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C-NAVY-5-98-1171W

May 20, 1998

Project Number 7752

Mr. James Shafer
Remedial Project Manager
Northern Division, Naval Facilities Engineering Command
10 Industrial Highway, Mail Stop 82
Lester, Pennsylvania 19113

Reference: CLEAN Contract No. N62472-90-D-1298
Contract Task Order No. 0302

Subject: Response to RIDEM Comments on the
Plan for Human Health Risk Assessment Derecktor Shipyard (Off-Shore)

Dear Mr. Shafer:

Attached are responses to comments on the Human Health Risk Assessment Report. Comments from the Rhode Island Department of Environmental Management were dated April 27, 1998 and comments from The U.S. Environmental Protection Agency were dated April 2, 1998.

Please be advised that we are proceeding with the revised Human Health Risk Assessment Report, and intend to complete it as described in these responses and deliver it 30 days from the date of this letter.

If you have any questions regarding this material, please do not hesitate to contact me.

Very truly yours,

Stephen S. Parker
Project Manager

SSP/RT

attachment

c: K. Coyle, NETC (w/encl.)
K. Keckler, USEPA (w/encl.)
P. Kulpa, RIDEM (w/encl.)
J. Stump, Gannett Fleming (w/encl.)
J. Trepanowski/G. Glenn, B&RE (w/encl.)
File 7752-3.2 (w/o encl.)

Attachment A
Responses to RIDEM Comments on the Human Health Risk Assessment Report
Off Shore areas of the Former Robert E. Derecktor Shipyard
Comments Dated April 27, 1998

Comment 1: **Restated from the comments to the HHRA Work Plan (comments dated February 24, 1998)**

This section of the report states that *The water depths within the study area are between 20-50 feet. This precludes the potential for human exposure to contaminants in the sediments in these areas.*

The Navy has indicated that the water depths within the study area range between 20 to 50 feet and therefore exposure to sediments is not an issue. This statement is in conflict with site conditions and with previous reports submitted by the Navy. Specifically, there is a large beach located on the southern section of Derecktor Shipyard. The water depth at this location is not 20 to 50 feet, in contrast, the area in question contains a shallow beach environment. This area was also reported in the 1993 Preliminary Assessment and most recently in the 1997 Site Assessment Screening Evaluation Report (for example page 7-2 of the latter report states *The vegetation in the South Waterfront includes a narrow corridor of upland shrub/scrub species, which parallel a dune beach strip along Narragansett Bay.... Certain portions of the upland and beach area have been significantly disturbed.*) In addition, this area was discussed with the Navy and the Navy's contractor during the recent Ecological Advisory Board Meeting. Specifically, it was pointed out that the beach in question was incorrectly identified as a dune beach.

Therefore, since it is a beach, it is inappropriate to state that the water depths in the area preclude potential for human exposure to sediments. Accordingly, the Work Plan should be modified and this exposure should be addressed in the Risk Assessment.

Response: *The previous response to this comment is as follows:*

"The South Waterfront area referred to in the comment is a gradually sloping beach environment. However, this portion of Coddington Cove was not included in the sediment sampling efforts in 1995 and therefore no sediment data was collected there. By providing this comment, the reviewer is inferring a request that samples should have been collected from this area, and that the risk assessment can account for this data.

The scope of this risk assessment was discussed at the RPMs meeting held on October 15, 1997, and at that time, the use of shellfish exposure alone was not contested. Therefore, the Navy has prepared the risk assessment using these exposure scenarios only.

It should be noted that the subtidal portions of the south waterfront were believed by the investigators to be beyond the area of impact from Derecktor operations. On-shore samples of the surface and subsurface soils collected from the south waterfront showed no contaminants present that could be directly attributed to site operations."

The RIDEM rebutted this resp nse at length. A summary is presented below:

1. the State interprets the response to say that the Navy is denying that a beach exists at the site

2. the State did not agree to limit the measured exposure parameters to ingestion of shellfish, and requests that the Navy evaluate incidental ingestion/dermal exposure to sediment during swimming/wading and shellfish collection.

3. there are areas of concern upgradient of the south waterfront area (on shore) and these areas could have impacted the sediments at the southern beach.

Response: *Although it is not clear from the comment letter, it appears that the RIDEM is again requesting additional samples from the subtidal portions of the beach at the South Waterfront Area, and the risk assessment be modified to include swimming/wading scenarios using this data.*

Following this approach, the Navy would perform additional sampling, data analysis and interpretation, revise PRG documents etc., resulting in a six to twelve month delay for Draft FS completion.

The Navy does not believe that existing sediment data is representative of the beach, and thus use of existing data would not be representative of actual risks. However, in an effort to move forward, the sediment data from Station 29 (one of the high probability ecorisk stations) was used to estimate an RME trespasser scenario for adult and child exposure to humans from sediment. The same exposure parameters that were used for McAllister Point Landfill were used for this scenario (scenarios 6 and 7, page 5-10; Human Health Risk Assessment Report McAllister Point Landfill, Brown and Root Environmental, April 1997). This scenario includes incidental ingestion and dermal contact with sediment from visitation to the site 7 times per year.

The results of this evaluation are presented in Tables 1 and 2 (attached). All parameters provided risk estimates for both receptors below $1x10^{-6}$, and below a HQ less than 1.0.

Given the low probability of the trespasser scenario and the distance between Station 29 and the area where exposure would occur, it is considered inappropriate to evaluate this scenario any further. Given the low calculated risk for this station, and the high concentration of PCBs measured there compared to the other stations near the beach (note Station 35, to the south), it is evident that evaluating this scenario further would not provide useful or pertinent information supporting cleanup criteria at the site.

Comment 2: **Restated from the comments to the HHRA Work Plan (comments dated February 24, 1998)**

This section of the report states that *The water depths within the study area are between 20-50 feet. This precludes the potential for human exposure to contaminants in the sediments in these areas.*

This section of the report indicates that water depths precludes exposure to site sediments. As a result, the only exposure route which is considered is ingestion of shellfish. Harvesting of shellfish results in dermal exposure to sediment adhering to the shells. This represents a direct dermal and incidental ingestion exposure. Similar concerns were recently submitted in the comment packages, dated June 12, 1997, and August 28, 1997, for the McAllister Point Landfill Human Health Risk Assessment (i.e. the State noted that the total exposure for an individual harvesting shellfish would include ingestion of said fish and exposure to sediments). Therefore the Work Plan should be modified to include this potential exposure in the risk assessment.

Response: *The previous response is as follows:*

"The scope of this risk assessment was discussed at the RPMs meeting held on October 15, 1997, and at that time, the use of shellfish exposure alone was not contested. Therefore, the Navy has prepared the risk assessment using these exposure scenarios only.

It is anticipated that if these scenarios were evaluated, the risks would be inconsequential in comparison to the risk calculated for direct ingestion of shellfish collected."

Re-Statement: The state rebutted the response as is described in Comment 1 above and restated that their original comment stands.

Response: *The Navy offers the following as additional arguments against such an activity:*

Typical shellfishing involves wading or walking through intertidal sediments, and dermal exposures and ingestion is foreseeable, resulting in a plausible risk of exposure. Sediment and shellfish samples for this site were collected from off-shore stations, and collection of shellfish at these stations would have to be performed by boat or diver. There are no published exposure parameters for this type of activity, and they would have to be developed for this site specifically. Finally, exposure parameters would be so low that a plausible scenario is unlikely and estimated risk would be very uncertain.

Evaluation of this scenario was performed for McAllister since there are intertidal sediments containing contaminants posing a plausible exposure pathway, and the resulting risks were two to three orders of magnitude less than that measured for ingestion of shellfish. Thus, if ingestion is driving risk, it is unproductive to measure other parameters.

The uncertainty involved in this scenario and the low risk (compared to that for scenarios already evaluated) that would be calculated from this scenario precludes it's useful purpose in the risk assessment process.

Finally, the reader should refer to the response to the previous comment, which describes the use of data from Station 29 for an RME trespasser scenario for child and adult. The results, provided in Tables 1 and 2 (attached), represent a highly conservative risk evaluation from exposure to sediments. As shown on these tables, all parameters provided risk estimates for both receptors at or below $1x10^{-6}$ (carcinogenic), and a HQ less than 1.0 (non-carcinogenic).

Comment 3: (Regarding the HHRA work plan)

The Navy has stated that deployed mussels are only exposed for a limited time and that the indigenous mussels by their very nature are expected to be more representative of shellfish collected by the human receptor. Accordingly, it would be expected that the concentrations of contaminants in the deployed mussels would be less than the indigenous mussels. In support of this position, the Navy should address the second part of the Offices comments (to the work plan) concerning the concentrations of contaminants in deployed and indigenous mussels. The office recommends including a table, which depicts the range of contaminants, detected in the deployed and indigenous mussels.

Response: *The Navy concurs, and agrees to add a table describing the data ranges for the indigenous mussels and the deployed mussels.*

Clarification on Comment 6 to the Work Plan:

The Navy response (to the work plan comment) is not clear in that it appears that the Navy will use the Work Plans exposure rate for the subsistence fisherman and the Offices exposure rate for the recreational fisherman, and by default the child exposure rate? As stated in the original comment (to the work plan) this issue was discussed at length for the McAllister Point Landfill site and it was determined that the adult consumption rate of 15.6 g/day is appropriate. The consumption rate for the subsistence fisherman for the prime harvest months is 80 g/day. Concerning this exposure route the Office is willing to discuss the number of prime harvest months and the consumption rate for the non-prime harvest months.

Response: *The ingestion rates used in the report are clearly stated on pages 5-4 and 5-5 of the HHRA report. As discussed many times, these ingestion rates were the same as those used for McAllister Point. The state was asked in 1997 to substantiate the 80 g/day rate for McAllister, and as yet has not to provided any documentation supporting their position, despite their repeated requests for the Navy to use it.*

The Navy feels that the rates used in this assessment are conservative and disagrees with revision without justification.

Comments on the Draft HHRA Report:

1: General Comment

The risk assessment for this site is based on the concentration of contaminants found in shellfish and lobster samples taken from the site. The data for this assessment was obtained from the Ecological Risk Assessment conducted at the site. During the Ecological Risk Assessment logistical problems prevented the collection of biota samples from all sampling stations (i.e. biota samples may not have been collected from areas where sediment samples were collected). The report should note whether biota samples used in the Human Health Risk Assessment correspond to the areas of observed sediment contamination. The report should also note whether areas of observed contamination were not addressed in the Human Health Risk Assessment due to the lack of biota samples. To this end a figure should be included which depicts all known sample areas of contamination and known biota sample locations.

The report should also indicate what actions will be taken to address those areas not covered by biota samples. One possible solution for those areas deficient in biota samples would be to estimate biota concentrations based upon existing data.

Response: The Navy concurs that a description of sample locations is pertinent to the report and will add such a figure to Section 2. Regarding the second part of the comment, new text will be added to Section 2.2 as follows:

Samples were collected from locations described in the ERA Work Plan Addendum B (URI and SAIC, July, 1995). Overall, with the exception of finfish, availability of individuals did not limit sample collections. The target finfish species was not found in enough quantity for sampling at off-shore stations 31, 33, 34 and 35 most likely due to lack of their preferred habitat, which consists of high relief reef-type features. Indigenous blue mussels were not found in sediments at Station 29 (a high risk-probability ERA station), although this is likely due to lack of suitable gravely substrate. The other station where a high probability of ecological risk was estimated is Station 27, where both suitable substrate and adequate numbers of blue mussels were present.

2. **Section 2.3 Data Evaluation**
Page 2-3

This section of the report indicates that edibility of biota tissue will be included in the assessment. Please note whether the hypopancreas is included in this assessment. This organ is known to accumulate toxins and as such would represent the greater exposure route. As this is a public document full justification is requested if this organ is not included. In addition, the report should discuss the ramifications of excluding this organ.

Response: The analysis performed on the lobsters collected from Derecktor Shipyard did not include analysis of hepatopancreas (known as tamale). The analytical laboratory (URI GSO) cited difficulty with analytical procedures with a material that is so high in lipid content. A discussion will be added to this section to outline the limitations of excluding this material from the risk assessment.

3. **Section 2.3 Data Evaluation**
Page 2-3

This section of the report indicates that the child (age 0-6 years) and the adults (age 18-65 years) is included in the evaluation. The report should note whether the age group 6-18 years is covered in the risk assessment. As this is a public document full justification is requested if this group is not covered.

Response: The Navy submits the following rationale for the States consideration: The 6-18 year age group is not evaluated as a separate receptor in the draft HHRA. Risks to this receptor would likely fall between that calculated for the adult and child receptors, since the exposure duration, body weight and ingestion rate would be within the high and low range set for the adult and child receptors.

Attachment B
Responses to U.S. EPA Comments on the Human Health Risk Assessment Report
Off Shore areas of the Former Robert E. Derecktor Shipyard
Comments Dated April 2, 1998

Comment 1: I understand that there is a ban on clams and mussels in the area - but not on lobster. The HHRA should note these bans with regard to risk. In particular, please explain the how the bans were developed and what they were based on.

Response: *The Navy concurs with this comment, and will add a summary of the ban, it's limitations and implications to the appropriate sections (2, 4, and 7) of the revised report.*

Comment 2: Since this is a public document, presentation of complete information is important. Please define all acronyms and any specific references used in tables directly on the page of the table. In many instances tables are pulled from documents or used for quick references.

Response: *The Navy concurs with this suggestion. All acronyms and references will be added to the appropriate tables in the revised report.*

Comment 3: Please add a note regarding the bold text risk values in tables 6-2 through 6-13. The highlighting of these values is useful for finding the major contributors to risk for each scenario, but this may not be apparent to every reader. A special point regarding the highlighting of the various PCB congeners should also be made. In addition, highlighting the substance correlating with the "high" risk values would make finding these high risk contributors easier to locate.

Response: *The Navy concurs with this comment. A set of footnotes will be added to the Tables in Section 6 that will explain further explain the increased incremental cancer risk. Bolded substance names, values, and references will also be added to Section 6 tables.*

Comment 4: Please add a section to the document or subsection under Risk Characterization that summarizes the risk conclusions. Although the risk evaluation is well-presented, a summary discussing the highest risk scenario, the Constituents of Potential Concern correlated with the higher risk values, and a general site-risk overview is necessary.

Response: *The Navy concurs with this comment. A section summarizing the increased risk characterization will be provided in Section 6.*

Page	Comment
Table 4-1	It appears that the Benz(a)pyrene equivalency factors (BEFs) were applied to the some of the carcinogenic polycyclic aromatic hydrocarbons (*e.g.*, benz(a)anthracene, benz(a)pyrene, chrysene, dibenz(a,h)anthracene, and

indeno(1,2,3-cd)pyrene). However, equivalency factors were not applied to benz(b)flouranthene (BEF = 0.1) and benz(k)flouranthene (BEF = 0.01). This policy is delineated in the August 1994 *US EPA Region One Risk Update* and in the *Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons* (EPA/600/R-93/089). Please make the appropriate changes to the calculations and the document. These changes should include adding an equivalency factor table and a discussion of the equivalency factor application.

Response: *Benzo(b)fluoranthene and Benzo(k)fluoranthene were not separated out as separate analytes from the data reported by the lab. As shown on Table 2-1 of the Draft report, they are reported together as benzo(b,j,k)fluoranthene. Since they are reported together, the more conservative (higher) of the equivalency factors described in the comment (benzo(b)fluoranthene, BEF=0.1 of benzo(a)pyrenes toxicity value) will have to be applied to the concentration reported by the lab. This approach is overly conservative because it uses a combined concentration and uses a higher slope factor. However, the associated cancer risk is not anticipated to result in an estimated risk greater than that reported for benzo(a)pyrene.*

pp. 5-3 to 5-4, §5 The dose equation needs to have a conversion factor for milligrams to kilograms. Based on a spot check of calculations, it appears that the conversion factor was used correctly in the dose calculations. Please add the conversion factor to the equation in the text.

Response: *The Navy concurs with this comment. As stated above, this factor is included in the calculations, but was left out of the general equation on page 5-3. The general equation will be revised as appropriate.*

Section 6.0 Please present cancer risk and non-cancer hazard quotient equations (*i.e.*, relationships between dose and toxicity) in this section.

Response: *The Navy concurs with this comment. The equations explaining cancer risk and noncancer hazard quotient methods will be added to Section 6 of the revised report.*

Table 6-2 Please insert lines for cancer risks and non-cancer hazard totals to the table. Also, note the definitions for RME and CTE on the same page.

Response: *As described in responses to other comments above, footnotes describing acronyms will be added to tables 6-2 through 6-13. Sum of cancer risks and non cancer risk hazards by receptor and exposure route are presented at the bottom of Tables 6-2 through 6-13.*

p. 7-6, 7.3.4.2 It is EPA's understanding that the shell fishing ban only pertains to mussels and clams. This statement is therefore not accurate with respect to risks from ingestion of lobster. Please provide more details about the shell fishing ban - and its effect on the risk assessment - in the text.

Response: *The Navy concurs with this comment. Refer to the response to general comment No. 1 above.*

p. 7-7 *Hard Shell Clams:* The first paragraph states that the arsenic at the site is more likely to be bay-related rather than site related. This appears to conflict with some of the information in the ecological risk assessment (SAIC, 1997). Statements from the ecological risk assessment are excerpted below:

> "...In general, the aluminum-normalized values for all measured anthropogenic trace metals (*i.e.*, arsenic, cadmium, chromium, copper, lead, mercury, nickel, silver, and zinc) demonstrated a decreasing trend moving offshore from Derecktor Shipyard/Coddington Cove [page 1-6]...."
>
> "...ER-L hazard quotients for metals in sediments indicated that Station DSY-29 had the highest elevations of arsenic, chromium, copper, lead, mercury, nickel, and zinc, with minor elevations of these metals at a relatively small number of the other stations within the Derecktor Shipyard/Coddington Cove study area [page 1-20]...."
>
> "...Unlike BSAFs for organics, the overall pattern of BAFs for metals did indicate differences in the degree of bioaccumulation into tissues: 1) High (Zn, As); 2) Intermediate (Hg, Cu); 3) Low (Cr, Mn, Fe, Al); and 4) Very Low (Ag, Ni, Pb) [page 1-23]...."

Response: *The discussions presented in the ERA are accurate, and arsenic concentrations may be higher nearer to the shipyard. However, it also appears that elevated levels of arsenic are present in the soils and marine sediment from natural degradation of bedrock, and as such are likely to be washed into the marine areas through storm drains, accounting for part of this distribution. The outfall sampling performed at Building 42 in May 1998 and the background investigation proposed for June 1998 should clarify these issues.*

Since the data from these studies are not expected to be available for the printing of the revised HHRA report, the discussion in the HHRA describing the plausible sources of arsenic, and the distribution described in the ERA (summarized in the comment) will be revised. The data from the background and the outfall investigations should be available for the Draft FS, and this issue will be discussed in that report in reference to risk management and the findings of the risk assessments.

Follow-Up Comment Dated 5-6-98:

For non-carcinogenic risks toxicological data exists for PCBs (Arochlors). Please estimate the contribution to non cancer risks from PCBs and recalculate the totals.

Response: *PCB data was reported from the laboratory specific to individual congeners, and not identified by Arochlors, and the toxicity information referenced by the comment is specific to each Arochlor.*

The report will be revised as follows: Total PCBs will be carried through the quantitative risk evaluation for non-cancer risk and assumed to all be Arochlor 1254 (the most common non-carcinogenic Arochlor found at industrial sites). This will result in a highly conservative non-carcinogenic risk value.

TABLE 1
ESTIMATED RME CANCER RISKS - SEDIMENT INGESTION AND DERMAL CONTACT (SAMPLE DSY-29-S)
DERECKTOR SHIPYARD - OFFSHORE
NEWPORT, RHODE ISLAND

Substance	Exposure Point Concentration	Trespasser Child Ingestion of Sediment	Trespasser Child Dermal Contact With Sediment	Trespasser Adult Ingestion of Sediment	Trespasser Adult Dermal Contact With Sediment
aluminum	37147.5	NT	NT	NT	NT
arsenic	12.46	4.10E-07	NA	2.19E-07	NA
cadmium	1.45	NT	NT	NT	NT
chromium	86.5	NT	NT	NT	NT
copper	157.75	NT	NT	NT	NT
iron	35452.5	NT	NT	NT	NT
lead	185.9	NT	NT	NT	NT
manganese	282.25	NT	NT	NT	NT
mercury	0.5	NT	NT	NT	NT
nickel	34.75	NT	NT	NT	NT
silver	0.79	NT	NT	NT	NT
zinc	392.75	NT	NT	NT	NT
1,6,7-trimethylnaphthalene	27.94	NT	NT	NT	NT
1-methylnaphthalene	50.07	NT	NT	NT	NT
1-methylphenanthrene	266.56	NT	NT	NT	NT
2,6-dimethylnaphthalene	112.32	NT	NT	NT	NT
2-methylnaphahalene	73.47	NT	NT	NT	NT
acenaphthene	188.59	NT	NT	NT	NT
acenaphthylene	300.15	NT	NT	NT	NT
anthracene	1220	NT	NT	NT	NT
benz(a)anthracene	2700	4.32E-08	NA	2.31E-08	NA
benzo(a)pyrene	2380	3.81E-07	NA	2.04E-07	NA
benzo(b,j,k)fluoranthene	5350	8.56E-08	NA	4.59E-08	NA
benzo(e)pyrene	1950	NT	NT	NT	NT
benzo(g,h,i)perylene	1110	NT	NT	NT	NT
1,1-biphenyl	29.91	NT	NT	NT	NT
chrysene	2800	4.48E-10	NA	2.40E-10	NA
dibenz(a,h)anthracene	317.43	5.08E-08	NA	2.72E-08	NA
fluoranthene	4970	NT	NT	NT	NT
fluorene	293.64	NT	NT	NT	NT
indeno(1,2,3-cd)pyrene	1020	1.63E-08	NA	8.74E-09	NA
naphthalene	76.08	NT	NT	NT	NT
perylene	610.95	NT	NT	NT	NT
phenanthrene	1609.54	NT	NT	NT	NT
pyrene	5300	NT	NT	NT	NT
PCB 101 (2 2'3 5 5')	16.7	2.20E-10	2.20E-10	1.18E-10	2.35E-10
PCB 105 (2 3 3'4 4')	6.61	8.69E-11	8.69E-11	4.66E-11	9.31E-11
PCB 118 (2 3'4 4'5)	18.38	2.42E-10	2.42E-10	1.29E-10	2.59E-10
PCB 128 (2 2'3 3'4 4')	5.14	6.76E-11	6.76E-11	3.62E-11	7.24E-11
PCB 138 (2 2'3 4 4'5)	27.04	3.56E-10	3.56E-10	1.90E-10	3.81E-10
PCB 153 (2 2'4 4'5 5')	22.8	3.00E-10	3.00E-10	1.61E-10	3.21E-10
PCB 170 (2 2'3 3'4 4'5)	7.25	9.53E-11	9.53E-11	5.11E-11	1.02E-10
PCB 18 (2 2'5)	0.68	8.94E-12	8.94E-12	4.79E-12	9.58E-12
PCB 180 (2 2'3 4 4'5 5')	13.79	1.81E-10	1.81E-10	9.72E-11	1.94E-10
PCB 187 (2 2'3 4'5 5'6)	8.54	1.12E-10	1.12E-10	6.02E-11	1.20E-10
PCB 195 (2 2'3 3'4 4'5 6)	3.83	5.04E-11	5.04E-11	2.70E-11	5.40E-11
PCB 206 (2 2'3 3'4 4'5 5'6)	17.39	2.29E-10	2.29E-10	1.23E-10	2.45E-10
PCB 209 (2 2'3 3'4 4'5 5'6 6	105.27	1.38E-09	1.38E-09	7.42E-10	1.48E-09
PCB 28 (2 4 4')	1.66	2.18E-11	2.18E-11	1.17E-11	2.34E-11
PCB 44 (2 2'3 5')	3.94	5.18E-11	5.18E-11	2.78E-11	5.55E-11
PCB 52 (2 2'5 5)	9.69	1.27E-10	1.27E-10	6.83E-11	1.37E-10
PCB 66 (2 3'4 4')	3.87	5.09E-11	5.09E-11	2.73E-11	5.45E-11
PCB 8 (2,4)	0.6	7.89E-12	7.89E-12	4.23E-12	8.45E-12
TOTAL PCBs	546.38	7.19E-09	7.19E-09	3.85E-09	7.70E-09
aldrin	0.1	3.73E-11	NA	2.00E-11	NA
hexachlorobenzene	0.16	5.61E-12	NA	3.01E-12	NA
mirex	0.1	3.95E-12	NA	2.11E-12	NA
o,p'-DDE	4.96	3.70E-11	NA	1.98E-11	NA
p,p'-DDE	6.29	4.69E-11	NA	2.51E-11	NA
dibutyltin	20.58	NT	NT	NT	NT
monobutyltin	8.65	NT	NT	NT	NT
tetrabutyltin	0.5	NT	NT	NT	NT
tributyltin	60.89	NT	NT	NT	NT
	RISK	9.94E-07	7.19E-09	5.33E-07	7.70E-09
	TOTAL RISK	1.00E-06		5.40E-07	

Inorganics are in mg/kg, Organics are in ug/kg

NT = No Established EPA Toxicity Factors Exist for this Compound; NA = Not Applicable for Dermal Toxicity as per EPA Region I

RME = Reasonable Maximum Exposure

TABLE 2
ESTIMATED RME NONCARCINOGENIC RISKS - SEDIMENT INGESTION AND DERMAL CONTACT (SAMPLE DSY-29-S)
DERECKTOR SHIPYARD - OFFSHORE
NEWPORT, RHODE ISLAND

Substance	Exposure Point Concentration	Trespasser Child Ingestion of Sediment	Trespasser Child Dermal Contact With Sediment	Trespasser Adult Ingestion of Sediment	Trespasser Adult Dermal Contact With Sediment
aluminum	37147.5	9.50E-03	NA	1.02E-03	NA
arsenic	12.46	1.06E-02	NA	1.14E-03	NA
cadmium	1.45	3.71E-04	1.85E-05	3.97E-05	3.97E-06
chromium	86.5	4.42E-03	NA	4.74E-04	NA
copper	157.75	1.01E-03	NA	1.08E-04	NA
iron	35452.5	3.02E-02	NA	3.24E-03	NA
lead	185.9	NT	NT	NT	NT
manganese	282.25	5.16E-04	NA	5.52E-05	NA
mercury	0.5	4.26E-04	NA	4.57E-05	NA
nickel	34.75	4.44E-04	NA	4.76E-05	NA
silver	0.79	4.04E-05	NA	4.33E-06	NA
zinc	392.75	3.35E-04	NA	3.59E-05	NA
1,6,7-trimethylnaphthalene	27.94	NT	NT	NT	NT
1-methylnaphthalene	50.07	3.20E-07	NA	3.43E-08	NA
1-methylphenanthrene	266.56	NT	NT	NT	NT
2,6-dimethylnaphthalene	112.32	NT	NT	NT	NT
2-methylnaphahalene	73.47	4.70E-07	NA	5.03E-08	NA
acenaphthene	188.59	8.04E-07	NA	8.61E-08	NA
acenaphthylene	300.15	NT	NT	NT	NT
anthracene	1220	1.04E-06	NA	1.11E-07	NA
benz(a)anthracene	2700	NT	NT	NT	NT
benzo(a)pyrene	2380	NT	NT	NT	NT
benzo(b,j,k)fluoranthene	5350	NT	NT	NT	NT
benzo(e)pyrene	1950	NT	NT	NT	NT
benzo(g,h,i)perylene	1110	NT	NT	NT	NT
1,1-biphenyl	29.91	1.53E-07	NA	1.64E-08	NA
chrysene	2800	NT	NT	NT	NT
dibenz(a,h)anthracene	317.43	NT	NT	NT	NT
fluoranthene	4970	3.18E-05	NA	3.40E-06	NA
fluorene	293.64	1.88E-06	NA	2.01E-07	NA
indeno(1,2,3-cd)pyrene	1020	NT	NT	NT	NT
naphthalene	76.08	4.86E-07	NA	5.21E-08	NA
perylene	610.95	NT	NT	NT	NT
phenanthrene	1609.54	NT	NT	NT	NT
pyrene	5300	4.52E-05	NA	4.84E-06	NA
PCB 101 (2 2'3 5 5')	16.7	NT	NT	NT	NT
PCB 105 (2 3 3'4 4')	6.61	NT	NT	NT	NT
PCB 118 (2 3'4 4'5)	18.38	NT	NT	NT	NT
PCB 128 (2 2'3 3'4 4')	5.14	NT	NT	NT	NT
PCB 138 (2 2'3 4 4'5)	27.04	NT	NT	NT	NT
PCB 153 (2 2'4 4'5 5')	22.8	NT	NT	NT	NT
PCB 170 (2 2'3 3'4 4'5)	7.25	NT	NT	NT	NT
PCB 18 (2 2'5)	0.68	NT	NT	NT	NT
PCB 180 (2 2'3 4 4'5 5')	13.79	NT	NT	NT	NT
PCB 187 (2 2'3 4'5 5'6)	8.54	NT	NT	NT	NT
PCB 195 (2 2'3 3'4 4'5 6)	3.83	NT	NT	NT	NT
PCB 206 (2 2'3 3'4 4'5 5'6	17.39	NT	NT	NT	NT
PCB 209 (2 2'3 3'4 4'5 5'6	105.27	NT	NT	NT	NT
PCB 28 (2 4 4')	1.66	NT	NT	NT	NT
PCB 44 (2 2'3 5')	3.94	NT	NT	NT	NT
PCB 52 (2 2'5 5)	9.69	NT	NT	NT	NT
PCB 66 (2 3'4 4')	3.87	NT	NT	NT	NT
PCB 8 (2,4)	0.6	NT	NT	NT	NT
TOTAL PCBs *	546.38	2.10E-03	1.05E-03	2.25E-04	2.24E-04
aldrin	0.1	8.52E-07	NA	9.13E-08	NA
hexachlorobenzene	0.16	5.11E-08	NA	5.48E-09	NA
mirex	0.1	1.28E-07	NA	1.37E-08	NA
o,p'-DDE	4.96	NT	NT	NT	NT
p,p'-DDE	6.29	NT	NT	NT	NT
dibutyltin	20.58	NT	NT	NT	NT
monobutyltin	8.65	NT	NT	NT	NT
tetrabutyltin	0.5	NT	NT	NT	NT
tributyltin	60.89	5.19E-05	NA	5.56E-06	NA
	RISK	6.01E-02	1.07E-03	6.44E-03	2.28E-04
	TOTAL RISK	6.12E-02		6.67E-03	

Inorganics are in mg/kg, Organics are in ug/kg

* = TOTAL PCB Exposure Point Concentrations are used to estimate Noncarcinogenic Risks as Aroclor-1254

NT = No Established EPA Toxicity Factors Exist for this Compound, NA = Not Applicable for Dermal Toxicity as per EPA Region I

RME = Reasonable Maximum Exposure