made at the site. The Navy then proposed to perform a second similar study. At that time the Office of Waste Management noted that it's position concerning this matter had not changed and did not approve the proposal to perform a second similar forensic study. The Navy elected to perform the second study using procedures and protocols, which had been questioned and found unacceptable in the first study. This brought into question the need for this agency to review the second forensic study. However, at the recommendation of the US EPA and the Navy the Office of Waste Management has generated comments on the forensic portion of the Sediment and Groundwater Monitoring Report, Old Fire Fighter Training Area.

Evaluation of Response

The Navy has indicated that it was their understanding that RIDEM did not have any outstanding concerns with the previous forensic study. Be advised that this was not the case.

Specific Comments:

1. **Introduction,
Paragraph 1.**

Typical of other firefighter training areas across the country, waste oils were used at the site. This was noted in the first report performed on the site, the Initial Assessment Study. Therefore, please modify this section of the report to state that waste oils were used at the site.

Evaluation of Draft Final Document

The Navy's own report, which was published shortly after the firefighter closed, and was based upon a review of records and interviews with base personnel, stated that waste oils were used at the site. Despite this fact that Navy still claims that only middle range marine diesel was used. Please modify the report to be in concert with previous findings.

**2. Introduction,
Paragraph 1.**

This section of the report notes that candidate fuels include jet fuel, kerosene, marine diesel and boiler range heavy fuel oil. Jet fuel was not used by the military during WW II. High-octane aviation fuel would have been used. In addition, the Navy used both Navy Special and Navy Black oil for their surface ships. Please modify this section of the report to include these fuels.

Evaluation of Draft Final Document

The Navy's position that diesel would have been used either due to expense or difficulty in lighting heavy fuels. The function of the firefighter training area was to train sailors in putting out fuel fires that they might experience on a ship. Starting in WWI and well into the 70's the main fuel used by the Navy was Navy Black oil or Navy special. As acknowledge by the Navy this fuel has vastly different igniting and burning characteristic then diesel fuel. Therefore, in order to train their personnel in dealing with the properties of this fuel it would have been used at the site. The same holds true for the other fuel listed in the comment.

**3. Technical Approach,
Paragraph 1.**

Potential candidate sources of contamination are listed in this paragraph. In regards to the fire fighter training area the report should note that there was at least one oil water separator at the site, which discharged into the bay, as well as tanks for underground storage of the fuel oils. The report must depict the locations of the discharge lines from the oil water separator(s) on a figure, as well as the underground tanks and associated piping network for the tanks.

Evaluation of Draft Final Document

The request was to include the figure as it is provides important information concerning potential sources and migration pathway at the site. As this is a forensic study charged with ascertain the source of contamination, excluding this figure is not in line with the function of the study.

**4. Technical Approach,
Paragraph 1.**

A review of engineering plans reveals that a series of storm drains, other than the two depicted in this report, cross the site. In addition, storm drains serviced the Fire Fighter Training Area itself. When the site was active these drains would have served as likely discharge points from operations associated with the Fire Fighter Training Area. Currently, they would serve as preferential flow paths for groundwater contamination. The report must include a discussion of these drains and depict their locations on a map.

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Focusing the report on two of the existing drains does not allow one to evaluate the historic drains, which were used at the site and/or any connections to existing drains. This is not in concert with the intent of a forensic study.

7 Technical Approach, Paragraph 2.

This section notes that two samples of asphalt from the shoreline were analyzed. Please provide more details concerning these asphalt samples. That is were the samples composed of asphalt and sand, or pure asphalt (pieces of asphalt). Also, it appears that one sample contained a binder. Please confirm and describe the binder.

Evaluation of Draft Final Report

The request was simply to include a description of the pieces from the field log in the text.

8 Technical Approach, Paragraph 2.

This section of the report notes that reference samples included crude, kerosene and diesel. The chromatograms from these fuels were compared to site samples. A cursory review of fuels used by the Navy would reveal that aviation fuel, jet fuel and Navy Special were used as fuel sources. In addition, waste oils would have been burned at the site. This should be noted in this section of the report. Further, samples of these fuels must be employed as reference samples.

Evaluation of Draft Final Document

The Navy has not included a reference sample of Navy Special or Black Oil, aviation fuel and jet fuel or waste oils. These fuels must be included in the report. The Navy has included sample of #4 and #6 oils. It is well known that unlike the distilled fuels the chromatograms of residuals oils can be dramatically different. As such, several samples of these fuels need to be employed. Finally, the report notes that reference samples of crude, diesel, kerosene, #2, #4, #, 6 and lube oil will be used. A review of the chromatograms provided in the CD was of North Slope Crude. Actual chromatograms of the other reference oils were not provided which does not allow for a comparison of reference and site chromatograms. What was provided for these other reference fuels were pictorial representation of chromatograms. While pictorials are helpful, the actual chromatograms should also be included.

9 Technical Approach, Paragraph 2.

This section states that oils in various stages of weathering were employed. Please describe how oils in various stages of weathering were obtained. That is, were soils contaminated with these

fuels from other sites used in this analysis, were fuels artificially aged, and if so how were they artificially aged?

Evaluation of Draft Final Document

A discussion indicating how the fuels were aged was not found in the Technical Approach section.

10. ***Technical Approach,
Paragraph 2.***

Only a limited number of weathered fuel samples were used in this analysis. Since a variety of oils were used at the sites, weathered samples of aviation fuel, jet fuel, waste oil and Navy Special must also be included in this analysis.

Evaluation of Draft Final Document

It appears that the weather fuel samples were not employed.

11. ***Technical Approach,
Paragraph 2.***

At the Old Fire Fighter Training Area a variety of fuel oils and waste oils were used in the fire fighting training exercises. This would have resulted in releases of the oils themselves, as wells as partially combusted and/or heated oils. Therefore, the forensic analysis would have to evaluate partially combusted and/or heated oils and waste oils.

Evaluation of Draft Final Document

Heated oils were not employed in the forensic study. Combusted oils were limited to pictorial for diesel and kerosene.

12. ***Technical Approach,
Paragraph 2.***

The intent of the study was to determine whether the chromatographs fingerprint of the sediments were indicative of onsite sources, i.e. firefighter operations, or normal background. In the current study the Navy elected to resample sediment and catch basin samples that previously underwent analysis in the original forensic study. However the Navy did not resample onsite soils in the current study. Please explain why it was necessary to resample sediment and catch basins samples, but is was not necessary to resample onsite soils.

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The Navy collected two site soil samples for forensic analysis and noted that they had marked differences in their structure, one indicative of middle distillate, (diesel) and the other of residual oils. Since the two samples were not identical the questions was whether additional signatures are present in the soil, i.e. whether different oil patterns are present. The Navy compared the two

forensic samples to the non-forensic soil samples collected at the site. Although the chromatograms did not align the Navy was able to conclude that the soils samples from the two forensic soil samples match up with 45 % and 25 % of the site soil samples. Ten percent of the site samples represented naturally occurring organics the remaining 15 % was not discussed. In support of this position the Navy has not included the actual chromatograms or even pictorials for the site samples. Instead a limited number of pictorials were supplied for selected samples. It is assumed that the actual site soil non-forensic chromatograms were placed on a disk so that the chromatograms from the two forensic samples could be overlaid and compared. As this was already performed this information should have been included in the report so that the Navy's conclusion could be confirmed. Please supply this chromatograms separated in those, which match up with the middle distillate, residual range, natural occurring organics and unknowns on a disk.

13. **Technical Approach,
Paragraph 2**

In the current study no onsite soils underwent forensic analysis. In the previous study only two onsite soils underwent forensic analysis. Based upon observations from test pit logs and soil borings it is known that contamination at the site is not homogenous. That is, in some sections of the site heavy oils were found at other locations lighter oils were found and/or a mixture of oils were present. The heterogeneity of the site was also demonstrated by the two vastly different chromatograms that were obtained from soil samples collected at two locations that underwent analysis in the first forensic study. Since it is known that the site is heterogeneous and the collection of only two samples during the first forensic study was found to be insufficient, additional samples should have been collected in this study. Therefore, additional onsite soil samples must be collected from the site. It is recommended that onsite soils which exhibited visual or olfactory evidence of contamination from known areas of contamination be selected for analysis.

Evaluation of Draft Final Document

See Evaluation to comment 12.

14. **Technical Approach,
Paragraph 2.**

In the current forensic study onsite soils did not undergo forensic analysis. Instead, the results from the previous forensic fingerprints of onsite soils were referenced. Typically, in order to compare chromatograms in a forensic analysis, the same procedures must be employed. Specifically sample prep, and the type of column used, operating parameters associated with the columns, flow rates, temperature ramps, detectors, etc must be the same. In order to use the results from the previous analysis the report must include a table, which outlines each step of sample prep for both analyses and each operating parameter for the GC in both analyses. Differences, between the two preps and GC analyses must be highlighted and discussed. Finally, as the final test of the comparability of the two studies, the chromatograms of the catch basin and sediment samples taken in both studies must be compared and any differences in elution time, fingerprint, etc must be explained.

Evaluation of Draft Final Document

The Navy has added two additional attachments to the forensic report, Attachment G, which is a quality control sample summary, and Attachment H, an overview of the process followed which should address this comment. In addition, soil analytical chromatographs from the soil predesign investigation are being evaluated for inclusion and will be discussed in a new Attachment I.

While the attachments do provide information concerning QA/QC procedures or the concepts of a forensic study that have not directly addressed the comment, which was a side by side comparison of the GC from the two separate studies. A review of the chromatograms from these two studies demonstrates that there are differences, which must be examined and addressed. This is necessary in order to determine whether the results from the previous study can be used. Further, the chromatograms themselves for each study should be examined in light of the conclusion represented.

15. *Technical Approach, Paragraph 2.*

The current forensic study elected to use the chromatograms from soil samples collected in the first forensic study. However, it does not appear that the actual chromatograms were included in the report. Assuming that the chromatograms can be used (see above comment), the report must include the chromatograms in the appendix.

Evaluation of Draft Final Document

The Navy indicated that Attachment I would contain the requested information. Pictorials, but not the actual chromatograms were in found in Attachment

16. *Technical Approach, Paragraph 2.*

The study relies on high-resolution chromatographic analysis of site samples and reference samples. For each sample please specify the operating parameters, (GC temperature ramp, flow rates, etc). If the samples were run under different conditions or using different GC or columns this should be noted and the information should be provided in a table.

Evaluation of Draft Final Document

The Navy has noted that some of the information requested is presented in Attachment F (laboratory report). However, two additional attachments will be added to the forensic report, Attachment G, which is a quality control sample summary, and Attachment H, an overview of the process followed. Attachment F is a three hundred-page laboratory report for sample collected in 2005; Attachment G is a simple QA/QC report Attachment H is an overview of environmental forensics (as it applies to OFFTA). The requested material was not found. It is assumed that the Navy was able to obtain the requested material. As such, simply provide a table with the requested information.

17. **Technical Approach,
Paragraph 2.**

The crux of the Navy's position is that the highest concentration of PAHs was observed at the outfalls and the source of the PAHs is typical urban runoff. An alternative explanation, which early studies had indicated, was either input of contaminants from the site directly into the storm drains and /or preferential flow paths of contaminants from this site along the storm drains. If the source of the PAHs was typical urban runoff, as opposed to site related PAH, one would also find that the highest concentrations of metals typically observed in urban runoff, such as nickel and copper would be found at the outfalls sediment samples. A review of the data reveals that this is clearly not the case. Significantly higher concentrations of these metals are found away from the outfalls. This fact would point to the PAHs being site related and not urban runoff related. Please include a discussion of these facts in the report.

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The Navy has noted that the fate and transport properties of petroleum hydrocarbons and metals are different. While this is not disputed the highest concentration of metals would still be expected to be found in the storm drains. The Navy's position is that the majority of the PAHs observed at the site are runoff out of the two storm drains, as opposed to leaching of site related contaminants. As analysis of the metals distribution would confirm this (the highest concentration of metals should be observed at the storm drains). This has not been done.

18 **Technical Approach,
Paragraph 2.**

In general, any forensic analysis of the site would have to address the problem that a variety of fuels were used at the site, including waste oils, and these fuels were exposed to heat and combustion. This would have resulted in releases of unburnt fuels, fuels exposed to heat and fuels exposed to combustion, all of which would have undergone physical/chemical/biological degradation. The first step in any forensic analysis would have been to determine whether one can even distinguish between the petrogenic/pyrogenic signatures associated with firefighting operations and petrogenic/pyrogenic signatures of urban background. This would have necessitated running samples of these fuels, as well as fuels exposed to heat and/or combustion and finally the various degradation processes. Once it has been established that one is able to distinguish between the two, and then the forensic study could proceed. Without performing this initial, critical test, the study is unfairly biased and flawed and meaningful conclusions cannot be drawn. Accordingly, these additional tests need to be performed in order to determine whether a forensic analysis is even possible at the site.

Evaluation of Draft Final Document

The request was to simply provide the data supporting the position that a forensic analysis can be performed on a complicated site. The added section did contain pictorial for some, but not all of the reference oils, and combustion pictorials for diesel and kerosene. It did not contain combusted pictorials for the other reference oils, nor did it contain heated pictorials for these oils or

degradation pictorials for these oils (pictorials are useful tools for presenting data, however, in all cases the original GCs must be included). The concern was that since a variety of fuels were used at the site the overlap between the degraded, combusted and heated fuels would complicate and compromise the forensic analysis.

**19. Section 4.1, Dominant Hydrocarbon Signatures
Paragraph 2.**

The report is a public document; therefore the concepts in this paragraph need to be clearly discussed. As an illustration, the report should explain what is meant by the organic residues of thermal decomposition (soot, creosote and tar based asphalt) and petroleum (diesel, heavy fuel oil and petroleum asphalt). The report should also state what are the upgradient or onsite sources of soot, creosote, tar based or petroleum based asphalt, etc

Evaluation of Draft Final Document

Please indicate where the sources of soot and creosote are noted in Attachment H.

**20 Section 4.1, Dominant Hydrocarbon Signatures,
Paragraph 2.**

The report is a public document therefore statements that a particular range of PAHs or a particular PAH is associated with asphalt, diesel, etc., should be explained in detail. Further the bases for this statement should be provided and attached as an appendix or at a minimum the web address for the reference must be provided. Finally, please provide tables listing all of the PAHs associated with the different sources and typical concentrations.

Evaluation of Draft Final Document

A table was not found which listed all of the PAHs associated with the different sources and typical concentrations

**22 Section 4.1, Dominant Hydrocarbon Signature.
Paragraph 3.**

This paragraph references figure 3 that depicts the range of heavy fuel oils. The figure shows fuel oils stopping just short of C-40. Heavy fuel oils go to C-40 and beyond. Please modify the figure to reflect this fact.

Evaluation of Response

The Navy has noted that the useful hydrocarbon range for the subject of the report is covered within the C-40 range. The Office of Waste Management disagrees in that if signatures are found beyond C-40 it can prove useful.

23 **Section 4.1, Dominant Hydrocarbon Signature
Paragraph 3.**

This paragraph references figure 3, which contains chromatograms of debris 1 and 2 both of which contain asphalt. One chromatogram contains the UCM in the C 30-C40 ranges the other does not. Please explain.

Evaluation of Draft Final Document

The Navy states that Debris 1 represents newer petroleum base asphalt and Debris 2 represents older non-petroleum based asphalt. The logs describe Debris 1 as a piece of older asphalt and Debris 2 is newer looking asphalt. Please explain.

25. **Section 4.1, Dominant Hydrocarbon Signatures
Paragraph 4.**

The report notes that benthic and biochemical weathering does not occur in the insulated confines of the asphalt. Please explain this statement. Is the Navy stating that the exterior of a piece of asphalt that is exposed to weathering would have a different chromatogram from the interior, which is not exposed to weathering? If this case please provide a copy of the reference from the literature or a copy of the chromatograms taken on the exterior and interior of the asphalt, which supports this position.

Evaluation of Draft Final Document

The Navy has noted that the statement in question means that the exposed surface of the asphalt is subjected to different physical, chemical, and biological conditions that may affect the molecular makeup of the material on that surface. Taken in context with the rest of the paragraph, the point that is being made is that the material inside the asphalt is slightly different than the asphalt material found within the storm drains since it is still intact and unlettered, while the material in the storm drains is more weathered and exposed.

Debris Sample 1 and Debris Sample 2 were both pieces of intact asphalt, the interiors of both pieces, by the Navy's logic, would not be representative of weather material, while the exteriors of both pieces would be. There is nothing in the log sheets or the analytical tables to suggest that the outside of Debris 1 was scrapped off and sent to the lab, while the exterior of Debris 2 was removed and only the inside was sent to the lab. In both cases the samples were simply sent to the lab. Please either remove these statements or reword the explanation.

27. **Section 4.1, Dominant Hydrocarbon Signatures,
Paragraph 4.**

This report states that OFFTA 7 contained lightly degraded diesel and catch basin sample 75a contained heavily biodegraded diesel. Please provide the justification for this statement. This justification should include, but not be limited to, chromatograms of lightly and heavily biodegraded diesel.

Evaluation of Draft Final Document

The Navy has indicated that this information will be provided in a new section (Attachment I) of the revised report. Attachment I does not contain pictorials, bar charts or chromatograms of the requested samples.

28. Section 4.1, Dominant Hydrocarbon Signatures Paragraph 3.

The report assigns the PAH distribution to asphalt and weather tar. The report must clearly and in detail provide justification for this statement. This justification should include, but not be limited to, chromatograms of all potential sources, a list of constituents found in these sources, a list of typical concentrations of PAHs in these sources, etc, an explanation of how one can distinguish between asphalt PAHs and PAHs associated with heavy fuel oils, burnt or combusted fuel oils, weathered fuel oils and fuel oils exposed to heat.

Evaluation of Draft Final Document

While a general discussion has been included the requested information such as tables, etc was not.

29. Section 4.1, Dominant Hydrocarbon Signatures Paragraph 3.

The report contains the chromatograms of three sediment samples collected from three storm drains. Even discounting the diesel signature in one of the drains, the chromatograms are not similar. Since the drains essentially served the same area, the chromatograms should have been nearly identical. Please explain in detail why irrespective of the diesel component in one sample, the chromatograms are not identical.

Evaluation of Draft Final Document

The Navy notes that different asphalt materials in different areas laid at different times is responsible for the differences. The drains are in close proximity to each, (two drains are connected). Runoff at the site is intermingling. Therefore if the source were PAHs from the asphalt one would have expected to see these differences. The Navy should look for an alternate explanation, such as contribution from site.

32. Section 4.1, Dominant Hydrocarbon Signatures Paragraph Whole Section.

Please include a table with the concentration of the individual PAHs observed at the site, reference sediment samples, soil samples and the various reference samples, (i.e. crude oils, diesels, asphalt, Navy Special; waste oils, etc). The table should also highlight which PAHs are believed to be indicative of a particular PAH source in each sample, i.e. if sediment contains diesel PAHs this should be highlighted. Since the report is a public document the highlighted PAHs should be

colored coded. That is asphalt PAHs would be one color, diesel PAHs would be another, etc. A designation should also be applied to PAHs that may be found in more than one source material.

Evaluation of Response

The Navy has stated that the individual PAHs are not generally assigned to the specific sources as suggested in the comment above. The figures provided show mixtures of the different PAHs and other analytes. These mixtures, or patterns are what are used to determine sources and similarities.

A review of the information presented shows that some figures show a range of PAHs while other figures have individual PAHs. In addition the Navy has stated that the individual PAHs observed in the sediment samples at OFFTA are attributable to specific sources. Therefore please provide the information as requested.

33. Section 4.1, Dominant Hydrocarbon Signatures Paragraph Whole Section.

This section of the report includes the results from the first forensic study. Prior to this study a forensic analysis was conducted on samples of pure asphalt, sediment mixed with asphalt and pure sediment with no asphalt. The results of this study must be included in the report and discussed in this section.

Evaluation of Draft Final Document

The Navy stated that the specific report described in this comment is unclear. The ecological risk assessment report references a study by Battelle from 1994, which was largely rejected by the regulatory parties due to the use of composted samples. The findings of the 2002 forensic report conducted by Battelle are confirmed and refined somewhat in the 2005 forensic report by Newfields Inc.

The information in question was produced by Tetra Tech.

34. Section 4.2, Petrogenic and Pyrogenic PAH Patterns Paragraph 2,

The report is a public document, therefore please include a table delineates which PAHs are petrogenic, pyrogenic or both.

Evaluation of Response

The Navy has stated that specific PAHs are not assigned in a simplistic manner. Rather the specific mixtures of PAHs and relative concentrations are indicative of pyrogenic or petrogenic origins. A new section will be added to the report, Attachment H, which is an overview of the process followed for the work conducted, and will address this comment.

Attachment H does not contain tables with the specific mixtures or relative concentrations labeled as requested.

**35. Section 4.2, Petrogenic and Pyrogenic PAH Patterns
Paragraph 2,**

This section of the report makes statements concerning the relative abundance of alkylated and parent PAHs in petrogenic and pyrogenic samples. In support of this position, the report must include a series of chromatograms and tables depicting the typical distribution of these compounds from these sources. Be advised that the concentrations must also be included.

Evaluation of Draft Final Document

Pictorial, but not the actual chromatograms nor the tables or concentrations has been included.

**37. Section 4.2, Petrogenic and Pyrogenic PAH Patterns
Paragraph 2.**

Please include a table with the concentration of the individual PAHs observed in the site, reference sediment samples soil samples and the various reference samples, (petrogenic and pyrogenic, i.e. crude oils, diesels, asphalt, combusted crude oil diesel, etc). The table should also highlight which PAHs are believed to be indicative of a particular PAH source in each sample, i.e. if sediment contains petrogenic diesel PAHs this should be highlighted, if it contain pyrogenic PAHs this should be highlighted. Since the report is a public document, and to aid in the table interpretation, it is recommended that the highlighted PAHs be colored coded.

Evaluation of Draft Final Document

See Comment 32.

**41 Section 4.2, Petrogenic and Pyrogenic PAH Patterns
Paragraph 2.**

The report notes that the concentrations of PAHs observed in the background stations is four to five times lower than that observed in the lowest PAH concentration site sample. A number of the samples were taken a considerable distance from the storm drains. Therefore, one would have expected to see concentrations equal to background. This is not the case. Therefore it is not appropriate to imply that observed PAH concentrations are background. Please remove these statements from the report.

Evaluation of Draft Final Document

The Navy has stated that the depositional nature of Coaster Harbor is responsible for the increase concentrations of PAHs compared to background stations. In support of this position the Navy should have included a map depicting percent sand and organic material from the various stations.

**42. Section 4.2, Petrogenic and Pyrogenic PAH Patterns
Paragraph 4.**

This paragraph states that the high concentration of PAHs observed in the debris sample of asphalt provides credence for the position that abraded asphalt found in urban runoff is responsible for the high concentrations observed at the outfalls as opposed to the reference station, which has less urban traffic and less abraded asphalt. This theory is based upon speculation from sampling asphalt. A true test of this position would have involved testing of samples with and without asphalt. This was done in the past. The result was the theory that asphalt is the source of PAHs in the sediments was found not to be valid in an earlier forensics study performed at the site. In this study samples of asphalt, and samples of sediment mixed with asphalt and samples of sediment with no asphalt were analyzed. The lowest concentrations and the lowest number of PAHs was observed in the asphalt samples and samples of sediment mixed with asphalt. The highest concentration of and greatest number of PAHs were observed in the samples without asphalt. The report must include the results of this earlier study and remove all statements indicating that asphalt is the source of PAHs at the site.

Evaluation of Draft Final Document

The Navy has noted that the conclusions were gathered from the evaluation of the samples of asphalt itself, and they stand based on the data shown. It should be apparent that the Jamestown shoreline carries less automobile traffic than the Newport shoreline. The comment appears to further discuss the findings of a study by Battelle in 1994 (although without reference, so this is uncertain), which was largely rejected by the regulatory parties at that time (please refer to the response to comment 33 above).

The Navy failed to address the apparent discrepancies between the two studies.

**43. Section 4.2, Petrogenic and Pyrogenic PAH Patterns.
Paragraph 4.**

This paragraph states that changes in land use over the past three years is responsible for the observed decrease in PAHs from the storm drains between the two sampling events. Please be advised that vehicle use increased at the site as a portion of Katy field was used as a parking lot starting in 2002. As such one would have expected to see an increase in PAHs, and not a decrease. Therefore, this statement should be removed from the report. Further, if urban runoff was the source of contamination, increased traffic use at Katy Field should have resulted in an increase in the concentrations of PAHs. As this was not the case, it brings into question the theory that urban runoff is responsible for the observed PAH distribution. Please note this in the report.

Evaluation of Draft Final Document

The Navy has noted that there have been many changes to the traffic patterns over the course of the period of 2002 through 2005. The installation of the overflow parking (gravel and stone) on the south end of Katy field in 2003 is actually a minor one because that lot has no storm drain connection. When this parking area was installed, a geofabric was laid down underneath which

should have captured any abraded asphalt released. The most likely local influence of abraded asphalt to the storm drains would have been during demolition and construction of the parking areas around the former brig and current SWOS buildings, south of OFFTA. Finally, the decrease is clearly a result of the vortex interceptor system installed in line with the outfall 093, which will be clarified in the revised report.

It appears that the storm drain located in Katy field does discharge to the bay. In regards to the Vortex separator that would have only served the storm drain on the western end of the site.

**44. Section 4.2, Petrogenic and Pyrogenic PAH Patterns
Paragraph 4.**

This paragraph references a series of bar graphs (figures 4a-j). The y-axis on the histograms is not labeled. Please provide a label and an appropriate index for the y-axis.

Evaluation of Draft Final Document

In the response the Navy has indicated that the y-axis reflects concentration. Please modify the report to reflect this and include the index (range in concentration).

**45. Section 4.2, Petrogenic and Pyrogenic PAH Patterns
Paragraph 7.**

The report notes that the petrogenic distribution of kerosene, diesel and crude oil when compared to the pyrogenic dominated composition of the site samples is proof of the source of contamination. As noted in the above comments, this comparison and conclusion is flawed for the following reasons: 1) Only a limited number of fuels were used in the comparisons, while a wider variety of fuels would have been used at the site. As an illustration, Navy Special would have been used since it was the major fuel used for all surface ships. 2. All of these fuels would have been exposed to heat and fire, thus these fuels would have generated signatures corresponding to heat exposure and combustion (pyrogenic signatures). 3. This mixture of unburnt fuels and burnt fuels would have been exposed to physical, chemical and biological decomposition. 4. The study failed to produce chromatograms for the above and therefore did not perform any comparison. Therefore, by limiting the comparison to a few fuels and not considering the above, meaningful conclusions cannot be drawn. Therefore, please remove the conclusions presented in this section of the report.

Evaluation of Draft Final Document

See evaluation of previous comments.

**47 Section 4.2, Petrogenic and Pyrogenic PAH Patterns
Foot note**

This section of the report notes that the data is log transformed to account for variability in PAH concentrations between samples and the concentrations of between analytes. This approach would negate the importance of an analyte which was found in high concentrations while at the same time increase the importance of an analyte, which was found at low concentration or at trace levels,

thereby generating erroneous conclusions. In order to avoid this problem, concentrations must be considered and log transformations should not be carried out.

Evaluation of Draft Final Document

Please refer to the response to Comment 41, above.

48 Section 4.3, Fugitive Petroleum and Plant Waxes, Whole Section

In this section the origins of the observed contaminant distribution in the various sediment samples were assigned to different sources (diesel, asphalt, plant waxes). However justification for the claims made in this section was not provided. That is, if the report claims that a particular chromatogram represents diesel, which has evaporated as opposed to biodegraded, in support of this position, chromatograms of evaporated and biodegraded diesel samples must be provided.

Evaluation of Draft Final Document

The information in Appendix H is incomplete and has not addressed all fuels.

50. Section 4.3, Fugitive Petroleum and Plant Waxes, Whole Section

The Navy has interpreted the saturated hydrocarbon fingerprint from the various samples collected at the site and included the following: Sample 75 is composed of plant wax, middle and heavy end petroleum distillate is not present, diesel is not present, and the plant wax contribution was so high that it masked any contribution from asphalt. The report states that chromatogram interpretation corresponds to field conditions as 75 have more plant material than the other catch basins. Sample 93 contains diesel and heavy end petroleum products, and plant waxes are not present. Again the report notes that the chromatogram interpretation corresponds to field observations, i.e. little vegetation next to 93 compared to 75. Finally 75a contains diesel, and asphalt with lower levels of plant waxes, again reflecting conditions observed in the field.

The actual site conditions bring into question the interpretations of the chromatograms in this report. Sample 75, which is composed of plant waxes with no asphalt or diesel, is located in the middle of a large asphalt parking lot. As such, it should have the highest concentration of asphalt and or diesel. Conversely sample 93, which has diesel and high-end petroleum, with no plant waxes and no asphalt PAHs identified in the chromatogram, abuts a grass field and a road. Therefore, it should have had both asphalt and plant waxes, the later at concentrations far greater than sample 75. Finally, 75a is completely surround by grass, it is in the middle of Katy field. Accordingly, it should have had the highest concentration of plant waxes, and the lowest concentration of asphalt.

The fact that the assigned PAH distribution for the chromatograms does not correspond to site conditions brings into question the interpretation of the chromatograms and the process by which peaks are assigned to different potential sources. The chromatograms must be examined again using different protocols or procedures than that employed during this analysis.

Evaluation of Draft Final Document

The Navy has indicated that recent conditions in 2005 has later the PAH distribution in these storm drains such that they no longer reflect historic conditions, but merely the most recent conditions. If this were the case it would seem to contradict statements made by the Navy elsewhere in the Navy indicating that the drains reflect historic conditions.

52 Section 4.4, Genetic Origins of Heavy Hydrocarbons, Paragraph 3

This section of the report states that the two storm drains exhibit different genetic markers due to differences in the type of petroleum asphalt. The storm drains are in relatively close proximity to each other and service essentially the same area. If asphalt was the source of the PAH distribution, the chromatograms should have been the same. The fact that there are differences suggests another source other than asphalt. Please modify the report to reflect this potential for another source.

Evaluation of Draft Final Document

The report correctly cites possibilities of different asphalt materials in different areas laid at different times. The conclusions are made based on a preponderance of evidence described and they will not be revised unless new data shows different findings.

In order for the Navy's position to be correct the storm drains would have to have a substantial reservoir of sediment contaminated with {PAHs from the various types of parking lots built on the base). If this were not the case the sediments in the drains would only reflect the current parking lot conditions. To address this issue please test the existing parking lot.