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NSY PORTSMOUTH
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RISK ASSESSMENT GUIDANCE FOR SUPERFUN (RAGS) PART D TABLE 7S FOR CTE FOR INCLUDION IN APPENDIX D.1 FINAL REMEDIAL INVESTIGATION REPORT OPERABLE UNIT 7 (OU7) SITE 32 WITH TRASNMITTAL NSY PORTSMOUTH ME
12/11/2012
TETRA TECH

TETRA TECH

PITT-12-12-018

December 11, 2012

Project Number 112G02100

Mr. Matthew Audet
USEPA, Region 1
5 Post Office Square
Suite 100
Mail Code OSRR07-3
Boston, Massachusetts 02109-3912

Mr. Iver McLeod
Maine Department of Environmental Protection
State House Station 17
Augusta, Maine 04333-0017

Reference: Contract No. N62470-08-D-1001 (CLEAN)
Contract Task Order No. WE26

Subject: RAGS Part D Table 7s for CTE for inclusion in Appendix D.1 of the Final RI Report for Operable Unit 7
Portsmouth Naval Shipyard (PNS), Kittery, Maine

Dear Mr. Audet/Mr. McLeod:

On behalf of the U.S. Navy, Tetra Tech, Inc. is pleased to provide to the U.S. Environmental Protection Agency Region I (USEPA) and to the Maine Department of Environmental Protection (MEDEP) 2 and 3 copies, respectively, of the RAGS Part D Table 7s for Central Tendency Exposure (CTE) for inclusion in Appendix D.1 (RAGS-Part D Tables) of the July 2011 Final Remedial Investigation (RI) Report for Operable Unit 7 (OU7) at Portsmouth Naval Shipyard, Kittery, Maine. Risk information from these tables was summarized in Table 6-2 of the RI Report for OU7. The attached tables are the ones that are listed on the flysheet that provides the list of tables for RAGS Part D Table 7 under CTE (Tables 7.1 CTE to 7.6 CTE) within Appendix D.1. Electronic copy of these tables will be provided via electronic mail.

If you have any comments or questions, or if additional information is required, please contact Ms. Elizabeth Middleton at 757.341.1985.

For the Community Restoration Advisory Board (RAB) members; if you have any comments or questions on these issues, they can be provided to the Navy at a RAB meeting, by calling the Public Affairs office at 207.438.1140 or by writing to:

Portsmouth Naval Shipyard
Public Affairs Office
Attn: Danna Eddy
Portsmouth, NH 03804-5000

Sincerely,

Deborah J. Cohen, P.E.
Project Manager

DJC/clm
Enclosure

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Tables 7.1 to 7.6 CTE Files

For inclusion in Appendix D.1 of the

Remedial Investigation Report for Operable Unit 7

Portsmouth Naval Shipyard

Kittery, Maine

July 2011

APPENDIX D

SUPPORTING INFORMATION FOR HEALTH RISK ASSESSMENT

APPENDIX D.1

RAGS-PART D TABLES

RAGS Part D Table 7

Calculation Of Cancer Risks and Non-Cancer Hazards

LIST OF TABLES
RAGS PART D TABLE 7
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

Table No.	
	REASONABLE MAXIMUM EXPOSURES
7.1A.RME	Construction Workers - Entire Site Surface/Subsurface Soil
7.1B.RME	Construction Workers - Former Location of Buidling 237 Subsurface Soil
7.2.RME	Occupational Workers - Entire Site Surface Soil
7.3.RME	Adult Recreational Users - Entire Site Surface Soil & Sediment
7.4.RME	Adolescent Recreational Users - Entire Site Surface Soil & Sediment
7.5.RME	Adult Residents - Entire Site Surface Soil
7.6.RME	Child Residents - Entire Site Surface Soil
	CENTRAL TENDENCY EXPOSURES
7.1A.CTE	Construction Workers - Entire Site Surface/Subsurface Soil
7.1B.CTE	Construction Workers - Former Location of Building 237 Subsurface Soil
7.2.CTE	Occupational Workers - Entire Site Surface Soil
7.3.CTE	Adult Recreational Users - Entire Site Surface Soil & Sediment
7.4.CTE	Adolescent Recreational Users - Entire Site Surface Soil & Sediment
7.5.CTE	Adult Residents - Entire Site Surface Soil
7.6.CTE	Child Residents - Entire Site Surface Soil

TABLE 7.1A.CTE
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURES
PORTSMOUTH NAVAL SHIPYARD OPERABLE UNIT 7 REMEDIAL INVESTIGATION

Scenario Timeframe: Current
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	OU7	Ingestion	Benzo(a)pyrene Equivalents	1.80	mg/kg	5.0E-08	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	3.6E-07	3.5E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Aroclor-1248	1.50	mg/kg	4.2E-08	(mg/kg/day)	2.0E+00	$(mg/kg/day)^{-1}$	8.3E-08	2.9E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Barium	335	mg/kg	9.3E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	6.5E-04	(mg/kg/day)	2.0E-01	(mg/kg/day)	0.003
				Chromium	62.2	mg/kg	1.7E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.2E-04	(mg/kg/day)	1.5E+00	(mg/kg/day)	0.00008
				Copper	1,030	mg/kg	2.9E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.0E-03	(mg/kg/day)	4.0E-02	(mg/kg/day)	0.05
				Iron	34,200	mg/kg	9.5E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	6.6E-02	(mg/kg/day)	7.0E-01	(mg/kg/day)	0.09
				Lead	510	mg/kg	1.4E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	9.9E-04	(mg/kg/day)	NA	(mg/kg/day)	--
				Mercury	2.10	mg/kg	5.8E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	4.1E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.01
				Thallium	0.480	mg/kg	1.3E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	9.3E-07	(mg/kg/day)	1.0E-05	(mg/kg/day)	0.09
			Exp. Route Total								4.5E-07					0.3
			Dermal	Benzo(a)pyrene Equivalents	1.80	mg/kg	6.5E-09	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	4.7E-08	4.5E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Aroclor-1248	1.50	mg/kg	5.8E-09	(mg/kg/day)	2.0E+00	$(mg/kg/day)^{-1}$	1.2E-08	4.1E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Barium	335	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	1.4E-02	(mg/kg/day)	--
				Chromium	62.2	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	2.0E-02	(mg/kg/day)	--
				Copper	1,030	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	34,200	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	7.0E-01	(mg/kg/day)	--
				Lead	510	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Mercury	2.10	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	2.1E-05	(mg/kg/day)	--
				Thallium	0.480	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	1.0E-05	(mg/kg/day)	--
			Exp. Route Total								5.9E-08					--
		Exposure Point Total									5.1E-07					0.3
	Exposure Medium Total										5.1E-07					0.3
	Air	OU7	Inhalation	Benzo(a)pyrene Equivalents	1.3E-6	mg/m^3	2.5E-09	(mg/m^3)	1.1E-03	$(ug/m^3)^{-1}$	2.7E-09	1.7E-07	(mg/m^3)	NA	(mg/m^3)	--
				Aroclor-1248	1.0E-6	mg/m^3	2.1E-09	(mg/m^3)	5.7E-04	$(ug/m^3)^{-1}$	1.2E-09	1.4E-07	(mg/m^3)	NA	(mg/m^3)	--
				Barium	2.3E-4	mg/m^3	4.6E-07	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	3.2E-05	(mg/m^3)	5.0E-04	(mg/m^3)	0.06
				Chromium	4.3E-5	mg/m^3	8.5E-08	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	6.0E-06	(mg/m^3)	NA	(mg/m^3)	--
				Copper	7.2E-4	mg/m^3	1.4E-06	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	9.9E-05	(mg/m^3)	NA	(mg/m^3)	--
				Iron	0.024	mg/m^3	4.7E-05	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	3.3E-03	(mg/m^3)	NA	(mg/m^3)	--
				Lead	3.6E-4	mg/m^3	7.0E-07	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	4.9E-05	(mg/m^3)	NA	(mg/m^3)	--
				Mercury	1.5E-6	mg/m^3	2.9E-09	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	2.0E-07	(mg/m^3)	3.0E-05	(mg/m^3)	0.007
				Thallium	3.4E-7	mg/m^3	6.6E-10	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	4.6E-08	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								3.9E-09					0.07
		Exposure Point Total									3.9E-09					0.07
	Exposure Medium Total										3.9E-09					0.07
Medium Total											5.1E-07					0.3
Subsurface Soil	Subsurface Soil	OU7	Ingestion	Benzo(a)pyrene Equivalents	1.10	mg/kg	3.0E-08	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	2.2E-07	2.1E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Aroclor-1248	41.0	mg/kg	1.1E-06	(mg/kg/day)	2.0E+00	$(mg/kg/day)^{-1}$	2.3E-06	7.9E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				Aroclor-1260	4.60	mg/kg	1.3E-07	(mg/kg/day)	2.0E+00	$(mg/kg/day)^{-1}$	2.5E-07	8.9E-06	(mg/kg/day)	2.0E-05	(mg/kg/day)	0.4
				2,3,7,8-TCDD Equivalents	0.001	mg/kg	3.6E-11	(mg/kg/day)	1.3E+05	$(mg/kg/day)^{-1}$	4.7E-06	2.5E-09	(mg/kg/day)	1.0E-09	(mg/kg/day)	2.5
				Antimony	182	mg/kg	5.0E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.5E-04	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.9
				Barium	280	mg/kg	7.7E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	5.4E-04	(mg/kg/day)	2.0E-01	(mg/kg/day)	0.003
				Cadmium	5.10	mg/kg	1.4E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	9.9E-06	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.010
				Chromium	290	mg/kg	8.0E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	5.6E-04	(mg/kg/day)	1.5E+00	(mg/kg/day)	0.0004
				Cobalt	15.9	mg/kg	4.4E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.1E-05	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.1
				Copper	6,020	mg/kg	1.7E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.2E-02	(mg/kg/day)	4.0E-02	(mg/kg/day)	0.3
				Iron	97,100	mg/kg	2.7E-03	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.9E-01	(mg/kg/day)	7.0E-01	(mg/kg/day)	0.3
				Lead	1,600	mg/kg	4.4E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.1E-03	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese	969	mg/kg	2.7E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.9E-03	(mg/kg/day)	1.4E-01	(mg/kg/day)	0.01
				Mercury	9.40	mg/kg	2.6E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.8E-05	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.06
				Nickel	484	mg/kg	1.3E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	9.4E-04	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.05
				Thallium	0.890	mg/kg	2.5E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.7E-06	(mg/kg/day)	1.0E-05	(mg/kg/day)	0.2
				Zinc	2,600	mg/kg	7.2E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	5.0E-03	(mg/kg/day)	3.0E-01	(mg/kg/day)	0.02
			Exp. Route Total								7.4E-06					4.8

TABLE 7.1A.CTE
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURES
PORTSMOUTH NAVAL SHIPYARD OPERABLE UNIT 7 REMEDIAL INVESTIGATION

Scenario Timeframe: Current
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Subsurface Soil	Subsurface Soil	OU7	Dermal	Benzo(a)pyrene Equivalents	1.10	mg/kg	4.0E-09	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	2.9E-08	2.8E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Aroclor-1248	41.0	mg/kg	1.6E-07	(mg/kg/day)	2.0E+00	$(mg/kg/day)^{-1}$	3.2E-07	1.1E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				Aroclor-1260	4.60	mg/kg	1.8E-08	(mg/kg/day)	2.0E+00	$(mg/kg/day)^{-1}$	3.6E-08	1.2E-06	(mg/kg/day)	2.0E-05	(mg/kg/day)	0.06
				2,3,7,8-TCDD Equivalents	0.001	mg/kg	1.1E-12	(mg/kg/day)	1.3E+05	$(mg/kg/day)^{-1}$	1.4E-07	7.6E-11	(mg/kg/day)	1.0E-09	(mg/kg/day)	0.08
				Antimony	182	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	6.0E-05	(mg/kg/day)	--
				Barium	280	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	1.4E-02	(mg/kg/day)	--
				Cadmium	5.10	mg/kg	1.4E-10	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	9.9E-09	(mg/kg/day)	2.5E-05	(mg/kg/day)	0.0004
				Chromium	290	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	2.0E-02	(mg/kg/day)	--
				Cobalt	15.9	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-04	(mg/kg/day)	--
				Copper	6,020	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	97,100	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	7.0E-01	(mg/kg/day)	--
				Lead	1,600	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese	969	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	5.6E-03	(mg/kg/day)	--
				Mercury	9.40	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	2.1E-05	(mg/kg/day)	--
				Nickel	484	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	8.0E-04	(mg/kg/day)	--
				Thallium	0.890	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	1.0E-05	(mg/kg/day)	--
				Zinc	2,600	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	3.0E-01	(mg/kg/day)	--
			Exp. Route Total								5.2E-07					0.1
		Exposure Point Total									7.9E-06					5.0
	Exposure Medium Total										7.9E-06					5.0
	Air	OU7	Inhalation	Benzo(a)pyrene Equivalents	7.7E-7	mg/m^3	1.5E-09	(mg/m^3)	1.1E-03	$(ug/m^3)^{-1}$	1.7E-09	1.1E-07	(mg/m^3)	NA	(mg/m^3)	--
				Aroclor-1248	2.9E-5	mg/m^3	5.6E-08	(mg/m^3)	5.7E-04	$(ug/m^3)^{-1}$	3.2E-08	3.9E-06	(mg/m^3)	NA	(mg/m^3)	--
				Aroclor-1260	3.2E-6	mg/m^3	6.3E-09	(mg/m^3)	5.7E-04	$(ug/m^3)^{-1}$	3.6E-09	4.4E-07	(mg/m^3)	NA	(mg/m^3)	--
				2,3,7,8-TCDD Equivalents	9.1E-10	mg/m^3	1.8E-12	(mg/m^3)	3.8E+01	$(ug/m^3)^{-1}$	6.8E-08	1.2E-10	(mg/m^3)	4.0E-08	(mg/m^3)	0.003
				Antimony	1.3E-4	mg/m^3	2.5E-07	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.7E-05	(mg/m^3)		(mg/m^3)	--
				Barium	2.0E-4	mg/m^3	3.8E-07	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	2.7E-05	(mg/m^3)	5.0E-04	(mg/m^3)	0.05
				Cadmium	3.6E-6	mg/m^3	7.0E-09	(mg/m^3)	1.8E-03	$(ug/m^3)^{-1}$	1.3E-08	4.9E-07	(mg/m^3)	2.0E-05	(mg/m^3)	0.02
				Chromium	2.0E-4	mg/m^3	4.0E-07	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	2.8E-05	(mg/m^3)	NA	(mg/m^3)	--
				Cobalt	1.1E-5	mg/m^3	2.2E-08	(mg/m^3)	9.0E-03	$(ug/m^3)^{-1}$	2.0E-07	1.5E-06	(mg/m^3)	6.0E-06	(mg/m^3)	0.3
				Copper	0.004	mg/m^3	8.2E-06	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	5.8E-04	(mg/m^3)	NA	(mg/m^3)	--
				Iron	0.068	mg/m^3	1.3E-04	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	9.3E-03	(mg/m^3)	NA	(mg/m^3)	--
				Lead	0.001	mg/m^3	2.2E-06	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.5E-04	(mg/m^3)	NA	(mg/m^3)	--
				Manganese	6.8E-4	mg/m^3	1.3E-06	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	9.3E-05	(mg/m^3)	5.0E-05	(mg/m^3)	1.9
				Mercury	6.6E-6	mg/m^3	1.3E-08	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	9.0E-07	(mg/m^3)	3.0E-05	(mg/m^3)	0.03
				Nickel	3.4E-4	mg/m^3	6.6E-07	(mg/m^3)	2.6E-04	$(ug/m^3)^{-1}$	1.7E-07	4.6E-05	(mg/m^3)	9.0E-05	(mg/m^3)	0.5
				Thallium	6.2E-7	mg/m^3	1.2E-09	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	8.5E-08	(mg/m^3)	NA	(mg/m^3)	--
				Zinc	0.002	mg/m^3	3.6E-06	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	2.5E-04	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								4.9E-07					2.7
		Exposure Point Total									4.9E-07					2.7
	Exposure Medium Total										4.9E-07					2.7
Medium Total											8.4E-06					7.7
Groundwater	Groundwater	OU7	Dermal	Thallium	66.10	mg/kg	3.7E-09	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.6E-07	(mg/kg/day)	1.0E-05	(mg/kg/day)	0.03
			Exp. Route Total								- -					0.03
		Exposure Point Total									- -					0.03
	Exposure Medium Total										- -					0.03
Medium Total											- -					0.03
										Total of Receptor Risks Across All Media	8.9E-06				Total of Receptor Hazards Across All Media	8.1

TABLE 7.1.B.CTE
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURES
PORTSMOUTH NAVAL SHIPYARD OPERABLE UNIT 7 REMEDIAL INVESTIGATION

Scenario Timeframe: Current
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	OU7	Ingestion	Aroclor-1254	0.280	mg/kg	7.7E-09	(mg/kg/day)	2.0E+00	$(mg/kg/day)^{-1}$	1.5E-08	5.4E-07	(mg/kg/day)	2.0E-05	(mg/kg/day)	0.03
			Exp. Route Total								1.5E-08					0.03
			Dermal	Aroclor-1254	0.280	mg/kg	1.1E-09	(mg/kg/day)	2.0E+00	$(mg/kg/day)^{-1}$	2.2E-09	7.6E-08	(mg/kg/day)	2.0E-05	(mg/kg/day)	0.004
			Exp. Route Total								2.2E-09					0.004
		Exposure Point Total									1.8E-08					0.03
	Exposure Medium Total										1.8E-08					0.03
	Air	OU7	Inhalation	Aroclor-1254	2.0E-7	mg/m^3	3.8E-10	(mg/m^3)	5.7E-04	$(ug/m^3)^{-1}$	2.2E-10	2.7E-08	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								2.2E-10					--
		Exposure Point Total									2.2E-10					--
	Exposure Medium Total										2.2E-10					--
Medium Total											1.8E-08					0.03
Subsurface Soil	Subsurface Soil	OU7	Ingestion	Benzo(a)pyrene Equivalents	0.250	mg/kg	6.9E-09	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	5.1E-08	4.8E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese	405	mg/kg	1.1E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	7.8E-04	(mg/kg/day)	1.4E-01	(mg/kg/day)	0.006
			Exp. Route Total								5.1E-08					0.006
			Dermal	Benzo(a)pyrene Equivalents	0.250	mg/kg	9.0E-10	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	6.6E-09	6.3E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese	405	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	5.6E-03	(mg/kg/day)	--
			Exp. Route Total								6.6E-09					--
		Exposure Point Total									5.7E-08					0.006
	Exposure Medium Total										5.7E-08					0.006
	Air	OU7	Inhalation	Benzo(a)pyrene Equivalents	1.7E-7	mg/m^3	3.4E-10	(mg/m^3)	1.1E-03	$(ug/m^3)^{-1}$	3.8E-10	2.4E-08	(mg/m^3)	NA	(mg/m^3)	--
				Manganese	2.8E-4	mg/m^3	5.5E-07	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	3.9E-05	(mg/m^3)	5.0E-05	(mg/m^3)	0.8
			Exp. Route Total								3.8E-10					0.8
		Exposure Point Total									3.8E-10					0.8
	Exposure Medium Total										3.8E-10					0.8
Medium Total											5.7E-08					0.8
Total of Receptor Risks Across All Media											7.5E-08	Total of Receptor Hazards Across All Media				0.8

TABLE 7.2.CTE
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURES
PORTSMOUTH NAVAL SHIPYARD OPERABLE UNIT 7 REMEDIAL INVESTIGATION

Scenario Timeframe: Current
Receptor Population: Occupational Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	OU7	Ingestion	Benzo(a)pyrene Equivalents	1.80	mg/kg	9.9E-08	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	7.2E-07	7.7E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Aroclor-1248	1.50	mg/kg	8.3E-08	(mg/kg/day)	2.0E+00	$(mg/kg/day)^{-1}$	1.7E-07	6.4E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Barium	335	mg/kg	1.8E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.4E-04	(mg/kg/day)	2.0E-01	(mg/kg/day)	0.0007
				Copper	1,030	mg/kg	5.7E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	4.4E-04	(mg/kg/day)	4.0E-02	(mg/kg/day)	0.01
				Iron	34,200	mg/kg	1.9E-03	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.5E-02	(mg/kg/day)	7.0E-01	(mg/kg/day)	0.02
				Lead	510	mg/kg	2.8E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.2E-04	(mg/kg/day)	NA	(mg/kg/day)	--
				Mercury	2.10	mg/kg	1.2E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	9.0E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.003
				Thallium	0.480	mg/kg	2.6E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.1E-07	(mg/kg/day)	1.0E-05	(mg/kg/day)	0.02
			Exp. Route Total								8.9E-07					0.06
			Dermal	Benzo(a)pyrene Equivalents	1.80	mg/kg	1.7E-08	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	1.2E-07	1.3E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Aroclor-1248	1.50	mg/kg	1.5E-08	(mg/kg/day)	2.0E+00	$(mg/kg/day)^{-1}$	3.1E-08	1.2E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Barium	335	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	1.4E-02	(mg/kg/day)	--
				Copper	1,030	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	34,200	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	7.0E-01	(mg/kg/day)	--
				Lead	510	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Mercury	2.10	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	2.1E-05	(mg/kg/day)	--
				Thallium	0.480	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	1.0E-05	(mg/kg/day)	--
			Exp. Route Total								1.5E-07					--
		Exposure Point Total									1.0E-06					0.06
	Exposure Medium Total										1.0E-06					0.06
	Air	OU7	Inhalation	Benzo(a)pyrene Equivalents	1.6E-10	mg/m^3	4.2E-12	(mg/m^3)	1.1E-03	$(ug/m^3)^{-1}$	4.6E-12	3.3E-11	(mg/m^3)	NA	(mg/m^3)	--
				Aroclor-1248	1.4E-10	mg/m^3	3.5E-12	(mg/m^3)	5.7E-04	$(ug/m^3)^{-1}$	2.0E-12	2.7E-11	(mg/m^3)	NA	(mg/m^3)	--
				Barium	3.0E-8	mg/m^3	7.8E-10	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	6.1E-09	(mg/m^3)	5.0E-04	(mg/m^3)	0.00001
				Copper	9.4E-8	mg/m^3	2.4E-09	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.9E-08	(mg/m^3)	NA	(mg/m^3)	--
				Iron	3.1E-6	mg/m^3	8.0E-08	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	6.2E-07	(mg/m^3)	NA	(mg/m^3)	--
				Lead	4.6E-8	mg/m^3	1.2E-09	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	9.3E-09	(mg/m^3)	NA	(mg/m^3)	--
				Mercury	1.9E-10	mg/m^3	4.9E-12	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	3.8E-11	(mg/m^3)	3.0E-05	(mg/m^3)	0.0000013
				Thallium	4.4E-11	mg/m^3	1.1E-12	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	8.7E-12	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								6.6E-12					0.00001
		Exposure Point Total									6.6E-12					0.00001
	Exposure Medium Total										6.6E-12					0.00001
Medium Total											1.0E-06					0.06

TABLE 7.3.CTE
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURES
PORTSMOUTH NAVAL SHIPYARD OPERABLE UNIT 7 REMEDIAL INVESTIGATION

Scenario Timeframe: Current
Receptor Population: Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	OU7	Ingestion	Benzo(a)pyrene Equivalents	1.80	mg/kg	3.2E-08	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	2.3E-07	3.2E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Aroclor-1248	1.50	mg/kg	2.6E-08	(mg/kg/day)	2.0E+00	$(mg/kg/day)^{-1}$	5.3E-08	2.6E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Barium	335	mg/kg	5.9E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	5.9E-05	(mg/kg/day)	2.0E-01	(mg/kg/day)	0.0003
				Copper	1,030	mg/kg	1.8E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.8E-04	(mg/kg/day)	4.0E-02	(mg/kg/day)	0.005
				Iron	34,200	mg/kg	6.0E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	6.0E-03	(mg/kg/day)	7.0E-01	(mg/kg/day)	0.009
				Lead	510	mg/kg	9.0E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	9.0E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				Mercury	2.10	mg/kg	3.7E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.7E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.001
				Thallium	0.480	mg/kg	8.5E-09	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	8.5E-08	(mg/kg/day)	1.0E-05	(mg/kg/day)	0.008
			Exp. Route Total								2.8E-07					0.02
			Dermal	Benzo(a)pyrene Equivalents	1.80	mg/kg	4.7E-09	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	3.4E-08	4.7E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Aroclor-1248	1.50	mg/kg	4.2E-09	(mg/kg/day)	2.0E+00	$(mg/kg/day)^{-1}$	8.4E-09	4.2E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				Barium	335	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	1.4E-02	(mg/kg/day)	--
				Copper	1,030	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	34,200	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	7.0E-01	(mg/kg/day)	--
				Lead	510	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Mercury	2.10	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	2.1E-05	(mg/kg/day)	--
				Thallium	0.480	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	1.0E-05	(mg/kg/day)	--
			Exp. Route Total								4.3E-08					--
		Exposure Point Total									3.3E-07					0.02
	Exposure Medium Total										3.3E-07					0.02
	Air	OU7	Inhalation	Benzo(a)pyrene Equivalents	1.9E-10	mg/m^3	3.9E-13	(mg/m^3)	1.1E-03	$(ug/m^3)^{-1}$	4.3E-13	3.9E-12	(mg/m^3)	NA	(mg/m^3)	--
				Aroclor-1248	1.6E-10	mg/m^3	3.3E-13	(mg/m^3)	5.7E-04	$(ug/m^3)^{-1}$	1.9E-13	3.3E-12	(mg/m^3)	NA	(mg/m^3)	--
				Barium	3.6E-8	mg/m^3	7.3E-11	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	7.3E-10	(mg/m^3)	5.0E-04	(mg/m^3)	0.000001
				Copper	1.1E-7	mg/m^3	2.3E-10	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	2.3E-09	(mg/m^3)	NA	(mg/m^3)	--
				Iron	3.6E-6	mg/m^3	7.5E-09	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	7.5E-08	(mg/m^3)	NA	(mg/m^3)	--
				Lead	5.4E-8	mg/m^3	1.1E-10	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.1E-09	(mg/m^3)	NA	(mg/m^3)	--
				Mercury	2.2E-10	mg/m^3	4.6E-13	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	4.6E-12	(mg/m^3)	3.0E-05	(mg/m^3)	0.0000002
				Thallium	5.1E-11	mg/m^3	1.1E-13	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.1E-12	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								6.2E-13					0.000002
		Exposure Point Total									6.2E-13					0.000002
	Exposure Medium Total										6.2E-13					0.000002
Medium Total											3.3E-07					0.02
Sediment	Sediment	OU7	Ingestion	Benzo(a)pyrene Equivalents	1.20	mg/kg	9.4E-10	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	6.9E-09	9.4E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				TEQ PCB	0.002	mg/kg	1.3E-12	(mg/kg/day)	1.3E+05	$(mg/kg/day)^{-1}$	1.6E-07	1.3E-11	(mg/kg/day)	1.0E-09	(mg/kg/day)	0.01
				Total PCB Congeners	0.420	mg/kg	3.3E-10	(mg/kg/day)	2.0E+00	$(mg/kg/day)^{-1}$	6.6E-10	3.3E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Arsenic	14.5	mg/kg	1.1E-08	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	1.7E-08	1.1E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0004
				Chromium	150	mg/kg	1.2E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.2E-06	(mg/kg/day)	1.5E+00	(mg/kg/day)	0.0000008
				Iron	45,900	mg/kg	3.6E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.6E-04	(mg/kg/day)	7.0E-01	(mg/kg/day)	0.0005
				Lead	187	mg/kg	1.5E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.5E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese	468	mg/kg	3.7E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.7E-06	(mg/kg/day)	1.4E-01	(mg/kg/day)	0.00003
			Exp. Route Total								1.9E-07					0.01
			Dermal	Benzo(a)pyrene Equivalents	1.20	mg/kg	1.4E-10	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	1.0E-09	1.4E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				TEQ PCB	0.002	mg/kg	4.3E-14	(mg/kg/day)	1.3E+05	$(mg/kg/day)^{-1}$	5.6E-09	4.3E-13	(mg/kg/day)	1.0E-09	(mg/kg/day)	0.0004
				Total PCB Congeners	0.420	mg/kg	5.2E-11	(mg/kg/day)	2.0E+00	$(mg/kg/day)^{-1}$	1.0E-10	5.2E-10	(mg/kg/day)	NA	(mg/kg/day)	--
				Arsenic	14.5	mg/kg	3.9E-10	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	5.8E-10	3.9E-09	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.00001
				Chromium	150	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	2.0E-02	(mg/kg/day)	--
				Iron	45,900	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	7.0E-01	(mg/kg/day)	--
				Lead	187	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese	468	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	5.6E-03	(mg/kg/day)	--
			Exp. Route Total								7.3E-09					0.0004
		Exposure Point Total									1.9E-07					0.01
	Exposure Medium Total										1.9E-07					0.01
Medium Total											1.9E-07					0.01

TABLE 7.4.CTE
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURES
PORTSMOUTH NAVAL SHIPYARD OPERABLE UNIT 7 REMEDIAL INVESTIGATION

Scenario Timeframe: Current
Receptor Population: Recreational User
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	OU7	Ingestion	Benzo(a)pyrene Equivalents	1.80	mg/kg	1.1E-07	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	7.7E-07	4.9E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Aroclor-1248	1.50	mg/kg	2.9E-08	(mg/kg/day)	2.0E+00	$(mg/kg/day)^{-1}$	5.9E-08	4.1E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Barium	335	mg/kg	6.6E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	9.2E-05	(mg/kg/day)	2.0E-01	(mg/kg/day)	0.0005
				Copper	1,030	mg/kg	2.0E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.8E-04	(mg/kg/day)	4.0E-02	(mg/kg/day)	0.007
				Iron	34,200	mg/kg	6.7E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	9.4E-03	(mg/kg/day)	7.0E-01	(mg/kg/day)	0.01
				Lead	510	mg/kg	1.0E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.4E-04	(mg/kg/day)	NA	(mg/kg/day)	--
				Mercury	2.10	mg/kg	4.1E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	5.8E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.002
				Thallium	0.480	mg/kg	9.4E-09	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.3E-07	(mg/kg/day)	1.0E-05	(mg/kg/day)	0.01
			Exp. Route Total								8.3E-07					0.04
			Dermal	Benzo(a)pyrene Equivalents	1.80	mg/kg	4.5E-08	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	3.2E-07	2.1E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Aroclor-1248	1.50	mg/kg	1.3E-08	(mg/kg/day)	2.0E+00	$(mg/kg/day)^{-1}$	2.7E-08	1.9E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Barium	335	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	1.4E-02	(mg/kg/day)	--
				Copper	1,030	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	34,200	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	7.0E-01	(mg/kg/day)	--
				Lead	510	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Mercury	2.10	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	2.1E-05	(mg/kg/day)	--
				Thallium	0.480	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	1.0E-05	(mg/kg/day)	--
			Exp. Route Total								3.5E-07					--
		Exposure Point Total									1.2E-06					0.04
	Exposure Medium Total										1.2E-06					0.04
	Air	OU7	Inhalation	Benzo(a)pyrene Equivalents	1.9E-10	mg/m^3	8.5E-13	(mg/m^3)	1.1E-03	$(ug/m^3)^{-1}$	9.3E-13	3.9E-12	(mg/m^3)	NA	(mg/m^3)	--
				Aroclor-1248	1.6E-10	mg/m^3	2.3E-13	(mg/m^3)	5.7E-04	$(ug/m^3)^{-1}$	1.3E-13	3.3E-12	(mg/m^3)	NA	(mg/m^3)	--
				Barium	3.6E-8	mg/m^3	5.2E-11	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	7.3E-10	(mg/m^3)	5.0E-04	(mg/m^3)	0.000001
				Copper	1.1E-7	mg/m^3	1.6E-10	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	2.3E-09	(mg/m^3)	NA	(mg/m^3)	--
				Iron	3.6E-6	mg/m^3	5.4E-09	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	7.5E-08	(mg/m^3)	NA	(mg/m^3)	--
				Lead	5.4E-8	mg/m^3	8.0E-11	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.1E-09	(mg/m^3)	NA	(mg/m^3)	--
				Mercury	2.2E-10	mg/m^3	3.3E-13	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	4.6E-12	(mg/m^3)	3.0E-05	(mg/m^3)	0.0000002
				Thallium	5.1E-11	mg/m^3	7.5E-14	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.1E-12	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								1.1E-12					0.000002
		Exposure Point Total									1.1E-12					0.000002
	Exposure Medium Total										1.1E-12					0.000002
Medium Total											1.2E-06					0.04
Sediment	Sediment	OU7	Ingestion	Benzo(a)pyrene Equivalents	1.20	mg/kg	3.1E-09	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	2.3E-08	1.5E-08	(mg/kg/day)	NA	(mg/kg/day)	--
				TEQ PCB	0.002	mg/kg	1.4E-12	(mg/kg/day)	1.3E+05	$(mg/kg/day)^{-1}$	1.8E-07	1.9E-11	(mg/kg/day)	1.0E-09	(mg/kg/day)	0.02
				Total PCB Congeners	0.420	mg/kg	3.7E-10	(mg/kg/day)	2.0E+00	$(mg/kg/day)^{-1}$	7.3E-10	5.1E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Arsenic	14.5	mg/kg	1.3E-08	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	1.9E-08	1.8E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0006
				Chromium	150	mg/kg	1.3E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.8E-06	(mg/kg/day)	1.5E+00	(mg/kg/day)	0.000001
				Iron	45,900	mg/kg	4.0E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	5.6E-04	(mg/kg/day)	7.0E-01	(mg/kg/day)	0.0008
				Lead	187	mg/kg	1.6E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.3E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese	468	mg/kg	4.1E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	5.7E-06	(mg/kg/day)	1.4E-01	(mg/kg/day)	0.00004
			Exp. Route Total								2.2E-07					0.02
			Dermal	Benzo(a)pyrene Equivalents	1.20	mg/kg	1.3E-09	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	9.6E-09	6.2E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				TEQ PCB	0.002	mg/kg	1.4E-13	(mg/kg/day)	1.3E+05	$(mg/kg/day)^{-1}$	1.8E-08	1.9E-12	(mg/kg/day)	1.0E-09	(mg/kg/day)	0.002
				Total PCB Congeners	0.420	mg/kg	1.7E-10	(mg/kg/day)	2.0E+00	$(mg/kg/day)^{-1}$	3.3E-10	2.3E-09	(mg/kg/day)	NA	(mg/kg/day)	--
				Arsenic	14.5	mg/kg	1.2E-09	(mg/kg/day)	1.5E+00	$(mg/kg/day)^{-1}$	1.8E-09	1.7E-08	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.00006
				Chromium	150	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	2.0E-02	(mg/kg/day)	--
				Iron	45,900	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	7.0E-01	(mg/kg/day)	--
				Lead	187	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Manganese	468	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	5.6E-03	(mg/kg/day)	--
			Exp. Route Total								2.9E-08					0.002
		Exposure Point Total									2.5E-07					0.02
	Exposure Medium Total										2.5E-07					0.02
Medium Total											2.5E-07					0.02

TABLE 7.4.CTE
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURES
PORTSMOUTH NAVAL SHIPYARD OPERABLE UNIT 7 REMEDIAL INVESTIGATION

Scenario Timeframe: Current
Receptor Population: Recreational User
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Total of Receptor Risks Across All Media											1.4E-06	Total of Receptor Hazards Across All Media				0.06

TABLE 7.5.CTE
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURES
PORTSMOUTH NAVAL SHIPYARD OPERABLE UNIT 7 REMEDIAL INVESTIGATION

Scenario Timeframe: Current
Receptor Population: Residents
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	OU7	Ingestion	Benzo(a)pyrene Equivalents	1.80	mg/kg	1.3E-07	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	9.5E-07	8.2E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Aroclor-1248	1.50	mg/kg	6.9E-08	(mg/kg/day)	2.0E+00	$(mg/kg/day)^{-1}$	1.4E-07	6.9E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Barium	335	mg/kg	1.5E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.5E-04	(mg/kg/day)	2.0E-01	(mg/kg/day)	0.0008
				Copper	1,030	mg/kg	4.7E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	4.7E-04	(mg/kg/day)	4.0E-02	(mg/kg/day)	0.01
				Iron	34,200	mg/kg	1.6E-03	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.6E-02	(mg/kg/day)	7.0E-01	(mg/kg/day)	0.02
				Lead	510	mg/kg	2.3E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.3E-04	(mg/kg/day)	NA	(mg/kg/day)	--
				Mercury	2.10	mg/kg	9.6E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	9.6E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.003
				Thallium	0.480	mg/kg	2.2E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.2E-07	(mg/kg/day)	1.0E-05	(mg/kg/day)	0.02
			Exp. Route Total								1.1E-06					0.06
			Dermal	Benzo(a)pyrene Equivalents	1.80	mg/kg	1.9E-08	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	1.4E-07	1.2E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Aroclor-1248	1.50	mg/kg	1.1E-08	(mg/kg/day)	2.0E+00	$(mg/kg/day)^{-1}$	2.2E-08	1.1E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Barium	335	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	1.4E-02	(mg/kg/day)	--
				Copper	1,030	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	34,200	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	7.0E-01	(mg/kg/day)	--
				Lead	510	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Mercury	2.10	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	2.1E-05	(mg/kg/day)	--
				Thallium	0.480	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	1.0E-05	(mg/kg/day)	--
			Exp. Route Total								1.6E-07					--
		Exposure Point Total									1.2E-06					0.06
	Exposure Medium Total										1.2E-06					0.06
	Air	OU7	Inhalation	Benzo(a)pyrene Equivalents	1.9E-10	mg/m^3	1.9E-11	(mg/m^3)	1.1E-03	$(ug/m^3)^{-1}$	2.1E-11	1.2E-10	(mg/m^3)	NA	(mg/m^3)	--
				Aroclor-1248	1.6E-10	mg/m^3	1.0E-11	(mg/m^3)	5.7E-04	$(ug/m^3)^{-1}$	5.8E-12	1.0E-10	(mg/m^3)	NA	(mg/m^3)	--
				Barium	3.6E-8	mg/m^3	2.3E-09	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	2.3E-08	(mg/m^3)	5.0E-04	(mg/m^3)	0.00005
				Copper	1.1E-7	mg/m^3	7.0E-09	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	7.0E-08	(mg/m^3)	NA	(mg/m^3)	--
				Iron	3.6E-6	mg/m^3	2.3E-07	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	2.3E-06	(mg/m^3)	NA	(mg/m^3)	--
				Lead	5.4E-8	mg/m^3	3.5E-09	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	3.5E-08	(mg/m^3)	NA	(mg/m^3)	--
				Mercury	2.2E-10	mg/m^3	1.4E-11	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.4E-10	(mg/m^3)	3.0E-05	(mg/m^3)	0.0000048
				Thallium	5.1E-11	mg/m^3	3.3E-12	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	3.3E-11	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								2.7E-11					0.00005
		Exposure Point Total									2.7E-11					0.00005
	Exposure Medium Total										2.7E-11					0.00005
Medium Total											1.2E-06					0.06

TABLE 7.6.CTE
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURES
PORTSMOUTH NAVAL SHIPYARD OPERABLE UNIT 7 REMEDIAL INVESTIGATION

Scenario Timeframe: Current
Receptor Population: Residents
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	OU7	Ingestion	Benzo(a)pyrene Equivalents	1.80	mg/kg	1.4E-06	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	1.0E-05	7.7E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Aroclor-1248	1.50	mg/kg	1.8E-07	(mg/kg/day)	2.0E+00	$(mg/kg/day)^{-1}$	3.7E-07	6.4E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Barium	335	mg/kg	4.1E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.4E-03	(mg/kg/day)	2.0E-01	(mg/kg/day)	0.007
				Copper	1,030	mg/kg	1.3E-04	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	4.4E-03	(mg/kg/day)	4.0E-02	(mg/kg/day)	0.1
				Iron	34,200	mg/kg	4.2E-03	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.5E-01	(mg/kg/day)	7.0E-01	(mg/kg/day)	0.2
				Lead	510	mg/kg	6.2E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.2E-03	(mg/kg/day)	NA	(mg/kg/day)	--
				Mercury	2.10	mg/kg	2.6E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	9.0E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.03
				Thallium	0.480	mg/kg	5.9E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.1E-06	(mg/kg/day)	1.0E-05	(mg/kg/day)	0.2
			Exp. Route Total								1.1E-05					0.6
			Dermal	Benzo(a)pyrene Equivalents	1.80	mg/kg	2.1E-07	(mg/kg/day)	7.3E+00	$(mg/kg/day)^{-1}$	1.5E-06	1.1E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Aroclor-1248	1.50	mg/kg	2.9E-08	(mg/kg/day)	2.0E+00	$(mg/kg/day)^{-1}$	5.7E-08	1.0E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Barium	335	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	1.4E-02	(mg/kg/day)	--
				Copper	1,030	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	4.0E-02	(mg/kg/day)	--
				Iron	34,200	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	7.0E-01	(mg/kg/day)	--
				Lead	510	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Mercury	2.10	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	2.1E-05	(mg/kg/day)	--
				Thallium	0.480	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	1.0E-05	(mg/kg/day)	--
			Exp. Route Total								1.6E-06					--
		Exposure Point Total									1.2E-05					0.6
	Exposure Medium Total										1.2E-05					0.6
	Air	OU7	Inhalation	Benzo(a)pyrene Equivalents	1.9E-10	mg/m^3	2.3E-11	(mg/m^3)	1.1E-03	$(ug/m^3)^{-1}$	2.5E-11	1.2E-10	(mg/m^3)	NA	(mg/m^3)	--
				Aroclor-1248	1.6E-10	mg/m^3	2.9E-12	(mg/m^3)	5.7E-04	$(ug/m^3)^{-1}$	1.7E-12	1.0E-10	(mg/m^3)	NA	(mg/m^3)	--
				Barium	3.6E-8	mg/m^3	6.5E-10	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	2.3E-08	(mg/m^3)	5.0E-04	(mg/m^3)	0.00005
				Copper	1.1E-7	mg/m^3	2.0E-09	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	7.0E-08	(mg/m^3)	NA	(mg/m^3)	--
				Iron	3.6E-6	mg/m^3	6.7E-08	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	2.3E-06	(mg/m^3)	NA	(mg/m^3)	--
				Lead	5.4E-8	mg/m^3	1.0E-09	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	3.5E-08	(mg/m^3)	NA	(mg/m^3)	--
				Mercury	2.2E-10	mg/m^3	4.1E-12	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.4E-10	(mg/m^3)	3.0E-05	(mg/m^3)	0.0000048
				Thallium	5.1E-11	mg/m^3	9.4E-13	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	3.3E-11	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								2.7E-11					0.00005
		Exposure Point Total									2.7E-11					0.00005
	Exposure Medium Total										2.7E-11					0.00005
Medium Total											1.2E-05					0.6