Lockheed Martin Corporation
6801 Rockledge Drive MP: CCT-246
Bethesda, MD 20817
Telephone 301-548-2209

LOCKHEED MARTIN

March 6, 2020

VIA PRIVATE CARRIER

Brian Dietz
Land Restoration Program
Land and Materials Administration
Maryland Department of the Environment
1800 Washington Boulevard, Suite 625
Baltimore, Maryland 21230

Subject: Transmittal of the Block F PCB Residual-Risk Analysis Update for the Middle River Remediation Site
Lockheed Martin Corporation – Middle River Complex
2323 Eastern Boulevard, Middle River, Baltimore County, Maryland

Dear Mr. Dietz,

For your review please find enclosed two hard copies with a CD of the above-referenced document. This report summarizes the results of an updated post-excavation residual risk analysis for Tax Block F. The original residual risk analysis was conducted after the soil remedial action completed in July 2015, in accordance with the remedial action plan prepared for Block F of the Middle River Complex in Middle River, Maryland.

If possible, we respectfully request to receive MDE's document review comments by April 17, 2020.

Please let me know if you have any questions. My office phone is (301) 548-2209.

Sincerely,

Thomas D. Blackman
Project Lead, Environmental Remediation

cc: (via email without enclosure)
Gary Schold, MDE
Mark Mank, MDE
Christine Kline, Lockheed Martin
Norman Varney, Lockheed Martin
Dave Brown, MRAS
Tom Green, LMCPI
Michael Martin, Tetra Tech
Cannon Silver, CDM Smith

cc: (via Secure Information Exchange)
Jann Richardson, Lockheed Martin
Scott Heinlein, LMCPI
Christopher Keller, LMCPI
Glen Harriel, LMCPI

cc: (via mail with enclosure)
Budd Zahn, MRAS
Ruth Prince, EPA

Lockheed Martin Corporation
6801 Rockledge Drive MP: CCT-246
Bethesda, MD 20817
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March 6, 2020

VIA PRIVATE CARRIER

Ruth Prince, PhD Toxicologist
3LD10, RCRA Corrective Action Branch 1
Land, Chemicals and Redevelopment Division
U.S. Environmental Protection Agency III
1650 Arch Street
Philadelphia, PA 19103-2029
(215) 814-3118

Subject: Transmittal of the Block F PCB Residual-Risk Analysis Update for the Middle River Remediation Site
Lockheed Martin Corporation – Middle River Complex
2323 Eastern Boulevard, Middle River, Baltimore County, Maryland

Dear Mrs. Prince,

For your information please find enclosed one hard copy with a CD of the above-referenced document. This report summarizes the results of an updated post-excavation residual risk analysis for Tax Block F. The original residual risk analysis was conducted after the soil remedial action completed in July 2015, in accordance with the remedial action plan prepared for Block F of the Middle River Complex in Middle River, Maryland.

Please let me know if you have any questions. My office phone is (301) 548-2209.

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cc: (via mail with enclosure)
Budd Zahn, MRAS
Brian Dietz, MDE

BLOCK F PCB RESIDUAL-RISK ANALYSIS UPDATE FOR THE MIDDLE RIVER REMEDIATION SITE LOCKHEED MARTIN MIDDLE RIVER COMPLEX MIDDLE RIVER, MARYLAND

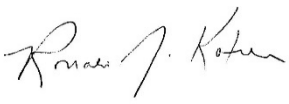
Prepared for:
Lockheed Martin Corporation

Prepared by:
Tetra Tech, Inc.

March 2020

Revision: _____

Michael Martin, P.G.
Regional Manager



Ronald Kotun
Project Manager

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ATTACHMENTS

ACRONYMS AND ABBREVIATIONS

BaPEq	benzo(a)pyrene equivalents
bgs	below ground surface
Block	Tax Block
COC	chemical(s) of concern
COPC	chemical(s) of potential concern
EPC	exposure point concentration
HHRA	human health risk assessment
HI	hazard index
ILCR	incremental lifetime cancer risk
Lockheed Martin	Lockheed Martin Corporation
MDE	Maryland Department of the Environment
µg/kg	micrograms per kilogram
OSWER	Office of Solid Waste and Emergency Response
PAHs	polycyclic aromatic hydrocarbons
PCBs	polychlorinated biphenyls
RRA	residual risk analysis
RAGS	*Risk Assessment Guidance for Superfund*
RAO	remedial action objective
RAP	remedial action plan
RSL	regional screening level
Tetra Tech	Tetra Tech, Inc.
USEPA	United States Environmental Protection Agency

SECTION 1
INTRODUCTION

On behalf of Lockheed Martin Corporation (Lockheed Martin), Tetra Tech, Inc. (Tetra Tech) has prepared this report summarizing the results of an updated post-excavation residual risk analysis (RRA) for Tax Block (Block) F. The original residual risk analysis was conducted after the soil remedial action completed in July 2015, in accordance with the remedial action plan (RAP) prepared for Block F (Tetra Tech, 2014), as amended. The remedial action (soil excavation) was necessary because the risk estimates presented for a hypothetical industrial worker population exposed to Block F soil in the *Human Health Risk Assessment (HHRA) for Blocks D, E, F, G, and H Soils, Lockheed Martin Middle River Complex, 2323 Eastern Boulevard, Middle River, Maryland* (Tetra Tech, 2012) exceeded Maryland Department of the Environment (MDE) risk management benchmarks. The post-excavation residual risk analysis, as presented in the *Construction Completion Report: Block F Soil Remedial Action* (Tetra Tech, 2016), calculated cancer and noncancer risks associated with industrial-worker exposure to onsite soil remaining after remediation with benzo(a)pyrene equivalents (BaPEq) as the predominant chemical of concern (COC). Benzo(a)pyrene equivalents represent the more toxic (carcinogenic) group of polycyclic aromatic hydrocarbons (PAHs), as compared and adjusted by the toxicity of benzo(a)pyrene and are typically used to evaluate risk at sites contaminated by polycyclic aromatic hydrocarbons.

This updated residual risk analysis incorporates analytical results from the August 2018 *Chesapeake Park Plaza Polychlorinated Biphenyl (PCB) Investigation* (Tetra Tech, 2019) and the May 2019 Block F soil investigation (Tetra Tech, 2020). Note that this update also incorporates revised exposure assumptions from those used in the original post-excavation residual risk analysis. This change reflects the Maryland Department of the Environment adoption of the United States Environmental Protection Agency regional screening levels (RSLs) and associated exposure assumptions. Specifically, an increased ingestion rate of 100 milligrams per day (mg/day), as compared to the previously used ingestion rate of 50 mg/day, was used to calculate risks for the

industrial worker exposure scenario. The previous soil ingestion rate of 50 mg/day used in the original post-excavation residual risk analysis was that recommended in the June 2008 Maryland Department of the Environment guidance *Cleanup Standards for Soil and Groundwater* (MDE, 2008). The overall objective of this update is to demonstrate that, even when including the results of recent studies and updated guidance, the remedial action objective (RAO) for Block F soil (i.e., reducing health risks to industrial workers exposed to soil, per the risk management benchmarks established by the Maryland Department of the Environment) has been achieved. The cumulative cancer and noncancer risk management benchmarks established by the Maryland Department of the Environment are (respectively) an incremental lifetime cancer risk (ILCR) of 1×10^{-5} (i.e., a one in one-hundred thousand excess chance of developing cancer) and a hazard index of 1. Potential adverse non-carcinogenic health effects may occur if the hazard index (calculated on a target organ specific basis) exceeds one. The remedial action objective for Block F is defined below:

> *RAO #1 – Reduce site-related chemicals of concern in Block F soils to 1×10^{-5} human health cancer-risk limits for industrial workers exposed to contaminants of concern via ingestion, dermal contact, and inhalation.*

The following sections briefly discuss analytical results obtained during recent surface soil sampling at Chesapeake Park Plaza and Block F and present the results of the updated post-excavation residual risk analysis for Block F. The updated dataset used to calculate residual risk associated with post-excavation surface soils (see Attachment A) is comprised of the post-excavation soil dataset as presented in the Block F construction completion report (Tetra Tech, 2016) (sample locations depicted on Figure 1), polychlorinated biphenyl results from all soil samples collected during the 2019 Block F soil investigation, and results from select soil sampling locations collected during the 2018 Chesapeake Park Plaza polychlorinated biphenyl investigation (CPP-SB-1857 through CPP-SB-1864).

SECTION 2
ANALYTICAL RESULTS FOR PCB SOIL SAMPLES

Surface soil samples were collected from Block F and Chesapeake Park Plaza and analyzed for polychlorinated biphenyls (PCBs) using United States Environmental Protection Agency (USEPA) SW-846 Method 8082A. The soil samples were collected from depths ranging from zero feet (i.e., the soil surface) to one foot below ground surface (bgs). Sampling locations are listed in Table A and depicted on Figure 1. All collected data were validated in accordance with USEPA Region 3 protocols and found acceptable for use in this residual risk analysis (RRA). Detailed descriptions of the soil sampling conducted in Block F and in Chesapeake Park Plaza are in the Reports (Tetra Tech, 2018 and 2020), which includes full data and associated laboratory reports.

Aroclor-1260 was the only targeted PCB analyte detected in post-excavation surface soil sampling conducted in 2018 and 2019 (see Table A). Aroclor-1260 was detected in 33 of 34 surface soil samples. The USEPA regional screening levels (RSLs) for Aroclor-1260 are 240 micrograms per kilogram (µg/kg) for residential receptors and 990 µg/kg for industrial receptors; these RSLs represent the 1×10^{-6} cancer risk level. Fifteen surface soil samples (and two duplicate samples) exceeded the residential RSL only, and seven samples exceeded both the residential and industrial RSLs (Table A). Note that all detected concentrations of Aroclor-1260 are below 10,000 µg/kg, which is the lower-end concentration of the action-level range (10,000 µg/kg–25,000 µg/kg) recommended for an industrial setting by USEPA guidance (USEPA, 1990).

SECTION 3
UPDATED RISK ASSESSMENT OF BLOCK F POST-EXCAVATION SOILS DATASET

The updated residual risk analysis (RRA) for post-excavation Block F soil was conducted using United States Environmental Protection Agency (USEPA) and Maryland Department of the Environment (MDE) methodologies, as presented in the 2012 human health risk assessment (HHRA) (Tetra Tech, 2012), and was updated as necessary based on recent USEPA risk assessment guidance (USEPA, 2014 and 2019). The 2012 HHRA (Tetra Tech, 2012) contains a detailed explanation of the risk assessment process and all equations used to calculate onsite receptors' exposure point concentrations (EPC) for chemicals of concern (COC) and associated risk.

As stated earlier, Aroclor-1260 was the only polychlorinated biphenyl (PCB) detected in the soil samples collected during the Block F and Chesapeake Park Plaza investigations; those analytical results were included in the updated residual risk calculations. Although Aroclor-1254 was not detected in these recent (2018 and 2019) investigations, its analytical results are also included in this evaluation as it was a chemical of potential concern (COPC) in the previous post-excavation RRA conducted in 2016 (Tetra Tech, 2016).

The updated RRA results are presented in USEPA *Risk Assessment Guidance for Superfund* (RAGS) Part D format tables in Attachment B. The chemicals highlighted in Table B were selected as COPC because their maximum detected concentrations exceeded current regional screening levels (RSLs) for residential exposures to soils. The EPCs for these COPC were calculated using the current version (5.1.002) of USEPA's ProUCL software (see Table C and Attachment C). The exposure assessment assumptions (e.g., hours per day and days per year exposed) are those specified in Attachment 1 of the Office of Solid Waste and Emergency Response (OSWER) Directive 9200.1-120, *Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors* (USEPA, 2014), included as Attachment D. The toxicity

criteria (e.g., cancer slope factors, reference doses) used to estimate cancer and noncancer risks are from the November 2019 RSL table published by USEPA (USEPA, 2019).

Table D includes risk assessment results for an industrial receptor exposed to COPC concentrations from the updated Block F post-excavation surface soil dataset; these results are presented in detail in Table 9.1 of Attachment B. The cancer risk estimate (2×10^{-6}) for industrial exposures to surface soil is less than the MDE cumulative risk management benchmark (i.e., an excess lifetime cancer risk of 1×10^{-5}). The total noncancer risk estimate (hazard index [HI] of 0.07) for industrial exposures to surface soil is also less than the MDE benchmark (i.e., less than 1.0). Note that the increase in the noncancer risk estimate, as compared to that presented for the industrial receptor in the 2016 post-excavation RRA, is due to the increased ingestion rate for the industrial worker, updated exposure point concentrations for several COPC, and updated benzo(a)pyrene toxicity criteria published by the USEPA in January 2017.

Table E includes the cancer risks and hazard indices calculated for residential exposures to surface soil at Block F. The incremental lifetime cancer risk for a hypothetical future resident exposed to surface soil (2×10^{-5}) exceeds the MDE cumulative risk management benchmark (1×10^{-5}); therefore, future unrestricted (e.g., residential) land use is not acceptable, and land use controls such as deed restrictions and notification requirements are a continued requirement for the MDE No Further Action approval for Block F. Changes in residential risk estimates are due primarily to updated exposure point concentrations and benzo(a)pyrene toxicity criteria.

SECTION 4
SUMMARY AND CONCLUSION

Soil sampling was completed at Chesapeake Park Plaza in August 2018 and in Block F in May 2019. Surface soil (zero to one foot below ground surface [bgs]) samples were collected and analyzed for polychlorinated biphenyls (PCBs) and results for samples collected in Block F were added to the 2016 post-excavation dataset for Block F soil. The only polychlorinated biphenyl detected in both the 2018 and 2019 investigations, Aroclor-1260, was present at concentrations exceeding both residential and industrial regional screening levels (RSLs) published by the United States Environmental Protection Agency (USEPA). However, both the calculated incremental lifetime cancer risk (ILCR of 2×10^{-6}) and noncancer risk (hazard index [HI] of 0.07) for the industrial receptor were below the Maryland Department of the Environment cumulative risk-management benchmarks for industrial exposures, verifying that attainment of the Block F remedial action objective (reducing health risks to industrial workers exposed to soil to a cumulative cancer risk of $1x10^{-5}$ and a noncancer hazard index of 1.0) continues to be valid.

SECTION 5
REFERENCES

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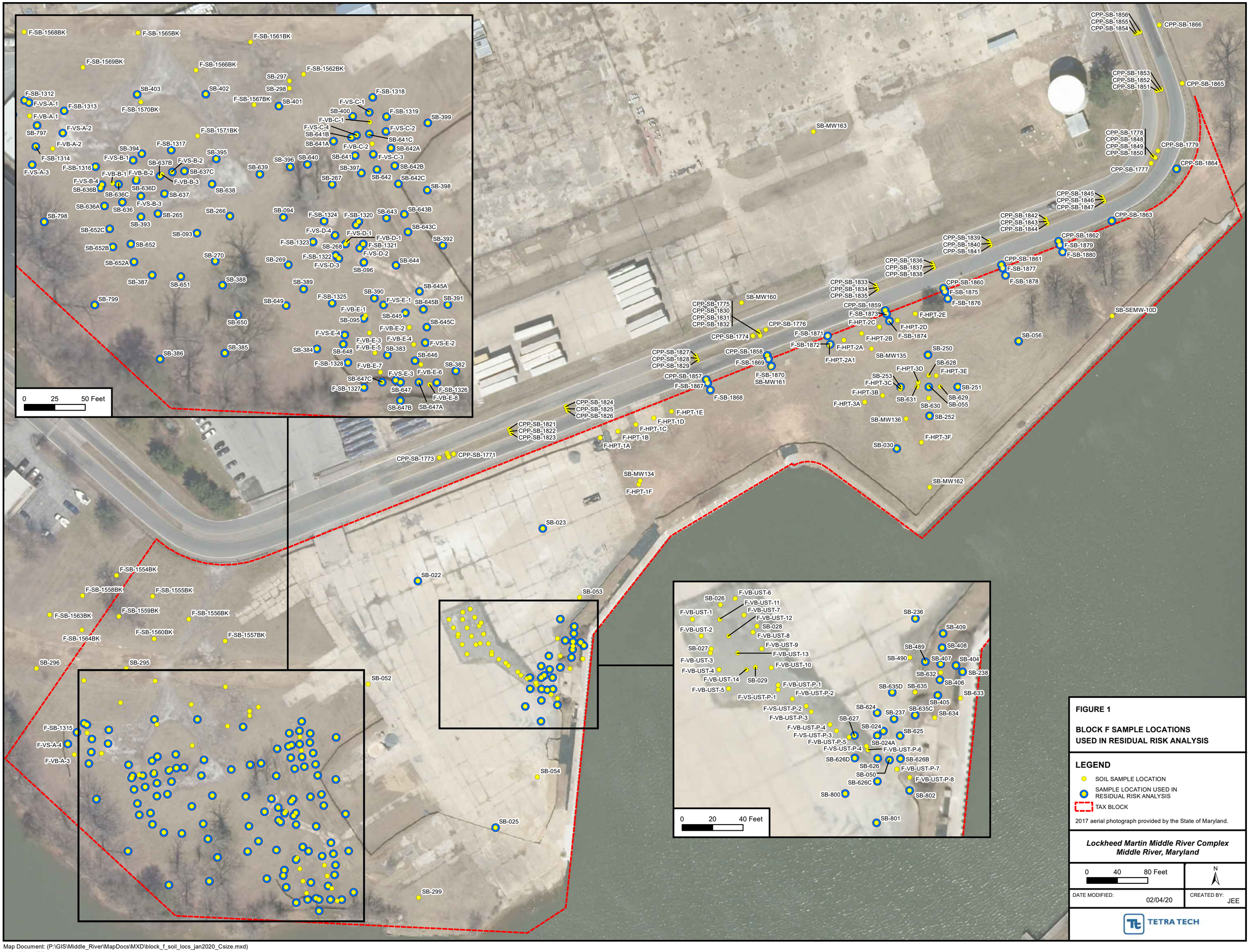
FIGURES

Figure 1 Block F Sample Locations Used in the Residual Risk Analysis



Map Document: (P:\GIS\Middle_River\MapDocs\MXD\block_f_soil_locs_jan2020_Csize.mxd)
02/04/20 -- JEE

TABLES

Table A Summary of PCB Analytical Results in Block F and Chesapeake Park Plaza Surface Soil– 2018-2019

Table B Occurrence, Distribution, And Selection of Chemicals of Potential Concern– Direct Contact with Surface Soil

Table C Exposure Point Concentrations

Table D Summary of Cancer Risks and Hazard Indices– Industrial Land Use– Reasonable Maximum Exposures

Table E Summary of Cancer Risks and Hazard Indices– Residential Land Use– Reasonable Maximum Exposures

Table A
Summary of PCB Analytical Results in Block F and Chesapeake Park Plaza Surface Soil - 2018-2019
Updated Post-Excavation Residual Risk Analysis for Block F
Lockheed Martin Corporation Middle River Complex
Middle River, Maryland

Sample ID	Location	Top Depth	Bottom Depth	Sample Date	Aroclor-1260 (µg/kg)
F-SB-1867-0-0.5	F-SB-1867	0	0.5	20190523	**660 J**
F-SB-1867-0-0.5-D	F-SB-1867	0	0.5	20190523	**320 J**
F-SB-1868-0-0.5	F-SB-1868	0	0.5	20190523	86
F-SB-1869-0-0.5	F-SB-1869	0	0.5	20190523	**520**
F-SB-1870-0-0.5	F-SB-1870	0	0.5	20190523	**280**
F-SB-1871-0-0.5	F-SB-1871	0	0.5	20190523	**840**
F-SB-1872-0-0.5	F-SB-1872	0	0.5	20190523	**340**
F-SB-1873-0-0.5	F-SB-1873	0	0.5	20190523	**860**
F-SB-1874-0-0.5	F-SB-1874	0	0.5	20190523	**460**
F-SB-1875-0-0.5	F-SB-1875	0	0.5	20190523	**270 J**
F-SB-1875-0-0.5-D	F-SB-1875	0	0.5	20190523	**560 J**
F-SB-1876-0-0.5	F-SB-1876	0	0.5	20190523	**730**
F-SB-1877-0-0.5	F-SB-1877	0	0.5	20190523	**1300**
F-SB-1877-0.5-1.0	F-SB-1877	0.5	1	20190523	**430**
F-SB-1878-0-0.5	F-SB-1878	0	0.5	20190523	**380**
F-SB-1879-0-0.5	F-SB-1879	0	0.5	20190523	**870**
F-SB-1880-0-0.5	F-SB-1880	0	0.5	20190523	**560**
CPP-SB-1857-0.0-0.5	CPP-SB-1857	0	0.5	20180817	**1100**
CPP-SB-1857-0.5-1.0	CPP-SB-1857	0.5	1	20180817	34 J
CPP-SB-1858-0.0-0.5	CPP-SB-1858	0	0.5	20180817	**1300**
CPP-SB-1858-0.5-1.0	CPP-SB-1858	0.5	1	20180817	--
CPP-SB-1859-0.0-0.5	CPP-SB-1859	0	0.5	20180817	**1000**
CPP-SB-1859-0.5-1.0	CPP-SB-1859	0.5	1	20180817	35 J
CPP-SB-1860-0.0-0.5	CPP-SB-1860	0	0.5	20180817	**4700**
CPP-SB-1860-0.5-1.0	CPP-SB-1860	0.5	1	20180817	76 J
CPP-SB-1860-0.5-1.0-D	CPP-SB-1860	0.5	1	20180817	89
CPP-SB-1861-0.0-0.5	CPP-SB-1861	0	0.5	20180817	**2500**
CPP-SB-1861-0.5-1.0	CPP-SB-1861	0.5	1	20180817	190
CPP-SB-1862-0.0-0.5	CPP-SB-1862	0	0.5	20180817	**1100**
CPP-SB-1862-0.5-1.0	CPP-SB-1862	0.5	1	20180817	70
CPP-SB-1863-0.0-0.5	CPP-SB-1863	0	0.5	20180817	**710**
CPP-SB-1863-0.5-1.0	CPP-SB-1863	0.5	1	20180817	240 J
CPP-SB-1864-0.0-0.5	CPP-SB-1864	0	0.5	20180817	**340**
CPP-SB-1864-0.5-1.0	CPP-SB-1864	0.5	1	20180817	160

Notes:
Only detected PCBs are presented.
Duplicate samples are marked with '-D'.
Light shading indicates value exceeds USEPA Residential Soil RSL (November 2019) of 240 µg/kg (based on ILCR of 1E-06).
Dark shading indicates value exceeds both USEPA Residential and Industrial Soil RSLs (November 2019) of 240 µg/kg and 990 µg/kg, respectively (based on ILCR of 1E-06).

Definitions:
-- = not detected
ILCR = integrated lifetime cancer risk
J = estimated value
PCB = polychlorinated biphenyl
RSL = Regional Screening Level
USEPA = United States Environmental Protection Agency
µg/kg = microgram per kilogram

Table B
Occurrence, Distribution, And Selection Of Chemicals Of Potential Concern - Direct Contact With Surface Soil
Updated Post-Excavation Residual Risk Analysis for Block F
Lockheed Martin Corporation Middle River Complex
Middle River, Maryland

Exposure Point	CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondetects[2]	Concentration Used for Screening[3]	Range of Background Concentrations[4]	USEPA RSL - Residential Soil[5]	Potential ARAR/TBC	Potential ARAR/TBC Source	COPC Flag	Rationale for Contaminant Deletion or Selection[6]
Block F	**Volatile Organic Compounds**														
	78-93-3	2-Butanone	2.87 J	3.14 J	ug/kg	SB-238-SS	2/11	0.53 - 66	3.14	NA	2,700,000 N	NA	NA	No	BSL
	67-64-1	Acetone	27.2 J	89 J	ug/kg	SB-22A-SS	3/11	0.94 - 66	89	NA	6,100,000 N	NA	NA	No	BSL
	75-15-0	Carbon Disulfide	0.72 J	7.1	ug/kg	SB-238-SS	2/11	0.38 - 7	7.1	NA	77,000 N	NA	NA	No	BSL
	75-09-2	Methylene Chloride	3.3 J	3.3 J	ug/kg	SB-238-01	1/11	0.33 - 11	3.3	NA	35,000 N	NA	NA	No	BSL
	Semivolatile Organic Compounds														
	65-85-0	Benzoic Acid	152 J	925	ug/kg	SB-267-SS	6/14	10 - 802	925	NA	25,000,000 N	NA	NA	No	BSL
	117-81-7	Bis(2-ethylhexyl)phthalate	40 J	40 J	ug/kg	SB-265-SS	1/23	24 - 4500	40	NA	39,000 C	NA	NA	No	BSL
	85-68-7	Butyl Benzyl Phthalate	25 J	25 J	ug/kg	SB-265-SS	1/23	11 - 4500	25	NA	290,000 C	NA	NA	No	BSL
	86-74-8	Carbazole	32 J	242	ug/kg	SB-265-SS	6/23	29 - 4500	242	NA	NA	NA	NA	No	NTX
	132-64-9	Dibenzofuran	27 J	86 J	ug/kg	SB-265-SS	3/23	0.72 - 4500	86	NA	7,300 N	NA	NA	No	BSL
	131-11-3	Dimethyl Phthalate	60 J	60 J	ug/kg	SB-23A-SS	1/23	19 - 4500	60	NA	NA	NA	NA	No	NTX
	84-74-2	di-n-Butyl Phthalate	32 J	38 J	ug/kg	SB-266-SS	3/23	16 - 4500	38	NA	630,000 N	NA	NA	No	BSL
	108-95-2	Phenol	420	420	ug/kg	SB-23A-SS	1/23	8 - 4500	420	NA	1,900,000 N	NA	NA	No	BSL
	Polynuclear Aromatic Hydrocarbons														
	83-32-9	Acenaphthene	4.3 J	640	ug/kg	F-SB-1317-SS	27/80	0.83 - 4500	640	NA	360,000 N	NA	NA	No	BSL
	208-96-8	Acenaphthylene	2.1 J	135	ug/kg	SB-265-SS	13/80	0.38 - 4500	135	NA	360,000 N[7]	NA	NA	No	BSL
	120-12-7	Anthracene	3.9 J	1,100	ug/kg	F-SB-1317-SS	48/80	0.86 - 4500	1,100	NA	1,800,000 N	NA	NA	No	BSL
	--	**Benzo(a)pyrene Equivalents**	1.2	5,140	ug/kg	F-SB-647C-1	129/161	0.71 - 430	5,140	NA	**110 C**	NA	NA	**Yes**	ASL
	56-55-3	**Benzo(a)anthracene**	3.8 J	3,400	ug/kg	F-SB-647C-1	106/132	0.7 - 430	3,400	NA	**1100 C**	NA	NA	**Yes**	ASL
	50-32-8	**Benzo(a)pyrene**	3.1 J	3,500	ug/kg	F-SB-647C-1	124/161	0.71 - 430	3,500	NA	**110 C**	NA	NA	**Yes**	ASL
	205-99-2	**Benzo(b)fluoranthene**	4.6 J	4,500	ug/kg	F-SB-647C-1	106/132	0.66 - 430	4,500	NA	**1100 C**	NA	NA	**Yes**	ASL
	191-24-2	Benzo(g,h,i)perylene	7.4 J	1,300	ug/kg	F-SB-1317-SS, F-SB-1327-SS	42/80	0.38 - 3600	1,300	NA	180,000 N[8]	NA	NA	No	BSL
	207-08-9	**Benzo(k)fluoranthene**	3.8 J	1,910	ug/kg	SB-265-SS	98/132	0.76 - 430	1,910	NA	11,000 C	NA	NA	**Yes**	ASL
	218-01-9	Chrysene	4.3 J	3,300	ug/kg	F-SB-647C-1	107/132	0.97 - 430	3,300	NA	110,000 C	NA	NA	No	BSL
	53-70-3	**Dibenzo(a,h)anthracene**	9.4	620	ug/kg	F-SB-647C-1	52/132	0.72 - 4500	620	NA	**110 C**	NA	NA	**Yes**	ASL
	206-44-0	Fluoranthene	4.8 J	6,000	ug/kg	F-SB-1317-SS	68/80	0.61 - 400	6,000	NA	240,000 N	NA	NA	No	BSL
	86-73-7	Fluorene	5.4 J	480	ug/kg	F-SB-1317-SS	27/80	0.58 - 4500	480	NA	240,000 N	NA	NA	No	BSL
	193-39-5	**Indeno(1,2,3-cd)pyrene**	7.6 J	2,100	ug/kg	F-SB-647C-1	74/132	0.38 - 430	2,100	NA	**1,100 C**	NA	NA	**Yes**	ASL
	91-20-3	Naphthalene	3.6 J	230	ug/kg	F-SB-1317-SS	20/80	0.89 - 4500	230	NA	3,800 C	NA	NA	No	BSL
	85-01-8	Phenanthrene	4.2 J	4,300	ug/kg	F-SB-1317-SS	64/80	0.81 - 400	4,300	NA	180,000 N[8]	NA	NA	No	BSL
	129-00-0	Pyrene	4.5 J	4,600	ug/kg	F-SB-1317-SS	67/80	0.49 - 430	4,600	NA	180,000 N	NA	NA	No	BSL
	PCBs														
	11097-69-1	Aroclor-1254	96	96	ug/kg	SB-267-SS	1/88	15 - 1300	96	NA	120 N	NA	NA	No	BSL
	11096-82-5	**Aroclor-1260**	22 J	4,700	ug/kg	CPP-SB-1860-0.0-0.5	40/88	9.7 - 320	4,700	NA	**240 C**	NA	NA	**Yes**	ASL
	Metals														
	7440-36-0	**Antimony**	0.4 L	4 L	mg/kg	SB-237-01	18/26	0.3 - 3	4	NA	**3.1 N**	NA	NA	**Yes**	ASL
	7440-38-2	**Arsenic**	0.4 J	6	mg/kg	SB-269-SS	20/30	1 - 3	6	NA	**0.68 C**	NA	NA	**Yes**	ASL
	7440-39-3	Barium	2.6 J	103	mg/kg	SB-269-SS	20/20	-	103	NA	1,500 N	NA	NA	No	BSL
	7440-41-7	Beryllium	0.5	5	mg/kg	SB-25A-SS	20/30	0.023 - 3.1	5	NA	16 N	NA	NA	No	BSL
	7440-43-9	Cadmium	0.3	4.5 L	mg/kg	SB-94-SS	13/30	0.019 - 3	4.5	NA	7.1 N	NA	NA	No	BSL
	7440-47-3	Chromium	8.1	185	mg/kg	SB-237-01	30/30	-	185	NA	12,000 N[9]	NA	NA	No	BSL
	7440-48-4	**Cobalt**	0.054 J	8.9	mg/kg	SB-265-SS	20/20	-	8.9	NA	**2.3 N**	NA	NA	**Yes**	ASL
	7440-50-8	Copper	1.1 J	74	mg/kg	SB-55-SS	30/30	-	74	NA	310 N	NA	NA	No	BSL
	7439-92-1	**Lead**	0.39 J	420 J	mg/kg	SB-55-SS	23/30	3 - 8	420	NA	**400**	NA	NA	**Yes**	ASL
	7439-97-6	**Mercury**	0.01	2.7 L	mg/kg	F-SB-626-2	37/45	0.015 - 0.12	2.7	NA	**2.3 N[10]**	NA	NA	**Yes**	ASL
	7439-98-7	**Molybdenum**	0.13 J	63	mg/kg	SB-237-01	2/20	0.4 - 2	63	NA	**39 N**	NA	NA	**Yes**	ASL
	7440-02-0	Nickel	0.21 J	27	mg/kg	SB-25A-SS	22/30	0.3 - 9	27	NA	150 N	NA	NA	No	BSL

Table B
Occurrence, Distribution, And Selection Of Chemicals Of Potential Concern - Direct Contact With Surface Soil
Updated Post-Excavation Residual Risk Analysis for Block F
Lockheed Martin Corporation Middle River Complex
Middle River, Maryland

Exposure Point	CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondetects[2]	Concentration Used for Screening[3]	Range of Background Concentrations[4]	USEPA RSL - Residential Soil[5]	Potential ARAR/TBC	Potential ARAR/TBC Source	COPC Flag	Rationale for Contaminant Deletion or Selection[6]
Block F	**Metals (continued)**														
	7782-49-2	Selenium	2	4	mg/kg	SB-237-01	9/30	0.056 - 3.1	4	NA	39 N	NA	NA	No	BSL
	7440-22-4	Silver	0.9	21	mg/kg	SB-95-SS	6/26	0.04 - 3.2	21	NA	39 N	NA	NA	No	BSL
	7440-62-2	**Vanadium**	20.3	49	mg/kg	SB-238-SS	20/20	-	49	NA	**39 N**	NA	NA	**Yes**	ASL
	7440-66-6	Zinc	1.3 J	287	mg/kg	SB-267-SS	27/30	26 - 30	287	NA	2,300 N	NA	NA	No	BSL
	Miscellaneous Compounds														
	18540-29-9	**Hexavalent Chromium**	0.49	3.6	mg/kg	SB-265-SS	5/8	0.36 - 0.55	3.6	NA	**0.3 C**	NA	NA	**Yes**	ASL
	22967-92-6	Mercury (Methyl)	0.071 J	1.467 J	ug/kg	SB-237-01	4/4	-	1.467	NA	780 N	NA	NA	No	BSL

Footnotes:
1 - Sample and duplicate are considered as two separate samples when determining the minimum and maximum concentrations.
2 - Values presented are sample-specific quantitation limits.
3 - The maximum detected concentration is used for screening purposes.
4 - No background data are available.
5 - United States Environmental Protection Agency (USEPA) Regional Screening Levels (RSLs) for Chemical Contaminants at Superfund Sites (November 2019).
Values correspond to a cancer risk level of 1E-06 or a hazard quotient (HQ) of 0.1.
6 - The chemical is selected as a COPC if the maximum detected concentration exceeds the risk-based COPC screening level.
7 - Values are for acenaphthene.
8 - Value is for pyrene.
9 - Value is for trivalent chromium.
10 - Value is for mercuric chloride (and other mercury salts).

Shaded criterion indicates that the maximum detected concentration exceeds one or more screening criteria. Shaded chemical name indicates that the chemical was retained as a COPC.

Definitions:
ARAR/TBC = Applicable or Relevant and Appropriate Requirements To Be Considered
C = Carcinogen
COPC = Chemical of potential concern
J = Estimated value
L = Biased low
N = Noncarcinogen
NA = Not applicable/Not available

Rationale Codes:
For selection as a COPC:
ASL = Above screening level

For elimination as a COPC:
BSL = Below COPC screening level
NTX = No toxicity criteria

Associated Samples:

F-SB-1312-1-2	F-SB-1323-SS	F-SB-93RE-2	SB-253-SS	SB-392-0102	F-SB-626-1	F-SB-641C-1	F-SB-652A-1	F-VS-D-2-1	F-SB-1879-0-0.5
F-SB-1312-SS	F-SB-1324-1-2	SB-93-SS	SB-265-02	SB-393-0102	F-SB-626-2	F-SB-642-1	F-SB-652B-1	F-VS-D-3-1	F-SB-1880-0-0.5
F-SB-1313-1-2	F-SB-1324-SS	F-SB-94RE-1	SB-265-SS	SB-394-0102	F-SB-626B-(1-4)	F-SB-642A-1	F-SB-652C-1	F-VS-D-4-1	CPP-SB-1857-0.0-0.5
F-SB-1313-SS	F-SB-1325-1-2	F-SB-94RE-2	SB-266-02	SB-395-0102	F-SB-626C-1	F-SB-642B-1	F-SB-797-SS	F-VS-E-1-1	CPP-SB-1857-0.5-1.0
F-SB-1314-1-2	F-SB-1325-SS	SB-94-SS	SB-266-SS	SB-396-0102	F-SB-626D-1	F-SB-642C-1	F-SB-798-SS	F-VS-E-2-1	CPP-SB-1858-0.0-0.5
F-SB-1314-SS	F-SB-1326-1-2	SB-95-SS	SB-267-02	SB-397-0102	F-SB-627-1	F-SB-643-1	F-SB-799-SS	F-VS-E-4-1	CPP-SB-1858-0.5-1.0
F-SB-1315-1-2	F-SB-1326-SS	F-SB-95RE-1	SB-267-SS	SB-398-0102	F-SB-627-2	F-SB-643B-1	F-SB-800-SS	F-VS-E-4-1-DUP	CPP-SB-1859-0.0-0.5
F-SB-1315-SS	F-SB-1327-1-2	F-SB-95RE-2	SB-268-02	SB-399-0102	F-SB-635C-1	F-SB-643C-1	F-SB-801-SS	F-VS-E-3-1	CPP-SB-1859-0.5-1.0
F-SB-1316-1-2	F-SB-1327-SS	F-SB-96RE-1	SB-268-SS	SB-400-0102	F-SB-635D-1	F-SB-644-1	F-SB-802-SS	F-SB-1867-0-0.5	CPP-SB-1860-0.0-0.5
F-SB-1316-SS	F-SB-1328-1-2	F-SB-96RE-2	SB-269-02	SB-401-0102	F-SB-636-1	F-SB-645-1	F-VS-A-1-1	F-SB-1867-0-0.5-D	CPP-SB-1860-0.5-1.0
F-SB-1317-1-2	F-SB-1328-SS	SB-236-01	SB-269-SS	SB-402-0102	F-SB-636A-1	F-SB-645A-1	F-VS-A-2-1	F-SB-1868-0-0.5	CPP-SB-1860-0.5-1.0-D
F-SB-1317-SS	SB-22A-SS	SB-236-SS	SB-270-02	SB-403-0102	F-SB-636B-1	F-SB-645B-1	F-VS-A-3-1-RS	F-SB-1869-0-0.5	CPP-SB-1861-0.0-0.5
F-SB-1318-1-2	SB-23A-SS	SB-237-01	SB-270-SS	SB-404-0102	F-SB-636C-1	F-SB-645C-1	F-VS-A-4-1	F-SB-1870-0-0.5	CPP-SB-1861-0.5-1.0
F-SB-1318-SS	SB-24A-SS	SB-237-SS	SB-382-0102	SB-405-0102	F-SB-636D-1	F-SB-646-1	F-VS-B-1-1	F-SB-1871-0-0.5	CPP-SB-1862-0.0-0.5
F-SB-1319-1-2	F-SB-24ARE-1	SB-238-01	SB-383-0102	SB-406-0102	F-SB-637-1	F-SB-647-1	F-VS-B-2-1	F-SB-1872-0-0.5	CPP-SB-1862-0.5-1.0
F-SB-1319-SS	F-SB-24ARE-2	SB-238-SS	SB-384-0102	SB-407-0102	F-SB-637B-1	F-SB-647A-1	F-VS-B-3-1	F-SB-1873-0-0.5	CPP-SB-1863-0.0-0.5
F-SB-1320-1-2	SB-25A-SS	SB-250-02	SB-385-0102	SB-408-0102	F-SB-637C-1	F-SB-647B-1	F-VS-B-4-1	F-SB-1874-0-0.5	CPP-SB-1863-0.5-1.0
F-SB-1320-SS	SB-30A-SS	SB-250-SS	SB-386-0102	SB-409-0102	F-SB-638-1	F-SB-647C-1	F-VS-C-1-1	F-SB-1875-0-0.5	CPP-SB-1864-0.0-0.5
F-SB-1321-1-2	SB-50-SS	SB-251-02	SB-387-0102	SB-489-0102	F-SB-639-1	F-SB-648-1	F-VS-C-1-1-DUP	F-SB-1875-0-0.5-D	CPP-SB-1864-0.5-1.0
F-SB-1321-SS	SB-55-SS	SB-251-SS	SB-388-0102	F-SB-624-1	F-SB-640-1	F-SB-649-1	F-VS-C-2-1	F-SB-1876-0-0.5	
F-SB-1322-1-2	F-SB-56RE-1	SB-252-02	SB-389-0102	F-SB-624-2	F-SB-641-1	F-SB-650-1	F-VS-C-3-1	F-SB-1877-0-0.5	
F-SB-1322-SS	F-SB-56RE-2	SB-252-SS	SB-390-0102	F-SB-625-1	F-SB-641A-1	F-SB-651-1	F-VS-C-4-1	F-SB-1877-0.5-1.0	
F-SB-1323-1-2	F-SB-93RE-1	SB-253-02	SB-391-0102	F-SB-625-2	F-SB-641B-1	F-SB-652-1	F-VS-D-1-1	F-SB-1878-0-0.5	

Table C
Exposure Point Concentrations
Updated Post-Excavation Residual Risk Analysis for Block F
Lockheed Martin Corporation Middle River Complex
Middle River, Maryland

COPC	Surface Soil
Polycyclic Aromatic Hydrocarbons (µg/kg)	
Benzo(a)pyrene Equivalents	600
Polychlorinated Biphenyls (µg/kg)	
Aroclor-1254	96[(1)]
Aroclor-1260	460
Metals (mg/kg)	
Antimony	1.6
Cadmium	3.9
Cobalt	6.3
Lead	44.3[(2)]
Mercury	0.69
Molybdenum	63
Nickel	12.0
Vanadium	34.4
Miscellaneous Parameters (mg/kg)	
Hexavalent Chromium	1.8

Notes:
EPCs are the 95-percent UCLs recommended by ProUCL 5.1.002 unless otherwise noted.
RAGS Part D tables for the EPCs are included in Attachment B.

Footnotes:
1 - There are less than four detected concentrations. Reliable statistics cannot be computed. The maximum concentration was used as the EPC.
2 - The average concentration is used as the EPC for lead.

Acronyms:
COPC = Chemical of Potential Concern
EPC = Exposure Point Concentration
RAGS = Risk Assessment Guidance for Superfund
UCL = Upper Confidence Limit

Table D
Summary of Cancer Risks and Hazard Indices - Industrial Land Use - Reasonable Maximum Exposures
Updated Post-Excavation Residual Risk Analysis for Block F
Lockheed Martin Corporation Middle River Complex
Middle River, Maryland

Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks $> 10^{-4}$	Chemicals with Cancer Risks $> 10^{-5}$ and $\leq 10^{-4}$	Chemicals with Cancer Risks $> 10^{-6}$ and $\leq 10^{-5}$	Hazard Index	Chemicals Contributing to an Target Organ HI > 1
Industrial Workers	Surface Soil	Incidental Ingestion	9E-07	--	--	--	0.05	--
		Dermal Contact	8E-07	--	--	--	0.02	--
		Inhalation	3E-08	--	--	--	0.0002	--
		Total	2E-06	--	--	--	0.07	--

Table E
Summary Of Cancer Risks And Hazard Indices - Residential Land Use - Reasonable Maximum Exposures
Updated Post-Excavation Residual Risk Analysis for Block F
Lockheed Martin Corporation Middle River Complex
Middle River, Maryland

Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks > 10^{-4}	Chemicals with Cancer Risks > 10^{-5} and ≤ 10^{-4}	Chemicals with Cancer Risks > 10^{-6} and ≤ 10^{-5}	Hazard Index	Chemicals Contributing to an Target Organ HI > 1
Child Residents	Surface Soil	Incidental Ingestion	1E-05	--	--	Benzo(a)pyrene Equivalents, Hexavalent Chromium	0.8	--
		Dermal Contact	6E-06	--	--	Hexavalent Chromium	0.2	--
		Inhalation	5E-08	--	--	--	0.0006	--
		Total	2E-05	--	--	Benzo(a)pyrene Equivalents, Hexavalent Chromium	1.0	--
Adolescent Residents	Surface Soil	Incidental Ingestion	2E-06	--	--	--	0.1	--
		Dermal Contact	2E-06	--	--	--	0.04	--
		Inhalation	6E-08	--	--	--	0.0006	--
		Total	4E-06	--	--	Hexavalent Chromium	0.1	--
Adult Residents	Surface Soil	Incidental Ingestion	5E-07	--	--	--	0.08	--
		Dermal Contact	5E-07	--	--	--	0.02	--
		Inhalation	5E-08	--	--	--	0.0006	--
		Total	1E-06	--	--	--	0.10	--
Lifelong Residents (Child and Adult)	Surface Soil	Incidental Ingestion	1E-05	--	Benzo(a)pyrene Equivalents	Hexavalent Chromium	NA	--
		Dermal Contact	8E-06	--	--	Benzo(a)pyrene Equivalents, Hexavalent Chromium	NA	--
		Inhalation	2E-07	--	--	--	NA	--
		Total	2E-05	--	Benzo(a)pyrene Equivalents	Hexavalent Chromium	NA	--

ATTACHMENTS

Attachment A—Updated Post-Excavation Surface Soil Data Set

Attachment B—RAGS Part D Tables

Attachment C—PROUCL Files

Attachment D—OSWER Directive 9200.1-120

ATTACHMENT A— UPDATED POST-EXCAVATION SURFACE SOIL DATA SET

Attachment A
Updated Post-Excavation Surface Soil Data Set
Updated Post-Excavation Residual Risk Analysis for Block F
Lockheed Martin Corporation Middle River Complex
Middle River, Maryland

LOCATION	F-SB-1312	F-SB-1312	F-SB-1313	F-SB-1313	F-SB-1314	F-SB-1314	F-SB-1315	F-SB-1315	F-SB-1316	F-SB-1316
SAMPLE ID	F-SB-1312-1-2	F-SB-1312-SS	F-SB-1313-1-2	F-SB-1313-SS	F-SB-1314-1-2	F-SB-1314-SS	F-SB-1315-1-2	F-SB-1315-SS	F-SB-1316-1-2	F-SB-1316-SS
SAMPLE DATE	20140422	20140422	20140422	20140422	20140422	20140422	20140422	20140422	20140422	20140422
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
TOP DEPTH	1	0	1	0	1	0	1	0	1	0
BOTTOM DEPTH	2	1	2	1	2	1	2	1	2	1
VOLATILE ORGANIC COMPOUNDS (UG/KG)										
2-BUTANONE										
ACETONE										
CARBON DISULFIDE										
METHYLENE CHLORIDE										
SEMIVOLATILE ORGANIC COMPOUNDS (UG/KG)										
BENZOIC ACID										
BIS(2-ETHYLHEXYL)PHTHALATE										
BUTYL BENZYL PHTHALATE										
CAPROLACTAM										
CARBAZOLE										
DIBENZOFURAN										
DIMETHYL PHTHALATE										
DI-N-BUTYL PHTHALATE										
DI-N-OCTYL PHTHALATE										
PHENOL										
POLYNUCLEAR AROMATIC HYDROCARBONS (UG/KG)										
1-METHYLNAPHTHALENE										
2-METHYLNAPHTHALENE										
ACENAPHTHENE	12	220	0.89 U	46	0.83 U	0.83 U	0.83 U	0.83 U	0.86 U	5.2 J
ACENAPHTHYLENE	6.3 J	83	0.41 U	0.4 U	0.38 U	0.38 U	0.38 U	0.38 U	0.4 U	0.39 U
ANTHRACENE	38	660	0.91 U	53	3.9 J	3.9 J	3.9 J	3.9 J	0.88 U	4.7 J
BAP EQUIVALENT-HALFND	270.84	1606.8	0.75 U	120.876	9.82	9.82	9.82	9.82	0.73 U	1.2467
BAP EQUIVALENT-POS	270.84	1606.8	0.75 U	120.876	9.82	9.82	9.82	9.82	0.73 U	0.4654
BENZO(A)ANTHRACENE	190	1500	0.74 U	85	8	8	8	8	0.71 U	4.6 J
BENZO(A)PYRENE	190	1100	0.75 U	86	7.7	7.7	7.7	7.7	0.73 U	0.71 U
BENZO(B)FLUORANTHENE	300	1600	0.69 U	120	8.9	8.9	8.9	8.9	0.67 U	0.66 U
BENZO(G,H,I)PERYLENE	77	520	0.41 U	43	0.38 U	0.38 U	0.38 U	0.38 U	0.4 U	0.39 U
BENZO(K)FLUORANTHENE	84	340	0.8 U	49	4.2 J	4.2 J	4.2 J	4.2 J	0.77 U	0.76 U
CHRYSENE	200	1400	1.3 U	86	9.3	9.3	9.3	9.3	1.2 U	5.4 J
DIBENZO(A,H)ANTHRACENE	23	140	0.77 U	10	0.72 U	0.72 U	0.72 U	0.72 U	0.75 U	0.74 U
FLUORANTHENE	360	3600	0.64 U	200	16	16	16	16	4.8 J	12
FLUORENE	11	200	0.62 U	59	0.58 U	0.58 U	0.58 U	0.58 U	0.6 U	5.4 J
INDENO(1,2,3-CD)PYRENE	78	520	0.41 U	38	0.38 U	0.38 U	0.38 U	0.38 U	0.4 U	0.39 U
NAPHTHALENE	6.2 J	16 J	0.96 U	13	0.89 U	0.89 U	0.89 U	0.89 U	0.93 U	13
PHENANTHRENE	160	2700	0.85 U	120	11	11	11	11	5.5 J	19
PYRENE	310	2600	0.51 U	160	15	15	15	15	0.5 U	8.4
PCBS (UG/KG)										
AROCLOR-1254										
AROCLOR-1260										
METALS (MG/KG)										
ANTIMONY										
ARSENIC										
BARIUM										
BERYLLIUM										
CADMIUM										
CHROMIUM										
COBALT										
COPPER										
LEAD										
MERCURY										
MOLYBDENUM										
NICKEL										
SELENIUM										
SILVER										
VANADIUM										
ZINC										
MISCELLANEOUS COMPOUNDS										
HEXAVALENT CHROMIUM (MG/KG)										
MERCURY (METHYL) (UG/KG)										

Attachment A
Updated Post-Excavation Surface Soil Data Set
Updated Post-Excavation Residual Risk Analysis for Block F
Lockheed Martin Corporation Middle River Complex
Middle River, Maryland

LOCATION	F-SB-1317	F-SB-1317	F-SB-1318	F-SB-1318	F-SB-1319	F-SB-1319	F-SB-1320	F-SB-1320	F-SB-1321	F-SB-1321
SAMPLE ID	F-SB-1317-1-2	F-SB-1317-SS	F-SB-1318-1-2	F-SB-1318-SS	F-SB-1319-1-2	F-SB-1319-SS	F-SB-1320-1-2	F-SB-1320-SS	F-SB-1321-1-2	F-SB-1321-SS
SAMPLE DATE	20140422	20140422	20140423	20140423	20140423	20140423	20140422	20140422	20140422	20140422
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
TOP DEPTH	1	0	1	0	1	0	1	0	1	0
BOTTOM DEPTH	2	1	2	1	2	1	2	1	2	1
VOLATILE ORGANIC COMPOUNDS (UG/KG)										
2-BUTANONE										
ACETONE										
CARBON DISULFIDE										
METHYLENE CHLORIDE										
SEMIVOLATILE ORGANIC COMPOUNDS (UG/KG)										
BENZOIC ACID										
BIS(2-ETHYLHEXYL)PHTHALATE										
BUTYL BENZYL PHTHALATE										
CAPROLACTAM										
CARBAZOLE										
DIBENZOFURAN										
DIMETHYL PHTHALATE										
DI-N-BUTYL PHTHALATE										
DI-N-OCTYL PHTHALATE										
PHENOL										
POLYNUCLEAR AROMATIC HYDROCARBONS (UG/KG)										
1-METHYLNAPHTHALENE										
2-METHYLNAPHTHALENE										
ACENAPHTHENE	4.3 J	640	0.84 U	0.89 U	0.85 U	9.1	0.88 U	0.87 U	0.83 U	0.83 U
ACENAPHTHYLENE	0.41 U	27 J	0.39 U	0.41 U	0.39 U	8.3 J	0.4 U	0.4 U	0.38 U	0.38 U
ANTHRACENE	4.8 J	1100	0.87 U	9.7	0.87 U	31	0.9 U	0.89 U	3.9 J	3.9 J
BAP EQUIVALENT-HALFND	17.75	3462.4	0.71 U	73.505	5.4376	191.45	0.74 U	0.73 U	9.82	9.82
BAP EQUIVALENT-POS	17.36	3462.4	0.71 U	73.115	5.0443	191.45	0.74 U	0.73 U	9.82	9.82
BENZO(A)ANTHRACENE	17	2700	0.7 U	55	3.8 J	130	0.73 U	0.72 U	8	8
BENZO(A)PYRENE	13	2400	0.71 U	56	4.2 J	130	0.74 U	0.73 U	7.7	7.7
BENZO(B)FLUORANTHENE	18	3300	0.66 U	80	4.6 J	200	0.68 U	0.68 U	8.9	8.9
BENZO(G,H,I)PERYLENE	7.4 J	1300	0.39 U	34	0.39 U	99	0.4 U	0.4 U	0.38 U	0.38 U
BENZO(K)FLUORANTHENE	8.3	980	0.76 U	26	0.76 U	40	0.78 U	0.78 U	4.2 J	4.2 J
CHRYSENE	17	2600	1.2 U	55	4.3 J	150	1.3 U	1.3 U	9.3	9.3
DIBENZO(A,H)ANTHRACENE	0.78 U	330	0.73 U	0.78 U	0.74 U	20	0.76 U	0.76 U	0.72 U	0.72 U
FLUORANTHENE	37	6000	0.61 U	100	6.3 J	260	0.63 U	0.63 U	16	16
FLUORENE	0.62 U	480	0.59 U	0.62 U	0.59 U	8.6	0.61 U	0.61 U	0.58 U	0.58 U
INDENO(1,2,3-CD)PYRENE	7.6 J	1200	0.39 U	33	0.39 U	79	0.4 U	0.4 U	0.38 U	0.38 U
NAPHTHALENE	0.96 U	230	0.91 U	0.96 U	0.91 U	6 J	0.94 U	0.94 U	0.89 U	0.89 U
PHENANTHRENE	22	4300	0.81 U	44	0.81 U	130	0.84 U	0.84 U	11	11
PYRENE	29	4600	0.49 U	95	4.5 J	220	0.51 U	0.5 U	15	15
PCBS (UG/KG)										
AROCLOR-1254										
AROCLOR-1260										
METALS (MG/KG)										
ANTIMONY										
ARSENIC										
BARIUM										
BERYLLIUM										
CADMIUM										
CHROMIUM										
COBALT										
COPPER										
LEAD										
MERCURY										
MOLYBDENUM										
NICKEL										
SELENIUM										
SILVER										
VANADIUM										
ZINC										
MISCELLANEOUS COMPOUNDS										
HEXAVALENT CHROMIUM (MG/KG)										
MERCURY (METHYL) (UG/KG)										

LOCATION	F-SB-1322	F-SB-1322	F-SB-1323	F-SB-1323	F-SB-1324	F-SB-1324	F-SB-1325	F-SB-1325	F-SB-1326	F-SB-1326
SAMPLE ID	F-SB-1322-1-2	F-SB-1322-SS	F-SB-1323-1-2	F-SB-1323-SS	F-SB-1324-1-2	F-SB-1324-SS	F-SB-1325-1-2	F-SB-1325-SS	F-SB-1326-1-2	F-SB-1326-SS
SAMPLE DATE	20140422	20140422	20140422	20140422	20140422	20140422	20140422	20140422	20140422	20140422
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
TOP DEPTH	1	0	1	0	1	0	1	0	1	0
BOTTOM DEPTH	2	1	2	1	2	1	2	1	2	1
VOLATILE ORGANIC COMPOUNDS (UG/KG)										
2-BUTANONE										
ACETONE										
CARBON DISULFIDE										
METHYLENE CHLORIDE										
SEMIVOLATILE ORGANIC COMPOUNDS (UG/KG)										
BENZOIC ACID										
BIS(2-ETHYLHEXYL)PHTHALATE										
BUTYL BENZYL PHTHALATE										
CAPROLACTAM										
CARBAZOLE										
DIBENZOFURAN										
DIMETHYL PHTHALATE										
DI-N-BUTYL PHTHALATE										
DI-N-OCTYL PHTHALATE										
PHENOL										
POLYNUCLEAR AROMATIC HYDROCARBONS (UG/KG)										
1-METHYLNAPHTHALENE										
2-METHYLNAPHTHALENE										
ACENAPHTHENE	0.83 U	0.83 U	0.88 U	0.87 U	0.87 U	0.86 U	0.9 U	0.92 U	0.83 U	0.83 U
ACENAPHTHYLENE	0.38 U	0.38 U	0.4 U	0.4 U	0.4 U	0.4 U	0.42 U	0.42 U	0.38 U	0.38 U
ANTHRACENE	3.9 J	3.9 J	0.9 U	0.9 U	0.9 U	0.89 U	0.93 U	0.94 U	3.9 J	3.9 J
BAP EQUIVALENT-HALFND	9.82	9.82	0.74 U	12.7159	0.74 U	0.73 U	0.76 U	0.77 U	9.82	9.82
BAP EQUIVALENT-POS	9.82	9.82	0.74 U	12.312	0.74 U	0.73 U	0.76 U	0.77 U	9.82	9.82
BENZO(A)ANTHRACENE	8	8	0.73 U	14	0.73 U	0.72 U	0.75 U	0.76 U	8	8
BENZO(A)PYRENE	7.7	7.7	0.74 U	9.2	0.74 U	0.73 U	0.76 U	0.77 U	7.7	7.7
BENZO(B)FLUORANTHENE	8.9	8.9	0.68 U	17	0.68 U	0.67 U	0.7 U	0.71 U	8.9	8.9
BENZO(G,H,I)PERYLENE	0.38 U	0.38 U	0.4 U	0.4 U	0.4 U	0.4 U	0.42 U	0.42 U	0.38 U	0.38 U
BENZO(K)FLUORANTHENE	4.2 J	4.2 J	0.79 U	0.78 U	0.78 U	0.77 U	0.81 U	0.82 U	4.2 J	4.2 J
CHRYSENE	9.3	9.3	1.3 U	12	1.3 U	1.2 U	1.3 U	1.3 U	9.3	9.3
DIBENZO(A,H)ANTHRACENE	0.72 U	0.72 U	0.76 U	0.76 U	0.76 U	0.75 U	0.78 U	0.8 U	0.72 U	0.72 U
FLUORANTHENE	16	16	0.64 U	23	10	0.62 U	0.65 U	0.67 U	16	16
FLUORENE	0.58 U	0.58 U	0.61 U	0.61 U	0.61 U	0.6 U	0.63 U	0.64 U	0.58 U	0.58 U
INDENO(1,2,3-CD)PYRENE	0.38 U	0.38 U	0.4 U	0.4 U	0.4 U	0.4 U	0.42 U	0.42 U	0.38 U	0.38 U
NAPHTHALENE	0.89 U	0.89 U	0.95 U	0.94 U	0.94 U	0.93 U	0.97 U	0.99 U	0.89 U	0.89 U
PHENANTHRENE	11	11	0.84 U	5.8 J	0.84 U	0.83 U	0.87 U	0.88 U	11	11
PYRENE	15	15	0.51 U	21	10	0.5 U	0.52 U	0.53 U	15	15
PCBS (UG/KG)										
AROCLOR-1254										
AROCLOR-1260										
METALS (MG/KG)										
ANTIMONY										
ARSENIC										
BARIUM										
BERYLLIUM										
CADMIUM										
CHROMIUM										
COBALT										
COPPER										
LEAD										
MERCURY										
MOLYBDENUM										
NICKEL										
SELENIUM										
SILVER										
VANADIUM										
ZINC										
MISCELLANEOUS COMPOUNDS										
HEXAVALENT CHROMIUM (MG/KG)										
MERCURY (METHYL) (UG/KG)										

LOCATION	F-SB-1327	F-SB-1327	F-SB-1328	F-SB-1328	SB-022	SB-023	SB-024	SB-024A	SB-024A	SB-025
SAMPLE ID	F-SB-1327-1-2	F-SB-1327-SS	F-SB-1328-1-2	F-SB-1328-SS	SB-22A-SS	SB-23A-SS	SB-24A-SS	F-SB-24ARE-1	F-SB-24ARE-2	SB-25A-SS
SAMPLE DATE	20140422	20140422	20140422	20140422	20040915	20040915	20040915	20090922	20090922	20040915
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
TOP DEPTH	1	0	1	0	0	0	0	1	2	0
BOTTOM DEPTH	2	1	2	1	1	1	1	1	2	1
VOLATILE ORGANIC COMPOUNDS (UG/KG)										
2-BUTANONE					66 U	55 U	61 U			60 U
ACETONE					89 J	55 UJ	61 UJ			60 UJ
CARBON DISULFIDE					7 U	6 U	6 U			6 U
METHYLENE CHLORIDE					11 B	6 U	6 U			6 U
SEMIVOLATILE ORGANIC COMPOUNDS (UG/KG)										
BENZOIC ACID										
BIS(2-ETHYLHEXYL)PHTHALATE					430 U	380 U	400 U			400 U
BUTYL BENZYL PHTHALATE					430 U	380 U	400 U			400 U
CAPROLACTAM					430 U	380 U	400 U			400 U
CARBAZOLE					430 U	380 U	400 U			400 U
DIBENZOFURAN					430 U	380 U	400 U			400 U
DIMETHYL PHTHALATE					430 U	60 J	400 U			400 U
DI-N-BUTYL PHTHALATE					430 U	380 U	400 U			400 U
DI-N-OCTYL PHTHALATE					430 U	380 U	400 U			400 U
PHENOL					430 U	420	400 U			400 U
POLYNUCLEAR AROMATIC HYDROCARBONS (UG/KG)										
1-METHYLNAPHTHALENE										
2-METHYLNAPHTHALENE					430 U	380 U	400 U			400 U
ACENAPHTHENE	10	84	52	57	430 U	380 U	400 U			400 U
ACENAPHTHYLENE	0.41 U	1.6 U	0.83 U	7.9 J	430 U	380 U	400 U			400 U
ANTHRACENE	33	240	170	170	430 U	380 U	400 U			400 U
BAP EQUIVALENT-HALFND	439.99	2797.8	1276.09	983.69	430 U	380 U	297.647			400 U
BAP EQUIVALENT-POS	439.99	2797.8	1276.09	983.69	430 U	380 U	77.647			400 U
BENZO(A)ANTHRACENE	270	1800	840	720 J	430 U	380 U	74 J			400 U
BENZO(A)PYRENE	310	2000	900	680 J	430 U	380 U	63 J			400 U
BENZO(B)FLUORANTHENE	460	2900	1300	990 J	430 U	380 U	66 J			400 U
BENZO(G,H,I)PERYLENE	200	1300	580	290	430 U	380 U	400 U			400 U
BENZO(K)FLUORANTHENE	170	890	520	300 J	430 U	380 U	57 J			400 U
CHRYSENE	290	1900	890	690 J	430 U	380 U	77 J			400 U
DIBENZO(A,H)ANTHRACENE	39	220	110	98	430 U	380 U	400 U			400 U
FLUORANTHENE	520	3500	1800	1400 J	57 J	380 U	170 J			400 U
FLUORENE	7.6 J	56	47	48	430 U	380 U	400 U			400 U
INDENO(1,2,3-CD)PYRENE	160	970	460	310	430 U	380 U	400 U			400 U
NAPHTHALENE	0.95 U	3.8 U	9.1 J	15	430 U	380 U	400 U			400 U
PHENANTHRENE	120	900	650	650	44 J	380 U	92 J			400 U
PYRENE	470	3200	1500	1200	430 U	380 U	110 J			400 U
PCBS (UG/KG)										
AROCLOR-1254					320 U	280 U	300 U			300 U
AROCLOR-1260					320 U	280 U	300 U			300 U
METALS (MG/KG)										
ANTIMONY					3 U	2.6 U	2.8 U			2.7 U
ARSENIC					1.3	2.2	3.4			0.6
BARIUM										
BERYLLIUM					3 U	2.6 U	2.8 U			5
CADMIUM					3 U	2.6 U	2.8 U			2.7 U
CHROMIUM					8.1	13	18			18
COBALT										
COPPER					4.9 K	5.3	36			15
LEAD					3 U	5.4	67			5.9
MERCURY					0.12 U	0.1 U	1.4	1.5 L	1 L	0.11 U
MOLYBDENUM										
NICKEL					4.6 K	7.1	14			27
SELENIUM					3 U	2.6 U	2.8 U			2.7 U
SILVER					3.2 U	3.4	2.9 U			2.9 U
VANADIUM										
ZINC					30 U	26 U	120			48 K
MISCELLANEOUS COMPOUNDS										
HEXAVALENT CHROMIUM (MG/KG)										
MERCURY (METHYL) (UG/KG)										

Attachment A
Updated Post-Excavation Surface Soil Data Set
Updated Post-Excavation Residual Risk Analysis for Block F
Lockheed Martin Corporation Middle River Complex
Middle River, Maryland

LOCATION	SB-030	SB-050	SB-055	SB-056	SB-056	SB-093	SB-093	SB-093	SB-094	SB-094
SAMPLE ID	SB-30A-SS	SB-50-SS	SB-55-SS	F-SB-56RE-1	F-SB-56RE-2	F-SB-93RE-1	F-SB-93RE-2	SB-93-SS	F-SB-94RE-1	F-SB-94RE-2
SAMPLE DATE	20040915	20040915	20040915	20090918	20090918	20090921	20090921	20040916	20090921	20090921
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
TOP DEPTH	0	0	0	1	2	1	2	0	1	2
BOTTOM DEPTH	1	1	1	1	2	1	2	1	1	2
VOLATILE ORGANIC COMPOUNDS (UG/KG)										
2-BUTANONE	53 U		53 U					66 U		
ACETONE	53 UJ		53 UJ					66 U		
CARBON DISULFIDE	5 U		5 U					7 U		
METHYLENE CHLORIDE	5 U		5 U					7 U		
SEMIVOLATILE ORGANIC COMPOUNDS (UG/KG)										
BENZOIC ACID										
BIS(2-ETHYLHEXYL)PHTHALATE	360 U		350 U					4500 U		
BUTYL BENZYL PHTHALATE	360 U		350 U					4500 U		
CAPROLACTAM	360 U		350 U					4500 U		
CARBAZOLE	360 U		350 U					4500 U		
DIBENZOFURAN	360 U		350 U					4500 U		
DIMETHYL PHTHALATE	360 U		350 U					4500 U		
DI-N-BUTYL PHTHALATE	360 U		350 U					4500 U		
DI-N-OCTYL PHTHALATE	360 U		350 U					4500 U		
PHENOL	360 U		350 U					4500 U		
POLYNUCLEAR AROMATIC HYDROCARBONS (UG/KG)										
1-METHYLNAPHTHALENE										
2-METHYLNAPHTHALENE	360 U		350 U					4500 U		
ACENAPHTHENE	360 U		350 U					4500 U		
ACENAPHTHYLENE	360 U		350 U					4500 U		
ANTHRACENE	360 U		350 U					4500 U		
BAP EQUIVALENT-HALFND	400.825		313.13	22.839	1.5 U	1189.76	150.16	1939.3	184.16	95.413
BAP EQUIVALENT-POS	4.825		120.63	22.039	1.5 U	1189.76	150.16	1939.3	184.16	95.413
BENZO(A)ANTHRACENE	44 J		110 J	17	1.1 U	890	100	1800 J	110	57
BENZO(A)PYRENE	360 U		99 J	17	1.5 U	810	89	1500 J	130	55
BENZO(B)FLUORANTHENE	360 U		94 J	21	1.4 U	1200	140	1600 J	150	58
BENZO(G,H,I)PERYLENE	360 U		70 J					1000 J		
BENZO(K)FLUORANTHENE	37 J		110 J	12	1.9 U	390	46	1500 J	91	24
CHRYSENE	55 J		130 J	19	1 U	860	100	2300 J	150	73
DIBENZO(A,H)ANTHRACENE	360 U		350 U	1.6 U	1.5 U	120	30	4500 U	19	25
FLUORANTHENE	84 J		270 J					3400 J		
FLUORENE	360 U		350 U					4500 U		
INDENO(1,2,3-CD)PYRENE	360 U		350 U	11	1.7 U	460	66	820 J	81	36
NAPHTHALENE	360 U		350 U					4500 U		
PHENANTHRENE	74 J		160 J					1600 J		
PYRENE	110 J		160 J					4000 J		
PCBS (UG/KG)										
AROCLOR-1254	270 U		260 U			19 U	20 U	330 U	20 U	21 U
AROCLOR-1260	270 U		260 U			120	20 U	800	20 U	21 U
METALS (MG/KG)										
ANTIMONY	2.7 UR	2.4 U	2.7 UR					3.1 UR		
ARSENIC	2.3 L	3.2	1.5 L					1.8 L		
BARIUM										
BERYLLIUM	2.7 U	2.4 U	2.7 U					3.1 UL		
CADMIUM	2.7 UL	2.4 U	2.7 UL					3.5 L		
CHROMIUM	8.7 L	9.4	13 L					110		
COBALT										
COPPER	4.4 K	17	74					21 L		
LEAD	4.5 J	33	420 J					73 L		
MERCURY	0.11 UL	0.42	0.11 UL					0.68		
MOLYBDENUM										
NICKEL	4.5 K	8.5	13					11		
SELENIUM	2.7 UL	2.4 U	2.7 UL					3.1 UL		
SILVER	2.7 UR	2.3 U	2.7 UR					3.1 UR		
VANADIUM										
ZINC	27 UL	100	58 J					100 K		
MISCELLANEOUS COMPOUNDS										
HEXAVALENT CHROMIUM (MG/KG)										
MERCURY (METHYL) (UG/KG)										

LOCATION	SB-094	SB-095	SB-095	SB-095	SB-096	SB-096	SB-236	SB-236	SB-237	SB-237
SAMPLE ID	SB-94-SS	SB-95-SS	F-SB-95RE-1	F-SB-95RE-2	F-SB-96RE-1	F-SB-96RE-2	SB-236-01	SB-236-SS	SB-237-01	SB-237-SS
SAMPLE DATE	20040916	20040916	20090918	20090918	20090921	20090921	20050509	20050509	20050509	20050509
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
TOP DEPTH	0	0	1	2	1	2	1	0	1	0
BOTTOM DEPTH	1	1	1	2	1	2	2	1	2	1
VOLATILE ORGANIC COMPOUNDS (UG/KG)										
2-BUTANONE	54 U	0.53 U								
ACETONE	54 U	0.94 U								
CARBON DISULFIDE	5 U	0.38 U								
METHYLENE CHLORIDE	5 U	0.33 U								
SEMIVOLATILE ORGANIC COMPOUNDS (UG/KG)										
BENZOIC ACID										
BIS(2-ETHYLHEXYL)PHTHALATE	3600 U	24 JB								
BUTYL BENZYL PHTHALATE	3600 U	11 U								
CAPROLACTAM	3600 U	40 U								
CARBAZOLE	3600 U	29 U								
DIBENZOFURAN	3600 U	0.72 U								
DIMETHYL PHTHALATE	3600 U	19 U								
DI-N-BUTYL PHTHALATE	3600 U	16 U								
DI-N-OCTYL PHTHALATE	3600 U	8.6 U								
PHENOL	3600 U	8 U								
POLYNUCLEAR AROMATIC HYDROCARBONS (UG/KG)										
1-METHYLNAPHTHALENE										
2-METHYLNAPHTHALENE	3600 U	0.55 U								
ACENAPHTHENE	3600 U	0.83 U								
ACENAPHTHYLENE	3600 U	0.38 U								
ANTHRACENE	3600 U	3.9 J								
BAP EQUIVALENT-HALFND	1074.1	9.82	9.82	9.82	601.84	1.6 U				
BAP EQUIVALENT-POS	1074.1	9.82	9.82	9.82	601.84	1.6 U				
BENZO(A)ANTHRACENE	880 J	8	8	8	390	1.1 U				
BENZO(A)PYRENE	850 J	7.7	7.7	7.7	410	1.6 U				
BENZO(B)FLUORANTHENE	890 J	8.9	8.9	8.9	580	1.5 U				
BENZO(G,H,I)PERYLENE	3600 U	0.38 U								
BENZO(K)FLUORANTHENE	1000 J	4.2 J	4.2 J	4.2 J	250	2.1 U				
CHRYSENE	1100 J	9.3	9.3	9.3	340	1.1 U				
DIBENZO(A,H)ANTHRACENE	3600 U	0.72 U	0.72 U	0.72 U	67	1.6 U				
FLUORANTHENE	2000 J	16								
FLUORENE	3600 U	0.58 U								
INDENO(1,2,3-CD)PYRENE	360 J	0.38 U	0.38 U	0.38 U	250	1.8 U				
NAPHTHALENE	3600 U	0.89 U								
PHENANTHRENE	1100 J	11								
PYRENE	1400 J	15								
PCBS (UG/KG)										
AROCLOR-1254	1300 U	15 U								
AROCLOR-1260	1400	9.7 U								
METALS (MG/KG)										
ANTIMONY	2.6 UR	0.43 U					2 L	0.5 L	4 L	0.4 L
ARSENIC	2.1 L	0.4 J					4	3	5	3 B
BARIUM							83	36	68	42
BERYLLIUM	2.6 UL	0.023 U					0.7	1.4	0.6	1.6
CADMIUM	4.5 L	0.019 U					0.4	0.3	0.3	0.4
CHROMIUM	25	11					19.8	17.7	185	19.8
COBALT							5.8	6.8	5.1	5.6
COPPER	21 L	1.1 J					22	14	33	12
LEAD	65 L	0.39 J					51	11	63	8 B
MERCURY	0.97	0.015 U					0.92 L	0.29 L	0.35	0.06
MOLYBDENUM							0.6 B	0.4 B	63	0.6 B
NICKEL	11	0.3 U					12	12	18	12
SELENIUM	2.6 UL	0.056 U					2 U	2	4	2
SILVER	2.6 UR	21					0.9	0.04 U	1.4	0.05 U
VANADIUM							31	29.9	41.9	31
ZINC	92 K	1.3 J					82	35	99	28
MISCELLANEOUS COMPOUNDS										
HEXAVALENT CHROMIUM (MG/KG)									0.4 U	
MERCURY (METHYL) (UG/KG)							0.734 J	0.071 J	1.467 J	

Attachment A
Updated Post-Excavation Surface Soil Data Set
Updated Post-Excavation Residual Risk Analysis for Block F
Lockheed Martin Corporation Middle River Complex
Middle River, Maryland

LOCATION	SB-238	SB-238	SB-250	SB-250	SB-251	SB-251	SB-252	SB-252	SB-253	SB-253
SAMPLE ID	SB-238-01	SB-238-SS	SB-250-02	SB-250-SS	SB-251-02	SB-251-SS	SB-252-02	SB-252-SS	SB-253-02	SB-253-SS
SAMPLE DATE	20050517	20050517	20050509	20050509	20050509	20050509	20050509	20050509	20050509	20050509
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
TOP DEPTH	1	0	1	0	1	0	1	0	1	0
BOTTOM DEPTH	2	1	2	1	2	1	2	1	2	1
VOLATILE ORGANIC COMPOUNDS (UG/KG)										
2-BUTANONE	2.87 J	3.14 J								
ACETONE	27.2 J	31 J								
CARBON DISULFIDE	0.72 J	7.1								
METHYLENE CHLORIDE	3.3 J	5.2 U								
SEMIVOLATILE ORGANIC COMPOUNDS (UG/KG)										
BENZOIC ACID	802 U	752 U								
BIS(2-ETHYLHEXYL)PHTHALATE	84 U	79 UJ								
BUTYL BENZYL PHTHALATE	203 U	191 UJ								
CAPROLACTAM										
CARBAZOLE	203 U	40 J								
DIBENZOFURAN	120 U	112 UJ								
DIMETHYL PHTHALATE	407 U	382 UJ								
DI-N-BUTYL PHTHALATE	203 U	191 U								
DI-N-OCTYL PHTHALATE	203 U	191 UJ								
PHENOL	407 U	382 U								
POLYNUCLEAR AROMATIC HYDROCARBONS (UG/KG)										
1-METHYLNAPHTHALENE	83.7 U	78.6 U								
2-METHYLNAPHTHALENE	84 U	79 U								
ACENAPHTHENE	84 U	79 UJ								
ACENAPHTHYLENE	84 U	79 UJ								
ANTHRACENE	84 U	54 J								
BAP EQUIVALENT-HALFND	140.162	424.437								
BAP EQUIVALENT-POS	98.162	424.437								
BENZO(A)ANTHRACENE	75 J	241 J								
BENZO(A)PYRENE	74 J	245 J								
BENZO(B)FLUORANTHENE	90	254 J								
BENZO(G,H,I)PERYLENE	75 J	344 J								
BENZO(K)FLUORANTHENE	87	225 J								
CHRYSENE	92	287 J								
DIBENZO(A,H)ANTHRACENE	84 U	100 J								
FLUORANTHENE	142	546								
FLUORENE	84 U	79 UJ								
INDENO(1,2,3-CD)PYRENE	67 J	274 J								
NAPHTHALENE	84 U	79 U								
PHENANTHRENE	58 J	249								
PYRENE	120	685 J								
PCBS (UG/KG)										
AROCLOR-1254	39 U	37 U								
AROCLOR-1260	39 U	154								
METALS (MG/KG)										
ANTIMONY	0.3 UL	1 L	0.6 L	0.8 L	0.9 L	1 L	0.8 L	0.7 L	0.9 L	1 L
ARSENIC	3	3	3 B	1 B	5	3 B	4	2 B	3 B	3 B
BARIUM	41	86	30	37	40	40	27	31	36	49
BERYLLIUM	1.8	1.3	1	0.7	1	0.7	0.5	0.6	0.7	0.6
CADMIUM	0.6	2	0.2 B	0.2 B	0.1 B	0.2 B	0.2 B	0.1 B	0.09 B	0.4
CHROMIUM	27.4	36.4	15.5	11.8	20.8	15.8	15.6	11.8	14	14.4
COBALT	8.4	6.4	2.8	5.8	7.1	5.9	3.5	3.6	4	4.9
COPPER	16	23	10	6	10	6	7	4	5	9
LEAD	30	148	5 B	17	7 B	7 B	6 B	10	5 B	31
MERCURY	0.08	0.24	0.03	0.04	0.01	0.02	0.04	0.04	0.03	0.07
MOLYBDENUM	0.8 B	1 B	0.6 B	0.5 B	0.5 B	0.6 U	0.7 B	0.4 U	0.5 B	0.5 U
NICKEL	22	21	6 B	8	9	9 B	6 B	6 B	5 B	8 B
SELENIUM	2 U	2 U	2 U	2	3	2 U	2 U	2 U	3	2 U
SILVER	0.06 U	0.06 U	0.06 U	0.05 B	0.05 U	0.06 U	0.05 U	0.04 U	0.2 B	0.2 B
VANADIUM	35.9	49	27.2	20.5	35.6	24.8	27.9	20.3	25.5	29.5
ZINC	54	167	25	32	34	29	24	25	20	39
MISCELLANEOUS COMPOUNDS										
HEXAVALENT CHROMIUM (MG/KG)	0.36 U	0.49								
MERCURY (METHYL) (UG/KG)										

Attachment A
Updated Post-Excavation Surface Soil Data Set
Updated Post-Excavation Residual Risk Analysis for Block F
Lockheed Martin Corporation Middle River Complex
Middle River, Maryland

LOCATION	SB-265	SB-265	SB-266	SB-266	SB-267	SB-267	SB-268	SB-268	SB-269	SB-269
SAMPLE ID	SB-265-02	SB-265-SS	SB-266-02	SB-266-SS	SB-267-02	SB-267-SS	SB-268-02	SB-268-SS	SB-269-02	SB-269-SS
SAMPLE DATE	20050509	20050509	20050509	20050509	20050509	20050509	20050509	20050509	20050509	20050509
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
TOP DEPTH	1	0	1	0	1	0	1	0	1	0
BOTTOM DEPTH	2	1	2	1	2	1	2	1	2	1
VOLATILE ORGANIC COMPOUNDS (UG/KG)										
2-BUTANONE										
ACETONE										
CARBON DISULFIDE										
METHYLENE CHLORIDE										
SEMIVOLATILE ORGANIC COMPOUNDS (UG/KG)										
BENZOIC ACID	740 U	152 J	784 U	157 J	333 J	925	10 U	10 U	786 U	765 UJ
BIS(2-ETHYLHEXYL)PHTHALATE	77 U	40 J	82 U	78 U	82 U	80 U	24 JB	24 JB	82 U	80 UJ
BUTYL BENZYL PHTHALATE	188 U	25 J	199 U	188 U	199 U	193 U	11 U	11 U	199 U	194 UJ
CAPROLACTAM										
CARBAZOLE	43 J	242	199 U	158 J	199 U	193 U	29 U	29 U	199 U	123 J
DIBENZOFURAN	110 U	86 J	117 U	43 J	117 U	114 U	0.72 U	0.72 U	117 U	27 J
DIMETHYL PHTHALATE	375 U	369 U	398 U	377 U	399 U	386 U	19 U	19 U	399 U	388 UJ
DI-N-BUTYL PHTHALATE	32 J	37 J	199 U	38 J	199 U	193 U	16 U	16 U	199 U	194 UJ
DI-N-OCTYL PHTHALATE	188 U	184 U	199 U	188 U	199 U	193 U	8.6 U	8.6 U	199 U	194 UJ
PHENOL	375 U	369 U	398 U	377 U	399 U	386 U	8 U	8 U	399 U	388 UJ
POLYNUCLEAR AROMATIC HYDROCARBONS (UG/KG)										
1-METHYLNAPHTHALENE	77.3 U	76 U	81.9 U	77.6 U	82.1 U	79.5 U	0.55 U	0.55 U	82.1 U	79.9 UJ
2-METHYLNAPHTHALENE	77 U	76 U	82 U	78 U	82 U	80 U	0.55 U	0.55 U	82 U	80 UJ
ACENAPHTHENE	77 U	174	82 U	98	82 U	80 U	0.83 U	0.83 U	82 U	79 J
ACENAPHTHYLENE	77 U	135	82 U	44 J	82 U	80 U	0.38 U	0.38 U	82 U	80 UJ
ANTHRACENE	109	870	30 J	291	82 U	41 J	3.9 J	3.9 J	82 U	256 J
BAP EQUIVALENT-HALFND	601.611	2544.69	192.445	1343.73	144.582	313.239	9.82	9.82	82 U	1883.35
BAP EQUIVALENT-POS	601.611	2544.69	151.445	1343.73	103.582	313.239	9.82	9.82	82 U	1883.35
BENZO(A)ANTHRACENE	432	1980	121	947	81 J	209	8	8	82 U	1260 J
BENZO(A)PYRENE	401	1800	116	977	80 J	212	7.7	7.7	82 U	1310 J
BENZO(B)FLUORANTHENE	374	2300	129	1090	83	229	8.9	8.9	82 U	1520 J
BENZO(G,H,I)PERYLENE	260 J	450 J	85 J	253 J	59 J	113 J	0.38 U	0.38 U	82 UJ	662 J
BENZO(K)FLUORANTHENE	405	1910	111	1100	90	241	4.2 J	4.2 J	82 U	1360 J
CHRYSENE	461	2090	135	1030	82 J	229	9.3	9.3	82 U	1250 J
DIBENZO(A,H)ANTHRACENE	86	232	82 UJ	117	82 UJ	41 J	0.72 U	0.72 U	82 U	206 J
FLUORANTHENE	802	4020	245	1940	173	395	16	16	82 U	2720 J
FLUORENE	32 J	213	82 U	94	82 U	80 U	0.58 U	0.58 U	82 U	68 J
INDENO(1,2,3-CD)PYRENE	295	635	92 J	340	62 J	138 J	0.38 U	0.38 U	82 U	745 J
NAPHTHALENE	77 U	36 J	82 U	78 U	82 U	80 U	0.89 U	0.89 U	82 U	80 UJ
PHENANTHRENE	417	2740	127	1090	47 J	163	11	11	82 U	987 J
PYRENE	637	2570	178	1380	110	286	15	15	28 J	1740 J
PCBS (UG/KG)										
AROCLOR-1254		36 U		36 U		96		15 U		37 U
AROCLOR-1260		119		756		73 J		9.7 U		95
METALS (MG/KG)										
ANTIMONY		0.5		1		1		0.43 U		1 L
ARSENIC		5		3 B		3 B		0.4 J		6
BARIUM		29		44		79		2.6 J		103
BERYLLIUM		1.3		0.8		0.8		0.023 U		1.7
CADMIUM		0.8		1.8		0.7		0.019 U		0.7
CHROMIUM		55.8		31.3		16.4		11		26.1
COBALT		8.9		8.5		6		0.054 J		6.6
COPPER		17		16		16		1.1 J		15
LEAD		20		43		91		0.39 J		56
MERCURY		0.09		0.51		0.07		0.015 U		0.18
MOLYBDENUM		2 B		0.6 B		0.6 U		0.13 J		1 B
NICKEL		20		14		9		0.21 J		13
SELENIUM		2 U		3		3		0.3 U		3
SILVER		1.1		1.1		0.06 B		0.056 U		0.06 U
VANADIUM		46.2		33.4		21.6		21		42.8
ZINC		50		85		287		1.3 J		74
MISCELLANEOUS COMPOUNDS										
HEXAVALENT CHROMIUM (MG/KG)		3.6		2				0.55 U		0.51
MERCURY (METHYL) (UG/KG)				0.63						

Attachment A
Updated Post-Excavation Surface Soil Data Set
Updated Post-Excavation Residual Risk Analysis for Block F
Lockheed Martin Corporation Middle River Complex
Middle River, Maryland

LOCATION	SB-270	SB-270	SB-382	SB-383	SB-384	SB-385	SB-386	SB-387	SB-388	SB-389
SAMPLE ID	SB-270-02	SB-270-SS	SB-382-0102	SB-383-0102	SB-384-0102	SB-385-0102	SB-386-0102	SB-387-0102	SB-388-0102	SB-389-0102
SAMPLE DATE	20050509	20050509	20071015	20071015	20071015	20071015	20071015	20071015	20071015	20071015
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
TOP DEPTH	1	0	1	1	1	1	1	1	1	1
BOTTOM DEPTH	2	1	2	2	2	2	2	2	2	2
VOLATILE ORGANIC COMPOUNDS (UG/KG)										
2-BUTANONE										
ACETONE										
CARBON DISULFIDE										
METHYLENE CHLORIDE										
SEMIVOLATILE ORGANIC COMPOUNDS (UG/KG)										
BENZOIC ACID	217 J	189 J								
BIS(2-ETHYLHEXYL)PHTHALATE	84 U	83 U								
BUTYL BENZYL PHTHALATE	204 U	200 U								
CAPROLACTAM										
CARBAZOLE	204 U	32 J								
DIBENZOFURAN	120 U	118 U								
DIMETHYL PHTHALATE	408 U	401 U								
DI-N-BUTYL PHTHALATE	204 U	200 U								
DI-N-OCTYL PHTHALATE	204 U	200 U								
PHENOL	408 U	401 U								
POLYNUCLEAR AROMATIC HYDROCARBONS (UG/KG)										
1-METHYLNAPHTHALENE	83.9 U	82.5 U								
2-METHYLNAPHTHALENE	84 U	83 U								
ACENAPHTHENE	84 U	83 U								
ACENAPHTHYLENE	84 U	83 U								
ANTHRACENE	84 U	66 J								
BAP EQUIVALENT-HALFND	123.389	369.109	1.5 U	9.82	1.5 U	1.4 U	1.4 U	12	380	220
BAP EQUIVALENT-POS	80.969	369.109	1.5 U	9.82	1.5 U	1.4 U	1.4 U	12	380	220
BENZO(A)ANTHRACENE	73 J	239								
BENZO(A)PYRENE	62 J	258	1.5 U	7.7	1.5 U	1.4 U	1.4 U	12 J	380	220 J
BENZO(B)FLUORANTHENE	65 J	250								
BENZO(G,H,I)PERYLENE	48 J	175 J								
BENZO(K)FLUORANTHENE	84 U	244								
CHRYSENE	69 J	269								
DIBENZO(A,H)ANTHRACENE	84 UJ	46 J								
FLUORANTHENE	163	600								
FLUORENE	84 U	83 U								
INDENO(1,2,3-CD)PYRENE	51 J	135 J								
NAPHTHALENE	84 U	83 U								
PHENANTHRENE	81 J	265								
PYRENE	113	371								
PCBS (UG/KG)										
AROCLOR-1254		38 U	39 U	15 U	38 U	36 U	37 U	35 U	35 U	36 U
AROCLOR-1260		29 J	39 U	9.7 U	38 U	36 U	37 U	35 U	35 U	36 U
METALS (MG/KG)										
ANTIMONY		1 L								
ARSENIC		3 B								
BARIUM		64								
BERYLLIUM		1.1								
CADMIUM		0.3 B								
CHROMIUM		15.3								
COBALT		5.4								
COPPER		12								
LEAD		64								
MERCURY		0.11								
MOLYBDENUM		0.6 B								
NICKEL		8 B								
SELENIUM		2 U								
SILVER		0.06 U								
VANADIUM		26.2								
ZINC		51								
MISCELLANEOUS COMPOUNDS										
HEXAVALENT CHROMIUM (MG/KG)		0.64								
MERCURY (METHYL) (UG/KG)										

Attachment A
Updated Post-Excavation Surface Soil Data Set
Updated Post-Excavation Residual Risk Analysis for Block F
Lockheed Martin Corporation Middle River Complex
Middle River, Maryland

LOCATION	SB-390	SB-391	SB-392	SB-393	SB-394	SB-395	SB-396	SB-397	SB-398	SB-399
SAMPLE ID	SB-390-0102	SB-391-0102	SB-392-0102	SB-393-0102	SB-394-0102	SB-395-0102	SB-396-0102	SB-397-0102	SB-398-0102	SB-399-0102
SAMPLE DATE	20071015	20071016	20071016	20071016	20071016	20071016	20071016	20071016	20071016	20071016
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
TOP DEPTH	1	1	1	1	1	1	1	1	1	1
BOTTOM DEPTH	2	2	2	2	2	2	2	2	2	2
VOLATILE ORGANIC COMPOUNDS (UG/KG)										
2-BUTANONE										
ACETONE										
CARBON DISULFIDE										
METHYLENE CHLORIDE										
SEMIVOLATILE ORGANIC COMPOUNDS (UG/KG)										
BENZOIC ACID										
BIS(2-ETHYLHEXYL)PHTHALATE										
BUTYL BENZYL PHTHALATE										
CAPROLACTAM										
CARBAZOLE										
DIBENZOFURAN										
DIMETHYL PHTHALATE										
DI-N-BUTYL PHTHALATE										
DI-N-OCTYL PHTHALATE										
PHENOL										
POLYNUCLEAR AROMATIC HYDROCARBONS (UG/KG)										
1-METHYLNAPHTHALENE										
2-METHYLNAPHTHALENE										
ACENAPHTHENE										
ACENAPHTHYLENE										
ANTHRACENE										
BAP EQUIVALENT-HALFND	9.9	1.6 U	1.4 U	450	140	1.6 U	80	80	29	1.4 U
BAP EQUIVALENT-POS	9.9	1.6 U	1.4 U	450	140	1.6 U	80	80	29	1.4 U
BENZO(A)ANTHRACENE										
BENZO(A)PYRENE	9.9 J	1.6 U	1.4 U	450	140 J	1.6 U	80 J	80 J	29 J	1.4 U
BENZO(B)FLUORANTHENE										
BENZO(G,H,I)PERYLENE										
BENZO(K)FLUORANTHENE										
CHRYSENE										
DIBENZO(A,H)ANTHRACENE										
FLUORANTHENE										
FLUORENE										
INDENO(1,2,3-CD)PYRENE										
NAPHTHALENE										
PHENANTHRENE										
PYRENE										
PCBS (UG/KG)										
AROCLOR-1254	38 U	39 U	37 U	35 U	37 U	40 U	39 U	35 U	36 U	36 U
AROCLOR-1260	38 U	39 U	37 U	22 J	37 U	40 U	39 U	35 U	36 U	36 U
METALS (MG/KG)										
ANTIMONY										
ARSENIC										
BARIUM										
BERYLLIUM										
CADMIUM										
CHROMIUM										
COBALT										
COPPER										
LEAD										
MERCURY										
MOLYBDENUM										
NICKEL										
SELENIUM										
SILVER										
VANADIUM										
ZINC										
MISCELLANEOUS COMPOUNDS										
HEXAVALENT CHROMIUM (MG/KG)										
MERCURY (METHYL) (UG/KG)										

Attachment A
Updated Post-Excavation Surface Soil Data Set
Updated Post-Excavation Residual Risk Analysis for Block F
Lockheed Martin Corporation Middle River Complex
Middle River, Maryland

LOCATION	SB-400	SB-401	SB-402	SB-403	SB-404	SB-405	SB-406	SB-407	SB-408	SB-409
SAMPLE ID	SB-400-0102	SB-401-0102	SB-402-0102	SB-403-0102	SB-404-0102	SB-405-0102	SB-406-0102	SB-407-0102	SB-408-0102	SB-409-0102
SAMPLE DATE	20071016	20071016	20071016	20071016	20071016	20071016	20071016	20071016	20071016	20071016
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
TOP DEPTH	1	1	1	1	1	1	1	1	1	1
BOTTOM DEPTH	2	2	2	2	2	2	2	2	2	2
VOLATILE ORGANIC COMPOUNDS (UG/KG)										
2-BUTANONE										
ACETONE										
CARBON DISULFIDE										
METHYLENE CHLORIDE										
SEMIVOLATILE ORGANIC COMPOUNDS (UG/KG)										
BENZOIC ACID										
BIS(2-ETHYLHEXYL)PHTHALATE										
BUTYL BENZYL PHTHALATE										
CAPROLACTAM										
CARBAZOLE										
DIBENZOFURAN										
DIMETHYL PHTHALATE										
DI-N-BUTYL PHTHALATE										
DI-N-OCTYL PHTHALATE										
PHENOL										
POLYNUCLEAR AROMATIC HYDROCARBONS (UG/KG)										
1-METHYLNAPHTHALENE										
2-METHYLNAPHTHALENE										
ACENAPHTHENE										
ACENAPHTHYLENE										
ANTHRACENE										
BAP EQUIVALENT-HALFND	9.1	25	37	1.5 U	1.5 U	36	510	130	87	39
BAP EQUIVALENT-POS	9.1	25	37	1.5 U	1.5 U	36	510	130	87	39
BENZO(A)ANTHRACENE										
BENZO(A)PYRENE	9.1 J	25 J	37 J	1.5 U	1.5 U	36 J	510	130 J	87 J	39 J
BENZO(B)FLUORANTHENE										
BENZO(G,H,I)PERYLENE										
BENZO(K)FLUORANTHENE										
CHRYSENE										
DIBENZO(A,H)ANTHRACENE										
FLUORANTHENE										
FLUORENE										
INDENO(1,2,3-CD)PYRENE										
NAPHTHALENE										
PHENANTHRENE										
PYRENE										
PCBS (UG/KG)										
AROCLOR-1254	36 U	41 U	41 U	37 U	38 U	36 U	38 U	42 U	40 U	43 U
AROCLOR-1260	36 U	41 U	41 U	37 U	38 U	36 U	38 U	42 U	40 U	43 U
METALS (MG/KG)										
ANTIMONY										
ARSENIC										
BARIUM										
BERYLLIUM										
CADMIUM										
CHROMIUM										
COBALT										
COPPER										
LEAD										
MERCURY										
MOLYBDENUM										
NICKEL										
SELENIUM										
SILVER										
VANADIUM										
ZINC										
MISCELLANEOUS COMPOUNDS										
HEXAVALENT CHROMIUM (MG/KG)										
MERCURY (METHYL) (UG/KG)										

Attachment A
Updated Post-Excavation Surface Soil Data Set
Updated Post-Excavation Residual Risk Analysis for Block F
Lockheed Martin Corporation Middle River Complex
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LOCATION	SB-489	SB-624	SB-624	SB-625	SB-625	SB-626	SB-626	SB-626	SB-626C	SB-626D
SAMPLE ID	SB-489-0102	F-SB-624-1	F-SB-624-2	F-SB-625-1	F-SB-625-2	F-SB-626-1	F-SB-626-2	F-SB-626B-(1-4)	F-SB-626C-1	F-SB-626D-1
SAMPLE DATE	20071016	20090921	20090921	20090921	20090921	20090922	20090922	20091111	20091111	20091111
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
TOP DEPTH	1	1	2	1	2	1	2	1	1	1
BOTTOM DEPTH	2	1	2	1	2	1	2	4	1	1
VOLATILE ORGANIC COMPOUNDS (UG/KG)										
2-BUTANONE										
ACETONE										
CARBON DISULFIDE										
METHYLENE CHLORIDE										
SEMIVOLATILE ORGANIC COMPOUNDS (UG/KG)										
BENZOIC ACID										
BIS(2-ETHYLHEXYL)PHTHALATE										
BUTYL BENZYL PHTHALATE										
CAPROLACTAM										
CARBAZOLE										
DIBENZOFURAN										
DIMETHYL PHTHALATE										
DI-N-BUTYL PHTHALATE										
DI-N-OCTYL PHTHALATE										
PHENOL										
POLYNUCLEAR AROMATIC HYDROCARBONS (UG/KG)										
1-METHYLNAPHTHALENE										
2-METHYLNAPHTHALENE										
ACENAPHTHENE										
ACENAPHTHYLENE										
ANTHRACENE										
BAP EQUIVALENT-HALFND	9.6									
BAP EQUIVALENT-POS	9.6									
BENZO(A)ANTHRACENE										
BENZO(A)PYRENE	9.6 J									
BENZO(B)FLUORANTHENE										
BENZO(G,H,I)PERYLENE										
BENZO(K)FLUORANTHENE										
CHRYSENE										
DIBENZO(A,H)ANTHRACENE										
FLUORANTHENE										
FLUORENE										
INDENO(1,2,3-CD)PYRENE										
NAPHTHALENE										
PHENANTHRENE										
PYRENE										
PCBS (UG/KG)										
AROCLOR-1254	41 U									
AROCLOR-1260	41 U									
METALS (MG/KG)										
ANTIMONY										
ARSENIC										
BARIUM										
BERYLLIUM										
CADMIUM										
CHROMIUM										
COBALT										
COPPER										
LEAD										
MERCURY		0.035	0.22	0.02 U	0.58	2.2 L	2.7 L	1.2	2.2	0.36
MOLYBDENUM										
NICKEL										
SELENIUM										
SILVER										
VANADIUM										
ZINC										
MISCELLANEOUS COMPOUNDS										
HEXAVALENT CHROMIUM (MG/KG)										
MERCURY (METHYL) (UG/KG)										

Attachment A
Updated Post-Excavation Surface Soil Data Set
Updated Post-Excavation Residual Risk Analysis for Block F
Lockheed Martin Corporation Middle River Complex
Middle River, Maryland

LOCATION	SB-627	SB-627	SB-635C	SB-635D	SB-636	SB-636A	SB-636B	SB-636C	SB-636D	SB-637
SAMPLE ID	F-SB-627-1	F-SB-627-2	F-SB-635C-1	F-SB-635D-1	F-SB-636-1	F-SB-636A-1	F-SB-636B-1	F-SB-636C-1	F-SB-636D-1	F-SB-637-1
SAMPLE DATE	20090922	20090922	20091104	20091110	20091007	20091105	20091105	20091105	20091105	20091007
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
TOP DEPTH	1	2	1	1	1	1	1	1	1	1
BOTTOM DEPTH	1	2	1	1	1	1	1	1	1	1
VOLATILE ORGANIC COMPOUNDS (UG/KG)										
2-BUTANONE										
ACETONE										
CARBON DISULFIDE										
METHYLENE CHLORIDE										
SEMIVOLATILE ORGANIC COMPOUNDS (UG/KG)										
BENZOIC ACID										
BIS(2-ETHYLHEXYL)PHTHALATE										
BUTYL BENZYL PHTHALATE										
CAPROLACTAM										
CARBAZOLE										
DIBENZOFURAN										
DIMETHYL PHTHALATE										
DI-N-BUTYL PHTHALATE										
DI-N-OCTYL PHTHALATE										
PHENOL										
POLYNUCLEAR AROMATIC HYDROCARBONS (UG/KG)										
1-METHYLNAPHTHALENE										
2-METHYLNAPHTHALENE										
ACENAPHTHENE										
ACENAPHTHYLENE										
ANTHRACENE										
BAP EQUIVALENT-HALFND			1266.69	20.2071	163.09	409.6	1412.29	9.82	9.82	1185.74
BAP EQUIVALENT-POS			1266.69	19.4981	163.09	409.6	1412.29	9.82	9.82	1185.74
BENZO(A)ANTHRACENE			760	11	130	290	790	8	8	900
BENZO(A)PYRENE			870	16	110	270	950	7.7	7.7	820
BENZO(B)FLUORANTHENE			1200	8.9	140	400	1200	8.9	8.9	1100
BENZO(G,H,I)PERYLENE										
BENZO(K)FLUORANTHENE			390	1.8 U	58	130	540	4.2 J	4.2 J	390
CHRYSENE			790	8.1	110	300	890	9.3	9.3	840
DIBENZO(A,H)ANTHRACENE			150	1.4 U	19	53	200	0.72 U	0.72 U	120
FLUORANTHENE										
FLUORENE										
INDENO(1,2,3-CD)PYRENE			460	15	64	160	570	0.38 U	0.38 U	410
NAPHTHALENE										
PHENANTHRENE										
PYRENE										
PCBS (UG/KG)										
AROCLOR-1254					20 U					19 U
AROCLOR-1260					20 U					19 U
METALS (MG/KG)										
ANTIMONY										
ARSENIC										
BARIUM										
BERYLLIUM										
CADMIUM										
CHROMIUM										
COBALT										
COPPER										
LEAD										
MERCURY	0.31 L	0.38 L								
MOLYBDENUM										
NICKEL										
SELENIUM										
SILVER										
VANADIUM										
ZINC										
MISCELLANEOUS COMPOUNDS										
HEXAVALENT CHROMIUM (MG/KG)										
MERCURY (METHYL) (UG/KG)										

Attachment A
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Lockheed Martin Corporation Middle River Complex
Middle River, Maryland

LOCATION	SB-637B	SB-637C	SB-638	SB-639	SB-640	SB-641	SB-641A	SB-641B	SB-641C	SB-642
SAMPLE ID	F-SB-637B-1	F-SB-637C-1	F-SB-638-1	F-SB-639-1	F-SB-640-1	F-SB-641-1	F-SB-641A-1	F-SB-641B-1	F-SB-641C-1	F-SB-642-1
SAMPLE DATE	20091106	20091106	20091007	20091007	20091007	20091006	20091104	20091104	20091104	20091019
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
TOP DEPTH	1	1	1	1	1	1	1	1	1	1
BOTTOM DEPTH	1	1	1	1	1	1	1	1	1	1
VOLATILE ORGANIC COMPOUNDS (UG/KG)										
2-BUTANONE										
ACETONE										
CARBON DISULFIDE										
METHYLENE CHLORIDE										
SEMIVOLATILE ORGANIC COMPOUNDS (UG/KG)										
BENZOIC ACID										
BIS(2-ETHYLHEXYL)PHTHALATE										
BUTYL BENZYL PHTHALATE										
CAPROLACTAM										
CARBAZOLE										
DIBENZOFURAN										
DIMETHYL PHTHALATE										
DI-N-BUTYL PHTHALATE										
DI-N-OCTYL PHTHALATE										
PHENOL										
POLYNUCLEAR AROMATIC HYDROCARBONS (UG/KG)										
1-METHYLNAPHTHALENE										
2-METHYLNAPHTHALENE										
ACENAPHTHENE										
ACENAPHTHYLENE										
ANTHRACENE										
BAP EQUIVALENT-HALFND	9.82	2075.2	1.4 U	78.536	73.797	1363.848	41.373	289.14	9.82	1495.18
BAP EQUIVALENT-POS	9.82	2075.2	1.4 U	77.786	73.047	1363.84	40.623	289.14	9.82	1495.18
BENZO(A)ANTHRACENE	8	1700	1 U	62	52	960	31	190	8	1100
BENZO(A)PYRENE	7.7	1400	1.4 U	59	55	860	32	200	7.7	1000
BENZO(B)FLUORANTHENE	8.9	1900	1.3 U	88	88	1300	38	290	8.9	1200
BENZO(G,H,I)PERYLENE										
BENZO(K)FLUORANTHENE	4.2 J	870	1.8 U	32	29	1.6 U	19	95	4.2 J	620
CHRYSENE	9.3	1500	0.97 U	66	57	840	33	190	9.3	980
DIBENZO(A,H)ANTHRACENE	0.72 U	230	1.4 U	1.5 U	1.5 U	210	1.5 U	30	0.72 U	200
FLUORANTHENE										
FLUORENE										
INDENO(1,2,3-CD)PYRENE	0.38 U	750	1.6 U	34	37	670	15	100	0.38 U	580
NAPHTHALENE										
PHENANTHRENE										
PYRENE										
PCBS (UG/KG)										
AROCLOR-1254			18 U	20 U	20 U					
AROCLOR-1260			18 U	20 U	20 U					
METALS (MG/KG)										
ANTIMONY										
ARSENIC										
BARIUM										
BERYLLIUM										
CADMIUM										
CHROMIUM										
COBALT										
COPPER										
LEAD										
MERCURY										
MOLYBDENUM										
NICKEL										
SELENIUM										
SILVER										
VANADIUM										
ZINC										
MISCELLANEOUS COMPOUNDS										
HEXAVALENT CHROMIUM (MG/KG)										
MERCURY (METHYL) (UG/KG)										

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Lockheed Martin Corporation Middle River Complex
Middle River, Maryland

LOCATION	SB-642A	SB-642B	SB-642C	SB-643	SB-643B	SB-643C	SB-644	SB-645	SB-645A	SB-645B
SAMPLE ID	F-SB-642A-1	F-SB-642B-1	F-SB-642C-1	F-SB-643-1	F-SB-643B-1	F-SB-643C-1	F-SB-644-1	F-SB-645-1	F-SB-645A-1	F-SB-645B-1
SAMPLE DATE	20091104	20091104	20091104	20091016	20091105	20091105	20091016	20091006	20091105	20091105
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
TOP DEPTH	1	1	1	1	1	1	1	1	1	1
BOTTOM DEPTH	1	1	1	1	1	1	1	1	1	1
VOLATILE ORGANIC COMPOUNDS (UG/KG)										
2-BUTANONE										
ACETONE										
CARBON DISULFIDE										
METHYLENE CHLORIDE										
SEMIVOLATILE ORGANIC COMPOUNDS (UG/KG)										
BENZOIC ACID										
BIS(2-ETHYLHEXYL)PHTHALATE										
BUTYL BENZYL PHTHALATE										
CAPROLACTAM										
CARBAZOLE										
DIBENZOFURAN										
DIMETHYL PHTHALATE										
DI-N-BUTYL PHTHALATE										
DI-N-OCTYL PHTHALATE										
PHENOL										
POLYNUCLEAR AROMATIC HYDROCARBONS (UG/KG)										
1-METHYLNAPHTHALENE										
2-METHYLNAPHTHALENE										
ACENAPHTHENE										
ACENAPHTHYLENE										
ANTHRACENE										
BAP EQUIVALENT-HALFND	1.5 U	56.598	1.737	708.4	118.119	1.4 U	69.594	9.82	110.918	112.462
BAP EQUIVALENT-POS	1.5 U	55.848	0.012	708.4	118.119	1.4 U	69.594	9.82	110.918	112.462
BENZO(A)ANTHRACENE	1.1 U	42	1.1 U	360	77	1 U	39	8	68	79
BENZO(A)PYRENE	1.5 U	44	1.5 U	490	70	1.4 U	47	7.7	66	78
BENZO(B)FLUORANTHENE	1.4 U	48	1.4 U	630	110	1.3 U	58	8.9	96	110
BENZO(G,H,I)PERYLENE										
BENZO(K)FLUORANTHENE	2 U	40	2 U	300	32	1.9 U	25	4.2 J	45	47
CHRYSENE	1 U	48	12	400	99	0.99 U	44	9.3	68	92
DIBENZO(A,H)ANTHRACENE	1.5 U	1.5 U	1.5 U	87	25	1.4 U	9.4	0.72 U	24	11
FLUORANTHENE										
FLUORENE										
INDENO(1,2,3-CD)PYRENE	1.7 U	24	1.8 U	290	40	1.7 U	32	0.38 U	40	40
NAPHTHALENE										
PHENANTHRENE										
PYRENE										
PCBS (UG/KG)										
AROCLOR-1254										
AROCLOR-1260										
METALS (MG/KG)										
ANTIMONY										
ARSENIC										
BARIUM										
BERYLLIUM										
CADMIUM										
CHROMIUM										
COBALT										
COPPER										
LEAD										
MERCURY										
MOLYBDENUM										
NICKEL										
SELENIUM										
SILVER										
VANADIUM										
ZINC										
MISCELLANEOUS COMPOUNDS										
HEXAVALENT CHROMIUM (MG/KG)										
MERCURY (METHYL) (UG/KG)										

Attachment A
Updated Post-Excavation Surface Soil Data Set
Updated Post-Excavation Residual Risk Analysis for Block F
Lockheed Martin Corporation Middle River Complex
Middle River, Maryland

LOCATION	SB-645C	SB-646	SB-647	SB-647A	SB-647B	SB-647C	SB-648	SB-649	SB-650	SB-651
SAMPLE ID	F-SB-645C-1	F-SB-646-1	F-SB-647-1	F-SB-647A-1	F-SB-647B-1	F-SB-647C-1	F-SB-648-1	F-SB-649-1	F-SB-650-1	F-SB-651-1
SAMPLE DATE	20091105	20091006	20091006	20091105	20091105	20091105	20091006	20091006	20091006	20091007
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
TOP DEPTH	1	1	1	1	1	1	1	1	1	1
BOTTOM DEPTH	1	1	1	1	1	1	1	1	1	1
VOLATILE ORGANIC COMPOUNDS (UG/KG)										
2-BUTANONE										
ACETONE										
CARBON DISULFIDE										
METHYLENE CHLORIDE										
SEMIVOLATILE ORGANIC COMPOUNDS (UG/KG)										
BENZOIC ACID										
BIS(2-ETHYLHEXYL)PHTHALATE										
BUTYL BENZYL PHTHALATE										
CAPROLACTAM										
CARBAZOLE										
DIBENZOFURAN										
DIMETHYL PHTHALATE										
DI-N-BUTYL PHTHALATE										
DI-N-OCTYL PHTHALATE										
PHENOL										
POLYNUCLEAR AROMATIC HYDROCARBONS (UG/KG)										
1-METHYLNAPHTHALENE										
2-METHYLNAPHTHALENE										
ACENAPHTHENE										
ACENAPHTHYLENE										
ANTHRACENE										
BAP EQUIVALENT-HALFND	369.44	9.82	9.82	9.82	283.14	5140.3	2.2 U	2.2 U	4.1202	13.7284
BAP EQUIVALENT-POS	369.44	9.82	9.82	9.82	283.14	5140.3	2.2 U	2.2 U	3.1	12.9689
BENZO(A)ANTHRACENE	260	8	8	8	170	3400	1.2 U	1.3 U	1.2 U	8.8
BENZO(A)PYRENE	240	7.7	7.7	7.7	180	3500	2.2 U	2.2 U	3.1 J	9.9
BENZO(B)FLUORANTHENE	330	8.9	8.9	8.9	240	4500	1.6 U	1.6 U	1.6 U	13
BENZO(G,H,I)PERYLENE										
BENZO(K)FLUORANTHENE	120	4.2 J	4.2 J	4.2 J	97	1700	1.6 U	1.7 U	1.6 U	1.9 U
CHRYSENE	240	9.3	9.3	9.3	170	3300	1.4 U	1.4 U	1.4 U	8.9
DIBENZO(A,H)ANTHRACENE	55	0.72 U	0.72 U	0.72 U	49	620	1.7 U	1.8 U	1.7 U	1.5 U
FLUORANTHENE										
FLUORENE										
INDENO(1,2,3-CD)PYRENE	140	0.38 U	0.38 U	0.38 U	120	2100	0.43 U	0.44 U	0.43 U	8.8
NAPHTHALENE										
PHENANTHRENE										
PYRENE										
PCBS (UG/KG)										
AROCLOR-1254										19 U
AROCLOR-1260										19 U
METALS (MG/KG)										
ANTIMONY										
ARSENIC										
BARIUM										
BERYLLIUM										
CADMIUM										
CHROMIUM										
COBALT										
COPPER										
LEAD										
MERCURY										
MOLYBDENUM										
NICKEL										
SELENIUM										
SILVER										
VANADIUM										
ZINC										
MISCELLANEOUS COMPOUNDS										
HEXAVALENT CHROMIUM (MG/KG)										
MERCURY (METHYL) (UG/KG)										

Attachment A
Updated Post-Excavation Surface Soil Data Set
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Lockheed Martin Corporation Middle River Complex
Middle River, Maryland

LOCATION	SB-652	SB-652A	SB-652B	SB-652C	SB-797	SB-798	SB-799	SB-800	SB-801	SB-802
SAMPLE ID	F-SB-652-1	F-SB-652A-1	F-SB-652B-1	F-SB-652C-1	F-SB-797-SS	F-SB-798-SS	F-SB-799-SS	F-SB-800-SS	F-SB-801-SS	F-SB-802-SS
SAMPLE DATE	20091007	20091105	20091105	20091105	20100820	20100820	20100820	20100910	20100910	20100910
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
TOP DEPTH	1	1	1	1	1	1	1	1	1	1
BOTTOM DEPTH	1	1	1	1	1	1	1	1	1	1
VOLATILE ORGANIC COMPOUNDS (UG/KG)										
2-BUTANONE										
ACETONE										
CARBON DISULFIDE										
METHYLENE CHLORIDE										
SEMIVOLATILE ORGANIC COMPOUNDS (UG/KG)										
BENZOIC ACID										
BIS(2-ETHYLHEXYL)PHTHALATE										
BUTYL BENZYL PHTHALATE										
CAPROLACTAM										
CARBAZOLE										
DIBENZOFURAN										
DIMETHYL PHTHALATE										
DI-N-BUTYL PHTHALATE										
DI-N-OCTYL PHTHALATE										
PHENOL										
POLYNUCLEAR AROMATIC HYDROCARBONS (UG/KG)										
1-METHYLNAPHTHALENE					0.55 U	3.7 U	3.9 U			
2-METHYLNAPHTHALENE					0.55 U	3.7 U	3.9 U			
ACENAPHTHENE					0.83 U	3.7 U	3.9 U			
ACENAPHTHYLENE					0.38 U	3.7 U	3.9 U			
ANTHRACENE					3.9 J	3.7 U	3.9 U			
BAP EQUIVALENT-HALFND	342.45	228.02	505.25	18.534	9.82	3.7 U	13.0855			
BAP EQUIVALENT-POS	342.45	228.02	505.25	17.699	9.82	3.7 U	10.921			
BENZO(A)ANTHRACENE	260	150	350	16	8	3.7 U	8.1			
BENZO(A)PYRENE	230	150	340	13	7.7	3.7 U	9			
BENZO(B)FLUORANTHENE	330	200	430	30	8.9	3.7 U	11			
BENZO(G,H,I)PERYLENE					0.38 U	3.7 U	3.9 U			
BENZO(K)FLUORANTHENE	120	96	190	8.4	4.2 J	3.7 U	3.9 U			
CHRYSENE	250	160	350	15	9.3	1.2 U	11			
DIBENZO(A,H)ANTHRACENE	38	33	65	1.5 U	0.72 U	3.7 U	3.9 U			
FLUORANTHENE					16	11	17			
FLUORENE					0.58 U	3.7 U	3.9 U			
INDENO(1,2,3-CD)PYRENE	140	89	200	1.7 U	0.38 U	3.7 U	3.9 U			
NAPHTHALENE					0.89 U	3.7 U	3.9 U			
PHENANTHRENE					11	3.7 U	8			
PYRENE					15	9.1	17			
PCBS (UG/KG)										
AROCLOR-1254	20 U									
AROCLOR-1260	20 U									
METALS (MG/KG)										
ANTIMONY										
ARSENIC										
BARIUM										
BERYLLIUM										
CADMIUM										
CHROMIUM										
COBALT										
COPPER										
LEAD										
MERCURY								1 L	0.18 L	0.017 UR
MOLYBDENUM										
NICKEL										
SELENIUM										
SILVER										
VANADIUM										
ZINC										
MISCELLANEOUS COMPOUNDS										
HEXAVALENT CHROMIUM (MG/KG)										
MERCURY (METHYL) (UG/KG)										

LOCATION	F-VS-A-1-1	F-VS-A-2-1	F-VS-A-3-1-RS	F-VS-A-4-1	F-VS-B-1-1	F-VS-B-2-1	F-VS-B-3-1	F-VS-B-4-1	F-VS-C-1-1	F-VS-C-1-1-AVG
SAMPLE ID	201507/15	201507/15	201507/15	201507/15	201507/15	201507/15	201507/15	201507/15	20150716	20150716
SAMPLE DATE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	AVG
SAMPLE CODE	1	1	1	1	1	1	1	1	1	1
TOP DEPTH	1	1	1	1	1	1	1	1	1	1
BOTTOM DEPTH										
VOLATILE ORGANIC COMPOUNDS (UG/KG)										
2-BUTANONE										
ACETONE										
CARBON DISULFIDE										
METHYLENE CHLORIDE										
SEMIVOLATILE ORGANIC COMPOUNDS (UG/KG)										
BENZOIC ACID										
BIS(2-ETHYLHEXYL)PHTHALATE										
BUTYL BENZYL PHTHALATE										
CAPROLACTAM										
CARBAZOLE										
DIBENZOFURAN										
DIMETHYL PHTHALATE										
DI-N-BUTYL PHTHALATE										
DI-N-OCTYL PHTHALATE										
PHENOL										
POLYNUCLEAR AROMATIC HYDROCARBONS (UG/KG)										
1-METHYLNAPHTHALENE										
2-METHYLNAPHTHALENE										
ACENAPHTHENE	12	46	59	360	9.9	8.2	450	160	26 J	16.6
ACENAPHTHYLENE	5.7 J	8.7	0.4 U	8.7	0.39 U	0.4 U	1.9 U	0.41 U	0.4 U	0.4 U
ANTHRACENE	22	59	97	670	21	26	860	170	65 J	43
BAP EQUIVALENT-HALFND	122.505	186.9	343	1920	89.117	216.235	2740	579.01	259 J	185
BAP EQUIVALENT-POS	122.505	186.9	343	1920	88.747	215.86	2740	579.01	259 J	185
BENZO(A)ANTHRACENE	83	140	240	1600	71	170	2100	420	190 J	136
BENZO(A)PYRENE	77	120	240	1300	69	170	2000	430	180 J	126
BENZO(B)FLUORANTHENE	120	170	300	1700	93	220	2600	520	210 J	153
BENZO(G,H,I)PERYLENE	60	83	170	730	26	58	540	120	77 J	59
BENZO(K)FLUORANTHENE	52	76	150	790	48	120	1400	260	120 J	84
CHRYSENE	85	140	260	1500	67	160	1900	410	190 J	136
DIBENZO(A,H)ANTHRACENE	19	27	33	210	0.74 U	0.75 U	200	40	30 J	23.5
FLUORANTHENE	200	260	580	3900	160	350	5400	1000	460 J	325
FLUORENE	9.8	36	51	300	7.5	6 J	380	77	23 J	15.1
INDENO(1,2,3-CD)PYRENE	56	80	140	730	28	55	550	120	72 J	55
NAPHTHALENE	6.6 J	14	33	140	8	0.93 U	180	200	4.6 J	2.5
PHENANTHRENE	87	230	440	3000	87	80	3500	650	240 J	161
PYRENE	150	230	470	3700	140	310	4400	860	360 J	255
PCBS (UG/KG)										
AROCLOR-1254										
AROCLOR-1260										
METALS (MG/KG)										
ANTIMONY										
ARSENIC										
BARIUM										
BERYLLIUM										
CADMIUM										
CHROMIUM										
COBALT										
COPPER										
LEAD										
MERCURY										
MOLYBDENUM										
NICKEL										
SELENIUM										
SILVER										
VANADIUM										
ZINC										
MISCELLANEOUS COMPOUNDS										
HEXAVALENT CHROMIUM (MG/KG)										
MERCURY (METHYL) (UG/KG)										

LOCATION	F-VS-C-1-1-DUP	F-VS-C-2-1	F-VS-C-3-1	F-VS-C-4-1	F-VS-D-1-1	F-VS-D-2-1	F-VS-D-3-1	F-VS-D-4-1	F-VS-E-1-1	F-VS-E-2-1
SAMPLE ID	20150716	20150716	20150716	20150716	201507/21	201507/21	201507/21	201507/21	20150722	20150722
SAMPLE DATE	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE CODE	1	1	1	1'	1	1	1	1	1	1
TOP DEPTH	1	1	1	1'	1	1	1	1	1	1
BOTTOM DEPTH										
VOLATILE ORGANIC COMPOUNDS (UG/KG)										
2-BUTANONE										
ACETONE										
CARBON DISULFIDE										
METHYLENE CHLORIDE										
SEMIVOLATILE ORGANIC COMPOUNDS (UG/KG)										
BENZOIC ACID										
BIS(2-ETHYLHEXYL)PHTHALATE										
BUTYL BENZYL PHTHALATE										
CAPROLACTAM										
CARBAZOLE										
DIBENZOFURAN										
DIMETHYL PHTHALATE										
DI-N-BUTYL PHTHALATE										
DI-N-OCTYL PHTHALATE										
PHENOL										
POLYNUCLEAR AROMATIC HYDROCARBONS (UG/KG)										
1-METHYLNAPHTHALENE										
2-METHYLNAPHTHALENE										
ACENAPHTHENE	7.2 J	0.86 U	0.86 U	0.87 U	0.9 U	15	0.87 U	11	0.84 U	0.86 U
ACENAPHTHYLENE	0.4 U	0.4 U	0.4 U	0.4 U	4 J	0.4 U	0.4 U	0.42 U	0.39 U	0.4 U
ANTHRACENE	21 J	0.88 U	0.89 U	0.89 U	14	41	0.89 U	29	0.86 U	0.89 U
BAP EQUIVALENT-HALFND	111 J	1.8	29.5	2	128.39	174.1	14.3885	228.75	9.2	17.3
BAP EQUIVALENT-POS	111 J	1	29.2	1.2	128	174.1	14.0135	228.75	8.8	16.9
BENZO(A)ANTHRACENE	82 J	0.71 U	21	0.72 U	99	130	7.5 J	140	4.8 J	11
BENZO(A)PYRENE	72 J	0.73 U	22	0.73 U	100	120	9.7	160	5.7 J	12
BENZO(B)FLUORANTHENE	96 J	10	32	12	130	160	21	180	14	22
BENZO(G,H,I)PERYLENE	41 J	0.4 U	17	0.4 U	44	58	14	80	11	15
BENZO(K)FLUORANTHENE	48 J	0.77 U	15	0.78 U	60	87	5.6 J	110	3.8 J	9.4
CHRYSENE	81 J	1.2 U	21	1.3 U	100	130	7.5 J	150	5.3 J	13
DIBENZO(A,H)ANTHRACENE	17 J	0.75 U	0.75 U	0.75 U	0.78 U	19	0.75 U	28	0.73 U	0.75 U
FLUORANTHENE	190 J	0.62 U	41	5.3 J	200	320	13	320	9.8	24
FLUORENE	7.2 J	0.6 U	0.6 U	0.6 U	0.63 U	12	0.6 U	8.3	0.58 U	0.6 U
INDENO(1,2,3-CD)PYRENE	38 J	0.4 U	17	0.4 U	44	51	14	75	12	15
NAPHTHALENE	0.93 U	0.93 U	0.93 U	0.93 U	0.97 U	0.93 U	0.93 U	7.1 J	0.9 U	7.5 J
PHENANTHRENE	82 J	0.83 U	10	0.83 U	58	190	4.2 J	120	4.6 J	10
PYRENE	150 J	0.5 U	37	4.9 J	170	250	12	260	8.9	20
PCBS (UG/KG)										
AROCLOR-1254										
AROCLOR-1260										
METALS (MG/KG)										
ANTIMONY										
ARSENIC										
BARIUM										
BERYLLIUM										
CADMIUM										
CHROMIUM										
COBALT										
COPPER										
LEAD										
MERCURY										
MOLYBDENUM										
NICKEL										
SELENIUM										
SILVER										
VANADIUM										
ZINC										
MISCELLANEOUS COMPOUNDS										
HEXAVALENT CHROMIUM (MG/KG)										
MERCURY (METHYL) (UG/KG)										

LOCATION	F-VS-E-4-1	F-VS-E-4-1-AVG	F-VS-E-4-1-DUP	F-VS-E-3-1	F-SB-1867-0-0.5	F-SB-1867-0-0.5-AVG	F-SB-1867-0-0.5-D	F-SB-1868-0-0.5
SAMPLE ID	**20150722**	**20150722**	**20150722**	**20150722**	**20190523**	**20190523**	**20190523**	**20190523**
SAMPLE DATE	**ORIG**	**AVG**	**DUP**	**NORMAL**	**ORIG**	**AVG**	**DUP**	**NORMAL**
SAMPLE CODE	**1**	**1**	**1**	**1**	**0**	**0**	**0**	**0**
TOP DEPTH	**1**	**1**	**1**	**1**	**0.5**	**0.5**	**0.5**	**0.5**
BOTTOM DEPTH								
VOLATILE ORGANIC COMPOUNDS (UG/KG)								
2-BUTANONE								
ACETONE								
CARBON DISULFIDE								
METHYLENE CHLORIDE								
SEMIVOLATILE ORGANIC COMPOUNDS (UG/KG)								
BENZOIC ACID								
BIS(2-ETHYLHEXYL)PHTHALATE								
BUTYL BENZYL PHTHALATE								
CAPROLACTAM								
CARBAZOLE								
DIBENZOFURAN								
DIMETHYL PHTHALATE								
DI-N-BUTYL PHTHALATE								
DI-N-OCTYL PHTHALATE								
PHENOL								
POLYNUCLEAR AROMATIC HYDROCARBONS (UG/KG)								
1-METHYLNAPHTHALENE								
2-METHYLNAPHTHALENE								
ACENAPHTHENE	8.7 J	45.85	83 J	32				
ACENAPHTHYLENE	2.1 J	1.45	1.6 U	9.1 J				
ANTHRACENE	29 J	139.5	250 J	97				
BAP EQUIVALENT-HALFND	400	1710	3020	1350				
BAP EQUIVALENT-POS	400	1710	3020	1350				
BENZO(A)ANTHRACENE	230 J	1065	1900 J	840				
BENZO(A)PYRENE	280 J	1240	2200 J	980				
BENZO(B)FLUORANTHENE	330 J	1565	2800 J	1200				
BENZO(G,H,I)PERYLENE	160 J	475	790 J	380				
BENZO(K)FLUORANTHENE	180 J	740	1300 J	570				
CHRYSENE	240 J	1120	2000 J	830				
DIBENZO(A,H)ANTHRACENE	48 J	154	260 J	120				
FLUORANTHENE	460 J	2330	4200 J	1800				
FLUORENE	7.5 J	34.75	62	23				
INDENO(1,2,3-CD)PYRENE	140 J	460	780 J	350				
NAPHTHALENE	3.6 J	3.6	3.8 U	1.9 U				
PHENANTHRENE	100 J	505	910 J	350				
PYRENE	390 J	1945	3500 J	1500				
PCBS (UG/KG)								
AROCLOR-1254					26 U	26.5 U	27 U	26 U
AROCLOR-1260					660 J	490	320 J	86
METALS (MG/KG)								
ANTIMONY								
ARSENIC								
BARIUM								
BERYLLIUM								
CADMIUM								
CHROMIUM								
COBALT								
COPPER								
LEAD								
MERCURY								
MOLYBDENUM								
NICKEL								
SELENIUM								
SILVER								
VANADIUM								
ZINC								
MISCELLANEOUS COMPOUNDS								
HEXAVALENT CHROMIUM (MG/KG)								
MERCURY (METHYL) (UG/KG)								

LOCATION	F-SB-1869-0-0.5	F-SB-1870-0-0.5	F-SB-1871-0-0.5	F-SB-1872-0-0.5	F-SB-1873-0-0.5	F-SB-1874-0-0.5	F-SB-1875-0-0.5
SAMPLE ID	20190523	20190523	20190523	20190523	20190523	20190523	20190523
SAMPLE DATE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG
SAMPLE CODE	0	0	0	0	0	0	0
TOP DEPTH	0.5	0.5	0.5	0.5	0.5	0.5	0.5
BOTTOM DEPTH							
VOLATILE ORGANIC COMPOUNDS (UG/KG)							
2-BUTANONE							
ACETONE							
CARBON DISULFIDE							
METHYLENE CHLORIDE							
SEMIVOLATILE ORGANIC COMPOUNDS (UG/KG)							
BENZOIC ACID							
BIS(2-ETHYLHEXYL)PHTHALATE							
BUTYL BENZYL PHTHALATE							
CAPROLACTAM							
CARBAZOLE							
DIBENZOFURAN							
DIMETHYL PHTHALATE							
DI-N-BUTYL PHTHALATE							
DI-N-OCTYL PHTHALATE							
PHENOL							
POLYNUCLEAR AROMATIC HYDROCARBONS (UG/KG)							
1-METHYLNAPHTHALENE							
2-METHYLNAPHTHALENE							
ACENAPHTHENE							
ACENAPHTHYLENE							
ANTHRACENE							
BAP EQUIVALENT-HALFND							
BAP EQUIVALENT-POS							
BENZO(A)ANTHRACENE							
BENZO(A)PYRENE							
BENZO(B)FLUORANTHENE							
BENZO(G,H,I)PERYLENE							
BENZO(K)FLUORANTHENE							
CHRYSENE							
DIBENZO(A,H)ANTHRACENE							
FLUORANTHENE							
FLUORENE							
INDENO(1,2,3-CD)PYRENE							
NAPHTHALENE							
PHENANTHRENE							
PYRENE							
PCBS (UG/KG)							
AROCLOR-1254	26 U	26 U	25 U	26 U	28 U	26 U	25 U
AROCLOR-1260	520	280	840	340	860	460	270 J
METALS (MG/KG)							
ANTIMONY							
ARSENIC							
BARIUM							
BERYLLIUM							
CADMIUM							
CHROMIUM							
COBALT							
COPPER							
LEAD							
MERCURY							
MOLYBDENUM							
NICKEL							
SELENIUM							
SILVER							
VANADIUM							
ZINC							
MISCELLANEOUS COMPOUNDS							
HEXAVALENT CHROMIUM (MG/KG)							
MERCURY (METHYL) (UG/KG)							

LOCATION	F-SB-1875-0-0.5-AVG	F-SB-1875-0-0.5-D	F-SB-1876-0-0.5	F-SB-1877-0-0.5	F-SB-1877-0.5-1.0	F-SB-1878-0-0.5	F-SB-1879-0-0.5
SAMPLE ID	20190523	20190523	20190523	20190523	20190523	20190523	20190523
SAMPLE DATE	AVG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE CODE	0	0	0	0	0.5	0	0
TOP DEPTH	0.5	0.5	0.5	0.5	1	0.5	0.5
BOTTOM DEPTH							
VOLATILE ORGANIC COMPOUNDS (UG/KG)							
2-BUTANONE							
ACETONE							
CARBON DISULFIDE							
METHYLENE CHLORIDE							
SEMIVOLATILE ORGANIC COMPOUNDS (UG/KG)							
BENZOIC ACID							
BIS(2-ETHYLHEXYL)PHTHALATE							
BUTYL BENZYL PHTHALATE							
CAPROLACTAM							
CARBAZOLE							
DIBENZOFURAN							
DIMETHYL PHTHALATE							
DI-N-BUTYL PHTHALATE							
DI-N-OCTYL PHTHALATE							
PHENOL							
POLYNUCLEAR AROMATIC HYDROCARBONS (UG/KG)							
1-METHYLNAPHTHALENE							
2-METHYLNAPHTHALENE							
ACENAPHTHENE							
ACENAPHTHYLENE							
ANTHRACENE							
BAP EQUIVALENT-HALFND							
BAP EQUIVALENT-POS							
BENZO(A)ANTHRACENE							
BENZO(A)PYRENE							
BENZO(B)FLUORANTHENE							
BENZO(G,H,I)PERYLENE							
BENZO(K)FLUORANTHENE							
CHRYSENE							
DIBENZO(A,H)ANTHRACENE							
FLUORANTHENE							
FLUORENE							
INDENO(1,2,3-CD)PYRENE							
NAPHTHALENE							
PHENANTHRENE							
PYRENE							
PCBS (UG/KG)							
AROCLOR-1254	25.5 U	26 U	27 U	27 U	26 U	26 U	29 U
AROCLOR-1260	415	560 J	730	1300	430	380	870
METALS (MG/KG)							
ANTIMONY							
ARSENIC							
BARIUM							
BERYLLIUM							
CADMIUM							
CHROMIUM							
COBALT							
COPPER							
LEAD							
MERCURY							
MOLYBDENUM							
NICKEL							
SELENIUM							
SILVER							
VANADIUM							
ZINC							
MISCELLANEOUS COMPOUNDS							
HEXAVALENT CHROMIUM (MG/KG)							
MERCURY (METHYL) (UG/KG)							

LOCATION	F-SB-1880-0-0.5	CPP-SB-1857-0.0-0.5	CPP-SB-1857-0.5-1.0	CPP-SB-1858-0.0-0.5	CPP-SB-1858-0.5-1.0	CPP-SB-1859-0.0-0.5	CPP-SB-1859-0.5-1.0
SAMPLE ID	20190523	20180817	20180817	20180817	20180817	20180817	20180817
SAMPLE DATE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE CODE	0	0	0.5	0	0.5	0	0.5
TOP DEPTH	0.5	0.5	1	0.5	1	0.5	1
BOTTOM DEPTH							
VOLATILE ORGANIC COMPOUNDS (UG/KG)							
2-BUTANONE							
ACETONE							
CARBON DISULFIDE							
METHYLENE CHLORIDE							
SEMIVOLATILE ORGANIC COMPOUNDS (UG/KG)							
BENZOIC ACID							
BIS(2-ETHYLHEXYL)PHTHALATE							
BUTYL BENZYL PHTHALATE							
CAPROLACTAM							
CARBAZOLE							
DIBENZOFURAN							
DIMETHYL PHTHALATE							
DI-N-BUTYL PHTHALATE							
DI-N-OCTYL PHTHALATE							
PHENOL							
POLYNUCLEAR AROMATIC HYDROCARBONS (UG/KG)							
1-METHYLNAPHTHALENE							
2-METHYLNAPHTHALENE							
ACENAPHTHENE							
ACENAPHTHYLENE							
ANTHRACENE							
BAP EQUIVALENT-HALFND							
BAP EQUIVALENT-POS							
BENZO(A)ANTHRACENE							
BENZO(A)PYRENE							
BENZO(B)FLUORANTHENE							
BENZO(G,H,I)PERYLENE							
BENZO(K)FLUORANTHENE							
CHRYSENE							
DIBENZO(A,H)ANTHRACENE							
FLUORANTHENE							
FLUORENE							
INDENO(1,2,3-CD)PYRENE							
NAPHTHALENE							
PHENANTHRENE							
PYRENE							
PCBS (UG/KG)							
AROCLOR-1254	26 U	27 U	28 U	150 U	26 U	27 U	26 U
AROCLOR-1260	560	1100	34 J	1300	24 U	1000	35 J
METALS (MG/KG)							
ANTIMONY							
ARSENIC							
BARIUM							
BERYLLIUM							
CADMIUM							
CHROMIUM							
COBALT							
COPPER							
LEAD							
MERCURY							
MOLYBDENUM							
NICKEL							
SELENIUM							
SILVER							
VANADIUM							
ZINC							
MISCELLANEOUS COMPOUNDS							
HEXAVALENT CHROMIUM (MG/KG)							
MERCURY (METHYL) (UG/KG)							

LOCATION	CPP-SB-1860-0.0-0.5	CPP-SB-1860-0.5-1.0	CPP-SB-1860-0.5-1.0-AVG	CPP-SB-1860-0.5-1.0-D	CPP-SB-1861-0.0-0.5	CPP-SB-1861-0.5-1.0	CPP-SB-1862-0.0-0.5
SAMPLE ID	20180817	20180817	20180817	20180817	20180817	20180817	20180817
SAMPLE DATE	NORMAL	ORIG	AVG	DUP	NORMAL	NORMAL	NORMAL
SAMPLE CODE	0	0.5	0.5	0.5	0	0.5	0
TOP DEPTH	0.5	1	1	1	0.5	1	0.5
BOTTOM DEPTH							
VOLATILE ORGANIC COMPOUNDS (UG/KG)							
2-BUTANONE							
ACETONE							
CARBON DISULFIDE							
METHYLENE CHLORIDE							
SEMIVOLATILE ORGANIC COMPOUNDS (UG/KG)							
BENZOIC ACID							
BIS(2-ETHYLHEXYL)PHTHALATE							
BUTYL BENZYL PHTHALATE							
CAPROLACTAM							
CARBAZOLE							
DIBENZOFURAN							
DIMETHYL PHTHALATE							
DI-N-BUTYL PHTHALATE							
DI-N-OCTYL PHTHALATE							
PHENOL							
POLYNUCLEAR AROMATIC HYDROCARBONS (UG/KG)							
1-METHYLNAPHTHALENE							
2-METHYLNAPHTHALENE							
ACENAPHTHENE							
ACENAPHTHYLENE							
ANTHRACENE							
BAP EQUIVALENT-HALFND							
BAP EQUIVALENT-POS							
BENZO(A)ANTHRACENE							
BENZO(A)PYRENE							
BENZO(B)FLUORANTHENE							
BENZO(G,H,I)PERYLENE							
BENZO(K)FLUORANTHENE							
CHRYSENE							
DIBENZO(A,H)ANTHRACENE							
FLUORANTHENE							
FLUORENE							
INDENO(1,2,3-CD)PYRENE							
NAPHTHALENE							
PHENANTHRENE							
PYRENE							
PCBS (UG/KG)							
AROCLOR-1254	140 U	26 U	27 U	28 U	140 U	26 U	31 U
AROCLOR-1260	4700	76 J	82.5	89	2500	190	1100
METALS (MG/KG)							
ANTIMONY							
ARSENIC							
BARIUM							
BERYLLIUM							
CADMIUM							
CHROMIUM							
COBALT							
COPPER							
LEAD							
MERCURY							
MOLYBDENUM							
NICKEL							
SELENIUM							
SILVER							
VANADIUM							
ZINC							
MISCELLANEOUS COMPOUNDS							
HEXAVALENT CHROMIUM (MG/KG)							
MERCURY (METHYL) (UG/KG)							

LOCATION	CPP-SB-1862-0.5-1.0	CPP-SB-1863-0.0-0.5	CPP-SB-1863-0.5-1.0	CPP-SB-1864-0.0-0.5	CPP-SB-1864-0.5-1.0
SAMPLE ID	20180817	20180817	20180817	20180817	20180817
SAMPLE DATE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE CODE	0.5	0	0.5	0	0.5
TOP DEPTH	1	0.5	1	0.5	1
BOTTOM DEPTH					
VOLATILE ORGANIC COMPOUNDS (UG/KG)					
2-BUTANONE					
ACETONE					
CARBON DISULFIDE					
METHYLENE CHLORIDE					
SEMIVOLATILE ORGANIC COMPOUNDS (UG/KG)					
BENZOIC ACID					
BIS(2-ETHYLHEXYL)PHTHALATE					
BUTYL BENZYL PHTHALATE					
CAPROLACTAM					
CARBAZOLE					
DIBENZOFURAN					
DIMETHYL PHTHALATE					
DI-N-BUTYL PHTHALATE					
DI-N-OCTYL PHTHALATE					
PHENOL					
POLYNUCLEAR AROMATIC HYDROCARBONS (UG/KG)					
1-METHYLNAPHTHALENE					
2-METHYLNAPHTHALENE					
ACENAPHTHENE					
ACENAPHTHYLENE					
ANTHRACENE					
BAP EQUIVALENT-HALFND					
BAP EQUIVALENT-POS					
BENZO(A)ANTHRACENE					
BENZO(A)PYRENE					
BENZO(B)FLUORANTHENE					
BENZO(G,H,I)PERYLENE					
BENZO(K)FLUORANTHENE					
CHRYSENE					
DIBENZO(A,H)ANTHRACENE					
FLUORANTHENE					
FLUORENE					
INDENO(1,2,3-CD)PYRENE					
NAPHTHALENE					
PHENANTHRENE					
PYRENE					
PCBS (UG/KG)					
AROCLOR-1254	25 U	28 U	27 U	28 U	28 U
AROCLOR-1260	70	710	240 J	340	160
METALS (MG/KG)					
ANTIMONY					
ARSENIC					
BARIUM					
BERYLLIUM					
CADMIUM					
CHROMIUM					
COBALT					
COPPER					
LEAD					
MERCURY					
MOLYBDENUM					
NICKEL					
SELENIUM					
SILVER					
VANADIUM					
ZINC					
MISCELLANEOUS COMPOUNDS					
HEXAVALENT CHROMIUM (MG/KG)					
MERCURY (METHYL) (UG/KG)					

Blank cells indicate the associated analyte was not analyzed.

Excavated samples. Chemical concentrations were replaced with concentrations of chemicals in backfill.
Confirmation samples.
2018-2019 Block F and Chesapeake Park Plaza samples (PCB data only, and only Aroclor-1260 was detected).

Definitions:
B = Detected in blank.
J = Estimated value.
JB = Estimated value, detected in blank.
K = Biased high.
L = Biased low.
U = Not detected.
UJ = Not detected, value is estimated.
UL = Not detected, value biased low.
UR = Not detected, rejected.

ATTACHMENT B— RAGS PART D TABLES

TABLE 3.1.RME
EXPOSURE POINT CONCENTRATION SUMMARY
REASONABLE MAXIMUM EXPOSURE
LOCKHEED MARTIN, MIDDLE RIVER COMPLEX, MIDDLE RIVER, MARYLAND

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution)	Maximum Concentration (Qualifier)	Exposure Point Concentration			
						Value	Units	Statistic	Rationale
Block F	Benzo(a)pyrene Equivalents	mg/kg	0.35	0.60 (NP)	5.14	0.60	mg/kg	95% KM (Chebyshev) UCL	ProUCL 5.1.002
	Aroclor-1254	mg/kg	0.036	(1)	0.096	0.096	mg/kg	Maximum Detected Concentration	(1)
	Aroclor-1260	mg/kg	0.31	0.46 (G)	4.7	0.46	mg/kg	95% KM Approximate Gamma UCL	ProUCL 5.1.002
	Antimony	mg/kg	1.0	1.6 (NP)	4	1.6	mg/kg	95% KM (Chebyshev) UCL	ProUCL 5.1.002
	Cadmium	mg/kg	0.89	3.9 (L)	4.5	3.9	mg/kg	KM H-UCL	ProUCL 5.1.002
	Cobalt	mg/kg	5.6	6.3 (N)	8.9	6.3	mg/kg	95% Student's-t UCL	ProUCL 5.1.002
	Lead	mg/kg	44.3	86.6 (G)	420	44.3	mg/kg	Arithmetic Mean Concentration	(2)
	Mercury	mg/kg	0.46	0.69 (G)	2.7	0.69	mg/kg	Gamma Adjusted KM-UCL	ProUCL 5.1.002
	Molybdenum	mg/kg	3.5	(1)	63	63	mg/kg	Maximum Detected Concentration	(1)
	Nickel	mg/kg	9.8	12.0 (N)	27	12.0	mg/kg	95% KM (t) UCL	ProUCL 5.1.002
	Vanadium	mg/kg	31.1	34.4 (N)	49	34.4	mg/kg	95% Student's-t UCL	ProUCL 5.1.002
	Hexavalent Chromium	mg/kg	0.98	1.8 (NP)	5.5	1.8	mg/kg	95% KM (Chebyshev) UCL	ProUCL 5.1.002

G = Gamma
L = Lognormal
N = Normal
NP = Non-parametric

1 - There are less than four detected concentrations. Reliable statistics cannot be computed. The Maximum concentration was used as the EPC.
2 - Mean concentration is used as exposure point concentration for evaluating exposures to lead.
U.S. EPA, 1994:Guidance Manual for the Integrated Exposure Uptake Biokinetic Model for lead in Children.

TABLE 4.1.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE - INDUSTRIAL WORKERS - SOIL

LOCKHEED MARTIN, MARTIN MIDDLE RIVER COMPLEX, MIDDLE RIVER, MARYLAND

Scenario Timeframe: Future
Medium: Surface Soil/Subsurface Soil
Exposure Medium: Surface/Subsurface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Industrial Workers	Adult	Block F	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002	Intake (mg/kg/day) =
				IR-S	Ingestion Rate	100	mg/day	USEPA, 2014	
				RBA	Relative Bioavailability	Chemical Specific	unitless	USEPA, 1989	
				CF3	Conversion Factor 3	0.000001	kg/mg	--	$\frac{CS \times IRS \times CF3 \times FI \times EF \times ED}{BW \times AT}$
				FI	Fraction Ingested	1	unitless	USEPA, 2014	
				EF	Exposure Frequency	250	days/year	USEPA, 2014	
				ED	Exposure Duration	25	years	USEPA, 2014	
				BW	Body Weight	80	kg	USEPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	9125	days	USEPA, 2014	
Dermal	Industrial Workers	Adult	Block F	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002	Dermally Absorbed Dose (mg/kg/day) =
				CF3	Conversion Factor 3	0.000001	kg/mg	--	
				SA	Skin Surface Available for Contact	3,527	cm2	USEPA, 2014	$\frac{CS \times CF3 \times SA \times SSAF \times DABS \times EV \times EF \times ED}{BW \times AT}$
				SSAF	Soil to Skin Adherence Factor	0.12	mg/cm2/event	USEPA, 2014	
				DABS	Absorption Factor	Chemical Specific	unitless	USEPA, 2004	
				EV	Events Frequency	1	events/day	USEPA, 2014	
				EF	Exposure Frequency	250	days/year	USEPA, 2014	
				ED	Exposure Duration	25	years	USEPA, 2014	
				BW	Body Weight	80	kg	USEPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	9125	days	USEPA, 2014	

Sources:

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A.

USEPA, 2002:Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10, December.

USEPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

USEPA, 2014: Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER 9200.1-120.

TABLE 4.2.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE - INDUSTRIAL WORKERS - SOIL TO AIR

LOCKHEED MARTIN, MARTIN MIDDLE RIVER COMPLEX, MIDDLE RIVER, MARYLAND

Scenario Timeframe: Future
Medium: Surface Soil/Subsurface Soil
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Industrial Workers	Adult	Block F	CA	Chemical concentration in air	Calculated	mg/m3	USEPA, 2002a	Exposure Concentration (mg/m^3) =
				CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002b	
				ET	Exposure Time	8	hours/day	(1)	$\frac{CA \times ET \times EF \times ED}{AT \times 24\ hours/day}$
				EF	Exposure Frequency	250	days/year	USEPA, 2014	
				ED	Exposure Duration	25	years	USEPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	CA = (1/PEF + 1/VF) x Cs
				AT-N	Averaging Time (Non-Cancer)	9125	days	USEPA, 2014	
				PEF	Particulate Emission Factor	3.23E+09	m3/kg	USEPA, 2016	
				VF	Volatilization Factor	Chemical-specific	m3/kg	USEPA, 2002a	
				Q/C	Inverse of mean concentration at center of source	87.36898	g/m2-s per kg/m3	USEPA, 2016	
				Ut	Equivalent threshold of wind velocity at 7m.	11.32	m/sec	USEPA, 2016	
				Um	Mean annual wind speed	4.29	m/sec	USEPA, 2016	
				V	Fraction of vegetative cover	0.5	unitless	USEPA, 2016	
				F(x)	Function dependent of Um/Ut	0.0993	unitless	USEPA, 2016	

Notes:

1 - Length of typical work day.

Sources:

USEPA, 2002a: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

USEPA, 2002b: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10, December.

USEPA, 2014: Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER 9200.1-120.

USEPA, 2016: Regional Screening Level Internet site at http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/index.htm. Site-specific values for Philadelphia, PA.

TABLE 4.3.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE - CHILD RESIDENTS - SOILS

LOCKHEED MARTIN, MARTIN MIDDLE RIVER COMPLEX, MIDDLE RIVER, MARYLAND

Scenario Timeframe: Future
Medium: Surface Soil/Subsurface Soil
Exposure Medium: Surface/Subsurface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Child	Block F	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002	Intake (mg/kg/day) =
				IR-S	Ingestion Rate	200	mg/day	USEPA, 2014	
				RBA	Relative Bioavailability	Chemical Specific	unitless	USEPA, 1989	
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	$\frac{CS \times IRS \times CF3 \times FI \times EF \times ED}{BW \times AT}$
				FI	Fraction Ingested	1	unitless	USEPA, 2014	
				EF	Exposure Frequency	350	days/year	USEPA, 2014	
				ED1	Exposure Duration (Age 0 - 2)	2	years	(1), USEPA, 2005, 2014	
				ED2	Exposure Duration (Age 2 - 6)	4	years	(1), USEPA, 2005, 2014	
				BW	Body Weight	15	kg	USEPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	USEPA, 2014	
Dermal	Resident	Child	Block F	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002	Dermally Absorbed Dose (mg/kg/day) =
				CF3	Conversion Factor 3	1E-06	kg/mg	--	
				SA	Skin Surface Available for Contact	2,373	cm2	USEPA, 2014	$\frac{CS \times CF3 \times SA \times SSAF \times DABS \times EV \times EF \times ED}{BW \times AT}$
				SSAF	Soil to Skin Adherence Factor	0.2	mg/cm2/event	USEPA, 2014	
				DABS	Absorption Factor	Chemical Specific	unitless	USEPA, 2004	
				EV	Events Frequency	1	events/day	USEPA, 2004	
				EF	Exposure Frequency	350	days/year	USEPA, 2014	
				ED1	Exposure Duration (Age 0 - 2)	2	years	(1), USEPA, 2005, 2014	
				ED2	Exposure Duration (Age 2 - 6)	4	years	(1), USEPA, 2005, 2014	
				BW	Body Weight	15	kg	USEPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	USEPA, 2014	

Notes:

1 - Children will be evaluated as one age group (0 - 6 years) for non-mutagenic chemicals. For chemicals that act via the mutagenic mode of action, residential children will be evaluated as two age groups, 0 - 2 years and 2 - 6 years in accordance with USEPA's Supplemental Guidance of Assessing Susceptibility from Early-Life Exposure to Carcinogens (USEPA, 2005).

Sources:

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

USEPA, 2002: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10, December.

USEPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

USEPA, 2014: Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER 9200.1-120.

TABLE 4.4.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE - CHILD RESIDENTS SOILS TO AIR

LOCKHEED MARTIN, MARTIN MIDDLE RIVER COMPLEX, MIDDLE RIVER, MARYLAND

Scenario Timeframe: Future
Medium: Surface Soil/Subsurface Soil
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Resident	Child	Block F	CA	Chemical concentration in air	Calculated	mg/m3	USEPA, 2002a	Exposure Concentration (mg/m^3) =
				CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002b	
				ET	Exposure Time	24	hours/day	USEPA, 2014	$\frac{CA \times ET \times EF \times ED}{AT \times 24\ hours/day}$
				EF	Exposure Frequency	350	days/year	USEPA, 2014	
				ED1	Exposure Duration (Age 0 - 2)	2	years	(1), USEPA, 2005, 2014	
				ED2	Exposure Duration (Age 2 - 6)	4	years	(1), USEPA, 2005, 2014	CA = (1/PEF + 1/VF) x Cs
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	2190	days	USEPA, 2014	
				PEF	Particulate Emission Factor	3.23E+09	m3/kg	USEPA 2016	
				VF	Volatilization Factor	Chemical-specific	m3/kg	USEPA, 2002a	
				Q/C	Inverse of mean concentration at center of source	87.36898	g/m2-s per kg/m3	USEPA 2016	
				Ut	Equivalent threshold of wind velocity at 7m.	11.32	m/sec	USEPA 2016	
				Um	Mean annual wind speed	4.29	m/sec	USEPA 2016	
				V	Fraction of vegetative cover	0.5	unitless	USEPA 2016	
				F(x)	Function dependent of Um/Ut	0.0993	unitless	USEPA 2016	

Notes:

1 - Children will be evaluated as one age group (0 - 6 years) for non-mutagenic chemicals. For chemicals that act via the mutagenic mode of action, residential children will be evaluated as two age groups, 0 - 2 years and 2 - 6 years in accordance with USEPA's Supplemental Guidance of Assessing Susceptibility from Early-Life Exposure to Carcinogens (USEPA, 2005).

Sources:

USEPA, 2002a: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

USEPA, 2002b: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10, December.

USEPA, 2014: Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER 9200.1-120.

USEPA, 2016: Regional Screening Level Internet site at http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/index.htm. Site-specific values for Philadelphia, PA.

TABLE 4.5.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE - ADOLESCENT RESIDENTS - SOILS

LOCKHEED MARTIN, MARTIN MIDDLE RIVER COMPLEX, MIDDLE RIVER, MARYLAND

Scenario Timeframe: Future
Medium: Surface Soil/Subsurface Soil
Exposure Medium: Surface/Subsurface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Adolescent	Block F	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002a	Intake (mg/kg/day) =
				IR-S	Ingestion Rate	100	mg/day	USEPA, 2014	
				RBA	Relative Bioavailability	Chemical Specific	unitless	USEPA, 1989	
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	$\frac{CS \times IRS \times CF3 \times FI \times EF \times ED}{BW \times AT}$
				FI	Fraction Ingested	1	unitless	USEPA, 2014	
				EF	Exposure Frequency	350	days/year	USEPA, 2002b	
				ED	Exposure Duration (Age 6 - 16)	10	years	(1), USEPA, 2005, 2014	
				ED2	Exposure Duration (Age 16 - 18)	2	years	(1), USEPA, 2005, 2014	
				BW	Body Weight	40	kg	USEPA, 1989	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	4,380	days	USEPA, 2014	
Dermal	Resident	Adolescent	Block F	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002	Dermally Absorbed Dose (mg/kg/day) =
				CF3	Conversion Factor 3	1E-06	kg/mg	--	
				SA	Skin Surface Available for Contact	4,320	cm2	MDE, 2008	$\frac{CS \times CF3 \times SA \times SSAF \times DABS \times EV \times EF \times ED}{BW \times AT}$
				SSAF	Soil to Skin Adherence Factor	0.1	mg/cm2/event	USEPA, 2004	
				DABS	Absorption Factor	Chemical Specific	unitless	USEPA, 2004	
				EV	Events Frequency	1	events/day	USEPA, 2004	
				EF	Exposure Frequency	350	days/year	USEPA, 2002b	
				ED	Exposure Duration (Age 6 - 16)	10	years	(1), USEPA, 2005, 2014	
				ED2	Exposure Duration (Age 16 - 18)	2	years	(1), USEPA, 2005, 2014	
				BW	Body Weight	40	kg	USEPA, 1989	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	4,380	days	USEPA, 2014	

Notes:

1 - For chemicals that act via the mutagenic mode of action the intake will be multiplied by the appropriate age-dependent adjustment factor in accordance with USEPA's Supplemental Guidance of Assessing Susceptibility from Early-Life Exposure to Carcinogens (USEPA, 2005).

Sources:

MDE, 2008: Cleanup Standards for Soil and Groudnwater. Interim Final Guidance, June.

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

USEPA, 2002a: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10, December.

USEPA, 2002b: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

USEPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

USEPA, 2014: Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER 9200.1-120.

TABLE 4.6.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE - ADOLESCENT RESIDENTS SOILS TO AIR

LOCKHEED MARTIN, MARTIN MIDDLE RIVER COMPLEX, MIDDLE RIVER, MARYLAND

Scenario Timeframe: Future
Medium: Surface Soil/Subsurface Soil
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Resident	Adolescent	Block F	CA	Chemical concentration in air	Calculated	mg/m3	USEPA, 2002a	Exposure Concentration (mg/m^3) =
				CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002b	
				ET	Exposure Time	24	hours/day	USEPA, 2014	$\frac{CA \times ET \times EF \times ED}{AT \times 24\ hours/day}$
				EF	Exposure Frequency	350	days/year	USEPA, 2002a	
				ED	Exposure Duration (Age 6 - 16)	10	years	(1), USEPA, 2005, 2014)	
				ED2	Exposure Duration (Age 16 - 18)	2	years	(1), USEPA, 2005, 2014)	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	$CA = (1/PEF + 1/VF) \times Cs$
				AT-N	Averaging Time (Non-Cancer)	4,380	days	USEPA, 2014	
				PEF	Particulate Emission Factor	3.23E+09	m3/kg	USEPA 2016	
				VF	Volatilization Factor	Chemical-specific	m3/kg	USEPA, 2002a	
				Q/C	Inverse of mean concentration at center of source	87.36898	g/m2-s per kg/m3	USEPA, 2016	
				Ut	Equivalent threshold of wind velocity at 7m.	11.32	m/sec	USEPA, 2016	
				Um	Mean annual wind speed	4.29	m/sec	USEPA, 2016	
				V	Fraction of vegetative cover	0.5	unitless	USEPA, 2016	
				F(x)	Function dependent of Um/Ut	0.0993	unitless	USEPA, 2016	

Notes:

1 - For chemicals that act via the mutagenic mode of action the intake will be multiplied by the appropriate age-dependent adjustment factor in accordance with USEPA's Supplemental Guidance of Assessing Susceptibility from Early-Life Exposure to Carcinogens (USEPA, 2005).

Sources:

USEPA, 2002a: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

USEPA, 2002b: Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10, December.

USEPA, 2014: Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER 9200.1-120.

USEPA, 2016: Regional Screening Level Internet site at http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/index.htm. Site-specific values for Philadelphia, PA.

TABLE 4.7.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE - ADULT RESIDENTS - SOILS

LOCKHEED MARTIN, MARTIN MIDDLE RIVER COMPLEX, MIDDLE RIVER, MARYLAND

Scenario Timeframe: Future
Medium: Surface Soil/Subsurface Soil
Exposure Medium: Surface/Subsurface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Adult	Block F	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002a	Intake (mg/kg/day) =
				IR-S	Ingestion Rate	100	mg/day	USEPA, 2014	
				RBA	Relative Bioavailability	Chemical Specific	unitless	USEPA, 1989	
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	$\frac{CS \times IRS \times CF3 \times FI \times EF \times ED}{BW \times AT}$
				FI	Fraction Ingested	1	unitless	USEPA, 2014	
				EF	Exposure Frequency	350	days/year	USEPA, 2014	
				ED	Exposure Duration (Age 18 - 30)	12	years	(1), USEPA, 2005, 2014)	
				BW	Body Weight	80	kg	USEPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	4,380	days	USEPA, 2014	
Dermal	Resident	Adult	Block F	CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002	Dermally Absorbed Dose (mg/kg/day) =
				CF3	Conversion Factor 3	1.0E-06	kg/mg	--	
				SA	Skin Surface Available for Contact	6,032	cm2	USEPA, 2014	$\frac{CS \times CF3 \times SA \times SSAF \times DABS \times EV \times EF \times ED}{BW \times AT}$
				SSAF	Soil to Skin Adherence Factor	0.07	mg/cm2/event	USEPA, 2014	
				DABS	Absorption Factor	Chemical Specific	unitless	USEPA, 2004	
				EV	Events Frequency	1	events/day	USEPA, 2004	
				EF	Exposure Frequency	350	days/year	USEPA, 2014	
				ED	Exposure Duration (Age 18 - 30)	12	years	(1), USEPA, 2005, 2014)	
				BW	Body Weight	80	kg	USEPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	4,380	days	USEPA, 2014	

Notes:

1 - Adults will be evaluated as one age group (7 - 26 years) for non-mutagenic chemicals. For chemicals that act via the mutagenic mode of action, adults will be evaluated as two age groups, 7 - 16 years and 16 - 26 years in accordance with USEPA's Supplemental Guidance of Assessing Susceptibility from Early-Life Exposure to Carcinogens (USEPA, 2005).

Sources:

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A.

USEPA, 2002:Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10, December.

USEPA, 2002b: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

USEPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

USEPA, 2014: Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER 9200.1-120.

TABLE 4.8.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE - ADULT RESIDENTS - SOILS TO AIR

LOCKHEED MARTIN, MARTIN MIDDLE RIVER COMPLEX, MIDDLE RIVER, MARYLAND

Scenario Timeframe: Future
Medium: Surface Soil/Subsurface Soil
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Resident	Adult	Block F	CA	Chemical concentration in air	Calculated	mg/m3	USEPA, 2002a	Exposure Concentration (mg/m^3) =
				CS	Chemical concentration in soil	Max or 95% UCL	mg/kg	USEPA, 2002b	
				ET	Exposure Time	24	hours/day	USEPA, 2014	$\frac{CA \times ET \times EF \times ED}{AT \times 24\ hours/day}$
				EF	Exposure Frequency	350	days/year	USEPA, 2014	
				ED	Exposure Duration (Age 18 - 30)	12	years	(1), USEPA, 2005, 2014)	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 2014	$CA = (1/PEF + 1/VF) \times Cs$
				AT-N	Averaging Time (Non-Cancer)	4380	days	USEPA, 2014	
				PEF	Particulate Emission Factor	3.23E+09	m3/kg	USEPA 2016	
				VF	Volatilization Factor	Chemical-specific	m3/kg	USEPA, 2002a	
				Q/C	Inverse of mean concentration at center of source	87.36898	g/m2-s per kg/m3	USEPA, 2016	
				Ut	Equivalent threshold of wind velocity at 7m.	11.32	m/sec	USEPA, 2016	
				Um	Mean annual wind speed	4.29	m/sec	USEPA, 2016	
				V	Fraction of vegetative cover	0.5	unitless	USEPA, 2016	
				F(x)	Function dependent of Um/Ut	0.0993	unitless	USEPA, 2016	

Notes:

1 - For chemicals that act via the mutagenic mode of action the intake will be multiplied by the appropriate age-dependent adjustment factor in accordance with USEPA's Supplemental Guidance of Assessing Susceptibility from Early-Life Exposure to Carcinogens (USEPA, 2005).

Sources:

USEPA, 2002:Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10, December.

USEPA, 2002b: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

USEPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

USEPA, 2014: Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER 9200.1-120.

USEPA, 2016: Regional Screening Level Internet site at http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/index.htm. Site-specific values for Philadelphia, PA.

TABLE 5.1
NON-CANCER TOXICITY DATA -- ORAL/DERMAL
BLOCK F
LOCKHEED MARTIN, MIDDLE RIVER COMPLEX
MIDDLE RIVER, MARYLAND

Chemical of Potential Concern	Chronic/ Subchronic	Oral RfD		Oral Absorption Efficiency for Dermal[1]	Absorbed RfD for Dermal[2]		Primary Target Organ(s)	Combined Uncertainty/Modifying Factors	RfD:Target Organ(s)	
		Value	Units		Value	Units			Source(s)	Date(s) (MM/DD/YYYY)
Polycyclic Aromatic Hydrocarbons										
Benzo(a)pyrene	Chronic	3.0E-04	mg/kg/day	1	3.0E-04	mg/kg/day	Developmental	300/1	IRIS	1/8/2020
Polychlorinated Biphenyls										
Aroclor-1254	Chronic	2.0E-05	mg/kg/day	1	2.0E-05	mg/kg/day	Immune System	300/1	IRIS	1/8/2020
Aroclor-1260	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals										
Antimony	Chronic	4.0E-04	mg/kg/day	0.15	6.0E-05	mg/kg/day	Blood	1000/1	IRIS	1/8/2020
Cadmium[3]	Chronic	1.0E-03	mg/kg/day	0.025	2.5E-05	mg/kg/day	Kidney	10/1	IRIS	1/8/2020
Cobalt	Chronic	3.0E-04	mg/kg/day	1	3.0E-04	mg/kg/day	Thyroid	NA	PPRTV	8/25/2008
Lead	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury[4]	Chronic	3.0E-04	mg/kg/day	0.07	2.1E-05	mg/kg/day	Central Nervous System	1000/1	IRIS	1/8/2020
Molybdenum	Chronic	5.0E-03	mg/kg/day	1	5.0E-03	mg/kg/day	Urinary	30/1	IRIS	1/8/2020
Nickel	Chronic	2.0E-02	mg/kg/day	0.04	8.0E-04	mg/kg/day	Body Weight	300/1	IRIS	1/8/2020
Vanadium	Chronic	5.0E-03	mg/kg/day	0.026	1.3E-04	mg/kg/day	Kidney	300	RSL	11/2019
Miscellaneous Parameters										
Hexavalent Chromium	Chronic	3.0E-03	mg/kg/day	0.025	7.5E-05	mg/kg/day	None Reported	300/3	IRIS	1/8/2020

Notes:

1 - U.S. EPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Interim. EPA/540/R/99/005.

2 - Adjusted dermal RfD = Oral RfD x Oral Absorption Efficiency for Dermal.

3 - Values are for cadmium - diet.

4 - Values are for mercuric chloride.

Definitions:

IRIS = Integrated Risk Information System.

NA = Not available.

RSL = USEPA Regional Screening Levels for Chemical Contaminants at Superfund Sites, November 2019.

PPRTV = Provisional Peer Reviewed Toxicity Value.

TABLE 5.2
NON-CANCER TOXICITY DATA -- INHALATION
BLOCK F
LOCKHEED MARTIN, MIDDLE RIVER COMPLEX
MIDDLE RIVER, MARYLAND

Chemical of Potential Concern	Chronic/ Subchronic	Inhalation RfC		Extrapolated RfD[1]		Primary Target Organ(s)	Combined Uncertainty/Modifying Factors	RfC : Target Organ(s)	
		Value	Units	Value	Units			Source(s)	Date(s) (MM/DD/YYYY)
Polycyclic Aromatic Hydrocarbons									
Benzo(a)pyrene	Chronic	2.0E-06	mg/m^3	5.7E-07	(mg/kg/day)	Developmental	3000/1	IRIS	1/8/2020
Polychlorinated Biphenyls									
Aroclor-1254	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1260	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals									
Antimony	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	Chronic	1.0E-05	mg/m^3	2.9E-06	(mg/kg/day)	Kidney	NA	ATSDR	9/2008
Cobalt	Chronic	6.0E-06	mg/m^3	1.7E-06	(mg/kg/day)	Respiratory	NA	PPRTV	8/25/2008
Lead	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury[2]	Chronic	3.0E-04	mg/m^3	8.6E-05	(mg/kg/day)	Central Nervous System	NA	Cal EPA	9/2009
Molybdenum	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	Chronic	9.0E-05	mg/m^3	2.6E-05	(mg/kg/day)	Respiratory	NA	ASTDR	9/2005
Vanadium	Chronic	1.0E-04	mg/m^3	2.9E-05	(mg/kg/day)	Respiratory	30	ATSDR	9/2012
Miscellaneous Parameters									
Hexavalent Chromium	Chronic	1.0E-04	mg/m^3	2.9E-05	(mg/kg/day)	Respiratory	300/1	IRIS	1/8/2020

Notes:
1 - Extrapolated RfD = RfC *$20m^3$/day / 70 kg
2 - Value is for mercuric chloride.
Definitions:
ATSDR = Agency for Toxic Substances and Disease Registry.
Cal EPA = California Environmental Protection Agency.
IRIS = Integrated Risk Information System.
NA = Not available.
PPRTV = Provisional Peer Reviewed Toxicity Value.

TABLE 6.1
CANCER TOXICITY DATA -- ORAL/DERMAL
BLOCK F
LOCKHEED MARTIN, MIDDLE RIVER COMPLEX
MIDDLE RIVER, MARYLAND

Chemical of Potential Concern	Oral Cancer Slope Factor		Oral Absorption Efficiency for Dermal[1]	Absorbed Cancer Slope Factor for Dermal[2]		Weight of Evidence/ Cancer Guideline Description	Oral CSF	
	Value	Units		Value	Units		Source(s)	Date(s) (MM/DD/YYYY)
Polycyclic Aromatic Hydrocarbons								
Benzo(a)pyrene[3]	1.0E+00	$(mg/kg/day)^{-1}$	1	1.0E+00	$(mg/kg/day)^{-1}$	Carcinogenic to humans	IRIS	1/8/2020
Polychlorinated Biphenyls								
Aroclor-1254	2.0E+00	$(mg/kg/day)^{-1}$	1	2.0E+00	$(mg/kg/day)^{-1}$	B2 / Probable human carcinogen	USEPA(1)	9/1996
Aroclor-1260	2.0E+00	$(mg/kg/day)^{-1}$	1	2.0E+00	$(mg/kg/day)^{-1}$	B2 / Probable human carcinogen	USEPA(1)	9/1996
Metals								
Antimony	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	NA	NA	NA	NA	NA	B1 / Probable human carcinogen	IRIS	1/8/2020
Cobalt	NA	NA	NA	NA	NA	NA	NA	NA
Lead	NA	NA	NA	NA	NA	B2 (Probable human carcinogen)	IRIS	1/8/2020
Mercury	NA	NA	NA	NA	NA	C / Possible human carcinogen	IRIS	1/8/2020
Molybdenum	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	NA	NA	NA	NA	NA	NA	NA	NA
Miscellaneous Parameters								
Hexavalent Chromium[3]	5.0E-01	$(mg/kg/day)^{-1}$	0.025	2.0E+01	$(mg/kg/day)^{-1}$	NA	Cal EPA	7/2011

Notes:

1 - USEPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Interim. EPA/540/R/99/005.

2 - Adjusted cancer slope factor for dermal = Oral cancer slope factor / Oral Absorption Efficiency for Dermal.

3 - Several PAHs and hexavalent chromium are considered to act via the mutagenic mode of action. These chemicals are evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

Cal EPA = California Environmental Protection Agency.

IRIS = Integrated Risk Information System.

NA = Not available.

USEPA(1) = USEPA, PCBs: Cancer Dose-Response Assessment and Applications to Environmental Mixtures, September 1996, EPA/600/P-96/001F.

TABLE 6.2
CANCER TOXICITY DATA -- INHALATION
BLOCK F
LOCKHEED MARTIN, MIDDLE RIVER COMPLEX
MIDDLE RIVER, MARYLAND

Chemical of Potential Concern	Unit Risk		Inhalation Cancer Slope Factor[1]		Weight of Evidence/ Cancer Guideline Description	Unit Risk : Inhalation CSF	
	Value	Units	Value	Units		Source(s)	Date(s) (MM/DD/YYYY)
Polycyclic Aromatic Hydrocarbons							
Benzo(a)pyrene[2]	6.0E-04	$(ug/m^3)^{-1}$	2.1E+00	$(mg/kg/day)^{-1}$	Carcinogenic to humans	IRIS	1/8/2020
Polychlorinated Biphenyls							
Aroclor-1254	5.7E-04	$(ug/m^3)^{-1}$	2.0E+00	$(mg/kg/day)^{-1}$	B2 / Probable human carcinogen	USEPA(1)	9/1996
Aroclor-1260	5.7E-04	$(ug/m^3)^{-1}$	2.0E+00	$(mg/kg/day)^{-1}$	B2 / Probable human carcinogen	USEPA(1)	9/1996
Metals							
Antimony	NA	NA	NA	NA	NA	NA	NA
Cadmium	1.8E-03	$(ug/m^3)^{-1}$	6.3E+00	$(mg/kg/day)^{-1}$	B1 / Probable human carcinogen	IRIS	1/8/2020
Cobalt	9.0E-03	$(ug/m^3)^{-1}$	3.2E+01	$(mg/kg/day)^{-1}$	NA	PPRTV	8/25/2008
Lead	NA	NA	NA	NA	B2 (Probable human carcinogen)	IRIS	1/8/2020
Mercury	NA	NA	NA	NA	C / Possible human carcinogen	IRIS	1/8/2020
Molybdenum	NA	NA	NA	NA	NA	NA	NA
Nickel	2.6E-04	$(ug/m^3)^{-1}$	9.1E-01	$(mg/kg/day)^{-1}$	NA	Cal EPA	9/2009
Vanadium	NA	NA	NA	NA	NA	NA	NA
Miscellaneous Parameters							
Hexavalent Chromium[2]	8.4E-02	$(ug/m^3)^{-1}$	2.9E+02	$(mg/kg/day)^{-1}$	A / Known human carcinogen	IRIS	1/8/2020

Notes:

1 - Inhalation CSF = Unit Risk * 70 kg / $20m^3$/day.

2 - Several PAHs and hexavalent chromium are considered to act via the mutagenic mode of action. These chemicals are evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

Definitions:

Cal EPA = California Environmental Protection Agency.

IRIS = Integrated Risk Information System.

NA = Not available.

PPRTV = Provisional Peer Reviewed Toxicity Value.

USEPA(1) = USEPA, PCBs: Cancer Dose-Response Assessment and Applications to Environmental Mixtures, September 1996, EPA/600/P-96/001F.

TABLE 7.1.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURES
LOCKHEED MARTIN, MIDDLE RIVER COMPLEX, MIDDLE RIVER, MARYLAND

Scenario Timeframe: Current/Future
Receptor Population: Industrial 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	Block F	Ingestion	Benzo(a)pyrene Equivalents	0.6	mg/kg	1.8E-07	(mg/kg/day)	1.0E+00	$(mg/kg/day)^{-1}$	2E-07	5.1E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.002
				Aroclor-1254	0.096	mg/kg	2.9E-08	(mg/kg/day)	2.0E+00	$(mg/kg/day)^{-1}$	6E-08	8.2E-08	(mg/kg/day)	2.0E-05	(mg/kg/day)	0.004
				Aroclor-1260	0.46	mg/kg	1.4E-07	(mg/kg/day)	2.0E+00	$(mg/kg/day)^{-1}$	3E-07	3.9E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Antimony	1.6	mg/kg	4.9E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.4E-06	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.004
				Cadmium	3.9	mg/kg	1.2E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.3E-06	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.003
				Cobalt	6.3	mg/kg	1.9E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	5.4E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.02
				Lead	44.3	mg/kg	1.4E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.8E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				Mercury	0.69	mg/kg	2.1E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	5.9E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.002
				Molybdenum	63	mg/kg	1.9E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	5.4E-05	(mg/kg/day)	5.0E-03	(mg/kg/day)	0.01
				Nickel	12	mg/kg	3.7E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.0E-05	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.0005
				Vanadium	34.4	mg/kg	1.1E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.9E-05	(mg/kg/day)	5.0E-03	(mg/kg/day)	0.006
				Hexavalent Chromium	1.8	mg/kg	5.5E-07	(mg/kg/day)	5.0E-01	$(mg/kg/day)^{-1}$	3E-07	1.5E-06	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.0005
			Exp. Route Total								9E-07					0.05
			Dermal	Benzo(a)pyrene Equivalents	0.6	mg/kg	1.0E-07	(mg/kg/day)	1.0E+00	$(mg/kg/day)^{-1}$	1E-07	2.8E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0009
				Aroclor-1254	0.096	mg/kg	1.7E-08	(mg/kg/day)	2.0E+00	$(mg/kg/day)^{-1}$	3E-08	4.9E-08	(mg/kg/day)	2.0E-05	(mg/kg/day)	0.002
				Aroclor-1260	0.46	mg/kg	8.3E-08	(mg/kg/day)	2.0E+00	$(mg/kg/day)^{-1}$	2E-07	2.3E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Antimony	1.6	mg/kg	2.1E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	5.8E-08	(mg/kg/day)	6.0E-05	(mg/kg/day)	0.001
				Cadmium	3.9	mg/kg	5.0E-09	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.4E-08	(mg/kg/day)	2.5E-05	(mg/kg/day)	0.0006
				Cobalt	6.3	mg/kg	8.1E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.3E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.0008
				Lead	44.3	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Mercury	0.69	mg/kg	8.9E-09	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.5E-08	(mg/kg/day)	2.1E-05	(mg/kg/day)	0.001
				Molybdenum	63	mg/kg	8.1E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.3E-06	(mg/kg/day)	5.0E-03	(mg/kg/day)	0.0005
				Nickel	12	mg/kg	1.5E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	4.3E-07	(mg/kg/day)	8.0E-04	(mg/kg/day)	0.0005
				Vanadium	34.4	mg/kg	4.4E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.2E-06	(mg/kg/day)	1.3E-04	(mg/kg/day)	0.009
				Hexavalent Chromium	1.8	mg/kg	2.3E-08	(mg/kg/day)	2.0E+01	$(mg/kg/day)^{-1}$	5E-07	6.5E-08	(mg/kg/day)	7.5E-05	(mg/kg/day)	0.0009
			Exp. Route Total								8E-07					0.02
		Exposure Point Total									2E-06					0.07
	Exposure Medium Total										2E-06					0.07
	Air	Block F	Inhalation	Benzo(a)pyrene Equivalents	1.8E-10	mg/m^3	1.5E-11	(mg/m^3)	6.0E-04	$(ug/m^3)^{-1}$	9E-12	4.1E-11	(mg/m^3)	2.0E-06	(mg/m^3)	0.00002
				Aroclor-1254	1.2E-07	mg/m^3	9.8E-09	(mg/m^3)	5.7E-04	$(ug/m^3)^{-1}$	6E-09	2.7E-08	(mg/m^3)	NA	(mg/m^3)	--
				Aroclor-1260	3.5E-07	mg/m^3	2.9E-08	(mg/m^3)	5.7E-04	$(ug/m^3)^{-1}$	2E-08	8.0E-08	(mg/m^3)	NA	(mg/m^3)	--
				Antimony	4.9E-10	mg/m^3	4.0E-11	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.1E-10	(mg/m^3)	NA	(mg/m^3)	--
				Cadmium	1.2E-09	mg/m^3	9.8E-11	(mg/m^3)	1.8E-03	$(ug/m^3)^{-1}$	2E-10	2.7E-10	(mg/m^3)	1.0E-05	(mg/m^3)	0.00003
				Cobalt	1.9E-09	mg/m^3	1.5E-10	(mg/m^3)	9.0E-03	$(ug/m^3)^{-1}$	1E-09	4.3E-10	(mg/m^3)	6.0E-06	(mg/m^3)	0.00007
				Lead	1.4E-08	mg/m^3	1.1E-09	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	3.2E-09	(mg/m^3)	NA	(mg/m^3)	--
				Mercury	2.1E-10	mg/m^3	1.7E-11	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	4.8E-11	(mg/m^3)	3.0E-04	(mg/m^3)	0.0000002
				Molybdenum	1.9E-08	mg/m^3	1.5E-09	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	4.3E-09	(mg/m^3)	NA	(mg/m^3)	--
				Nickel	3.7E-09	mg/m^3	3.0E-10	(mg/m^3)	2.6E-04	$(ug/m^3)^{-1}$	8E-11	8.4E-10	(mg/m^3)	9.0E-05	(mg/m^3)	0.000009
				Vanadium	1.1E-08	mg/m^3	9.0E-10	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	2.5E-09	(mg/m^3)	1.0E-04	(mg/m^3)	0.00003
				Hexavalent Chromium	5.5E-10	mg/m^3	4.5E-11	(mg/m^3)	8.4E-02	$(ug/m^3)^{-1}$	4E-09	1.3E-10	(mg/m^3)	1.0E-04	(mg/m^3)	0.000001
			Exp. Route Total								3E-08					0.0002
		Exposure Point Total									3E-08					0.0002
	Exposure Medium Total										3E-08					0.0002
Medium Total											2E-06					0.07
										Total of Receptor Risks Across All Media	2E-06			Total of Receptor Hazards Across All Media		0.07

Notes:

1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 7.2.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURES
LOCKHEED MARTIN, MIDDLE RIVER COMPLEX, MIDDLE RIVER, MARYLAND

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	Block F	Ingestion	Benzo(a)pyrene Equivalents	0.6	mg/kg	3.5E-06	(mg/kg/day)	1.0E+00	$(mg/kg/day)^{-1}$	4E-06	7.7E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.03
				Aroclor-1254	0.096	mg/kg	1.1E-07	(mg/kg/day)	2.0E+00	$(mg/kg/day)^{-1}$	2E-07	1.2E-06	(mg/kg/day)	2.0E-05	(mg/kg/day)	0.06
				Aroclor-1260	0.46	mg/kg	5.0E-07	(mg/kg/day)	2.0E+00	$(mg/kg/day)^{-1}$	1E-06	5.9E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Antimony	1.6	mg/kg	1.8E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.0E-05	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.05
				Cadmium	3.9	mg/kg	4.3E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	5.0E-05	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.05
				Cobalt	6.3	mg/kg	6.9E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	8.1E-05	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.3
				Lead	44.3	mg/kg	4.9E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	5.7E-04	(mg/kg/day)	NA	(mg/kg/day)	--
				Mercury	0.69	mg/kg	7.6E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	8.8E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.03
				Molybdenum	63	mg/kg	6.9E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	8.1E-04	(mg/kg/day)	5.0E-03	(mg/kg/day)	0.2
				Nickel	12	mg/kg	1.3E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.5E-04	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.008
				Vanadium	34.4	mg/kg	3.8E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	4.4E-04	(mg/kg/day)	5.0E-03	(mg/kg/day)	0.09
				Hexavalent Chromium	1.8	mg/kg	1.1E-05	(mg/kg/day)	5.0E-01	$(mg/kg/day)^{-1}$	6E-06	2.3E-05	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.008
			Exp. Route Total								1E-05					0.8
			Dermal	Benzo(a)pyrene Equivalents	0.6	mg/kg	1.1E-06	(mg/kg/day)	1.0E+00	$(mg/kg/day)^{-1}$	1E-06	2.4E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.008
				Aroclor-1254	0.096	mg/kg	3.5E-08	(mg/kg/day)	2.0E+00	$(mg/kg/day)^{-1}$	7E-08	4.1E-07	(mg/kg/day)	2.0E-05	(mg/kg/day)	0.02
				Aroclor-1260	0.46	mg/kg	1.7E-07	(mg/kg/day)	2.0E+00	$(mg/kg/day)^{-1}$	3E-07	2.0E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Antimony	1.6	mg/kg	4.2E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	4.8E-07	(mg/kg/day)	6.0E-05	(mg/kg/day)	0.008
				Cadmium	3.9	mg/kg	1.0E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.2E-07	(mg/kg/day)	2.5E-05	(mg/kg/day)	0.005
				Cobalt	6.3	mg/kg	1.6E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.9E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.006
				Lead	44.3	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Mercury	0.69	mg/kg	1.8E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.1E-07	(mg/kg/day)	2.1E-05	(mg/kg/day)	0.01
				Molybdenum	63	mg/kg	1.6E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.9E-05	(mg/kg/day)	5.0E-03	(mg/kg/day)	0.004
				Nickel	12	mg/kg	3.1E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.6E-06	(mg/kg/day)	8.0E-04	(mg/kg/day)	0.005
				Vanadium	34.4	mg/kg	8.9E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.0E-05	(mg/kg/day)	1.3E-04	(mg/kg/day)	0.08
				Hexavalent Chromium	1.8	mg/kg	2.5E-07	(mg/kg/day)	2.0E+01	$(mg/kg/day)^{-1}$	5E-06	5.5E-07	(mg/kg/day)	7.5E-05	(mg/kg/day)	0.007
			Exp. Route Total								6E-06					0.2
		Exposure Point Total									2E-05					1
	Exposure Medium Total										2E-05					1
	Air	Block F	Inhalation	Benzo(a)pyrene Equivalents	1.9E-10	mg/m^3	8.3E-11	(mg/m^3)	6.0E-04	$(ug/m^3)^{-1}$	5E-11	1.8E-10	(mg/m^3)	2.0E-06	(mg/m^3)	0.00009
				Aroclor-1254	1.2E-07	mg/m^3	9.9E-09	(mg/m^3)	5.7E-04	$(ug/m^3)^{-1}$	6E-09	1.2E-07	(mg/m^3)	NA	(mg/m^3)	--
				Aroclor-1260	3.5E-07	mg/m^3	2.9E-08	(mg/m^3)	5.7E-04	$(ug/m^3)^{-1}$	2E-08	3.4E-07	(mg/m^3)	NA	(mg/m^3)	--
				Antimony	5.0E-10	mg/m^3	4.1E-11	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	4.8E-10	(mg/m^3)	NA	(mg/m^3)	--
				Cadmium	1.2E-09	mg/m^3	9.9E-11	(mg/m^3)	1.8E-03	$(ug/m^3)^{-1}$	2E-10	1.2E-09	(mg/m^3)	1.0E-05	(mg/m^3)	0.0001
				Cobalt	2.0E-09	mg/m^3	1.6E-10	(mg/m^3)	9.0E-03	$(ug/m^3)^{-1}$	1E-09	1.9E-09	(mg/m^3)	6.0E-06	(mg/m^3)	0.0003
				Lead	1.4E-08	mg/m^3	1.2E-09	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.3E-08	(mg/m^3)	NA	(mg/m^3)	--
				Mercury	2.1E-10	mg/m^3	1.7E-11	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	2.0E-10	(mg/m^3)	3.0E-04	(mg/m^3)	0.0000007
				Molybdenum	2.0E-08	mg/m^3	1.6E-09	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.9E-08	(mg/m^3)	NA	(mg/m^3)	--
				Nickel	3.7E-09	mg/m^3	3.0E-10	(mg/m^3)	2.6E-04	$(ug/m^3)^{-1}$	8E-11	3.5E-09	(mg/m^3)	9.0E-05	(mg/m^3)	0.00004
				Vanadium	1.1E-08	mg/m^3	9.0E-10	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.1E-08	(mg/m^3)	1.0E-04	(mg/m^3)	0.0001
				Hexavalent Chromium	5.6E-10	mg/m^3	2.5E-10	(mg/m^3)	8.4E-02	$(ug/m^3)^{-1}$	2E-08	5.4E-10	(mg/m^3)	1.0E-04	(mg/m^3)	0.000005
			Exp. Route Total								5E-08					0.0006
		Exposure Point Total									5E-08					0.0006
	Exposure Medium Total										5E-08					0.0006
Medium Total											2E-05					1
										Total of Receptor Risks Across All Media	2E-05			Total of Receptor Hazards Across All Media		1

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 7.3.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURES
LOCKHEED MARTIN, MIDDLE RIVER COMPLEX, MIDDLE RIVER, MARYLAND

Scenario Timeframe: Current
Receptor Population: Residents
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	Block F	Ingestion	Benzo(a)pyrene Equivalents	0.6	mg/kg	7.4E-07	(mg/kg/day)	1.0E+00	$(mg/kg/day)^{-1}$	7E-07	1.4E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.005
				Aroclor-1254	0.096	mg/kg	3.9E-08	(mg/kg/day)	2.0E+00	$(mg/kg/day)^{-1}$	8E-08	2.3E-07	(mg/kg/day)	2.0E-05	(mg/kg/day)	0.01
				Aroclor-1260	0.46	mg/kg	1.9E-07	(mg/kg/day)	2.0E+00	$(mg/kg/day)^{-1}$	4E-07	1.1E-06	(mg/kg/day)	NA	(mg/kg/day)	--
				Antimony	1.6	mg/kg	6.6E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.8E-06	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.01
				Cadmium	3.9	mg/kg	1.6E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	9.4E-06	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.009
				Cobalt	6.3	mg/kg	2.6E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.5E-05	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.05
				Lead	44.3	mg/kg	1.8E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.1E-04	(mg/kg/day)	NA	(mg/kg/day)	--
				Mercury	0.69	mg/kg	2.8E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.7E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.006
				Molybdenum	63	mg/kg	2.6E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.5E-04	(mg/kg/day)	5.0E-03	(mg/kg/day)	0.03
				Nickel	12	mg/kg	4.9E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.9E-05	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.001
				Vanadium	34.4	mg/kg	1.4E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	8.3E-05	(mg/kg/day)	5.0E-03	(mg/kg/day)	0.02
				Hexavalent Chromium	1.8	mg/kg	2.2E-06	(mg/kg/day)	5.0E-01	$(mg/kg/day)^{-1}$	1E-06	4.3E-06	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.001
			Exp. Route Total								2E-06					0.1
			Dermal	Benzo(a)pyrene Equivalents	0.6	mg/kg	2.9E-07	(mg/kg/day)	1.0E+00	$(mg/kg/day)^{-1}$	3E-07	5.7E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.002
				Aroclor-1254	0.096	mg/kg	1.7E-08	(mg/kg/day)	2.0E+00	$(mg/kg/day)^{-1}$	3E-08	9.7E-08	(mg/kg/day)	2.0E-05	(mg/kg/day)	0.005
				Aroclor-1260	0.46	mg/kg	8.0E-08	(mg/kg/day)	2.0E+00	$(mg/kg/day)^{-1}$	2E-07	4.7E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Antimony	1.6	mg/kg	2.0E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.2E-07	(mg/kg/day)	6.0E-05	(mg/kg/day)	0.002
				Cadmium	3.9	mg/kg	4.9E-09	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.8E-08	(mg/kg/day)	2.5E-05	(mg/kg/day)	0.001
				Cobalt	6.3	mg/kg	7.9E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	4.6E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.002
				Lead	44.3	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Mercury	0.69	mg/kg	8.6E-09	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	5.0E-08	(mg/kg/day)	2.1E-05	(mg/kg/day)	0.002
				Molybdenum	63	mg/kg	7.9E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	4.6E-06	(mg/kg/day)	5.0E-03	(mg/kg/day)	0.0009
				Nickel	12	mg/kg	1.5E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	8.7E-07	(mg/kg/day)	8.0E-04	(mg/kg/day)	0.001
				Vanadium	34.4	mg/kg	4.3E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.5E-06	(mg/kg/day)	1.3E-04	(mg/kg/day)	0.02
				Hexavalent Chromium	1.8	mg/kg	6.7E-08	(mg/kg/day)	2.0E+01	$(mg/kg/day)^{-1}$	1E-06	1.3E-07	(mg/kg/day)	7.5E-05	(mg/kg/day)	0.002
			Exp. Route Total								2E-06					0.04
		Exposure Point Total									4E-06					0.1
	Exposure Medium Total										4E-06					0.1
	Air	Block F	Inhalation	Benzo(a)pyrene Equivalents	1.9E-10	mg/m^3	9.4E-11	(mg/m^3)	6.0E-04	$(ug/m^3)^{-1}$	6E-11	1.8E-10	(mg/m^3)	2.0E-06	(mg/m^3)	0.00009
				Aroclor-1254	1.2E-07	mg/m^3	2.0E-08	(mg/m^3)	5.7E-04	$(ug/m^3)^{-1}$	1E-08	1.2E-07	(mg/m^3)	NA	(mg/m^3)	--
				Aroclor-1260	3.5E-07	mg/m^3	5.8E-08	(mg/m^3)	5.7E-04	$(ug/m^3)^{-1}$	3E-08	3.4E-07	(mg/m^3)	NA	(mg/m^3)	--
				Antimony	5.0E-10	mg/m^3	8.2E-11	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	4.8E-10	(mg/m^3)	NA	(mg/m^3)	--
				Cadmium	1.2E-09	mg/m^3	2.0E-10	(mg/m^3)	1.8E-03	$(ug/m^3)^{-1}$	4E-10	1.2E-09	(mg/m^3)	1.0E-05	(mg/m^3)	0.0001
				Cobalt	2.0E-09	mg/m^3	3.3E-10	(mg/m^3)	9.0E-03	$(ug/m^3)^{-1}$	3E-09	1.9E-09	(mg/m^3)	6.0E-06	(mg/m^3)	0.0003
				Lead	1.4E-08	mg/m^3	2.3E-09	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.3E-08	(mg/m^3)	NA	(mg/m^3)	--
				Mercury	2.1E-10	mg/m^3	3.5E-11	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	2.0E-10	(mg/m^3)	3.0E-04	(mg/m^3)	0.0000007
				Molybdenum	2.0E-08	mg/m^3	3.3E-09	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.9E-08	(mg/m^3)	NA	(mg/m^3)	--
				Nickel	3.7E-09	mg/m^3	6.1E-10	(mg/m^3)	2.6E-04	$(ug/m^3)^{-1}$	2E-10	3.5E-09	(mg/m^3)	9.0E-05	(mg/m^3)	0.00004
				Vanadium	1.1E-08	mg/m^3	1.8E-09	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.1E-08	(mg/m^3)	1.0E-04	(mg/m^3)	0.0001
				Hexavalent Chromium	5.6E-10	mg/m^3	2.8E-10	(mg/m^3)	8.4E-02	$(ug/m^3)^{-1}$	2E-08	5.4E-10	(mg/m^3)	1.0E-04	(mg/m^3)	0.000005
			Exp. Route Total								6E-08					0.0006
		Exposure Point Total									6E-08					0.0006
	Exposure Medium Total										6E-08					0.0006
Medium Total											4E-06					0.1
										Total of Receptor Risks Across All Media	4E-06			Total of Receptor Hazards Across All Media		0.1

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 7.4.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURES
LOCKHEED MARTIN, MIDDLE RIVER COMPLEX, MIDDLE RIVER, MARYLAND

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	Block F	Ingestion	Benzo(a)pyrene Equivalents	0.6	mg/kg	1.2E-07	(mg/kg/day)	1.0E+00	$(mg/kg/day)^{-1}$	1E-07	7.2E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.002
				Aroclor-1254	0.096	mg/kg	2.0E-08	(mg/kg/day)	2.0E+00	$(mg/kg/day)^{-1}$	4E-08	1.2E-07	(mg/kg/day)	2.0E-05	(mg/kg/day)	0.006
				Aroclor-1260	0.46	mg/kg	9.4E-08	(mg/kg/day)	2.0E+00	$(mg/kg/day)^{-1}$	2E-07	5.5E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Antimony	1.6	mg/kg	3.3E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.9E-06	(mg/kg/day)	4.0E-04	(mg/kg/day)	0.005
				Cadmium	3.9	mg/kg	8.0E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	4.7E-06	(mg/kg/day)	1.0E-03	(mg/kg/day)	0.005
				Cobalt	6.3	mg/kg	1.3E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	7.6E-06	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.03
				Lead	44.3	mg/kg	9.1E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	5.3E-05	(mg/kg/day)	NA	(mg/kg/day)	--
				Mercury	0.69	mg/kg	1.4E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	8.3E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.003
				Molybdenum	63	mg/kg	1.3E-05	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	7.6E-05	(mg/kg/day)	5.0E-03	(mg/kg/day)	0.02
				Nickel	12	mg/kg	2.5E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.4E-05	(mg/kg/day)	2.0E-02	(mg/kg/day)	0.0007
				Vanadium	34.4	mg/kg	7.1E-06	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	4.1E-05	(mg/kg/day)	5.0E-03	(mg/kg/day)	0.008
				Hexavalent Chromium	1.8	mg/kg	3.7E-07	(mg/kg/day)	5.0E-01	$(mg/kg/day)^{-1}$	2E-07	2.2E-06	(mg/kg/day)	3.0E-03	(mg/kg/day)	0.0007
			Exp. Route Total								5E-07					0.08
			Dermal	Benzo(a)pyrene Equivalents	0.6	mg/kg	6.8E-08	(mg/kg/day)	1.0E+00	$(mg/kg/day)^{-1}$	7E-08	3.9E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.001
				Aroclor-1254	0.096	mg/kg	1.2E-08	(mg/kg/day)	2.0E+00	$(mg/kg/day)^{-1}$	2E-08	6.8E-08	(mg/kg/day)	2.0E-05	(mg/kg/day)	0.003
				Aroclor-1260	0.46	mg/kg	5.6E-08	(mg/kg/day)	2.0E+00	$(mg/kg/day)^{-1}$	1E-07	3.3E-07	(mg/kg/day)	NA	(mg/kg/day)	--
				Antimony	1.6	mg/kg	1.4E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	8.1E-08	(mg/kg/day)	6.0E-05	(mg/kg/day)	0.001
				Cadmium	3.9	mg/kg	3.4E-09	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	2.0E-08	(mg/kg/day)	2.5E-05	(mg/kg/day)	0.0008
				Cobalt	6.3	mg/kg	5.5E-08	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.2E-07	(mg/kg/day)	3.0E-04	(mg/kg/day)	0.001
				Lead	44.3	mg/kg	0.0E+00	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	0.0E+00	(mg/kg/day)	NA	(mg/kg/day)	--
				Mercury	0.69	mg/kg	6.0E-09	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.5E-08	(mg/kg/day)	2.1E-05	(mg/kg/day)	0.002
				Molybdenum	63	mg/kg	5.5E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	3.2E-06	(mg/kg/day)	5.0E-03	(mg/kg/day)	0.0006
				Nickel	12	mg/kg	1.0E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	6.1E-07	(mg/kg/day)	8.0E-04	(mg/kg/day)	0.0008
				Vanadium	34.4	mg/kg	3.0E-07	(mg/kg/day)	NA	$(mg/kg/day)^{-1}$	- -	1.7E-06	(mg/kg/day)	1.3E-04	(mg/kg/day)	0.01
				Hexavalent Chromium	1.8	mg/kg	1.6E-08	(mg/kg/day)	2.0E+01	$(mg/kg/day)^{-1}$	3E-07	9.1E-08	(mg/kg/day)	7.5E-05	(mg/kg/day)	0.001
			Exp. Route Total								5E-07					0.02
		Exposure Point Total									1E-06					0.1
	Exposure Medium Total										1E-06					0.1
	Air	Block F	Inhalation	Benzo(a)pyrene Equivalents	1.9E-10	mg/m^3	3.1E-11	(mg/m^3)	6.0E-04	$(ug/m^3)^{-1}$	2E-11	1.8E-10	(mg/m^3)	2.0E-06	(mg/m^3)	0.00009
				Aroclor-1254	1.2E-07	mg/m^3	2.0E-08	(mg/m^3)	5.7E-04	$(ug/m^3)^{-1}$	1E-08	1.2E-07	(mg/m^3)	NA	(mg/m^3)	--
				Aroclor-1260	3.5E-07	mg/m^3	5.7E-08	(mg/m^3)	5.7E-04	$(ug/m^3)^{-1}$	3E-08	3.4E-07	(mg/m^3)	NA	(mg/m^3)	--
				Antimony	5.0E-10	mg/m^3	8.2E-11	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	4.8E-10	(mg/m^3)	NA	(mg/m^3)	--
				Cadmium	1.2E-09	mg/m^3	2.0E-10	(mg/m^3)	1.8E-03	$(ug/m^3)^{-1}$	4E-10	1.2E-09	(mg/m^3)	1.0E-05	(mg/m^3)	0.0001
				Cobalt	2.0E-09	mg/m^3	3.3E-10	(mg/m^3)	9.0E-03	$(ug/m^3)^{-1}$	3E-09	1.9E-09	(mg/m^3)	6.0E-06	(mg/m^3)	0.0003
				Lead	1.4E-08	mg/m^3	2.3E-09	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.3E-08	(mg/m^3)	NA	(mg/m^3)	--
				Mercury	2.1E-10	mg/m^3	3.4E-11	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	2.0E-10	(mg/m^3)	3.0E-04	(mg/m^3)	0.0000007
				Molybdenum	2.0E-08	mg/m^3	3.3E-09	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.9E-08	(mg/m^3)	NA	(mg/m^3)	--
				Nickel	3.7E-09	mg/m^3	6.1E-10	(mg/m^3)	2.6E-04	$(ug/m^3)^{-1}$	2E-10	3.5E-09	(mg/m^3)	9.0E-05	(mg/m^3)	0.00004
				Vanadium	1.1E-08	mg/m^3	1.8E-09	(mg/m^3)	NA	$(ug/m^3)^{-1}$	- -	1.1E-08	(mg/m^3)	1.0E-04	(mg/m^3)	0.0001
				Hexavalent Chromium	5.6E-10	mg/m^3	9.2E-11	(mg/m^3)	8.4E-02	$(ug/m^3)^{-1}$	8E-09	5.4E-10	(mg/m^3)	1.0E-04	(mg/m^3)	0.000005
			Exp. Route Total								5E-08					0.0006
		Exposure Point Total									5E-08					0.0006
	Exposure Medium Total										5E-08					0.0006
Medium Total											1E-06					0.1
										Total of Receptor Risks Across All Media	1E-06			Total of Receptor Hazards Across All Media		0.1

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 9.1.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
LOCKHEED MARTIN, MIDDLE RIVER COMPLEX, MIDDLE RIVER, MARYLAND

Scenario Timeframe: Current/Future
Receptor Population: Industrial Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Block F	Benzo(a)pyrene Equivalents	2E-07	--	1E-07	--	3E-07	Developmental	0.002	--	0.0009	0.003
			Aroclor-1254	6E-08	--	3E-08	--	9E-08	Immune	0.004	--	0.002	0.006
			Aroclor-1260	3E-07	--	2E-07	--	5E-07	NA	--	--	--	--
			Antimony	- -	--	- -	--	- -	Blood	0.004	--	0.001	0.005
			Cadmium	- -	--	- -	--	- -	Kidney	0.003	--	0.0006	0.004
			Cobalt	- -	--	- -	--	- -	Thyroid	0.02	--	0.0008	0.02
			Lead	- -	--	- -	--	- -	NA	--	--	--	--
			Mercury	- -	--	- -	--	- -	CNS	0.002	--	0.001	0.003
			Molybdenum	- -	--	- -	--	- -	Urinary	0.01	--	0.0005	0.01
			Nickel	- -	--	- -	--	- -	Body Weight	0.0005	--	0.0005	0.001
			Vanadium	- -	--	- -	--	- -	Kidney	0.006	--	0.009	0.02
			Hexavalent Chromium	3E-07	--	5E-07	--	8E-07	None Specified	0.0005	--	0.0009	0.001
			Chemical Total	9E-07	--	8E-07	--	2E-06		0.05	--	0.02	0.07
		Exposure Point Total						2E-06					0.07
	Exposure Medium Total							2E-06					0.07
	Air	Block F	Benzo(a)pyrene Equivalents	--	9E-12	--	--	9E-12	Developmental	--	0.00002	--	0.00002
			Aroclor-1254	--	6E-09	--	--	6E-09	NA	--	--	--	--
			Aroclor-1260	--	2E-08	--	--	2E-08	NA	--	--	--	--
			Antimony	--	- -	--	--	- -	NA	--	--	--	--
			Cadmium	--	2E-10	--	--	2E-10	Kidney, Respiratory	--	0.00003	--	0.00003
			Cobalt	--	1E-09	--	--	1E-09	Respiratory	--	0.00007	--	0.00007
			Lead	--	- -	--	--	- -	NA	--	--	--	--
			Mercury	--	- -	--	--	- -	CNS	--	0.0000002	--	0.0000002
			Molybdenum	--	- -	--	--	- -	NA	--	--	--	--
			Nickel	--	8E-11	--	--	8E-11	Respiratory	--	0.000009	--	0.000009
			Vanadium	--	- -	--	--	- -	Respiratory	--	0.00003	--	0.00003
			Hexavalent Chromium	--	4E-09	--	--	4E-09	Respiratory	--	0.000001	--	0.000001
			Chemical Total	--	3E-08	--	--	3E-08		- -	0.0002	- -	0.0002
		Exposure Point Total						3E-08					0.0002
	Exposure Medium Total							3E-08					0.0002
Medium Total								2E-06					0.07
Receptor Total							Receptor Risk Total	2E-06				Receptor HI Total	0.07

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 9.2.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
LOCKHEED MARTIN, MIDDLE RIVER COMPLEX, MIDDLE RIVER, MARYLAND

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

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Block F	Benzo(a)pyrene Equivalents	4E-06	--	1E-06	--	5E-06	Developmental	0.03	--	0.008	0.04
			Aroclor-1254	2E-07	--	7E-08	--	3E-07	Immune	0.06	--	0.02	0.08
			Aroclor-1260	1E-06	--	3E-07	--	1E-06	NA	--	--	--	--
			Antimony	- -	--	- -	--	- -	Blood	0.05	--	0.008	0.06
			Cadmium	- -	--	- -	--	- -	Kidney	0.05	--	0.005	0.06
			Cobalt	- -	--	- -	--	- -	Thyroid	0.3	--	0.006	0.3
			Lead	- -	--	- -	--	- -	NA	--	--	--	--
			Mercury	- -	--	- -	--	- -	CNS	0.03	--	0.01	0.04
			Molybdenum	- -	--	- -	--	- -	Urinary	0.2	--	0.004	0.2
			Nickel	- -	--	- -	--	- -	Body Weight	0.008	--	0.005	0.01
			Vanadium	- -	--	- -	--	- -	Kidney	0.09	--	0.08	0.2
			Hexavalent Chromium	6E-06	--	5E-06	--	1E-05	None Specified	0.008	--	0.007	0.02
			Chemical Total	1E-05	--	6E-06	--	2E-05		0.8	--	0.2	1
		Exposure Point Total						2E-05					1
	Exposure Medium Total							2E-05					1
	Air	Block F	Benzo(a)pyrene Equivalents	--	5E-11	--	--	5E-11	Developmental	--	0.00009	--	0.00009
			Aroclor-1254	--	6E-09	--	--	6E-09	NA	--	--	--	--
			Aroclor-1260	--	2E-08	--	--	2E-08	NA	--	--	--	--
			Antimony	--	- -	--	--	- -	NA	--	--	--	--
			Cadmium	--	2E-10	--	--	2E-10	Kidney, Respiratory	--	0.0001	--	0.0001
			Cobalt	--	1E-09	--	--	1E-09	Respiratory	--	0.0003	--	0.0003
			Lead	--	- -	--	--	- -	NA	--	--	--	--
			Mercury	--	- -	--	--	- -	CNS	--	0.0000007	--	0.0000007
			Molybdenum	--	- -	--	--	- -	NA	--	--	--	--
			Nickel	--	8E-11	--	--	8E-11	Respiratory	--	0.00004	--	0.00004
			Vanadium	--	- -	--	--	- -	Respiratory	--	0.0001	--	0.0001
			Hexavalent Chromium	--	2E-08	--	--	2E-08	Respiratory	--	0.000005	--	0.000005
			Chemical Total	--	5E-08	--	--	5E-08		- -	0.0006	- -	0.0006
		Exposure Point Total						5E-08					0.0006
	Exposure Medium Total							5E-08					0.0006
Medium Total								2E-05					1
Receptor Total							Receptor Risk Total	2E-05				Receptor HI Total	1

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 9.3.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
LOCKHEED MARTIN, MIDDLE RIVER COMPLEX, MIDDLE RIVER, MARYLAND

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

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Block F	Benzo(a)pyrene Equivalents	7E-07	--	3E-07	--	1E-06	Developmental	0.005	--	0.002	0.007
			Aroclor-1254	8E-08	--	3E-08	--	1E-07	Immune	0.01	--	0.005	0.02
			Aroclor-1260	4E-07	--	2E-07	--	6E-07	NA	--	--	--	--
			Antimony	- -	--	- -	--	- -	Blood	0.01	--	0.002	0.01
			Cadmium	- -	--	- -	--	- -	Kidney	0.009	--	0.001	0.01
			Cobalt	- -	--	- -	--	- -	Thyroid	0.05	--	0.002	0.05
			Lead	- -	--	- -	--	- -	NA	--	--	--	--
			Mercury	- -	--	- -	--	- -	CNS	0.006	--	0.002	0.008
			Molybdenum	- -	--	- -	--	- -	Urinary	0.03	--	0.0009	0.03
			Nickel	- -	--	- -	--	- -	Body Weight	0.001	--	0.001	0.002
			Vanadium	- -	--	- -	--	- -	Kidney	0.02	--	0.02	0.04
			Hexavalent Chromium	1E-06	--	1E-06	--	2E-06	None Specified	0.001	--	0.002	0.003
			Chemical Total	2E-06	--	2E-06	--	4E-06		0.1	--	0.04	0.1
		Exposure Point Total						4E-06					0.1
	Exposure Medium Total							4E-06					0.1
	Air	Block F	Benzo(a)pyrene Equivalents	--	6E-11	--	--	6E-11	Developmental	--	0.00009	--	0.00009
			Aroclor-1254	--	1E-08	--	--	1E-08	NA	--	--	--	--
			Aroclor-1260	--	3E-08	--	--	3E-08	NA	--	--	--	--
			Antimony	--	- -	--	--	- -	NA	--	--	--	--
			Cadmium	--	4E-10	--	--	4E-10	Kidney, Respiratory	--	0.0001	--	0.0001
			Cobalt	--	3E-09	--	--	3E-09	Respiratory	--	0.0003	--	0.0003
			Lead	--	- -	--	--	- -	NA	--	--	--	--
			Mercury	--	- -	--	--	- -	CNS	--	0.0000007	--	0.0000007
			Molybdenum	--	- -	--	--	- -	NA	--	--	--	--
			Nickel	--	2E-10	--	--	2E-10	Respiratory	--	0.00004	--	0.00004
			Vanadium	--	- -	--	--	- -	Respiratory	--	0.0001	--	0.0001
			Hexavalent Chromium	--	2E-08	--	--	2E-08	Respiratory	--	0.000005	--	0.000005
			Chemical Total	--	6E-08	--	--	6E-08		- -	0.0006	- -	0.0006
		Exposure Point Total						6E-08					0.0006
	Exposure Medium Total							6E-08					0.0006
Medium Total								4E-06					0.1
Receptor Total							Receptor Risk Total	4E-06				Receptor HI Total	0.1

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 9.4.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
LOCKHEED MARTIN, MIDDLE RIVER COMPLEX, MIDDLE RIVER, MARYLAND

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

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Block F	Benzo(a)pyrene Equivalents	1E-07	--	7E-08	--	2E-07	Developmental	0.002	--	0.001	0.003
			Aroclor-1254	4E-08	--	2E-08	--	6E-08	Immune	0.006	--	0.003	0.009
			Aroclor-1260	2E-07	--	1E-07	--	3E-07	NA	--	--	--	--
			Antimony	- -	--	- -	--	- -	Blood	0.005	--	0.001	0.006
			Cadmium	- -	--	- -	--	- -	Kidney	0.005	--	0.0008	0.006
			Cobalt	- -	--	- -	--	- -	Thyroid	0.03	--	0.001	0.03
			Lead	- -	--	- -	--	- -	NA	--	--	--	--
			Mercury	- -	--	- -	--	- -	CNS	0.003	--	0.002	0.005
			Molybdenum	- -	--	- -	--	- -	Urinary	0.02	--	0.0006	0.02
			Nickel	- -	--	- -	--	- -	Body Weight	0.0007	--	0.0008	0.002
			Vanadium	- -	--	- -	--	- -	Kidney	0.008	--	0.01	0.02
			Hexavalent Chromium	2E-07	--	3E-07	--	5E-07	None Specified	0.0007	--	0.001	0.002
			Chemical Total	5E-07	--	5E-07	--	1E-06		0.08	--	0.02	0.1
		Exposure Point Total						1E-06					0.1
	Exposure Medium Total							1E-06					0.1
	Air	Block F	Benzo(a)pyrene Equivalents	--	2E-11	--	--	2E-11	Developmental	--	0.00009	--	0.00009
			Aroclor-1254	--	1E-08	--	--	1E-08	NA	--	--	--	--
			Aroclor-1260	--	3E-08	--	--	3E-08	NA	--	--	--	--
			Antimony	--	- -	--	--	- -	NA	--	--	--	--
			Cadmium	--	4E-10	--	--	4E-10	Kidney, Respiratory	--	0.0001	--	0.0001
			Cobalt	--	3E-09	--	--	3E-09	Respiratory	--	0.0003	--	0.0003
			Lead	--	- -	--	--	- -	NA	--	--	--	--
			Mercury	--	- -	--	--	- -	CNS	--	0.0000007	--	0.0000007
			Molybdenum	--	- -	--	--	- -	NA	--	--	--	--
			Nickel	--	2E-10	--	--	2E-10	Respiratory	--	0.00004	--	0.00004
			Vanadium	--	- -	--	--	- -	Respiratory	--	0.0001	--	0.0001
			Hexavalent Chromium	--	8E-09	--	--	8E-09	Respiratory	--	0.000005	--	0.000005
			Chemical Total	--	5E-08	--	--	5E-08		- -	0.0006	- -	0.0006
		Exposure Point Total						5E-08					0.0006
	Exposure Medium Total							5E-08					0.0006
Medium Total								1E-06					0.1
Receptor Total							Receptor Risk Total	1E-06				Receptor HI Total	0.1

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

TABLE 9.5.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURES
LOCKHEED MARTIN, MIDDLE RIVER COMPLEX, MIDDLE RIVER, MARYLAND

Scenario Timeframe: Current
Receptor Population: Residents
Receptor Age: Lifelong (Child and Adult)

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Block F	Benzo(a)pyrene Equivalents	5E-06	--	1E-06	--	6E-06					
			Aroclor-1254	3E-07	--	1E-07	--	4E-07					
			Aroclor-1260	2E-06	--	6E-07	--	2E-06					
			Antimony	- -	--	- -	--	- -					
			Cadmium	- -	--	- -	--	- -					
			Cobalt	- -	--	- -	--	- -					
			Lead	- -	--	- -	--	- -					
			Mercury	- -	--	- -	--	- -					
			Molybdenum	- -	--	- -	--	- -					
			Nickel	- -	--	- -	--	- -					
			Vanadium	- -	--	- -	--	- -					
			Hexavalent Chromium	7E-06	--	6E-06	--	1E-05					
			Chemical Total	1E-05	--	8E-06	--	2E-05					
		Exposure Point Total						2E-05					
	Exposure Medium Total							2E-05					
	Air	Block F	Benzo(a)pyrene Equivalents	--	1E-10	--	--	1E-10					
			Aroclor-1254	--	3E-08	--	--	3E-08					
			Aroclor-1260	--	8E-08	--	--	8E-08					
			Antimony	--	- -	--	--	- -					
			Cadmium	--	1E-09	--	--	1E-09					
			Cobalt	--	7E-09	--	--	7E-09					
			Lead	--	- -	--	--	- -					
			Mercury	--	- -	--	--	- -					
			Molybdenum	--	- -	--	--	- -					
			Nickel	--	5E-10	--	--	5E-10					
			Vanadium	--	- -	--	--	- -					
			Hexavalent Chromium	--	5E-08	--	--	5E-08					
			Chemical Total	--	2E-07	--	--	2E-07					
		Exposure Point Total						2E-07					
	Exposure Medium Total							2E-07					
Medium Total								2E-05					
Receptor Total							Receptor Risk Total	2E-05					

Notes:
1 - Mutagenic chemicals were evaluated in accordance with USEPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (2005).

ATTACHMENT C— PROUCL FILES

Attachment C
ProUCL Input
Updated Post-Excavation Residual Risk Analysis for Block F
Lockheed Martin Corporation Middle River Complex
Middle River, Maryland

Samples	SACODE	BAP EQUIVALENT-HALFND	d_BAP EQUIVALENT-HALFND	AROCLOR-1254	d_AROCLOR-1254	AROCLOR-1260	d_AROCLOR-1260	ANTIMONY	d_ANTIMONY	CADMIUM
F-SB-1312-1-2	NORMAL	270.84	1							
F-SB-1312-SS	NORMAL	1606.8	1							
F-SB-1313-1-2	NORMAL	0.75	0							
F-SB-1313-SS	NORMAL	120.876	1							
F-SB-1314-1-2	NORMAL	9.82	1							
F-SB-1314-SS	NORMAL	9.82	1							
F-SB-1315-1-2	NORMAL	9.82	1							
F-SB-1315-SS	NORMAL	9.82	1							
F-SB-1316-1-2	NORMAL	0.73	0							
F-SB-1316-SS	NORMAL	1.2467	1							
F-SB-1317-1-2	NORMAL	17.75	1							
F-SB-1317-SS	NORMAL	3462.4	1							
F-SB-1318-1-2	NORMAL	0.71	0							
F-SB-1318-SS	NORMAL	73.505	1							
F-SB-1319-1-2	NORMAL	5.4376	1							
F-SB-1319-SS	NORMAL	191.45	1							
F-SB-1320-1-2	NORMAL	0.74	0							
F-SB-1320-SS	NORMAL	0.73	0							
F-SB-1321-1-2	NORMAL	9.82	1							
F-SB-1321-SS	NORMAL	9.82	1							
F-SB-1322-1-2	NORMAL	9.82	1							
F-SB-1322-SS	NORMAL	9.82	1							
F-SB-1323-1-2	NORMAL	0.74	0							
F-SB-1323-SS	NORMAL	12.7159	1							
F-SB-1324-1-2	NORMAL	0.74	0							
F-SB-1324-SS	NORMAL	0.73	0							
F-SB-1325-1-2	NORMAL	0.76	0							
F-SB-1325-SS	NORMAL	0.77	0							
F-SB-1326-1-2	NORMAL	9.82	1							
F-SB-1326-SS	NORMAL	9.82	1							
F-SB-1327-1-2	NORMAL	439.99	1							
F-SB-1327-SS	NORMAL	2797.8	1							
F-SB-1328-1-2	NORMAL	1276.09	1							
F-SB-1328-SS	NORMAL	983.69	1							
SB-22A-SS	NORMAL	430	0	320	0	320	0	3	0	3
SB-23A-SS	NORMAL	380	0	280	0	280	0	2.6	0	2.6
SB-24A-SS	NORMAL	297.647	1	300	0	300	0	2.8	0	2.8
F-SB-24ARE-1	NORMAL									
F-SB-24ARE-2	NORMAL									
SB-25A-SS	NORMAL	400	0	300	0	300	0	2.7	0	2.7
SB-30A-SS	NORMAL	400.825	1	270	0	270	0			2.7
SB-50-SS	NORMAL							2.4	0	2.4
SB-55-SS	NORMAL	313.13	1	260	0	260	0			2.7
F-SB-56RE-1	NORMAL	22.839	1							
F-SB-56RE-2	NORMAL	1.5	0							
F-SB-93RE-1	NORMAL	1189.76	1	19	0	120	1			
F-SB-93RE-2	NORMAL	150.16	1	20	0	20	0			
SB-93-SS	NORMAL	1939.3	1	330	0	800	1			3.5
F-SB-94RE-1	NORMAL	184.16	1	20	0	20	0			
F-SB-94RE-2	NORMAL	95.413	1	21	0	21	0			

Attachment C
ProUCL Input
Updated Post-Excavation Residual Risk Analysis for Block F
Lockheed Martin Corporation Middle River Complex
Middle River, Maryland

Samples	SACODE	BAP EQUIVALENT-HALFND	d_BAP EQUIVALENT-HALFND	AROCLOR-1254	d_AROCLOR-1254	AROCLOR-1260	d_AROCLOR-1260	ANTIMONY	d_ANTIMONY	CADMIUM
SB-94-SS	NORMAL	1074.1	1	1300	0	1400	1			4.5
SB-95-SS	NORMAL	9.82	1	15	0	9.7	0	0.43	0	0.019
F-SB-95RE-1	NORMAL	9.82	1							
F-SB-95RE-2	NORMAL	9.82	1							
F-SB-96RE-1	NORMAL	601.84	1							
F-SB-96RE-2	NORMAL	1.6	0							
SB-236-01	NORMAL							2	1	0.4
SB-236-SS	NORMAL							0.5	1	0.3
SB-237-01	NORMAL							4	1	0.3
SB-237-SS	NORMAL							0.4	1	0.4
SB-238-01	NORMAL	140.162	1	39	0	39	0	0.3	0	0.6
SB-238-SS	NORMAL	424.437	1	37	0	154	1	1	1	2
SB-250-02	NORMAL							0.6	1	0.2
SB-250-SS	NORMAL							0.8	1	0.2
SB-251-02	NORMAL							0.9	1	0.1
SB-251-SS	NORMAL							1	1	0.2
SB-252-02	NORMAL							0.8	1	0.2
SB-252-SS	NORMAL							0.7	1	0.1
SB-253-02	NORMAL							0.9	1	0.09
SB-253-SS	NORMAL							1	1	0.4
SB-265-02	NORMAL	601.611	1							
SB-265-SS	NORMAL	2544.69	1	36	0	119	1	0.5	1	0.8
SB-266-02	NORMAL	192.445	1							
SB-266-SS	NORMAL	1343.73	1	36	0	756	1	1	1	1.8
SB-267-02	NORMAL	144.582	1							
SB-267-SS	NORMAL	313.239	1	96	1	73	1	1	1	0.7
SB-268-02	NORMAL	9.82	1							
SB-268-SS	NORMAL	9.82	1	15	0	9.7	0	0.43	0	0.019
SB-269-02	NORMAL	82	0							
SB-269-SS	NORMAL	1883.35	1	37	0	95	1	1	1	0.7
SB-270-02	NORMAL	123.389	1							
SB-270-SS	NORMAL	369.109	1	38	0	29	1	1	1	0.3
SB-382-0102	NORMAL	1.5	0	39	0	39	0			
SB-383-0102	NORMAL	9.82	1	15	0	9.7	0			
SB-384-0102	NORMAL	1.5	0	38	0	38	0			
SB-385-0102	NORMAL	1.4	0	36	0	36	0			
SB-386-0102	NORMAL	1.4	0	37	0	37	0			
SB-387-0102	NORMAL	12	1	35	0	35	0			
SB-388-0102	NORMAL	380	1	35	0	35	0			
SB-389-0102	NORMAL	220	1	36	0	36	0			
SB-390-0102	NORMAL	9.9	1	38	0	38	0			
SB-391-0102	NORMAL	1.6	0	39	0	39	0			
SB-392-0102	NORMAL	1.4	0	37	0	37	0			
SB-393-0102	NORMAL	450	1	35	0	22	1			
SB-394-0102	NORMAL	140	1	37	0	37	0			
SB-395-0102	NORMAL	1.6	0	40	0	40	0			
SB-396-0102	NORMAL	80	1	39	0	39	0			
SB-397-0102	NORMAL	80	1	35	0	35	0			
SB-398-0102	NORMAL	29	1	36	0	36	0			
SB-399-0102	NORMAL	1.4	0	36	0	36	0			

Samples	SACODE	BAP EQUIVALENT-HALFND	d_BAP EQUIVALENT-HALFND	AROCLOR-1254	d_AROCLOR-1254	AROCLOR-1260	d_AROCLOR-1260	ANTIMONY	d_ANTIMONY	CADMIUM
SB-400-0102	NORMAL	9.1	1	36	0	36	0			
SB-401-0102	NORMAL	25	1	41	0	41	0			
SB-402-0102	NORMAL	37	1	41	0	41	0			
SB-403-0102	NORMAL	1.5	0	37	0	37	0			
SB-404-0102	NORMAL	1.5	0	38	0	38	0			
SB-405-0102	NORMAL	36	1	36	0	36	0			
SB-406-0102	NORMAL	510	1	38	0	38	0			
SB-407-0102	NORMAL	130	1	42	0	42	0			
SB-408-0102	NORMAL	87	1	40	0	40	0			
SB-409-0102	NORMAL	39	1	43	0	43	0			
SB-489-0102	NORMAL	9.6	1	41	0	41	0			
F-SB-624-1	NORMAL									
F-SB-624-2	NORMAL									
F-SB-625-1	NORMAL									
F-SB-625-2	NORMAL									
F-SB-626-1	NORMAL									
F-SB-626-2	NORMAL									
F-SB-626B-(1-4)	NORMAL									
F-SB-626C-1	NORMAL									
F-SB-626D-1	NORMAL									
F-SB-627-1	NORMAL									
F-SB-627-2	NORMAL									
F-SB-635C-1	NORMAL	1266.69	1							
F-SB-635D-1	NORMAL	20.2071	1							
F-SB-636-1	NORMAL	163.09	1	20	0	20	0			
F-SB-636A-1	NORMAL	409.6	1							
F-SB-636B-1	NORMAL	1412.29	1							
F-SB-636C-1	NORMAL	9.82	1							
F-SB-636D-1	NORMAL	9.82	1							
F-SB-637-1	NORMAL	1185.74	1	19	0	19	0			
F-SB-637B-1	NORMAL	9.82	1							
F-SB-637C-1	NORMAL	2075.2	1							
F-SB-638-1	NORMAL	1.4	0	18	0	18	0			
F-SB-639-1	NORMAL	78.536	1	20	0	20	0			
F-SB-640-1	NORMAL	73.797	1	20	0	20	0			
F-SB-641-1	NORMAL	1363.848	1							
F-SB-641A-1	NORMAL	41.373	1							
F-SB-641B-1	NORMAL	289.14	1							
F-SB-641C-1	NORMAL	9.82	1							
F-SB-642-1	NORMAL	1495.18	1							
F-SB-642A-1	NORMAL	1.5	0							
F-SB-642B-1	NORMAL	56.598	1							
F-SB-642C-1	NORMAL	1.737	1							
F-SB-643-1	NORMAL	708.4	1							
F-SB-643B-1	NORMAL	118.119	1							
F-SB-643C-1	NORMAL	1.4	0							
F-SB-644-1	NORMAL	69.594	1							
F-SB-645-1	NORMAL	9.82	1							
F-SB-645A-1	NORMAL	110.918	1							
F-SB-645B-1	NORMAL	112.462	1							

Samples	SACODE	BAP EQUIVALENT-HALFND	d_BAP EQUIVALENT-HALFND	AROCLOR-1254	d_AROCLOR-1254	AROCLOR-1260	d_AROCLOR-1260	ANTIMONY	d_ANTIMONY	CADMIUM
F-SB-645C-1	NORMAL	369.44	1							
F-SB-646-1	NORMAL	9.82	1							
F-SB-647-1	NORMAL	9.82	1							
F-SB-647A-1	NORMAL	9.82	1							
F-SB-647B-1	NORMAL	283.14	1							
F-SB-647C-1	NORMAL	5140.3	1							
F-SB-648-1	NORMAL	2.2	0							
F-SB-649-1	NORMAL	2.2	0							
F-SB-650-1	NORMAL	4.1202	1							
F-SB-651-1	NORMAL	13.7284	1	19	0	19	0			
F-SB-652-1	NORMAL	342.45	1	20	0	20	0			
F-SB-652A-1	NORMAL	228.02	1							
F-SB-652B-1	NORMAL	505.25	1							
F-SB-652C-1	NORMAL	18.534	1							
F-SB-797-SS	NORMAL	9.82	1							
F-SB-798-SS	NORMAL	3.7	0							
F-SB-799-SS	NORMAL	13.0855	1							
F-SB-800-SS	NORMAL									
F-SB-801-SS	NORMAL									
F-SB-802-SS	NORMAL									
F-VS-A-1-1	NORMAL	122.505	1							
F-VS-A-2-1	NORMAL	186.9	1							
F-VS-A-3-1-RS	NORMAL	343	1							
F-VS-A-4-1	NORMAL	1920	1							
F-VS-B-1-1	NORMAL	89.117	1							
F-VS-B-2-1	NORMAL	216.235	1							
F-VS-B-3-1	NORMAL	2740	1							
F-VS-B-4-1	NORMAL	579.01	1							
F-VS-C-1-1-AVG	AVG	185	1							
F-VS-C-2-1	NORMAL	1.8	1							
F-VS-C-3-1	NORMAL	29.5	1							
F-VS-C-4-1	NORMAL	2	1							
F-VS-D-1-1	NORMAL	128.39	1							
F-VS-D-2-1	NORMAL	174.1	1							
F-VS-D-3-1	NORMAL	14.3885	1							
F-VS-D-4-1	NORMAL	228.75	1							
F-VS-E-1-1	NORMAL	9.2	1							
F-VS-E-2-1	NORMAL	17.3	1							
F-VS-E-4-1-AVG	AVG	1710	1							
F-VS-E-3-1	NORMAL	1350	1							
F-SB-1867-0-0.5-AVG	AVG			26.5	0	490	1			
F-SB-1868-0-0.5	NORMAL			26	0	86	1			
F-SB-1869-0-0.5	NORMAL			26	0	520	1			
F-SB-1870-0-0.5	NORMAL			26	0	280	1			
F-SB-1871-0-0.5	NORMAL			25	0	840	1			
F-SB-1872-0-0.5	NORMAL			26	0	340	1			
F-SB-1873-0-0.5	NORMAL			28	0	860	1			
F-SB-1874-0-0.5	NORMAL			26	0	460	1			
F-SB-1875-0-0.5-AVG	AVG			25.5	0	415	1			
F-SB-1876-0-0.5	NORMAL			27	0	730	1			

Samples	SACODE	BAP EQUIVALENT-HALFND	d_BAP EQUIVALENT-HALFND	AROCLOR-1254	d_AROCLOR-1254	AROCLOR-1260	d_AROCLOR-1260	ANTIMONY	d_ANTIMONY	CADMIUM
F-SB-1877-0-0.5	NORMAL			27	0	1300	1			
F-SB-1877-0.5-1.0	NORMAL			26	0	430	1			
F-SB-1878-0-0.5	NORMAL			26	0	380	1			
F-SB-1879-0-0.5	NORMAL			29	0	870	1			
F-SB-1880-0-0.5	NORMAL			26	0	560	1			
CPP-SB-1857-0.0-0.5	NORMAL			27	0	1100	1			
CPP-SB-1857-0.5-1.0	NORMAL			28	0	34	1			
CPP-SB-1858-0.0-0.5	NORMAL			150	0	1300	1			
CPP-SB-1858-0.5-1.0	NORMAL			26	0	24	0			
CPP-SB-1859-0.0-0.5	NORMAL			27	0	1000	1			
CPP-SB-1859-0.5-1.0	NORMAL			26	0	35	1			
CPP-SB-1860-0.0-0.5	NORMAL			140	0	4700	1			
CPP-SB-1860-0.5-1.0-AVG	AVG			27	0	82.5	1			
CPP-SB-1861-0.0-0.5	NORMAL			140	0	2500	1			
CPP-SB-1861-0.5-1.0	NORMAL			26	0	190	1			
CPP-SB-1862-0.0-0.5	NORMAL			31	0	1100	1			
CPP-SB-1862-0.5-1.0	NORMAL			25	0	70	1			
CPP-SB-1863-0.0-0.5	NORMAL			28	0	710	1			
CPP-SB-1863-0.5-1.0	NORMAL			27	0	240	1			
CPP-SB-1864-0.0-0.5	NORMAL			28	0	340	1			
CPP-SB-1864-0.5-1.0	NORMAL			28	0	160	1			

Samples	SACODE	d_CADMIUM	COBALT	d_COBALT	LEAD	d_LEAD	MERCURY	d_MERCURY	MOLYBDENUM	d_MOLYBDENUM	NICKEL	d_NICKEL
F-SB-1312-1-2	NORMAL											
F-SB-1312-SS	NORMAL											
F-SB-1313-1-2	NORMAL											
F-SB-1313-SS	NORMAL											
F-SB-1314-1-2	NORMAL											
F-SB-1314-SS	NORMAL											
F-SB-1315-1-2	NORMAL											
F-SB-1315-SS	NORMAL											
F-SB-1316-1-2	NORMAL											
F-SB-1316-SS	NORMAL											
F-SB-1317-1-2	NORMAL											
F-SB-1317-SS	NORMAL											
F-SB-1318-1-2	NORMAL											
F-SB-1318-SS	NORMAL											
F-SB-1319-1-2	NORMAL											
F-SB-1319-SS	NORMAL											
F-SB-1320-1-2	NORMAL											
F-SB-1320-SS	NORMAL											
F-SB-1321-1-2	NORMAL											
F-SB-1321-SS	NORMAL											
F-SB-1322-1-2	NORMAL											
F-SB-1322-SS	NORMAL											
F-SB-1323-1-2	NORMAL											
F-SB-1323-SS	NORMAL											
F-SB-1324-1-2	NORMAL											
F-SB-1324-SS	NORMAL											
F-SB-1325-1-2	NORMAL											
F-SB-1325-SS	NORMAL											
F-SB-1326-1-2	NORMAL											
F-SB-1326-SS	NORMAL											
F-SB-1327-1-2	NORMAL											
F-SB-1327-SS	NORMAL											
F-SB-1328-1-2	NORMAL											
F-SB-1328-SS	NORMAL											
SB-22A-SS	NORMAL	0			3	0	0.12	0			4.6	1
SB-23A-SS	NORMAL	0			5.4	1	0.1	0			7.1	1
SB-24A-SS	NORMAL	0			67	1	1.4	1			14	1
F-SB-24ARE-1	NORMAL						1.5	1				
F-SB-24ARE-2	NORMAL						1	1				
SB-25A-SS	NORMAL	0			5.9	1	0.11	0			27	1
SB-30A-SS	NORMAL	0			4.5	1	0.11	0			4.5	1
SB-50-SS	NORMAL	0			33	1	0.42	1			8.5	1
SB-55-SS	NORMAL	0			420	1	0.11	0			13	1
F-SB-56RE-1	NORMAL											
F-SB-56RE-2	NORMAL											
F-SB-93RE-1	NORMAL											
F-SB-93RE-2	NORMAL											
SB-93-SS	NORMAL	1			73	1	0.68	1			11	1
F-SB-94RE-1	NORMAL											
F-SB-94RE-2	NORMAL											

Samples	SACODE	d_CADMIUM	COBALT	d_COBALT	LEAD	d_LEAD	MERCURY	d_MERCURY	MOLYBDENUM	d_MOLYBDENUM	NICKEL	d_NICKEL
SB-94-SS	NORMAL	1			65	1	0.97	1			11	1
SB-95-SS	NORMAL	0			0.39	1	0.015	0			0.3	0
F-SB-95RE-1	NORMAL											
F-SB-95RE-2	NORMAL											
F-SB-96RE-1	NORMAL											
F-SB-96RE-2	NORMAL											
SB-236-01	NORMAL	1	5.8	1	51	1	0.92	1	0.6	0	12	1
SB-236-SS	NORMAL	1	6.8	1	11	1	0.29	1	0.4	0	12	1
SB-237-01	NORMAL	1	5.1	1	63	1	0.35	1	63	1	18	1
SB-237-SS	NORMAL	1	5.6	1	8	0	0.06	1	0.6	0	12	1
SB-238-01	NORMAL	1	8.4	1	30	1	0.08	1	0.8	0	22	1
SB-238-SS	NORMAL	1	6.4	1	148	1	0.24	1	1	0	21	1
SB-250-02	NORMAL	0	2.8	1	5	0	0.03	1	0.6	0	6	0
SB-250-SS	NORMAL	0	5.8	1	17	1	0.04	1	0.5	0	8	1
SB-251-02	NORMAL	0	7.1	1	7	0	0.01	1	0.5	0	9	1
SB-251-SS	NORMAL	0	5.9	1	7	0	0.02	1	0.6	0	9	0
SB-252-02	NORMAL	0	3.5	1	6	0	0.04	1	0.7	0	6	0
SB-252-SS	NORMAL	0	3.6	1	10	1	0.04	1	0.4	0	6	0
SB-253-02	NORMAL	0	4	1	5	0	0.03	1	0.5	0	5	0
SB-253-SS	NORMAL	1	4.9	1	31	1	0.07	1	0.5	0	8	0
SB-265-02	NORMAL											
SB-265-SS	NORMAL	1	8.9	1	20	1	0.09	1	2	0	20	1
SB-266-02	NORMAL											
SB-266-SS	NORMAL	1	8.5	1	43	1	0.51	1	0.6	0	14	1
SB-267-02	NORMAL											
SB-267-SS	NORMAL	1	6	1	91	1	0.07	1	0.6	0	9	1
SB-268-02	NORMAL											
SB-268-SS	NORMAL	0	0.054	1	0.39	1	0.015	0	0.13	1	0.21	1
SB-269-02	NORMAL											
SB-269-SS	NORMAL	1	6.6	1	56	1	0.18	1	1	0	13	1
SB-270-02	NORMAL											
SB-270-SS	NORMAL	0	5.4	1	64	1	0.11	1	0.6	0	8	0
SB-382-0102	NORMAL											
SB-383-0102	NORMAL											
SB-384-0102	NORMAL											
SB-385-0102	NORMAL											
SB-386-0102	NORMAL											
SB-387-0102	NORMAL											
SB-388-0102	NORMAL											
SB-389-0102	NORMAL											
SB-390-0102	NORMAL											
SB-391-0102	NORMAL											
SB-392-0102	NORMAL											
SB-393-0102	NORMAL											
SB-394-0102	NORMAL											
SB-395-0102	NORMAL											
SB-396-0102	NORMAL											
SB-397-0102	NORMAL											
SB-398-0102	NORMAL											
SB-399-0102	NORMAL											

Samples	SACODE	d_CADMIUM	COBALT	d_COBALT	LEAD	d_LEAD	MERCURY	d_MERCURY	MOLYBDENUM	d_MOLYBDENUM	NICKEL	d_NICKEL
SB-400-0102	NORMAL											
SB-401-0102	NORMAL											
SB-402-0102	NORMAL											
SB-403-0102	NORMAL											
SB-404-0102	NORMAL											
SB-405-0102	NORMAL											
SB-406-0102	NORMAL											
SB-407-0102	NORMAL											
SB-408-0102	NORMAL											
SB-409-0102	NORMAL											
SB-489-0102	NORMAL											
F-SB-624-1	NORMAL						0.035	1				
F-SB-624-2	NORMAL						0.22	1				
F-SB-625-1	NORMAL						0.02	0				
F-SB-625-2	NORMAL						0.58	1				
F-SB-626-1	NORMAL						2.2	1				
F-SB-626-2	NORMAL						2.7	1				
F-SB-626B-(1-4)	NORMAL						1.2	1				
F-SB-626C-1	NORMAL						2.2	1				
F-SB-626D-1	NORMAL						0.36	1				
F-SB-627-1	NORMAL						0.31	1				
F-SB-627-2	NORMAL						0.38	1				
F-SB-635C-1	NORMAL											
F-SB-635D-1	NORMAL											
F-SB-636-1	NORMAL											
F-SB-636A-1	NORMAL											
F-SB-636B-1	NORMAL											
F-SB-636C-1	NORMAL											
F-SB-636D-1	NORMAL											
F-SB-637-1	NORMAL											
F-SB-637B-1	NORMAL											
F-SB-637C-1	NORMAL											
F-SB-638-1	NORMAL											
F-SB-639-1	NORMAL											
F-SB-640-1	NORMAL											
F-SB-641-1	NORMAL											
F-SB-641A-1	NORMAL											
F-SB-641B-1	NORMAL											
F-SB-641C-1	NORMAL											
F-SB-642-1	NORMAL											
F-SB-642A-1	NORMAL											
F-SB-642B-1	NORMAL											
F-SB-642C-1	NORMAL											
F-SB-643-1	NORMAL											
F-SB-643B-1	NORMAL											
F-SB-643C-1	NORMAL											
F-SB-644-1	NORMAL											
F-SB-645-1	NORMAL											
F-SB-645A-1	NORMAL											
F-SB-645B-1	NORMAL											

Samples	SACODE	d_CADMIUM	COBALT	d_COBALT	LEAD	d_LEAD	MERCURY	d_MERCURY	MOLYBDENUM	d_MOLYBDENUM	NICKEL	d_NICKEL
F-SB-645C-1	NORMAL											
F-SB-646-1	NORMAL											
F-SB-647-1	NORMAL											
F-SB-647A-1	NORMAL											
F-SB-647B-1	NORMAL											
F-SB-647C-1	NORMAL											
F-SB-648-1	NORMAL											
F-SB-649-1	NORMAL											
F-SB-650-1	NORMAL											
F-SB-651-1	NORMAL											
F-SB-652-1	NORMAL											
F-SB-652A-1	NORMAL											
F-SB-652B-1	NORMAL											
F-SB-652C-1	NORMAL											
F-SB-797-SS	NORMAL											
F-SB-798-SS	NORMAL											
F-SB-799-SS	NORMAL											
F-SB-800-SS	NORMAL						1	1				
F-SB-801-SS	NORMAL						0.18	1				
F-SB-802-SS	NORMAL											
F-VS-A-1-1	NORMAL											
F-VS-A-2-1	NORMAL											
F-VS-A-3-1-RS	NORMAL											
F-VS-A-4-1	NORMAL											
F-VS-B-1-1	NORMAL											
F-VS-B-2-1	NORMAL											
F-VS-B-3-1	NORMAL											
F-VS-B-4-1	NORMAL											
F-VS-C-1-1-AVG	AVG											
F-VS-C-2-1	NORMAL											
F-VS-C-3-1	NORMAL											
F-VS-C-4-1	NORMAL											
F-VS-D-1-1	NORMAL											
F-VS-D-2-1	NORMAL											
F-VS-D-3-1	NORMAL											
F-VS-D-4-1	NORMAL											
F-VS-E-1-1	NORMAL											
F-VS-E-2-1	NORMAL											
F-VS-E-4-1-AVG	AVG											
F-VS-E-3-1	NORMAL											
F-SB-1867-0-0.5-AVG	AVG											
F-SB-1868-0-0.5	NORMAL											
F-SB-1869-0-0.5	NORMAL											
F-SB-1870-0-0.5	NORMAL											
F-SB-1871-0-0.5	NORMAL											
F-SB-1872-0-0.5	NORMAL											
F-SB-1873-0-0.5	NORMAL											
F-SB-1874-0-0.5	NORMAL											
F-SB-1875-0-0.5-AVG	AVG											
F-SB-1876-0-0.5	NORMAL											

Samples	SACODE	d_CADMIUM	COBALT	d_COBALT	LEAD	d_LEAD	MERCURY	d_MERCURY	MOLYBDENUM	d_MOLYBDENUM	NICKEL	d_NICKEL
F-SB-1877-0-0.5	NORMAL											
F-SB-1877-0.5-1.0	NORMAL											
F-SB-1878-0-0.5	NORMAL											
F-SB-1879-0-0.5	NORMAL											
F-SB-1880-0-0.5	NORMAL											
CPP-SB-1857-0.0-0.5	NORMAL											
CPP-SB-1857-0.5-1.0	NORMAL											
CPP-SB-1858-0.0-0.5	NORMAL											
CPP-SB-1858-0.5-1.0	NORMAL											
CPP-SB-1859-0.0-0.5	NORMAL											
CPP-SB-1859-0.5-1.0	NORMAL											
CPP-SB-1860-0.0-0.5	NORMAL											
CPP-SB-1860-0.5-1.0-AVG	AVG											
CPP-SB-1861-0.0-0.5	NORMAL											
CPP-SB-1861-0.5-1.0	NORMAL											
CPP-SB-1862-0.0-0.5	NORMAL											
CPP-SB-1862-0.5-1.0	NORMAL											
CPP-SB-1863-0.0-0.5	NORMAL											
CPP-SB-1863-0.5-1.0	NORMAL											
CPP-SB-1864-0.0-0.5	NORMAL											
CPP-SB-1864-0.5-1.0	NORMAL											

Samples	SACODE	VANADIUM	d_VANADIUM	HEXAVALENT CHROMIUM (MG/KG)	d_HEXAVALENT CHROMIUM (MG/KG)
F-SB-1312-1-2	NORMAL				
F-SB-1312-SS	NORMAL				
F-SB-1313-1-2	NORMAL				
F-SB-1313-SS	NORMAL				
F-SB-1314-1-2	NORMAL				
F-SB-1314-SS	NORMAL				
F-SB-1315-1-2	NORMAL				
F-SB-1315-SS	NORMAL				
F-SB-1316-1-2	NORMAL				
F-SB-1316-SS	NORMAL				
F-SB-1317-1-2	NORMAL				
F-SB-1317-SS	NORMAL				
F-SB-1318-1-2	NORMAL				
F-SB-1318-SS	NORMAL				
F-SB-1319-1-2	NORMAL				
F-SB-1319-SS	NORMAL				
F-SB-1320-1-2	NORMAL				
F-SB-1320-SS	NORMAL				
F-SB-1321-1-2	NORMAL				
F-SB-1321-SS	NORMAL				
F-SB-1322-1-2	NORMAL				
F-SB-1322-SS	NORMAL				
F-SB-1323-1-2	NORMAL				
F-SB-1323-SS	NORMAL				
F-SB-1324-1-2	NORMAL				
F-SB-1324-SS	NORMAL				
F-SB-1325-1-2	NORMAL				
F-SB-1325-SS	NORMAL				
F-SB-1326-1-2	NORMAL				
F-SB-1326-SS	NORMAL				
F-SB-1327-1-2	NORMAL				
F-SB-1327-SS	NORMAL				
F-SB-1328-1-2	NORMAL				
F-SB-1328-SS	NORMAL				
SB-22A-SS	NORMAL			0.405	1
SB-23A-SS	NORMAL			0.65	1
SB-24A-SS	NORMAL			0.9	1
F-SB-24ARE-1	NORMAL				
F-SB-24ARE-2	NORMAL				
SB-25A-SS	NORMAL			0.9	1
SB-30A-SS	NORMAL			0.435	1
SB-50-SS	NORMAL			0.47	1
SB-55-SS	NORMAL			0.65	1
F-SB-56RE-1	NORMAL				
F-SB-56RE-2	NORMAL				
F-SB-93RE-1	NORMAL				
F-SB-93RE-2	NORMAL				
SB-93-SS	NORMAL			5.5	1
F-SB-94RE-1	NORMAL				
F-SB-94RE-2	NORMAL				

Samples	SACODE	VANADIUM	d_VANADIUM	HEXAVALENT CHROMIUM (MG/KG)	d_HEXAVALENT CHROMIUM (MG/KG)
SB-94-SS	NORMAL			1.25	1
SB-95-SS	NORMAL			0.55	1
F-SB-95RE-1	NORMAL				
F-SB-95RE-2	NORMAL				
F-SB-96RE-1	NORMAL				
F-SB-96RE-2	NORMAL				
SB-236-01	NORMAL	31	1	0.99	1
SB-236-SS	NORMAL	29.9	1	0.885	1
SB-237-01	NORMAL	41.9	1	0.4	0
SB-237-SS	NORMAL	31	1	0.99	1
SB-238-01	NORMAL	35.9	1	0.36	0
SB-238-SS	NORMAL	49	1	0.49	1
SB-250-02	NORMAL	27.2	1	0.775	1
SB-250-SS	NORMAL	20.5	1	0.59	1
SB-251-02	NORMAL	35.6	1	1.04	1
SB-251-SS	NORMAL	24.8	1	0.79	1
SB-252-02	NORMAL	27.9	1	0.78	1
SB-252-SS	NORMAL	20.3	1	0.59	1
SB-253-02	NORMAL	25.5	1	0.7	1
SB-253-SS	NORMAL	29.5	1	0.72	1
SB-265-02	NORMAL				
SB-265-SS	NORMAL	46.2	1	3.6	1
SB-266-02	NORMAL				
SB-266-SS	NORMAL	33.4	1	2	1
SB-267-02	NORMAL				
SB-267-SS	NORMAL	21.6	1	0.82	1
SB-268-02	NORMAL				
SB-268-SS	NORMAL	21	1	0.55	0
SB-269-02	NORMAL				
SB-269-SS	NORMAL	42.8	1	0.51	1
SB-270-02	NORMAL				
SB-270-SS	NORMAL	26.2	1	0.64	1
SB-382-0102	NORMAL				
SB-383-0102	NORMAL				
SB-384-0102	NORMAL				
SB-385-0102	NORMAL				
SB-386-0102	NORMAL				
SB-387-0102	NORMAL				
SB-388-0102	NORMAL				
SB-389-0102	NORMAL				
SB-390-0102	NORMAL				
SB-391-0102	NORMAL				
SB-392-0102	NORMAL				
SB-393-0102	NORMAL				
SB-394-0102	NORMAL				
SB-395-0102	NORMAL				
SB-396-0102	NORMAL				
SB-397-0102	NORMAL				
SB-398-0102	NORMAL				
SB-399-0102	NORMAL				

Samples	SACODE	VANADIUM	d_VANADIUM	HEXAVALENT CHROMIUM (MG/KG)	d_HEXAVALENT CHROMIUM (MG/KG)
SB-400-0102	NORMAL				
SB-401-0102	NORMAL				
SB-402-0102	NORMAL				
SB-403-0102	NORMAL				
SB-404-0102	NORMAL				
SB-405-0102	NORMAL				
SB-406-0102	NORMAL				
SB-407-0102	NORMAL				
SB-408-0102	NORMAL				
SB-409-0102	NORMAL				
SB-489-0102	NORMAL				
F-SB-624-1	NORMAL				
F-SB-624-2	NORMAL				
F-SB-625-1	NORMAL				
F-SB-625-2	NORMAL				
F-SB-626-1	NORMAL				
F-SB-626-2	NORMAL				
F-SB-626B-(1-4)	NORMAL				
F-SB-626C-1	NORMAL				
F-SB-626D-1	NORMAL				
F-SB-627-1	NORMAL				
F-SB-627-2	NORMAL				
F-SB-635C-1	NORMAL				
F-SB-635D-1	NORMAL				
F-SB-636-1	NORMAL				
F-SB-636A-1	NORMAL				
F-SB-636B-1	NORMAL				
F-SB-636C-1	NORMAL				
F-SB-636D-1	NORMAL				
F-SB-637-1	NORMAL				
F-SB-637B-1	NORMAL				
F-SB-637C-1	NORMAL				
F-SB-638-1	NORMAL				
F-SB-639-1	NORMAL				
F-SB-640-1	NORMAL				
F-SB-641-1	NORMAL				
F-SB-641A-1	NORMAL				
F-SB-641B-1	NORMAL				
F-SB-641C-1	NORMAL				
F-SB-642-1	NORMAL				
F-SB-642A-1	NORMAL				
F-SB-642B-1	NORMAL				
F-SB-642C-1	NORMAL				
F-SB-643-1	NORMAL				
F-SB-643B-1	NORMAL				
F-SB-643C-1	NORMAL				
F-SB-644-1	NORMAL				
F-SB-645-1	NORMAL				
F-SB-645A-1	NORMAL				
F-SB-645B-1	NORMAL				

Samples	SACODE	VANADIUM	d_VANADIUM	HEXAVALENT CHROMIUM (MG/KG)	d_HEXAVALENT CHROMIUM (MG/KG)
F-SB-645C-1	NORMAL				
F-SB-646-1	NORMAL				
F-SB-647-1	NORMAL				
F-SB-647A-1	NORMAL				
F-SB-647B-1	NORMAL				
F-SB-647C-1	NORMAL				
F-SB-648-1	NORMAL				
F-SB-649-1	NORMAL				
F-SB-650-1	NORMAL				
F-SB-651-1	NORMAL				
F-SB-652-1	NORMAL				
F-SB-652A-1	NORMAL				
F-SB-652B-1	NORMAL				
F-SB-652C-1	NORMAL				
F-SB-797-SS	NORMAL				
F-SB-798-SS	NORMAL				
F-SB-799-SS	NORMAL				
F-SB-800-SS	NORMAL				
F-SB-801-SS	NORMAL				
F-SB-802-SS	NORMAL				
F-VS-A-1-1	NORMAL				
F-VS-A-2-1	NORMAL				
F-VS-A-3-1-RS	NORMAL				
F-VS-A-4-1	NORMAL				
F-VS-B-1-1	NORMAL				
F-VS-B-2-1	NORMAL				
F-VS-B-3-1	NORMAL				
F-VS-B-4-1	NORMAL				
F-VS-C-1-1-AVG	AVG				
F-VS-C-2-1	NORMAL				
F-VS-C-3-1	NORMAL				
F-VS-C-4-1	NORMAL				
F-VS-D-1-1	NORMAL				
F-VS-D-2-1	NORMAL				
F-VS-D-3-1	NORMAL				
F-VS-D-4-1	NORMAL				
F-VS-E-1-1	NORMAL				
F-VS-E-2-1	NORMAL				
F-VS-E-4-1-AVG	AVG				
F-VS-E-3-1	NORMAL				
F-SB-1867-0-0.5-AVG	AVG				
F-SB-1868-0-0.5	NORMAL				
F-SB-1869-0-0.5	NORMAL				
F-SB-1870-0-0.5	NORMAL				
F-SB-1871-0-0.5	NORMAL				
F-SB-1872-0-0.5	NORMAL				
F-SB-1873-0-0.5	NORMAL				
F-SB-1874-0-0.5	NORMAL				
F-SB-1875-0-0.5-AVG	AVG				
F-SB-1876-0-0.5	NORMAL				

Samples	SACODE	VANADIUM	d_VANADIUM	HEXAVALENT CHROMIUM (MG/KG)	d_HEXAVALENT CHROMIUM (MG/KG)
F-SB-1877-0-0.5	NORMAL				
F-SB-1877-0.5-1.0	NORMAL				
F-SB-1878-0-0.5	NORMAL				
F-SB-1879-0-0.5	NORMAL				
F-SB-1880-0-0.5	NORMAL				
CPP-SB-1857-0.0-0.5	NORMAL				
CPP-SB-1857-0.5-1.0	NORMAL				
CPP-SB-1858-0.0-0.5	NORMAL				
CPP-SB-1858-0.5-1.0	NORMAL				
CPP-SB-1859-0.0-0.5	NORMAL				
CPP-SB-1859-0.5-1.0	NORMAL				
CPP-SB-1860-0.0-0.5	NORMAL				
CPP-SB-1860-0.5-1.0-AVG	AVG				
CPP-SB-1861-0.0-0.5	NORMAL				
CPP-SB-1861-0.5-1.0	NORMAL				
CPP-SB-1862-0.0-0.5	NORMAL				
CPP-SB-1862-0.5-1.0	NORMAL				
CPP-SB-1863-0.0-0.5	NORMAL				
CPP-SB-1863-0.5-1.0	NORMAL				
CPP-SB-1864-0.0-0.5	NORMAL				
CPP-SB-1864-0.5-1.0	NORMAL				

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.11/8/2020 2:09:12 PM
From File	ProUCL Data - Surface Soil_LC010820.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

BAP EQUIVALENT-HALFND

General Statistics

Total Number of Observations	161	Number of Distinct Observations	118
		Number of Missing Observations	29
Number of Detects	129	Number of Non-Detects	32
Number of Distinct Detects	104	Number of Distinct Non-Detects	15
Minimum Detect	1.247	Minimum Non-Detect	0.71
Maximum Detect	5140	Maximum Non-Detect	430
Variance Detects	619843	Percent Non-Detects	19.88%
Mean Detects	435.3	SD Detects	787.3
Median Detects	118.1	CV Detects	1.809
Skewness Detects	3.033	Kurtosis Detects	11.58
Mean of Logged Detects	4.491	SD of Logged Detects	2.011

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.608	**Normal GOF Test on Detected Observations Only**
5% Shapiro Wilk P Value	0	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.291	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.0784	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	350.4	KM Standard Error of Mean	57.18
KM SD	722.6	95% KM (BCA) UCL	445.3
95% KM (t) UCL	445	95% KM (Percentile Bootstrap) UCL	447.3
95% KM (z) UCL	444.4	95% KM Bootstrap t UCL	464.3
90% KM Chebyshev UCL	521.9	95% KM Chebyshev UCL	599.6
97.5% KM Chebyshev UCL	707.5	99% KM Chebyshev UCL	919.3

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	3.85	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.84	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.122	**Kolmogorov-Smirnov GOF**

5% K-S Critical Value	0.0877	Detected Data Not Gamma Distributed at 5% Significance Level	
Detected Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	0.413	k star (bias corrected MLE)	0.408
Theta hat (MLE)	1054	Theta star (bias corrected MLE)	1066
nu hat (MLE)	106.5	nu star (bias corrected)	105.4
Mean (detects)	435.3		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	348.8
Maximum	5140	Median	36
SD	725.4	CV	2.08
k hat (MLE)	0.227	k star (bias corrected MLE)	0.227
Theta hat (MLE)	1534	Theta star (bias corrected MLE)	1535
nu hat (MLE)	73.22	nu star (bias corrected)	73.18
Adjusted Level of Significance (β)	0.0485		
Approximate Chi Square Value (73.18, α)	54.48	Adjusted Chi Square Value (73.18, β)	54.34
95% Gamma Approximate UCL (use when n>=50)	468.5	95% Gamma Adjusted UCL (use when n<50)	469.8
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	350.4	SD (KM)	722.6
Variance (KM)	522181	SE of Mean (KM)	57.18
k hat (KM)	0.235	k star (KM)	0.235
nu hat (KM)	75.7	nu star (KM)	75.62
theta hat (KM)	1490	theta star (KM)	1492
80% gamma percentile (KM)	497	90% gamma percentile (KM)	1056
95% gamma percentile (KM)	1727	99% gamma percentile (KM)	3531
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (75.62, α)	56.59	Adjusted Chi Square Value (75.62, β)	56.44
95% Gamma Approximate KM-UCL (use when n>=50)	468.2	95% Gamma Adjusted KM-UCL (use when n<50)	469.4
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Approximate Test Statistic	0.931	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	4.6962E-7	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.134	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.0784	Detected Data Not Lognormal at 5% Significance Level	

Detected Data Not Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	349.5	Mean in Log Scale	3.693
SD in Original Scale	725.1	SD in Log Scale	2.459
95% t UCL (assumes normality of ROS data)	444	95% Percentile Bootstrap UCL	447
95% BCA Bootstrap UCL	464.2	95% Bootstrap t UCL	472
95% H-UCL (Log ROS)	1707		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	3.607	KM Geo Mean	36.87
KM SD (logged)	2.575	95% Critical H Value (KM-Log)	3.873
KM Standard Error of Mean (logged)	0.205	95% H-UCL (KM -Log)	2236
KM SD (logged)	2.575	95% Critical H Value (KM-Log)	3.873
KM Standard Error of Mean (logged)	0.205		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	352.9	Mean in Log Scale	3.635
SD in Original Scale	723.9	SD in Log Scale	2.624
95% t UCL (Assumes normality)	447.3	95% H-Stat UCL	2676
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution at 5% Significance Level			
Suggested UCL to Use			
95% KM (Chebyshev) UCL	599.6		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
AROCLOR-1254			
General Statistics			
Total Number of Observations	88	Number of Distinct Observations	32
		Number of Missing Observations	133
Number of Detects	1	Number of Non-Detects	87
Number of Distinct Detects	1	Number of Distinct Non-Detects	31
Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!			

It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable AROCLOR-1254 was not processed!

AROCLOR-1260

General Statistics

Total Number of Observations	88	Number of Distinct Observations	55
		Number of Missing Observations	133
Number of Detects	40	Number of Non-Detects	48
Number of Distinct Detects	37	Number of Distinct Non-Detects	20
Minimum Detect	22	Minimum Non-Detect	9.7
Maximum Detect	4700	Maximum Non-Detect	320
Variance Detects	695030	Percent Non-Detects	54.55%
Mean Detects	642.3	SD Detects	833.7
Median Detects	422.5	CV Detects	1.298
Skewness Detects	3.348	Kurtosis Detects	14.42
Mean of Logged Detects	5.791	SD of Logged Detects	1.286

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.663	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.94	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.228	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.139	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	300.5	KM Standard Error of Mean	68.78
KM SD	636.9	95% KM (BCA) UCL	428
95% KM (t) UCL	414.9	95% KM (Percentile Bootstrap) UCL	416
95% KM (z) UCL	413.6	95% KM Bootstrap t UCL	475.4
90% KM Chebyshev UCL	506.9	95% KM Chebyshev UCL	600.3
97.5% KM Chebyshev UCL	730.1	99% KM Chebyshev UCL	984.9

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.344	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.784	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.0745	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.144	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only			
k hat (MLE)	0.871	k star (bias corrected MLE)	0.822
Theta hat (MLE)	737.3	Theta star (bias corrected MLE)	780.9
nu hat (MLE)	69.69	nu star (bias corrected)	65.8
Mean (detects)	642.3		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	291.9
Maximum	4700	Median	0.01
SD	644.2	CV	2.207
k hat (MLE)	0.14	k star (bias corrected MLE)	0.143
Theta hat (MLE)	2089	Theta star (bias corrected MLE)	2048
nu hat (MLE)	24.6	nu star (bias corrected)	25.09
Adjusted Level of Significance (β)	0.0473		
Approximate Chi Square Value (25.09, α)	14.68	Adjusted Chi Square Value (25.09, β)	14.55
95% Gamma Approximate UCL (use when n>=50)	498.9	95% Gamma Adjusted UCL (use when n<50)	503.5
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	300.5	SD (KM)	636.9
Variance (KM)	405621	SE of Mean (KM)	68.78
k hat (KM)	0.223	k star (KM)	0.223
nu hat (KM)	39.18	nu star (KM)	39.18
theta hat (KM)	1350	theta star (KM)	1350
80% gamma percentile (KM)	416.9	90% gamma percentile (KM)	907.5
95% gamma percentile (KM)	1504	99% gamma percentile (KM)	3120
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (39.18, α)	25.84	Adjusted Chi Square Value (39.18, β)	25.66
95% Gamma Approximate KM-UCL (use when n>=50)	455.6	95% Gamma Adjusted KM-UCL (use when n<50)	458.8
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.962	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.94	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.112	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.139	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			

Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	302.1	Mean in Log Scale	4.075
SD in Original Scale	639.7	SD in Log Scale	1.892
95% t UCL (assumes normality of ROS data)	415.5	95% Percentile Bootstrap UCL	420.4
95% BCA Bootstrap UCL	461.5	95% Bootstrap t UCL	479.2
95% H-UCL (Log ROS)	680.8		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	3.995	KM Geo Mean	54.33
KM SD (logged)	1.893	95% Critical H Value (KM-Log)	3.247
KM Standard Error of Mean (logged)	0.212	95% H-UCL (KM -Log)	629.5
KM SD (logged)	1.893	95% Critical H Value (KM-Log)	3.247
KM Standard Error of Mean (logged)	0.212		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	309.2	Mean in Log Scale	4.25
SD in Original Scale	637.2	SD in Log Scale	1.773
95% t UCL (Assumes normality)	422.2	95% H-Stat UCL	608.5
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Gamma Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM Approximate Gamma UCL	455.6		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
ANTIMONY			
General Statistics			
Total Number of Observations	26	Number of Distinct Observations	16
		Number of Missing Observations	56
Number of Detects	18	Number of Non-Detects	8
Number of Distinct Detects	9	Number of Distinct Non-Detects	7
Minimum Detect	0.4	Minimum Non-Detect	0.3
Maximum Detect	4	Maximum Non-Detect	3
Variance Detects	0.655	Percent Non-Detects	30.77%
Mean Detects	1.061	SD Detects	0.81

Median Detects	0.95	CV Detects	0.763
Skewness Detects	3.165	Kurtosis Detects	11.18
Mean of Logged Detects	-0.0971	SD of Logged Detects	0.517
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.584	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.897	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.419	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.202	Detected Data Not Normal at 5% Significance Level	
Detected Data Not Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.928	KM Standard Error of Mean	0.149
KM SD	0.715	95% KM (BCA) UCL	1.181
95% KM (t) UCL	1.183	95% KM (Percentile Bootstrap) UCL	1.175
95% KM (z) UCL	1.173	95% KM Bootstrap t UCL	1.428
90% KM Chebyshev UCL	1.375	95% KM Chebyshev UCL	1.578
97.5% KM Chebyshev UCL	1.859	99% KM Chebyshev UCL	2.411
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	1.572	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.745	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.358	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.205	Detected Data Not Gamma Distributed at 5% Significance Level	
Detected Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	3.354	k star (bias corrected MLE)	2.832
Theta hat (MLE)	0.316	Theta star (bias corrected MLE)	0.375
nu hat (MLE)	120.8	nu star (bias corrected)	102
Mean (detects)	1.061		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.88
Maximum	4	Median	0.765
SD	0.747	CV	0.85
k hat (MLE)	1.271	k star (bias corrected MLE)	1.15
Theta hat (MLE)	0.692	Theta star (bias corrected MLE)	0.765

nu hat (MLE)	66.08	nu star (bias corrected)	59.79
Adjusted Level of Significance (β)	0.0398		
Approximate Chi Square Value (59.79, α)	43.01	Adjusted Chi Square Value (59.79, β)	42.07
95% Gamma Approximate UCL (use when n>=50)	1.223	95% Gamma Adjusted UCL (use when n<50)	1.25
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.928	SD (KM)	0.715
Variance (KM)	0.512	SE of Mean (KM)	0.149
k hat (KM)	1.683	k star (KM)	1.514
nu hat (KM)	87.51	nu star (KM)	78.74
theta hat (KM)	0.551	theta star (KM)	0.613
80% gamma percentile (KM)	1.434	90% gamma percentile (KM)	1.929
95% gamma percentile (KM)	2.409	99% gamma percentile (KM)	3.493
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (78.74, α)	59.3	Adjusted Chi Square Value (78.74, β)	58.18
95% Gamma Approximate KM-UCL (use when n>=50)	1.232	95% Gamma Adjusted KM-UCL (use when n<50)	1.256
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.85	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.897	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.314	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.202	Detected Data Not Lognormal at 5% Significance Level	
Detected Data Not Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.917	Mean in Log Scale	-0.252
SD in Original Scale	0.713	SD in Log Scale	0.541
95% t UCL (assumes normality of ROS data)	1.156	95% Percentile Bootstrap UCL	1.166
95% BCA Bootstrap UCL	1.281	95% Bootstrap t UCL	1.466
95% H-UCL (Log ROS)	1.117		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-0.257	KM Geo Mean	0.773
KM SD (logged)	0.567	95% Critical H Value (KM-Log)	2.024
KM Standard Error of Mean (logged)	0.124	95% H-UCL (KM -Log)	1.143
KM SD (logged)	0.567	95% Critical H Value (KM-Log)	2.024
KM Standard Error of Mean (logged)	0.124		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	1.017	Mean in Log Scale	-0.201
SD in Original Scale	0.744	SD in Log Scale	0.706

95% t UCL (Assumes normality)	1.266	95% H-Stat UCL	1.423
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution at 5% Significance Level			
Suggested UCL to Use			
95% KM (Chebyshev) UCL	1.578		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
CADMIUM			
General Statistics			
Total Number of Observations	30	Number of Distinct Observations	18
		Number of Missing Observations	52
Number of Detects	13	Number of Non-Detects	17
Number of Distinct Detects	9	Number of Distinct Non-Detects	10
Minimum Detect	0.3	Minimum Non-Detect	0.019
Maximum Detect	4.5	Maximum Non-Detect	3
Variance Detects	1.808	Percent Non-Detects	56.67%
Mean Detects	1.262	SD Detects	1.344
Median Detects	0.7	CV Detects	1.066
Skewness Detects	1.674	Kurtosis Detects	1.95
Mean of Logged Detects	-0.197	SD of Logged Detects	0.919
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.734	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.866	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.327	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.234	Detected Data Not Normal at 5% Significance Level	
Detected Data Not Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.648	KM Standard Error of Mean	0.208
KM SD	1.05	95% KM (BCA) UCL	1.029
95% KM (t) UCL	1.002	95% KM (Percentile Bootstrap) UCL	1.008
95% KM (z) UCL	0.99	95% KM Bootstrap t UCL	1.181
90% KM Chebyshev UCL	1.272	95% KM Chebyshev UCL	1.554
97.5% KM Chebyshev UCL	1.947	99% KM Chebyshev UCL	2.717

Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.892	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.753	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.264	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.242	Detected Data Not Gamma Distributed at 5% Significance Level	
Detected Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	1.305	k star (bias corrected MLE)	1.055
Theta hat (MLE)	0.967	Theta star (bias corrected MLE)	1.196
nu hat (MLE)	33.93	nu star (bias corrected)	27.43
Mean (detects)	1.262		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.576
Maximum	4.5	Median	0.01
SD	1.066	CV	1.851
k hat (MLE)	0.338	k star (bias corrected MLE)	0.326
Theta hat (MLE)	1.704	Theta star (bias corrected MLE)	1.764
nu hat (MLE)	20.28	nu star (bias corrected)	19.58
Adjusted Level of Significance (β)	0.041		
Approximate Chi Square Value (19.58, α)	10.55	Adjusted Chi Square Value (19.58, β)	10.16
95% Gamma Approximate UCL (use when n>=50)	1.069	95% Gamma Adjusted UCL (use when n<50)	1.11
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.648	SD (KM)	1.05
Variance (KM)	1.102	SE of Mean (KM)	0.208
k hat (KM)	0.382	k star (KM)	0.366
nu hat (KM)	22.89	nu star (KM)	21.94
theta hat (KM)	1.7	theta star (KM)	1.774
80% gamma percentile (KM)	1.034	90% gamma percentile (KM)	1.86
95% gamma percentile (KM)	2.779	99% gamma percentile (KM)	5.112
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (21.94, α)	12.29	Adjusted Chi Square Value (21.94, β)	11.87
95% Gamma Approximate KM-UCL (use when n>=50)	1.157	95% Gamma Adjusted KM-UCL (use when n<50)	1.198

Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.887	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.866	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.203	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.234	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.644	Mean in Log Scale	-1.212
SD in Original Scale	1.029	SD in Log Scale	1.194
95% t UCL (assumes normality of ROS data)	0.964	95% Percentile Bootstrap UCL	0.968
95% BCA Bootstrap UCL	1.035	95% Bootstrap t UCL	1.236
95% H-UCL (Log ROS)	1.111		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-1.906	KM Geo Mean	0.149
KM SD (logged)	1.944	95% Critical H Value (KM-Log)	3.846
KM Standard Error of Mean (logged)	0.415	95% H-UCL (KM -Log)	3.94
KM SD (logged)	1.944	95% Critical H Value (KM-Log)	3.846
KM Standard Error of Mean (logged)	0.415		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.885	Mean in Log Scale	-1
SD in Original Scale	1.046	SD in Log Scale	1.63
95% t UCL (Assumes normality)	1.21	95% H-Stat UCL	3.84
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Lognormal Distributed at 5% Significance Level			
Suggested UCL to Use			
KM H-UCL	3.94		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

COBALT

General Statistics			
Total Number of Observations	20	Number of Distinct Observations	19
		Number of Missing Observations	62
Minimum	0.054	Mean	5.558
Maximum	8.9	Median	5.8
SD	2.091	Std. Error of Mean	0.468
Coefficient of Variation	0.376	Skewness	-0.734
Normal GOF Test			
Shapiro Wilk Test Statistic	0.951	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.905	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.127	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.192	Data appear Normal at 5% Significance Level	
Data appear Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	6.366	95% Adjusted-CLT UCL (Chen-1995)	6.245
		95% Modified-t UCL (Johnson-1978)	6.354
Gamma GOF Test			
A-D Test Statistic	2.186	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.751	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.262	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.196	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	2.382	k star (bias corrected MLE)	2.058
Theta hat (MLE)	2.334	Theta star (bias corrected MLE)	2.701
nu hat (MLE)	95.26	nu star (bias corrected)	82.31
MLE Mean (bias corrected)	5.558	MLE Sd (bias corrected)	3.874
		Approximate Chi Square Value (0.05)	62.4
Adjusted Level of Significance	0.038	Adjusted Chi Square Value	61.03
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	7.331	95% Adjusted Gamma UCL (use when n<50)	7.495
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.491	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.905	Data Not Lognormal at 5% Significance Level	

Lilliefors Test Statistic	0.313	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.192	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-2.919	Mean of logged Data	1.491
Maximum of Logged Data	2.186	SD of logged Data	1.081
Assuming Lognormal Distribution			
95% H-UCL	15.77	90% Chebyshev (MVUE) UCL	13.9
95% Chebyshev (MVUE) UCL	16.74	97.5% Chebyshev (MVUE) UCL	20.68
99% Chebyshev (MVUE) UCL	28.42		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	6.327	95% Jackknife UCL	6.366
95% Standard Bootstrap UCL	6.325	95% Bootstrap-t UCL	6.311
95% Hall's Bootstrap UCL	6.25	95% Percentile Bootstrap UCL	6.29
95% BCA Bootstrap UCL	6.23		
90% Chebyshev(Mean, Sd) UCL	6.961	95% Chebyshev(Mean, Sd) UCL	7.596
97.5% Chebyshev(Mean, Sd) UCL	8.478	99% Chebyshev(Mean, Sd) UCL	10.21
Suggested UCL to Use			
95% Student's-t UCL	6.366		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be			
reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.			
LEAD			
General Statistics			
Total Number of Observations	30	Number of Distinct Observations	27
		Number of Missing Observations	52
Number of Detects	23	Number of Non-Detects	7
Number of Distinct Detects	22	Number of Distinct Non-Detects	5
Minimum Detect	0.39	Minimum Non-Detect	3

Maximum Detect	420	Maximum Non-Detect	8
Variance Detects	7530	Percent Non-Detects	23.33%
Mean Detects	56.94	SD Detects	86.78
Median Detects	33	CV Detects	1.524
Skewness Detects	3.62	Kurtosis Detects	14.98
Mean of Logged Detects	3.138	SD of Logged Detects	1.689
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.568	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.914	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.296	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.18	Detected Data Not Normal at 5% Significance Level	
Detected Data Not Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	44.09	KM Standard Error of Mean	14.54
KM SD	77.88	95% KM (BCA) UCL	71.07
95% KM (t) UCL	68.8	95% KM (Percentile Bootstrap) UCL	69.43
95% KM (z) UCL	68.01	95% KM Bootstrap t UCL	97.82
90% KM Chebyshev UCL	87.71	95% KM Chebyshev UCL	107.5
97.5% KM Chebyshev UCL	134.9	99% KM Chebyshev UCL	188.8
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.417	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.789	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.138	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.19	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	0.673	k star (bias corrected MLE)	0.614
Theta hat (MLE)	84.66	Theta star (bias corrected MLE)	92.76
nu hat (MLE)	30.94	nu star (bias corrected)	28.24
Mean (detects)	56.94		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	43.66
Maximum	420	Median	18.5

SD	79.45	CV	1.82
k hat (MLE)	0.285	k star (bias corrected MLE)	0.278
Theta hat (MLE)	153.4	Theta star (bias corrected MLE)	156.9
nu hat (MLE)	17.07	nu star (bias corrected)	16.7
Adjusted Level of Significance (β)	0.041		
Approximate Chi Square Value (16.70, α)	8.456	Adjusted Chi Square Value (16.70, β)	8.118
95% Gamma Approximate UCL (use when n>=50)	86.2	95% Gamma Adjusted UCL (use when n<50)	89.79
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	44.09	SD (KM)	77.88
Variance (KM)	6065	SE of Mean (KM)	14.54
k hat (KM)	0.32	k star (KM)	0.311
nu hat (KM)	19.23	nu star (KM)	18.64
theta hat (KM)	137.6	theta star (KM)	141.9
80% gamma percentile (KM)	68.18	90% gamma percentile (KM)	129.5
95% gamma percentile (KM)	199.4	99% gamma percentile (KM)	380.4
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (18.64, α)	9.855	Adjusted Chi Square Value (18.64, β)	9.487
95% Gamma Approximate KM-UCL (use when n>=50)	83.39	95% Gamma Adjusted KM-UCL (use when n<50)	86.63
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.898	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.914	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.171	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.18	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Approximate Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	44.1	Mean in Log Scale	2.537
SD in Original Scale	79.2	SD in Log Scale	1.855
95% t UCL (assumes normality of ROS data)	68.67	95% Percentile Bootstrap UCL	71.24
95% BCA Bootstrap UCL	83.7	95% Bootstrap t UCL	101.9
95% H-UCL (Log ROS)	253.2		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	2.377	KM Geo Mean	10.78
KM SD (logged)	2.08	95% Critical H Value (KM-Log)	4.062
KM Standard Error of Mean (logged)	0.413	95% H-UCL (KM -Log)	449.6
KM SD (logged)	2.08	95% Critical H Value (KM-Log)	4.062
KM Standard Error of Mean (logged)	0.413		

DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	44.34	Mean in Log Scale	2.647
SD in Original Scale	79.07	SD in Log Scale	1.734
95% t UCL (Assumes normality)	68.87	95% H-Stat UCL	196.9
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Gamma Distributed at 5% Significance Level			
Suggested UCL to Use			
Adjusted KM-UCL (use when k<=1 and 15 < n < 50 but k<=1)	86.63		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
MERCURY			
General Statistics			
Total Number of Observations	45	Number of Distinct Observations	33
		Number of Missing Observations	124
Number of Detects	37	Number of Non-Detects	8
Number of Distinct Detects	30	Number of Distinct Non-Detects	5
Minimum Detect	0.01	Minimum Non-Detect	0.015
Maximum Detect	2.7	Maximum Non-Detect	0.12
Variance Detects	0.474	Percent Non-Detects	17.78%
Mean Detects	0.554	SD Detects	0.688
Median Detects	0.29	CV Detects	1.242
Skewness Detects	1.69	Kurtosis Detects	2.35
Mean of Logged Detects	-1.479	SD of Logged Detects	1.509
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.765	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.936	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.226	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.144	Detected Data Not Normal at 5% Significance Level	
Detected Data Not Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.461	KM Standard Error of Mean	0.0979
KM SD	0.648	95% KM (BCA) UCL	0.634

95% KM (t) UCL	0.626	95% KM (Percentile Bootstrap) UCL	0.623
95% KM (z) UCL	0.622	95% KM Bootstrap t UCL	0.674
90% KM Chebyshev UCL	0.755	95% KM Chebyshev UCL	0.888
97.5% KM Chebyshev UCL	1.073	99% KM Chebyshev UCL	1.435
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.556	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.795	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.116	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.151	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	0.682	k star (bias corrected MLE)	0.645
Theta hat (MLE)	0.813	Theta star (bias corrected MLE)	0.86
nu hat (MLE)	50.48	nu star (bias corrected)	47.72
Mean (detects)	0.554		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.458
Maximum	2.7	Median	0.18
SD	0.657	CV	1.434
k hat (MLE)	0.515	k star (bias corrected MLE)	0.496
Theta hat (MLE)	0.889	Theta star (bias corrected MLE)	0.924
nu hat (MLE)	46.38	nu star (bias corrected)	44.62
Adjusted Level of Significance (β)	0.0447		
Approximate Chi Square Value (44.62, α)	30.3	Adjusted Chi Square Value (44.62, β)	29.91
95% Gamma Approximate UCL (use when n>=50)	0.675	95% Gamma Adjusted UCL (use when n<50)	0.684
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.461	SD (KM)	0.648
Variance (KM)	0.42	SE of Mean (KM)	0.0979
k hat (KM)	0.507	k star (KM)	0.488
nu hat (KM)	45.6	nu star (KM)	43.9
theta hat (KM)	0.91	theta star (KM)	0.945
80% gamma percentile (KM)	0.756	90% gamma percentile (KM)	1.254
95% gamma percentile (KM)	1.787	99% gamma percentile (KM)	3.101

Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (43.90, α)	29.7	Adjusted Chi Square Value (43.90, β)	29.31
95% Gamma Approximate KM-UCL (use when n>=50)	0.681	95% Gamma Adjusted KM-UCL (use when n<50)	0.69
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.956	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.936	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0927	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.144	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.461	Mean in Log Scale	-1.893
SD in Original Scale	0.655	SD in Log Scale	1.673
95% t UCL (assumes normality of ROS data)	0.625	95% Percentile Bootstrap UCL	0.623
95% BCA Bootstrap UCL	0.649	95% Bootstrap t UCL	0.665
95% H-UCL (Log ROS)	1.376		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-1.907	KM Geo Mean	0.149
KM SD (logged)	1.67	95% Critical H Value (KM-Log)	3.22
KM Standard Error of Mean (logged)	0.256	95% H-UCL (KM -Log)	1.348
KM SD (logged)	1.67	95% Critical H Value (KM-Log)	3.22
KM Standard Error of Mean (logged)	0.256		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.463	Mean in Log Scale	-1.858
SD in Original Scale	0.654	SD in Log Scale	1.643
95% t UCL (Assumes normality)	0.626	95% H-Stat UCL	1.322
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Gamma Distributed at 5% Significance Level			
Suggested UCL to Use			
Adjusted KM-UCL (use when k<=1 and 15 < n < 50 but k<=1)	0.69		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

MOLYBDENUM

General Statistics

Total Number of Observations	20	Number of Distinct Observations	9
		Number of Missing Observations	62
Number of Detects	2	Number of Non-Detects	18
Number of Distinct Detects	2	Number of Distinct Non-Detects	7
Minimum Detect	0.13	Minimum Non-Detect	0.4
Maximum Detect	63	Maximum Non-Detect	2
Variance Detects	1976	Percent Non-Detects	90%
Mean Detects	31.57	SD Detects	44.46
Median Detects	31.57	CV Detects	1.408
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	1.051	SD of Logged Detects	4.372

Warning: Data set has only 2 Detected Values.

This is not enough to compute meaningful or reliable statistics and estimates.

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	3.274	KM Standard Error of Mean	4.333
KM SD	13.7	95% KM (BCA) UCL	N/A
95% KM (t) UCL	10.77	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	10.4	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	16.27	95% KM Chebyshev UCL	22.16
97.5% KM Chebyshev UCL	30.33	99% KM Chebyshev UCL	46.39

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	0.289	k star (bias corrected MLE)	N/A
Theta hat (MLE)	109.2	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	1.156	nu star (bias corrected)	N/A
Mean (detects)	31.57		

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	3.274	SD (KM)	13.7
Variance (KM)	187.8	SE of Mean (KM)	4.333
k hat (KM)	0.0571	k star (KM)	0.0818

nu hat (KM)	2.283	nu star (KM)	3.274
theta hat (KM)	57.35	theta star (KM)	40
80% gamma percentile (KM)	1.628	90% gamma percentile (KM)	7.872
95% gamma percentile (KM)	19.05	99% gamma percentile (KM)	57.35
Gamma Kaplan-Meier (KM) Statistics			
		Adjusted Level of Significance (β)	0.038
Approximate Chi Square Value (3.27, α)	0.458	Adjusted Chi Square Value (3.27, β)	0.388
95% Gamma Approximate KM-UCL (use when n>=50)	23.4	95% Gamma Adjusted KM-UCL (use when n<50)	27.59
95% Gamma Adjusted KM-UCL (use when k<=1 and 15 < n < 50)			
Lognormal GOF Test on Detected Observations Only			
Not Enough Data to Perform GOF Test			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	3.528	Mean in Log Scale	-1.762
SD in Original Scale	14.02	SD in Log Scale	2.134
95% t UCL (assumes normality of ROS data)	8.946	95% Percentile Bootstrap UCL	9.788
95% BCA Bootstrap UCL	13.21	95% Bootstrap t UCL	155.1
95% H-UCL (Log ROS)	15.52		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-1.731	KM Geo Mean	0.177
KM SD (logged)	1.348	95% Critical H Value (KM-Log)	3.172
KM Standard Error of Mean (logged)	0.426	95% H-UCL (KM -Log)	1.171
KM SD (logged)	1.348	95% Critical H Value (KM-Log)	3.172
KM Standard Error of Mean (logged)	0.426		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	3.469	Mean in Log Scale	-0.922
SD in Original Scale	14.01	SD in Log Scale	1.262
95% t UCL (Assumes normality)	8.887	95% H-Stat UCL	2.12
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution at 5% Significance Level			
Suggested UCL to Use			
99% KM (Chebyshev) UCL	46.39		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

NICKEL

General Statistics

Total Number of Observations	30	Number of Distinct Observations	19
		Number of Missing Observations	52
Number of Detects	22	Number of Non-Detects	8
Number of Distinct Detects	16	Number of Distinct Non-Detects	5
Minimum Detect	0.21	Minimum Non-Detect	0.3
Maximum Detect	27	Maximum Non-Detect	9
Variance Detects	39.81	Percent Non-Detects	26.67%
Mean Detects	12.31	SD Detects	6.31
Median Detects	12	CV Detects	0.512
Skewness Detects	0.483	Kurtosis Detects	0.352
Mean of Logged Detects	2.274	SD of Logged Detects	0.972

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.967	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.911	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.167	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.184	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	9.673	KM Standard Error of Mean	1.344
KM SD	6.975	95% KM (BCA) UCL	11.89
95% KM (t) UCL	11.96	95% KM (Percentile Bootstrap) UCL	11.99
95% KM (z) UCL	11.88	95% KM Bootstrap t UCL	11.95
90% KM Chebyshev UCL	13.71	95% KM Chebyshev UCL	15.53
97.5% KM Chebyshev UCL	18.07	99% KM Chebyshev UCL	23.05

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.918	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.754	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.172	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.188	Detected data appear Gamma Distributed at 5% Significance Level

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	2.261	k star (bias corrected MLE)	1.983
Theta hat (MLE)	5.446	Theta star (bias corrected MLE)	6.209

nu hat (MLE)	99.49	nu star (bias corrected)	87.26
Mean (detects)	12.31		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.21	Mean	10.01
Maximum	27	Median	9
SD	6.653	CV	0.665
k hat (MLE)	1.805	k star (bias corrected MLE)	1.647
Theta hat (MLE)	5.545	Theta star (bias corrected MLE)	6.078
nu hat (MLE)	108.3	nu star (bias corrected)	98.8
Adjusted Level of Significance (β)	0.041		
Approximate Chi Square Value (98.80, α)	76.87	Adjusted Chi Square Value (98.80, β)	75.75
95% Gamma Approximate UCL (use when n>=50)	12.86	95% Gamma Adjusted UCL (use when n<50)	13.05
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	9.673	SD (KM)	6.975
Variance (KM)	48.65	SE of Mean (KM)	1.344
k hat (KM)	1.923	k star (KM)	1.753
nu hat (KM)	115.4	nu star (KM)	105.2
theta hat (KM)	5.03	theta star (KM)	5.518
80% gamma percentile (KM)	14.71	90% gamma percentile (KM)	19.41
95% gamma percentile (KM)	23.93	99% gamma percentile (KM)	34.05
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (105.17, α)	82.51	Adjusted Chi Square Value (105.17, β)	81.35
95% Gamma Approximate KM-UCL (use when n>=50)	12.33	95% Gamma Adjusted KM-UCL (use when n<50)	12.51
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.673	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.911	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.239	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.184	Detected Data Not Lognormal at 5% Significance Level	
Detected Data Not Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	9.688	Mean in Log Scale	1.897
SD in Original Scale	6.97	SD in Log Scale	1.054
95% t UCL (assumes normality of ROS data)	11.85	95% Percentile Bootstrap UCL	11.89

95% BCA Bootstrap UCL	12.05	95% Bootstrap t UCL	12.08
95% H-UCL (Log ROS)	19.12		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	1.642	KM Geo Mean	5.165
KM SD (logged)	1.554	95% Critical H Value (KM-Log)	3.246
KM Standard Error of Mean (logged)	0.366	95% H-UCL (KM -Log)	44.1
KM SD (logged)	1.554	95% Critical H Value (KM-Log)	3.246
KM Standard Error of Mean (logged)	0.366		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	9.835	Mean in Log Scale	1.887
SD in Original Scale	6.837	SD in Log Scale	1.187
95% t UCL (Assumes normality)	11.96	95% H-Stat UCL	24.34
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	11.96		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
VANADIUM			
General Statistics			
Total Number of Observations	20	Number of Distinct Observations	19
		Number of Missing Observations	62
Minimum	20.3	Mean	31.06
Maximum	49	Median	29.7
SD	8.573	Std. Error of Mean	1.917
Coefficient of Variation	0.276	Skewness	0.691
Normal GOF Test			
Shapiro Wilk Test Statistic	0.929	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.905	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.153	**Lilliefors GOF Test**	

5% Lilliefors Critical Value	0.192	Data appear Normal at 5% Significance Level	
Data appear Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	34.37	95% Adjusted-CLT UCL (Chen-1995)	34.53
		95% Modified-t UCL (Johnson-1978)	34.42
Gamma GOF Test			
A-D Test Statistic	0.316	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.741	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.118	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.194	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	14.56	k star (bias corrected MLE)	12.41
Theta hat (MLE)	2.133	Theta star (bias corrected MLE)	2.503
nu hat (MLE)	582.5	nu star (bias corrected)	496.5
MLE Mean (bias corrected)	31.06	MLE Sd (bias corrected)	8.816
		Approximate Chi Square Value (0.05)	445.8
Adjusted Level of Significance	0.038	Adjusted Chi Square Value	442
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	34.59	95% Adjusted Gamma UCL (use when n<50)	34.89
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.956	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.905	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.101	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.192	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	3.011	Mean of logged Data	3.401
Maximum of Logged Data	3.892	SD of logged Data	0.268
Assuming Lognormal Distribution			
95% H-UCL	34.81	90% Chebyshev (MVUE) UCL	36.69
95% Chebyshev (MVUE) UCL	39.26	97.5% Chebyshev (MVUE) UCL	42.81
99% Chebyshev (MVUE) UCL	49.79		
Nonparametric Distribution Free UCL Statistics			

Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	34.21	95% Jackknife UCL	34.37
95% Standard Bootstrap UCL	34.14	95% Bootstrap-t UCL	34.74
95% Hall's Bootstrap UCL	34.5	95% Percentile Bootstrap UCL	34.35
95% BCA Bootstrap UCL	34.63		
90% Chebyshev(Mean, Sd) UCL	36.81	95% Chebyshev(Mean, Sd) UCL	39.42
97.5% Chebyshev(Mean, Sd) UCL	43.03	99% Chebyshev(Mean, Sd) UCL	50.13
Suggested UCL to Use			
95% Student's-t UCL	34.37		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
HEXAVALENT CHROMIUM (MG/KG)			
General Statistics			
Total Number of Observations	30	Number of Distinct Observations	25
		Number of Missing Observations	52
Number of Detects	27	Number of Non-Detects	3
Number of Distinct Detects	23	Number of Distinct Non-Detects	3
Minimum Detect	0.405	Minimum Non-Detect	0.36
Maximum Detect	5.5	Maximum Non-Detect	0.55
Variance Detects	1.182	Percent Non-Detects	10%
Mean Detects	1.06	SD Detects	1.087
Median Detects	0.775	CV Detects	1.025
Skewness Detects	3.329	Kurtosis Detects	11.61
Mean of Logged Detects	-0.18	SD of Logged Detects	0.595
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.531	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.923	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.359	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.167	Detected Data Not Normal at 5% Significance Level	
Detected Data Not Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.992	KM Standard Error of Mean	0.192
KM SD	1.032	95% KM (BCA) UCL	1.332

95% KM (t) UCL	1.319	95% KM (Percentile Bootstrap) UCL	1.33
95% KM (z) UCL	1.308	95% KM Bootstrap t UCL	1.954
90% KM Chebyshev UCL	1.569	95% KM Chebyshev UCL	1.83
97.5% KM Chebyshev UCL	2.192	99% KM Chebyshev UCL	2.903
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	2.625	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.755	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.274	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.17	Detected Data Not Gamma Distributed at 5% Significance Level	
Detected Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	2.247	k star (bias corrected MLE)	2.022
Theta hat (MLE)	0.472	Theta star (bias corrected MLE)	0.524
nu hat (MLE)	121.3	nu star (bias corrected)	109.2
Mean (detects)	1.06		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.955
Maximum	5.5	Median	0.71
SD	1.078	CV	1.129
k hat (MLE)	1	k star (bias corrected MLE)	0.923
Theta hat (MLE)	0.955	Theta star (bias corrected MLE)	1.035
nu hat (MLE)	60.03	nu star (bias corrected)	55.36
Adjusted Level of Significance (β)	0.041		
Approximate Chi Square Value (55.36, α)	39.26	Adjusted Chi Square Value (55.36, β)	38.48
95% Gamma Approximate UCL (use when n>=50)	1.347	95% Gamma Adjusted UCL (use when n<50)	1.374
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.992	SD (KM)	1.032
Variance (KM)	1.065	SE of Mean (KM)	0.192
k hat (KM)	0.924	k star (KM)	0.854
nu hat (KM)	55.47	nu star (KM)	51.25
theta hat (KM)	1.074	theta star (KM)	1.162
80% gamma percentile (KM)	1.616	90% gamma percentile (KM)	2.375
95% gamma percentile (KM)	3.144	99% gamma percentile (KM)	4.952

Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (51.25, α)	35.81	Adjusted Chi Square Value (51.25, β)	35.07
95% Gamma Approximate KM-UCL (use when n>=50)	1.42	95% Gamma Adjusted KM-UCL (use when n<50)	1.451
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.825	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.923	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.208	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.167	Detected Data Not Lognormal at 5% Significance Level	
Detected Data Not Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.981	Mean in Log Scale	-0.296
SD in Original Scale	1.057	SD in Log Scale	0.668
95% t UCL (assumes normality of ROS data)	1.309	95% Percentile Bootstrap UCL	1.324
95% BCA Bootstrap UCL	1.456	95% Bootstrap t UCL	1.92
95% H-UCL (Log ROS)	1.207		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-0.259	KM Geo Mean	0.772
KM SD (logged)	0.603	95% Critical H Value (KM-Log)	2.041
KM Standard Error of Mean (logged)	0.112	95% H-UCL (KM -Log)	1.164
KM SD (logged)	0.603	95% Critical H Value (KM-Log)	2.041
KM Standard Error of Mean (logged)	0.112		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.976	Mean in Log Scale	-0.316
SD in Original Scale	1.061	SD in Log Scale	0.702
95% t UCL (Assumes normality)	1.305	95% H-Stat UCL	1.232
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution at 5% Significance Level			
Suggested UCL to Use			
95% KM (Chebyshev) UCL	1.83		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

ATTACHMENT D— OSWER DIRECTIVE 9200.1-120

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

FEB - 6 2014

OFFICE OF
SOLID WASTE AND
EMERGENCY RESPONSE

OSWER Directive 9200.1-120

MEMORANDUM

SUBJECT: Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors

FROM: Dana Stalcup, Acting Director
Assessment and Remediation Division
Office of Superfund Remediation and Technology Innovation

TO: Superfund National Policy Managers, Regions 1 - 10

Purpose

The mission of the Superfund program is to protect human health and the environment consistent with the Comprehensive Environmental Response, Compensation and Liability Act, as amended, (CERCLA) and as implemented by the National Oil and Hazardous Substances Pollution Contingency Plan. The purpose of this directive is to update the Interim Final Standard Exposure Factors Guidance (1991), which is reflected in the attached table and is to be used:

- in the CERCLA remedial investigation and feasibility study process (e.g., assessing baseline health risks, developing preliminary remediation goals, evaluating risks of remedial alternatives),
- to evaluate health risks in the CERCLA removal program, and
- in the process of five-year reviews of selected remedies.

This guidance update supplements the *Risk Assessment Guidance for Superfund: Human Health Evaluation Manual, Part A* (RAGS, Part A) that was issued October 13, 1989. This guidance supersedes and replaces certain portions of OSWER Directive 9285.6-03, issued March 25, 1991 and updates the *Risk Assessment Guidance for Superfund, Part E,* issued July 2004 (RAGS, Part E). Other cleanup programs in the Office of Solid Waste and Emergency Response (OSWER) are welcome and encouraged to adopt the recommended exposure factors, much as they have historically adopted other aspects of the *Risk Assessment Guidance for Superfund* (RAGS).

Background

In September 2011, EPA's National Center for Environmental Assessment, Office of Research and Development (ORD/NCEA) issued a substantive update to its exposure assessment recommendations. *Exposure Factors Handbook – 2011 Edition*, referred to as EFH 2011 herein, provides information and recommendations on various physiological and behavioral factors commonly used in assessing exposure of adults and children to environmental chemicals. ORD/NCEA's recommended values for exposure factors are based on the results of studies deemed to be the most up-to-date and scientifically sound, based upon data available up to July 2011, and incorporates revisions made to the *Child-Specific Exposure Factors Handbook*, which was last updated and published in 2008. EFH 2011 is not a Superfund-specific document; rather, it provides a summary of the latest developments in exposure science and provides recommendations for a broad range of EPA programs.

Following the publication of EFH 2011, regional risk assessors received inquiries from other EPA program offices, states, the regulated community, and other interested parties regarding the applicability of the ORD/NCEA's recommendations for use in human health risk assessments. During the October 2011 to August 2012 period, the OSWER Human Health Regional Risk Assessors Forum (OHHRRAF) reviewed the recommendations in EFH 2011 in the context of the default exposure factors used in the Superfund program and to derive Regional screening levels. As a result of a consensus-driven process, the OHHRRAF identified several Superfund-specific default exposure factors that warranted updating, based upon recommendations from ORD/NCEA in EFH 2011. This guidance incorporates and adopts the updates recommended by the OHHRRAF.

Objective

This guidance has been developed to reduce variability and uncertainty in the exposure assumptions used by Regional Superfund staff to characterize exposures to human populations for human health risk assessments.

Implementation

This guidance supplements the *Risk Assessment Guidance for Superfund: Human Health Evaluation Manual* (RAGS), Part A through E. Where numerical values differ from those presented in Part A or E, the factors presented in this guidance should be considered updates to the older values. As new data become available, this Directive may be modified accordingly.

This report can be found at www.epa.gov/oswer/riskassessment/superfund_hh_exposure.htm Please contact Richard Kapuscinski at (703) 305-7411 if you have questions or concerns.

Attachment

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OSWER/OSRTI Human Health Regional Risk Assessors Forum

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Attachment 1. Recommended Default Exposure Factors (2014)

Symbol	Definition (units)	Previous Default Value	Currently Recommended Value	Source of current recommendation	Source of previous recommendation
Ingestion and Dermal Contact Rates					
IRW_c	Resident Drinking Water Ingestion Rate - Child (L/day)	1	0.78	U.S. EPA 2011a, Tables 3-15 and 3-33; weighted average of 90th percentile consumer-only ingestion of drinking water (birth to <6 years)	U.S. EPA 1989 (Exhibit 6-11)
IRW_a	Resident Drinking Water Ingestion Rate - Adult (L/day)	2	2.5	U.S. EPA 2011a, Table 3-33; 90th percentile of consumer-only ingestion of drinking water (≥ 21 years)	U.S. EPA 1989 (Exhibit 6-11)
IRS_c	Resident Soil Ingestion Rate - Child (mg/day)	200	200	U.S. EPA 2011a (Table 5-1); "upper-bound values" accounting for both soil and dust ingestion	U.S. EPA 1991a (pg. 15)
IRS_a	Resident Soil Ingestion Rate - Adult (mg/day)	100	100	U.S. EPA 1991a (pp. 6 and 15); EFH 2011 only provides a central tendency value	U.S. EPA 1991a (pg. 15)
IR_{iw}	Indoor Worker Soil Ingestion Rate (mg/day)	50	50	U.S. EPA 1991a (pp. 9-10, 15); EFH 2011 values not provided	U.S. EPA 1991a (pg. 15)
IR_{ow}	Outdoor Worker Soil Ingestion Rate (mg/day)	100	100	U.S. EPA 1991a (pg. 15), same as adult resident; EFH 2011 value not provided	U.S. EPA 1991a (pg. 15)
SA_{sc}	Resident skin surface area - child (cm^2)	2,800	2,373	U.S. EPA 2011a, Tables 7-2 and 7-8; weighted average of mean values for head, hands, forearms, lower legs, and feet (male and female, birth to < 6 years)(forearm and lower leg-specific data used when available, ratios for nearest available age group used elsewhere (per EPA 2011b))	U.S. EPA 2002 (Exhibit 1-2)
SA_{sa}	Resident skin surface area - adult (cm^2)	5,700	6,032	U.S. EPA 2011a, Tables 7-2 and 7-12; weighted average of mean values for head, hands, forearms, and lower legs (male and female, 21+ years)(forearm and lower leg-specific data used for males and female lower leg; ratio of male forearm to arm applied to female arm data).	U.S. EPA 2002 (Exhibit 1-2)
SA_{sow}	Worker skin surface area - adult (cm^2)	3,300	3,527	US EPA 2011a, Table 7-2; weighted average of mean values for head, hands, and forearms (male and female, 21+years) (similar assumptions for forearms as used in EPA 2011b)	U.S. EPA 2002 (Exhibit 1-2)
SA_{wc}	Resident Water Surface area - child (cm^2)	6,600	6,365	U.S. EPA 2011a, Table 7.9; weighted average of mean values for male and female children <6 years.	U.S. EPA 2004 (Exhibit 3-2)
SA_{wa}	Resident Water Surface area - adult (cm^2)	18,000	19,652	U.S. EPA 2011a, Table 7.9; weighted average of mean values for male and female adults, 21-78.	U.S. EPA 2004 (Exhibit 3-2)
AF_c	Resident soil adherence factor - child (mg/cm^2)	0.2	0.2	U.S. EPA 2004 (Exhibit 3-5), RAGS Part E	U.S. EPA 2002 (Exhibit 1-2)
AF_a	Resident soil adherence factor - adult (mg/cm^2)	0.07	0.07	U.S. EPA 2004 (Exhibit 3-5), RAGS Part E	U.S. EPA 2002 (Exhibit 1-2)
AF_{ow}	Worker soil adherence factor - adult (mg/cm^2)	0.2	0.12	U.S. EPA 2011a, Table 7-20 and Section 7.2.2; arithmetic mean of weighted average of body part-specific (hands, forearms, and face) mean adherence factors for adult commercial/industrial activities	U.S. EPA 2002 (Exhibit 1-2)
BW_c	Resident Body Weight - child (kg)	15	15	U.S. EPA 2011a, Table 8-1; weighted average of mean body weights (birth to <6 years)	U.S. EPA 1991a (pg. 15)
BW_a	Resident Body Weight - adult (kg)	70	80	U.S. EPA 2011a, Table 8-3; weighted mean values for adults 21 – 78	U.S. EPA 1991a (pg. 15)
BW_w	Worker Body Weight (kg)	70	80	U.S. EPA 2011a, Table 8-3; weighted mean values for adults 21 – 78	U.S. EPA 1991a (pg. 15)
Exposure Frequency, Exposure Duration, and Exposure Time Variables					

Attachment 1. Recommended Default Exposure Factors (2014)

Symbol	Definition (units)	Previous Default Value	Currently Recommended Value	Source of current recommendation	Source of previous recommendation
EF_r	Resident Exposure Frequency (days/yr)	350	350	U.S. EPA 1991a (pg. 15); value not provided in EFH 2011	U.S. EPA 1991a (pg. 15)
EF_w	Worker Exposure Frequency (days/yr)	250	250	U.S. EPA 1991a (pg. 15); value not provided in EFH 2011	U.S. EPA 1991a (pg. 15)
EF_{iw}	Indoor Worker Exposure Frequency (days/yr)	250	250	U.S. EPA 1991a (pg. 15); value not provided in EFH 2011	U.S. EPA 1991a (pg. 15)
EF_{ow}	Outdoor Worker Exposure Frequency (days/yr)	225	225	U.S. EPA 2002; value not provided in EFH 2011	U.S. EPA 1991a (pg. 15)
ED_r	Resident Exposure Duration (yr)	30	26	EPA 2011a, Table 16-108; 90th percentile for current residence time.	U.S. EPA 1991a (pg. 15)
ED_c	Resident Exposure Duration - child (yr)	6	6	U.S. EPA 1991a, Pages 6 and 15	U.S. EPA 1991a (pg. 15)
ED_a	Resident Exposure Duration - adult (yr)	24	20	EDr (26 years) - EDc (6 years)	U.S. EPA 1991a (pg. 15)
ED_w	Worker Exposure Duration - (yr)	25	25	U.S. EPA 1991a (pg. 15); EFH 2011 only provides a central tendency value	U.S. EPA 1991a (pg. 15)
ED_{iw}	Indoor Worker Exposure Duration - (yr)	25	25	U.S. EPA 1991a (pg. 15); EFH 2011 only provides a central tendency value	U.S. EPA 1991a (pg. 15)
ED_{ow}	Outdoor Worker Exposure Duration (yr)	25	25	U.S. EPA 1991a (pg. 15); EFH 2011 only provides a central tendency value	U.S. EPA 1991a (pg. 15)
ET_{ra}	Resident Air Exposure Time (hours/day)	24	24	The whole day	The whole day
ET_{rs}	Resident Soil Exposure Time (hours/day)	24	24	The whole day	The whole day
ET_w	Worker Air Exposure Time (hr/hr)	8	8	The work day	The work day
ET_{ws}	Worker Soil Exposure Time (hours/day)	8	8	The work day	The work day
ET_{rw}	Resident Water Exposure Time (hours/day)	24	24	The whole day	The whole day
ET_{rwc}	Resident Water Exposure Time - child (hours/event)	1	0.54	U.S. EPA 2011a, Table 16-28; weighted average of 90th percentile time spent bathing (birth to <6 years)	U.S. EPA 2004
ET_{rwa}	Resident Water Exposure Time - adult (hours/event)	0.58	0.71	U.S. EPA 2011a, Tables 16-30 and 16-31; weighted average of adult (21 to 78) 90th percentile of time spent bathing/ showering in a day, divided by mean number of baths/showers taken in a day.	U.S. EPA 2004
Miscellaneous Variables; values not provided in EFH 2011					
AT_r	Averaging time - resident (days/year)	365	365	U.S. EPA 1989 (pg. 6-23)	U.S. EPA 1989 (pg. 6-23)
AT_w	Averaging time - composite worker (days/year)	365	365	U.S. EPA 1989 (pg. 6-23)	U.S. EPA 1989 (pg. 6-23)
AT_{iw}	Averaging time - indoor worker (days/year)	365	365	U.S. EPA 1989 (pg. 6-23)	U.S. EPA 1989 (pg. 6-23)
AT_{ow}	Averaging time - outdoor worker (days/year)	365	365	U.S. EPA 1989 (pg. 6-23)	U.S. EPA 1989 (pg. 6-23)

Attachment 1. Recommended Default Exposure Factors (2014)

Symbol	Definition (units)	Previous Default Value	Currently Recommended Value	Source of current recommendation	Source of previous recommendation
LT	Lifetime (years)	70	70	U.S. EPA 1989 (pg. 6-22), pending additional input from NCEA	U.S. EPA 1989 (pg. 6-22)
IR_{fish}	Fish Ingestion Rate (mg/day)	5.4×10^4	**	Recommend using site-specific values	U.S. EPA 1991a (pg. 15)
$IR_{produce}$	Consumption of homegrown produce (g/day)	42 (fruit); 80 (veg)	**	Recommend using site-specific values	U.S. EPA 1990

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Footnote: Users are directed to the *Exposure Factors Handbook* (2011) as a source for specific age-group exposure factors as described in EPA, 2005.