

**Draft Technical Report
for
Tentative Cleanup and Abatement
Order No. ~~R9-2011-0001~~ R9-2012-0024**

APPENDIX FOR SECTION 28

**TIER II BASE RISK
ASSESSMENT FOR HUMAN HEALTH**

~~September 15, 2010~~ March 14, 2012

CHEMICALS OF POTENTIAL CONCERN IN FISH/SHELLFISH TISSUE FOR THE RECREATIONAL ANGLER

	Recreational Angler		Human Health Tissue Screening Level (ug/kg)
	Fillet Sand Bass Max Concentration (ug/kg)	Edible Tissue Lobster Max Concentration (ug/kg)	CR = 21 g/day, TRL = 10 ⁻⁶
Metals			
Arsenic, inorganic	28	532	1,000
Arsenic, inorganic	28	532	2.2
Cadmium	2.5 U	50	1,667
Chromium	50 U	50 U	10,000
Copper	460	17,900	123,333
Mercury, total	224	521	333
Nickel	20 U	50 U	66,667
Selenium	500	300	16,667
Silver	2 U	21	16,667
Zinc	4,900	32,400	1,000,000
Organometallic Compounds			
Tributyltin	23	9.6	1,000
Polycyclic Aromatic Hydrocarbons			
Naphthalene	5 U	5 U	66,667
Acenaphthene	5 U	5 U	200,000
Fluorene	5 U	5 U	133,333
Anthracene	5 U	5 U	1,000,000
Fluoranthene	5 U	5 U	133,333
Pyrene	5 U	5 U	66,667
Benz[a]anthracene	5 U	5 U	2.8
Chrysene	5 U	5 U	28
Benzo[b]fluoranthene	5 U	5 U	2.8
Benzo[k]fluoranthene	5 U	5 U	2.8
Benzo[a]pyrene	5 U	5 U	0.3
Indeno[1,2,3-cd]pyrene	5 U	5 U	2.8
Dibenz[a,h]anthracene	5 U	5 U	0.8
Polychlorinated Biphenyls			
Total PCBs	400	21	1.7
Total PCBs (as Aroclor 1254)	400	21	67

NOTE: Tissue concentrations bold faced and shaded are greater than the human health tissue screening levels.

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CHEMICALS OF POTENTIAL CONCERN IN FISH/SHELLFISH TISSUE FOR THE SUBSISTENCE ANGLER

	Subsistence Angler		Human Health Tissue Screening Level (ug/kg)
	Whole Body Sand Bass Max Concentration (ug/kg)	Whole Body Lobster Max Concentration (ug/kg)	CR = 161 g/day, TRL = 10 ⁻⁶
Metals			
Arsenic, inorganic	36	260	130
Arsenic, inorganic	36	260	0.3
Cadmium	40	230	217
Chromium	700	200 U	1,304
Copper	6,100	67,000	16,087
Mercury, total	200	59	43
Nickel	440	110	8,696
Selenium	1,000	400	2,174
Silver	41	260	2,174
Zinc	22,000	28,000	130,435
Organometallic Compounds			
Tributyltin	63	27	130
Polycyclic Aromatic Hydrocarbons			
Naphthalene	10 U	10 U	8,696
Acenaphthene	10 U	10 U	26,087
Fluorene	10 U	16	17,391
Anthracene	10 U	18	130,435
Fluoranthene	10 U	13	17,391
Pyrene	10 U	10 U	8,696
Benz[a]anthracene	10 U	10 U	0.4
Chrysene	10 U	10 U	3.6
Benzo[b]fluoranthene	10 U	10 U	0.4
Benzo[k]fluoranthene	10 U	10 U	0.4
Benzo[a]pyrene	10 U	10 U	0.04
Indeno[1,2,3-cd]pyrene	10 U	10 U	0.4
Dibenz[a,h]anthracene	10 U	10 U	0.1
Polychlorinated Biphenyls			
Total PCBs	2,100	76	0.2
Total PCBs (as Aroclor 1254)	2,100	76	8.7

NOTE: Tissue concentrations bold faced and shaded are greater than the human health tissue screening levels.

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RISKS TO THE RECREATIONAL ANGLER FROM FISH INSIDE THE NASSCO LEASEHOLD

Inside NASSCO Fillet Sand Bass

Recreational Angler:	C	CR	FI	ED	EF	BW	AT	CF	Dose (mg/kg - day)	RfD	CSF	Cancer Risk	Noncancer Risk
Metals													
Inorganic Arsenic (carcinogenic)	16	0.021	1	30	365	70	25550	1000	2.06E-06	--	1.5	3.09E-06	--
Polychlorinated Biphenyls													
Total PCBs (carcinogenic)	46	0.021	1	30	365	70	25550	1000	5.91E-06	--	2	1.18E-05	--
Total PCBs (noncarcinogenic)	46	0.021	1	30	365	70	10950	1000	1.38E-05	0.00002	--	--	6.90E-01

Reference 2240 Fillet Sand Bass

Recreational Angler:	C	CR	FI	ED	EF	BW	AT	CF	Dose (mg/kg - day)	RfD	CSF	Cancer Risk	Noncancer Risk
Metals													
Inorganic Arsenic (carcinogenic)	16	0.021	1	30	365	70	25550	1000	2.06E-06	--	1.5	3.09E-06	--
Polychlorinated Biphenyls													
Total PCBs (carcinogenic)	55	0.021	1	30	365	70	25550	1000	7.07E-06	--	2	1.41E-05	--
Total PCBs (noncarcinogenic)	55	0.021	1	30	365	70	10950	1000	1.65E-05	0.00002	--	--	8.25E-01

RISKS TO THE RECREATIONAL ANGLER FROM SHELLFISH INSIDE THE NASSCO LEASEHOLD

Inside NASSCO Edible Tissue Lobster

Recreational Angler:	C	CR	FI	ED	EF	BW	AT	CF	Dose (mg/kg - day)	RfD	CSF	Cancer Risk	Noncancer Risk
Metals													
Inorganic Arsenic (carcinogenic)	520	0.021	1	30	365	70	25550	1000	6.69E-05	--	1.5	1.00E-04	--
Total Mercury (noncarcinogenic)	520	0.021	1	30	365	70	10950	1000	1.56E-04	0.0001	--	--	1.56E+00
Polychlorinated Biphenyls													
Total PCBs (carcinogenic)	20	0.021	1	30	365	70	25550	1000	2.57E-06	--	2	5.14E-06	

Reference 2230 Edible Tissue Lobster

Recreational Angler:	C	CR	FI	ED	EF	BW	AT	CF	Dose (mg/kg - day)	RfD	CSF	Cancer Risk	Noncancer Risk
Metals													
Inorganic Arsenic (carcinogenic)	176	0.021	1	30	365	70	25550	1000	2.26E-05	--	1.5	3.39E-05	--
Total Mercury (noncarcinogenic)	110	0.021	1	30	365	70	10950	1000	3.30E-05	0.0001	--	--	3.30E-01
Polychlorinated Biphenyls													
Total PCBs (carcinogenic)	20	0.021	1	30	365	70	25550	1000	2.57E-06	--	2	5.14E-06	

RISKS TO THE SUBSISTENCE ANGLER FROM FISH INSIDE THE NASSCO LEASEHOLD

Inside NASSCO Whole Body Sand Bass

Subsistence Angler:	C	CR	FI	ED	EF	BW	AT	CF	Dose (mg/kg - day)	RfD	CSF	Cancer Risk	Noncancer Risk
Metals													
Inorganic Arsenic (carcinogenic)	24	0.161	1	30	365	70	25550	1000	2.37E-05	--	1.5	3.55E-05	--
Total Mercury	180	0.161	1	30	365	70	10950	1000	4.14E-04	0.0001	--	--	4.14E+00
Polychlorinated Biphenyls													
Total PCBs (carcinogenic)	2100	0.161	1	30	365	70	25550	1000	2.07E-03	--	2	4.14E-03	--
Total PCBs (noncarcinogenic)	2100	0.161	1	30	365	70	10950	1000	4.83E-03	0.00002	--	--	2.42E+02

Reference 2240 Whole Body Sand Bass

Subsistence Angler:	C	CR	FI	ED	EF	BW	AT	CF	Dose (mg/kg - day)	RfD	CSF	Cancer Risk	Noncancer Risk
Metals													
Inorganic Arsenic (carcinogenic)	20	0.161	1	30	365	70	25550	1000	1.97E-05	--	1.5	2.96E-05	--
Total Mercury	160	0.161	1	30	365	70	10950	1000	3.68E-04	0.0001	--	--	3.68E+00
Polychlorinated Biphenyls													
Total PCBs (carcinogenic)	560	0.161	1	30	365	70	25550	1000	5.52E-04	--	2	1.10E-03	--
Total PCBs (noncarcinogenic)	560	0.161	1	30	365	70	10950	1000	1.29E-03	0.00002	--	--	6.44E+01

RISKS TO THE SUBSISTENCE ANGLER FROM SHELLFISH INSIDE THE NASSCO LEASEHOLD

Inside NASSCO Whole Body Lobster

Subsistence Angler:	C	CR	FI	ED	EF	BW	AT	CF	Dose (mg/kg - day)	RfD	CSF	Cancer Risk	Noncancer Risk
Metals													
Inorganic Arsenic (carcinogenic)	188	0.161	1	30	365	70	25550	1000	1.85E-04	--	1.5	2.78E-04	--
Cadmium	180	0.161	1	30	365	70	10950	1000	4.14E-04	0.0005	--	--	8.28E-01
Copper	67000	0.161	1	30	365	70	10950	1000	1.54E-01	0.037	--	--	4.16E+00
Total Mercury (noncarcinogenic)	59	0.161	1	30	365	70	10950	1000	1.36E-04	0.0001	--	--	1.36E+00
Polychlorinated Biphenyls													
Total PCBs (carcinogenic)	76	0.161	1	30	365	70	25550	1000	7.49E-05	--	2	1.50E-04	--
Total PCBs (noncarcinogenic)	76	0.161	1	30	365	70	10950	1000	1.75E-04	0.00002	--	--	8.74E+00

Reference 2230 Whole Body Lobster

Subsistence Angler:	C	CR	FI	ED	EF	BW	AT	CF	Dose (mg/kg - day)	RfD	CSF	Cancer Risk	Noncancer Risk
Metals													
Inorganic Arsenic (carcinogenic)	300	0.161	1	30	365	70	25550	1000	2.96E-04	--	1.5	4.44E-04	--
Cadmium	190	0.161	1	30	365	70	10950	1000	4.37E-04	0.0005	--	--	8.74E-01
Copper	66000	0.161	1	30	365	70	10950	1000	1.52E-01	0.037	--	--	4.10E+00
Total Mercury (noncarcinogenic)	86	0.161	1	30	365	70	10950	1000	1.98E-04	0.0001	--	--	1.98E+00
Polychlorinated Biphenyls													
Total PCBs (carcinogenic)	41	0.161	1	30	365	70	25550	1000	4.04E-05	--	2	8.08E-05	--
Total PCBs (noncarcinogenic)	41	0.161	1	30	365	70	10950	1000	9.43E-05	0.00002	--	--	4.72E+00

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RISKS TO THE RECREATIONAL ANGLER FROM FISH OUTSIDE THE NASSCO LEASEHOLD

Outside NASSCO Fillet Sand Bass

Recreational Angler:	C	CR	FI	ED	EF	BW	AT	CF	Dose (mg/kg - day)	RfD	CSF	Cancer Risk	Noncancer Risk
Metals													
Inorganic Arsenic (carcinogenic)	20	0.021	1	30	365	70	25550	1000	2.57E-06	--	1.5	3.86E-06	--
Polychlorinated Biphenyls													
Total PCBs (carcinogenic)	57	0.021	1	30	365	70	25550	1000	7.33E-06	--	2	1.47E-05	--
Total PCBs (noncarcinogenic)	57	0.021	1	30	365	70	10950	1000	1.71E-05	0.00002	--	--	8.55E-01

Reference 2240 Fillet Sand Bass

Recreational Angler:	C	CR	FI	ED	EF	BW	AT	CF	Dose (mg/kg - day)	RfD	CSF	Cancer Risk	Noncancer Risk
Metals													
Inorganic Arsenic (carcinogenic)	16	0.021	1	30	365	70	25550	1000	2.06E-06	--	1.5	3.09E-06	--
Polychlorinated Biphenyls													
Total PCBs (carcinogenic)	55	0.021	1	30	365	70	25550	1000	7.07E-06	--	2	1.41E-05	--
Total PCBs (noncarcinogenic)	55	0.021	1	30	365	70	10950	1000	1.65E-05	0.00002	--	--	8.25E-01

RISKS TO THE SUBSISTENCE ANGLER FROM FISH OUTSIDE THE NASSCO LEASEHOLD

Outside NASSCO Whole Body Sand Bass

Subsistence Angler:	C	CR	FI	ED	EF	BW	AT	CF	Dose (mg/kg - day)	RfD	CSF	Cancer Risk	Noncancer Risk
Metals													
Inorganic Arsenic (carcinogenic)	36	0.161	1	30	365	70	25550	1000	3.55E-05	--	1.5	5.32E-05	--
Total Mercury	200	0.161	1	30	365	70	10950	1000	4.60E-04	0.0001	--	--	4.60E+00
Polychlorinated Biphenyls													
Total PCBs (carcinogenic)	600	0.161	1	30	365	70	25550	1000	5.91E-04	--	2	1.18E-03	--
Total PCBs (noncarcinogenic)	600	0.161	1	30	365	70	10950	1000	1.38E-03	0.00002	--	--	6.90E+01

Reference 2240 Whole Body Sand Bass

Subsistence Angler:	C	CR	FI	ED	EF	BW	AT	CF	Dose (mg/kg - day)	RfD	CSF	Cancer Risk	Noncancer Risk
Metals													
Inorganic Arsenic (carcinogenic)	20	0.161	1	30	365	70	25550	1000	1.97E-05	--	1.5	2.96E-05	--
Total Mercury	160	0.161	1	30	365	70	10950	1000	3.68E-04	0.0001	--	--	3.68E+00
Polychlorinated Biphenyls													
Total PCBs (carcinogenic)	560	0.161	1	30	365	70	25550	1000	5.52E-04	--	2	1.10E-03	--
Total PCBs (noncarcinogenic)	560	0.161	1	30	365	70	10950	1000	1.29E-03	0.00002	--	--	6.44E+01

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RISKS TO THE RECREATIONAL ANGLER FROM FISH INSIDE THE SOUTHWEST MARINE LEASEHOLD

Inside Southwest Marine Fillet Sand Bass

Recreational Angler:	C	CR	FI	ED	EF	BW	AT	CF	Dose (mg/kg - day)	RfD	CSF	Cancer Risk	Noncancer Risk
Metals													
Inorganic Arsenic (carcinogenic)	28	0.021	1	30	365	70	25550	1000	3.60E-06	--	1.5	5.40E-06	--
Polychlorinated Biphenyls													
Total PCBs (carcinogenic)	400	0.021	1	30	365	70	25550	1000	5.14E-05	--	2	1.03E-04	
Total PCBs (noncarcinogenic)	400	0.021	1	30	365	70	10950	1000	1.20E-04	0.00002	--		6.00E+00

Reference 2240 Fillet Sand Bass

Recreational Angler:	C	CR	FI	ED	EF	BW	AT	CF	Dose (mg/kg - day)	RfD	CSF	Cancer Risk	Noncancer Risk
Metals													
Inorganic Arsenic (carcinogenic)	16	0.021	1	30	365	70	25550	1000	2.06E-06	--	1.5	3.09E-06	--
Polychlorinated Biphenyls													
Total PCBs (carcinogenic)	55	0.021	1	30	365	70	25550	1000	7.07E-06	--	2	1.41E-05	
Total PCBs (noncarcinogenic)	55	0.021	1	30	365	70	10950	1000	1.65E-05	0.00002	--		8.25E-01

RISKS TO THE RECREATIONAL ANGLER FROM SHELLFISH INSIDE THE SOUTHWEST MARINE LEASEHOLD

Inside Southwest Marine Edible Tissue Lobster

Recreational Angler:	C	CR	FI	ED	EF	BW	AT	CF	Dose (mg/kg - day)	RfD	CSF	Cancer Risk	Noncancer Risk
Metals													
Inorganic Arsenic (carcinogenic)	264	0.021	1	30	365	70	25550	1000	3.39E-05	--	1.5	5.09E-05	--
Total Mercury (noncarcinogenic)	110	0.021	1	30	365	70	10950	1000	3.30E-05	0.0001	--	--	3.30E-01
Polychlorinated Biphenyls													
Total PCBs (carcinogenic)	64	0.021	1	30	365	70	25550	1000	8.23E-06	--	2	1.65E-05	

Reference 2230 Edible Tissue Lobster

Recreational Angler:	C	CR	FI	ED	EF	BW	AT	CF	Dose (mg/kg - day)	RfD	CSF	Cancer Risk	Noncancer Risk
Metals													
Inorganic Arsenic (carcinogenic)	176	0.021	1	30	365	70	25550	1000	2.26E-05	--	1.5	3.39E-05	--
Total Mercury (noncarcinogenic)	110	0.021	1	30	365	70	10950	1000	3.30E-05	0.0001	--	--	3.30E-01
Polychlorinated Biphenyls													
Total PCBs (carcinogenic)	20	0.021	1	30	365	70	25550	1000	2.57E-06	--	2	5.14E-06	

RISKS TO THE SUBSISTENCE ANGLER FROM FISH INSIDE THE SOUTHWEST MARINE LEASEHOLD

Inside Southwest Marine Whole Body Sand Bass

Subsistence Angler:	C	CR	FI	ED	EF	BW	AT	CF	Dose (mg/kg - day)	RfD	CSF	Cancer Risk	Noncancer Risk
Metals													
Inorganic Arsenic (carcinogenic)	24	0.161	1	30	365	70	25550	1000	2.37E-05	--	1.5	3.55E-05	--
Total Mercury	170	0.161	1	30	365	70	10950	1000	3.91E-04	0.0001	--	--	3.91E+00
Polychlorinated Biphenyls													
Total PCBs (carcinogenic)	1800	0.161	1	30	365	70	25550	1000	1.77E-03	--	2	3.55E-03	
Total PCBs (noncarcinogenic)	1800	0.161	1	30	365	70	10950	1000	4.14E-03	0.00002	--		2.07E+02

Reference 2240 Whole Body Sand Bass

Subsistence Angler:	C	CR	FI	ED	EF	BW	AT	CF	Dose (mg/kg - day)	RfD	CSF	Cancer Risk	Noncancer Risk
Metals													
Inorganic Arsenic (carcinogenic)	20	0.161	1	30	365	70	25550	1000	1.97E-05	--	1.5	2.96E-05	--
Total Mercury	160	0.161	1	30	365	70	10950	1000	3.68E-04	0.0001	--	--	3.68E+00
Polychlorinated Biphenyls													
Total PCBs (carcinogenic)	560	0.161	1	30	365	70	25550	1000	5.52E-04	--	2	1.10E-03	
Total PCBs (noncarcinogenic)	560	0.161	1	30	365	70	10950	1000	1.29E-03	0.00002	--		6.44E+01

RISKS TO THE SUBSISTENCE ANGLER FROM SHELLFISH INSIDE THE SOUTHWEST MARINE LEASEHOLD

Inside Southwest Marine Whole Body Lobster

Subsistence Angler:	C	CR	FI	ED	EF	BW	AT	CF	Dose (mg/kg - day)	RfD	CSF	Cancer Risk	Noncancer Risk
Metals													
Inorganic Arsenic (carcinogenic)	260	0.161	1	30	365	70	25550	1000	2.56E-04	--	1.5	3.84E-04	--
Cadmium	230	0.161	1	30	365	70	10950	1000	5.29E-04	0.0005	--	--	1.06E+00
Copper	62000	0.161	1	30	365	70	10950	1000	1.43E-01	0.037	--	--	3.85E+00
Total Mercury (noncarcinogenic)	47	0.161	1	30	365	70	10950	1000	1.08E-04	0.0001	--	--	1.08E+00
Polychlorinated Biphenyls													
Total PCBs (carcinogenic)	64	0.161	1	30	365	70	25550	1000	6.31E-05	--	2	1.26E-04	--
Total PCBs (noncarcinogenic)	64	0.161	1	30	365	70	10950	1000	1.47E-04	0.00002	--	--	7.36E+00

Reference 2230 Whole Body Lobster

Subsistence Angler:	C	CR	FI	ED	EF	BW	AT	CF	Dose (mg/kg - day)	RfD	CSF	Cancer Risk	Noncancer Risk
Metals													
Inorganic Arsenic (carcinogenic)	300	0.161	1	30	365	70	25550	1000	2.96E-04	--	1.5	4.44E-04	--
Cadmium	190	0.161	1	30	365	70	10950	1000	4.37E-04	0.0005	--	--	8.74E-01
Copper	66000	0.161	1	30	365	70	10950	1000	1.52E-01	0.037	--	--	4.10E+00
Total Mercury (noncarcinogenic)	86	0.161	1	30	365	70	10950	1000	1.98E-04	0.0001	--	--	1.98E+00
Polychlorinated Biphenyls													
Total PCBs (carcinogenic)	41	0.161	1	30	365	70	25550	1000	4.04E-05	--	2	8.08E-05	--
Total PCBs (noncarcinogenic)	41	0.161	1	30	365	70	10950	1000	9.43E-05	0.00002	--	--	4.72E+00

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RISKS TO THE RECREATIONAL ANGLER FROM FISH OUTSIDE THE SOUTHWEST MARINE LEASEHOLD

Outside Southwest Marine Fillet Sand Bass

Recreational Angler:	C	CR	FI	ED	EF	BW	AT	CF	Dose (mg/kg - day)	RfD	CSF	Cancer Risk	Noncancer Risk
Metals													
Inorganic Arsenic (carcinogenic)	20	0.021	1	30	365	70	25550	1000	2.57E-06	--	1.5	3.86E-06	--
Polychlorinated Biphenyls													
Total PCBs (carcinogenic)	110	0.021	1	30	365	70	25550	1000	1.41E-05	--	2	2.83E-05	
Total PCBs (noncarcinogenic)	110	0.021	1	30	365	70	10950	1000	3.30E-05	0.00002	--		1.65E+00

Reference 2240 Fillet Sand Bass

Recreational Angler:	C	CR	FI	ED	EF	BW	AT	CF	Dose (mg/kg - day)	RfD	CSF	Cancer Risk	Noncancer Risk
Metals													
Inorganic Arsenic (carcinogenic)	16	0.021	1	30	365	70	25550	1000	2.06E-06	--	1.5	3.09E-06	--
Polychlorinated Biphenyls													
Total PCBs (carcinogenic)	55	0.021	1	30	365	70	25550	1000	7.07E-06	--	2	1.41E-05	
Total PCBs (noncarcinogenic)	55	0.021	1	30	365	70	10950	1000	1.65E-05	0.00002	--		8.25E-01

RISKS TO THE SUBSISTENCE ANGLER FROM FISH OUTSIDE THE SOUTHWEST MARINE LEASEHOLD

Outside Southwest Marine Whole Body Sand Bass

Subsistence Angler:	C	CR	FI	ED	EF	BW	AT	CF	Dose (mg/kg - day)	RfD	CSF	Cancer Risk	Noncancer Risk
Metals													
Inorganic Arsenic (carcinogenic)	32	0.161	1	30	365	70	25550	1000	3.15E-05	--	1.5	4.73E-05	--
Total Mercury	170	0.161	1	30	365	70	10950	1000	3.91E-04	0.0001	--	--	3.91E+00
Polychlorinated Biphenyls													
Total PCBs (carcinogenic)	970	0.161	1	30	365	70	25550	1000	9.56E-04	--	2	1.91E-03	
Total PCBs (noncarcinogenic)	970	0.161	1	30	365	70	10950	1000	2.23E-03	0.00002	--		1.12E+02

Reference 2240 Whole Body Sand Bass

Subsistence Angler:	C	CR	FI	ED	EF	BW	AT	CF	Dose (mg/kg - day)	RfD	CSF	Cancer Risk	Noncancer Risk
Metals													
Inorganic Arsenic (carcinogenic)	20	0.161	1	30	365	70	25550	1000	1.97E-05	--	1.5	2.96E-05	--
Total Mercury	160	0.161	1	30	365	70	10950	1000	3.68E-04	0.0001	--	--	3.68E+00
Polychlorinated Biphenyls													
Total PCBs (carcinogenic)	560	0.161	1	30	365	70	25550	1000	5.52E-04	--	2	1.10E-03	
Total PCBs (noncarcinogenic)	560	0.161	1	30	365	70	10950	1000	1.29E-03	0.00002	--		6.44E+01