



RHODE ISLAND
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

235 Promenade Street, Providence, RI 02908-5767

TDD 401-222-4462

November 30, 2005

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: Draft 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 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. These concerns were never addressed by the Navy. 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 its 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.

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



**Comments on
Appendix E
Draft Sediment and Groundwater Monitoring Report,
Old Fire Fighter Training Area**

**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.

**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.

**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.

**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.

**5. Technical Approach,
Paragraph 1.**

There are sanitary sewer lines which crossed the site. These lines would serve as preferential flow paths for contaminants in the groundwater. The report must include a discussion of these lines and depict their location on a map.

**6. Technical Approach,
Paragraph 1.**

Please include in an appendix a copy of the field notebooks used when the samples were collected.

**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.

**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.

**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?

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

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

**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 well as partially combusted and/or heated oils. Therefore, the forensic analysis would have to evaluate partially combusted and/or heated oils and waste oils.

**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 it was not necessary to resample onsite soils.

**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.

**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.

**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.

**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.

**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.

**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, 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.

**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

**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.

**21. Section 4.1, Dominant Hydrocarbon Signatures.
Paragraph 3.**

This paragraph states that the PAHs observed in the samples were associated with abraded asphalt from the parking lot. As this is a public document, please explain what is meant by abraded asphalt, that is, were pieces of asphalt found in the sample, etc..

**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.

**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 range the other does not. Please explain.

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

The chromatograms for the asphalt samples have considerable differences. In essence the Navy is suggesting that the chromatograms of asphalt can be vastly different. This complicates the investigation and is important as it has obvious implications when comparing chromatograms. To insure that the observed differences reflect different composition of asphalt, (as opposed to field, lab

error, contaminants on asphalt, etc) and to ascertain whether other chromatographic fingerprints of asphalt are not possible, it is recommended that additional samples of asphalt be collected and analyzed.

**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.

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

PAHs were found in the sediments adjacent to the site. It is the Navy's position that the observed PAHs are from asphalt. Please state whether the contaminants found in these sediments represent PAHs, which leached from the asphalt or actual pieces of asphalt in the sediment samples.

**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.

**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.

**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.

**30. Section 4.1, Dominant Hydrocarbon Signatures.,
Paragraph 3.**

This section states that the chromatograms of the three catch basin samples contains middle distillate and soot or weathered tar byproducts. Justification for this statement must be included in the report. This justification must include chromatograms of soot or tar products, heavily weathered middle distillate, etc. The report must also clearly state how the observed distribution can be attributed to these sources as opposed to other petroleum products, including weathered products..

**31. Section 4.1, Dominant Hydrocarbon Signatures.,
Paragraph Whole Section.**

This section of the report attributes the PAH distribution in the sediments to asphalt, and roofing tar. The report is a public document, therefore it should clearly state whether the observed PAH distribution represents PAHs that have leached from asphalt, roofing tar, etc or reflects pieces of asphalt or roofing tar in the sediments.

**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.

**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.

**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.

**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.

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

This section of the report states that the presence of a particular compound is more important than the concentration of the compound due to interferences associated with phthalates, halogenated compounds and subtle chromatographic changes (peak widening) that can occur in a GC fingerprint. These statements are not applicable to this site. Halogenated organics were not disposed of at this site. In regards to phthalates the same equipment would have been used to collect all of the samples so phthalate contamination would have been consistent and further it would have been noted in the QA/QC process. If a chemist believes that a peak width is hiding critical components for PAH analysis, the solution is not to assume that this is occurring and therefore totally disregard concentrations. If this is important the solution is to run the sample again in such a manner as to achieve better separation and thus eliminate the effects of peak width widening. In consideration of the above the statement that PAH concentration can be discounted and the focus can be restricted to PAH distribution is not supported on this site. Doing so would bias any analysis. Therefore this portion of the forensic analysis must consider PAH concentration.

**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 contains 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.

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

This section of the report states that specific types of decaying vegetation contain certain PAHs. Please list these specific types of vegetation and note whether they were found at OFFTA.

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

This section of the report states that decaying vegetation contains certain PAHs, such as, perylene. Perylene is commonly found in diesel and # 2 fuel oil. Please explain how the presence of perylene can be attributed to decaying vegetation and not due to the presence of diesel or fuel oil.

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

This section of the report discussed the sum of EPA PAHs observed in site sediments and the parking lot sediments. In order for the report not to be biased the concentration of EPA PAHs observed in site soil samples must be included.

**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 that 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.

**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.

**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.

**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 are not labeled. Please provide a label and an appropriate index for the y-axis.

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

This paragraph notes that certain PAHs are associated with soot, while others are associated with asphalt, or diesel, etc. It is known that fuels contain a wide range of PAHs. Therefore, the report must explain why a PAH which may be found in several different fuels, can be assigned to a specific fuel or source.

**46. 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 both 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.

**47. Section 4.2, Petrogenic and Pyrogenic PAH Patterns.,
Paragraph 8/9**

The section deals with PCA. The report must include a detailed discussion of PCA and how it was applied to the site. Further, in the main body of the test the report should provide an example of how PCA was applied to one sample. In an appendix the PCA applications details must be provided for each sample. Without this information it is not possible to determine whether PCA was applied correctly to the site samples.

**48. 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..

**49. 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 .

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

The report states that all of the sediment samples are similar to SD 5. A review of the chromatograms indicates that this is not the case (some chromatograms have pronounced UCM, others do not, peak distribution and intensities are different, etc.) As there are considerable differences in the chromatograms, please remove these statements indicating that the chromatograms are similar and provide a more detailed explanation on why there are differences.

**51. 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 has 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 laer 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.

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

This section of the report notes that the genetic fingerprint indicates that there is contamination associated with heavy petroleum in the storm drain, yet this contamination is not observed in the sediment samples at the discharge point of the drain. Please explain why heavy petroleum contamination is observed in a drain, but is not observed at the outfall.

**53. 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.

54. Reference Section.

The last two references refer to an article from Environmental Science and Technology (which could not be retrieved from the web) and a study conducted at the Norfolk Navy shipyard. Please provide a copy of these reports to the State.