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IN REPLY REFER TO

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AUG 22 2000

U.S. Environmental Protection Agency
Region II
Attn: Ms. Nicoletta DiForte
Chief, RCRA Caribbean Section
290 Broadway - 22nd Floor
New York, New York 10007-1866

SUBJECT: U.S. NAVAL STATION ROOSEVELT ROADS, PUERTO RICO
RCRA CORRECTIVE ACTION PROGRAM
RCRA/HSWA PERMIT NO. PR2170027203
RESPONSE TO EPA COMMENT LETTER DATED JULY 5, 2000 ON
DRAFT HUMAN HEALTH RISK ASSESSMENT FOR SWMU 14 AND
DRAFT CMS FINAL REPORT FOR SWMU 6/AOC B

Dear Ms. DiForte:

The Navy is providing your office with an enclosure that responds to your comments submitted in a letter dated July 5, 2000 (received in our office on July 10, 2000) regarding the Draft Human Health Risk Assessment for SWMU 14 and the Draft CMS Final Report for SWMU 6/AOC B. The EPA comment letter raises several administrative and technical issues requiring resolution prior to commencing with the RCRA process at these SWMUs. The enclosed response provides a detailed, point by point discussion of each EPA comment and the Navy's proposed resolution.

The Navy requests EPA review the Navy response enclosure, which includes proposed resolution to each EPA comment, and reach concurrence with the Navy on the appropriate actions prior to establishing an implementation schedule as stated in your letter. This approach will minimize the likelihood of revisions and expedite agreeable restitution to the issues presented in the EPA comment letter.

The EPA comment letter implies that the Navy is deficient in its characterization of SWMU 14. The Navy is a sound environmental steward and has acted in good faith in its management of the SWMU 14 and SWMU 6/AOC B investigations. The work performed at SWMUs 6/AOC B and SWMU 14 was completed

Quality Performance ... Quality Results

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following EPA approved Work Plans. The Navy voluntarily developed the HHRA for SWMU 14 following the identification of an error in the presentation of the SWMU 14 analytical data. However, all the analytical data for SWMU 14 was accurately reported in Appendix D of the Draft RFI for Phase I Investigations at Operable Units (OU) 1, 6, and 7 and was subject to EPA review. Following review of this document by your office, only one minor comment was identified. The Navy promptly responded to this comment in the Draft RFI Report Addendum (January 20, 1997). It was only during the development of the No Further Action Plan documentation for SWMU 14 that the Navy identified the discrepancy and brought it to the attention of EPA.

The Navy recommends not performing any additional activities at SWMU 14 at this time. Details on this recommendation are provided in the enclosed response to comments. Briefly stated, the fire-training pit is still in operation, and the HHRA for SWMU 14 did not identify risks to the current commercial/utility worker in excess of the EPA acceptable range of 10^{-4} to 10^{-6} . The Navy's recommendation will not place potential receptors in a compromising situation, and it will provide the Navy with the opportunity to more fully evaluate this SWMU at the completion of its lifecycle.

The EPA comment letter also includes an unusual discussion concerning the evaluation of cumulative exposure by a given receptor population to all or multiple contaminated SWMUs and AOCs throughout NSRR. This is the first time the Navy has ever received such a comment and the EPA's recommended approach is not recognized as a standard industry practice for evaluating risk. The Navy requests that the EPA provide the precedence for, guidance for implementing, and the scientific rationale for the suggested approach as well as an explanation as to how this approach is envisioned to be incorporated into the overall RFI/CMS process under the current RCRA/HSWA permit for Roosevelt Roads.

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DRAFT HUMAN HEALTH RISK ASSESSMENT FOR SWMU 14 AND
DRAFT CMS FINAL REPORT FOR SWMU 6/AOC B

Please do not hesitate to call me at (757) 322-4815 if you have any questions or desire further clarification of any of the points discussed in the enclosure.

Sincerely,



CHRISTOPHER T. PENNY, REM
Navy Technical Representative
Installation Restoration Section
(South)
Environmental Programs Branch
Environmental Division
By direction of the Commander

Enclosure

Copy to:

EPA Region II (Mr. Tim Gordon)
US EPA Caribbean Office (Mr. Carl Soderberg)
Booz Allen & Hamilton (Ms. Constance Crossley)
NAVSTA Roosevelt Roads (Ms. Madeline Rivera)
PREQB (Mr. Jose J. Lajara)
Baker Environmental, Inc. (Mr. Mark E. Kimes, P.E.)
CH2M Hill Virginia Beach (Mr. John Tomik)

**NAVY RESPONSES TO
EPA COMMENT LETTER DATED JULY 5, 2000
DRAFT HUMAN HEALTH RISK ASSESSMENT FOR SWMU 14 (2/4/00)
DRAFT CMS FINAL REPORT FOR SWMU 6/AOC B (5/30/00)**

EPA COMMENT

Draft Human Health Risk Assessment for SWMU #14

EPA has completed its review of the Draft Human Health Risk Assessment (HHRA) for SWMU #14, submitted by letter dated January 28, 2000. Based on that review and a review by our contractor, Booz Allen & Hamilton, EPA finds that while the HHRA evaluation for exposure to surface soils is generally adequate, deficiencies in site characterization preclude a full evaluation of all potential risks, as discussed in the enclosed Booz Allen Technical Review, dated June 23, 2000. Those deficiencies in site characterization were never previously noted because of factual misstatements [as well as inappropriate recommendations] regarding SWMU #14 in the July 1996 Phase I RFI Report for Operable Units 1, 6, and 7. With the submission of this HHRA you have now advised us of such misstatements; yet the deficiencies in site assessment now apparent, preclude a complete evaluation of all potential risks. Accordingly, EPA does not fully approve the HHRA and the recommendation, given in Section 3.0 [as well as in the July 1996 Phase I RFI Report for Operable Units 1, 6, and 7] that no further action is required for SWMU # 14.

NAVY RESPONSE

It should be noted that all of the site characterization work performed in the Spring of 1996 was performed in accordance with the EPA approved RFI Work Plans. The EPA review of the July 1996 Phase I RFI Report for Operable Units 1, 6, and 7 did not identify the discrepancy in the data from the nature and extent tables and Appendix D.

EPA COMMENT

The deficiencies in site characterization result from the fact that, as discussed in the enclosed Booz Allen Technical Review, possible impacts to groundwater have not been investigated, despite the detection of poly-aromatic hydrocarbon (PAH) constituents in surface soil samples at levels exceeding EPA's generic "soil screening levels"(SSLs) for possible groundwater impacts. For example, benzo(a)anthracene was detected at 3,400 ug/kg, while EPA's generic SSL is 2000 ug/kg based on a dilution attenuation factor (DAF) of 20 [at a DAF of 1 the SSL is 80 ug/kg], and benzo(b)fluoranthene was detected at 7,600 ug/kg, while the SSL based on a DAF of 20 is 5000 ug/kg [at a DAF of 1 the SSL is 200 ug/kg]. Furthermore, because an older unlined fire training pit, reportedly used from the early 1960s through 1983, apparently underlays the present concrete structure, which was constructed in 1983, possible impacts to soils underlying the present concrete structure, have never been determined. The only site investigation work at this SWMU was sampling of the surface soils outside of the present concrete structure and associated concrete apron. Based on statements in the July 1996 Phase I RFI Report for Operable Units 1, 6, and 7 [see Section 5.2.5 (page 5-18) and Section 7.1.5 (pages 7- 5)], EPA accepted the recommendation in the Phase I RFI Report that, because no evidence of releases was found in surface soil samples (which was erroneous), further investigation at SWMU #14 was not warranted [see Section 7.1.5, pages 7- 6].

NAVY RESPONSE

The site characterization did not address groundwater at SWMU 14 as it was not requested in the EPA approved RFI Work Plans nor the NSRR Final Permit. The permit states that groundwater investigations will be contingent on the soil sampling results. Therefore, the use of the phrase that

the site characterization is deficient is inappropriate for this phase of the site characterization since it was performed in accordance of the Final Permit and EPA approved RFI Work Plans.

EPA COMMENT

In light of the above, EPA requests the Navy to either submit either:

- a) a supplemental site characterization workplan to investigate subsurface soils underneath the present concrete structure and groundwater that may have been impacted by releases from either the existing concrete-lined structure, as well as the prior unlined fire training pit; or
- b) a revised HHRA [and a streamlined Corrective Measures Study (CMS) report, as discussed below] addressing the comments in the enclosed Technical Review as well as those below.

If the Navy submits a revised HHRA rather than a supplemental site characterization workplan, EPA requests that the following be addressed, in addition to comments in the enclosed Technical Review:

1. Groundwater concentrations for those PAHs detected in surface soil samples at levels exceeding their generic SSLs should be extrapolated utilizing those surface soil concentrations divided by a dilution attenuation factor of 10. [Usage of the DAF of 10 is recommended to be conservative in assessing potential risk, and is reasonable since groundwater is expected to be relatively shallow based on the depth to groundwater in the nearest background well installed along the perimeter road west of this SWMU.] Potential human health risks from groundwater exposures should then be evaluated utilizing those extrapolated groundwater concentrations. This evaluation should include both current usage scenarios and possible future residential usage scenarios. However, as groundwater is not utilized as a drinking water source, that exposure scenario does not need to be evaluated, but the HHRA must explain why it is not.
2. If the Navy chooses to submit a revised HHRA, in lieu of a supplemental site characterization workplan, that HHRA and the conclusions thereof, would, in effect, be predicated on the maintenance of the present concrete fire training pit and associated apron as an engineering control to prevent exposure to the [uncharacterized] soils beneath. Based on the previous operation of an unlined fire training pit at that location, soils beneath the existing concrete fire training pit and associated concrete apron are likely to contain PAHs, and possibly other hazardous constituents, at concentration levels greater than those evaluated in the HHRA. If such is the case, without the presence of the existing concrete fire training pit and associated apron those soils may pose unacceptable risks.
3. Therefore, if the site remains not adequately characterized, EPA cannot approve an HHRA recommending an unrestricted no further action status, without the final determination also including a proposal for an institutional control, which would require maintenance of the concrete fire training pit and associated apron as an engineering control, and/or a requirement that both surface and subsurface soils underlying the present concrete fire training pit and associated apron would be adequately characterized when those structures are removed, and if found to pose unacceptable risks, those soils would be acceptably remediated at that point. The proposal for such a remedy should be described in a streamlined CMS Final Report.

Accordingly, within 60 days of your receipt of this letter, please submit for SW MU #14 either:

- a) a draft CMS report, which proposes institutional controls as discussed above, and a revised HHRA reflecting the above comments, along with those in the enclosed Technical Review, or

- b) a supplemental site characterization workplan to adequately characterize all media (including soils underlying the present concrete fire training pit and associated apron, as well as groundwater) that may have been impacted by releases from either the present structure at SWMU #14, or the previous fire training pit at that same location.

Of course, a revised HHRA incorporating the results of the supplemental site characterization, and possibly also a CMS, would still likely be required following implementation of the supplemental site characterization.

NAVY RESPONSE

The Navy feels the most appropriate way of dealing with this SWMU would be to wait until the fire training pit is no longer utilized. This way the site can be appropriately characterized as discussed in the following responses. To continue on with the RFI process at this stage would not be in the best interest of the federal governments funds. This is supported by the Draft HHRA for SWMU 14. This HHRA did not identify any risks outside the EPA acceptable 10^{-4} to 10^{-6} range. The following responses also assist in supporting this decision.

EPA COMMENT

In addition, within 60 days of your receipt of this letter, please submit an appendix to the July 1996 Phase I RFI Report for Operable Units 1, 6, and 7, noting and/or revising all factual misstatements and/or inappropriate recommendations regarding SWMU #14, especially in Section 5.2.5 (page 5-18) and Section 7.1.5 (pages 7- 5 and 7-6).

NAVY RESPONSE

The Navy recommends to update the Draft RFI for OU 1, 6, and 7 in accordance with the long list of comments and responses since the development of this document. As indicated in the EPA Comment Letter dated November 14, 1997 there have been so many different pieces of this document developed in the past that it is very hard to determine the status on each and every site covered in OU 1, 6, and 7. Therefore, it would be in everyone's best interest to pull all of this information together and provide a Draft Final RFI Report within 120 days of approval of this response to comments. It would be in this document that the corrections will be made to the RFI for SWMU 14 as requested.

EPA COMMENT

Revised Corrective Measures Study(CMS) Final Report for SWMU #6 / AOC B

The revised CMS Final Report dated May 30, 2000 was submitted to address EPA's comments given in my letter of March 15, 2000. SWMU #6 consists of an abandoned, partially subterranean concrete bunker that was formerly used for storage of waste paints and other liquid wastes. AOC B consists of the adjoining, open-air, bricked floor of demolished building 25, and was formerly used for storage of waste oils and other wastes.

Based on our review of the revised CMS Final Report, including a Human Health Risk Assessment (HHRA), EPA cannot fully approve it. EPA has several concerns with the results of the HHRA discussed in Section 3.0 of the CMS Report, and the conclusions and recommendation, given in Sections 3.3.2, 3.4, and 4.0 of the CMS Report, that there are no unacceptable risks to human health and that no further action is required. EPA has the following comments on the HHRA and CMS Report, and the recommendation that no further action is required:

1. Since the calculated total hazard index (HI) for young children under a possible future military residential usage is 1.4, a possible unacceptable threat is indicated. However, in Section 3.3.2 of the CMS Report, it is stated that "...these two COPCs [arsenic and 4,4'-DDT] target different organs of the human body. Therefore, it can be concluded that no unacceptable adverse human health effects would result for the future residential child...". While segregation of hazard indices by effect is allowed, EPA's "Risk Assessment Guidance for Superfund" ("RAGS"), December 1989, states in Section 8.2.2 (Aggregate Risks for Multiple Substances), page 8-14, that "Segregation of hazard indices ...is complex ...because it is necessary to identify all of the major effects and target organs for each chemical" and that "If the segregation is not carefully done, an underestimate of true hazard could result." This is particularly significant in that all of the indicated risk to young children under future residential usage results from exposure to a single medium, surface soils. The submitted HHRA does not adequately document that segregation is appropriate in this case. Therefore, the HHRA must either more fully document that segregation of hazard indices for possible future exposure of young children to surface soils is acceptable, or the statement in the CMS (on page 3-7) that "...it can be concluded that no unacceptable adverse human health effects would result for the future residential child...", must be deleted. In addition, should segregation of hazard indices for young child exposure to surface soils not be warranted, the CMS must be revised to include proposals for institutional (land usage restriction or other requirements discussed below) and/or engineering (such as fencing or capping) controls, in the absence of actual remediation of those surface soils.

NAVY RESPONSE

Initial investigation indicates that arsenic and 4,4'-DDT have two different target organs with different critical effects when considering noncarcinogenic health effects. Based on information obtained from IRIS (USEPA, 2000), arsenic targets the skin with a primary critical effect of hyperpigmentation, while 4,4'-DDT targets the liver with a primary critical effect of liver lesions. Further research will be conducted to verify this initial information. The Navy plans to pave this area with asphalt. This cover would constitute an engineering control that would eliminate the surface soil exposure pathway. Should the target organ analysis of arsenic and 4,4'-DDT show that there is no risk to the future military child resident, then an institutional control would not be required. However, if the research does not support segregation of the surface soil HI for the future military child resident, an institutional control will be proposed.

EPA COMMENT

2. There is no explanation of why exposure to contaminated pooled [surface] waters inside SWMU #6 was not evaluated under a possible future military residential usage scenario for either adults or young children; yet that exposure route was evaluated for current on-site commercial/utility workers. The HHRA must be revised to evaluate that exposure under future military residential usage, unless institutional controls [such as a requirement that building 145 (i.e., the bunker) and the surrounding contaminated soils, as well as any contaminated pooled (surface) water that may have accumulated inside the bunker, be removed prior to any future military residences being constructed nearby], and/or engineering controls (such as fencing and/or sealing of the roof openings) are proposed as part of the CMS recommended remedy.

NAVY RESPONSE

Future military residents were evaluated for exposure to pooled surface water under an incidental contact scenario and no carcinogenic risks or noncarcinogenic adverse health effects were calculated that exceeded USEPA's acceptable levels (see below).

Potential Exposure to Pooled Surface Water		
Receptor	ILCR	HI
Future Military Adult	1.3×10^{-06}	0.01
Future Military Child	3.3×10^{-06}	0.1

Furthermore, the Navy plans on removing the pooled surface water and demolishing the bunker. This will eliminate this media all together from the risk assessment.

EPA COMMENT

- There is no explanation of why construction workers were evaluated only for exposure to subsurface soils, while exposures to contaminated surface soils, pooled [surface] waters inside SWMU #6, and contaminated groundwater [which could accumulate if a construction excavation intersect the water table] were not evaluated. The HHRA must be revised to evaluate those exposures for construction workers.

NAVY RESPONSE

Evaluation of construction worker exposure was limited to subsurface soil because potential exposure to subsurface soil is much more significant to the construction worker than surface soil exposure. During excavation activities, it is estimated that 90% of the exposure would come from the subsurface soil, while only 10% would come from surface soil. Surface soil samples are collected from 0 to 6 inches, while subsurface soil samples are collected from 6 inches to 10+ feet. The text in the document will be modified to explain this scenario very clearly. This approach is consistent with what was recently approved in the RFI and CMS for SWMU 13, 46/AOC C.

The Navy evaluated the construction worker scenario for the pooled surface water and total groundwater. As seen in the following table only the HI for the total groundwater is driving a risk. This is from vanadium which contributes 1.7 to the HI. Evaluating the construction worker to groundwater is not a truly valid scenario. The groundwater at the site is approximately 9 to 10 feet below ground surface. This depth is greater then what would be encountered for normal construction activities at that area of the base. Utilities are normally located in the top few feet below ground surface, and all of the buildings are constructed on slabs, there are no basements.

Potential Exposures for Construction Worker			
Receptor	Scenario	ILCR	HI
Construction Worker	Pooled Surface Water	8.3×10^{-07}	0.06
Construction Worker	Groundwater (total)	5.7×10^{-08}	1.8

The text in the CMS will be modified to clearly explain how the groundwater is not a truly valid scenario for this site.

EPA COMMENT

- In Section 3.2.2 (Identification of COPCs [constituents of potential concern]), it is stated that detected constituents in the single pooled [surface] water sample collected inside the bunker

structure at SWMU #6 were compared to EPA Region 3 tap water risk based concentrations (RBCs) "because human health comparison criteria do not exist for surface water." Yet the constituents lead and mercury, which were both detected at concentrations over ten times their respective maximum contaminant levels (MCLs) [refer to National Primary Drinking Water Regulations (NPDWRs)], were not retained as COPCs and evaluated in the HHRA because it is indicated that tap water RBCs are "not established" [refer to Table 2-10] for those two constituents. That is inappropriate. Lead was detected at 735 ug/l. compared to its MCL of 50 ug/l [under the NPDWRs, there is now "Treatment Technique" Action Level for lead of 15 ug/l], and mercury was detected at 22 ug/l, compared to its MCL of 2 ug/l. Even though MCLs were promulgated as drinking water standards, they are relevant health based concentrations, and their usage as RCRA corrective action standards in non-drinking water situations is long-standing based on EPA guidance. Since accidental ingestion of the pooled [surface] water is a reasonable exposure route, and was evaluated in the HHRA for onsite commercial/utility worker exposure, lead and mercury must be retained as COPCs in the evaluation of pooled [surface] water risks, under all possible usage scenarios, both that previously evaluated (on-site commercial/utility worker), plus those additional usages discussed above (construction worker and possible future military residents).

NAVY RESPONSE

The comment incorrectly refers to MCLs as health based concentrations. They are not appropriate for use as comparison criteria for the selection of COPCs. Furthermore, the MCL of 50 µg/L for lead has been withdrawn. Lead and mercury concentrations detected in the pooled surface water will not be evaluated in this CMS as toxicity criteria currently does not exist with which to evaluate them. Also, the IEUBK model cannot be used to evaluate lead detected in the pooled surface water because the model does not have input values for this medium. Furthermore, the Navy plans on demolishing the bunker which eliminates this media.

EPA COMMENT

Within 45 days of your receipt of this letter, please submit a revised CMS Final Report for SWMU #6/AOC B, including a revised HHRA, addressing the above comments.

NAVY RESPONSE

The Navy requests to submit the Draft Final CMS Final Report within 45 days of resolving the comments for this document.

EPA COMMENT

General Comments Applicable to both Documents

In addition, the HHRAs for both SWMU #6/AOC B and SWMU #14, evaluated possible receptor exposures to contamination on a SWMU specific or local area specific (as with SWMU #6/AOC B) basis only, and did not evaluate the effect of cumulative exposure by a given receptor population to all [or multiple] contaminated SWMUs and AOCs at Roosevelt Roads. Therefore, if it is subsequently established that, due to an absence of acceptable institutional and/or engineering controls at unremediated contaminated SWMUs and AOCs, a given receptor population may be exposed to risks from multiple SWMUs and AOCs at the facility, those HHRAs may have to be revised to evaluate the effect of cumulative exposure to multiple SWMUs and AOCs at the facility.

NAVY RESPONSE

Site specific risk assessments are conducted at Naval Station Roosevelt Roads in accordance with the National Contingency Plan (NCP) (55 Fed. Reg. 8666 - 8865, March 8, 1990). Risk Assessments characterize the current and future potential threats to human health and the environment to provide managers with an understanding of actual risks posed by the site and an evaluation of the inherent uncertainties associated with the site specific risk assessment process.

Because site specific risk assessments are conducted at Naval Station Roosevelt Roads (as opposed to Station-wide assessments of risk) potential human health risks are estimated for lifetime exposures at the site in question. From a Station wide perspective, this is a worst-case scenario because it is the equivalent of assuming 100% exposure at each site. Under a Station-wide risk assessment, exposure frequency (days exposure per year) would be segregated to account for the amount of time a receptor could spend at each site/SWMU. Therefore, cumulative risks resulting from multiple site/SWMU exposure could not produce risks in excess of individual site risks derived using the site specific approach.

This methodology for conducting risk assessments is not recognized as a standard industry practice for evaluating risk. It is unconventional and highly unprotective of the receptor population at NSRR.

**BOOZ ALLEN & HAMILTON INC.
TECHNICAL REVIEW**

**JANUARY 4, 2000,
DRAFT HUMAN HEALTH RISK ASSESSMENT REPORT FOR
SWMU 14 - FIRE TRAINING PIT AREA**

**NAVAL STATION ROOSEVELT ROADS
CIEBA, PUERTO RICO**

JUNE 23, 2000 REPA2-0203-017

BAH COMMENT

1. The January 4, 2000, Draft Human Health Risk Assessment Report for SWMU 14 -Fire Training Pit Area (HHRA), does not consider exposures to contaminants in the drainage area (the ditch extending from the pit along the adjacent runway shoulder). As this area is considered part of SWMU 14 and receives runoff from SWMU 14, contamination in this area and the potential for exposure is similar to that of the fire training pit. Consequently, this area should have been included in the risk evaluation for SWMU 14. Naval Station Roosevelt Roads (NSRR) should provide rationale as to why the drainage area was not considered in the risk assessment.

NAVY RESPONSE

This comment should have been made during EPA review of the work plan, when concerns about additional analytical parameters could have been addressed in a timely manner. The absence of data important to EPA at the risk assessment stage will not only add time to the schedule for clean up, but will also increase the cost of the investigation beyond that of acquiring the data in question.

It was the intent of this risk assessment to evaluate the data that was omitted in the original version of the RFI not the sampling that was conducted in accordance with the EPA approved Project Plans for the Phase I RFI. This is a comment which should have been made during the EPAs review of the 1995 RFI Project Plans. This comment implies that the EPA review of the RFI Project Plans was incomplete and deficient. The rationale for not including the drainage area in the risk assessment is that neither the Navy nor the EPA felt it was necessary as indicated in the EPA approved Project Plans and the NSRR Final Permit.

BAH COMMENT

2. Soil samples obtained from SWMU 14 were analyzed for volatile organic compounds (VOCs), semi volatile organic compounds (SVOCs), poly chlorinated biphenyls (PCBs) and total petroleum hydrocarbons (TPH). Given the nature of the activities conducted at this SWMU, including the burning of multiple items (e.g., waste solvents, fuels, oils, wood, trash, plastics, etc.), the possibility exists that the formation of dioxins/furans occurred as a result of the combustion process. NSRR should clarify why the sampling parameters did not include dioxins/furans.

NAVY RESPONSE

This comment should have been made during EPA review of the work plan, when concerns about additional analytical parameters could have been addressed in a timely manner. The absence of data important to EPA at the risk assessment stage will not only add time to the schedule for clean up, but will also increase the cost of the investigation beyond that of acquiring the data in question.

The need to collect dioxin and dibenzofuran data was considered by the Navy. Dioxins and dibenzofurans can be formed by the incomplete combustion of organic material. The temperature of the burn and the type of material (i.e., amount of chlorine available in the fuel) seems to dictate the amount and types of dioxin/dibenzofuran congeners that are formed. For example, it is generally acknowledged that the burning of PCBs can produce 2,3,7,8 - tetrachlorodibenzodioxin (TCDD) and higher chlorinated dioxin/dibenzofuran congeners. But data concerning dioxin formation during PCB fires is somewhat equivocal because PCB mixtures may contain levels of dioxins and dibenzofurans as impurities before combustion. The production of dioxins by incomplete combustion of even the most favorable materials is possible but is far from a certainty.

Recent investigations performed by LANTDIV at the request of multiple EPA regions indicate that less toxic hexa-, hepta- and octa-chlorinated dibenzodioxins and dibenzofurans are commonly formed at open burning sites. Very low concentrations (sub part-per-billion levels) of the most toxic 2,3,7,8 chlorinated dioxin/dibenzofurans are detected at these sites, if they are detected at all. In most cases the 2,3,7,8 dioxin/dibenzofuran congeners are not detected using the high resolution analytical method. To date, concentrations of 2,3,7,8 TCDD/TCDF or TEQ values (concentrations considering the relative toxicity of higher chlorinated dioxins and dibenzofurans to the most toxic tetra chlorinated dioxin/dibenzofuran moieties) have not warranted any additional remedial action.

Although It is not possible to know if unacceptable levels of dioxins/dibenzofurans exist at SWMU 14, additional data for dioxins is not necessary to address the health impacts associated with the site.

BAH COMMENT

3. Potential contaminant migration from soil to groundwater in the area of SWMU 14 is not considered in the HHRA.. Review of the HHRA indicates that NSRR conducted surface soil (1-2 ft. below ground surface) sampling outside the concrete pad at SWMU 14. These soil samples reported several poly aromatic hydrocarbons (PAHs) concentrations above the EPA Region 3 risk-based criteria (RBC) for industrial soil. Based on these exceedences, a comparison of the detected PAH concentrations to EPA's Soil Screening Levels (dilution attenuation factor of 1) was conducted to assess the potential for PAHs to migrate from soil to groundwater. This comparison indicates that a majority of the PAHs detected at SWMU 14 exceed their respective Soil Screening Levels (SSLs). For example, benzo(a)anthracene was detected at 3,400 ug/kg; the SSL . is 80 ug/kg. In addition, benzo(b)fluoranthene was detected at 7,600 ug/kg; the SSL is 200 ug/kg. Despite the elevated detections in soil around the pad, there is no discussion regarding the potential migration of these contaminants to groundwater. In addition, the HHRA does not present any discussion regarding hydrogeology at the site, or the depth to groundwater at the site. NSRR should provide a discussion on the hydrogeology of the site and the potential for contaminant migration from soil to groundwater.

NAVY RESPONSE

The Navy is recommending to postpone any further action at this SWMU until after it use as a fire training pit is completed. At that time the Navy will reevaluate the data needs for this SWMU and implement the proper steps to meet the needs.

BAH COMMENT

4. The HHRA considers only current risk at the site. If, however, under future land use conditions, the concrete pad is removed and/or construction related activities occur, there is the potential for

exposure to subsurface soil or groundwater. Given the potential for future exposures to these environmental media, or if residential properties are constructed in the immediate area of SWMU 14, a revised risk assessment to include these exposure pathways may be necessary. The following are recommendations for addressing future risk at the SWMU:

NAVY RESPONSE

Agreed. That is why the Navy is recommending to evaluate this SWMU after it's use as a fire training pit is completed as discussed previously.

BAH COMMENT

- The HHRA evaluates risks using the existing concrete pad as an institutional control. As a result, no sampling or analysis was performed beneath this pad. Should the concrete pad be removed or breached, sampling and analysis of the soil and groundwater beneath the pad may be required. Furthermore, since only surface soil samples were collected at SWMU 14, subsurface soil and groundwater would need to be included as potential exposure media. This evaluation would also have to include the potential for contaminants to migrate from the soil beneath the concrete pad to groundwater, and potential risks due to exposure to groundwater in the area of SWMU 14.

NAVY RESPONSE

The statement that the concrete pad would be an institutional control is incorrect. The concrete pad would serve as an engineering control. The investigation conducted at SWMU 14 was done in accordance with what was requested in the NSRR Final Permit and the EPA approved RFI Project Plans. It is recommended that the requested items of this comment to be addressed at the end of the life of the fire training pit as discussed previously.

BAH COMMENT

- The HHRA does not consider the potential exposures of future military adult/child residents to SVOCs via indoor air inhalation. If future use of this area includes the potential for a residence to be constructed, exposure to the future military adult/child resident via inhalation of SVOCs into indoor air should be considered.

NAVY RESPONSE

USEPA 1989 RAGS A states, “ .. risk from indoor inhalation of volatiles is assumed to be relevant only for chemicals that easily volatilize. Thus, the risk equation incorporated a water-air concentration relationship that is applicable only to chemicals with a Henrys Law constant of greater than 1×10^{-5} atm-m³/mole and a molecular weight of less than 200 g/mole” .

Based on the information listed below, PAHs were not evaluated for inhalation of volatiles and will not be in the final HHRA.

	Henrys Law Constant	Molecular Weight
Benz(a)anthracene	3.35×10^{-6}	228
Benzo(b)fluoranthene	1.11×10^{-4}	252
Benzo(a)pyrene	1.13×10^{-6}	252
Dibenz(a,h)anthracene	1.47×10^{-8}	278
Indeno(1,2,3)pyrene	1.6×10^{-6}	239

BAH COMMENT

5. Review of the HHRA identified several errors and discrepancies. Although these discrepancies do not change the conclusions regarding risk at the site, any future risk assessments should consider the identified deficiencies. These errors include:
 - The HHRA does not provide toxicological profiles for each chemical of concern (COC). Standard Risk Assessment Protocol (USEPA Risk Assessment Guidance for Superfund, Part A, 1989) requires that toxicological profiles be provided within a risk assessment for the selected COCs, if available. This omission of toxicological profiles has no bearing on the calculated risks at the site. However, if conditions and/or uses of SWMU 14 change, and/or if a revised HHRA is needed, NSRR should include toxicological profiles for each COC in the revised risk assessment report.

NAVY RESPONSE

Toxicological Profiles are easily accessible through the internet at (www.epa.gov/iris), and will be included as an appendix for the revised HHRA.

BAH COMMENT

- Standard risk assessment protocol allows for the use of central tendency (CT) exposure parameter values, if these CT values are balanced with reasonable maximum exposure (RME) values in the calculation of risk and hazard estimates. Based upon a review of the exposure parameters presented in the HHRA, NSRR has used a majority of CT values for evaluation of risks at SWMU 14. This technique can lead to an underestimation of calculated risks. It should be noted, however, that a recalculation of total risks for each pathway at the site was conducted using a majority of EPA recommended RME values. Based upon these calculations, it appears that the lack of RME parameters in the evaluation does not have a significant impact on the risk estimates in the HHRA.

NAVY RESPONSE

The revised HHRA will incorporate the RME values as discussed in the following responses except were noted differently.

BAH COMMENT

6. The following discrepancies were found in the risk calculation tables. These discrepancies result in slightly elevated chronic daily intakes (CDI) and total risk estimates; however, the associated affects on the results of the HHRA are not considered to be significant:
 - Section 3.2.3 correctly indicates that an exposure frequency (EF) of 180 days/year should be used to calculate the CDI for the construction worker. However, a review of the calculations presented in Appendix B shows that a more conservative EF of 250 days/year was actually used to calculate the CDI.

NAVY RESPONSE

The EF will be changed to 180 days/year in the revised HHRA.

BAH COMMENT

- Section 3.2.3 correctly indicates that a body weight (BW) of 45 kg should be used to calculate the CDI for the youth trespasser. However, a review of the calculations presented in Appendix B shows that a more conservative B W of 70 kg was actually used to calculate the CDI.

NAVY RESPONSE

The BW of 45 kg will be utilized in the revised HHRA.

BAH COMMENT

7. Several of the exposure parameters (Table 2-4) used in calculating risk estimates at the site are either incorrect or are not consistent with standard EPA guidance. For example:

NAVY RESPONSE

The exposure parameters used in this HHRA are neither incorrect nor inconsistent with EPA Exposure Factors Handbook (1997). However, the revised HHRA will make the changes as listed below to concur with utilization of the upper confidence limits rather than the central tendency as recommended.

BAH COMMENT

- Exposure Frequency (EF): Superfund Standard Default Exposure Factors (OSWER 9285.6-03) recommends an exposure frequency of 25 years for the commercial/utility worker. NSRR presents a value of 22 years in the Draft HHRA. The recommended EF value of 25 years should be used for the commercial/utility worker.

NAVY RESPONSE

The EFs used in the HHRA were 350 days for future military resident adult and child, 250 days for the commercial utility worker, 180 days for the construction worker, and 52 days for the trespasser. These parameters will not be changed in the revised HHRA.

For Exposure Duration (ED), USEPA 1997 Exposure Factors Handbook Volume III recommends a tenure value of 21.9 years for a working lifetime. The revised HHRA will however, change the ED from 22 to 25 years as recommended in the comment letter.

BAH COMMENT

- Ingestion Rate (IR): NSRR has proposed a CT IR of 50 mg/day for an adult, and 100 mg/day for a child. The Exposure Factors Handbook (EFH) (USEPA, 1987) and the Superfund Standard Default Exposure Factors Guidance both recommend an RME value of 100 mg/day for an adult, and 200 mg/day for a child. The use of CT values is appropriate when the risk calculations are balanced by RME values; therefore, NSRR should ensure that a balance of RME and CT exposure parameters are used in the risk calculations.

NAVY RESPONSE

The IR for the adult commercial –utility worker will be 50 mg/day as recommended by Risk Assessment Guidance for Superfund Volume I. Human Health Evaluation Manual (Part B)

(Development of Risk-Based Preliminary Remediation Goals). Interim. Washington, D.C.: Office Solid Waste and Emergency Response. December, 1991. OSWER Directive 9285.7-01B. USEPA. (1991). The IR for adult and child resident will be changed to 100 mg/day and 200 mg/day as recommended in the comments to concur with utilization of the upper confidence limits rather than the central tendency.

BAH COMMENT

- NSRR has calculated an IR of 60 mg/day for a construction worker. The EFH recommends a value of 480 mg/day. NSRR has calculated the reduced IR using a soil to skin adherence factor which is not an EPA approved methodology. Further, the use of a soil to skin adherence factor in the calculation of an ingestion rate is not appropriate. NSRR should use an IR of 480 mg/day for the construction worker.

NAVY RESPONSE

The most recent Exposure Factors Handbook (1997) does not recommend using 480 mg/day for a construction worker. THE EFH states:

“Only three studies have attempted to estimate adult soil ingestion. Hawley (1985) suggested a value of 480 mg/day for adults engaged in outdoor activities and a range of 0.56 to 110 mg/day of house dust during indoor activities. These values were derived from assumptions about soil/dust levels on hands and mouthing behavior; no supporting measurements were made. Making further assumptions about frequencies of indoor air and outdoor activities, Hawley (1985) derived an annual average of 60.5 mg/day. Given the lack of supporting measurements, these estimates must be considered conjectural”. It does not provide a recommendation for a construction worker, rather it provides only recommendation for an adult worker of 50 mg/kg, and 100 for an adult resident.

The soil ingestion rate of 480 mg/day is based on an estimated soil-skin adherence factor of 3.5 mg/cm² for the forefingers and thumbs of an adult (Hawley, 1985). It is assumed that an adult licks his fingers and thumbs twice a day resulting in soil ingestion. More recent quantitative measures of soil to skin adherence have been developed by the University of Washington funded by a USEPA grant (Kissel et al., 1996). Therefore for this HHRA the approach used by Hawley, was refined using more accurate measures of soil-skin adherence.

The results of the Kissel et al., 1996 study are presented in the 1997 Exposure Factors Handbook. The results indicate an soil adherence factor of 0.43 mg/cm² for an 8 hour construction worker day. The ingestion rate was refined in the following manner:

$$\frac{480 \text{ mg/day}}{3.5 \text{ mg/cm}^2} * 0.43 \text{ mg/cm}^2 = 59 \text{ mg/day}$$

Based on the above response, the revised HHRA will not incorporate the use of 480 mg/day, and will use 60 mg/day.

BAH COMMENT

- Dermal Absorption Factor DAF: The DAF for SVOCs is incorrectly presented as 0.01. According to EPA's Dermal Draft Guidance (USEPA, 1997), a DAF of 0.1 should be used for SVOCs. NSRR should use the recommended DAF value of 0.1 for SVOCs.

NAVY RESPONSE

The DAF value of 0.01 is not incorrect. The value was derived from Wester et al 1990. This paper is presented in the 1992 Dermal Exposure Assessment Report and summarized on page 2-8 of the SWMU 14 HHRA. In addition the revised HHRA will incorporate 0.1 as recommended by the Risk Assessment Guidance for Superfund Volume 1: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment), Interim Guidance. EPA/540/R-99/005. Office of Solid Waste and Emergency Response, Washington, DC. PB99-963312. USEPA 1999.

BAH COMMENT

- Surface Area (SA): The SA values presented also represent CT exposure parameters. The EFH recommends an RME SA value for an adult of 5,800 cm². In addition, NSRR has used the 50th percentile total body surface area values for calculation SA for a child and youth. NSRR should use the EFH recommended RME SA values for both an adult and a youth.

NAVY RESPONSE

The USEPA RAGS (A) states, “ To calculate the reasonable maximum exposure for this pathway, 50th percentile values, instead of 95th percentiles, are used for the area of exposed skin (SA). This is because surface area and body weight area strongly correlated, and 50th percentile values are most representative of individuals of average weight...” Therefore, the RME values for surface area will not be used in the revised HHRA.

BAH COMMENT

- Adherence Factor (AF): The use of an AF of 0.2 is also the lowest possible value allowed for the AF based upon a review of the Dermal Guidance. EPA's 1992 Dermal Guidance presents an approved AF range of 0.2 to 1.0. NSRR should use a more conservative AF value.

NAVY RESPONSE

For the SWMU 14 HHRA a soil adherence factor of 1.0 will not be used. The Risk Assessment Guidance for Superfund Volume 1: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment), Interim Guidance. EPA/540/R-99/005. Office of Solid Waste and Emergency Response, Washington, DC. PB99-963312. USEPA 1999. recommends a SA of 0.2 for the adult worker, and child, and 0.07 for the adult resident. These values will be used in the revised HHRA for SWMU 14. These values have been verified by EPA Toxicologist Stanford Smucker in a recent correspondence with Melissa Fredrick at Baker Environmental (Dr. Smucker contact information is 415-744-2311).

BAH COMMENT

- Inhalation Rate (IR_h): NSRR presents an IR_h for an adult (1.27 m³/hr) and child (0.69 m³/hr) only. The IR_h presented for the child appears to underestimate the potential risks associated with the inhalation pathway of a youth. NSRR should present a calculated IR_h for both the child and youth receptors.

NAVY RESPONSE

The adult inhalation rate of 1.27 m³/hr was used for the youth trespasser in the draft HHRA. The child inhalation rate stated in your comment was not utilized in this risk assessment. Therefore, No change is necessary.